APPLICATION FOR AMENDED CERTIFICATE OF SITE COMPATIBILITY

Submitted to:

NORTH DAKOTA PUBLIC SERVICE COMMISSION

Submitted by:

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LOGAN AND MCINTOSH COUNTIES, NORTH DAKOTA

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ACRONYM LIST

ADLS	Aircraft Detection Lighting System
AGL	Above Ground Level
APE	area of potential effects
Application	Application for an Amended Certificate of Site Compatibility
AM	amplitude modulation
Badger Wind	Badger Wind, LLC
BBCS	Bird and Bat Conservation Strategy
BCC	Birds of Conservation Concern
BLM	Bureau of Land Management
BMP	best management practices
BOP	Balance-of-Plant
CRP	Conservation Reserve Program
CSC	Certificate of Site Compatibility
CUP	Conditional Use Application
CWA, Act	Clean Water Act
dB	decibels
dBA	A-weighted decibels
DoD	Department of Defense
ECP/EMP	Eagle Conservation Plan/Eagle Management Plan
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FM	frequency modulation
ft	foot/feet
FRS	Facility Registry Service
GE	General Electric
ICBM	intercontinental ballistic missile
IPaC	Information for Planning and Consultation
km	kilometer
kV	kilovolt
kW	kilowatt
LNTE	low-noise trailing edge
LUST	Leaking Underground Storage Tank
m	meter
MDU	Montana-Dakota Utilities
MET towers	meteorological evaluation towers
MISO	Midcontinent Independent System Operator
m/s	meters per second

MW	megawatt
mi	miles
MOU	Memorandum of Understanding
ND	North Dakota
NDAC	North Dakota Administrative Code
NDCC	North Dakota Century Code
NDDA	North Dakota Department of Agriculture
NDDEQ	North Dakota Department of Environmental Quality
NDDOT	North Dakota Department of Transportation
NDDTL	North Dakota Department of Trust Lands
ND DWR	North Dakota Department of Water Resource
NDGF	North Dakota Game and Fish
NDPDES	North Dakota Pollutant Discharge Elimination System
NDPR	North Dakota Parks and Recreation
NLCD	National Land Cover Data
NLEB	northern long-eared bat
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NTIA	U.S. Department of Commerce, National Telecommunications, and Information Administration
NWI	National Wetlands Inventory
NWR	National Wildlife Refuge
O&M	operations and maintenance
Order	Findings of Fact, Conclusions of Law and Order
Ørsted	Ørsted Onshore North America, LLC
PLOTS	Private Land Open to Sportsmen
Project	Badger Wind Project
Project Area	the 35,227-acre area of the Badger Wind Project
PSC	Public Service Commission
Q1, Q2, Q3, Q4	first, second, third, or fourth quarter of the year, respectively
RGA	Recovered Government Archive
ROW	right-of-way
SCP	species of conservation priority
SHPO	State Historic Preservation Office
SHSND	State Historical Society of North Dakota
SPCC	Spill Prevention, Control, and Countermeasure
Study Area	Area assessed for project suitability, approximately 127,092 acres
SWPPP	Stormwater Pollution Prevention Plan
TV	television
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service

USGS	U.S. Geological Survey
UST	Underground Storage Tank
WEG	Wind Energy Guidelines
WMA	Wildlife Management Area
WNS	white-nose syndrome
WOTUS	waters of the United States
WPA	Waterfowl Production Area

1. INTRODUCTION

On November 30, 2022, the North Dakota (ND) Public Service Commission (PSC or Commission) issued its Findings of Fact, Conclusions of Law and Order (Order), along with Certificate of Site Compatibility (CSC) No. 64 (Case No. PU-22-86) to Badger Wind, LLC (Badger Wind) for the Badger Wind Project (Project) in Logan County and McIntosh County, North Dakota. Since then, Badger Wind has made changes to the Project, which include expanding the Project boundary and design modifications. Accordingly, pursuant to North Dakota Century Code (NDCC) Section 49-22-08(5), Badger Wind is submitting to the PSC this Application for an Amended Certificate of Site Compatibility (Application) for the updated Project.

1.1. Overview of Project Updates

As Badger Wind explained at the June 2022 public hearing before the PSC, Badger Wind had been looking into a range of turbine models, including the 3.4-megawatt (MW) turbine used for analysis purposes in the Application for a Certificate of Site Compatibility submitted by Badger Wind in February 2022 (2022 CSC Application) as well as smaller turbine model(s). After the CSC was issued, market conditions required Badger Wind to further analyze turbine model options for the Project. Additionally, in June 2023, Badger Wind was finally successful in obtaining leases from a competitor in the area that it had been trying to acquire since prior to submitting the 2022 CSC Application in February 2022. With this additional land, Badger Wind was able to consider smaller turbine options that make the Project more economically attractive to potential offtakers. Thus, Badger Wind redesigned the Project to accommodate the 2.82 MW turbine now under consideration for the current Project, which best matches the energy profile at this site and allows more landowner participation in the Project.

Badger Wind then proceeded to conduct updated and additional surveys and studies for the updated Project Area in coordination with the appropriate wildlife agencies, and determined what updates were needed to permits such as the CSC and the Logan County wind energy siting / conditional use permit.

As a result of these efforts and analyses, Badger Wind updated the Project as follows: The Project is now located within an approximately 35,227-acre Project Area (compared to the 31,467-acre Project Area approved in the Order and CSC) (see **Figure 3: Comparison Figure**), and Badger Wind is now considering a 2.82 MW turbine (rmather than a 3.4 MW turbine as was contemplated previously). The PSC Order and CSC approved up to 79 potential turbine locations (see Hearing Exhibit No. 2 and Order Finding No. 4). As a result of the additional land added to the Project Area and the smaller turbine, Badger Wind is now proposing 103 potential turbine locations, of which up to 93 turbines will be constructed. The Project facilities are shown on **Figure 2: Project Facilities** and will include:

- 103 wind turbine locations, of which, up to 93 wind turbines will be constructed;

- buried electrical collection lines and communication lines, with aboveground junction boxes and/or underground splices;
- new gravel access roads and improvements to existing roads, as necessary;
- a collector substation;
- five proposed permanent meteorological evaluation tower (MET) positions, of which up to three will be constructed;
- an aircraft detection lighting system (ADLS) and related equipment;
- an operations and maintenance (O&M) facility located in McIntosh County; and
- temporary facilities, including: a temporary batch plant, a laydown yard for construction offices, a multi-purpose laydown area to support the Project's construction activities, a marshalling yard to assist with logistics during turbine component deliveries, temporary crane paths, and temporary road improvements, as needed.

The Project will still interconnect via an approximately 0.25-mile transmission line extending from the Project substation to the Wishek Junction 230-kilovolt (kV) substation owned and operated by Montana-Dakota Utilities (MDU).

The current Project continues to meet all requirements of the Order and CSC, as well as all applicable PSC and local siting requirements, as demonstrated throughout this Application. Additionally, as discussed in **Section 6.2.3**, Badger Wind submitted an application for a new Wind Energy Facility Siting Permit/Conditional Use Permit for the current Project on 6 December 2023 and anticipates Logan County will issue the new permit in Q1 2024.

1.2. Project Description

1.2.1. Study Area

As a result of the updated Project Area, the Study Area has been revised to add approximately 1,138 acres of land in Logan and McIntosh Counties, thereby increasing the Study Area from approximately 125,954 acres to approximately 127,092 acres (see **Figure 1: Project Location**). **Table 1-1**: **Study Area Location** summarizes the townships, sections, and ranges included in the Study Area.

Table 1-1: Study Area Location

Township Name	County	Township	Range	Section(s)
Unorganized Territory	McIntosh	130N	71W	2–6
Unorganized Territory	McIntosh	130N	72W	1–6
Unorganized Territory	McIntosh	131N	71W	2–11, 13-36

Township Name	County	Township	Range	Section(s)
Unorganized Territory	McIntosh	131N	72W	1–5, 7, 9–36
Unorganized Territory	McIntosh	131N	73W	13–14, 23–26, 35–36
Unorganized Territory	McIntosh	132N	70W	4–8
Unorganized Territory	McIntosh	132N	71W	1, 4-9, 12, 17–22, 26–35
Unorganized Territory	McIntosh	132N	72W	1–4, 9–15, 22–29, 32–36
Unorganized Territory	Logan	133N	70W	6–8, 15–22, 27–34
Unorganized Territory	Logan	133N	71W	1–36
Unorganized Territory	Logan	133N	72W	1–5, 8-13, 15-17, 20-22, 24-25, 35-36
Red Lake	Logan	134N	71W	31–33
Starkey	Logan	134N	72W	25–29, 32–36
Note: Land added to the Study Area since the 2022 CSC Application is indicated in blue.				

1.2.2. Project Area

The current Project Area is comprised of approximately 35,227 acres in Logan and McIntosh Counties (see **Figure 1: Project Location**). Since the Project was approved by the PSC in 2022, approximately 3,760 acres of land were added to the Project Area and two parcels (Land Parcels 2606002 and 00564000) comprising 313.5 acres were removed from the Project Area based on consultations with the affected landowner (see **Figure 3: Comparison Figure**). As discussed above, in June of 2023, Badger Wind completed its acquisition of a competitor's project holdings in the local area (Open Range Wind). That acquisition allowed Badger Wind to slightly expand the Project footprint, extending the Project benefits to additional landowners and allowing more optionality in turbine selection.

Table 1-2 summarizes the townships, sections, and ranges included in the current Project Area.

Table 1-2: Project Area Location

Township Name	County	Township	Range	Section(s)
Unorganized Territory	Logan	133N	70W	6–8, 16–21, 28-33
Unorganized Territory	Logan	133N	71W	3–6, 8–10, 12, 14, 15, 18–23, 25–29, 30–36
Unorganized Territory	Logan	133N	72W	13, 24, 25, 36
Red Lake	Logan	134N	71W	31–32
Unorganized Territory	McIntosh	132N	70W	5–7
Unorganized Territory	McIntosh	132N	71W	1, 4–8, 12, 17–21, 28-33
Unorganized Territory	McIntosh	132N	72W	1, 2, 9-14, 23
Note: Land added to the Project Area since the 2022 CSC Application is indicated in blue.				

1.2.3. Interconnection

The Project will interconnect to the Midcontinent Independent System Operator (MISO) system via a 230-kV generation interconnection tie line (Gen-Tie Line) less than one mile in length (approximately 0.25 miles [mi]) extending from the Project's collector substation to the existing Wishek Junction 230-kV substation owned and operated by Montana-Dakota Utilities Company (MDU). The substation is located approximately 1.2 mi west of Wishek in McIntosh County, North Dakota. The Project will have a nameplate capacity of up to 262.26 MW, with up to 250 MW delivered to the grid. Badger Wind has executed a Generation Interconnection Agreement with MISO.

1.2.4. Projected Output

The Project will have a nameplate capacity of up to 262.26 MW. The Project's interconnection request will permit up to 250 MW to be delivered to the grid. The Project has a projected average output ranging from 1,000,000 to 1,200,000 MW hours per year. Variations in the actual project output will depend upon final wind turbine selection and any additional changes to the final design and layout of the facility. As a point of reference, this amount of electrical output is enough to power approximately 70,000 average American homes.

1.2.5. Project Schedule

The following list provides details of the updated anticipated schedule for the Project:

- **Land Acquisition**: All participating landowner agreements have been secured.
- **PSC CSC and CSC Amendment**: Badger Wind obtained a CSC from the PSC on November 30, 2022. Badger Wind submitted an application to amend the CSC in Q1 2024 and anticipates the amended CSC will be issued by the PSC in Q2 or Q3 2024.
- **Logan County Wind Energy Facility Siting Permit/Conditional Use Permit (CUP)**: Badger Wind submitted an application for the updated Project in December 2023 and anticipates Logan County will issue the new wind energy facility siting permit / conditional use permit in Q1 2024.
- **Other Permits**: Badger Wind will acquire all other permits necessary for construction of the Project prior to conducting the work for which a permit is required.
- **Construction**: Project construction is anticipated to begin as early as Q3 2024 and be completed by Q4 2026.
- **Commissioning**: Upon completion of the construction phase, the Project will undergo detailed inspection and testing procedures before being commissioned.
- **Commercial Operations**: Badger Wind anticipates full commercial operation to occur as early as 2025 or by 2026.

1.2.6. Expansion or Addition

Badger Wind does not propose any additions or expansions to the current Project Area at this time. Should Badger Wind develop adjacent areas in the future, all necessary permits and approvals would be obtained to allow such an expansion.

1.2.7. Project Ownership

The Project will be developed, constructed, owned, and operated by Badger Wind.

1.2.8. Project Cost

The estimated total cost to construct the Project is approximately USD 472M.

2. NEED FOR FACILITY

Badger Wind has identified a shortlist of interested off-takers for the Project's output. As an independent power producer, Badger Wind is able to bid into a variety of markets and contractual structures. The updates to the original Project footprint and layout significantly strengthen the underlying project fundamentals by increasing the Project's net capacity factor, thereby strengthening Badger Wind's market position. The need for the Project was described in Section 2 of Badger Wind's 2022 CSC Application and remains accurate and applicable to the updated Project. Therefore, please refer to Section 2 of the 2022 CSC Application.

Pursuant to NDCC Section 49-22-04 and North Dakota Administrative Code (NDAC) Chapter 69-06-02, Badger Wind submitted a Ten-Year Plan for years 2024–2034 in February 2024. Badger Wind's Ten-Year Plan, included as **Appendix B: Badger Wind, LLC's, Ten-Year Plan**, is consistent with the contents of this Application.

3. SITE SELECTION CRITERIA

Badger Wind selected the Project Area based on a number of factors, including the excellent wind resource, support from landowners, regional demand for renewable energy, and compatibility with existing land uses and resources. In addition, site selection for the Project was based on the criteria outlined in NDAC Chapter 69-06-08. These criteria are discussed further below.

3.1. Compliance with Exclusion Areas

Per NDAC Sections 69-06-08-01(1) and (2), the geographical areas listed in **Table 3-1: Summary of Exclusion Areas** below shall be excluded in the consideration of a site for an energy conversion facility and a wind energy conversion facility. **Table 3-1: Summary of Exclusion Areas** summarizes these exclusion areas and their presence or absence in the Project Area, notes the information discussed in the 2022 CSC Application filings and the PSC Order granting a CSC for each criterion, and provides any updates to the information for the current Project. The current Project complies

with all exclusion areas. Exclusion areas within the current Study Area and Project Area are depicted in **Figure 4: Exclusion Areas**.

Table 3-1: Summary of Exclusion Areas

Exclusion Area	2022 CSC Application / PSC Order		Current Project	
	Present Within Project Area?	Description	Present Within Project Area?	Description
General Exclusion Areas				
Designated or registered national: parks; memorial parks; historic sites and landmarks; natural landmarks; historic districts; monuments; wilderness areas; wildlife areas; wild, scenic, or recreational rivers; wildlife refuges; and grasslands.	None	N/A	No change	No change
Designated or registered state: parks; forests; forest management lands; historic sites; monuments; historical markers; archaeological sites; grasslands; wild, scenic, or recreational rivers; game refuges; game management areas; management areas; and nature preserves.	None	N/A	No change	No change
County parks and recreational areas; municipal parks; parks owned or administered by other governmental subdivisions; hardwood draws; and enrolled woodlands.	None	N/A	No change	No change
Areas critical to the life stages of threatened or endangered animal or plant species.	None	N/A	No change	No change
Areas where animal or plant species that are unique or rare to this state would be irreversibly damaged.	None	N/A	No change	No change

Exclusion Area	2022 CSC Application / PSC Order		Current Project	
	Present Within Project Area?	Description	Present Within Project Area?	Description
Areas within 1,200 ft of the geographic center of an intercontinental ballistic missile (ICBM) launch or control facility.	None	No ICBMs are in Logan or McIntosh County.	No change	No change
Areas within 30 ft (9.14 meters[m]) on either side of a direct line between an ICBM launch facility and a missile alert or launch control facilities to avoid microwave interference. This restriction only applies to aboveground structures, not to surface features, such as roads, or belowground infrastructure.	None	No ICBMs are in Logan or McIntosh County.	No change	No change
Additional Exclusion Areas for Wind Energy Conversion Facilities				
1.1 times the turbine height from the nearest edge of an interstate or state roadway right-of-way (ROW).	Present	No turbines will be sited in these exclusion areas.	No change	No change
1.1 times the turbine height plus 75 ft from the centerline of any county or maintained township roadway.	Present	No turbines will be sited in these exclusion areas.	No change	No change
1.1 times the turbine height from the nearest edge of railroad ROW.	Present	No turbines will be sited in these exclusion areas.	No change	No change
1.1 times the turbine height from the nearest edge of a 115-kV or higher transmission line ROW	Present	No turbines will be sited in these exclusion areas.	No change	No change

Exclusion Area	2022 CSC Application / PSC Order		Current Project	
	Present Within Project Area?	Description	Present Within Project Area?	Description
1.1 times the turbine height from the property line of a non-participating landowner and three times the height of the turbine from an inhabited rural residence of a non-participating landowner unless a variance is granted. A variance may be granted if an authorized representative or agent of the permittee, the non-participating landowner, and affected parties with associated wind rights file a written agreement expressing all parties' support for a variance to reduce the setback requirement in this subsection. A non-participating landowner is a landowner that has not signed a wind option or an easement agreement with the permittee of the wind energy conversion facility as defined in NDCC Chapter 17-04.	Present	No turbines will be sited in these exclusion areas.	No change	No change

[1]For the purposes of setbacks, Badger Wind assumed a turbine of up to 89 m in hub height, with an up to 127.2 m rotor diameter, and/or total tip height of 152.1 m.

3.2. Compliance with Avoidance Areas

Per NDAC Sections 69-06-08-01(3) and (4), the geographical areas listed in **Table 3-2: Summary of Avoidance Areas** below may not be approved as a site for an energy conversion facility or a wind energy conversion facility unless the applicant shows that under the circumstances there is no reasonable alternative or (in the case of the sound limit) a waiver has been obtained. **Table 3-2: Summary of Avoidance Areas** summarizes these avoidance areas and their presence or absence in the Project Area, notes the information discussed in the 2022 CSC Application filings and the PSC Order for each criterion, and provides any updates to the information for the current Project.

As indicated in **Table 3-2: Summary of Avoidance Areas**, the current Project meets the PSC's avoidance area criteria. The Project avoids permanent impacts to wetlands with the exception of one access road to a potential MET tower location that crosses one field-mapped wetland resulting in a permanent impact of 0.007 acres; however, if the wetland is confirmed during field delineations, Badger Wind will avoid impacting this wetland unless no reasonable alternative exists. Additionally, nine occupied residences are modelled with sound levels above 45 A-weighted decibels (dBA); Badger Wind has obtained waivers from the owners of seven of these occupied residences and is in the process of securing waivers from the owner of the remaining two occupied residences. If the owner of the affected residences does not sign a waiver, Badger Wind will either use noise reduction technology to comply with the sound level requirement or will not construct the turbine(s) causing the exceedance(s). Avoidance areas within the current Study Area and Project Area are depicted on **Figure 5: Avoidance Areas**.

Table 3-2: Summary of Avoidance Areas

Avoidance Area	2022 CSC Application Filings / PSC Order		Current Project	
	Present Within Project Area?	Description	Present Within Project Area?	Description
General Avoidance Areas				
Historical resources which are not designated as exclusion areas.	Present	Identified eligible cultural and architectural resources will be avoided.	Present	Additional cultural and architectural resource surveys were conducted in areas not previously surveyed. The Project will avoid identified eligible cultural and architectural resources.
Areas within the city limits of a city or the boundaries of a military installation.	None	No project infrastructure will be sited within city limits or the boundaries of a military installation.	No change	No change

Avoidance Area	2022 CSC Application Filings / PSC Order		Current Project	
	Present Within Project Area?	Description	Present Within Project Area?	Description
Areas within known floodplains as defined by the geographical boundaries of the 100-year flood.	No mapped floodplain data	N/A	No change	No change
Areas that are geologically unstable.	None	N/A	No change	No change

Woodlands and wetlands.	Present	Wetlands and small woodlands and shelterbelts are present within the Project Area. The Project avoids permanent impacts to delineated wetlands with the exception of one access road that will cross a field-delineated drainage wetland that parallels an existing road, resulting in a permanent impact to this wetland of less than 0.01 acre. A culvert will be installed where the road crosses the drainage to facilitate continued wetland function and local hydrology. This impact will be self-certified under the U.S. Army Corps of Engineers (USACE) Clean Water Act (CWA) Nationwide Permit program. Badger Wind demonstrated that there is no reasonable alternative to impacting this wetland. Order Finding No. 38.	Present	Wetlands and small woodlands and shelterbelts are present within the Project Area. Additional wetland field surveys and a woodland desktop study were conducted for areas not previously surveyed. The Project avoids permanent impacts to wetlands with the exception of one access road to MET Tower 1 that crosses one field-mapped wetland resulting in a permanent impact of 0.007 acres. If the wetland is confirmed during field delineations, Badger Wind will avoid impacting this wetland unless no reasonable alternative exists. At the time the CSC was issued, one access road crossed a field-delineated drainage wetland, resulting in a permanent impact to the wetland of less than 0.01 acre. This access road has now been removed and this wetland will no longer be permanently impacted.
		Impacts to woodlands will be avoided to the extent practicable. As currently designed, the Project may impact approximately 0.03		Impacts to woodlands will be avoided to the extent practicable. As currently designed, the Project may permanently impact approximately 0.4 acres of

Avoidance Area	2022 CSC Application Filings / PSC Order		Current Project	
	Present Within Project Area?	Description	Present Within Project Area?	Description
		acres of trees/shrubs. Where unavoidable, impacts have been minimized to the extent feasible. If impacts to trees and/or shrubs occur, Badger Wind will adhere to the Commission's tree and shrub mitigation specifications. The PSC authorized Badger Wind to clear trees and shrubs in the Project Area up to 100 ft in limited areas only where it is necessary to collocate collection lines, access roads, and/or crane walks. Order Para. No. 8.		woodland areas. Where unavoidable, impacts have been minimized to the extent feasible. If impacts to trees and/or shrubs occur, Badger Wind will adhere to the Commission's tree and shrub mitigation specifications. Badger Wind requests PSC approval to clear trees and shrubs in the current Project Area up to 100 ft in limited areas where it is necessary to collocate collection lines, access roads, and/or crane walks.
Areas of recreational significance that are not designated as exclusion areas.	None	N/A	No change	No change

Avoidance Area	2022 CSC Application Filings / PSC Order		Current Project	
	Present Within Project Area?	Description	Present Within Project Area?	Description
Additional Avoidance Areas for Wind Energy Conversion Facilities				
A geographic area where, due to the operation of the facility, the sound levels within 100 ft of an inhabited residence or community building will exceed 45 A-weighted decibels (dBA). The sound level avoidance area criteria may be waived in writing by the owner of the occupied residence or the community building.	Present	A noise study was completed for the Project using GE 3.4-MW turbines at all 79 potential turbine locations (Hearing Exhibit No. 8). With the exception of seven receptors, modeled sound levels comply with the sound level requirement. Badger Wind secured waivers from the owners of the seven receptors (residences). See Hearing Exhibit Nos. 1 (Appendix J), 6, 8, and 30; see also Order Finding No. 49.	Present	A noise study (**Appendix E: Updated Sound Analysis Report**) was completed for the current Project using GE 2.82-MW turbines at all[1] potential turbine locations, of which up to 93 will be constructed. With the exception of nine receptors, modeled sound levels comply with the sound level requirement. For the nine receptors with exceedances, Badger Wind has obtained written waivers for seven receptors and is in the process of securing waivers for the remaining two receptors. See **Appendix J: Badger Wind Sound Waivers**. If the owner of an affected residence does not sign a waiver, Badger Wind will either use noise reduction technology to comply with the sound limitation or will not construct the turbine(s) causing the exceedance(s).

[1] Badger Wind proposes 103 total turbine positions and will build up to 93 total. There is one pair of turbine positions (73 and 73B) that are designed to be mutually exclusive such that only one of these two positions can be constructed due to their proximity and mutual waking. Therefore, the sound analysis only modeled turbine 73 because it has higher sound power levels at the receptors and therefore represents the most conservative and realistic sound modeling scenario.

3.3. Compliance with Selection Criteria

In accordance with NDAC Section 69-06-08-01(5), a "site may be approved in an area only when it is demonstrated to the commission by the applicant that any significant adverse effects resulting from the location, construction, and operation of the facility in that area, as they relate to the following, will be at an acceptable minimum, or that those effects will be managed and maintained at an acceptable minimum." **Table 3-3: Summary of Selection Criteria** summarizes the PSC's selection criteria, notes the information discussed in the 2022 CSC Application filings and PSC Order for each criterion, and provides any updates to the information for the updated Project.

As set forth in **Table 3-3: Summary of Selection Criteria** below, any significant adverse effects resulting from the location, construction, and operation of the Project as they relate to the selection criteria continue to be at an acceptable minimum or be managed and maintained at an acceptable minimum (see PSC Order Finding No. 43).

Table 3-3: Summary of Selection Criteria

Selection Criteria	Potential Adverse Effects from Project	
	2022 CSC Application Filings / Order	Current Project
The Impact Upon Agriculture:		
(1) Agricultural production	Approximately 14,375 acres (about 45.6 percent) of the Project Area is identified as cultivated croplands or pasture/hay lands (refer to Table 6-2, 2022 CSC Application). The Project will result in permanent impacts to less than one percent of the total land cover within the Project Area.	Approximately 16,238 acres (about 46.0 percent) of the current Project Area is identified as cultivated croplands or pasture/hay lands (refer to **Table 6-2: Land Cover Types and their Relative Abundance in the Project Area**). The Project will result in permanent impacts to less than one percent (0.4 percent) of the total land cover within the current Project Area.

Selection Criteria	Potential Adverse Effects from Project	
	2022 CSC Application Filings / Order	Current Project
(2) Family farms and ranches	While some areas of agricultural production will be converted to a renewable energy generation resource during the life of the Project, the Project will provide additional income to these landowners in the form of lease income. Any economic losses are anticipated to be minor in comparison. Additionally, the Project has been designed to minimize impacts to family farms and ranches to the extent possible, and turbines have been set back from occupied dwellings in accordance with Commission requirements.	No change
(3) Land which the owner demonstrates has soil topography, drainage, and an available water supply that cause the land to be economically suitable for irrigation	Landowners have not expressed concerns relating to irrigation of their lands. No known irrigation system is present within the Project Area.	No change
(4) Surface drainage patterns and ground water flow patterns	The Project is not anticipated to result in adverse impacts to surface drainage or groundwater flow patterns.	No change
(5) The agricultural quality of cropland	Landowners will be compensated for project facilities sited on their properties and shall be reimbursed for lost revenues due to temporary construction impacts to crops. No adverse impacts to the agricultural quality of croplands are anticipated.	No change

Selection Criteria	Potential Adverse Effects from Project	
	2022 CSC Application Filings / Order	Current Project
The Impact Upon the Availability and Adequacy of the Following Categories:		
(1) Law enforcement	No adverse impacts anticipated.	No change
(2) School systems and education programs	No adverse impacts anticipated.	No change
(3) Governmental services and facilities	No adverse impacts anticipated.	No change
(4) General and mental health care facilities	No adverse impacts anticipated.	No change
(5) Recreational programs and facilities	No adverse impacts anticipated.	No change
(6) Transportation facilities and networks	A temporary increase in vehicular traffic will occur within the Project Area during construction. Badger Wind will coordinate with local road authorities regarding haul routes. During operations, road use will generally be similar to other area traffic.	No change
(7) Retail service facilities	No adverse impacts anticipated.	No change
(8) Utility services	No adverse impacts to utility services are expected. Badger Wind will coordinate with KEM Electric Cooperative, Inc., and MDU for electricity for the operations and maintenance (O&M) facility and the South-Central Regional Water District for rural water or will drill a well.	No change
The Impact Upon:		
(1) Local institutions	No adverse impacts anticipated.	No change

Selection Criteria	Potential Adverse Effects from Project	
	2022 CSC Application Filings / Order	Current Project
(2) Noise-sensitive land uses	Noise-sensitive land uses within the Project Area include residences in proximity to turbine sites. However, Badger Wind has sited turbines to comply with applicable setbacks, and the Project will comply with the Commission's sound level requirement. With the exception of seven receptors, modeled sound levels comply with the sound level requirement. For the seven receptors with exceedances, Badger Wind has obtained written waivers. See Hearing Exhibit Nos. 1 (Appendix J), 6, 8, and 30; see also Order Finding No. 49.	Noise-sensitive land uses within the Project Area include residences in proximity to turbine sites. However, Badger Wind has sited turbines to comply with applicable setbacks, and the Project will comply with the Commission's sound level requirement. With the exception of nine receptors, modeled sound levels comply with the sound level requirement. For the nine receptors with exceedances, Badger Wind has obtained written waivers for seven receptors and is in the process of securing waivers for the remaining two receptors. See **Appendix J: Badger Wind Sound Waivers**. If the owner of an affected residence does not sign a waiver, Badger Wind will either use noise reduction technology to comply with the sound limitation or will not construct the turbine(s) causing the exceedance(s).

Selection Criteria	Potential Adverse Effects from Project	
	2022 CSC Application Filings / Order	Current Project
(3) Light-sensitive land uses	Turbine and MET tower lighting will be in accordance with Federal Aviation Administration (FAA) minimum standards, and, subject to FAA approval, Badger Wind will use commercially reasonable efforts to install a light-mitigating technology that is consistent with applicable requirements. Lighting of ancillary structures will be downward shielded.	No change
(3) Rural residences and businesses	No adverse impacts anticipated. Badger Wind has sited turbines to comply with applicable setbacks, and the Project will comply with the Commission's sound level requirement. With the exception of seven receptors, modeled sound levels comply with the sound level requirement. For the seven receptors with exceedances, Badger Wind has obtained written waivers. See Hearing Exhibit Nos. 1 (Appendix J), 6, 8, and 30; see also Order Finding No. 49.	No adverse impacts anticipated. Badger Wind has sited turbines to comply with applicable setbacks, and the Project will comply with the Commission's sound level requirement. With the exception of nine receptors, modeled sound levels comply with the sound level requirement. For the nine receptors with exceedances, Badger Wind has obtained written waivers for seven receptors and is in the process of securing waivers for the remaining two receptors. See **Appendix J: Badger Wind Sound Waivers**. If the owner of an affected residence does not sign a waiver, Badger Wind will either use noise reduction technology to comply with the sound limitation or will not construct the turbine(s) causing the exceedance(s).

Selection Criteria	Potential Adverse Effects from Project	
	2022 CSC Application Filings / Order	Current Project
(4) Aquifers	No adverse impacts anticipated. The Wishek and Lower Wishek aquifers are at depths greater than proposed construction activities.	No change
(5) Human health and safety	No adverse impacts anticipated.	No change
(6) Animal health and safety	No adverse impacts to domestic animal health and safety are anticipated, and measures will be implemented to ensure construction impacts to livestock are avoided. Coordination is ongoing with North Dakota Game and Fish (NDGF) and U.S. Fish and Wildlife Service (USFWS) regarding minimization of impacts to wildlife.	No change
(7) Plant life	Temporary and permanent impacts to vegetation will occur as a result of project development. Following construction, temporarily disturbed non-agricultural lands will be revegetated using a seed mix approved by the Natural Resources Conservation Service (NRCS) in accordance with the project reclamation plan. Agricultural lands will be reclaimed to landowner specifications, to the extent practical. In addition, a noxious weed management plan will be implemented. See Hearing Exhibit No. 1 (Appendix I).	No change

Selection Criteria	Potential Adverse Effects from Project	
	2022 CSC Application Filings / Order	Current Project
(8) Temporary and permanent housing	No adverse impacts anticipated. Temporary lodging needs will be filled in the form of rental housing or the use of hotels, which could provide short-term economic benefits.	No change
(9) Temporary and permanent skilled and unskilled labor	Badger Wind will encourage its Balance-of-Plant (BOP) contractor to source materials and the construction labor force from within ND and/or areas near the Project, as commercially reasonable. Badger Wind anticipates its BOP contractor to develop a sourcing and workforce plan that seeks to achieve this goal within the parameters of the Project's requirements for safety, quality, schedule, and budget.	No change
Cumulative Impact:		
The cumulative effects of the location of the facility in relation to existing and planned facilities and other industrial development	Development of the Project will not conflict with existing development plans of state, local, or private businesses. Cumulative impacts from the Project will be minimized by siting project infrastructure within areas of existing development to the extent practicable, including utilizing existing public and farm access roads as possible. The ND Wind (I and II) facilities are located approximately 27 miles east of the Project Area.	No change

3.4. Compliance with Policy Criteria

In accordance with NDAC Section 69-06-08-01(6), "[t]he commission may give preference to an applicant that will maximize benefits that result from the adoption of the following policies and practices, and in a proper case may require the adoption of such policies and practices. The commission may also give preference to an applicant that will maximize interstate benefits." **Table 3-4: Summary of Policy Criteria** summarizes the policy criteria, notes the information discussed in the 2022 CSC Application filings for each criterion, and provides any updates to the information for the updated Project.

As set forth in **Table 3-4: Summary of Policy Criteria** below, Badger Wind continues to demonstrate its commitment to maximize the benefits of the Project as far as possible to meet the PSC's policy criteria.

Table 3-4: Summary of Policy Criteria

Policy Criteria	Applicant's Policies and Practices	
	2022 CSC Application Filings	Current Project
Recycling of the conversion byproducts and effluents	N/A	No change
Energy conversion through location, process, and design	The Project has been sited and designed to maximize energy conversion efficiency.	No change
Training and utilization of available labor in this state for the general and specialized skills required	The Project will use skilled and trained laborers from ND to the extent feasible, within the parameters of the Project's safety, quality, budget, and schedule requirements.	No change
Use of a primary energy source or raw material located within the state	Energy generated by the Project will come from the wind resource within ND. In addition, the Project, to the extent commercially reasonable, will utilize local sources for construction materials such as gravel for roads and turbine pads and aggregate for concrete.	No change
Not relocating residents	The Project will not result in the relocation of residents.	No change

Policy Criteria	Applicant's Policies and Practices	
	2022 CSC Application Filings	Current Project
The dedication of an area adjacent to the facility to land uses such as recreation, agriculture, or wildlife management	The Project will not interfere with adjacent land uses. As such, Badger Wind does not currently anticipate dedicating any adjacent areas for land uses such as recreation, agriculture, or wildlife management.	No change
Economies of construction and operation	With a nameplate capacity of 251.6 MW, Badger Wind will benefit from the economies of scale associated with project construction and operation. Because wind energy projects typically incur one-time costs that do not differ substantially with the scale of the project, larger-scale projects benefit from economies-of-scale advantages as they provide greater output with similar fixed costs. Examples of such fixed costs include procurement and construction of the project substation, crane mobilization, and on-site office space.	The current nameplate capacity is 262.26 MW, but the prior analysis remains otherwise applicable.
Secondary uses of appropriate or associated facilities for recreation and the enhancement of wildlife	None. The Project is compatible with existing wildlife and recreational uses.	No change
Use of citizen coordinating committees	Badger Wind has coordinated and will continue to coordinate with landowners, local businesses, and organizations in the vicinity of the Project Area.	No change

Policy Criteria	Applicant's Policies and Practices	
	2022 CSC Application Filings	Current Project
A commitment of a portion of the energy produced for use in this state	Energy generated by the Project will interconnect to the power grid at the Wishek Junction substation. The energy provided by the Project will be positioned to meet the local, regional, or national demand for renewable energy, and/or corporate or government renewable energy goals.	No change
Labor relations.	No adverse impacts are anticipated.	No change
The coordination of facilities	The Project has been sited with the consideration of existing facilities and facility corridors.	No change
Monitoring of impacts	Badger Wind will monitor construction activities and use appropriate best management practices (BMPs) during project construction. During project operation and reclamation activities, Badger Wind will monitor the Project to assess impacts and to achieve compliance with all requirements set forth in the Certificate. The Project's Bird and Bat Conservation Strategy (BBCS) (Hearing Exhibit No. 1 (Appendix H)) and Reclamation and Weed Management Plan (Hearing Exhibit No. 1 (Appendix I)) outline wildlife and revegetation monitoring measures, respectively.	No change
A commitment to install lighting mitigation technology for wind energy conversion facilities subject to commercial availability and FAA approval	The Project will utilize a light-mitigating technology system that is consistent with applicable requirements, subject to FAA approval.	No change

3.5. Compliance with Setbacks

The Project has been sited to comply with the setback requirements of the PSC, as well as Logan County. Where setback requirements differ, the Project will adhere to the more stringent requirement. McIntosh County has not enacted zoning and, therefore, does not have setback requirements for wind energy projects; therefore, only the PSC setback requirements have been used for the Project in McIntosh County. Applicable setback requirements, as well as the Project's voluntary setback commitments, are identified in **Table 3-5: North Dakota Public Service Commission and County Setback Requirements**. Setbacks are measured from the closest edge of the turbine tower base to the closest edge of the referenced feature. All Project setbacks are depicted in **Figure 6: Project Setbacks**.

Table 3-5: North Dakota Public Service Commission and County Setback Requirements

Entity	Turbine Setback[1]
PSC	
The geographic center of an ICBM launch facility or launch control facility	Areas within 1,200 ft of the geographic center
Direct line between an ICBM launch facility and a missile alert or launch control facilities to avoid microwave interference	Areas within 30 ft (9.14 m) on either side of a direct line between an ICBM launch facility and a missile alert or launch control facility
Nearest edge of an interstate highway or state roadway ROW	1.1 times turbine height
County or maintained township roadway	1.1 times the height of the turbine plus 75 ft from the centerline of the roadway
Nearest edge of a railroad ROW	1.1 times the height of the turbine
Nearest edge of a 115-kV or higher-voltage transmission line ROW	1.1 times the height of the turbine
Property line of a non-participating landowner	1.1 times the height of the turbine[2]
Inhabited rural residence of a non-participating landowner	3 times the height of the turbine[2]
Inhabited residence or community building	A wind energy conversion site must not include a geographic area where, due to the operation of the facility, the sound levels within 100 ft of an inhabited residence or a community building will exceed 45 dBA[3]
Logan County	
Turbine setback from the center of the existing ROW of the nearest public road	200 ft

Entity	Turbine Setback[1]
Turbine setback from the center of the existing ROW of the nearest aboveground communication and electrical lines	200 ft
Wind Energy Facility Perimeter	2.5 times the rotor diameter of the turbine[4]
Turbine setback from the nearest occupied dwelling, commercial building, or publicly used structure or facility	1.25 times the turbine total height or 750 ft, whichever is greater
Building and structure setback from county and state highway ROW	200 ft from county and state highway ROW
Building and structure setback from county road ROW	200 ft from the county road ROW
Tree plantings and shelterbelts planting setback from center of all roads (north, south, west, and east)	200 ft from center of all roads (north, south, west, and east), unless the guidelines set forth by the U.S. Department of Agriculture (USDA)-NRCS offices allow for a lesser setback
Non-farm structure setback from any public road ROW and 50 ft from any lot line of any lot of record	200 ft
Non-farm structure setback from any lot line of any lot of record	50 ft

[1] Setbacks are based on a turbine up to 89 m in hub height with an up to 127.2 m rotor diameter and/or a total tip height of 152.1 m. Required setback distances were converted and rounded to the next meter to ensure compliance.
[2] As set forth in NDCC Section 49-22-05.1(4) and NDAC Section 69-06-08-01(2)(a)(5), a variance from this setback requirement may be granted if an authorized representative or agent of the permittee, the nonparticipating landowner, and affected parties with associated wind rights file a written agreement expressing the support of all parties for a variance to reduce the setback requirement. A nonparticipating landowner is a landowner that has not signed a wind option or an easement agreement with the permittee of the wind energy conversion facility as defined in chapter 17-04.
[3] The sound level avoidance area criteria may be waived in writing by the owner of the occupied residence or community building, as provided in NDAC Section 69-06-08-01(4). Badger Wind has obtained or is in the process of obtaining waivers where modeled sound levels exceed the PSC's sound level requirement.
[4] Logan County Zoning Regulations Section 6.11.4.2(3) provides that a variance may be granted if an authorized representative or agent of the permittee and those affected parties on adjoining properties with associated wind rights sign a formal and legally binding agreement expressing all parties' support for a variance that waives or reduces the setback requirement.

Appendix K: Updated Receptor Table includes a table identifying occupied residences and community buildings in or near the Project Area, the receptor type and status (participating or non-participating), the closest turbine or transformer, distance to the closest turbine or transformer, modeled shadow flicker in hours per year, the modeled sound level, and whether a sound waiver is required/obtained.

4. DESCRIPTION OF PROPOSED FACILITY

4.1. Project Components

With the exception of the updated information provided in the following sections, the discussion of Project components, including turbines, associated facilities, and temporary facilities has not changed from what was presented in the 2022 CSC Application. Please refer to Section 4.1 of the 2022 CSC Application for a discussion of the Project components. The current Project layout and estimated Project facility impacts are also described below. **Figure 2: Project Facilities** shows the locations of the proposed Project infrastructure.

4.1.1. Turbine Model

A final wind turbine model has not been selected at this time, and Badger Wind plans to select the most appropriate technology in terms of cost effectiveness and optimization of land and wind resources. In Badger Wind's 2022 CSC Application, the Project layout and sound and shadow flicker analyses utilized a General Electric (GE) 3.4 MW turbine with a hub height of 98 m (approximately 322.5 ft), a rotor diameter of 140 m (approximately 459.3 ft), and a total tip height of 168 m (approximately 551.2 ft). As discussed above, Badger Wind has determined that a smaller turbine is the best fit for the current Project. The current Project layout and sound and shadow flicker analyses utilize a GE turbine with an output of 2.82 MW, which aligns with the updated Project characteristics. Regardless of the model selected, Badger Wind has sited the Project so that all proposed turbine locations meet all applicable siting requirements, including setbacks required by the PSC and Logan County, for a turbine with an up to 89 m (approximately 291 ft) hub height, an up to 127.2-m (approximately 416.7-ft) rotor diameter, and a total tip height of 152.1 m (approximately 498.9 ft), thus providing flexibility in the selection of the turbine model.

Table 4-1: Wind Turbine Characteristics describes the characteristics of the GE 2.82-MW turbine; however, the Project may opt to use a turbine or combinations of turbines not included in the table. If the Project uses a model other than the GE 2.82-MW turbine, Badger Wind will provide the updated turbine specifications, sound modeling, and shadow flicker modeling to the PSC to demonstrate compliance with applicable requirements.

Table 4-1: Wind Turbine Characteristics

Characteristic	GE 2.82 MW (current model under consideration)
Nameplate capacity	2,820 kilowatts (kW)
Hub height[1]	89 m (291 ft)
Rotor diameter	127.2 m (416.7 ft)
Total height[2]	152.1 m (498.9 ft)
Cut-in wind speed[3]	3 meters per second (m/s)

Characteristic	GE 2.82 MW (current model under consideration)
Rated capacity wind speed[4]	12 m/s
Cut-out wind speed (sustained)[5]	30 m/s
Cut-out wind speed (gust)	39 m/s
Rotor swept area	12,704 m^2

[1] Hub height = the turbine height from the ground to the top of the nacelle
[2] Total height = the total turbine height from the ground to the tip of the blade in an upright position
[3] Cut-in wind speed = wind speed at which the turbine begins operation
[4] Rated capacity wind speed = wind speed at which the turbine reaches its rated capacity
[5] Cut-out wind speed = wind speed at which the turbine shuts down operation

4.1.2. Project Layout

As noted above, the current Project layout is shown utilizing a GE turbine with an output of 2.82 MW. As a result of the additional land added to the Project Area since 2022 and the smaller 2.82-MW turbine, Badger Wind is now proposing 103 potential turbine locations, of which up to 93 turbines will be constructed. Of the original 79 turbine locations approved by the PSC in 2022 (see Hearing Exhibit No. 2), eight of the original 79 locations have been removed from the layout, and nine of the remaining original turbine locations have been adjusted to accommodate the new, smaller turbine dimensions. The final number of turbines constructed will be dependent on final engineering analysis and Project design. All 103 potential turbine locations are shown on **Figure 2: Project Facilities**.

Permanent Project facilities are shown on **Figure 2: Project Facilities** and will include:

- 103 wind turbine locations, of which, up to 93 wind turbines will be constructed;
- buried electrical collection lines and communication lines, with aboveground junction boxes and/or underground splices;
- new gravel access roads and improvements to existing roads, as necessary;
- a collector substation;
- five proposed permanent MET tower positions, of which up to three will be constructed;
- an ADLS and related equipment; and
- an O&M facility located in McIntosh County.

The Project will also include temporary facilities, including: a temporary batch plant, a laydown yard for construction offices, a multi-purpose laydown area to support the Project's construction activities, a marshalling yard to assist with logistics during turbine component deliveries, temporary crane paths, and temporary road improvements, as needed.

The Project will interconnect via an approximately 0.25-mile transmission line extending from the Project substation to the Wishek Junction 230-kV substation owned and operated by MDU.

As a result of final micro-siting and the utility coordination needed to facilitate Project interconnection, adjustments to the Project design may be necessary. The Project's current layout does, and the final layout will comply with the PSC's siting criteria and Logan County's setback and design requirements. See **Section 8: Compliance with ndcc section 49-22-09 factors** below for additional information on the Project's compliance with applicable setback requirements.

4.1.3. Estimated Project Impacts

As stated above, the current Project layout includes 103 potential turbine locations. Turbines and other Project infrastructure have been sited to meet applicable PSC and Logan County setbacks, minimize environmental, cultural resource, and economic impacts, and optimize use of the wind resource. Of these locations, up to 93 turbines will be constructed. Although only up to 93 turbines will be constructed, all 103 potential turbine locations and associated infrastructure (e.g., collection lines, access roads, etc.) have been included for calculations of potential impacts. Overall, the current Project will permanently impact only approximately 127.8 acres of land, an increase of only approximately 0.1 percent of the site compared to the layout/site approved by the PSC in 2022 (see Hearing Exhibit No. 5 and Order Finding No. 42). The current layout includes 10 alternate turbine locations (each with an associated access road, collection line, and crane path). By comparison, Badger Wind was considering constructing all 79 turbines and associated infrastructure previously approved by the PSC.

The maximum estimated temporary and permanent impacts for the current Project design are shown in **Table 4-2: Summary of Temporary and Permanent Footprints from Project Facilities (acres)**Table 4-2. Although only up to three permanent MET towers will be constructed, all five potential MET tower locations have been included for calculations of potential impacts. Furthermore, conservative temporary construction disturbance areas are assumed for these analyses. Thus, the actual area that will be disturbed is expected to be smaller than those reported herein.

Table 4-2: Summary of Temporary and Permanent Footprints from Project Facilities (acres)

Project Facility	Current Layout[1]		
	Description of Footprint	Temporary Impacts (acres)	Permanent Impacts (acres)
Turbines	103 turbine locations (includes 10 alternates), 50-ft radius turbine pad, 250-ft radius temporary construction workspace	359.7	18.5

Project Facility	Current Layout[1]		
	Description of Footprint	Temporary Impacts (acres)	Permanent Impacts (acres)
Access Roads	16-ft-wide road, 100-ft-wide temporary construction workspace	263.3	105.5
Crane Paths	100-ft-wide temporary disturbance area	358.2	0.0
Electrical Collection and Communication Lines	75-ft-wide corridor for collection lines	632.2	0.0
ADLS	0.5-acre ADLS tower site	0.4	0.1
MET Towers	Five possible locations are included, but only three permanent MET towers will be constructed; each MET tower location has a 50-sq ft permanent disturbance area and an associated 0.5-acre temporary disturbance area.	0.8	0.01
Project Facilities	Includes laydown/staging/marshalling areas, O&M facility, batch plant, substation footprints	36.8	3.8
Total		**1,651.4**	**127.8**

[1] Because the Project has collocated facilities, double counting of potential impacts has been accounted for by first calculating permanent impacts, then calculating temporary impacts from electrical collection and communication lines (ground disturbance), then turbine workspace, crane paths, access roads, facility footprints and MET towers.

5. PROJECT CONSTRUCTION, OPERATION, AND DECOMMISSIONING

The discussion of the Project construction, operation, and decommissioning presented in the 2022 CSC Application has not changed for the current Project. Please refer to Section 5 of the 2022 CSC Application.

6. UPDATED ENVIRONMENTAL ANALYSIS

A detailed environmental analysis was conducted for the Project as part of the 2022 CSC Application filings. For several resources, the original analysis presented in the 2022 CSC Application and subsequent filings has not substantially changed for the current Project (as described in **Section 1: Introduction** of this Application). For other resources, Badger Wind conducted additional studies and analyses to confirm that the Project site continues to comply with applicable requirements and avoid and/or minimize potential impacts.

A summary of potential impacts and avoidance/minimization measures for the resources are discussed in **Section 6.17: Summary of Impacts and Avoidance/Minimization Measures**.

Updated information, including the results of any additional studies and analyses, as well as discussions of agency consultation and mitigation, as applicable, are provided in the following sections. Copies of study reports referenced are included in **Appendices C: Updated Telecommunications Studies** and **E: Updated Sound Analysis Report** through **O: Updated Grassland Habitat Assessment**.

6.1. Demographics

The demographics of Logan and McIntosh Counties have not changed since the 2022 CSC Application. See Section 6.1 of the 2022 CSC Application.

In addition to the creation of jobs and personal income (see Section 6.1 of 2022 CSC Application), the Project will pay an Electric Generation Tax of USD 2.50 per kilowatt times the rated capacity of the turbine, as well as one-half of one mill per kilowatt-hour of generated electricity (NDCC Section 57-33.2-04). Thus, Badger Wind anticipates paying the production taxes presented in **Table 6-1: Tax Revenue Generated by the Project** annually and over the life of the Project, based on current State tax law and rates**.**

Table 6-1: Tax Revenue Generated by the Project

Taxing Authority/Recipient	Approximate Amount (average per year)	Approximate Amount (over 30-year life of Project)
State of North Dakota	$421,725	$12,651,739
McIntosh County	$226,316	$6,789,070
Logan County	$259,996	$7,799,886
Wishek #19 School District	$317,450	$9,523,372
Napolean #2 School District	$8,428	$252,838
Wishek Rural Fire District	$19,710	$591,293
Napolean Fire District	$658	$19,753
Wishek Rural Ambulance	$9,278	$278,347
Napolean Ambulance	$2,272	$68,161

Long-term beneficial impacts to the tax bases of Logan and McIntosh Counties, as a result of the construction and operation of the Project, will have an additional positive impact on the local economy in this area of North Dakota.

6.2. Land Cover, Land Use, and Zoning

6.2.1. Land Cover

The current Study Area is in a rural and predominately agricultural area. Badger Wind reviewed U.S. Geological Survey (USGS) National Land Cover Data (NLCD) to determine land cover classification types present within the current Study Area and Project Area. The results of this

review are presented in **Table 6-2: Land Cover Types and their Relative Abundance in the Project Area**Table 6-2.

Table 6-2: Land Cover Types and their Relative Abundance in the Project Area

Land Cover	2022 Project[1]				Current Project			
	Study Area		Project Area		Study Area		Project Area	
	Acres	%	Acres	%	Acres	%	Acres	%
Open Water	241.0	0.2	34.9	0.1	309.8	0.2	37.1	0.1
Developed	3,754.0	3.0	999.3	3.2	3,795.9	2.9	1,092.6	3.1
Barren Land (Sand, Rock, Clay)	13.0	0.0	0.0	0.0	13.0	0.0	0.0	0.0
Deciduous Forest	53.6	0.0	5.6	0.0	53.3	0.0	5.2	0.0
Shrub/Scrub	916.1	0.7	270.4	0.9	920.3	0.7	276.4	0.8
Grassland/Herbaceous	43,930.2	34.9	16,122.3	51.2	43,865.2	34.5	16,725.6	47.5
Pasture/Hay	3,347.0	2.7	1,296.2	4.1	3,328.0	2.6	1,291.4	3.7
Cultivated Crops	70,611.3	55.9	11,935.6	37.8	71,839.5	56.4	14,946.6	42.4
Woody Wetlands	233.5	0.2	21.0	0.1	206.8	0.2	21.0	0.1
Emergent Herbaceous Wetlands	2,854.2	2.3	828.6	2.6	2,760.2	2.2	831.1	2.4
Total	**125,954.0**	**100**	**31,514.0**	**100**	**127,092.0**	**100**	**35,227.0**	**100**

[1] See Hearing Exhibit No. 32.
Source: (USGS 2021)

Temporarily disturbed areas will be reclaimed, fertilized, and reseeded according to NRCS recommendations, unless otherwise specified by the landowner and approved by the Commission, as detailed in**Appendix I: Appendix I: Badger Wind Reclamation and Weed Management Plan**Badger Wind Reclamation and Weed Management Plan.

Table 6-3**Table 6-3: Project Summary of Land Cover Impacts** presents the anticipated impacts on land cover categories as a result of construction and operation of the current Project.

Table 6-3: Project Summary of Land Cover Impacts

Land Cover Type	Impacts	
	Current Project	
	Temporary (acres)	Permanent (acres)
Open Water	0.0	0.0
Developed	101.5	13.9
Barren Land (Sand, Rock, Clay)	0.0	0.0

Land Cover Type	Impacts	
	Current Project	
	Temporary (acres)	Permanent (acres)
Deciduous Forest	0.0	0.0
Shrub/Scrub	7.4	0.2
Grassland/Herbaceous	383.7	19.3
Pasture/Hay	45.0	2.6
Cultivated Crops	1,108.2	91.8
Woody Wetlands	0.0	0.0
Emergent Herbaceous Wetlands	5.6	0.0
Total	**1,651.4**	**127.8**
Source: (USGS 2021)		

Construction of the Project will temporarily impact approximately 1,651.4 acres of land. Approximately 67 percent of the temporary impacts will occur on land categorized as cultivated crops, and 23 percent of the impacts will occur on land categorized as grassland/herbaceous, with the remaining temporary impacts occurring on other land cover types. Impacts related to construction workspaces at turbine sites and access roads, the temporary batch plant, installation of underground collection and communication lines, and use of crane paths and laydown yards will be temporary and will terminate with the completion of construction. Temporarily disturbed areas will be reclaimed, fertilized, and reseeded according to NRCS recommendations, unless otherwise specified by the landowner and approved by the Commission, as detailed in **Appendix I: Badger Wind Reclamation and Weed Management Plan**.

Impacts from turbines, access roads, the O&M facility, permanent MET towers, the ADLS tower, and the Project substation will be long term and will convert existing land uses to a renewable energy source for the life of the Project. In total, the Project will impact approximately 127.8 acres of land during the life of the Project. Badger Wind designed the Project to minimize impacts to land use and land cover by collocating linear facilities (i.e., access roads, crane paths, and collection lines) to the extent practicable. In some cases, siting linear facilities in previously disturbed areas and minimizing siting in unbroken grasslands means the facilities will traverse longer distances.

Badger Wind does not expect that the permanent conversion of approximately 127.8 acres of land to a renewable energy source will impact broader existing land use patterns. Agricultural activities, including grazing and cultivation, may continue in the Project Area during the life of the Project. The Project also does not conflict with the existing development plans of state, local, or private entities within the Project Area because the Project generally avoids developed areas.

Lease payments will be paid to landowners for placement of project facilities to offset loss of income from permanent impacts to land used for agriculture.

6.2.2. Land Use and Ownership

Federal and state ownership interests present in the current Study Area and the Project Area are shown in **Table 6-4: Land Ownership in the Study Area and Project Area** shows the locations of public lands and easements in relation to the current Study Area and Project Area.

Table 6-4: Land Ownership in the Study Area and Project Area

Agency	Current Project	
	Acres in Study Area	Acres in Project Area
Bureau of Land Management	**0.0**	**0.0**
Grazing Allotments	0.0	0.0
U.S. Fish and Wildlife Service	**9,011.7**	**2,414.5**
Fee Owned Waterfowl Production Areas	102.4	0.0
Easements (grassland)	1,464.5	276.0
Easements (wetlands)	7,444.9	2,142.0
National Wildlife Refuges	0.0	0.0
U.S. Department of Agriculture	**0.0**	**0.0**
Conservation Reserve Program	0.0	0.0
State of North Dakota	**20,125.9**	**4,803.8**
Private Lands Open to Sportsmen	384.9	0.0
Wildlife Management Areas	0.0	0.0
North Dakota State Lands	19,751.3	4,819.0
Surface Trust Lands	684.3	14.6
Mineral Rights Trust Lands	19,067.1	4,804.4
Source: (North Dakota GIS Technical Committee, 2024)		

No Bureau of Land Management (BLM)-managed grazing allotments are present within the Project Area or Study Area. The Project will not impact these resources, and no mitigation is necessary (BLM, 2021).

Badger Wind coordinated with landowners to identify any areas of Conservation Reserve Program (CRP)-enrolled land within the land added to the Project Area since 2022. At the time of submitting this Application, no CRP parcels have been identified. Badger Wind will coordinate with state and local NRCS offices to confirm there are no CRP parcels within the current Project Area prior to construction. To date, no parcels enrolled in the CRP have been identified in the

Project Area; however, if identified in further coordination with landowners, Badger Wind will coordinate with the landowners and these agencies to determine appropriate reclamation programs for temporarily disturbed land or offset payment requirements for any land that is permanently impacted by the Project.

One U.S. Fish and Wildlife Service (USFWS) fee-owned Waterfowl Production Area (WPA) is present in the Study Area, and none are present within the Project Area. The Project will not impact these resources, and no mitigation is necessary.

No National Wildlife Refuges (NWRs) are within the Study Area or Project Area. The nearest NWR, Springwater, is located approximately 18 mi west of the Project Area.

USFWS grassland and wetland easements are present within the Study Area and Project Area. Although USFWS grassland easements protect the entirety of the parcel(s) subject to a given easement, a wetland easement only protects the wetland basin(s) present within the easement. In all, approximately 1,465 acres and 7,445 acres of grassland and wetland easements, respectively, are within the Study Area. In all, 276 acres and 2,142 acres of grassland and wetland easements, respectively, are within the Project Area. In some instances, these easements overlap; therefore, the total adjusted acreages for easements within the Study Area and Project Area are 7,525 and 2,219 acres, respectively.

As per the January 23, 2024 meeting, the USFWS will provide wetland delineations for Badger Wind to confirm Project impacts.

Crane paths are sited on USFWS grassland easements in two areas. Badger Wind has been coordinating with the USFWS Kulm office regarding these crane paths and will continue to coordinate to determine the best approaches for construction to minimize or avoid impacts to the USFWS easement areas and will obtain any required USFWS authorizations. Underground collection lines are sited on USFWS grassland easements in two areas. Badger Wind will bore under these USFWS grassland easements to avoid impacts when installing the underground collection lines; accordingly, no impacts to these easements are anticipated.

Crane paths are sited on USFWS wetland easements in four areas. In one of the areas, the Project obtained leases for these parcels prior to the USFWS obtaining the easements; accordingly, there is no regulatory requirement to avoid impacts to those easements. For the remaining three areas where crane paths are sited on USFWS wetland easements, Badger Wind will continue to coordinate with the USFWS Kulm office and will either avoid the wetland basin(s) or obtain the necessary approvals from USFWS. Underground collection lines are sited on USFWS wetland easements in four areas. In one of the areas, the Project obtained leases for these parcels prior to the USFWS obtaining the easements and therefore, there is no regulatory requirement to avoid impacts to those easements; nevertheless, Badger Wind will avoid impacts to wetlands within these parcels, as feasible. For the remaining three areas where underground collection lines sited on USFWS wetland easements, Badger Wind will either avoid the wetland basin(s) or

will bore under the wetlands to avoid impacts when installing the underground collection lines; accordingly, no impacts to these easements are anticipated.

Turbine 64 and its associated access road (the associated crane path and underground collection line are discussed above) are sited within a USFWS wetland easement which was obtained by USFWS after the Project obtained leases for these parcels. As such, there is no regulatory requirement to avoid impacts to these easements; nevertheless, Badger Wind will avoid impacts to wetlands within these parcels, as feasible. Badger Wind has been coordinating regularly and will continue to coordinate with the USFWS Kulm office to determine the best approaches for construction to minimize or avoid impacts to the USFWS easement areas and will obtain any required USFWS authorizations. Please see **Appendix D: Agency Correspondence Since CSC Issuance** for meeting minutes.

Approximately 385 acres of Private Land Open to Sportsmen (PLOTS) lands are present within the Study Area, and no PLOTS lands are in the Project Area. Three PLOTS parcels are located on the western side of the Study Area and two PLOTS parcels are located on the northwestern portion of the Study Area. The Project will not impact PLOTS lands.

No Wildlife Management Areas (WMAs) are present in the Study Area or the Project Area. The nearest WMA is located 2.2 mi to the northeast in Logan County. Because no WMAs are within the Project Area, the Project will not impact these resources.

Badger Wind reviewed publicly available information to identify North Dakota Department of Trust Lands (NDDTL) within the current Study Area and Project Area. In all, approximately 684 acres of surface trust lands and 19,067 acres of mineral rights trust lands are within the Study Area. Of these, approximately 15 acres of surface trust lands and 4,804 acres of mineral rights trust lands are within the Project Area. Badger Wind has designed the Project to avoid permanent impacts to state-managed land, including NDDTL-managed surface and mineral trust lands, to the extent practicable; nevertheless, temporary and permanent impacts totaling 222 acres and 20 acres, respectively, will occur. These impacts are associated with construction of access roads, crane paths, collection lines, communication lines, turbines, and MET towers.

Water wells and oil and gas wells are within the Study Area and Project Area. In all, 76 domestic, stock, industrial, or observational water wells are in the Study Area. Of these, 21 are located within the Project Area (ND Department of Water Resources 2024). Nine dry oil and gas wells are within the Study Area; three of these are within the Project Area. No active oil and gas wells were identified (ND DMR 2024). Impacts to water wells will be avoided. Badger Wind may potentially use existing water wells or create new water wells, as necessary. Badger Wind has voluntarily sited turbines at least 168 m (approximately 551 ft) away from inactive oil and gas wells in the Project Area; no active oil and gas wells were identified within the Project Area. Further discussion of potential impacts and mitigation strategies for inactive oil and gas wells within the Project Area are discussed in **Section 6.11: Geologic and Groundwater Resources**.

No concentrated residential developments are present within the Study Area or Project Area, though residences and farmsteads are present in both areas. In total, 94 residences or farmsteads are in the Study Area; of these, 25 are located within the Project Area. The Project will not impact these resources, and no mitigation is necessary.

6.2.3. Zoning

Logan County previously granted Badger Wind a wind energy facility siting permit / conditional use permit for the Project on May 11, 2022. Based on communications with Logan County regarding the changes to the Project, Badger Wind submitted an application for a new wind energy facility siting permit/conditional use permit for the current Project on 6 December 2023 and anticipates Logan County will issue the new permit in Q1 2024.

Badger Wind has designed the Project to comply with the applicable Logan County permitting requirements. McIntosh County does not currently have a zoning ordinance; therefore, no impacts to zoning are anticipated.

6.3. Public Services

Data identifying public services and infrastructure in the current Project Area, including transportation ROWs, known transmission lines, and telecommunication facilities, were analyzed to assess potential impacts. Specific categories of public infrastructure are discussed below. **Figure 9: Existing Infrastructure** depicts existing public infrastructure in the current Study Area.

6.3.1. Local Services

The prior analysis in Section 6.3 of the 2022 CSC Application regarding existing local services and potential impacts remains accurate for the current Project.

6.3.2. Electrical Services

Electrical service in the Project Area is provided by KEM Electric Cooperative, Inc., and MDU. Electrical infrastructure includes distribution and transmission lines. According to the publicly available U.S. Energy Mapping System, two high-voltage transmission lines (230 kV and 345 kV) transect the Project Area (EIA 2023). Additionally, small underground and overhead distribution lines are present, which serve nearby farmsteads, residential properties, and commercial areas. One existing substation was identified within one mile of the boundary of the Project Area.

The Project will help meet regional demand for electricity, and as a result the Project is anticipated to have a positive effect on the electrical services in the region. Badger Wind will utilize ND One Call prior to construction to identify existing utilities and will coordinate with facility owners to minimize potential impacts to existing infrastructure. Badger Wind anticipates that electrical services for routine operations will be provided by a local utility.

6.3.3. Roads

The prior analysis in Section 6.3 of the 2022 CSC Application regarding existing road infrastructure and potential impacts remains accurate for the current Project.

Badger Wind's road use is expected to have a minimal effect on existing road infrastructure and will comply with all applicable federal, state, and local requirements. Badger Wind will coordinate with applicable local and state road authorities so that all applicable permits are obtained, delivery plans are communicated, and traffic management plans are implemented where necessary. Badger Wind has entered into road use and maintenance agreements with Logan County and McIntosh County. Badger Wind will update these road use and maintenance agreements with the applicable road authorities, if needed. Badger Wind will also negotiate agreements with affected townships, if needed.

6.3.4. Railroads

The prior analysis in Section 6.3 of the 2022 CSC Application regarding existing railroads and potential impacts remains accurate for the current Project. Badger Wind will coordinate with Canadian Pacific Railroad for a crossing agreement for each crossing of the Soo Line Railroad. Direct impacts to the Soo Line Railroad are not anticipated; therefore, mitigation measures for impacts to railroads are not required.

6.3.5. Water Supply

Rural water is supplied to the Project Area by the South Central Regional Water District. Rural residences in the area also commonly utilize private wells for household and agricultural purposes. According to data from the North Dakota State Water Commission, 76 domestic, stock, industrial, or observational water wells are in the Study Area; of these, 21 are located within the Project Area (ND Department of Water Resources 2024).

Impacts to water wells will be avoided. Water will be used during construction to provide dust control and as a component of concrete mixes. One temporary batch plant will be constructed in the Project Area to supply concrete for construction of the Project. The batch plant may be able to use rural water service but is more likely to require well water. The O&M facility will likely require a new private water well. Water usage during the operating period will be similar to household volume: less than five gallons per minute. Badger Wind will coordinate with the South Central Water Authority Water District with respect to use of a potable water supply, as necessary. All required permits will be obtained for installation of a water well for the O&M facility. Use of water for operations will be negligible, and the Project will not require water appropriations beyond those provided at the O&M facility. Project facilities have been sited to avoid water wells. The water supply for local nearby communities is not anticipated to be affected by the Project. Therefore, mitigation measures for impacts to the water supply are not required.

6.3.6. Telephone, Microwave, Radio, and Television Communications

Badger Wind updated its telecommunications and microwave beam path studies and confirmed the Project will not impact those resources. The assessment results are discussed further below.

An updated Telecommunications Study was conducted to identify communication towers and antennas licensed by the Federal Communications Commission (FCC) in the vicinity of the Project (**Appendix C: Updated Telecommunications Studies**). One FCC-licensed antenna affixed to the roof of a structure was identified in the vicinity of the Project, but not within the Project Area. No communication tower structures are in the Project Area. No television (TV) broadcasting stations were identified within 5 kilometers (km) of any of the Project turbines. The closest TV broadcasting station is 29.6 mi to the closest Project turbine. No amplitude modulation/frequency modulation (AM/FM) radio towers are in the Project Area. The closest AM tower is located over 50 mi from the nearest Project turbine. The closest FM tower is located 40 mi from the nearest Project turbine. The nearest TV tower is located 30 mi from the nearest Project turbine. No microwave towers are in the Project Area.

The updated Communications Study conducted for the Project indicates that interference with communication towers is not likely to occur due to the proposed placement of the turbines. The risk of interference (obstruction or reflection) with broadcasting systems, such as TV, AM and FM, is low. Although several TV and AM towers have broadcast service contours of varying intensity that overlap the Project Area, the low population density near the turbines and the large distances from the broadcasting towers and adequate spacing between turbines and residences significantly alleviates the risk of signal-related problems at residences. No further mitigation or assessment is required.

The Off-air TV Analysis performed for the 2022 CSC Application remains accurate for the current Project (see Hearing Exhibit No. 1, Appendix C). The TV Signal Baseline Measurements Report (Hearing Exhibit No. 17) remains accurate for the current Project. TV reception at residences relying on cable or satellite TV service will not be impacted by construction or operation of the Project. If residents who rely on antennas experience signal disruption, Badger Wind will coordinate with the resident to mitigate the disruption. Impacts to low-power stations and translator stations are not anticipated to occur because those stations have a limited range.

Construction and operation of the Project are also not expected to impact landline phone service.

One microwave beam path has been identified overlapping the Project Area. Turbines 19 and 37 are the closest turbines to the beam path and have been positioned at the recommended setback distance to the Fresnel zones associated with the beam path. No adverse impact is expected.

The current Project information was provided to the U.S. Department of Commerce, National Telecommunications, and Information Administration (NTIA) for the department's review of proposed turbine placement in the current Project Area; Badger Wind is awaiting a response.

Badger Wind will coordinate with utility companies to determine utility locations and will comply with North Dakota One-Call requirements.

6.4. Human Health and Safety

6.4.1. Air Traffic

Badger Wind has coordinated with the Federal Aviation Administration (FAA), the Department of Defense (DoD) Siting Clearing House, and the Wishek Municipal Airport regarding the current Project. Badger Wind has contacted the North Dakota Aeronautics Commission with information regarding the current Project and is awaiting a response.

Badger Wind submitted Notice of Proposed Construction (Form 7460-1) filings to the FAA for all turbine and permanent MET tower locations in January 2024.

The current Project was reviewed by the DoD Military Aviation and Installation Assurance Siting Clearinghouse on 26 January 2024, and no concerns were raised.

No private airstrips registered with the FAA or North Dakota Aeronautics Commission are located within or in close proximity to the current Project Area.

Badger Wind also coordinated with the Wishek Municipal Airport regarding the current Project layout. In August – November 2023, Badger Wind consulted with the Wishek Municipal Airport to discuss the current Project layout. In November 2023, Badger Wind showed the current Project layout to the Wishek Municipal Airport, and the Wishek Municipal Airport contacted the North Dakota Aeronautics Commission during its review of the Project. The Wishek Municipal Airport confirmed it does not have any concerns with the current Project layout (**Appendix D: Agency Correspondence Since CSC Issuance)**.

6.4.2. Electromagnetic Fields

The prior analysis in Section 6.4 of the 2022 CSC Application remains accurate for the current Project.

6.4.3. Hazardous Materials/Hazardous Waste

The land within the Project Area is rural and primarily used for agriculture. Potential hazardous materials associated with agricultural activities include petroleum products (fuel and lubricants), pesticides, and herbicides. Older farmsteads may also have lead-based paints, asbestos shingles, and polychlorinated biphenyls in transformers. Trash and farm equipment dumps are common in rural settings. Potential hazardous materials associated with oil and gas wells can include, but are not limited to, releases of petroleum products and chemicals, which may potentially have adverse effects to human health or the environment.

As discussed in Section 6.4.1.3 of the 2022 CSC Application, a Phase I Environmental Site Assessment was conducted for the original Badger Wind Project Area in October 2021. No issues

were identified. Refer to the discussion in Sections 6.4.1.3 and 6.4.2.3 of the 2022 CSC Application regarding hazardous materials and hazardous waste.

A January 2024 review of the Leaking Underground Storage Tank (LUST), Underground Storage Tank (UST) and Recovered Government Archive (RGA) LUST lists, as provided by Environmental Data Resources, has identified no LUST/RGA LUST sites in the current Study Area or Project Area, and one UST site within the Project Area. **Table 6-5: U.S. Environmental Protection Agency Facility Registry Service Interests in the Study Area, Project Area** presents a comprehensive summary of the U.S. Environmental Protection Agency's (EPA) Facility Registry Service (FRS) interests that were identified within the current Study Area and Project Area, as a result of this review. Most of the FRS interests that were identified are related to oil and gas production facilities and farming/dairy operations in the Study Area and Project Area (e.g., gas plants, compressor stations) that are captured under multiple FRS categories (**Table 6-5: U.S. Environmental Protection Agency Facility Registry Service Interests in the Study Area, Project Area**Table 6-5). Other facilities were identified in the FRS records that are not related to oil and gas production/distribution, such as Delmer Diegel Farm, Rohweder Dairy, and Walth Cattle, etc.

Table 6-5: U.S. Environmental Protection Agency Facility Registry Service Interests in the Study Area, Project Area

EPA FRS Interest Category	2022 CSC Application		Current Project	
	Study Area	Project Area	Study Area	Project Area
Department of Homeland Security—Chemical Security Assessment Tool Reporter	0	0	0	0
Enforcement/Compliance Activity	0	0	0	0
Risk Management Plan Reporter	1	0	0	2
Small-quantity Hazardous Materials Generator	0	0	0	0
State Master	12	2	9	1
Tier 2 Hazardous Materials Reporter	0	0	1	0
Toxic Substances Control Act Reporting	0	0	0	1
Not Currently Classified in any Hazardous Waste Universe	0	0	0	0
Air Major	2	0	0	0
Total	**15**	**2**	**10**	**4**

Source(s): EDR Area / Corridor Report from December 28, 2023; EPA FRS queries in January 2024

Badger Wind will perform an updated Phase I Environmental Site Assessment, in accordance with the current ASTM standard (E1527-21) in Spring/Summer of 2024.

6.4.4. Security

The prior analysis in Section 6.4 of the 2022 CSC Application regarding security and potential impacts thereto remains accurate for the current Project.

6.5. Sound Resources

NDAC Section 69-06-08-01(4) provides that wind turbines must be sited such that sound levels within 100 ft of an inhabited residence or community building do not exceed 45 dBA unless a waiver is obtained from the owner of the inhabited residence or community building. Logan County and McIntosh County do not have sound level requirements for wind energy facilities.

Badger Wind conducted a Sound Assessment (**Appendix E: Updated Sound Analysis Report**) for the current Project. Sound levels were calculated using the ISO 9613-2 sound propagation model. The sound assessment conservatively assumed that: (i) all potential wind turbine locations[1] will be used, (ii) the turbines will be operated at a wind speed resulting in the loudest noise possible being emitted (108.5 dBA), and (iii) a +2 decibels (dB) adjustment was applied to turbine sound power levels. Additionally, the two substation step-up transformers were included in the sound modeling. For purposes of modeling, Badger Wind assumed low-noise trailing edge (LNTE) blades on all 103 turbines. Badger Wind has not yet selected the subset of 93 turbines to be constructed or the final turbine model. For purposes of modeling, the GE 2.82 MW turbine model with a hub height of 89 m was used.

The results of the modeling showed that nine receptors (including six participating and three non-participating residences) exceeded the applicable 45 dBA sound limit at 100 ft from the residence. For the nine receptors with exceedances, Badger Wind has obtained written waivers for seven receptors and is in the process of securing waivers for the remaining two receptors. These sound waivers can be found in **Appendix J: Badger Wind Sound Waivers**. If the owner of an affected residence does not sign a waiver, Badger Wind will either use noise reduction technology to comply with the sound limitation or will not construct the turbine(s) causing the exceedance(s). Accordingly, sound levels within 100 ft of an inhabited residence or community building will not exceed 45 dBA, unless waived in writing by the owner of such residence or building. Therefore, with respect to sound, the Project continues to meet the condition upon which the CSC was issued (see PSC Order Finding No. 49, and Order Para. No. 6).

6.6. Visual Resources

No local, state, or federal requirements exist with respect to shadow flicker. However, Badger Wind has designed the Project to comply with the industry standard of 30 hours per year or less

[1] Badger Wind proposes 103 total turbine positions and will build up to 93 total. There is one pair of turbine positions (73 and 73B) that are designed to be mutually exclusive such that only one of these two positions can be constructed due to their proximity and mutual waking. Therefore, the sound analysis only modeled turbine 73 because it has higher sound power levels at the receptors and therefore represents the most conservative and realistic sound modeling scenario.

of shadow flicker at non-participating and participating occupied residences, absent a waiver. An updated shadow flicker analysis was conducted for the current Project layout and turbine under consideration (see **Appendix F: Updated Shadow Flicker Analysis Report**). All 103 wind turbine locations were modeled, even though not all 103 turbine positions will be constructed. No receptors are expected to experience more than 30 hours per year for shadow flicker duration. Accordingly, the Project will comply with Badger Wind's voluntary commitment of 30 hours per year or less of shadow flicker at all residences, absent a waiver. Therefore, with respect to shadow flicker, the Project continues to meet the condition upon which the CSC was issued (see PSC Order Finding No. 50, and Order Para. No. 7).

6.7. Cultural/Archaeological and Historic Architectural Resources

At the time the CSC was issued, Badger Wind had completed Class III Cultural Resources Inventories for all areas that may experience temporary or permanent ground disturbance during construction and operations of the 2022 Project layout. Badger Wind has received concurrences from the State Historical Society of North Dakota (SHSND) for all of these reports. These studies identified seven unevaluated archaeological sites, and two site leads. At the time the CSC was issued, the planned Project infrastructure avoided these site leads and unevaluated sites (see PSC Order Finding No. 25).

A supplemental Class III Archaeological Survey (**Appendix L: Archaeological Reconnaissance Survey Report**) was completed for the current Project, covering the area added to the Project Area since 2022 and any other unsurveyed areas within the current Project Area potentially affected by updates to the Project layout. The survey identified one new archaeological site (32LO174) and one new prehistoric isolated find (32LOX76). These resources are recommended not eligible for listing in the National Register of Historic Places (NRHP). These findings have been submitted to SHSND for concurrence. Badger Wind will provide the Commission with the SHSND's concurrence once it is received.

To summarize, Badger Wind has sited the current Project to avoid the seven unevaluated archaeological sites and two archaeological site leads noted above. As a result, no impacts to archaeological resources are anticipated. Additionally, Badger Wind has developed an Unanticipated Discoveries Plan, which will be followed during construction in the event that previously unidentified potential cultural resources or human remains are encountered. A copy of the Unanticipated Discoveries Plan was provided as Appendix D to Hearing Exhibit No. 13.

Badger Wind continues to coordinate with the SHSND on archaeological resources. Additionally, due to landowner requests and micrositing, Badger Wind will complete additional cultural resource surveys on a limited number of unsurveyed areas in the spring of 2024 for minor shifts in the current layout. Badger Wind will provide both the SHSND and the Commission with copies of those reports and will provide the Commission with SHSND's concurrences on those reports prior to constructing in those areas.

At the time the CSC was issued, Badger Wind had also completed a Class I Literature Review and Class II Architectural Reconnaissance Inventory Survey for structures 45 years of age or older within the proposed Project's area of potential effects (APE) which consists of a two-mile buffer extending outwards from each proposed turbine location, per SHSND guidelines The Class II Survey identified five historic architectural resources and one contributing resource that are recommended as potentially eligible for listing in the NRHP. SHSND concurred with the Class I and Class II survey report. At the time the CSC was issued, the Project's layout was not anticipated to have an adverse direct or indirect impact on the identified architectural resources (see PSC Order Finding No. 27).

A supplemental Class I Literature Review and Class II Architectural Reconnaissance Inventory Survey (**Appendix M: Architectural Reconnaissance Survey Report**) was also completed for the current Project to cover any areas in the revised APE that were not subject to the previous review/survey. The supplemental Class I Literature Review identified one previously documented aboveground historic resource (32MT00038) that was either not fully evaluated for listing in the NRHP or was previously determined not eligible for inclusion. The Class II Architectural Reconnaissance Inventory survey identified a total of nine aboveground resources that are recommended not eligible for listing in the NRHP and confirmed that previously documented resource 32MT00038 was no longer extant. These findings have been submitted to SHSND for concurrence. Badger Wind will provide the Commission with the SHSND's concurrence once it is received.

To summarize, Badger Wind has sited the current Project to avoid impacts to the five historic architectural resources and one contributing resource that are recommended as potentially eligible for listing in the NRHP. As a result, no impacts to architectural resources are anticipated.

6.8. Recreational Resources

There are no designated recreation areas, public or private parks, or designated trails located in the Project Area, the Project will not impact recreational resources.

6.9. Effects on Land-Based Economies

Up to 1,153.2 acres of agricultural land will be temporarily impacted during construction of the current Project; however, these areas will be available for agricultural use following construction. Agricultural land temporarily impacted by construction will be restored to pre-construction conditions in accordance with NRCS recommendations, unless otherwise specified by the landowner and approved by the Commission, as detailed in **Appendix I: Badger Wind Reclamation and Weed Management Plan**. Temporary impacts to soil will be restored (e.g., decompacted) in accordance with Commission requirements and landowner agreements. The current Project will permanently impact up to approximately 94.4 acres of agricultural land for the life of the Project. However, during operations, landowners may continue to plant crops and graze livestock near and up to the turbine pads and access roads. The loss of agricultural land for operation of the Project will reduce the amount of land that can be cultivated or grazed in the

Project Area; however, less than one percent of the Project Area will be converted to non-agricultural land use (i.e., wind turbines, access roads, substation, O&M facility, permanent MET towers, and ADLS tower) for the life of the Project.

Trees are sparse within the current Project Area, and Badger Wind has designed the Project to minimize tree removal to the extent possible. Badger Wind has sited the majority of Project facilities in areas lacking large contiguous woodlands. Construction of the Project will permanently impact up to 0.4 acres of woodlands. The PSC authorized Badger Wind to clear trees and shrubs in the Project Area up to 100 ft in limited areas where it is necessary to collocate collection lines, access roads, and/or crane walks (see PSC Order Finding No. 39 and Order Para. No. 8). If tree removal is necessary, Badger Wind will coordinate with landowners regarding tree removal and replacement and will follow the Commission's tree and shrub mitigation specifications. If necessary, Badger Wind may bore collection lines under tree lines and woodlots to avoid impacts. Badger Wind requests PSC approval to clear trees and shrubs in the current Project Area up to 100 ft in limited areas where it is necessary to collocate collection lines, access roads, and/or crane walks.

6.10. Soil Resources

Soil characteristics within the current Study Area and Project Area were assessed using the NRCS Soil Survey Geographic (SSURGO) database. The prior analysis in Section 6.10 of the 2022 CSC Application and in Hearing Exhibit No. 5 regarding existing soil resources and potential impacts remains accurate for the current Project. 112 soil types are found within the current Study Area and 98 soil types are within the current Project Area (USDA 2019). Only 1 additional soil type was identified for the current Project from the 2022 CSC Application (USDA 2019). A list of the soil types is provided in **Appendix G: Updated Soil Types for the Badger Wind Project**.

Table 6-6: Farmland Classifications within the Study Area and Project Area lists the acres of prime farmland, prime farmland if drained, and farmland of statewide importance within the current Study Area and Project Area. **Figure 10: Prime and Unique Farmland** depicts the distribution of these classifications within the current Study Area and Project Area.

Table 6-6: Farmland Classifications within the Study Area and Project Area

Farmland Classification	2022 CSC Application		Current Project	
	Study Area (acres)*	Project Area (acres)*	Study Area (acres)*	Project Area (acres)*
Prime Farmland	6,368.7	1,743.0	6,372.6	1,868.5
Farmland of Statewide Importance	40,505.0	8,045.5	41,338.3	10,048.1
Not Prime Farmland	79,015.3	21,718.4	79,316.8	23,299.1
Prime Farmland If Drained	65.1	6.9	64.1	6.8

Farmland Classification	2022 CSC Application		Current Project	
	Study Area (acres)*	Project Area (acres)*	Study Area (acres)*	Project Area (acres)*
Total	**125,954.2**	**31,513.8**	**127,091.6**	**35,222.5**

Source: (USDA 2019)
*Note: Rounding has been applied to all values.

Seven percent of the total land in the current Project Area that could be considered prime farmland will be impacted for the life of the Project. Within the current Project Area, 9.2 acres of prime farmland and 63.8 acres of farmland of statewide importance will be impacted for the life of the Project (**Table 6-7: Summary of Permanent Impacts to Prime Farmland**). As such, the acres of prime farmland and farmland of statewide importance removed from use for the life of the Project will have a negligible impact on agricultural production.

Table 6-7: Summary of Permanent Impacts to Prime Farmland

Farmland Classification	2022 Project (Hearing Exhibit No. 5)	Current Layout
	Permanent Facility Acres[1]	Permanent Facility Acres[1]
Prime Farmland[2]	6.7	9.2
Farmland of Statewide Importance	32.4	63.8
Not Prime Farmland	37.8	54.9
Total	**76.9**	**127.8**

[1] Acres of impacts includes all permanent facilities (turbines, access roads, project substation, and O&M facility). Rounding has been applied to all values.
[2] This includes soils classified as prime farmland or prime farmland if the limiting factor is mitigated (e.g., by draining or irrigating).

Following construction, the temporarily disturbed areas outside of cropland will be reclaimed and reseeded with a seed mixture consistent with the surrounding vegetation and free of noxious weeds according to NRCS recommendations, unless otherwise specified by the landowner and approved by the Commission (see **Appendix I: Badger Wind Reclamation and Weed Management Plan**). To minimize the impacts of surface water runoff, BMPs in accordance with a Stormwater Pollution Prevention Plan (SWPPP) will be implemented, including use of silt fencing to control erosion and storm water runoff and directing surface flow away from cut-and-fill slopes and into ditches that discharge to natural drainages. All roads, turbine pads, and trenched areas will be regularly inspected and maintained to minimize erosion. Additionally, Badger Wind will obtain coverage under the North Dakota Pollutant Discharge Elimination System (NDPDES) General Stormwater Construction Permit, which requires preparation of a SWPPP. In addition, if more than 1,320 gallons of oil storage occurs on-site during construction,

Badger Wind will complete and implement a Spill Prevention, Control and Countermeasure (SPCC) Plan.

6.11. Geologic and Groundwater Resources

Figure 11: Geologic and Groundwater Resources depicts the existing geologic and groundwater resources in the current Study and Project Areas.

There are 76 domestic/stock/industrial/observational water wells in the current Study Area; of these 76 wells, 21 are located within the current Project Area. Six of these wells are for stock ponds, four are associated with farmsteads, two are associated with active observation wells, and three are either capped or destroyed observation wells. Within the current Study Area, 26 wells are listed as test wells and four are listed as unknown, of which four test wells and two unknown wells are within the current Project Area (ND Department of Water Resources 2024). Project facilities have been sited to avoid water wells.

Badger Wind does not anticipate any impacts to bedrock during construction or operation of the Project because bedrock within the Project Area is at depths much greater than the proposed foundation depths of seven to 13 ft deep. Additionally, Badger Wind does not expect any impacts to groundwater resources because the Wishek and Lower Wishek aquifers are at depths greater than the underground collection line depths of approximately four ft and proposed foundation depths of 7 to 13 ft deep.

Badger Wind anticipates that water may be used during construction for dust control and concrete mixes at a temporary concrete batch plant, if one is needed to supply concrete for construction of the Project. The water source will be determined prior to construction.

The O&M facility will likely require a new private water well. Water usage during the operating period will be similar to household volume—less than five gallons per minute. Use of water for operations will be negligible. The Project will not require the appropriation of surface water or permanent dewatering.

No active oil and gas wells were identified within the Project Area. Badger Wind has voluntarily sited turbines at least 168 m (approximately 551 ft) (turbine tip height) away from existing inactive oil and gas wells in the Project Area.

6.12. Surface Water and Floodplain Resources

Figure 12: Surface Water and Wetlands depicts the existing water resources in the current Study and Project Areas.

Prior analysis regarding existing surface water and floodplain resources and potential impacts remains accurate for the current Project. There are no current effective Federal Emergency Management Agency (FEMA) floodplain maps in Logan and McIntosh Counties (FEMA 2024). Thus, no impacts to FEMA-mapped floodplains are anticipated. However, based on consultation

with the North Dakota Department of Water Resources (ND DWR), Badger Wind understands that floodplain mapping is in progress; accordingly, if areas within the Project Area are identified as floodplains within the final FEMA Flood Insurance Rate Maps, Badger Wind will coordinate with Logan County regarding floodplain permitting, if applicable.

The current Project has been sited to avoid or minimize impacts to surface waters resources, to the extent practicable. Wind turbines will be built on uplands to avoid surface water resources in lower elevations, to the extent practicable. Access roads, crane paths, and collection lines have been designed to avoid crossing of streams and other surface waters, to the extent practicable.

Badger Wind anticipates that there will be unavoidable impacts to USACE jurisdictional waters under the 0.1-acre threshold for permanent impacts that will be permitted under the USACE Nationwide Permit program. Additionally, Badger Wind will obtain coverage under the NDPDES General Stormwater Permit, which requires preparation of a SWPPP.

6.13. Wetlands

Figure 12: Surface Water and Wetlands shows the locations of delineated and mapped wetlands. In areas where field delineations have not yet occurred, wetlands are shown based on wetland mapping procedures conducted in the field due to winter conditions. Areas identified through wetland mapping will be field delineated during spring and summer 2024.

At the time the CSC was issued, the Project's layout avoided permanent impacts to delineated wetlands with the exception of one access road that was planned to cross a field-delineated drainage wetland that paralleled an existing road and extends across the property, resulting in a permanent impact to the wetland of less than 0.01 acre (see PSC Order Finding Nos. 19, 38). This access road has now been removed and this wetland will no longer be permanently impacted.

Potential wetlands within the current Study Area and Project Area were identified using the USFWS National Wetlands Inventory (NWI). NWI data indicated the potential presence of up to 5,109 acres of wetlands within the current Study Area and 1,402 acres of wetlands within the current Project Area. In fall 2023, field wetland delineations and field wetland mapping were completed at locations not previously surveyed within the current Project Area with the potential for ground disturbance from Project construction activities or installed facilities associated with the Project. In all, 344.7 acres of wetlands were delineated within the current Study Area and 296.7 acres of wetlands were delineated within the current Project Area. 34.6 acres of potential wetlands were mapped within the current Study Area and 30.4 acres were mapped within the current Project Area. See **Appendix N: Wetland and Waterbodies Assessment**.

While the majority of areas of potential ground disturbance have been delineated to date, areas identified as potentially jurisdictional wetlands or waters of the Unites States (WOTUS) in the 2024 desktop assessment and identified as mapped wetlands from the 2023 field reconnaissance, will be targeted for wetland delineations in Spring 2024. Additionally, limited

additional field delineations will be conducted in Spring 2024 to delineate wetlands in areas identified from landowner requests and/or micrositing.

The Project has been designed to avoid permanent impacts to surveyed wetlands and minimize temporary wetland impacts. Where wetlands are present, Badger Wind plans to bore underground collection lines under the wetlands, thereby avoiding impacts to wetlands. The Project avoids permanent impacts to wetlands with the exception of one access road to a potential MET tower location (MET Tower 1) that crosses one field-mapped wetland resulting in permanent impact of 0.007 acres; however, if the wetland is confirmed during field delineations as a wetland, Badger Wind will avoid impacting this wetland unless no reasonable alternative exists. In the event MET Tower 1, and its associated access road, is constructed, the impact will be a self-certification under the Nationwide Permit in accordance with Section 404 of the CWA. Badger Wind will continue to assess the location of infrastructure and construction workspace of crane paths, access roads, and turbine pads through micrositing and landowner coordination to further minimize or avoid, where practicable, temporary impacts to wetlands. Matting will also be used when crossing wetlands during construction to minimize temporary disturbances. Coverage under the Section 404 CWA permit may be needed if discharge of dredge or fill material (temporarily or permanently) into WOTUS will occur.

6.14. Vegetation Resources

Badger Wind reviewed U.S. Geological Survey (USGS) National Land Cover Data (NLCD) to determine land cover classification types present within the current Study Area and Project Area. The results of this review are presented in **Section 6.2.1: Land Cover**.

Vegetation will be removed from areas of permanent infrastructure footprints for the life of the Project. These areas include turbine pads, access roads, the Project substation, the O&M facility, the ADLS tower, and permanent MET towers. With less than one percent of the current Project Area permanently converted for wind turbines or other Project infrastructure, the Project will permanently remove approximately 113.9 acres of vegetation for the life of the Project, the majority of which is cropland (approximately 91.8 acres) (**Table 6-3: Project Summary of Land Cover Impacts**).

Temporary vegetation impacts will occur within construction easements or workspace during the construction of Project components. Construction of the Project will temporarily impact 1,549.9 acres of vegetation (see **Table 6-3: Project Summary of Land Cover Impacts**). Following construction, the temporarily disturbed areas outside of cropland will be re-vegetated with a seed mixture consistent with the surrounding vegetation and free of noxious weeds, in coordination with the NRCS and landowners. Once re-vegetated, these areas will be available for their present use. Construction workspace impact calculations are conservative, and actual impacts are anticipated to be less.

Badger Wind has developed a Reclamation and Weed Management Plan (**Appendix I: Badger Wind Reclamation and Weed Management Plan**) that identifies and establishes the procedures

to prevent the introduction and spread of noxious weeds during construction and ongoing operations. As detailed in the Badger Wind Reclamation and Noxious Weed Management Plan, appropriate BMPs will be employed during Project construction to avoid or minimize temporary impacts to vegetation. Temporary disturbance areas will be reclaimed and reseeded according to NRCS recommendations, unless otherwise specified by the landowner and approved by the Commission. Badger Wind will work collaboratively with construction parties to prevent and/or minimize the introduction and spread of noxious weeds during construction and operations.

6.15. Wildlife

Since the issuance of the CSC, Badger Wind has completed additional wildlife and habitat studies and analyses for the current Project, which are discussed in the following sections. The wildlife surveys listed in **Table 6-8: Summary of Additional Wildlife Studies and Plans for the Badger Wind Project** were conducted (or are planned) based on consultation with NDGF and USFWS and are consistent with the voluntary USFWS Land-Based Wind Energy Guidelines (WEG) and Eagle Conservation Plan Guidance. The surveys listed in **Table 6-8: Summary of Additional Wildlife Studies and Plans for the Badger Wind Project** are summarized in the sections below. Based on the additional studies and analyses conducted with respect to wildlife, the Project site continues to meet the conditions upon which the CSC was issued.

Table 6-8: Summary of Additional Wildlife Studies and Plans for the Badger Wind Project

Survey Type	Study/Plan Development Period	Status	Reference
Updated Grassland Habitat Assessment	August 2023	Complete	**Appendix O: Updated Grassland Habitat Assessment**
Additional eagle/large bird use surveys	August 2023 – July 2024	Ongoing	N/A
Bald eagle nest field verification	January 2024	Complete	**Appendix H: Updated Bird and Bat Conservation Strategy**
Additional eagle and raptor nest surveys	Spring 2024	Planned	N/A
Eagle Management Plan/Eagle Conservation Plan	January 2024 – June 2024	Ongoing	N/A
Updates to Bird and Bat Conservation Strategy (BBCS)	November 2023 – January 2024	Complete	**Appendix H: Updated Bird and Bat Conservation Strategy**
	January 2024 – June 2024	Ongoing	N/A

As discussed further in **Section 9.0: Agency Comments**, Badger Wind coordinated closely with the USFWS, NDGF, and North Dakota Parks and Recreation (NDPR) regarding wildlife and species habitat. Specifically, the USFWS provided information related to federally listed Threatened and

Endangered species (discussed further in **Section 6.16: Rare and Unique Natural Resources**), eagles, Birds of Conservation Concern (BCC), and other migratory birds protected under the Migratory Bird Treaty Act (MBTA). The NDGF provided information relating to species of conservation priority (SCP), particularly relating to conserving habitat for these species. This included concerns relating to potential impacts to native prairie (also referred to interchangeably by NDGF as unbroken grasslands), wetlands, sharp-tailed grouse, bats, bald and golden eagles, and whooping cranes within the Project Area. The NDPR performed a review of the ND Natural Heritage biological conservation database. No resources were identified within the Project Area, and the NDPR deferred further comment on the Project's potential to impact wildlife to the NDGF and USFWS.

6.15.1. Avian Surveys

At the time the CSC was issued, Badger Wind had completed two years of baseline general avian and eagle use surveys, fixed-point avian use surveys, and aerial and ground-based eagle and raptor nest surveys (see PSC Order Finding No. 22). The surveys identified avian species within and near the 2022 Project Area. See Section 6.15 of the 2022 CSC Application for a discussion of the results of the avian use and eagle and raptor nest surveys conducted previously, which remain accurate and applicable to the current Project. No known, active golden eagle nests were identified within the 2022 Project Area or within ten mi of it (see PSC Order Finding No. 22). One active bald eagle nest (BAEA 21-01) and one alternate nest were identified within the 2022 Project Area but are located more than two mi from 2022 Project turbine locations (see PSC Order Finding No. 22).

Avian use in the current Project Area is representative of the previously observed avian use, as turbines located in the area added to the Project Area since 2022 are located no farther than two mi away from the previously surveyed area with similar land cover and avian habitat. However, Badger Wind has commissioned an additional 12 months of eagle and large bird surveys of the current Project Area to ensure that avian use is sufficiently characterized for the current Project Area. The additional eagle and large bird surveys began in August of 2023 and will conclude in July 2024, allowing for an additional year of data collection prior to commencement of construction.

At the time the CSC was issued, Badger Wind had prepared a Bird and Bat Conservation Strategy (BBCS) in coordination with USFWS and NDGF. The Project BBCS has been updated as of January 2024 to reflect the current Project, additional coordination with USFWS and NDGF, and additional planned environmental studies for Badger Wind. The updated BBCS has been shared with NDGF and USFWS for review and is included with this application as **Appendix H: Updated Bird and Bat Conservation Strategy**.

Eagle and Raptor Nests

Based on surveys conducted to date, no golden eagle nests have been identified within the current Project Area or within ten mi of the Project Area.

A ground-based nest verification survey was completed on 5 January 2024 **(Appendix H: Updated Bird and Bat Conservation Strategy**) to confirm the presence or absence of the two previously identified eagle nests (one active nest and one alternate nest) within the Project Area. One previously identified nest (BAEA 21-01) was observed in a deciduous tree and was classified as being in good condition; however, the nest status was unknown. The second nest (BAEA 19-01) was missing and not observed during this survey. Project turbines are sited at least two mi from the remaining nest. Badger Wind plans to do additional eagle and raptor nest surveys of the current Project Area in Spring 2024.

Grassland Breeding Birds

In addition to the grassland habitat assessments conducted for the 2022 Project (see Section 6.15 of the 2022 CSC Application), Badger Wind conducted additional desktop and field verification surveys for grasslands in August of 2023 (see **Appendix O: Updated Grassland Habitat Assessment**) to cover changes/updates to the Project, which include the expanded Project boundary. Badger Wind prepared an updated Grassland Habitat Assessment included as **Appendix O: Updated Grassland Habitat Assessment**, which presents the combined results of grassland assessments conducted for the Project during 2021 and during 2023. The results of these surveys have been used to evaluate and inform Project infrastructure siting decisions to avoid and/or minimize potential impacts to unbroken grassland habitat. No turbines are sited within unbroken grasslands. Additionally, the majority of turbine locations are in areas not suitable for grassland species habitat, and all turbines in suitable habitat are sited in already fragmented areas, which helps minimize impacts to grassland species.

Badger Wind is continuing to coordinate with the USFWS and NDGF on voluntary offsets for potential grassland breeding bird displacement.

Sharp-tailed Grouse

At the time the CSC was issued, Badger Wind had completed aerial and ground-based sharp-tailed grouse lek surveys in 2019 and 2020. The surveys found two confirmed lek locations within the 2022 Project Area boundary, four confirmed and one possible lek locations within one mile of the 2022 Project Area boundary, and seven confirmed and one possible lek locations more than one mile from the 2022 Project Area boundary (see PSC Order Finding No. 22). Badger Wind retained WEST to develop a Plains Sharp-Tailed Grouse Conservation Strategy to minimize potential impacts to sharp-tailed grouse during Project construction and operations (Hearing Exhibit No. 10). As was committed to in the Plains Sharp-Tailed Grouse Conservation Strategy (Hearing Exhibit No. 10), in the current Project layout, no turbines are located within unbroken grasslands, the majority of turbines are sited in areas that are not suitable for sharp-tailed grouse habitat, and all turbines located in identified suitable habitat are located in previously fragmented areas, which helps minimize impacts to the local sharp-tailed grouse population. Badger Wind has coordinated with USFWS and NDGF regarding the current layout and its continued compliance with the Plains Sharp-Tailed Grouse Conservation Strategy (Hearing Exhibit No. 10).

Based on consultation with the USFWS and NDGF, previous surveys, and determined low potential impacts to sharp-tailed grouse leks, additional data collection has not been deemed necessary for the Project at this time (see **Appendix D: Agency Correspondence Since CSC Issuance**).

6.15.2. Mammals

Prior analysis regarding habitat for mammals and potential impacts remains accurate for the current Project; thus, no impacts are anticipated. See Section 6.15 of the 2022 CSC Application.

6.15.3. Bat Species

At the time the CSC was issued, Badger Wind had completed two years of acoustic bat monitoring and a bat habitat assessment (see PSC Order Finding No. 22) in 2019 and 2020. During the monitoring period, no northern long-eared bat (NLEB) calls were confirmed, although there were two unconfirmed calls from the *Myotis* species group, which includes NLEB. The desktop Bat Habitat Assessment found that potentially suitable habitat for NLEB is limited within the 2022 Project Area. The results of the acoustic monitoring and habitat assessment indicate the potential for NLEB to occur in the 2022 Project Area is low (see PSC Order Finding No. 22).

Badger Wind coordinated with USFWS and NDGF on whether additional data collection is needed for the current Project Area. USFWS and NDGF did not indicate that additional data collection for bat species was necessary for the current Project Area (**Appendix D: Agency Correspondence Since CSC Issuance**). Additionally, Badger Wind has prepared an updated BBCS that will be implemented during construction and operation of the Project (**Appendix H: Updated Bird and Bat Conservation Strategy**). The updated BBCS documents the measures to be implemented during siting, construction, and operations to avoid and/or minimize potential impacts to bats.

6.15.4. Reptiles and Amphibians

Prior analysis regarding reptiles and amphibians and potential impacts remains accurate for the current Project; thus, no impacts are anticipated. See Section 6.15 of the 2022 CSC Application.

6.16. Rare and Unique Natural Resources

6.16.1. Federally Listed Species

The USFWS Information for Planning and Consultation (IPaC) system was reviewed for a list of Threatened, Endangered, and Candidate species and Designated Critical Habitat that could occur within the current Project Area and a one-mile buffer (USFWS 2024). According to the USFWS IPaC system, no Designated Critical Habitat is present in the current Study or Project Areas. Five federally listed species and one Candidate species have the potential to occur within the current Project Area and a one-mile buffer:

- Whooping crane (*Grus americana*; Endangered)

- NLEB (*Myotis septentrionalis;* Endangered)
- Piping plover (*Charadrius melodus*; Threatened)
- Rufa red knot (*Calidris canutus rufa*; Threatened)
- Dakota skipper (*Hesperia dacotae;* Threatened)
- Monarch butterfly (*Danaus plexippus;* Candidate)

Whooping Crane

At the time the CSC was issued, Badger Wind had completed a whooping crane habitat assessment in 2021, which indicated that potential whooping crane stopover habitat is present in the 2022 Project Area, but the habitat is of relatively lower quality and quantity compared to the nearby reference areas analyzed (see PSC Order Finding No. 22). Based on previous surveys results, whooping cranes may occur in the Project Area during the migration season; however, the potential for impacts to whooping cranes is low.

As referenced in the updated BBCS, Badger Wind is coordinating with USFWS on additional whooping crane avoidance measures.

Northern Long-eared Bat

The NLEB was reclassified by the USFWS as Endangered under the *Endangered Species Act* (ESA) on 29 November 2022, with an effective date of 31 March 2023 (USFWS 2023a). Reclassification occurred primarily because the NLEB faces extinction due to the wide-range impacts of white-nose syndrome (WNS). As a result, reclassification of NLEB to an Endangered species has nullified the section 4(d) rule, which limited prohibitions for the incidental take of the species to those that would protect the bat in WNS-affected areas. While the 4(d) rule has been nullified, USFWS still requires projects to comply with Section 7(a)(2) of the ESA and to consult with the USFWS to ensure projects will not jeopardize the continued existence of any federally listed species or adversely modify designated critical habitats (USFWS 2023b).

With reclassification to Endangered, incidental take of the species is now prohibited in all cases without an incidental take statement (ITS) from USFWS. While the Project Area lacks high quality woodlands, which limits the species' likelihood to occur, NLEB are roost generalists, and roost tree species exhibiting preferential roost characteristics were documented in small numbers within the 2019 Study Area during a site visit on June 12–June 13, 2019 (Atwell 2020a). Therefore, although likelihood of occurrence of NLEB in the Project is low, Badger Wind has or will implement the following measures to minimize potential impacts to the species:

- Avoiding impacts to woodland where feasible, and if tree clearing is unavoidable, completing tree clearing in accordance with tree restrictions for NLEB as per the ESA.
- Conduct post-construction fatality monitoring to assess impacts to NLEB and revise the BBCS as needed.

Piping Plover

According to the USFWS IPaC report (USFWS 2024), there is Designated Critical Habitat for the piping plover approximately three mi northeast of the Project Area; however, no individuals were observed during avian surveys in 2019 and 2020. Impacts to piping plover as a result of Project construction and operation are likely to be low. As such, no mitigation measures are proposed.

Rufa Red Knot

Prior analysis regarding the rufa red knot and potential impacts remains accurate for the current Project; thus, no impacts are anticipated. See Section 6.15 of the 2022 CSC Application.

6.16.2. State Species of Concern

The NDPR maintains the North Dakota Natural Heritage Inventory database containing the known locations of rare animal and plant species and significant ecological communities within the state. In a November 2021 guidance letter, the NDPR indicated there are no known rare species or significant ecological communities documented within or immediately adjacent to the 2022 Project Area. An updated guidance letter from the NDPR dated 10 January 2024 indicated there are no known rare species or significant ecological communities documented within or immediately adjacent to the current Project Area (see **Appendix D: Agency Correspondence Since CSC Issuance**).

The State of North Dakota does not have a state threatened and endangered species list; instead, the NDGF maintains a list of SCP. Prior analysis regarding SCP and potential impacts remains accurate for the current Project. See Section 6.16 of the 2022 CSC Application.

Avoidance and minimization measures and general conservation strategies for SCP species follow those described in the previous sections for all wildlife species. The updated BBCS (**Appendix H: Updated Bird and Bat Conservation Strategy**) outlines specific avoidance and minimization measures that will be used to avoid impacts to both bird and bat species, including SCP.

6.17. Summary of Impacts and Avoidance/Minimization Measures

Table 6-9: Updated Summary of Impacts provides a summary of potential Project impacts and their associated avoidance and minimization measures.

Table 6-9: Updated Summary of Impacts

Resource	Potential Impact	Proposed Avoidance, Minimization, and Mitigation	Section
Demographics	The Project will result in an increase in socioeconomic benefits for landowners, local governments, and communities by providing increased income to landowners receiving lease payments, which could raise the per capita income in Logan and McIntosh Counties. No long-term changes to demographics anticipated.	The Project will increase the local tax base, thereby creating benefits to local governments and communities; therefore, no mitigation is required.	6.1
Land Cover, Land Use, and Zoning	The Project will convert approximately 127.8 acres of land in the Project Area into a renewable, alternative energy source for the life of the Project. The Project will temporarily impact approximately 1,651.4 acres of land.	After construction, temporary disturbance areas will be reclaimed, fertilized, and reseeded according to NRCS recommendations, unless otherwise specified by the landowner and approved by the Commission, as detailed in **Appendix I: Badger Wind Reclamation and Weed Management Plan**. Lease payments will be paid to landowners for placement of Project facilities to offset loss of income from permanent impacts to agricultural land. Linear facilities (i.e., access roads, crane paths, and collection lines) will be collocated to the extent practicable and sited in previously disturbed areas. The Project is compatible with existing land uses and has been designed to comply with local zoning requirements.	6.2

Resource	Potential Impact	Proposed Avoidance, Minimization, and Mitigation	Section
Public Services	Construction of the Project will temporarily increase traffic on haul roads. Traffic impacts associated with the operations phase after construction will be minimal. The Project has the potential to impact TV reception for residents relying on antennas. Impacts to local emergency services, railroads, water supplies, telephone, microwave, or radio communications are not anticipated.	Badger Wind will utilize North Dakota One Call to identify existing utilities prior to construction. Badger Wind will coordinate with applicable local and state road authorities to ensure that all applicable permits are obtained, delivery plans are communicated, and traffic management plans are implemented where necessary. Badger Wind has executed road use and maintenance agreements with Logan County and McIntosh County. Following completion of construction, per the terms of the road use agreements, affected roadways will be repaired or restored to a condition at least equal to the condition prior to construction of the Project. The Project has been sited to avoid microwave beam paths and communication systems. If residents that rely on antennas experience signal disruption, Badger Wind will coordinate with the residence owners to mitigate the disruption.	6.3
Human Health and Safety	No adverse impacts are anticipated.	Badger Wind has sited turbines and associated facilities in compliance with Commission and Logan County setback requirements. Badger Wind will comply with light-mitigating technology system requirements set forth in NDCC Section 49-22-16.4. Badger Wind will coordinate with emergency service providers to determine appropriate safety precautions/standards and develop an Emergency Response Plan.	6.4
Sound	A noise study (**Appendix E: Updated Sound Analysis Report**) was completed for the current Project using GE 2.82-MW turbines at all potential turbine locations[1], of which up to 93 will be constructed. Sound levels are modeled at or below 45 dBA within 100 ft of all inhabited residences and community buildings, with the exception of nine receptors (six	For the nine receptors with modeled sound levels above the sound level requirement, Badger Wind has obtained written waivers for seven receptors and is in the process of securing waivers for the remaining two receptors. See (**Appendix J: Badger Wind Sound Waivers**). In the event waivers are not obtained for the remaining two receptors with modeled sound levels above the sound level requirement, Badger Wind will take steps to ensure compliance with the sound level requirement, such as by using noise reduction technology or not constructing the turbine(s) causing the exceedance(s).	6.5

Resource	Potential Impact	Proposed Avoidance, Minimization, and Mitigation	Section
	participating and three non-participating residences).		
Visual	The Project will have visual and potential aesthetic impacts. A shadow flicker analysis was conducted for the current Project layout and turbine under consideration (**Appendix F: Updated Shadow Flicker Analysis Report**). The highest expected shadow flicker is 27 hours per year, which is at a participating receptor. All receptors, including all participating and non-participating receptors, have expected shadow flicker of less than 30 hours per year.	Compliance with applicable setbacks and minimum FAA lighting and marking requirements are anticipated to minimize visual impacts. Badger Wind has designed the Project to comply with the industry standard of 30 hours per year or less of shadow flicker at all occupied residences, absent a waiver.	6.6
Cultural Resources	Ground-disturbing activities during construction have the potential to impact known or unknown cultural and historic architectural resources in or adjacent to the Project Area.	Class I, II, and III surveys and associated reports have been completed for a majority of the current Project, with a minimal number of unsurveyed areas to be surveyed for archaeological resources in spring 2024. Project infrastructure has been sited to avoid archaeological and historic architectural resources that have been identified and recommended for avoidance in the Project's Class I, II, and III reports. Additionally, Badger Wind has prepared an Unanticipated Discoveries Plan.	6.7
Recreational Resources	There are no designated recreation areas, public or private parks, or designated trails located in the Project Area. Impacts to recreational resources are not anticipated.	No avoidance or mitigation measures are required or proposed.	6.8

Resource	Potential Impact	Proposed Avoidance, Minimization, and Mitigation	Section
Land-Based Economies	The Project will temporarily impact up to approximately 1,154.6 acres of agricultural land, and will impact up to approximately 104.1 acres of agricultural land for the life of the Project. The Project may impact approximately 0.4 acres of woodlands.	Agricultural land temporarily impacted by construction will be restored to preconstruction conditions in accordance with NRCS recommendations, unless otherwise specified by the landowner and approved by the Commission. Agricultural practices will be able to continue during Project construction and operations. After construction, temporarily disturbed non-agricultural lands will be revegetated using a seed mix approved by the NRCS in accordance with the Project reclamation plan. The Project has been designed to minimize tree removal to the extent possible, and the majority of Project facilities have been sited in areas lacking large contiguous woodlands. Any impacts on trees and woodlands from the placement of wind turbines and associated facilities for the Project would be minor in nature. If tree removal is necessary, Badger Wind will coordinate with landowners regarding tree removal and replacement and will follow the Commission's tree and shrub mitigation specifications. If necessary, Badger Wind may bore collection lines under tree lines and woodlots to avoid impacts.	6.9
Soil Resources	Surface disturbance caused by construction of the Project may cause the soil surface to become more prone to erosion and result in soil compaction and the spread of noxious weeds.	Impacts to soils within the Project Area will be localized to the areas where Project activities occur and minimized through the use of BMPs. BMPs may include erosion and sediment control measures, noxious weed control, segregation of topsoil, decompaction of subsurface soils before topsoil replacement, reseeding of temporarily disturbed areas, the use of construction equipment appropriately sized to the scope and scale of the Project, and designing access road grades to fit closely with the natural terrain, to the extent practicable.	6.10

Resource	Potential Impact	Proposed Avoidance, Minimization, and Mitigation	Section
Geologic and Groundwater Resources	Impacts to geologic and groundwater resources are not anticipated.	No mitigation is proposed.	6.11
Surface Water and Floodplain Resources	Construction of Project facilities could potentially impact surface water runoff within the Project Area. Ground-disturbing construction activities have the potential to cause sedimentation, but these impacts are expected to be minimal and will only occur during construction. The Project is not anticipated to permanently impact surface waters.	The Project and associated facilities have been sited to avoid or minimize impacts to surface waters and floodplain resources, to the extent practicable. If unavoidable impacts to USACE jurisdictional waters were to occur, these activities would be permitted under the Nationwide Permit Program. Badger Wind will also implement appropriate erosion and sediment control BMPs and obtain coverage under the NDPDES General Stormwater Permit.	6.12

Resource	Potential Impact	Proposed Avoidance, Minimization, and Mitigation	Section
Wetlands	The Project avoids permanent impacts to wetlands with the exception of one access road to a potential MET tower location (MET Tower 1) that crosses one field-mapped wetland resulting in permanent impact of 0.007 acres.	The Project has been designed to avoid and/or minimize impacts to wetlands, to the extent practicable. The Project avoids permanent impacts to wetlands with the exception of one access road to a potential MET tower location (MET Tower 1) that crosses one field-mapped wetland resulting in permanent impact of 0.007 acres; however, if the wetland is confirmed during field delineations as a wetland, Badger Wind will avoid impacting this wetland unless no reasonable alternative exists. In the event MET Tower 1, and its associated access road, is constructed, the impact will be a self-certification under the Nationwide Permit in accordance with Section 404 of the CWA. The construction workspace of crane paths, access roads, and turbine pads may be reduced in size or slightly shifted, where practicable, to avoid or minimize temporary impacts to wetlands. Matting will also be used when crossing wetlands during construction to minimize temporary disturbances. Collection lines will be bored under wetlands where they intersect, thereby avoiding impacts to wetlands. If unavoidable impacts to USACE jurisdictional waters occur, these activities will be self-certified under the Nationwide Permit Program.	6.13
Vegetation	The Project will remove up to approximately 127.5 acres of vegetation (the majority of which is cropland) for the life of the Project. The Project will temporarily impact up to approximately 1,552.7 acres of vegetation.	As detailed in the Badger Wind Reclamation and Noxious Weed Management Plan (**Appendix I: Badger Wind Reclamation and Weed Management Plan**), appropriate BMPs will be employed during Project construction to avoid or minimize temporary impacts to vegetation. The plan also identifies and establishes the procedures that will be implemented to prevent the introduction and spread of noxious weeds during construction and ongoing operations. Following construction, temporary disturbance areas will be reclaimed and reseeded according to NRCS recommendations, unless otherwise specified by the landowner and approved by the Commission. Badger Wind will work collaboratively with construction parties to prevent and/or minimize the introduction and spread of noxious weeds during construction and operations.	6.14

Resource	Potential Impact	Proposed Avoidance, Minimization, and Mitigation	Section
Wildlife: Avian Species	The Project may impact avian species through increasing the potential for bird strikes with the turbines and/or habitat impacts.	The Project has been sited to avoid/minimize impacts to avian species. Badger Wind has coordinated with USFWS and NDGF regarding the current layout and its continued compliance with the Plains Sharp-Tailed Grouse Conservation Strategy (Hearing Exhibit No. 10), such as: the majority of turbines are sited in areas that are not suitable for sharp-tailed grouse; and all turbines are located in previously fragmented areas, which helps minimize impacts to the local sharp-tailed grouse population. Additionally, Project collection and communication lines will be buried, thereby avoiding the potential for collisions with overhead lines. Temporary disturbance areas will be reclaimed and reseeded according to NRCS recommendations, unless otherwise specified by the landowner and approved by the Commission. If impacts to trees/shrubs occur, they will be mitigated per the Commission's tree and shrub mitigation specifications. Badger Wind is continuing to coordinate with the USFWS and NDGF on voluntary offsets for potential grassland breeding bird displacement. Badger Wind's updated BBCS outlines proposed avoidance, minimization, and mitigation measures that will be implemented (**Appendix H: Updated Bird and Bat Conservation Strategy**).	6.15.1
Wildlife: Mammals	The Project may impact habitat for ground-dwelling wildlife.	Turbines and access roads have been sited to avoid wooded stands and shelterbelts to the extent practicable. Tree clearing will be avoided to the extent practicable. Where unavoidable, tree removal will be mitigated in accordance with the Commission's tree and shrub mitigation specifications. After construction impacts, all temporary surface disturbance will be reclaimed according to NRCS recommendations, unless otherwise specified by the landowner and approved by the Commission, as detailed in the Badger Wind Reclamation and Weed Management Plan (**Appendix I: Badger Wind Reclamation and Weed Management Plan**).	6.15.2

Resource	Potential Impact	Proposed Avoidance, Minimization, and Mitigation	Section
Wildlife: Bat Species	Impacts to bats may occur through loss of habitat or as a result of direct impact due to collision. Approximately 0.4 acres of impacts to woodlands may occur.	Badger Wind has coordinated with the USFWS and NDGF and has designed the Project to avoid and/or minimize potential impacts to bat species. Turbines and access roads have been sited to avoid wooded stands and shelterbelts to the extent practicable. Unavoidable impacts to trees will be mitigated consistent with the Commission's tree and shrub mitigation specifications. Badger Wind's updated BBCS outlines proposed avoidance, minimization, and mitigation measures that will be implemented (**Appendix H: Updated Bird and Bat Conservation Strategy**).	6.15.3
Wildlife: Reptiles and Amphibians	Impacts to reptiles and amphibians as a result of Project development are expected to be minimal.	Impacts to reptiles and amphibians will be limited by avoiding and minimizing impacts to surface water features on site.	6.15.4
Rare and Unique Natural Resources: Federally Listed Species	The potential for federally listed species to occur in the Project Area is low due to limited potential habitat; therefore, impacts to federally listed species are not anticipated.	Project collection and communication lines will be buried to avoid the potential for whooping crane collisions with overhead lines. As referenced in the updated BBCS, Badger Wind is coordinating with USFWS on additional whooping crane avoidance measures. Badger Wind has or will implement the following measures to minimize potential impacts to NLEB: • Avoiding impacts to woodland where feasible, and if tree clearing is unavoidable, completing tree clearing in accordance with tree restrictions for NLEB. • Conduct post-construction fatality monitoring to assess impacts to NLEB and revise the BBCS as needed. • Badger Wind has developed an updated BBCS that outlines proposed avoidance, minimization, and mitigation measures that will be implemented.	6.16.1

Resource	Potential Impact	Proposed Avoidance, Minimization, and Mitigation	Section
Rare and Unique Natural Resources: State Species of Concern	Impacts to state species of concern will be similar to those for wildlife.	The Project has been sited to avoid and minimize impacts to SCP. Badger Wind has coordinated with USFWS and NDGF regarding the current layout and its continued compliance with the Plains Sharp-Tailed Grouse Conservation Strategy (Hearing Exhibit No. 10), such as: no turbines are sited in unbroken grasslands, the majority of turbines are sited in areas that are not suitable for sharp-tailed grouse habitat, , and all turbines in suitable habitat are located in previously fragmented areas, which helps minimize impacts to the local sharp-tailed grouse population. Additionally, roads and laydown areas have been sited in previously disturbed or agricultural areas, to the extent practicable, to reduce habitat fragmentation. Wind turbines and other infrastructure have been sited to avoid wetlands to the maximum extent practicable to minimize impacts to snapping turtles. Impacts to SCP will be further limited by avoiding and minimizing impacts to surface water features on site. All collection and communication lines will be buried to reduce the potential for strikes with electric lines. Impacts to bats and birds as a result of the Project will be minimized by avoiding and/or mitigating impacts to trees, consistent with the Commission's tree and shrub mitigation specifications. Avoidance and minimization measures and general conservation strategies for SCP species follow those described in Section 6.15 for all wildlife species. An updated BBCS (**Appendix H: Updated Bird and Bat Conservation Strategy**) was developed, which outlines specific avoidance and minimization measures that will be used to avoid impacts to bird and bat species, including SCP.	6.16.2

[1]Badger Wind proposes 103 total turbine positions and will build up to 93 total. There is one pair of turbine positions (73 and 73B) that are designed to be mutually exclusive such that only one of these two positions can be constructed due to their proximity and mutual waking. Therefore, the sound analysis only modeled turbine 73 because it has higher sound power levels at the receptors and therefore represents the most conservative and realistic sound modeling scenario."

7. IDENTIFICATION OF POTENTIAL PERMITS/APPROVALS

Potential permits, clearances, and approvals that may be needed for the development and operation of the Project are listed in **Table 7-1: Potential Permits and Approvals**. Documentation of related agency correspondence since the CSC issuance is included in **Appendix D: Agency Correspondence Since CSC Issuance**.

Table 7-1: Potential Permits and Approvals

Administering Agency	Permit, Approval, or Consultation	Applicability for Project	Status
Federal			
U.S. Army Corps of Engineers	Federal Clean Water Act Section 404	Required if dredging or filling WOTUS.	To be obtained prior to activity subject to permit, if needed.
U.S. Fish and Wildlife Service (USFWS)	Special Use Permit(s)	Required for temporary disturbance to USFWS grassland easements and wetland impacts within a USFWS wetland easement.	To be obtained, as needed, prior to construction.
	Review for Threatened and Endangered Species	Consultation regarding potential impacts to species protected under the Endangered Species Act (ESA).	Coordination with the USFWS has been ongoing since October 2019.
Federal Aviation Administration (FAA)	Form 7460-1 Notice of Proposed Construction or Alteration (Determination of No Hazard)	Construction or alteration of structures higher than 200 ft Above Ground Level (AGL), structures near airports, or siting within line of sight of radar of an air defense facility.	Filed October 2021; updates were filed in January 2024; to be obtained prior to construction of turbines.
	Notice of Actual Construction or Alteration (Form 7460-2)	Supplemental notice to FAA in advance of or after commencing construction of turbines.	Notice to be provided in advance of or after commencing construction of turbines, as appropriate.
	Marking and Lighting Recommendations	Required for approval of light-mitigating technology.	To be obtained prior to marking/lighting.
Federal Communications Commission	Radio Station Authorization/License	Typically required for operation of ADLS communications tower.	To be obtained prior to activity subject to permit.

Administering Agency	Permit, Approval, or Consultation	Applicability for Project	Status
	Registration	Typically required for operation of ADLS communications tower.	To be obtained prior to activity subject to permit.
State of North Dakota			
North Dakota Public Service Commission	Certificate of Site Compatibility	Required for construction of an energy conversion facility with a nameplate capacity greater than 0.5 MW.	Certificate of Site Compatibility obtained November 30, 2022; amendment in progress, to be obtained prior to commencement of construction.
North Dakota Department of Environmental Quality (NDDEQ)	North Dakota Pollutant Discharge Elimination System (NDPDES) General Permit for Stormwater Discharge Related to Construction (includes Stormwater Pollution Prevention Plan [SWPPP])	Required for stormwater discharges from construction activities disturbing greater than one acre. Must also prepare a SWPPP.	To be obtained prior to activity subject to permit.
	401 Water Quality Certification	Required in conjunction with Section 404 permit for filling jurisdictional WOTUS.	Incorporated into Section 404 Nationwide Permits.
North Dakota State Water Commission, Office of the State Engineer	Temporary Water Permit	Required for temporary uses of water, with the exception of when the volume of water to be impounded, withdrawn, or diverted is less than 12.5 acre-feet (4,073,137 gallons) and the water is used for domestic, fish, livestock, wildlife, or recreational purposes.	To be obtained prior to activity subject to permit, if needed.

Administering Agency	Permit, Approval, or Consultation	Applicability for Project	Status
	Conditional Water Permit	Required for water uses where the use period will exceed 12 months, with the exception of when the volume of water to be impounded, withdrawn, or diverted is less than 12.5 acre-feet and the water is used for domestic, fish, livestock, wildlife, or recreational purposes.	To be obtained prior to activity subject to permit, if needed.
	Drainage Permit	Required prior to drainage of a waterbody, pond, lake, slough, or sheetwater, or any series thereof, that has a watershed area of at least 80 acres.	To be obtained prior to activity subject to permit, if needed.
North Dakota Highway Patrol	Oversize/Overweight Permit	Required to transport oversized/overweight loads within state-managed roadways.	To be obtained prior to transport of oversized/ overweight loads, if needed.
North Dakota Department of Transportation (NDDOT)	Utility Occupancy Permit(s)	Required to install electrical lines within state-owned roadway ROW.	To be obtained prior to construction work within state roadway ROW, if needed.
	Highway Access Permit(s)	Required to construct driveway access/approach to state-owned roadway ROW.	To be obtained prior to construction or alteration of access/approach within state roadway ROW, if needed.
	Temporary Modification Permits	Required for temporary modifications to state-owned ROW.	To be obtained prior to temporary modifications within state roadway ROW subject to permit, if needed.

Administering Agency	Permit, Approval, or Consultation	Applicability for Project	Status
North Dakota State Electrical Board	Wiring Certificate and Inspection Approval	Required for installation of electrical facilities.	To be obtained prior to activity subject to permit.
North Dakota State Historic Preservation Office (SHPO) / State Historical Society of North Dakota (SHSND)	Cultural and Historic Resources Review, Review of State and National Registers of Historic Sites, and Archaeological Survey	Consultation required in connection with other agency permitting requirements, such as the Commission.	Class I Architectural/Archeological Literature Review, Class II Architectural Inventory, and III Archeological Inventory surveys have been completed for the Project expansion area and reports submitted to the SHPO in Q1 2024.
Local Approvals			
Logan County	Wind Energy Facility Siting Permit / Conditional Use Permit	Required for construction of a wind energy facility within Logan County.	Wind energy facility siting permit / conditional use permit obtained May 11, 2022; a new application was submitted on December 6, 2023 for the current Project and a new permit is expected to be issued in Q1 2024.
	Building Permit(s)	Required to erect, construct, make structural changes, or move any structure.	If needed, to be obtained prior to construction of structures.
	Certificate(s) of Compliance	May be required in connection with building permits.	If needed, to be obtained in connection with the building permit.
	Utility Permit(s)	Required to install electrical lines on/across county road ROW.	If needed, to be obtained prior to crossing and/or installation of electrical lines in county road ROW.
	Approach/Driveway Permit(s)	May be required for the installation of approaches/driveways abutting county road ROW.	If needed, to be obtained prior to installation of approaches.

Administering Agency	Permit, Approval, or Consultation	Applicability for Project	Status
	Oversize/Overweight Permit	Transportation of oversize/overweight loads.	If needed, to be obtained prior to transporting oversize/overweight loads.
McIntosh County	Oversize/Overweight Permit	Transportation of oversize/overweight loads.	If needed, to be obtained prior to transporting oversize/overweight loads.
Township(s)	Utility Permit(s)	Installation of facilities in/across township road ROW.	If needed, to be obtained prior to crossing and/or installation of facilities in township road ROW.
	Driveway/Approach Permit(s)	Installation of approaches abutting township road ROW.	If needed, to be obtained prior to installation of approaches.
	Oversize/Overweight Permit	May be required for transportation of oversize/overweight loads.	If needed, to be obtained prior to transporting oversize/overweight loads.
Water Resource District(s) (WRD)	Utility Permit(s)	May be required to cross WRD-owned ROW and infrastructure.	If needed, to be obtained prior to installation of electrical lines across WRD-owned ROW and infrastructure.
Local Public Health Unit (Central Valley Health District)	Septic system permit/approval	May be required for installation of septic system (O&M facility).	If needed, to be obtained prior to construction of the septic system.
Existing Infrastructure Owner(s)	Crossing License(s)/Permit(s)	May be required to cross existing easements (e.g., railroad ROW).	If needed, to be obtained prior to crossing existing infrastructure and easements

8. COMPLIANCE WITH NDCC SECTION 49-22-09 FACTORS

As discussed below, based on analysis of the factors in NDCC Section 49-22-09, the Project site meets the conditions upon which the CSC was issued.

8.1. Public Health, Welfare, Natural Resources, and the Environment

Section 8 of the 2022 CSC Application (see summary in **Section 6.17: Summary of Impacts and Avoidance/Minimization Measures**) and this Application discuss the research and investigations relating to the potential effects of the Project on public health and welfare, natural resources, and the environment, as well as the proposed mitigation measures to avoid or minimize effects.

8.2. Minimizing Adverse Environmental Effects

As indicated in Section 8.2 of the 2022 CSC Application, Badger Wind will utilize the most recent technologies to optimize utilization of wind resources and minimize impacts to the environment.

8.3. Potential for Beneficial Uses of Waste Energy

Wind energy generation does not produce waste energy. Therefore, the Project does not have the potential for beneficial use of waste energy.

8.4. Unavoidable Adverse Environmental Effects

The unavoidable adverse environmental effects remain the same as set forth in Section 8.4 of the 2022 CSC Application. See also Section **4: Description of Proposed Facility** for an updated discussion of the maximum estimated temporary and permanent impacts for Project facilities.

8.5. Alternatives to the Proposed Site

The analysis of alternatives to the proposed site remains the same as set forth in Section 8.5 of the 2022 CSC Application.

8.6. Irreversible and Irretrievable Commitments of Natural Resources

The irreversible and irretrievable commitments of natural resources remain the same as set forth in Section 8.6 of the 2022 CSC Application.

8.7. Direct and Indirect Economic Impacts

As discussed in Section 8.7 of the 2022 CSC Application, direct economic impacts resulting from development of the Project will be primarily positive. The Project will result in conversion of land use during the life of the Project; however, the majority of the Project Area will remain available for agricultural uses, and participating landowners will be financially compensated for land occupied by wind turbines and associated infrastructure.

Additionally, as discussed in Section 8.7 of the 2022 CSC Application, the Project may also indirectly benefit economies in the surrounding area due to the wages and salaries paid to locally hired workers and increased spending at local businesses. Long-term benefits to the tax bases of Logan and McIntosh Counties resulting from the Project will improve the local economy.

8.8. Existing Development Plans of the State, Local Government, and Private Entities at or in the Vicinity of the Site

The Project is not anticipated to conflict with the existing plans of state, local, or private entities within the Project Area. Badger Wind will obtain a new wind energy facility siting permit/conditional use permit from Logan County. Additionally, Badger Wind has continued to coordinate with the Wishek Municipal Airport regarding the current Project; to-date, the Wishek Municipal Airport has not indicated any concerns with the current Project layout.

8.9. Effect of Site on Cultural Resources

Badger Wind has conducted cultural resource field surveys for the previous and current Project Area and Project layout (which includes the locations of 103 turbines for the current Project layout). The current Project layout avoids the seven unevaluated archaeological sites and two archaeological Site Leads previously identified. The 2023 cultural resource field surveys for the unsurveyed areas of the current Project Area identified one new archaeological site (32LO174) and one new prehistoric isolated find (32LOX76). These resources are recommended not eligible for inclusion in the NRHP. Badger Wind will provide the Commission with the SHSND's concurrences once they are received. Project infrastructure has been sited to avoid sensitive cultural and historic architectural resources that have been identified and recommended for avoidance in the Project's Class I, II, and III cultural resources inventories.

Badger Wind continues to coordinate with the SHSND on archaeological and architectural resources. Additionally, Badger Wind will complete cultural resources surveys on any unsurveyed portions of the Project layout, will report the findings to the SHSND, and will obtain and provide the Commission with the SHSND's concurrence prior to constructing in those areas. If additional cultural resources are discovered, Badger Wind will work with SHSND to avoid or mitigate impacts. Badger Wind has also prepared an Unanticipated Discoveries Plan.

8.10. Effect of Site on Biological Resources

The Project has minimal adverse impacts to biological resources. Extensive efforts to avoid or minimize impacts to biological resources have been made in siting the Project, and efforts will continue during project construction and operation. The Project continues to be designed to minimize impacts to wildlife. With respect to wildlife, Badger Wind plans to implement the measures outlined in Section 6.15.2 of the 2022 CSC Application and in **Section 6: Updated Environmental Analysis** above to avoid or minimize impacts. Badger Wind has developed an updated BBCS in coordination with USFWS and NDGF that outlines specific mitigation measures that have been implemented during Project siting and design, or that are planned to be

implemented during construction and operation of the Project, to avoid and minimize potential impacts to wildlife (refer to **Appendix H: Updated Bird and Bat Conservation Strategy**).

9. AGENCY COMMENTS

Since the issuance of the CSC, Badger Wind has continued to coordinate with county, state and federal agencies regarding the Project.

In December 2023, Badger Wind sent updated Project notification letters to 36 federal, state, and local agencies, including agencies and officers listed on NDAC Section 69-06-01-05. The notification letters included a description of the updated Project and a map of the current Project Area. The following sections summarize agency coordination efforts since the CSC was issued, organized by agency. A list of agencies consulted and copies of agency correspondence are provided in **Appendix D: Agency Correspondence Since CSC Issuance**.

9.1. U.S. Army Corps of Engineers, North Dakota Regulatory Office

Badger Wind contacted the Bismarck USACE Regulatory Office on December 19, 2023 to advise of the updated Project layout and to request guidance on applicable permitting requirements.

On December 29, 2023, the USACE responded to the Project notification letter stating the Project may need a CWA Section 404 permit. Badger Wind anticipates that impacts to USACE jurisdictional waters will be primarily temporary and permitted under the Nationwide Permit program.

9.2. Department of Defense

The DoD performed an informal review through the DoD Clearinghouse of the Project on January 26, 2024 and noted that the Project will have minimal impact on military operations conducted in the area. Badger Wind anticipates the DoD will also comment through the FAA permit process.

9.3. Wildlife Agencies (U.S. Fish and Wildlife Service, North Dakota Field Office, and North Dakota Game and Fish)

Badger Wind continued coordinating with the USFWS NDGF regarding the updated Project in the summer of 2023. Meetings and iterative reviews of Project information with the USFWS and NDGF helped to confirm appropriate resource surveys and protocols for the updated Project, as well as measures to avoid, minimize, and monitor potential impacts and incorporate adaptive management strategies. Copies of correspondence with the USFWS and NDGF since the CSC was issued are provided in **Appendix D: Agency Correspondence Since CSC Issuance**. Significant meetings and communications are summarized below.

9.3.1. June 29, 2023 North Dakota Game and Fish Department Meeting

Badger Wind met with NDGF to provide information regarding the status of development and updates to the Project, including the updated Project Area and layout changes. Badger Wind and NDGF discussed potential additional studies and surveys, as well as next steps in assessment of the Project's potential impacts to grassland and relevant turbine siting considerations. Badger

Wind and NDGF discussed continued placement of turbines on tilled land within two mi of a lek (see Plains Sharp-Tailed Grouse Conservation Strategy, Hearing Exhibit No. 10).

NDGF recommended that Badger Wind reach out to USFWs regarding potential surveys for federal species of concern. NDGF and Badger Wind discussed voluntary offsets. NDGF requested another meeting with USFWS and NDGF after impact analyses are complete.

9.3.2. August 15, 2023 North Dakota U.S. Fish and Wildlife Service and North Dakota Game and Fish Department Meeting

Badger Wind met with USFWS and NDGF to discuss the updates to the Project, including the expanded Project Area and layout changes. Badger Wind and the agencies also discussed potential additional surveys and federally protected species. NDGF requested to review the Eagle Conservation Plan/Eagle Management Plan (ECP/EMP) as soon as it becomes available. Badger Wind also noted that it will update the BBCS and provide the updated version to the agencies. Badger Wind and the agencies also discussed avoidance of unbroken grasslands, and potential voluntary offsets.

9.3.3. January 24, 2024 U.S. Fish and Wildlife Service Meeting

Badger Wind met with the USFWS Kulm Wetland Management District to discuss the Project and coordinate regarding USFWS wetland and grassland easements within the Project Area. Badger Wind and USFWS discussed potential temporary disturbances to USFWS grassland and/or wetland easements, and associated regulatory requirements. Badger Wind and USFWS discussed that Badger Wind would notify USFWS prior to construction for activities on parcels with USFWS easements for which a permit from USFWS is not required, such as boring under a grassland easement or activities on parcels where Badger Wind obtained its lease agreement(s) prior to USFWS obtaining its easement(s).

9.3.4. January 30, 2024 U.S. Fish and Wildlife Service, North Dakota Game and Fish, and North Dakota Department of Agriculture Meeting

Badger Wind met with the USFWS, NDGF, and North Dakota Department of Agriculture (NDDA) to discuss the Project and offset calculations. NDGF stated they accepts Badger Wind's impact calculation as accurate. Badger Wind confirmed a final impact calculation will be completed prior to construction and will be compared to the impact calculation provided during the meeting. NDDA stated that a Memorandum of Understanding (MOU) will include the mitigations Badger Wind commits to and this MOU can be included in the BBCS.

9.4. North Dakota Department of Environmental Quality

The NDDEQ responded to the updated Project notification letter on January 17, 2024. The NDDEQ provided guidelines for dust control, minimizing degradation to waterways during construction, preventing spills, and the appropriate disposal of solid waste materials. Additionally, NDDEQ stated that they have no projects scheduled in the area and do not own any land within the

Project Area. The NDDEQ stated that a permit for discharging stormwater runoff may be needed if the Project plans to disturb more than one acre. Badger Wind will obtain coverage under and construct the Project in compliance with the requirements of the NDPDES General Stormwater Permit.

9.5. North Dakota Department of Agriculture

9.5.1. December 28, 2023 North Dakota Department of Agriculture

On December 28, 2023, the NDDA responded to the updated Project notification letter sent on December 19, 2023. The NDDA advised of the new environmental mitigation program within the NDDA enacted July 1, 2023. Badger Wind will coordinate with the NDDA on voluntary mitigation program requirements, as applicable.

9.5.2. January 24, 2024 North Dakota Department of Agriculture meeting

Badger Wind met with NDDA to discuss the Project and Badger Wind's proposed voluntary offset payment amounts and structure. NDDA indicated the payment amounts provided are likely acceptable and that it will review the potential payment schedule. Badger Wind and NDDA will continue to work together to complete the MOU in an expedited manner. NDDA noted it would like NDGF to comment on the final draft of the MOU.

9.6. North Dakota Department of Water Resources

The ND DWR responded to the updated Project notification letter on January 19, 2024. ND DWR discussed that floodplain mapping is in progress. If areas within the Project Area are identified as floodplains within the final FEMA Flood Insurance Rate Maps, Badger Wind will coordinate with Logan County regarding floodplain permitting, if applicable. The ND DWR also discussed potential water appropriation and/or drainage permitting requirements. The ND DWR stated that it maintains wells across the state for monitoring water levels and quality in glacial and bedrock aquifers and asked to be contacted if an observation well is encountered during Project activities and must be removed. The Project layout avoids impacts to observation wells; therefore, Badger Wind does not anticipate that ND DWR well permits will be needed.

9.7. North Dakota Parks and Recreation

The NDPR responded to the updated Project notification letter on January 10, 2024. NPDR noted that the Project does not appear to affect properties that NDPR owns, leases, or manages or any properties protected under Section 6(f) of the Land and Water Conservation Fund. Additionally, NDPR indicated that no known rare species or significant ecological communities are documented within or immediately adjacent to the Project Area.

9.8. North Dakota Geological Survey

The NDGS responded to the updated Project notification letter on January 9, 2024, noting that there are no geological concerns with the proposed current Project Area.

9.9. Logan County

On June 27, 2022, Badger Wind executed the road use agreement with Logan County.

On June 7, 2023, Badger Wind attended the Logan County Board of Commissioners meeting. Badger Wind has continued coordinating with Logan County regarding the Project updates. Based on communications with Logan County regarding the updated Project, Logan County requested that Badger Wind file an application for a new wind energy facility siting permit / conditional use permit. Badger Wind filed its application in December 2023, and a public hearing was held on February 14, 2024. Badger Wind anticipates Logan County will issue a new wind energy facility siting permit / conditional use permit in Q1 2024.

9.10. McIntosh County

On March 24, 2022, Badger Wind executed the road use agreement with McIntosh County.

On June 7, 2023, Badger Wind attended the McIntosh County Commission Board Meeting. Badger Wind updated the commission on the progress of the Project. Badger Wind presented the county commission with maps of the updated Project, including the updated turbine layout. Badger Wind provided an update on its anticipated construction schedule. Additionally, on August 29, 2023, McIntosh County confirmed that the Project will not require any zoning permits/approvals from McIntosh County.

9.11. Wishek Airport

Badger Wind has continued to coordinate with the Wishek Municipal Airport regarding the current Project layout. In August – November 2023, Badger Wind consulted with the Wishek Municipal Airport to discuss the current Project layout. On November 17, 2023, Badger Wind had a phone call with the Wishek Municipal Airport during which Badger Wind showed the current Project layout, and the Wishek Municipal Airport confirmed it does not have any concerns with the current Project layout.

9.12. Community Outreach

In 2023, Badger Wind donated funds in support of improvement projects at the Wishek Civic Center and Doyle Memorial Park, located in Wishek. Badger Wind is in active communication with the local communities to design additional sponsorship and donation programs that ensure broader access to the benefits of a wind farm, which will be put in place near the time of construction.

10. REFERENCES

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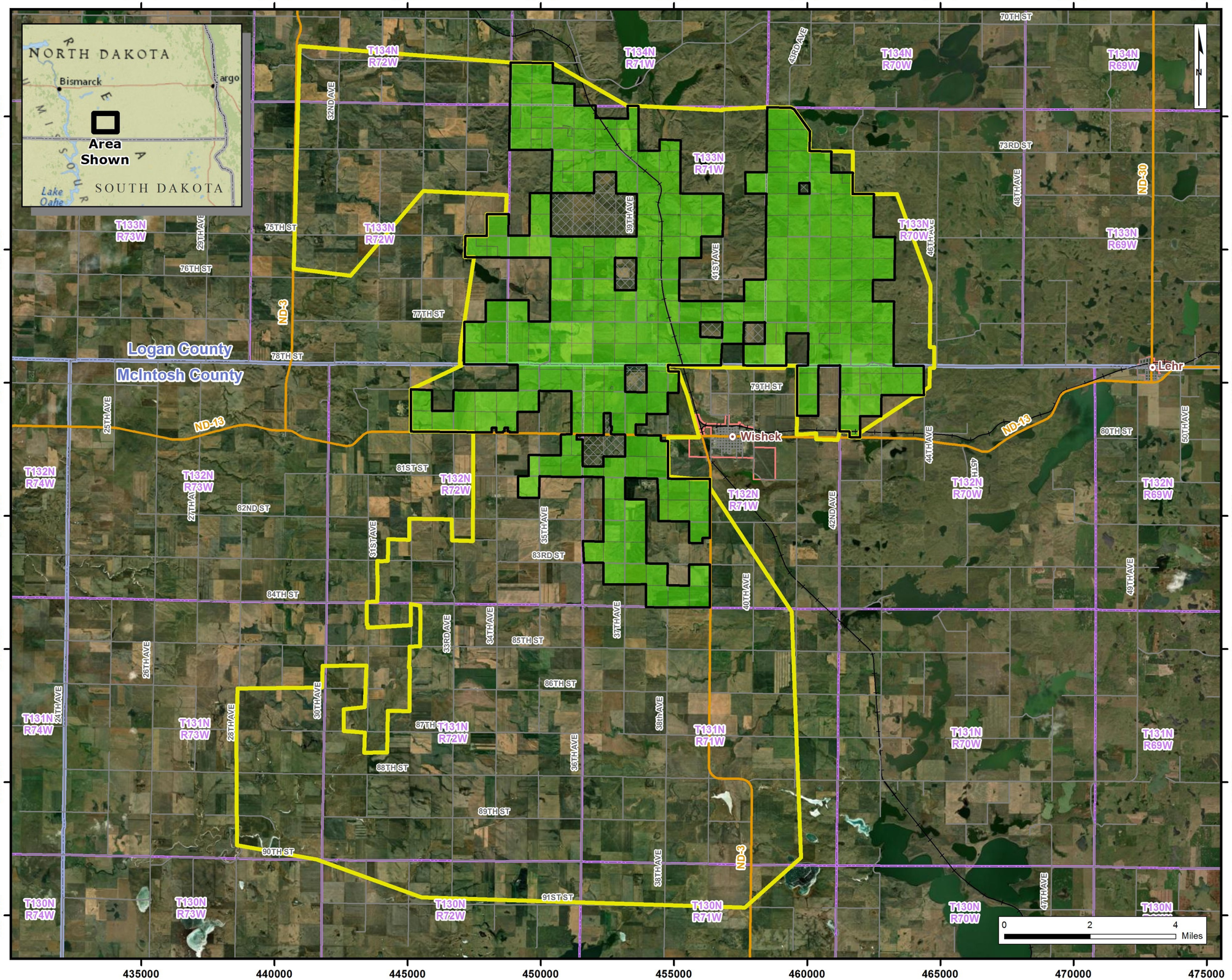


Legend

- Project Area
- Study Area
- Non-Participating Landowner Property
- Participating Landowner Property
- State Road
- Railroad
- City/Village
- Township (PLSS)
- County

Ørsted

Badger Wind, LLC

Figure 1:
PROJECT LOCATION
- Wind Energy Facility -
Logan and McIntosh Counties, ND

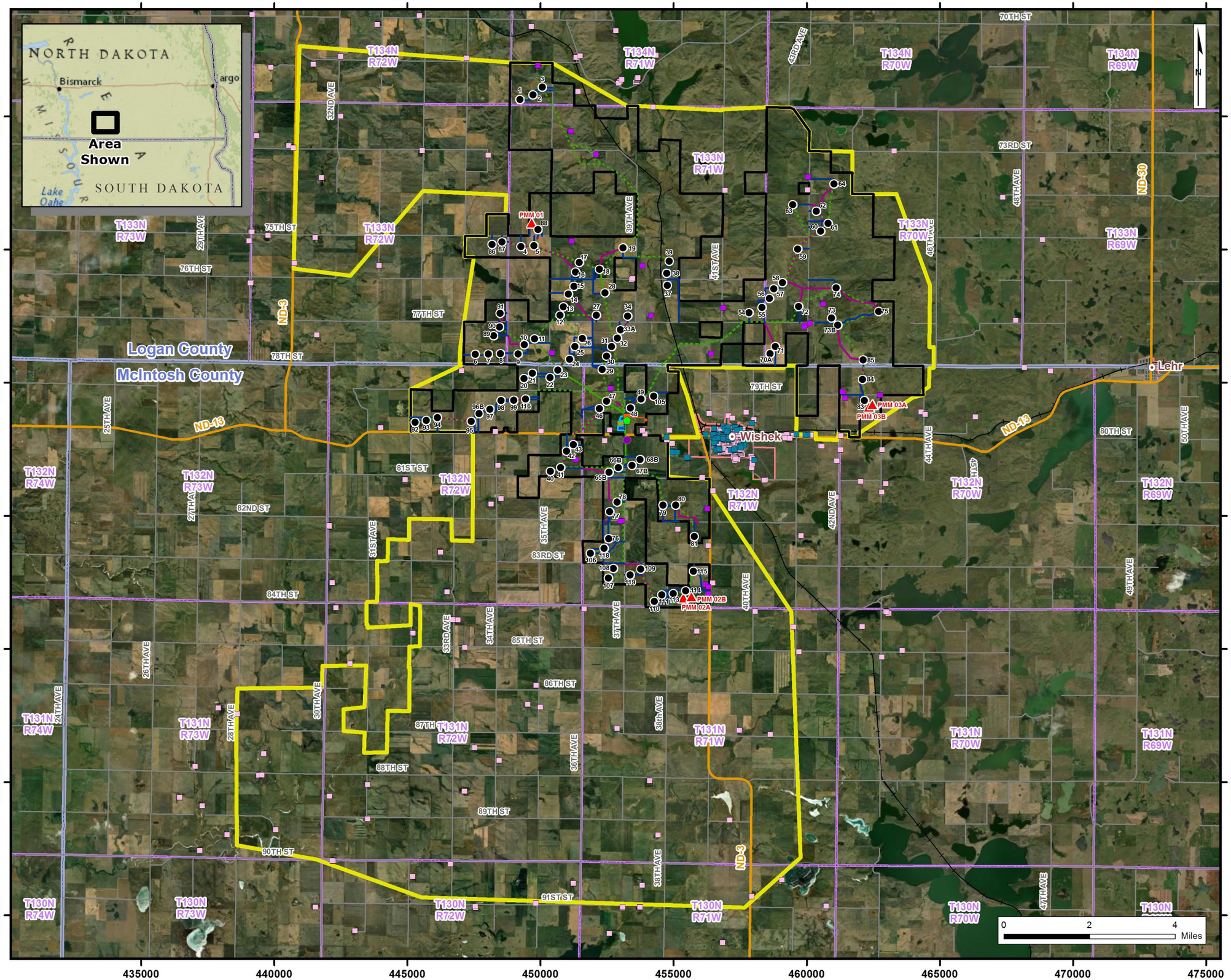
10455420-240118-PV

January 18, 2024

Projection: NAD83 UTM14

Sources: ESRI, NDGF, NDTL, TIGER

DNV



Legend

(symbols not to scale)

- Proposed Turbine
- Proposed Permanent MET Tower
- Proposed O&M Building
- Proposed Batch Plant
- Proposed Substation
- Proposed Gen-Tie Line
- Proposed Underground Collection/Fiber Line
- Proposed Crane Path
- Proposed Access Road
- Proposed Laydown Yard
- Proposed Marshalling Yard
- Project Area
- Study Area
- Participating Occupied Residence
- Non-Participating Occupied Residence
- Community Building
- State Road
- County/Township Road
- Railroad
- City/Village
- Township (PLSS)
- County

Ørsted

Badger Wind, LLC

Figure 2:
PROJECT FACILITIES
- Wind Energy Facility -
Logan and McIntosh Counties, ND

10455420-240118-PV

DNV

January 18, 2024

Projection: NAD83 UTM14

Sources: ESRI, NDGF, NDTL, TIGER

445000 450000 455000 460000 465000

5135000 5130000 5125000 5120000

T134N R72W | T134N R71W | T134N R70W | T134N R69W

T133N R72W | T133N R71W | T133N R70W | T133N R69W

T132N R73W | T132N R72W | T132N R71W | T132N R70W

T131N R73W | T131N R72W | T131N R71W | T131N R70W

71ST ST | 72ND ST | 73RD ST | 74TH ST | 75TH ST | 76TH ST | 77TH ST | 78TH ST | 79TH ST

34TH AVE | 35TH AVE | 36TH AVE | 37TH AVE | 38TH AVE | 39TH AVE | 40TH AVE | 41ST AVE | 42ND AVE | 43RD AVE | 44TH AVE | 46TH AVE

32ND AVE | 33RD AVE

ND-13 | ND-3

Logan County
McIntosh County

PMM 01 | PMM 02A | PMM 02B | PMM 03A | PMM 03B

Substation
Gen-Tie Line
O&M Building

Laydown Yards

Marshalling Yard

Batch Plant

Wishek

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33A 34 37 38 39 40 41 42 43 46 47 48 49 54 55 56 57 58 59 60 61 62 63 64 70A 71 72 73 73B 74 75 76 77 78 79 80 81 83 84 85 86 87 88 89 90 91 92 93 94 95 96B 97 98 99 105 106 107 108 109 110 111 113 114 115 116 118 119

Legend

- Current Layout
- 2022 Layout
- Current Project Area
- Project Area (Added Since 2022 Approval)
- Project Area (Removed Since 2022 Approval)
- County
- Township (PLSS)
- State Road
- County/Township Road

NORTH DAKOTA
Bismarck
Fargo
Area Shown
SOUTH DAKOTA
Lake Oahe

0 1 2 Miles

Ørsted

Badger Wind, LLC

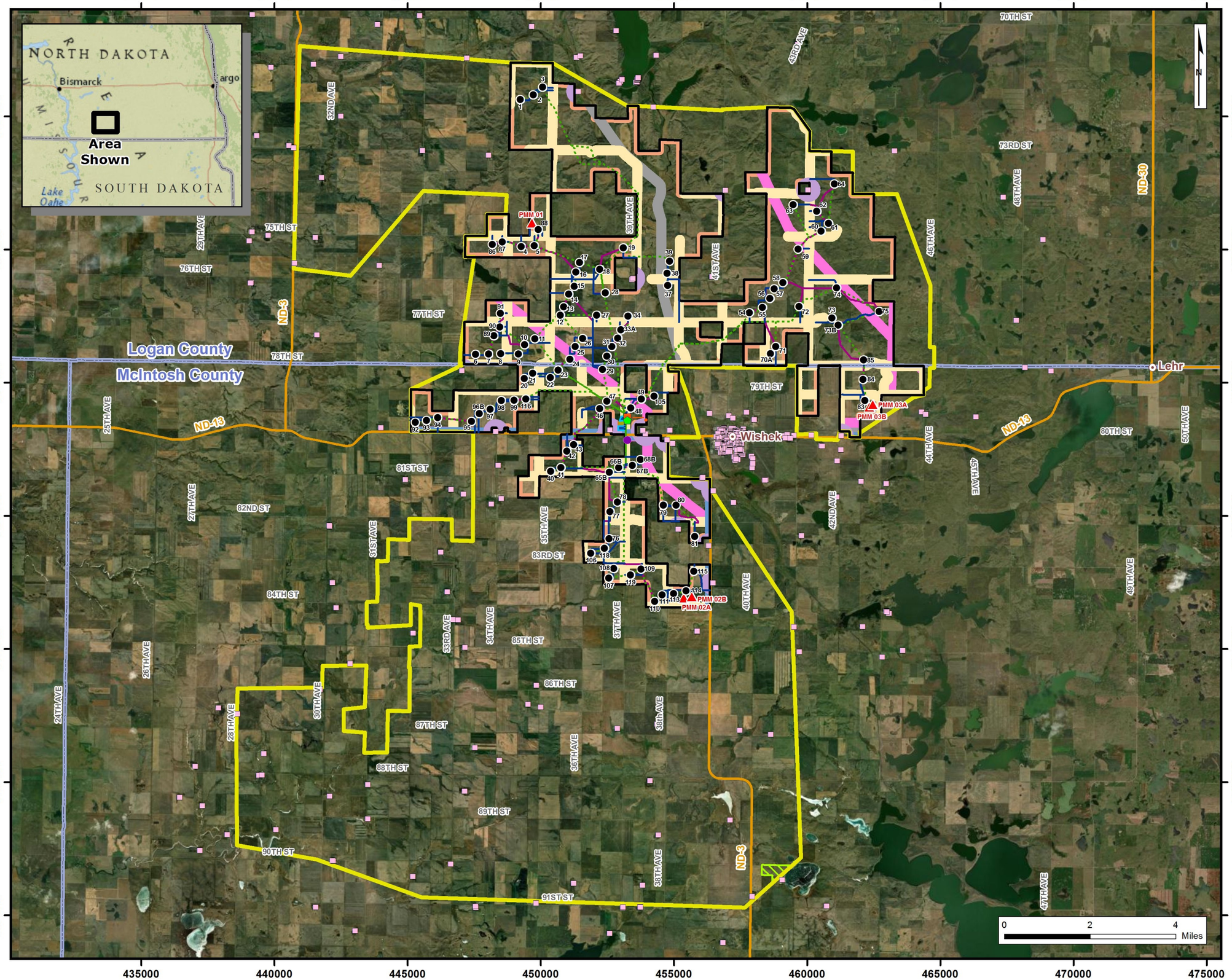
Figure 3:
COMPARISON FIGURE
- Wind Energy Facility -
Logan County, ND

10455420-240118-PV

January 18, 2024

Projection: NAD83 UTM14
Sources: ESRI, USGS

DNV



Legend

(symbols not to scale)

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- Proposed Permanent MET Tower
- Proposed O&M Building
- Proposed Batch Plant
- Proposed Substation
- Proposed Gen-Tie Line
- Proposed Underground Collection/Fiber Line
- Proposed Crane Path
- Proposed Access Road
- Proposed Laydown Yard
- Proposed Marshalling Yard
- Project Area
- Study Area
- State Road
- County
- Non-Participating Occupied Residence

Exclusion Area

- Waterfowl Production Area
- Railroad
- State Road
- County and Maintained Township Road
- Existing Transmission Line
- Non-Participating Occupied Residence
- Non-Participating Property Line

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Badger Wind, LLC

Figure 4:
EXCLUSION AREAS
- Wind Energy Facility -
Logan and McIntosh Counties, ND

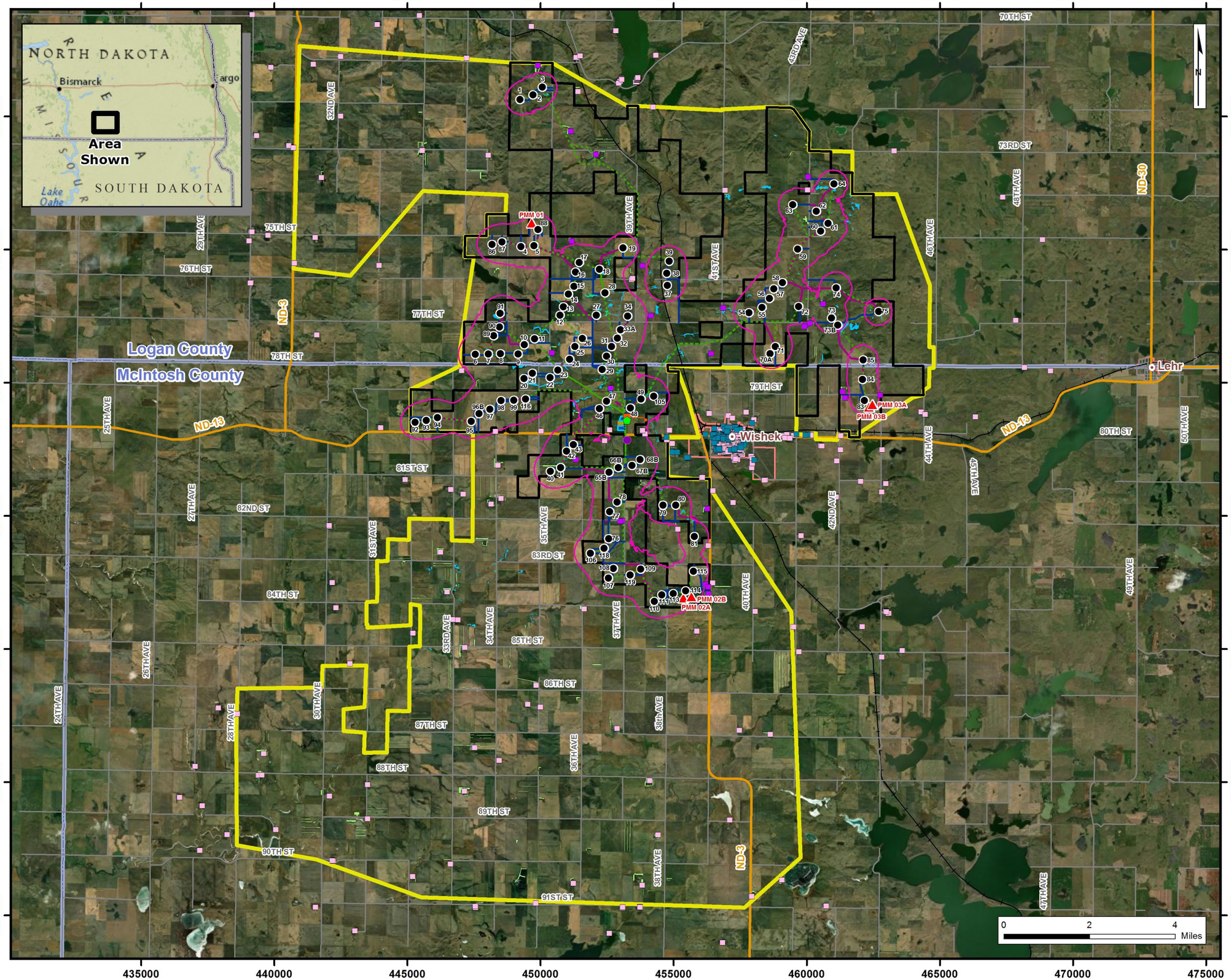
10455420-240118-PV

January 18, 2024

Projection: NAD83 UTM14

Sources: ESRI, NLCD-USGS, TIGER

DNV



Legend

(symbols not to scale)

- Proposed Turbine
- Proposed Permanent MET Tower
- Proposed O&M Building
- Proposed Batch Plant
- Proposed Substation
- Proposed Gen-Tie Line
- Proposed Underground Collection/Fiber Line
- Proposed Crane Path
- Proposed Access Road
- Proposed Laydown Yard
- Proposed Marshalling Yard
- Project Area
- Study Area
- State Road
- County

Avoidance Areas

- Participating Occupied Residence
- Non-Participating Occupied Residence
- Community Building
- 45 dBA Sound Level Isoline
- Field Mapped Wetland
- Delineated Wetland
- Woodlands (Desktop Delineation)
- City/Village

Ørsted

Badger Wind, LLC

Figure 5:
AVOIDANCE AREAS
- Wind Energy Facility -
Logan and McIntosh Counties, ND

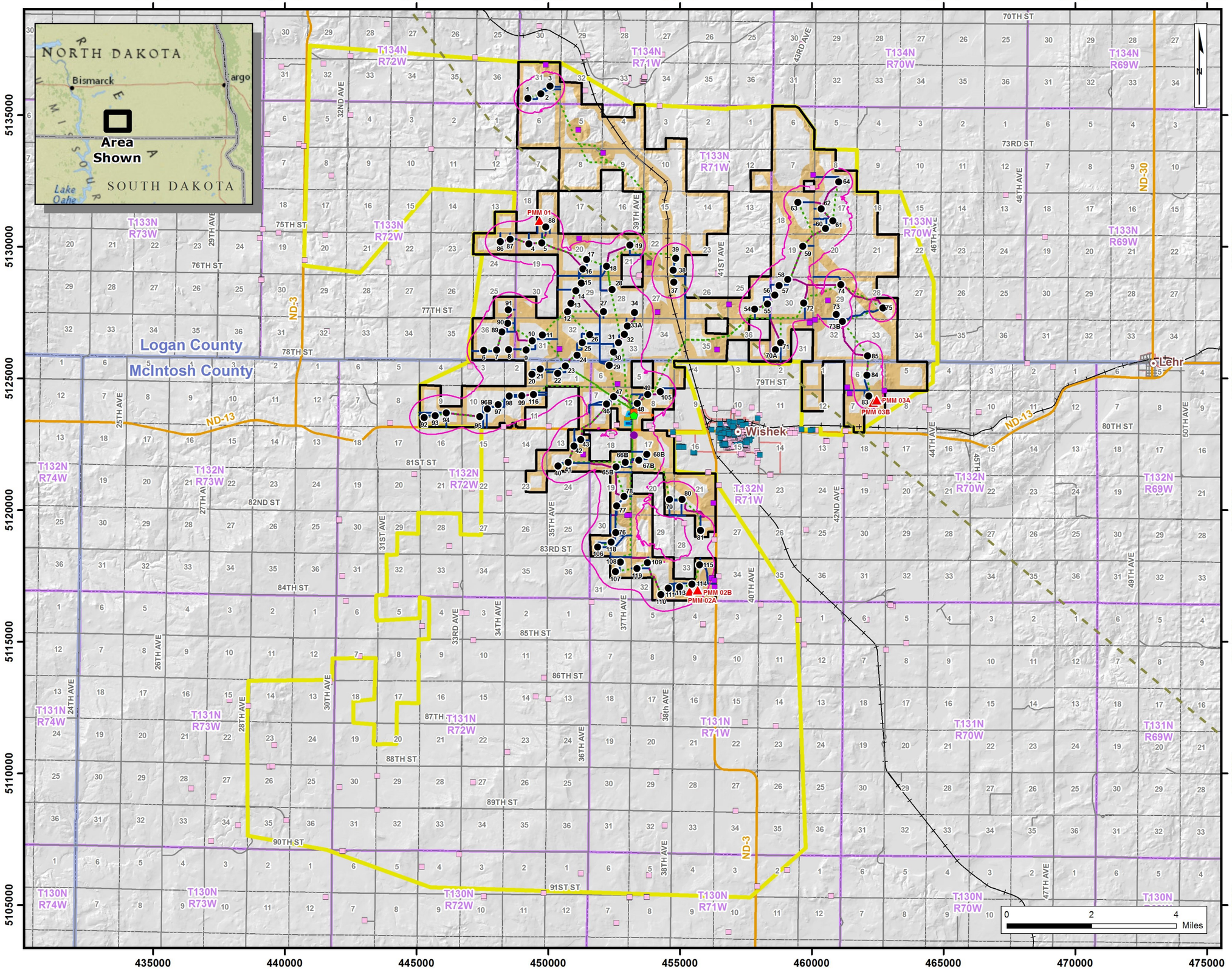
10455420-240118-PV

January 18, 2024

Projection: NAD83 UTM14

Sources: ESRI, NDGF, NDTL, TIGER

DNV



Legend

(symbols not to scale)

- Proposed Turbine
- Proposed Permanent MET Tower
- Proposed O&M Building
- Proposed Batch Plant
- Proposed Substation
- Proposed Gen-Tie Line
- Proposed Underground Collection/Fiber Line
- Proposed Crane Path
- Proposed Access Road
- Proposed Laydown Yard
- Proposed Marshalling Yard
- Project Area
- Study Area
- State Road
- Township (PLSS)
- Section Boundary
- County
- Participating Occupied Residence
- Non-Participating Occupied Residence
- Community Building
- 45 dBA Sound Level Isoline
- Microwave Beam Path
- Setback

Ørsted

Badger Wind, LLC

Figure 6:
PROJECT SETBACKS
- Wind Energy Facility -
Logan and McIntosh Counties, ND

10455420-240118-PV

January 18, 2024

Projection: NAD83 UTM14

Sources: ESRI, NDGF, NDTL, TIGER

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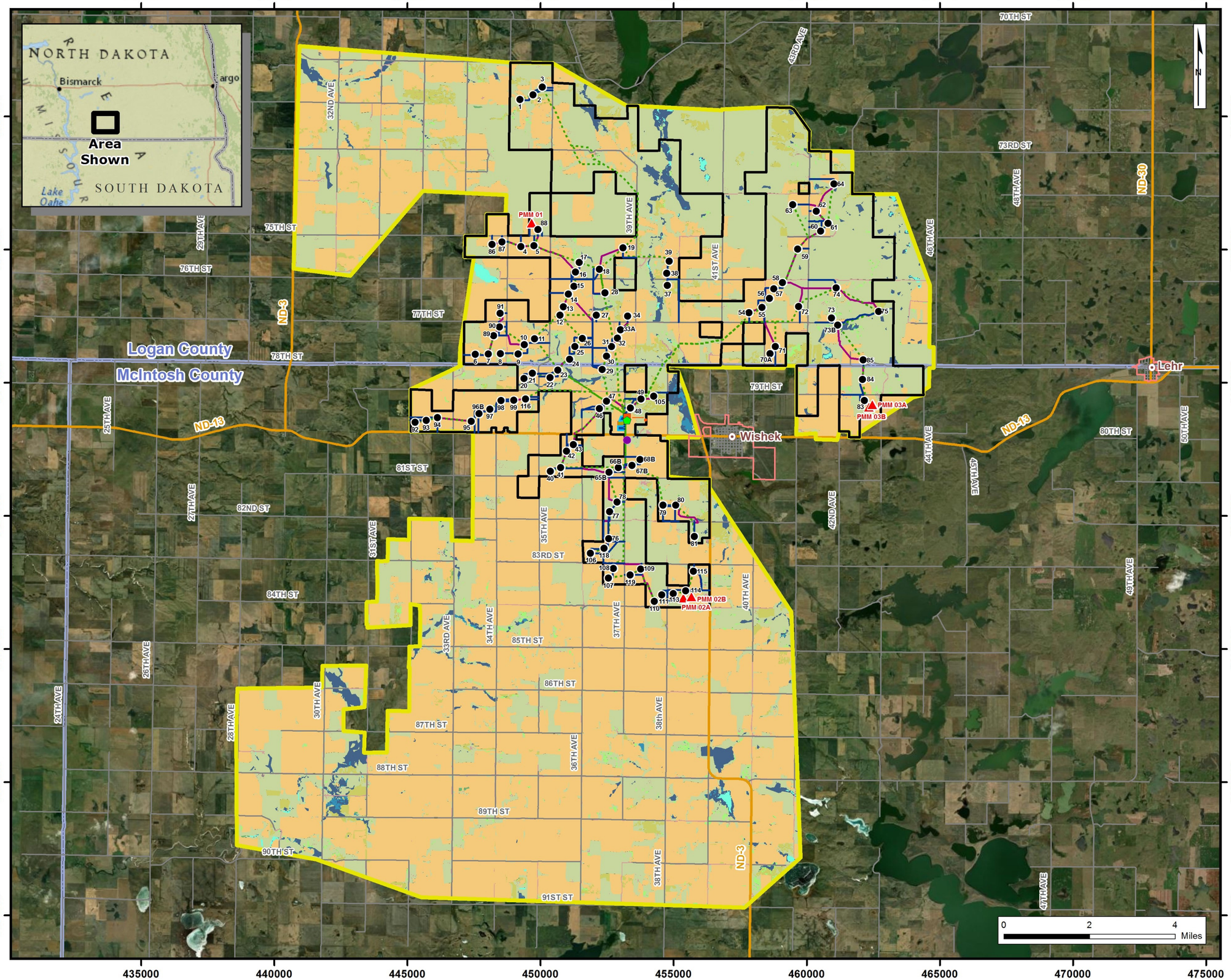

Legend

(symbols not to scale)

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- Proposed Permanent MET Tower
- Proposed O&M Building
- Proposed Batch Plant
- Proposed Substation
- Proposed Gen-Tie Line
- Proposed Underground Collection/Fiber Line
- Proposed Crane Path
- Proposed Access Road
- Proposed Laydown Yard
- Proposed Marshalling Yard
- Project Area
- Study Area
- State Road
- City/Village
- County

Land Cover (NLCD-USGS, 2021)

- Open Water
- Developed
- Barren Land (Rock/Sand/Clay)
- Deciduous Forest
- Shrub/Scrub
- Grassland/Herbaceous
- Pasture/Hay
- Cultivated Crops
- Woody Wetlands
- Emergent Herbaceous Wetlands

Ørsted

Badger Wind, LLC

Figure 7:
LAND COVER & USE
- Wind Energy Facility -
Logan and McIntosh Counties, ND

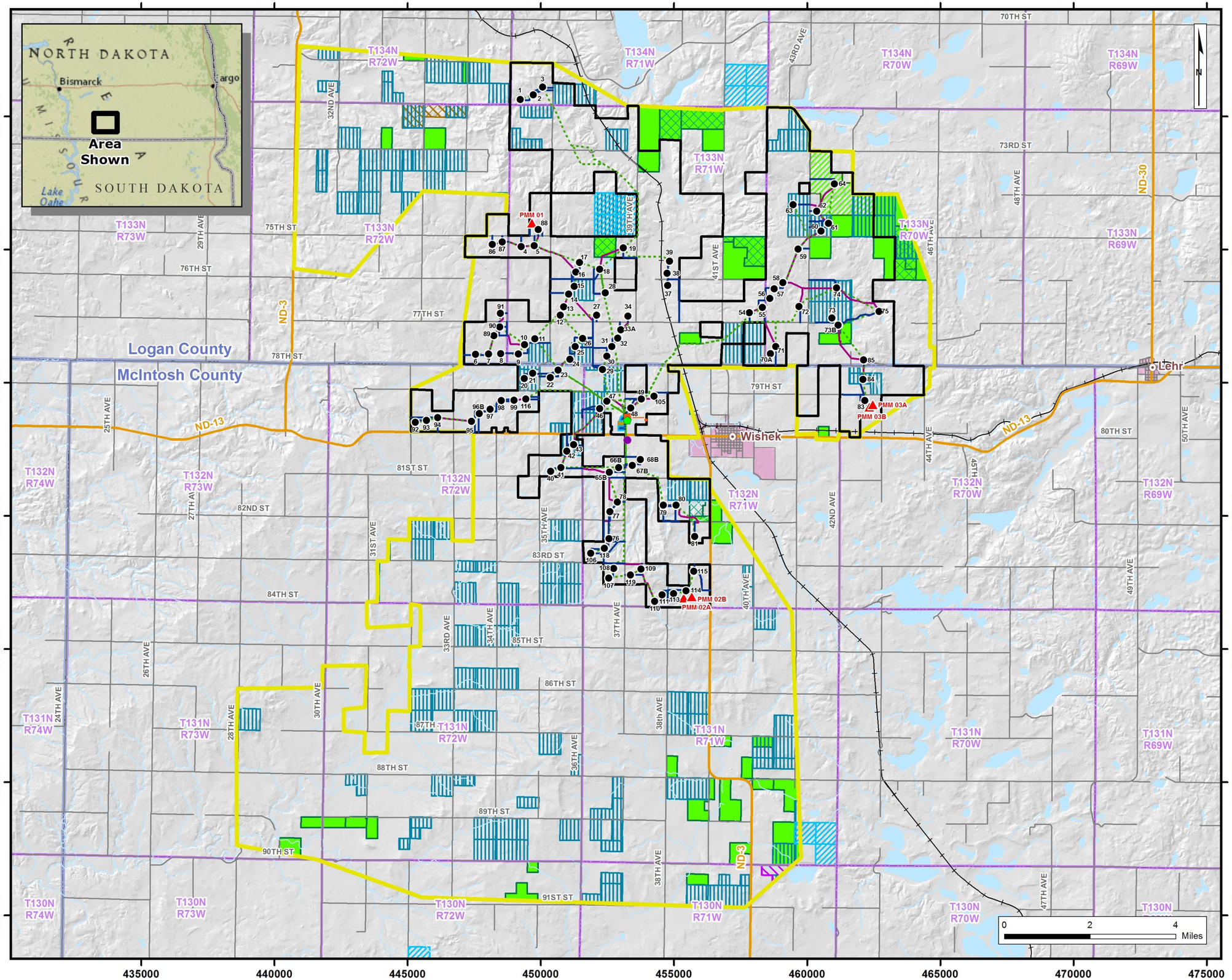
DNV

10455420-240118-PV

January 18, 2024

Projection: NAD83 UTM14

Sources: ESRI, NLCD-USGS, TIGER



Legend

(symbols not to scale)

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- Proposed Permanent MET Tower
- Proposed O&M Building
- Proposed Batch Plant
- Proposed Substation
- Proposed Gen-Tie Line
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- Proposed Access Road
- Proposed Laydown Yard
- Proposed Marshalling Yard
- Project Area
- Study Area
- State Road
- County/Township Road
- Railroad
- City/Village
- Township (PLSS)
- County

Existing Public Lands and Easements

- NDGF PLOTS Land
- North Dakota Trust Land - Surface
- North Dakota Trust Land - Mineral
- USFWS Waterfowl Production Area
- USFWS Grassland Easement
- USFWS Wetland Easement
- USFWS Wetland Easement obtained subsequent to Project lease agreement

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Badger Wind, LLC

Figure 8:
EXISTING PUBLIC LANDS & EASEMENTS
- Wind Energy Facility -
Logan and McIntosh Counties, ND

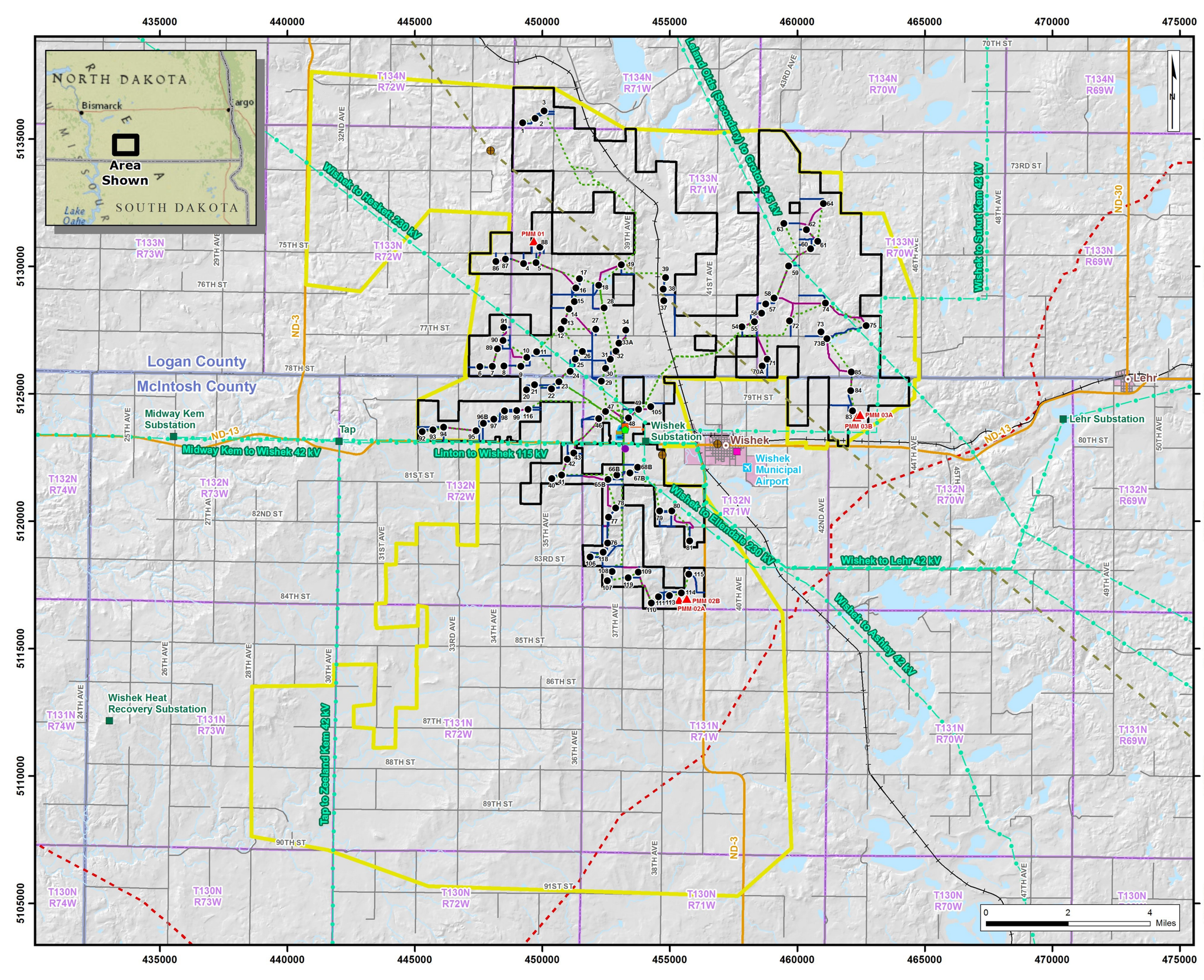
10455420-240118-PV

January 18, 2024

Projection: NAD83 UTM14

Sources: ESRI, NDGF, NDTL, TIGER

DNV



Legend

(symbols not to scale)

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- Proposed Permanent MET Tower
- Proposed O&M Building
- Proposed Batch Plant
- Proposed Substation
- Proposed Gen-Tie Line
- Proposed Underground Collection/Fiber Line
- Proposed Crane Path
- Proposed Access Road
- Proposed Laydown Yard
- Proposed Marshalling Yard
- Project Area
- Study Area
- City/Village
- Township (PLSS)
- County

Existing Infrastructure

- Airport
- School
- Communication Towers
- Existing Substation
- Existing Transmission Line
- Microwave Beam Path
- Natural Gas Pipeline
- State Road
- County/Township Road
- Railroad

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Badger Wind, LLC

Figure 9:
EXISTING INFRASTRUCTURE
- Wind Energy Facility -
Logan and McIntosh Counties, ND

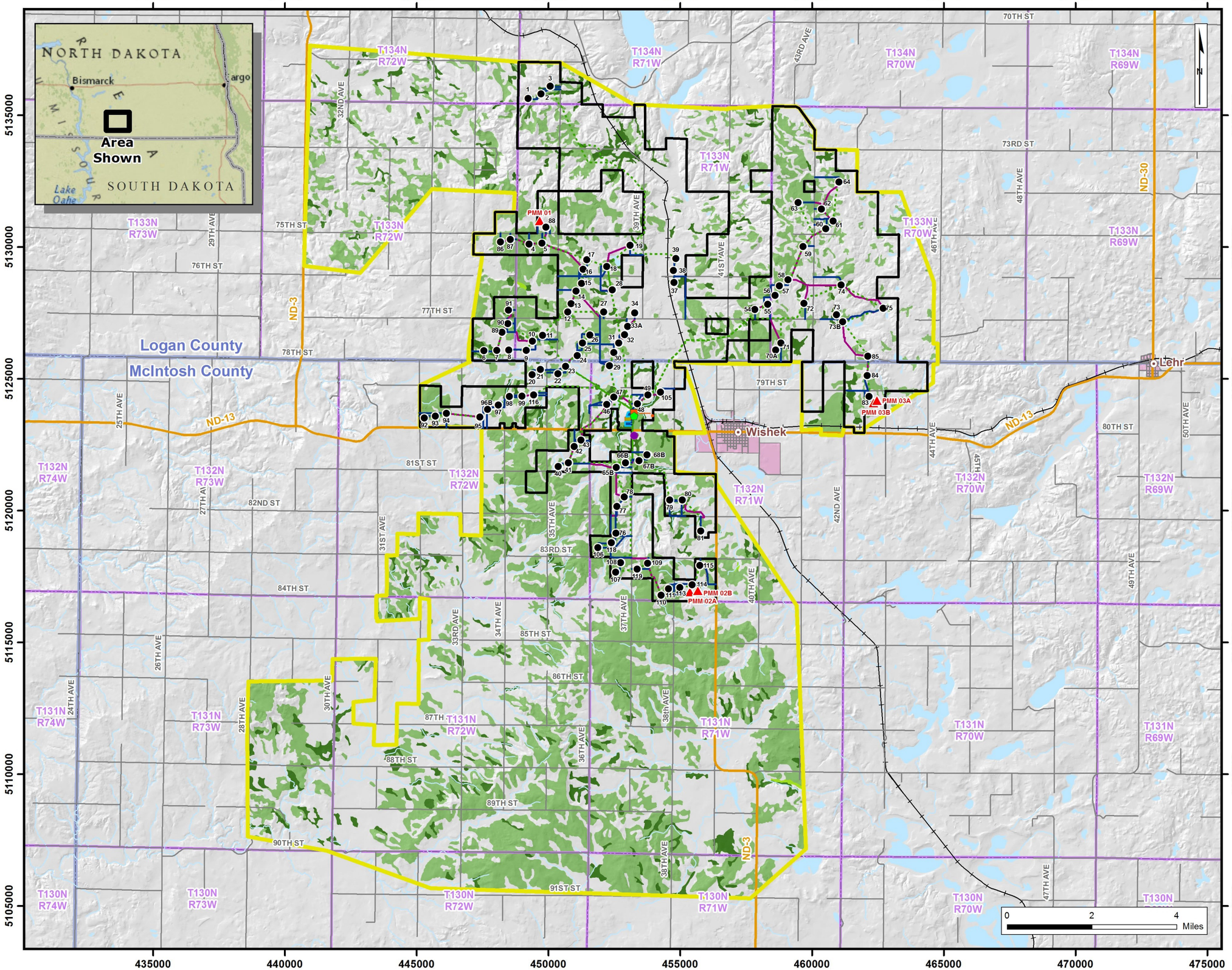
10455420-240118-PV

January 18, 2024

Projection: NAD83 UTM14

Sources: ESRI, TIGER

DNV



Legend

(symbols not to scale)

- Proposed Turbine
- Proposed Permanent MET Tower
- Proposed O&M Building
- Proposed Batch Plant
- Proposed Substation
- Proposed Gen-Tie Line
- Proposed Underground Collection/Fiber Line
- Proposed Crane Path
- Proposed Access Road
- Proposed Laydown Yard
- Proposed Marshalling Yard
- Project Area
- Study Area
- State Road
- County/Township Road
- Railroad
- City/Village
- Township (PLSS)
- County

Farmland Class (gSSURGO-USDA, 2022)

- Prime Farmland
- Farmland of Statewide Importance
- Prime Farmland if drained

Ørsted

Badger Wind, LLC

Figure 10:
PRIME AND UNIQUE FARMLAND
- Wind Energy Facility -
Logan and McIntosh Counties, ND

10455420-240118-PV

January 18, 2024

Projection: NAD83 UTM14

Sources: ESRI, gSSURGO (USDA), TIGER

DNV

435000 440000 445000 450000 455000 460000 465000 470000 475000

5135000 5130000 5125000 5120000 5115000 5110000 5105000



T134N R72W
T134N R71W
T134N R70W
T134N R69W
T133N R73W
T133N R72W
T133N R71W
T133N R70W
T133N R69W
T132N R74W
T132N R73W
T132N R72W
T132N R71W
T132N R70W
T132N R69W
T131N R74W
T131N R73W
T131N R72W
T131N R71W
T131N R70W
T131N R69W
T130N R74W
T130N R73W
T130N R72W
T130N R71W
T130N R70W

70TH ST
73RD ST
75TH ST
76TH ST
77TH ST
78TH ST
79TH ST
80TH ST
81ST ST
82ND ST
83RD ST
84TH ST
85TH ST
86TH ST
87TH ST
88TH ST
89TH ST
90TH ST
91ST ST

43RD AVE
32ND AVE
48TH AVE
ND-30
29TH AVE
39TH AVE
41ST AVE
46TH AVE
ND-3
25TH AVE
ND-13
44TH AVE
50TH AVE
27TH AVE
31ST AVE
35TH AVE
42ND AVE
45TH AVE
49TH AVE
33RD AVE
34TH AVE
37TH AVE
40TH AVE
26TH AVE
24TH AVE
28TH AVE
30TH AVE
38th AVE
36TH AVE
47TH AVE

Logan County
McIntosh County

Wishek
Lehr

PMM 01
PMM 02A
PMM 02B
PMM 03A
PMM 03B

0 2 4 Miles

Legend

(symbols not to scale)

- Proposed Turbine
- Proposed Permanent MET Tower
- Proposed O&M Building
- Proposed Batch Plant
- Proposed Substation
- Proposed Gen-Tie Line
- Proposed Underground Collection/Fiber Line
- Proposed Crane Path
- Proposed Access Road
- Proposed Laydown Yard
- Proposed Marshalling Yard
- Project Area
- Study Area
- State Road
- County/Township Road
- Railroad
- City/Village
- Township (PLSS)
- County

Ground Water Sites (NDDWR, n.d.)

- Domestic Well
- Observation Well
- Stock Well
- Plugged/Test Well
- Unknown Well

- Surficial Aquifer (NDDWR, 2019)

Surface Geology (NDGS, 2023)

- Qop, Qct, Qcoh, Qcdn, Qcdc, Qccu, Qccr, Qcch; Quaternary (clay or mud, silt)
- Qcrh, Qcrf; Quaternary (sand, gravel)
- Kh; Cretaceous Hell Creek Formation (sand and silt)
- Kf; Cretaceous Fox Hills Formation (sand and shale)
- Water

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Badger Wind, LLC

Figure 11:
GEOLOGIC AND GROUNDWATER RESOURCES - Wind Energy Facility - Logan and McIntosh Counties, ND

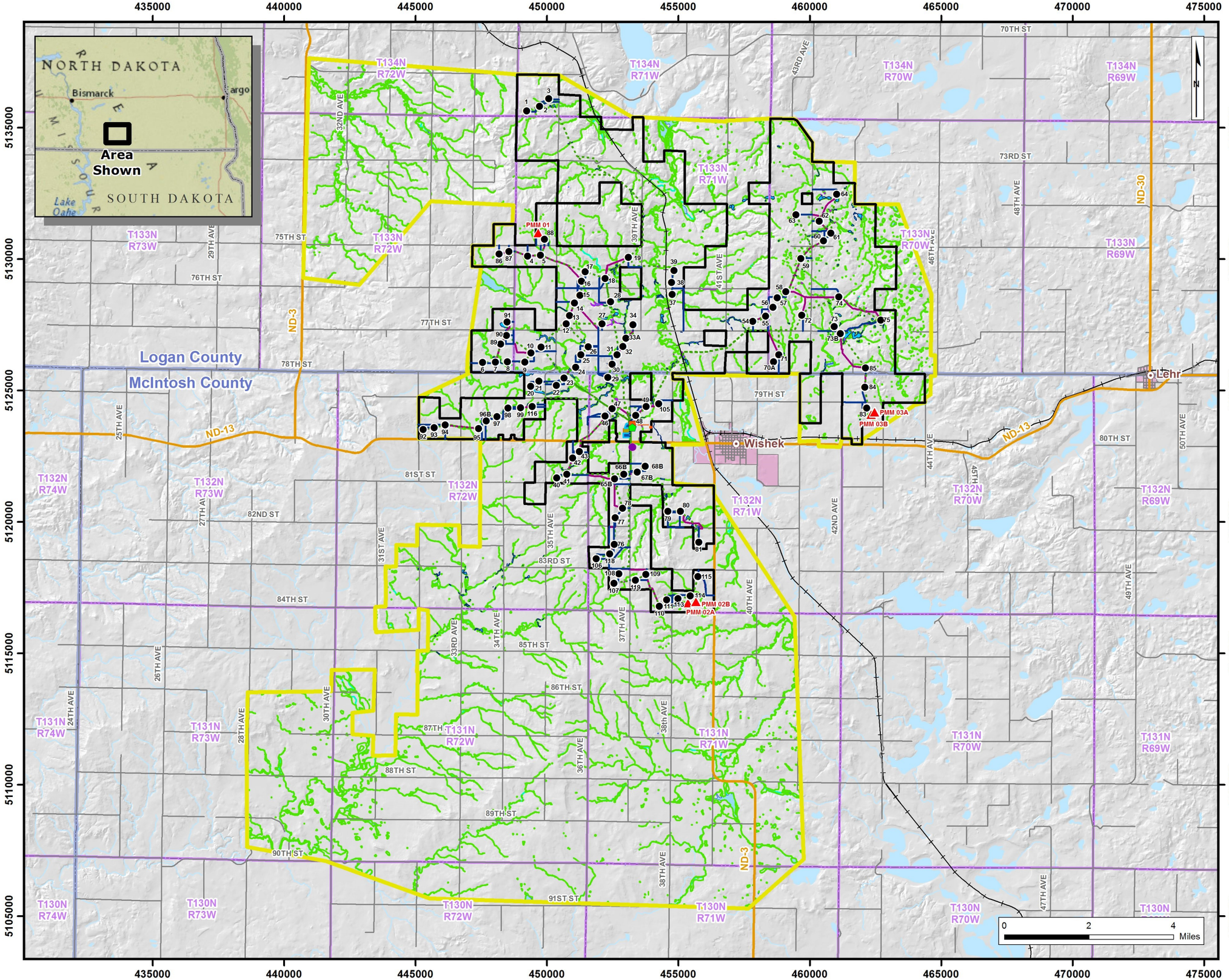
DNV

10455420-240118-PV

January 18, 2024

Projection: NAD83 UTM14

Sources: ESRI, NDDWR, NDGS, TIGER



Legend

(symbols not to scale)

- Proposed Turbine
- Proposed Permanent MET Tower
- Proposed O&M Building
- Proposed Batch Plant
- Proposed Substation
- Proposed Gen-Tie Line
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- Proposed Access Road
- Proposed Laydown Yard
- Proposed Marshalling Yard
- Project Area
- Study Area
- State Road
- County/Township Road
- Railroad
- City/Village
- Township (PLSS)
- County

Hydrography

- Perennial Stream (NHD)
- Intermittent Stream (NHD)
- Waterbody (NHD)
- Field Mapped Wetland (2023)
- Delineated Wetland
- Wetland (NWI)

Ørsted

Badger Wind, LLC

Figure 12:
SURFACE WATER & WETLANDS
- Wind Energy Facility -
Logan and McIntosh Counties, ND

10455420-240118-PV

January 18, 2024

Projection: NAD83 UTM14

Sources: ESRI, NHD (USGS), NWI (USFWS), TIGER

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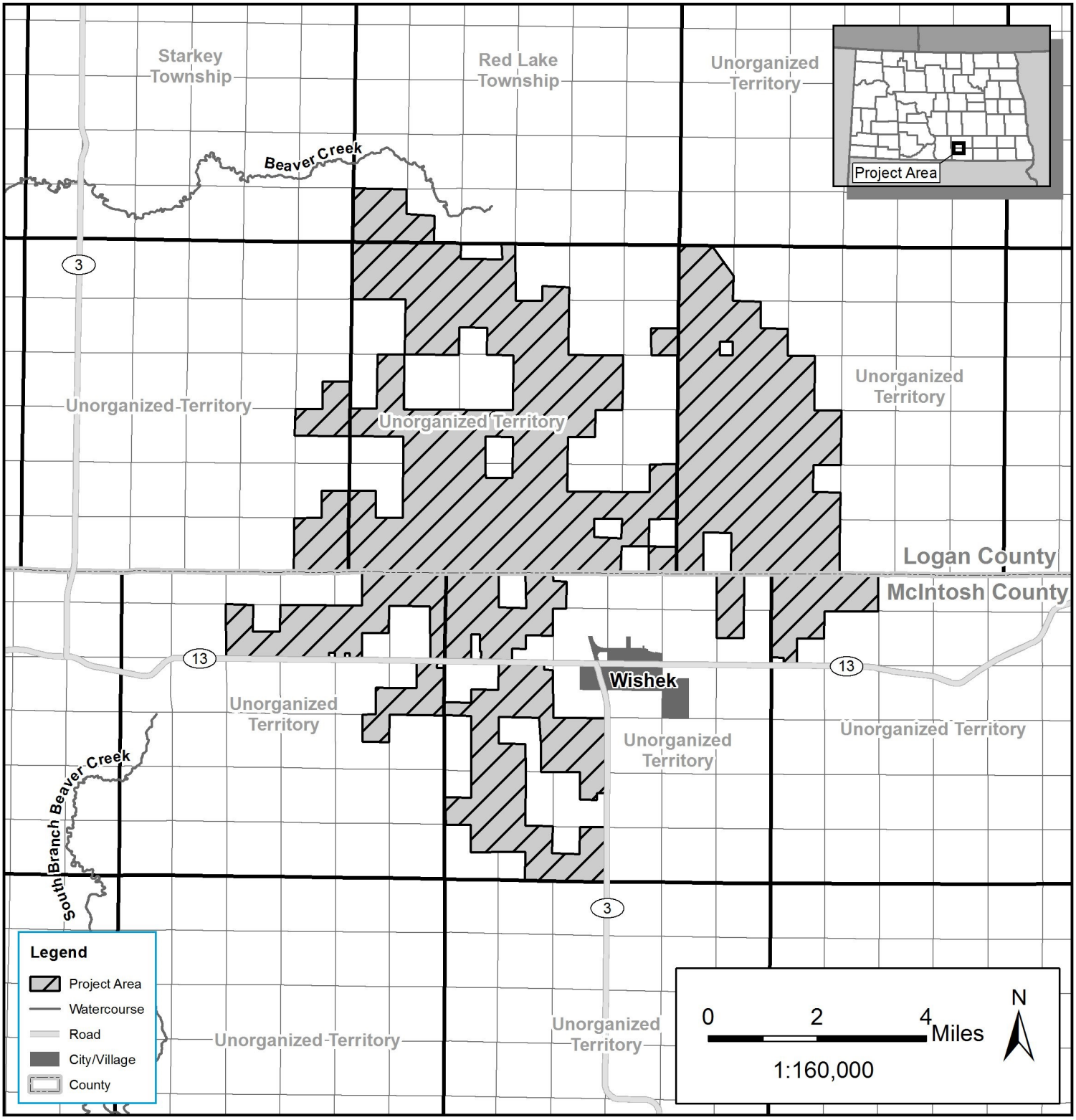

Badger Wind Project

Logan and McIntosh Counties, North Dakota

Appendix A
Badger Wind, LLC / Ørsted Policy Statement

Badger Wind, LLC
February 2024

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Badger Wind LLC Policy and Commitments to the Environment

Badger Wind, LLC ("Badger"), with the assistance of Ørsted Onshore North America's team of environmental siting/permitting professionals, engineering professionals and third-party consultants, is committed to identifying and avoiding or minimizing potential impacts from the Badger Wind Project ("Project") to the extent practicable. Throughout the project development, Badger Wind voluntarily followed the U.S. Fish and Wildlife Service ("USFWS") Land-Based Wind Energy Guidelines, the USFWS Eagle Conservation Plan Guidance and other agency guidance and recommendations to identity sensitive resources early in the siting process and then factored those resources into the Project's design. In addition, following Ørsted's standard practice, Badger Wind will prepare a Bird and Bat Conservation Strategy ("BBCS") for the Project, documenting its ongoing commitment to minimizing and managing potential impacts to environmental resources throughout the life of the Project.

Appendix B
Badger Wind, LLC's Ten-Year Plan

Badger Wind, LLC
February 2024

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TEN YEAR PLAN: 2024-2034
Badger Wind, LLC

February 14, 2024

In accordance with N.D.C.C. § 49-22-04 and N.D.A.C. Ch. 69-06-02, Badger Wind, LLC ("Badger Wind"), submits the following Ten Year Plan for years 2024 through 2034.

(1) A description of the general location, size, and type of all facilities to be owned or operated by the utility during the ensuing ten years, as well as those facilities to be removed from service during the ten-year period.

Badger Wind is a Delaware limited liability company, authorized to do business in the State of North Dakota. Badger Wind is developing a wind energy conversion facility known as the Badger Wind Project (the "Project") located in western Logan and McIntosh Counties, North Dakota. On May 11, 2022, Logan County issued a Conditional Use Permit ("CUP") for the Project. On November 30, 2022, The North Dakota Public Service Commission ("Commission") issued Findings of Fact, Conclusions of Law and Order ("Order") granting Certificate of Site Compatibility ("CSC") No. 64 to Badger Wind for the Project (*see* Case No. PU-22-086). Since then, Badger Wind has made updates to the Project, which include expanding the Project boundary and design modifications. The Project will have a nameplate capacity of up to 262.26 megawatts ("MW"), with up to 250 MW delivered to the grid. Badger Wind submitted a new CUP application to Logan County in December 2023 and anticipates submitting an application to amend the CSC to the Commission in the first quarter of 2024. McIntosh County has not enacted a zoning ordinance, so a zoning permit from McIntosh County is not required for the Project. Badger Wind is filing this updated Ten Year Plan to reflect the expanded Project area and modifications to the Project design.

The Project will interconnect to the grid via a short (less than one mile in length) 230 kilovolt ("kV") generation interconnection tie line extending from the Project's collector substation to the point of interconnection, the Midwest Independent System Operator ("MISO") system at Montana-Dakota Utilities Company's ("MDU") existing Wishek Junction 230 kV substation located in McIntosh County, North Dakota. The generation interconnection line will be less than one mile long and, therefore, is not subject to the jurisdiction of the Commission as a "transmission facility."

Other than the Project, Badger Wind does not have any transmission or generation facilities located in North Dakota. The Project will have an estimated life of greater than 10 years. As such, Badger Wind does not have any plans to decommission any transmission or generation facilities within the timeframe of this plan.

(2) An identification of the location of the tentative preferred site for all energy conversion facilities and the tentative location of all transmission facilities on which construction is intended to be commenced within the ensuing five years and such other information as may be required by the commission. The site and corridor identification shall be made in compliance with the criteria published by the commission pursuant to section 49-22-05.1.

As noted above, the Project footprint is located in McIntosh and Logan Counties, North Dakota, approximately two miles from Wishek, North Dakota. Badger Wind proposes to have the Project in-service as early as 2025 or by 2026. The Project will interconnect at MDU's Wishek Junction substation located in McIntosh County, North Dakota.

The location of the Project complies with the Commission's siting criteria, including the exclusion and avoidance area criteria referenced in N.D.C.C. § 49-22-05.1 and identified in N.D.A.C. Ch. 69-06-08. A map depicting the current Project area is attached as **Exhibit A**.

(3) A description of the efforts by the utility to coordinate the plan with other utilities to provide a coordinated regional plan for meeting the utility needs of the region.

Badger Wind is in the process of identifying an offtaker for the Project's output. Energy produced by the Project may help local or regional utilities to meet applicable renewable energy needs. Additionally, Badger Wind has executed a Generation Interconnection Agreement with MISO for the interconnection of the Project at MDU's Wishek substation.

(4) A description of the efforts to involve environmental protection and land-use planning agencies in the planning process, as well as other efforts to identify and minimize environmental problems at the earliest possible stage in the planning process.

Badger Wind engaged the services of qualified environmental consulting firms to study and identify avoidance and exclusion areas within the Project site, in accordance with N.D.C.C. Ch. 49-22 and N.D.A.C. Ch. 69-06-08. As discussed above, Logan County issued a CUP for the Project on May 11, 2022, and the Commission issued CSC No. 64 for the Project on November 30, 2022 (*see* Case No PU-22-086). As noted above, Badger Wind submitted a new CUP application to Logan County in December 2023 and anticipates submitting an application to amend the CSC to the Commission in the first quarter of 2024. Updates to the Project area and design will continue to comply with Commission's siting criteria.

Additionally, Badger Wind has consulted with applicable local, state, and federal agencies and entities in connection with siting and development of the Project, including the United States Fish and Wildlife Service, the Federal Aviation Administration, the North Dakota Game and Fish Department, the State Historical Society of North Dakota, McIntosh County, and Logan County. Badger Wind will continue to coordinate with agencies and entities, as appropriate, throughout the development, construction, and operation of the Project.

Additional information regarding Badger Wind's agency and entity contacts, and efforts to identify and minimize any potential environmental issues, is provided in Case No. PU-22-086.

(5) A statement of the projected demand for the service rendered by the utility for the ensuing ten years and the underlying assumptions for the projection, with that information being as geographically specific as possible, and a description of the manner and extent to which the utility will meet the projected demands.

As discussed above, Badger Wind is in the process of identifying an offtaker for the Project's output. Badger Wind is actively marketing the Project to a number of potential offtakers and may sell the power in the form of a power purchase agreement ("PPA"), directly on

the merchant market, or the Project could be sold and directly owned and operated by a utility. As an independent power producer, Badger Wind is able to bid into a variety of markets and contractual structures. The updates to the original Project footprint and layout significantly strengthen the underlying Project fundamentals by increasing the Project's net capacity factor, thereby strengthening Badger Wind's market position.

Utilities, commercial, and industrial customers seeking to diversify and build their energy generation portfolios are attracted to wind energy projects because of their ability to offer long-term contracts at a fixed and competitive price while simultaneously providing the associated environmental benefits to meet existing and future renewable energy procurement and sustainability goals and mandates. In North Dakota, excellent wind resources create high-capacity factor generation, reducing the cost/megawatt hour ("MWh"), and increasing the attractiveness of projects in the region. In general, renewable energy sources provide lower costs per megawatt hour than conventional sources.[1] Thus, the Project could help satisfy local, regional, or even national renewable energy demands.

Locally, in 2021, the North Dakota Legislature enacted a statutory provision adopting a low-emission technology initiative, which establishes a goal that the "agricultural, forestry, natural resources, and working land of the United States should provide energy from low-emission technology and continue to produce safe, abundant, and affordable food, fuel, feed, and fiber."[2] As used in this initiative, low-emission technology includes, among others, wind. Additional renewable resources will be needed to meet the low-emission technology initiative.

Also, in 2010, the North Dakota Department of Commerce, EmPower ND Commission, published the Comprehensive State Energy Policy 2010-2025, which recommended a capacity of wind generation up to 5,000 MW by 2020.[3] The state had a total of 4,302 MW of installed wind capacity at the end of 2020.[4] With improving technology and falling costs, utilities are beginning to include renewable energy projects in their resource plans as long-term economic energy and capacity resources. As noted above, in North Dakota, excellent wind resources create high capacity factor generation, reducing the cost/MWh, and in general, alternative energy sources provide lower costs per MW-hour than conventional sources.[5] Wind and solar costs have fallen 41 and 57 percent, respectively, over the last decade, making them the most

---

[1] Lazard, *Lazard's Levelized Cost of Energy Analysis – Version 16.0* (April 2023), at 2. Accessed online January 8, 2024. Retrieved from https://www.lazard.com/media/typdgxmm/lazards-lcoeplus-april-2023.pdf.

[2] *See* N.D.C.C. § 17-01-01.

[3] North Dakota Department of Commerce. Undated. EmPower North Dakota. Comprehensive State Energy Policy 2010-2025. Accessed online January 8, 2024. Retrieved from https://www.commerce.nd.gov/sites/www/files/documents/ED%26F/Energy/empower%20state%20energy%20report.pdf.

[4] U.S. Department of Energy. 2023. Land-Based Wind Market Report. Accessed online December 28, 2023. Retrieved from https://www.energy.gov/sites/default/files/2023-08/land-based-wind-market-report-2023-edition.pdf.

[5] Lazard, *Lazard's Levelized Cost of Energy Analysis – Version 16.0* (April 2023), at 2. Accessed online December 28, 2023. Retrieved from https://www.lazard.com/media/typdgxmm/lazards-lcoeplus-april-2023.pdf.

affordable new electricity sources in most of the U.S.[6] By the end of 2022, 27 states were generating at least 10 percent of electricity from wind, utility-scale solar, and small-scale solar.[7]

A need also exists for renewable energy produced in North Dakota to meet state renewable portfolio standards. Ten of the MISO states currently have either mandated or voluntary renewable portfolio standards or policies.[8] Under current state standards, aggregate United States renewable portfolio standard demand more than doubles from 400 terawatt hours ("TWh") in 2023 to 900 TWh in 2050.[9] Given existing renewable energy capacity, roughly 300 TWh of additional clean electricity supply will be required by 2030 and 800 TWh by 2050.[10] In addition, the regional transmission grid is being expanded to deliver wind generation in a cost-effective manner; specifically, MISO's Multi-Value Project ("MVP") Portfolio is expected to enable 41 million megawatt hours ("MWh") of wind energy per year to meet renewable energy mandates and goals.[11]

In addition to traditional utility demand for wind energy, a growing number of corporations are turning to renewable energy to save money on energy and meet sustainability goals. Corporate customers either purchase renewable energy directly or obtain renewable benefits and cost savings through financially settled contracts, sometimes called virtual PPAs. In addition, many utilities are creating "green tariffs," which allow customers to purchase up to 100 percent renewable energy from the utility.[12]

Beyond the growing demand from utilities, corporations such as Apple, Google and Facebook, along with many others, have recently set goals to obtain 100 percent of their energy from renewables. These clean energy goals fuel the demand for corporate renewables procurement and subsequent PPAs. According to Wood Mackenzie's report titled an "*Analysis of Commercial and Industrial Wind Energy Demand in the United States*," the United States is "at the beginning stage of a corporate renewables procurement boom," with approximately "85 gigawatts of renewable energy demand" from the "largest U.S. companies" alone through

---

[6] American Clean Power, 2022 American Clean Power Annual Market Report (2022). Retrieved from https://cleanpower.org/wp-content/uploads/2023/05/2022-ACP-Annual-Report_Public.pdf ("2022 ACP Market Report").

[7] 2022 ACP Market Report.

[8] U.S. Energy and Information Administration, Renewable energy explained, Portfolio standards (last updated November 30,2022). Accessed online January 8, 2024. Retrieved from https://www.eia.gov/energyexplained/renewable-sources/portfolio-standards.php.

[9] *See* Lawrence Berkeley National Laboratory, U.S. Renewable Portfolio Standards, 2023 Annual Status Report (June 2023), at 23. Retrieved from https://eta-publications.lbl.gov/sites/default/files/lbnl_rps_ces_status_report_2023_edition.pdf.

[10] *See* Lawrence Berkeley National Laboratory, U.S. Renewable Portfolio Standards, 2023 Annual Status Report (June 2023), at 23.

[11] MTEP18 MISO Transmission Enhancement Plan, at 42. Accessed online January 12, 2024. Retrieved from https://cdn.misoenergy.org/MTEP18%20Full%20Report264900.pdf.

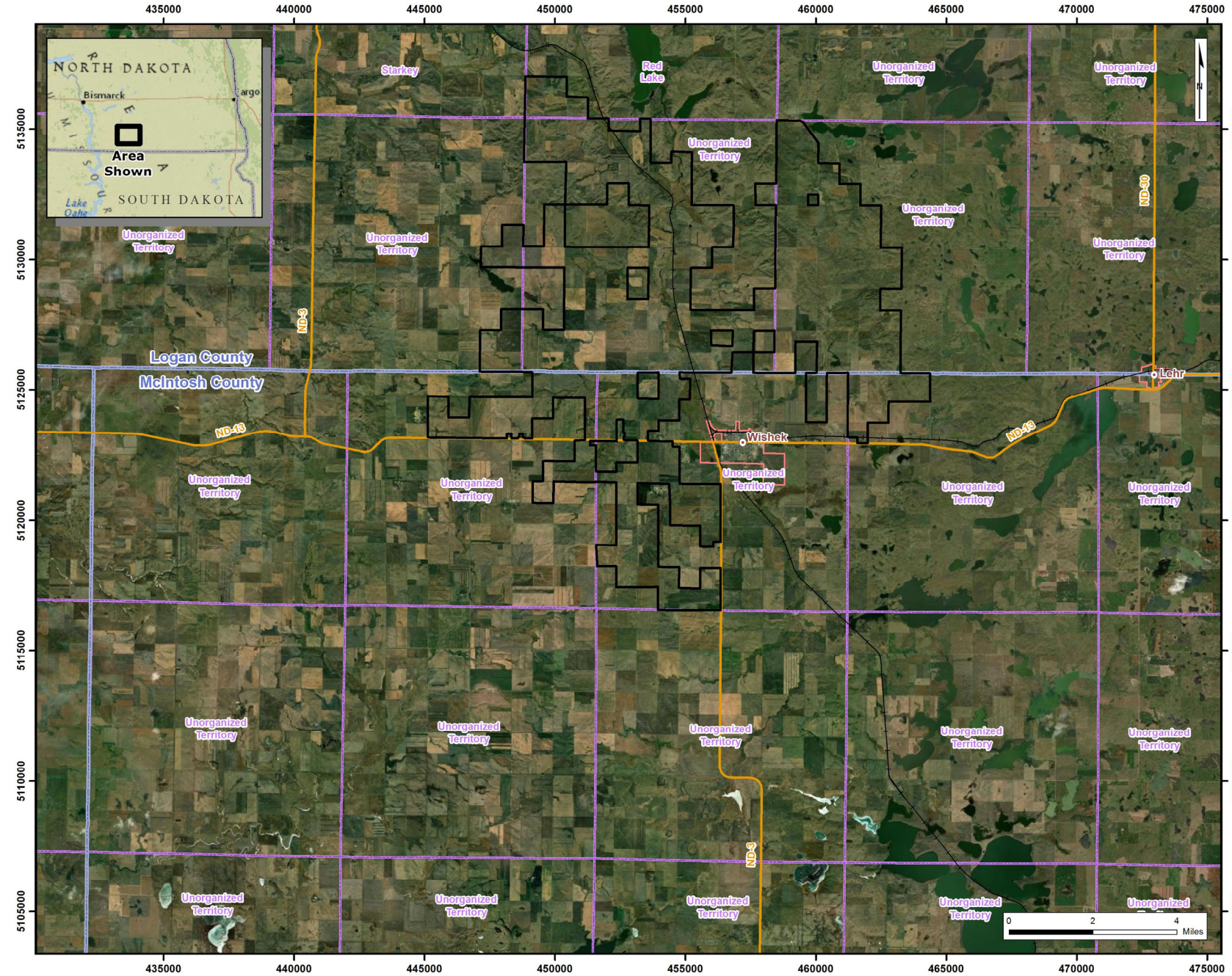
[12] U.S. Environmental Protection Agency – Green Power Partnership. Guide to Purchasing Green Power. Chapter 4. Retrieved from https://www.epa.gov/sites/default/files/2016-01/documents/purchasing_guide_for_web.pdf.

2030.[13] Further, the buyers are not just large corporations; smaller companies are entering into aggregated purchasing models and further driving additional market expansion.[14]

In summary, the renewable energy produced by Badger Wind's Project will be positioned to help meet local renewable energy initiatives/goals, the regional need for renewable energy, and national C&I customer demand.

[13] Wood Mackenzie, *Corporates usher in new wave of US wind and solar growth* (Aug. 20, 2019). Accessed online December 28, 2023. Retrieved from https://www.woodmac.com/our-expertise/focus/Power--Renewables/corporates-usher-in-new-wave-of-u.s.-wind-and-solar-growth/.

[14] Emma Foehringer Merchant, *2018 Was Record Year for Corporate Clean Energy Contracts* (Jan. 31, 2019). Accessed online December 28, 2023. Retrieved from https://www.greentechmedia.com/articles/read/reports-confirm-a-record-year-for-corporate-clean-energy-contracts#gs.nxat51.



Legend

- Project Area
- State Road
- Railroad
- City/Village
- Township
- County

Ørsted

Badger Wind, LLC

Exhibit A:
PROJECT AREA
- Wind Energy Facility -
Logan and McIntosh Counties, ND

10455420-240118-PV

DNV

January 18, 2024

Projection: NAD83 UTM14
Sources: ESRI, TIGER

Appendix C
Updated Telecommunications Studies

Badger Wind, LLC
February 2024

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BADGER WIND FARM

Telecommunications Study

Badger Wind, LLC

Document No.: 10455420-HOU-R-04
Issue: B**, Status:** Final
Date: 26 January 2024





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Project name:	Badger Wind Farm	DNV Energy USA Inc.
Report title:	Telecommunications Study	9665 Chesapeake Dr., Suite 435, San
Customer:	Badger Wind, LLC	Diego, CA 92123 USA
	401 N Michigan Ave, Suite 501	Tel: +1 619 340 1800
	Chicago, IL 60611	Enterprise No.: 23-2625724
Contact person:	Andrew Krieger	
Date of issue:	26 January 2024	
Project No.:	10455420	
Proposal Reference:	315673-HOU-P-01-B	
Document No.:	10455420-HOU-R-04	
Issue/Status:	B/Final	

Task and objective:
This report presents the results of a telecommunication analysis conducted by DNV on behalf of Badger Wind, LLC.

Prepared by:	Verified by:	Approved by:
Aren Nercessian Project Siting Engineer, Environment and Permitting Services	David De Caro Midwest Permitting Manager, Environment and Permitting Services	Gabriel Constantin Director, Environment and Permitting Services

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Keywords:

Telecommunication, Badger Wind Farm, North Dakota

Issue	Date	Reason for Issue	Prepared by	Verified by	Approved by
B	26 January 2024	Telecommunication Study	A. Nercessian	D. De Caro	G. Constantin

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1 INTRODUCTION

Badger Wind, LLC (the “Customer”) retained DNV Energy USA Inc. (“DNV”) to conduct a Telecommunication study for Badger Wind Farm (the “Project”) located in Logan County and McIntosh County, North Dakota.

The objective of this analysis is to understand the potential impacts from the Project on nearby radiocommunication and radar systems. This analysis included a detailed review all registered radiocommunication and radar systems within the vicinity of the Project, an evaluation of the potential for interference with these systems, and the development of recommendations based on these results.

2 DESCRIPTION OF THE WIND FARM SITE

2.1 Site description

The Project is situated in relatively simple terrain, consisting of flat farmland, with wind turbine base elevations ranging from approximately 2,000 ft to 2,200 ft above sea level. The ground cover on and near the site is primarily composed of farmland and open fields. Dwellings are interspersed throughout the Project site.

The site is in Logan County and McIntosh County, west of the town of Wishek, North Dakota.

2.2 Wind farm layout and turbine model

The Project layout considered for the analysis includes 103 GE 2.8-127 wind turbine generators with a hub height of 89 m (292 ft). The turbine layout was provided by the Customer [1]. Of the 103 turbine positions, up to 93 of them will be built.

The GE 2.8-127 has a maximum blade tip height of 152.5 m (500 ft), a hub height of 89 m (292 ft), and a rotor diameter of 127 m (417 ft).

3 SYSTEMS INVENTORY

For the purpose of this assessment, the following data review and analysis was conducted by DNV:

- Review of the Federal Communications Commission (FCC) Universal Licensing System (ULS) and information related to microwave systems, air navigation aids, broadcast stations (TV, FM, AM), cellular systems, mobile stations, and radars;
- Review of the Renewable Energy and Defense (READ) Geospatial Database for radar sites (air route surveillance, airport surveillance, NEXRAD weather);
- Review of the US Department of Defense (DoD) Military Installations, Ranges and Training Areas (MIRTA) data; and
- Analysis of licensed microwave paths, including the calculation of the microwave beam width.

Noteworthy assumptions and methodologies used to complete the impact assessment are listed below:

- Private, unlicensed, or governmental radiocommunication systems that are not currently registered with the FCC were not included in this analysis. Therefore, the potential for impact on such systems has not been assessed in this report. DNV has initiated the consultation process with the NTIA to address any possible issues related to such systems.
- The coordinates available through the FCC ULS may be inaccurate. DNV validated the FCC systems in the vicinity of the Project site using aerial imagery, where possible, and through a field validation for one system (WSR667) within the Project site.

3.1 Results

The results of the telecommunication analysis are summarized in the following tables and figure.

Table 1 Radiocommunication Systems within 1 km of Project Wind Turbines

Call Sign	Radio Service Code	Description	Frequency (MHz)	Distance from closest Wind Turbine (km)	Latitude (NAD83)	Longitude (NAD83)	Location	City	Licensee	Contact
WSR667	IG	Land mobile	460.65	0.52	46.266444	-99.714528	7971 32 ND Ave SE - Jahner Landfill	Wishek	Waste Management Holdings, Inc	APCO International, Inc Karen A Sowers 351 N Williamson Blvd Daytona Beach, FL 32114

Note: The Customer verified this location during a field visit. The antenna is placed on the roof of a building (not on a tower) with a listed height of 13 m in the ULS database. This height is lower than the bottom extremity of the circular turbine rotor swept area, and the risk of interference of this signal, through signal scattering by rotating blades, is therefore greatly reduced to a very low level. All other Land mobile or Cellular Systems are located beyond 1 km from a turbine and are not expected to pose interference risks.

Table 2 Television Broadcasting Stations

Call Sign	Distance from closest turbine (km)	Distance from closest turbine (mi)	Latitude (NAD83)	Longitude (NAD83)	Station Location	Licensee Name
KXMB-TV	91.3	56.7	46.589717	-100.806518	Bismarck	Nexstar Media Inc.
KJRE	47.6	29.6	46.298859	-98.866216	Ellendale	Prairie Public Broadcasting, Inc.
KBME-TV	90.9	56.5	46.589717	-100.80124	Bismarck	
KFYR-TV	91.8	57.1	46.605634	-100.80774	Bismarck	Gray Television Licensee, LLC

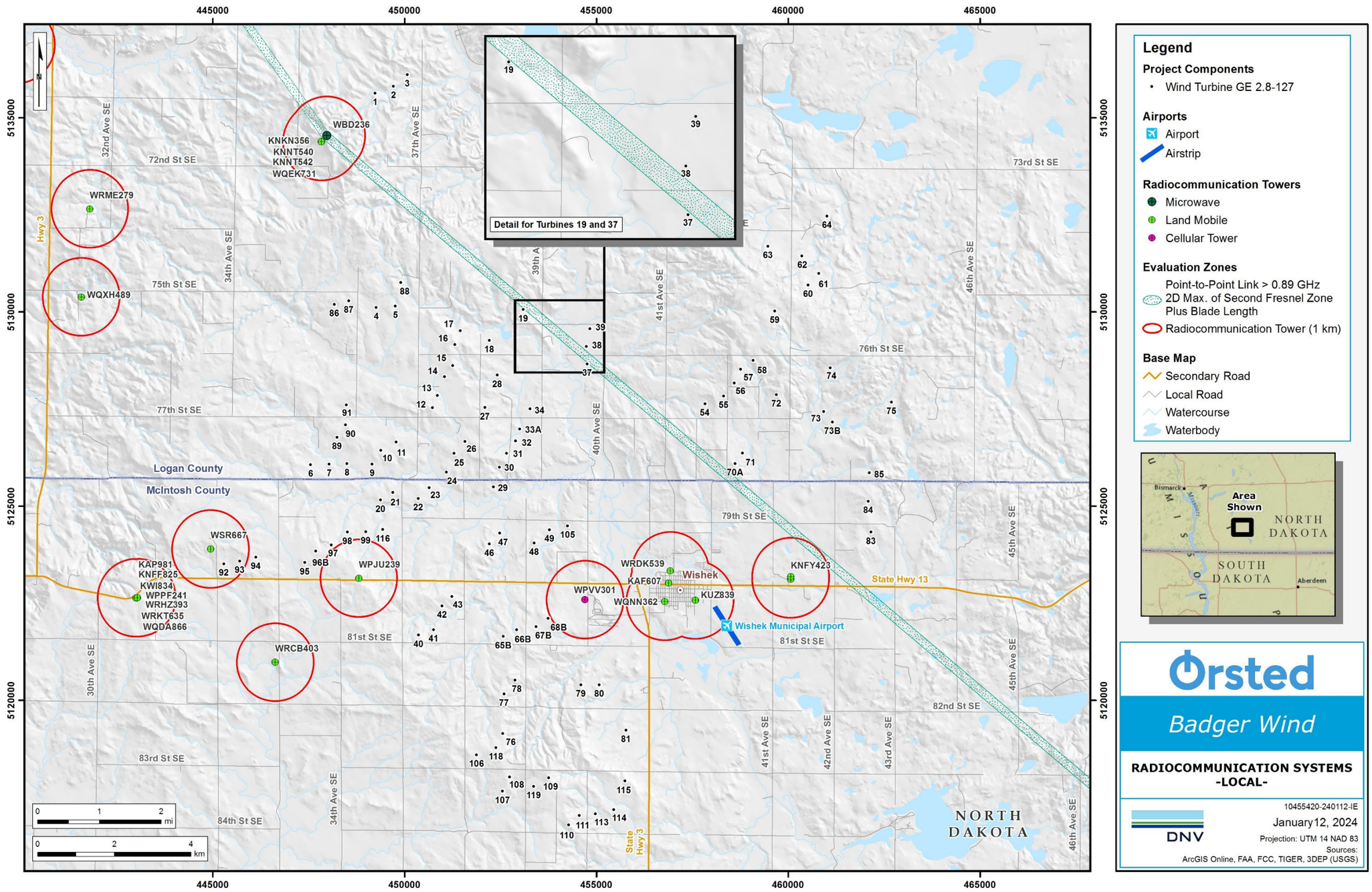
Note: DNV did not identify any TV broadcasting stations within 5 km of any of the Project turbines. Significant signal obstruction or shadowing is not expected beyond this distance.

The table above presents only the stations with TV service contours that potentially overlap Project turbines. These were evaluated for signal reflection risks.

DNV performed a baseline TV signal evaluation in 2022 [2], which concluded that signals from the TV stations listed above were “generally poor” and too weak to provide “sufficient signal strength for proper reception in Wishek and Lehr”. Only two stations (KXMB and KFYR) had adequate coverage in the town of Napoleon. However, no interference is expected in that case because the Project is farther away from those broadcasting towers than the town of Napoleon itself. Similarly, dwellings outside those population centers are expected to also have poor signals or otherwise not be close enough to turbines to experience signal reflection interference.

DNV also performed a review of potential interference risks to military aids, air navigation aids, or weather radars, summarized below:

- The closest NEXRAD weather radars are located in Aberdeen and Bismarck airports at distances of approximately 60 miles and 76 miles respectively. Beyond 50 km (31 miles), the risk of interference is deemed negligible for such radars.
- The closest NORAD radar (Finley ARSR-4) is located 111 miles away from the Project, beyond the 75 nautical mile (NM) (or 86 mile) evaluation zone for this specific radar [3], and does not pose notable interference risk from the Project.
- The closest air surveillance radars are located 60 miles and 81 miles away at Bismarck and Gettysburg. No notable risk is anticipated at these distances, pending review by the FAA.
- No military flight training routes overlap with the Project.



Legend

Project Components
- Wind Turbine GE 2.8-127

Airports
- Airport
- Airstrip

Radiocommunication Towers
- Microwave
- Land Mobile
- Cellular Tower

Evaluation Zones
- Point-to-Point Link > 0.89 GHz 2D Max. of Second Fresnel Zone Plus Blade Length
- Radiocommunication Tower (1 km)

Base Map
- Secondary Road
- Local Road
- Watercourse
- Waterbody

Ørsted

Badger Wind

RADIOCOMMUNICATION SYSTEMS -LOCAL-

10455420-240112-IE

DNV

January12, 2024

Projection: UTM 14 NAD 83

Sources: ArcGIS Online, FAA, FCC, TIGER, 3DEP (USGS)

Figure 1 Telecommunication Systems and Turbine Layout

4 CONCLUSIONS AND RECOMMENDATIONS

Based on the systems inventory and impact assessment completed for the Project, DNV has reached the following conclusions:

The risk of interference (obstruction or reflection) with broadcasting systems (TV, AM, FM) is low. Although several TV and AM towers have broadcast service contours of varying intensity that overlap the Project area, the low population density near the turbines and the large distances from the broadcasting towers and adequate spacing between turbines and residences significantly alleviates the risk of signal-related problems at residences. DNV notes the following:

- AM signals: The nearest AM tower is located 81 km (over 50 miles) from the nearest Project turbine. Signal obstruction is unlikely at this distance.
- FM signals: The nearest FM tower is located 64 km (40 miles) from the nearest Project turbine. Signal obstruction is unlikely at this distance.
- TV signals: The nearest digital TV tower (KJRE) is located 48 km (30 miles) from the nearest Project turbine. Signal obstruction is unlikely at this distance.

DNV's recommended setbacks between wind turbines and broadcast towers vary from 2 km (1.2 miles) to 15 km (9.3 miles) depending on the system. There are no turbines within those distances.

In the unlikely event of observed broadcast signal degradation at residences after the start of commercial operation, possible mitigations could be implemented. Such a mitigation measures may include actions such as installing better quality rooftop antennas or paying for a cable or satellite TV/radio subscription at the impacted residences.

- According to the FCC inventory, one land mobile system (WSR667) is located just under 1 km from turbines 92 and 93 (see Figure 1), which is DNV's recommended "best practice" evaluation zone. As the location of this antenna could not be verified using aerial imagery, the Customer performed a field survey to verify its location. The antenna is placed on the roof of a building (not on a tower) with a listed height of 13 m above ground in the ULS database. This height is lower than the bottom extremity of the circular turbine rotor swept area, and the risk of interference of this signal by rotating blades is therefore greatly reduced to a very low level.
- One high-frequency microwave link between towers with call signs WBD235 and WBD236 has been identified overlapping the Project area. Turbines 19 and 37 are the closest turbines to the beam path and have been positioned in a way that clears the recommended setback distance. No adverse impact is expected.
- A high-level review of air navigation systems and weather radar demonstrates that the risk of interference with such systems is low. However, this needs to be confirmed through the FAA permitting process and the NTIA consultation. These applications are currently under way.

The overall risk of interference caused by the Project turbines for the types of communication systems investigated herein is low.

5 REFERENCES

[1] Badger Wind Turbine locations received 9 November 2023

[2] DNV. *10306372-HOU-R-04-B. TV Signal Baseline Measurements*. 26 August 2022.

[3] NORAD radars of concern – proposed setbacks. August 7 2023.

APPENDIX A – WIND TURBINE COORDINATES

ID	UTM Zone 14, NAD 83 Datum	
	Easting [m]	Northing [m]
1	449232	5135638
2	449714	5135812
3	450071	5136111
4	449260	5130118
5	449758	5130152
6	447550	5126069
7	448035	5126080
8	448497	5126098
9	449154	5126084
10	449386	5126438
11	449781	5126652
12	450728	5127537
13	450860	5127853
14	451041	5128333
15	451256	5128620
16	451315	5129160
17	451460	5129521
18	452210	5129270
19	453099	5130065
20	449376	5125160
21	449699	5125356
22	450359	5125200
23	450646	5125478
24	451091	5125879
25	451295	5126363
26	451577	5126666
27	452097	5127541
28	452421	5128376
29	452323	5125495
30	452479	5126004
31	452664	5126361
32	452894	5126680
33A	453003	5126987
34	453276	5127510
37	454764	5128664

ID	UTM Zone 14, NAD 83 Datum	
	Easting [m]	Northing [m]
38	454742	5129112
39	454835	5129566
40	450370	5121682
41	450760	5121822
42	450982	5122434
43	451235	5122676
46	452216	5124027
47	452481	5124306
48	453381	5124054
49	453778	5124395
54	457834	5127638
55	458325	5127835
56	458601	5128175
57	458765	5128525
58	459094	5128759
59	459656	5130026
60	460523	5130695
61	460803	5130994
62	460359	5131441
63	459474	5131693
64	461020	5132473
65B	452574	5121646
66B	452928	5121822
67B	453431	5121899
68B	453743	5122114
70A	458619	5126099
71	458816	5126367
72	459697	5127871
73	460934	5127435
73B	461159	5127167
74	461104	5128566
75	462699	5127679
76	452565	5119147
77	452596	5120163
78	452882	5120526

ID	UTM Zone 14, NAD 83 Datum	
	Easting [m]	Northing [m]
79	454604	5120400
80	455082	5120401
81	455774	5119232
83	462165	5124334
84	462095	5125131
85	462125	5125862
86	448174	5130196
87	448552	5130291
88	449901	5130762
89	448243	5126773
90	448461	5127094
91	448482	5127610
92	445292	5123520
93	445705	5123590
94	446125	5123690
95	447398	5123549
96B	447688	5123845
97	448092	5124004
98	448512	5124333
99	448991	5124344
105	454252	5124496
106	451880	5118601
107	452555	5117661
108	452740	5118025
109	453762	5118008
110	454279	5116798
111	454557	5117036
113	454981	5117083
114	455457	5117189
115	455748	5117927
116	449433	5124398
118	452384	5118784
119	453366	5117786



About DNV

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Appendix D
Agency Correspondence

Badger Wind, LLC
February 2024

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December X, 2023

Mr./Ms. XX
Title/Agency
Address Line 1
Address Line 2

Subject: Proposed Updates to the Badger Wind Project in Logan and McIntosh Counties, North Dakota

Dear XX,

Badger Wind, LLC ("Badger") is in the process of developing the proposed Badger Wind Project (the "Project") in McIntosh and Logan Counties, North Dakota. The Project will have a nameplate capacity of up to 262.26 megawatts ("MW"), with up to 252 MW delivered to the grid. On November 30, 2022, the North Dakota Public Service Commission ("PSC") issued a Certificate of Site Compatibility to Badger Wind for the Project. Since then, Badger Wind has made updates to the Project, which include expanding the Project boundary and design modifications. The proposed Project is now planned to be located on approximately 34,867 acres of private land in Logan and McIntosh Counties ("Project Area").



Figure 1: Context Map of Logan and McIntosh Counties

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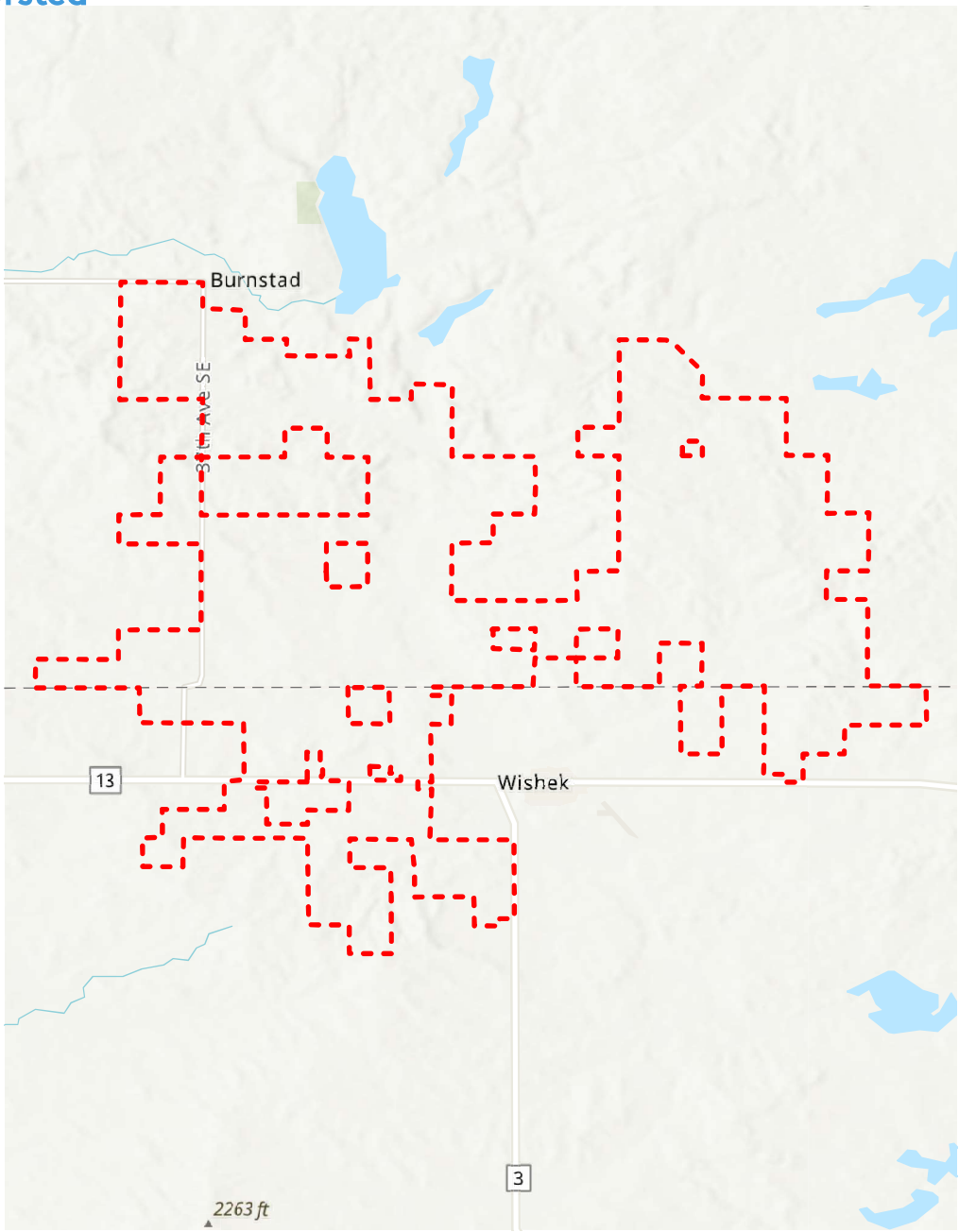
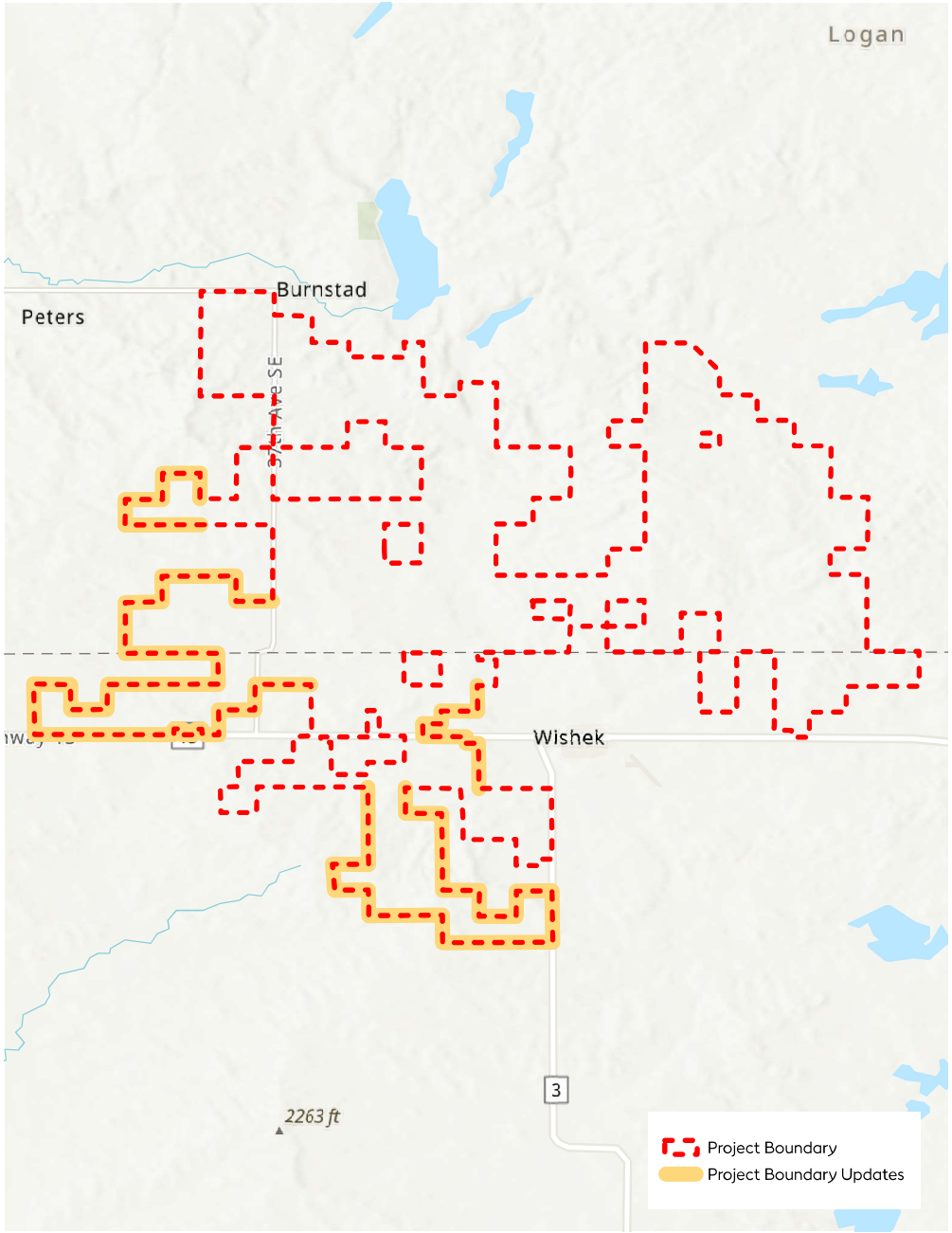


Previously Proposed Project Boundary



Currently Proposed Project Boundary

Comparison Map of previous and currently proposed Badger Wind Farm boundaries.

Current Proposed Project

With the updates, the proposed Project will include the following permanent facilities:

- up to 103 wind turbine locations, with up to 93 wind turbines and related equipment constructed, depending on final turbine model selected;
- underground electrical collection lines;
- new gravel access roads and improvements to existing roads;
- a collector substation;
- a new switchyard (depending on interconnection, see below);
- up to 3 permanent meteorological towers;
- an aircraft detection lighting system and related equipment;
- an operations and maintenance facility; and
- an overhead generation interconnection tie line.

The Project will also include temporary facilities, such as batch plants, laydown and staging areas, crane paths, and temporary road improvements.

The Project will interconnect to the grid via a short (less than one mile in length) 230 or 345 kilovolt ("kV") (voltage depending on point of interconnection) generation interconnection tie line extending from the Project's collector substation to the point of interconnection. Badger Wind is now considering two potential options for interconnection: (1) Montana-Dakota Utilities Company's ("MDU") existing Wishek Junction 230 kV substation in McIntosh County; or (2) the Groton – Leland Olds 345 kV transmission line, owned by Basin Electric, via a new switchyard located in Logan County.

Table 1 provides the sections of land that Badger Wind is evaluating for siting the Project.

Table 1: Project Area Location (Logan County)

Township Name	County	Township	Range	Section(s)
Unorganized Territory	Logan	133N	70W	6–8, 16–21, 28–33
Unorganized Territory	Logan	133N	71W	3–6, 8–10, 12, 14, 15, 18–23, 25–29, 30–36
Unorganized Territory	Logan	133N	72W	13, 24, 25, 36
Red Lake	Logan	134N	71W	31–32
Unorganized Territory	McIntosh	132N	70W	5-7
Unorganized Territory	McIntosh	132N	71W	1, 4-8, 12, 17-21, 28-33

Table 1: Project Area Location (Logan County)				
Township Name	**County**	**Township**	**Range**	**Section(s)**
Unorganized Territory	McIntosh	132N	72W	1, 2, 9-14, 23

Badger Wind anticipates initiating the process with the PSC for an amended Certificate of Site Compatibility in early 2024. In conjunction with preparing the PSC amendment application, we are seeking input from your agency or entity regarding any sensitive resources, current or planned development, or property interests your agency or entity may have in or around the Project Area that Badger Wind should consider as it moves forward with development. In addition, we ask that you provide information regarding any applicable permits that may be required from your office. To facilitate your review, we have enclosed a map that depicts the current Project Area within which turbines and associated facilities may be proposed. The map also shows the previous and current Project Areas, for reference. We welcome any comments your agency may have at this time and throughout the permit amendment application process. Any written agency comments provided in response to this letter will be incorporated into the PSC's review process.

More information can be found at our project website: https://badgerwindfarm.com. If you have an interest in receiving further information about the Project, please e-mail Mark Crowl (mcrow@orsted.com) or Amanda Coletti (amcol@orsted.com).

Regards,

Mark Crowl
Director, Development

Badger Wind Agency Consultation List Since 2022 CSC Permit Application							
Date	**Entered By**	**Task**	**Deliverable Type**	**Communication Type**	**To**	**From**	**Details**
U.S. Department of Commerce, National Telecommunications and Information Administration (NTIA)							
20-Dec-23	DD	Project Notification		Letter	NTIA	Ian Evans (DNV)	Submittal for NTIA Review
11-Jan-24	EW	Project Notification		Letter	NTIA	Ian Evans (DNV)	Submittal for NTIA Review-Turbine Adjustment
31-Jan-24	EW	Project Notification		Letter	Ian Evans (DNV)	NTIA (Felica Walker)	Request for information
1-Feb-24	DD	Project Notification		Letter	NTIA (Felicia Walker)	Ian Evans (DNV)	Response to request for additional information
U.S. Bureau of Land Management (BLM)							
19-Dec-23	EW	Project Notification		Letter	BLM	Mark Crowl (Orsted)	Sent Notice of Intent Letter
U.S. Army Corps of Engineers (USACE)							
19-Dec-23	EW	Project Notification		Letter	USACE	Mark Crowl (Orsted)	Sent Notice of Intent Letter
29-Dec-23	EW	Project Notification		Letter	Orsted (Amanda Coletti)	USACE (Benjamin N. Soiseth)	Received Notice of Intent response stating that a Section 404 permit may be needed and assigned an agency tracking number (NOW-2021-01889-BIS)
U.S. Fish and Wildlife Service (USFWS)							
15-Aug-23	EW	Project Consultation		Meeting	USFWS Heidi Riddle NDGF Bruce Kreft Elisha Mueller	Orsted Christoper Farmer Andrew Krieger Mark Crowl Ellen Crivella Nicholas Gebauer WEST Kristen Chodachek Martin Piorkowski	Agency project introduction meeting - included summary of studies completed to date (see meeting minutes)
19-Dec-23	EW	Project Notification		Letter	USFWS	Mark Crowl (Orsted)	Sent Notice of Intent Letter
24-Jan-24	EW	Project Consultation		Meeting	USFWS Wayne Henderson	Orsted Amber Minor Andrew Krieger Mark Crowl Amanda Coletti Samiel Hinebaugh Kevin Thomas Sonia Lopez Ayesha Vohra Carl Poole Taelor Chism DNV David De Caro Fredrickson Jeanne Tracy David Streier	Review easement regulatory requirements and actions.
30-Jan-24	EW	Project Consultation		Meeting	USFWS Heidi Riddle NDGF Bruce Kreft Elisha Mueller NDDA Dutch Bialke Adam Miller	 Orsted Christoper Farmer Andrew Krieger Mark Crowl WEST Kristen Chodachek Clayton Derby	Review offset calculations
Department of Defense (DoD)							
19-Dec-23	EW	Project Notification		Letter	DoD	Mark Crowl (Orsted)	Sent Notice of Intent Letter
19-Dec-23	EW	Project Notification		Letter	Military Aviation and Installation Assurance Siting Clearinghouse (DoD)	Mark Crowl (Orsted)	Sent Notice of Intent Letter
28-Dec-23	EW	Project Notification Response		Email	Ian Evans (DNV)	Military Aviation and Installation Assurance Siting Clearinghouse (DoD)	Notice of receipt
19-Jan-24	DD	Project Notification		Email	Ian Evans (DNV)	Dan Townes (DoD)	Request for Information
19-Jan-24	DD	Project Notification		Email	Dan Townes (DoD)	Ian Evans (DNV)	Request for Information - Response
26-Jan-24	EW	Project Notification		Letter	Ian Evans (DNV)	Robbin Beard (Clearinghouse)	Notifying of minimal impact on military operations conducted in the area.
Federal Aviation Administration (FAA)							

19-Dec-23	EW	Project Notification		Letter	FAA	Mark Crowl (Orsted)	Sent Notice of Intent Letter
Department of Trust Lands - Energy Infrastructure and Impact Office							
19-Dec-23	EW	Project Notification		Letter	Department of Trust Lands	Mark Crowl (Orsted)	Sent Notice of Intent Letter
North Dakota Geological Survey (NDGS)							
19-Dec-23	EW	Project Notification		Letter	NDGS	Mark Crowl (Orsted)	Sent Notice of Intent Letter
9-Jan-24		Project Notification Response		Email	Mark Crowl	Fred J. Anderson (NDGS)	Notice response noting no concerns
North Dakota Game and Fish Department (NDGF)							
19-Dec-23	EW	Project Notification		Letter	NDGF	Mark Crowl (Orsted)	Sent Notice of Intent Letter
29-Jun-23	EW	Project Consultation		Meeting	NDGF Bruce Kreft Elisha Mueller	Orsted Mark Crowl Chris Farmer Andrew Krieger WEST Martin Piorkowski Kristen Chodachek	Review project changes and seek feedback from NDGF
Grand Forks Air Force Base							
19-Dec-23	EW	Project Notification		Letter	Grand Forks Air Force Base	Mark Crowl (Orsted)	Sent Notice of Intent Letter
Logan County							
20-Mar-23	DD	Project Consultation		Email	Jody Kristiansen (Logan County)	Amanda Coletti (Orsted)	Meeting Request
20-Mar-23	DD	Project Consultation		Email	Amanda Coletti (Orsted)	Jody Kristiansen (Logan County)	Meeting Request
22-Mar-23	DD	Project Consultation		Email	Jody Kristiansen (Logan County)	Amanda Coletti (Orsted)	Meeting Request
22-Mar-23	DD	Project Consultation		Email	Amanda Coletti (Orsted)	Jody Kristiansen (Logan County)	Meeting Request
30-May-23	DD	Project Consultation		Email	Jody Kristiansen (Logan County)	Amanda Coletti (Orsted)	Meeting Request
30-May-23	DD	Project Consultation		Email	Amanda Coletti (Orsted)	Jody Kristiansen (Logan County)	Meeting Request
30-May-23	DD	Project Consultation		Email	Jody Kristiansen (Logan County)	Amanda Coletti (Orsted)	Meeting Request
7-Jun-23	EW	Project Consultation		Meeting Agenda	Logan County Commissioners	Amanda Coletti (Orsted)	Meeting Agenda
19-Dec-23	EW	Project Notification		Letter	Logan County	Mark Crowl (Orsted)	Sent Notice of Intent Letter
McIntosh County							
23-Mar-23	DD	Project Consultation		Email	Gina L. Ketterling (McIntosh County)	Amanda Coletti (Orsted)	Meeting Request
24-Mar-23	DD	Project Consultation		Email	Amanda Coletti (Orsted)	Gina L. Ketterling (McIntosh County)	Meeting Request
24-Mar-23	DD	Project Consultation		Email	Gina L. Ketterling (McIntosh County)	Amanda Coletti (Orsted)	Meeting Request
24-Mar-23	DD	Project Consultation		Email	Amanda Coletti (Orsted)	Gina L. Ketterling (McIntosh County)	Meeting Request
30-May-23	DD	Project Consultation		Email	Gina L. Ketterling (McIntosh County)	Amanda Coletti (Orsted)	Meeting Request
31-May-23	DD	Project Consultation		Email	Amanda Coletti (Orsted)	Gina L. Ketterling	Meeting Request
31-May-23	DD	Project Consultation		Email	Gina L. Ketterling (McIntosh County)	Amanda Coletti (Orsted)	Meeting Request
7-Jun-23	EW	Project Notification Response		Meeting Minutes	McIntosh County Commission	Amanda Coletti (Orsted)	Commission Board Meeting
7-Aug-23	DD	Project Consultation		Email	Gina L. Ketterling (McIntosh County)	Amanda Coletti (Orsted)	Meeting Follow-up
28-Aug-23	DD	Project Consultation		Email	Gina L. Ketterling (McIntosh County)	Amanda Coletti (Orsted)	Meeting Follow-up
29-Aug-23	DD	Project Consultation		Email	Amanda Coletti (Orsted)	Gina L. Ketterling (McIntosh County)	Confirmation that McIntosh County does not require zoning permits.
19-Dec-23	EW	Project Notification		Letter	McIntosh County	Mark Crowl (Orsted)	Sent Notice of Intent Letter
19-Dec-23	EW	Project Notification		Email	Gina L. Ketterling (McIntosh County)	Amanda Coletti (Orsted)	Logan County Meeting Notification
29-Jan-24	EW	Project Notification		Email	Gina L. Ketterling (McIntosh County)	Amanda Coletti (Orsted)	Project notification email and hearing notification.
Red Lake Township							
29-Aug-23	DD	Project Notification		Email	Chuck Fettig (Red Lake Twp)	Amanda Coletti (Orsted)	Consultation
8-Sep-23	DD	Project Notification		Email	Amanda Coletti (Orsted)	Chuck Fettig (Red Lake Twp)	Consultation
Minot Air Force Base							
19-Dec-23	EW	Project Notification		Letter	Minot Air Force Base	Mark Crowl (Orsted)	Sent Notice of Intent Letter
20th Airforce 91st Missile Wing							
19-Dec-23	EW	Project Notification		Letter	20th Airforce 91st Missile Wing	Mark Crowl (Orsted)	Sent Notice of Intent Letter
North Dakota Aeronautics Commission (NDAC)							
19-Dec-23	EW	Project Notification		Letter	NDAC	Mark Crowl (Orsted)	Sent Notice of Intent Letter
North Dakota Department of Agriculture (NDDA)							
19-Dec-23	EW	Project Notification		Letter	NDDA	Mark Crowl (Orsted)	Sent Notice of Intent Letter
28-Dec-23	EW	Project Notification		Email	Mark Crowl (Orsted) Amanda Coletti (Orsted)	J.P. "Dutch" Bialke (NDDA)	Notifying Orsted of changes to NDDA environmental mitigation policy.

24-Jan-24	EW	Project Consultation		Meeting	NDDA Dutch Bialke Adam Miller	Orsted Mark Crowl Chris Farmer Andrew Krieger Amanda Coletti WEST Clayton Derby Kevin Shelley	Review proposed Project voluntary offset payment structure and amounts.
North Dakota Department of Career and Technical Education							
19-Dec-23	EW	Project Notification		Letter	North Dakota Department of Career and Technical Education	Mark Crowl (Orsted)	Sent Notice of Intent Letter
North Dakota Department of Environmental Quality (DEQ)							
19-Dec-23	EW	Project Notification		Letter	DEQ	Mark Crowl (Orsted)	Sent Notice of Intent Letter
17-Jan-24	EW	Project Notification		Letter	Mark Crowl (Orsted)	L. David Glatt (DEQ)	Response to the Notice of Intent letter states that adverse effects to waters should be avoided. Stream beds and banks should be minimally disturbed and replaced/revegetated as soon as possible. Spills of oil and grease should be avoided. If the Project disturbs one or more acres, then a stormwater permit will be required. A TMDL allocation for fecal coliform bacteria has been developed for an UNT to Beaver Lake within the project area. Construction may be located over defined glacial drift aquifers, sensitive groundwater areas, or within wellhead or source water protection areas. Spills should be avoided and reported immediately if they occur. Solid water materials must be managed and transported in accordance with the state's solid and hazardous waste rules. DEQ does not own any land in or adjacent to the project. The proposed activities are consistent with the State Implementation Plan for the Control of Air Pollution.
North Dakota Department of Health							
19-Dec-23	EW	Project Notification		Letter	North Dakota Department of Health	Mark Crowl (Orsted)	Sent Notice of Intent Letter
North Dakota Department of Labor and Human Rights							
19-Dec-23	EW	Project Notification		Letter	North Dakota Department of Labor and Human Rights	Mark Crowl (Orsted)	Sent Notice of Intent Letter
North Dakota Department of Commerce							
19-Dec-23	EW	Project Notification		Letter	North Dakota Department of Commerce	Mark Crowl (Orsted)	Sent Notice of Intent Letter
North Dakota Department of Transportation (ND DOT)							
19-Dec-23	EW	Project Notification		Letter	ND DOT	Mark Crowl (Orsted)	Sent Notice of Intent Letter
North Dakota Department of Trust Lands (ND DTL)							
19-Dec-23	EW	Project Notification		Letter	ND DTL	Mark Crowl (Orsted)	Sent Notice of Intent Letter
North Dakota Department of Water Resources (DWR)							
19-Dec-23	EW	Project Notification		Letter	DWR	Mark Crowl (Orsted)	Sent Notice of Intent Letter
19-Jan-24	EW	Project Notification		Letter	Mark Crowl (Orsted)	Vanessa Davila (DWR)	Agency response to the Notice of Intent Letter states there are no FEMA regulatory floodplains within the project. DWR will require a permit if there are changes or effects to ponds, sloughs, lakes, watercourses, or drainage patterns. The project does not require a conditional or temporary permit for water appropriation, but will if surface water or groundwater will be diverted for construction. If any DWR wells have to be removed due to construction of the project, contact DWR.
North Dakota Forest Service							
19-Dec-23	EW	Project Notification		Letter	North Dakota Forest Service	Mark Crowl (Orsted)	Sent Notice of Intent Letter
North Dakota Department of Human Services							
19-Dec-23	EW	Project Notification		Letter	North Dakota Department of Human Services	Mark Crowl (Orsted)	Sent Notice of Intent Letter
North Dakota Indian Affairs Commission							
19-Dec-23	EW	Project Notification		Letter	North Dakota Indian Affairs Commission	Mark Crowl (Orsted)	Sent Notice of Intent Letter
North Dakota Industrial Commission							
19-Dec-23	EW	Project Notification		Letter	North Dakota Industrial Commission	Mark Crowl (Orsted)	Sent Notice of Intent Letter
Job Services North Dakota							
19-Dec-23	EW	Project Notification		Letter	Job Services North Dakota	Mark Crowl (Orsted)	Sent Notice of Intent Letter
North Dakota office of Attorney General							

19-Dec-23	EW	Project Notification		Letter	North Dakota office of Attorney General	Mark Crowl (Orsted)	Sent Notice of Intent Letter
Office of Governor Doug Burgum							
19-Dec-23	EW	Project Notification		Letter	Office of Governor Doug Burgum	Mark Crowl (Orsted)	Sent Notice of Intent Letter
North Dakota Pipeline Authority							
19-Dec-23	EW	Project Notification		Letter	North Dakota Pipeline Authority	Mark Crowl (Orsted)	Sent Notice of Intent Letter
North Dakota Parks and Recreation Department							
19-Dec-23	EW	Project Notification		Letter	North Dakota Parks and Recreation Department	Mark Crowl (Orsted)	Sent Notice of Intent Letter
10-Jan-24	EW	Project Notification		Letter	Mark Crowl (Orsted)	Kathy Duttenhefner (Parks and Recreation)	Response to the NOI letter stating that the project does not appear to affect properties that the NDPRD owns, leases, or manages. The project does not appear to affect any properties protected under Section 6(f) of the LWCF. There are no known rare species or significant ecological communities documented within or immediately adjacent to the project site.
17-Jan-24	EW	Project Notification		Email	Mark Crowl (Orsted) Amanda Coletti (Orsted)	Kathy Duttenhefner (Parks and Recreation)	Transmittal of project notification letter response.
State Historical Society of North Dakota							
19-Dec-23	EW	Project Notification		Letter	State Historical Society of North Dakota	Mark Crowl (Orsted)	Sent Notice of Intent Letter
23-Jan-24	DD	Architectural SHPO Filing		Log Entry	SHPO	CRA	Transmittal confirming report has been filed
26-Jan-24	EW	Archaeology SHPO Filing		Email	SHPO	Rigden Glaab (Westwood)	Transmittal email confirming report has been mailed
North Dakota Transmission Authority							
19-Dec-23	EW	Project Notification		Letter	North Dakota Transmission Authority	Mark Crowl (Orsted)	Sent Notice of Intent Letter
U.S. Department of Agriculture Natural Resources Conservation Service (USDA NRCS)							
19-Dec-23	EW	Project Notification		Letter	USDA NRCS	Mark Crowl (Orsted)	Sent Notice of Intent Letter
Wishek Airport							
12-Sep-23		Project Consultation		Email	Lorren Henke	Amanda Colleti (Orsted)	Consultation Letter
30-Oct-23		Project Consultation		Email	Lorren Henke	Amanda Colleti (Orsted)	Consultation Letter
17-Nov-23	EW	Project Consultation		Email	Lorren Henke	Amanda Colleti (Orsted)	Confirmation of No Issues

Appendix D

Agency Correspondence

U.S. Department of Commerce, National Telecommunications Information Administration

Badger Wind, LLC
February 2024

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Memo to:
Mrs. Joyce Countee Henry
U.S Department of Commerce,
National Telecommunications
Information Administration

From: DNV Energy USA Inc
Date: 20 December 2023

Prep. by: David De Caro,
Midwest Permitting Manager,
Environmental and Permitting
Services

Submittal of the Badger Wind Farm For Review by Federal Agencies

Dear Mrs. Henry,

I am submitting details for the Badger Wind Farm (the "Project") to the National Telecommunications Information Administration for review by federal agencies. The Project details are included below in the requested format.

If you have any questions or need additional information, I can be reached at david.decaro@dnv.com, or 1-302-463-9018.

Best Regards,

David De Caro

Date: December 20, 2023

Type of Notification: New

Project: Badger Wind Farm
County(ies): Logan and McIntosh
State: North Dakota

Project Sponsor:
Badger Wind, LLC

Sponsor Contact:
Andrew Krieger
401 N Michigan Ave, Suite 501, Chicago, IL 60611
akrie@orsted.com

Turbine Description:

Number of Turbines: 103 (up to)
Turbine Hub Height AGL (meters): 89
Turbine Blade Diameter (meters): 63.5
Max Blade Tip Height AGL (meters): 152.5

Turbine Locations:

Structure ID	Latitude (N)	Longitude (W)
1	46:22:20.680	099:39:036.313
2	46:22:26.447	099:39:013.820
3	46:22:36.232	099:38:057.224
4	46:19:21.857	099:39:032.850
5	46:19:23.092	099:39:009.576
6	46:17:10.212	099:40:051.186
7	46:17:10.702	099:40:028.528
8	46:17:11.411	099:40:006.946
9	46:17:11.137	099:39:036.238
10	46:17:22.668	099:39:025.531
11	46:17:29.706	099:39:007.153
12	46:17:58.628	099:38:023.230
13	46:18:08.903	099:38:017.178
14	46:18:24.498	099:38:008.898
15	46:18:33.854	099:37:058.955
16	46:18:51.361	099:37:056.399
17	46:19:03.097	099:37:049.753
18	46:18:55.156	099:37:014.592
19	46:19:21.137	099:36:033.311
20	46:16:41.261	099:39:025.506
21	46:16:47.698	099:39:010.487
22	46:16:42.820	099:38:039.592
23	46:16:51.902	099:38:026.286
24	46:17:05.010	099:38:005.644
25	46:17:20.742	099:37:056.291
26	46:17:30.631	099:37:043.223
27	46:17:59.111	099:37:019.240
28	46:18:26.248	099:37:004.400
29	46:16:52.882	099:37:007.932
30	46:17:09.413	099:37:000.826
31	46:17:21.026	099:36:052.312
32	46:17:31.420	099:36:041.677
33A	46:17:41.392	099:36:036.695
34	46:17:58.405	099:36:024.120
37	46:18:36.155	099:35:014.968

38	46:18:50.663	099:35:016.152
39	46:19:05.394	099:35:011.962
40	46:14:48.847	099:38:037.741
41	46:14:53.484	099:38:019.583
42	46:15:13.370	099:38:009.445
43	46:15:21.276	099:37:057.720
46	46:16:05.297	099:37:012.392
47	46:16:14.401	099:37:000.116
48	46:16:06.463	099:36:017.978
49	46:16:17.609	099:35:059.554
54	46:18:03.625	099:32:051.108
55	46:18:10.116	099:32:028.219
56	46:18:21.193	099:32:015.425
57	46:18:32.569	099:32:007.868
58	46:18:40.223	099:31:052.561
59	46:19:21.392	099:31:026.677
60	46:19:43.248	099:30:046.336
61	46:19:52.997	099:30:033.332
62	46:20:07.382	099:30:054.234
63	46:20:15.360	099:31:035.706
64	46:20:40.956	099:30:023.627
65B	46:14:48.246	099:36:054.806
66B	46:14:54.038	099:36:038.340
67B	46:14:56.656	099:36:014.879
68B	46:15:03.701	099:36:000.382
70A	46:17:13.938	099:32:013.927
71	46:17:22.664	099:32:004.805
72	46:18:11.581	099:31:024.096
73	46:17:57.718	099:30:026.140
73B	46:17:49.081	099:30:015.541
74	46:18:35.147	099:30:017.089
75	46:18:05.980	099:29:003.707
76	46:13:27.282	099:36:054.324
77	46:14:00.208	099:36:053.244
78	46:14:12.037	099:36:040.021
79	46:14:08.380	099:35:019.579
80	46:14:08.524	099:34:057.263
81	46:13:30.814	099:34:024.560
83	46:16:17.501	099:29:027.701
84	46:16:43.309	099:29:031.204
85	46:17:06.997	099:29:030.012
86	46:19:24.089	099:40:023.664
87	46:19:27.268	099:40:006.028
88	46:19:42.892	099:39:003.125
89	46:17:33.212	099:40:019.081
90	46:17:43.670	099:40:009.019
91	46:18:00.392	099:40:008.242
92	46:15:46.991	099:42:035.636
93	46:15:49.378	099:42:016.373
94	46:15:52.736	099:41:056.796
95	46:15:48.528	099:40:057.277
96B	46:15:58.198	099:40:043.849
97	46:16:03.461	099:40:025.039
98	46:16:14.236	099:40:005.549
99	46:16:14.722	099:39:043.175
105	46:16:20.996	099:35:037.446
106	46:13:09.419	099:37:026.098
107	46:12:39.136	099:36:054.252
108	46:12:50.976	099:36:045.749
109	46:12:50.677	099:35:058.045
110	46:12:11.603	099:35:033.497

111	46:12:19.379	099:35:020.609
113	46:12:21.002	099:35:000.838
114	46:12:24.552	099:34:038.662
115	46:12:48.528	099:34:025.331
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119	46:12:43.387	099:36:016.448

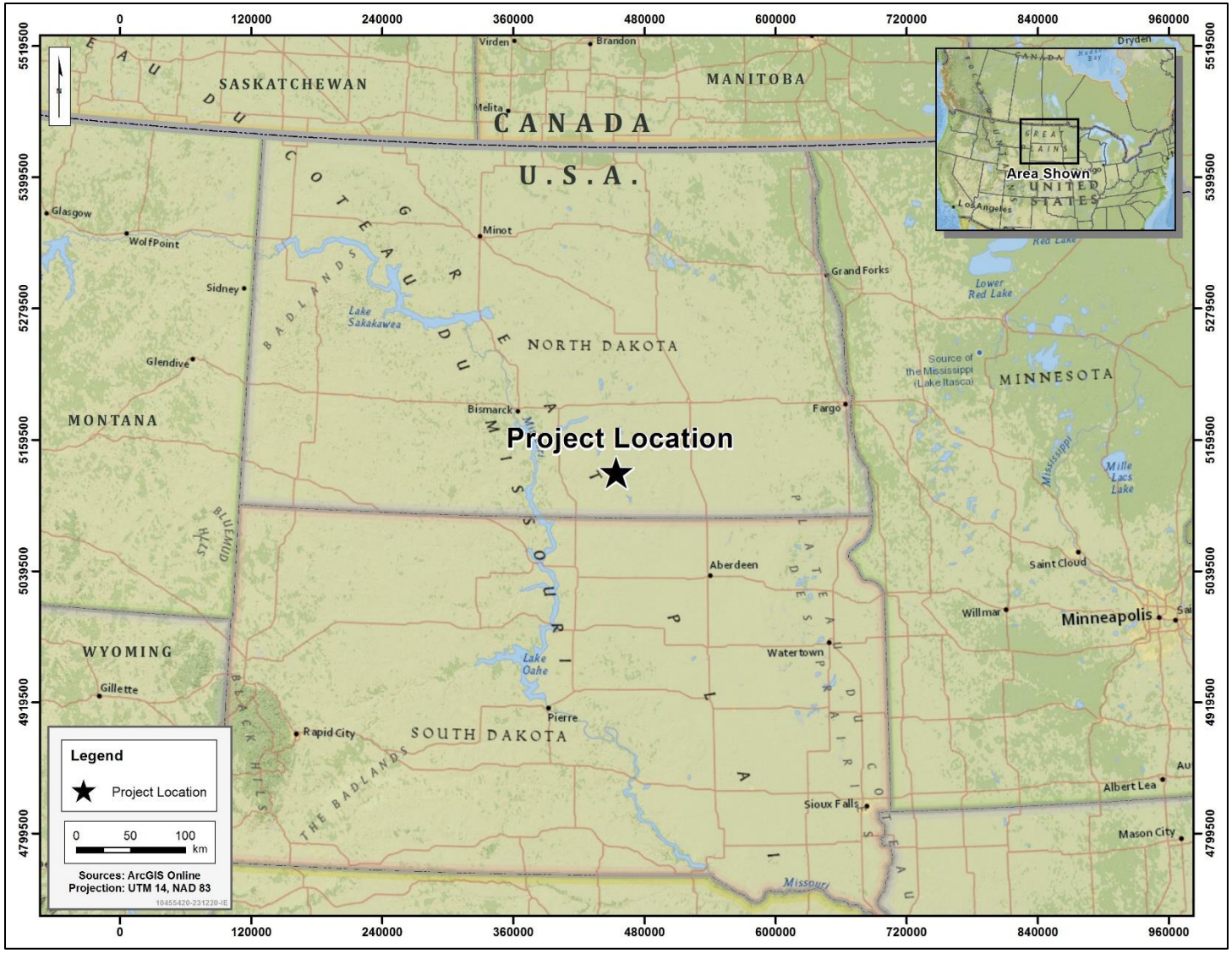

Figure 1 Project Vicinity

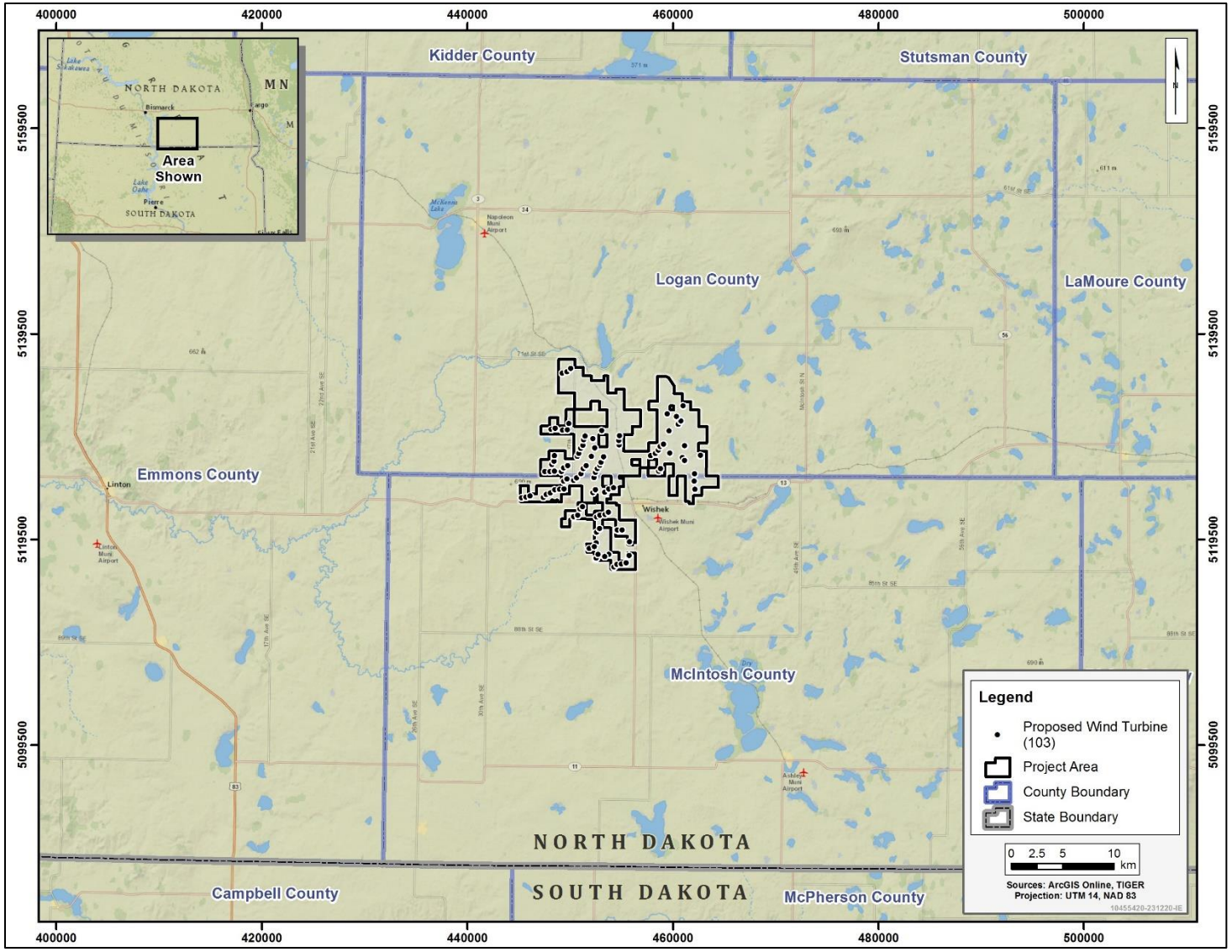

Figure 2 Project Area and Turbine Layout

Memo to:
Mr. John McFall
U.S Department of Commerce,
National Telecommunications
Information Administration

From: DNV Energy USA Inc
Date: 11 January 2024

Prep. by: David De Caro,
Midwest Permitting Manager,
Environmental and Permitting Services

Submittal of the Badger Wind Farm For Review by Federal Agencies

Dear Mr. McFall,

I am submitting details for the Badger Wind Farm (the "Project") to the National Telecommunications Information Administration for review by federal agencies. The Project details are included below in the requested format.

If you have any questions or need additional information, I can be reached at david.decaro@dnv.com, or 1-302-463-9018.

Best Regards,

David De Caro

Date: January 11, 2024

Type of Notification: New

Project: Badger Wind Farm
County(ies): Logan and McIntosh
State: North Dakota

Project Sponsor:
Badger Wind, LLC

Sponsor Contact:
Andrew Krieger
401 N Michigan Ave, Suite 501, Chicago, IL 60611
akrie@orsted.com

Turbine Description:

Number of Turbines: 103 (up to)
Turbine Hub Height AGL (meters): 89
Turbine Blade Diameter (meters): 63.5
Max Blade Tip Height AGL (meters): 152.5

Turbine Locations:

Structure ID	Latitude (N)	Longitude (W)
1	46:22:20.683	099:39:036.292
2	46:22:26.450	099:39:013.799
3	46:22:36.235	099:38:057.203
4	46:19:21.860	099:39:032.832
5	46:19:23.095	099:39:009.558
6	46:17:10.216	099:40:051.164
7	46:17:10.705	099:40:028.506
8	46:17:11.414	099:40:006.924
9	46:17:11.141	099:39:036.216
10	46:17:22.672	099:39:025.513
11	46:17:29.710	099:39:007.135
12	46:17:58.632	099:38:023.208
13	46:18:08.906	099:38:017.160
14	46:18:24.502	099:38:008.876
15	46:18:33.858	099:37:058.933
16	46:18:51.365	099:37:056.377
17	46:19:03.101	099:37:049.732
18	46:18:55.159	099:37:014.570
19	46:19:21.140	099:36:033.293
20	46:16:41.264	099:39:025.484
21	46:16:47.701	099:39:010.469
22	46:16:42.823	099:38:039.570
23	46:16:51.906	099:38:026.264
24	46:17:05.014	099:38:005.622
25	46:17:20.746	099:37:056.269
26	46:17:30.635	099:37:043.201
27	46:17:59.114	099:37:019.222
28	46:18:26.248	099:37:004.379
29	46:16:52.885	099:37:007.910
30	46:17:09.416	099:37:000.808
31	46:17:21.030	099:36:052.290
32	46:17:31.423	099:36:041.656
33A	46:17:41.395	099:36:036.673
34	46:17:58.409	099:36:024.098
37	46:18:36.158	099:35:014.946

Structure ID	Latitude (N)	Longitude (W)
38	46:18:50.666	099:35:016.130
39	46:19:05.398	099:35:011.940
40	46:14:48.851	099:38:037.720
41	46:14:53.488	099:38:019.561
42	46:15:13.374	099:38:009.424
43	46:15:21.280	099:37:057.698
46	46:16:05.300	099:37:012.374
47	46:16:14.405	099:37:000.095
48	46:16:06.467	099:36:017.960
49	46:16:17.612	099:35:059.532
54	46:18:03.629	099:32:051.086
55	46:18:10.120	099:32:028.198
56	46:18:21.197	099:32:015.403
57	46:18:32.573	099:32:007.850
58	46:18:40.226	099:31:052.540
59	46:19:21.396	099:31:026.659
60	46:19:43.252	099:30:046.318
61	46:19:53.000	099:30:033.311
62	46:20:07.386	099:30:054.212
63	46:20:15.364	099:31:035.688
64	46:20:40.960	099:30:023.605
65B	46:14:48.250	099:36:054.785
66B	46:14:54.042	099:36:038.318
67B	46:14:56.659	099:36:014.857
68B	46:15:03.704	099:36:000.364
70A	46:17:13.942	099:32:013.906
71	46:17:22.668	099:32:004.783
72	46:18:11.585	099:31:024.074
73	46:17:57.721	099:30:026.118
73B	46:17:49.085	099:30:015.523
74	46:18:34.394	099:30:018.529
75	46:18:05.983	099:29:003.685
76	46:13:27.286	099:36:054.302
77	46:14:00.211	099:36:053.222
78	46:14:12.041	099:36:040.000
79	46:14:08.383	099:35:019.558
80	46:14:08.527	099:34:057.241
81	46:13:30.817	099:34:024.539
83	46:16:17.504	099:29:027.679
84	46:16:43.313	099:29:031.182
85	46:17:07.001	099:29:029.990
86	46:19:24.092	099:40:023.646
87	46:19:27.271	099:40:006.006
88	46:19:42.895	099:39:003.103
89	46:17:33.216	099:40:019.060
90	46:17:43.674	099:40:008.998
91	46:18:00.396	099:40:008.220
92	46:15:46.994	099:42:035.615
93	46:15:49.381	099:42:016.355
94	46:15:52.740	099:41:056.778
95	46:15:48.532	099:40:057.256
96B	46:15:58.201	099:40:043.828
97	46:16:03.464	099:40:025.018
98	46:16:14.239	099:40:005.527
99	46:16:14.725	099:39:043.153
105	46:16:21.000	099:35:037.424
106	46:13:09.422	099:37:026.076
107	46:12:39.139	099:36:054.230
108	46:12:50.980	099:36:045.727
109	46:12:50.681	099:35:058.027

Structure ID	Latitude (N)	Longitude (W)
110	46:12:11.606	099:35:033.475
111	46:12:19.382	099:35:020.587
113	46:12:21.006	099:35:000.820
114	46:12:24.556	099:34:038.644
115	46:12:48.532	099:34:025.313
116	46:16:16.594	099:39:022.525
118	46:13:15.481	099:37:002.618
119	46:12:43.391	099:36:016.427

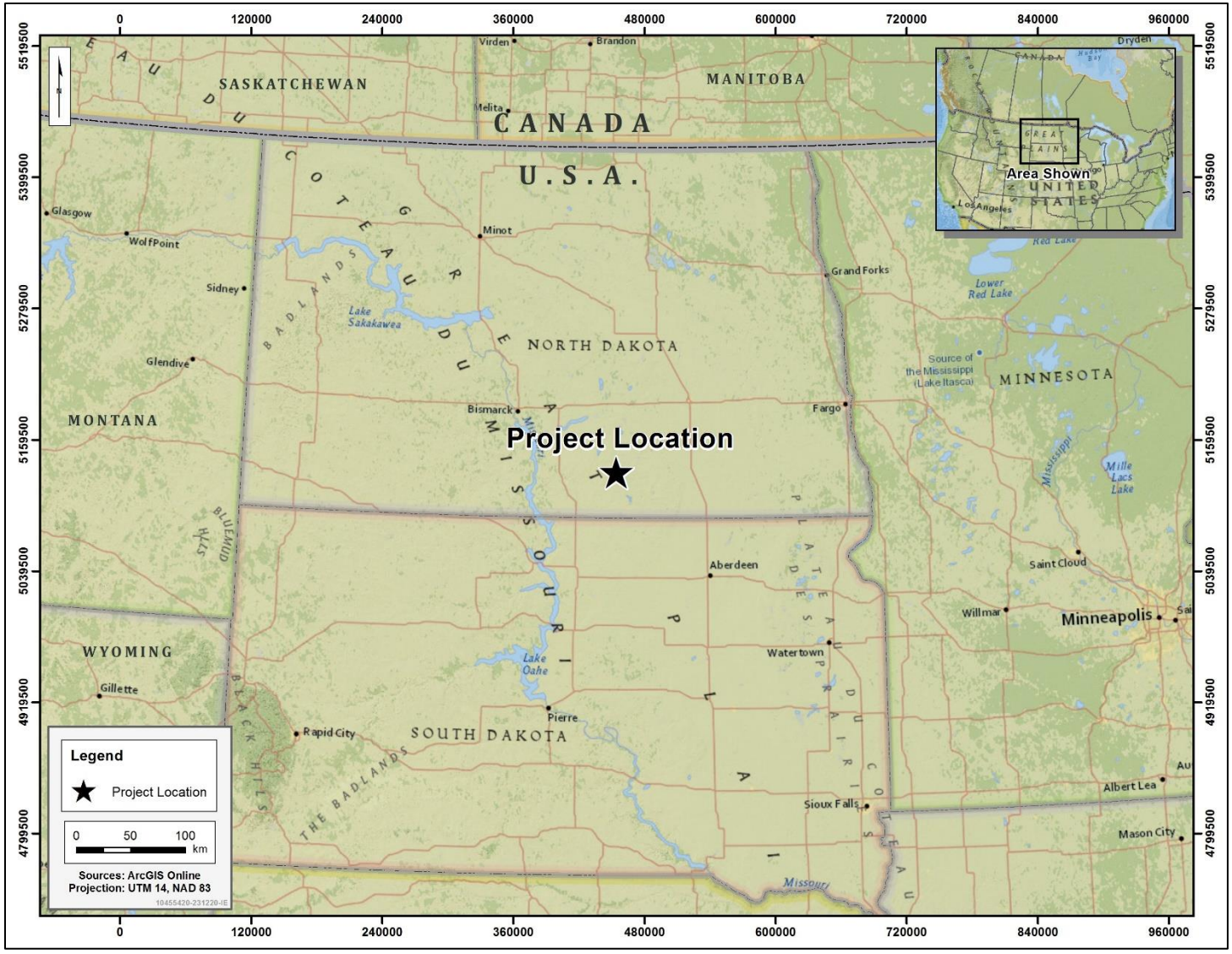

Figure 1 Project Vicinity

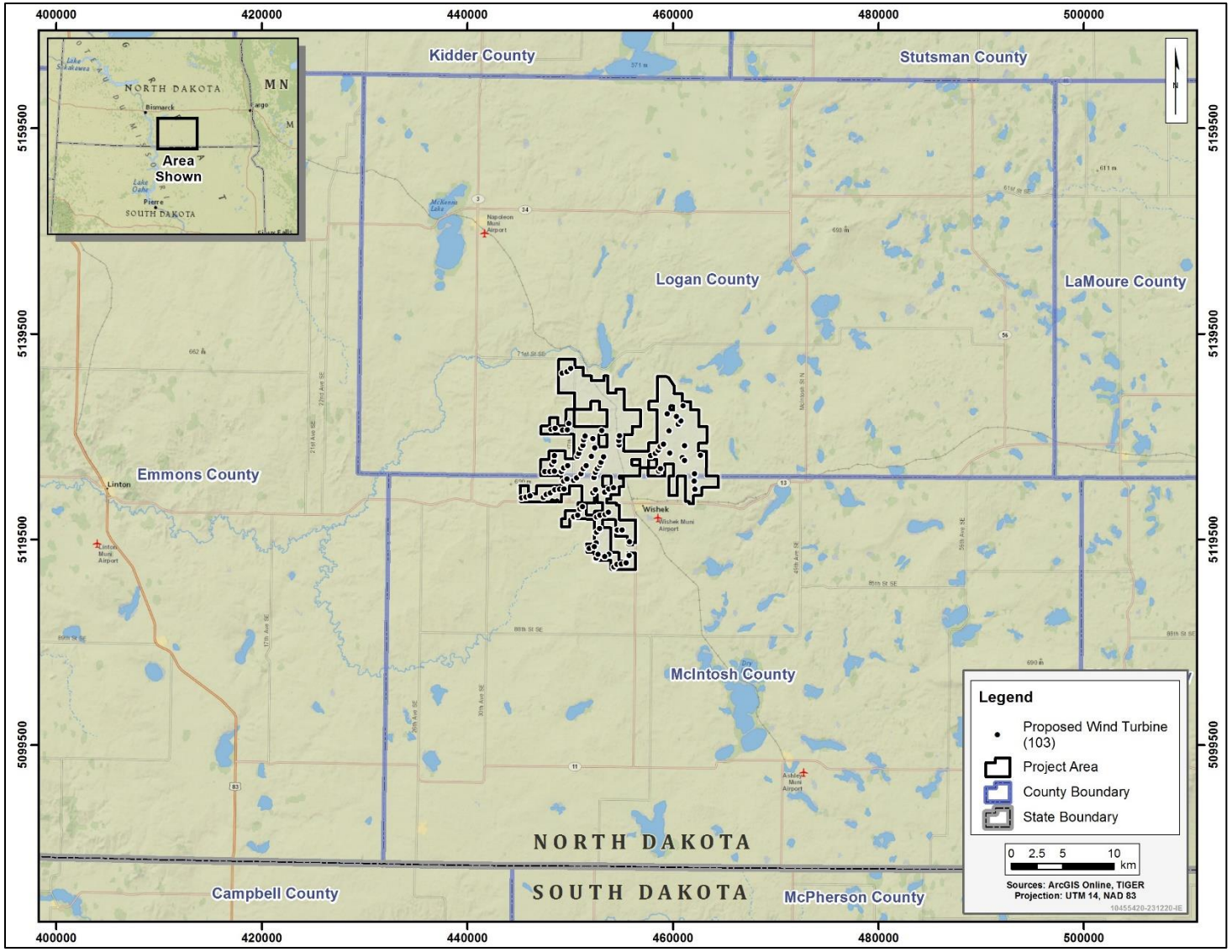

Figure 2 Project Area and Turbine Layout

From: Walker, Felicia
To: Evans, Ian
Cc: Wallace, Erin; De Caro, David
Subject: Badger Wind Farm - Submittal for NTIA Review
Date: Wednesday, January 31, 2024 11:23:09 AM
Attachments: 10455420-HOU-R-04-A Badger Wind Farm NTIA 240111 Coords.xlsx
10455420-HOU-R-04-A Badger Wind Farm NTIA 240111.pdf
Wind Turbine Template_update 2023 .pdf

Caution: This email originated from outside of the **DNV Organization.** Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hello Ian,

I would like to process this wind turbine notification, but I have some questions. I have a developer in my listing with the company name of DNV ENERGY SYSTEMS CANADA, is your company the same company? Please provide company address.

Clarification is needed on who is initiating this request Ian Evans or David De Caro on the wind turbine request letter.

I have attached the wind turbine template for your future submissions.

Felicia Walker
NTIA/WIND FARMS & WSR-88D
1401 Constitution Ave. NW
Washington, DC 20230
202-482-4589
fwalker@ntia.gov

From: Evans, Ian < White Rock >
Sent: Friday, January 19, 2024 9:28 AM
To: McFall, John <JMcFall@ntia.gov>
Cc: Wallace, Erin <Erin.Wallace@dnv.com>; De Caro, David <David.Decaro@dnv.com>
Subject: Badger Wind Farm - Submittal for NTIA Review

Dear Mr. McFall,

I am submitting details for the Badger Wind Farm to the National Telecommunications Information Administration for review by federal agencies. See the attached pdf. The coordinates are included in the pdf but I have also attached an Excel version in case that is more convenient for you.

Work-life balance is important! I do not expect you to respond to, or take action on this email outside of your normal working hours.

Best regards,

Ian Evans (he/him/his)

GIS Analyst
Energy Systems

DNV Canada Ltd.
ian.evans@dnv.com

dnv.com | LinkedIn

DNV email logo

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****

From: Evans, Ian
To: Walker, Felicia
Cc: Wallace, Erin; De Caro, David
Subject: RE: Badger Wind Farm - Submittal for NTIA Review
Date: Thursday, February 1, 2024 8:44:31 AM

Hello Felicia,

The company name is DNV, which operates under different legal entities depending on the jurisdiction. I can confirm DNV Energy USA Inc (named in the letter) and DNV Energy Systems Canda (from your records) are legal entities for the same company.

The legal entity making this submittal on behalf of the project sponsor is **DNV Energy USA Inc**, which is named in the submitted letter. The address is:

1400 Ravello Drive
Katy, Texas 77449
United States

David De Caro is initiating this request. I was assisting him on this, but I can confirm his name should be on the letter.

Thank you for providing the revised template. I did a quick check and it seems to match the older template we have on file. The main difference appears to be the updated contact information. Therefore I don't believe any revisions to the submittal would be required, though please let me know if you need any changes or need anything clarified.

P.S. DNV Energy Systems Canada is actually an older legal entity for DNV in Canada. The current entity is called DNV Canada Ltd. I included this information in the postscript rather than the main part of the message because I think it is tangential information for you. **DNV Energy USA Inc** is making the submittal, rather than a Canadian entity.

Work-life balance is important! I do not expect you to respond to, or take action on this email outside of your normal working hours.
Best regards,

Ian Evans (he/him/his)
GIS Analyst - Energy Systems

From: Walker, Felicia <FWalker@ntia.gov>
Sent: Wednesday, January 31, 2024 1:22 PM
To: Evans, Ian <Ian.Evans@dnv.com>
Cc: Wallace, Erin <Erin.Wallace@dnv.com>; De Caro, David <David.Decaro@dnv.com>
Subject: Badger Wind Farm - Submittal for NTIA Review

Caution: This email originated from outside of the **DNV Organization.** Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hello Ian,

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I have attached the wind turbine template for your future submissions.

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Sent: Friday, January 19, 2024 9:28 AM
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Dear Mr. McFall,

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Best regards,

Ian Evans (he/him/his)

GIS Analyst
Energy Systems

DNV Canada Ltd.
ian.evans@dnv.com

dnv.com | LinkedIn

DNV email logo

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Appendix D

Agency Correspondence

U.S. Army Corps of Engineers

Badger Wind, LLC
February 2024

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DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
NORTH DAKOTA REGULATORY OFFICE
3319 UNIVERSITY DRIVE
BISMARCK, NORTH DAKOTA 58504-7565

December 29, 2023

NWO-2021-01889-BIS

Orsted
Attn: Ms. Amanda Coletti
401 North Michigan Avenue, Suite 501
Chicago, Illinois 60611

Dear Ms. Coletti:

This is in response to your solicitation letter received on December 27, 2023 requesting Department of the Army (DA), United States Army Corps of Engineers (Corps) comments on the proposed Badger Wind project. The project is located throughout Logan and McIntosh Counties, North Dakota.

U. S. Army Corps of Engineers Regulatory Offices administer Section 404 of the Clean Water Act (Section 404). A Section 404 permit would be required for the discharge of dredge or fill material (temporarily or permanently) in waters of the United States. Waters of the United States may include, but are not limited to, rivers, streams, ditches, coulees, lakes, ponds, and their adjacent wetlands. Fill material includes, but is not limited to, rock, sand, soil, clay, plastics, construction debris, wood chips, overburden from mines or other excavation activities and materials used to create any structure or infrastructure in waters of the United States.

Based on the information contained in your letter, the Corps has determined that your proposed project may need a Clean Water Act Section 404 permit. The permit application and instructions for completing the application are enclosed and may also be found at: http://www.usace.army.mil/Missions/Civil-Works/Regulatory-Program-and-Permits/Obtain-a-Permit. Be sure to accurately describe all proposed work and construction methodology. Once the application is complete, mail it to the letterhead address or to the email address (preferred) below.

The North Dakota Regulatory office prefers that all submissions are sent electronically to the following email address: CENWO-OD-RND@usace.army.mil instead of a hard copy by mail. Please split large attachments (>25 MB) into multiple emails if needed.

Please refer to identification number **NWO-2021-01889-BIS** in any correspondence concerning this project. If you have any questions, please contact Hadden Carlberg at U.S. Army Corps of Engineers, North Dakota Regulatory Office, 3319 University Drive, Bismarck, North Dakota 58504-7565, by email at *Hadden.J.Carlberg@usace.army.mil*, or telephone at (701) 255-0015 ext. 2012. For more information regarding our program, please visit our website at *http://www.nwo.usace.army.mil/Missions/RegulatoryProgram/NorthDakota.aspx*.

Sincerely,



for Benjamin N. Soiseth
Chief, North Dakota Section

Enclosure

Appendix D

Agency Correspondence

U.S. Fish and Wildlife Service

Badger Wind, LLC
February 2024

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Orsted
Christopher Farmer
Andrew Krieger
Mark Crowl
Ellen Crivella
Nicholas Gebauer

U.S. Fish and Wildlife Service (USFWS)
Heidi Riddle

North Dakota Game and Fish Department (NDGFD)
Bruce Kreft
Elisha Mueller

WEST
Kristen Chodachek
Martin Piorkowski

Introductions
Chris F, Principal Onshore Biologist for Orsted, went through introductions and introduced himself and the changes for the Badger/Orsted team. Each Orsted team member briefly introduced themselves and the role they have in the company. Mark C. is the Director of the Western Development team, and he oversees day-to-day management of the Badger Wind Project. Nicholas G. is a Senior Development Director with Orsted and is involved with the Badger Wind Project. Ellen C. is involved with permitting of all environmental Projects for Orsted. Andrew K. is the Western Permitting Manager and manages the Badger Wind Project. Ellen C. is Head of Permitting, Environmental, and Marine Affairs

Western EcoSystems Technology (WEST) followed Orsted introductions. Martin is a Project Manager out of Bismarck and previously worked on the Badger Wind Project. He has worked for wind Projects since 2003 and occasionally with solar. Kristen is also a Project Manager out of Bismarck and will be the Project Manager for the Badger Wind Project.

North Dakota Game and Fish gave brief introductions. Bruce Kreft is the Regional Supervisor for the Conservation Biologist Section with the NDGF. Elisha is a Conservation Biologist with NDGF for wind development.

Heidi Riddle was the only representative of the USFWS. She is currently a Biologist with the Ecological Services (ECOS) office in Bismarck, ND.

Meeting Goals/Agenda
- Introduce Orsted
- Present project and updates
- Discussion

Overview of Orsted

- Global company that started in Europe with offshore development.
- Has been working to expand into onshore and other renewables in the US and around the world.
- Aiming to maintain and lead sustainable development – net positive biodiversity goal by 2030.

Overview of the Project

- Originally permitted for:
  - 79 turbines, 251.6 MW within 31,500 acres
  - Turbine Type – GE 3.4 MW; Hub Height – 98m; Rotor Diameter – up to 140m
  - Interconnection agreement signed with MDU and MISO to interconnect to the Wishek Junction 230-kV substation

- Permits Secured:
  - Logan County has CUP
  - McIntosh – no CUP, but has road use agreements
  - State of ND – Certificate of Site Compatibility in 2022
  - FAA – DNH certificate obtained in 2022

- Biological and Site Characterization Surveys
  - Grasslands
  - Wetland delineation
  - Bat Acoustics
  - Whooping Crane Habitat Desktop Assessment
  - Avian Use Surveys
  - Raptor Nest Surveys
  - Sharp-tailed Grouse lek Surveys
  - Bird and Bat Conservation Strategy

Focus on Federally Protected Species

<u>Eagle Use Surveys</u>

- 2 years of EUS within original footprint; footprint changed throughout Project
- Year 1 - 34 BAEA (81 risk mins); 6 GOEA (21 risk mins); incidental observations
- Year 2 – 35 BAEA (76 risk mins); 6 GOEA (26 risk mins); incidental observations

<u>Eagle Nests</u>

- Two BAEA nests within the Project for 2 years of survey
  - One occupied active; failed (2020)
  - One occupied, active (new in use nest in 2021)

Updated Layout and Technology

Recent Updates

- Project is expanding to the WEST and South
- Increase from 79 locations to 106 total locations
- Project capacity will stay the same at 250 MW
- Proposing to use GE 2.8 MW machines rather than GE 3.4 MW turbines
- GE 2.8 – hub 89m and Rotor 127m
- GE 3.4 MW – hub 98 m and Rotor 140m
- Considering interconnecting to a different location through SPP system

Bruce inquired why Orsted is using a smaller machine. Mark responded it is in part due to availability with the supply constraints for when they plan to construct, and the smaller turbine provides better energy for the Project and makes it more economically competitive.

Elisha inquired if any of the previously permitted turbines will be removed or if the new proposed turbines are additions. Andrew responded they are in addition to what was previously permitted.

Expanded Footprint

Orsted showed the proposed expanded footprint and that they are avoiding sensitive resources, including unbroken grasslands, by expanding to the west and south, as grasslands are most prevalent in the northeast. The current layout for the expansion area that Orsted has proposed will avoid direct impacts to unbroken grasslands. Additionally, Orsted has reviewed waterbody data and is working to avoid impacts as much as possible. Similarly, water resources are less dense as move southwest.

Additional Planned Studies and Documents

- Grasslands – showed grasslands not surveyed to date within the expansion area; will conduct impact calculations once field verify data in late August
- Wetland delineations – Proposing to conduct field surveys in September for the expansion area only
- Cultural Resources – Proposing to conduct cultural surveys in September for the expansion area only
- Eagle Use Surveys – one year of surveys, not two years; currently have time for one additional year of surveys to provide further information about eagles in the Project area
- Raptor and Eagle nest surveys for new turbines – 1-mile buffer for non-eagle raptors and 2-mile buffer for eagles
- Develop a whooping crane contingency plan
- Develop an EMP or ECP
- Update BBCS with current surveys

Andrew asked for Heidi's feedback on proposed surveys.

Heidi stated her comments are preliminary and she would like this PowerPoint or Project description to review further.

Heidi inquired if Orsted plans to conduct further bat habitat or bat surveys (acoustics or mist netting). Chris responded average woodlot size is 1.4 acres, so not pursuing northern long eared bat (NLEB) mist netting or acoustics. Based on previous acoustic data, primarily large bats were recorded. Chris mentioned there were a few little brown bats (LBBA) recorded during acoustics; however, they are currently not listed. Heidi stated that if there is little to no habitat, then additional surveys are likely not necessary Iie. She mentioned the recent uplisting of NLEB and there are likely to be other species on the horizon that may be listed. Heidi would like Orsted to run the Project through IPaC since updates have been made for NLEB ranges and feels there may be other species relevant information for the Project. Chris responded that Orsted will run the IPaC query on the Project to determine if new information is available.

Heidi inquired about Dakota skipper (DASK) from historical records. Chris mentioned it is outside of the DASK range.

Heidi inquired whether the whooping crane assessment has used the Niemuth et al. model for whooping crane (WHCR) mapping. Chris responded he would review the report and provide additional follow-up to this question via email. [*September 5, 2023 update, Orsted emailed Heidi to confirm that the Niemuth et al. model was indeed used for the whooping crane assessment.*]

Heidi inquired about whether Orsted would go back in front of the Public Service Commission (PSC). Andrew stated yes, they will be submitting an amendment to the PSC for the expanded Project area. Andrew stated there is an update to the Conditional Use Permit (CUP) for Logan County. Elisha inquired as to when Orsted will submit the amendment to the PSC and Andrew stated fourth quarter 2023.

Bruce stated a bill was passed to mitigate impact assessments; they started to write draft administrative rules which are not finalized. In proposed rules, part of the conditions is prior to applying to the PSC, developers can reach out to the Department of Agriculture and propose a mitigation plan with the application, or they can ask the Department of Agriculture to develop a mitigation plan. Mark stated they are aware of this and have begun conversations regarding this.

Bruce mentioned the Meadowlark initiative and that they are pushing as a potential mitigation tool to use. Mark mentioned they have been discussing internally. Bruce mentioned that he is aware that Orsted has been communicating with North Dakota State Trust as well.

Bruce has a comment on future studies. He recognizes that Orsted is moving out of grassland areas but noticed that lek surveys are not proposed. Andrew stated they have reviewed turbine locations and currently none of their turbines are within grasslands; however, some are within 2 miles of leks. Orsted's understanding was that if the turbine was located outside of grasslands, the turbines are 'safe'. Elisha agreed that the NDGF is trying to protect grasslands since it is grouse nesting habitat, so grasslands is where protection should be and should be avoided.

Elisha would like to see an Eagle Conservation Plan/Eagle Management Plan (ECP/EMP) as early as possible since the surveys will potentially be ongoing with the permit. Elisha needs to draft her letter 30 days in advance of the PSC hearing. Chris stated they can only have the commitment to have an ECP/EMP by October 2023, not an actual document. Chris stated they will update the Bird and Bat Conservation Strategy (BBCS) and provide to the agencies.

Nicholas inquired about state regulations for impact analysis and what this means. Bruce stated it will be out for public review soon. Bruce mentioned the NDGF will stay involved in the process early on. Elisha stated until regulations are published, NDGF will be working with acres for calculations of mitigation and voluntary offsets. This was the commitment discussed prior to the PSC approval for the Project. Elisha stated if the commission cannot commit to reaching acreage goals with the dollars, this is a tool that leaves the toolbox, and they will be providing different letters to the PSC in the future. Currently Elisha would like to see the impact calculations for the additional project areas. Heidi stated USFWS will defer to NGDF for grassland impacts. But will continue to make recommendations for voluntary impact offsets. Bruce encourages the public to be a part of the process for this new ruling.

Badger Wind
Call with USFWS KULM
1/24/2024

Attendees:
USFWS, Kulm Wetland Management District: Wayne Henderson

Ørsted: Amber Minor, Andrew Krieger, Mark Crowl, Amanda Coletti, Samuel Hinebaugh, Kevin Thomas, Sonia Lopez, Ayesha Vohra, Carl Poole, and Taelor Chism
DNV: David DeCaro
Fredrickson: Jeanne Tracy and David Streier

Amber thanks Wayne for his time and introduces the different groups which are joining the call included Orsted's GIS, Engineering, Real Estate and Development teams and consultants with DNV and Fredrikson Law

Amber: To start with I'd like to revisit some of the broader items we discussed in our last meeting. It is our understanding we can bore under grassland easements w/o formal agrmt and can be done with temporary disturbance agreement and in terms of maintenance or later tasks necessary, we can do so by obtaining a special use permit. Is this correct?

Wayne: That is correct.

Amber: Do you have a standard template or examples you could share with us?

Wayne: We do it on a case-by-case basis, no examples right now. It's a long process and tailored for individual requests, I can't think of any that fall under this category.

Amber: How long does the approval process take and is this done entirely within your office or are other parts of the agency involved?

Wayne: I will do it. It takes little bit of time. Typically, a temporary permit is used until the compatibility survey is complete.

Amber: For a temporary disturbance permit, how long can we anticipate this approval process taking?

Wayne: 35-40 days usually. The sooner, the better.

Andrew: Are there any other steps needed once payment is secured by the applicant?

Wayne: Once I issue the permit, there is nothing else to do on your part. I will outline the guidelines for the temporary permit. Before permit I need a scope of work from Orsted.

Andrew: Do you have a template for a "Scope of Work" or could you describe what you're looking for?

Wayne: No, just map of where you are planning, how much area you will disturb, and how long you plan on being there.

Andrew: Do you have any guidance for information on boring collection line under grassland?

Wayne: Boring underneath doesn't need a permit. It's if there are any changes or repairs in the future where you need access from the surface.

Andrew: Can we use special use permits for crane paths, and assemblies, repairs on collection line underneath one of their easements?

Wayne: We can do crane paths after doing compatibility…. Leveling hills won't fly with upper management.

Amber: When applying for these permits, do we create scope of work for each permit area or can this be handled in one document?

Wayne: If they are different, I want different permits. If the same scope of work applies to both, we can just do it on one.

(Andrew providing context, presents slideshow on project, provides details on what is driving conversation for today and that we are expanding footprint of project and doing some shifts from previous infrastructure project area, that is why some things are different since last time we spoke with Kulm WMD. Andrew explained we switched to a smaller turbine model which explains some of the shifting. Andrew states there is no Fish and Wildlife areas in these expanded infrastructure areas. Also, all of the easements is under the heading of the easement, just talking about easements today)

Andrew: Project did received CSC back in 2022 from ND. Re-doing entire permitting if you will due to expansion. Plan to submit CSC amendment next month.

Andrew to group: Any questions?

Wayne: Nope, not from me

Andrew: *Showing GIS screen of map*. These are the wetland easements in our project area and the crossings. I'd like to share our current layout and get your feedback on these crossings.

Showing crossings spreadsheet

Andrew: First one, collection line, plans to bore under easement. Wouldn't require SUP.

Wayne: Correct. Would appreciate or day or two notice before doing it. No letter or real estate agreements needed, just notice.

Andrew: If we were to do maintenance on the easement we would need an SUP. This second one is a crane path and would require SUP

Wayne: Correct. To clarify, SUP, is not going to distract from purpose of the easement. *He needs a scope of work and compatibility and NEPA. Wayne suggests NEPA not as hard as it sounds and recommends we find category exclusion in NEPA for temporary use.*

Andrew requests list of category exclusions

Wayne: I don't have one but you can just Google it for cat exes.

Andrew: I'll shoot you an email to confirm.

Wayne: Sure. All wetland easements also have a grassland easements. *Wayne questions the crane path and asks if there is no way to make it go straight across.*

Andrew: That's a great question. We are probably avoiding topography features. Sonya from engineering, do you know why we have it this way?

Sonya: For this one, I don't have the answer right now, but most likely avoiding topography issues. I'll double check on it.

Andrew: We will see if we can straighten it out.

Wayne: It would just make it easier to justify. The more you can stay off the easement the better.

Wayne: If boring under wetland, there is no easement, I recommend you bore under wetland. A crane path can't go through wetland.

Andrew confirms we are boring underneath the wetlands. Wayne explains there was new work done for FWS for wetland areas.

Wayne – Shapefiles, did I share them with you? I'll look into it and send you the wetland areas so you have those easements.

Andrew: Last area to review, this set colored in orange does have a grassland easement and Badger Wind does have priority over Fish and Wildlife Services.

Wayne: I believe that's just a wetland easement, your easement supersedes ours so you have first right. Although I'd like to have a conversation if you impact the wetland. You guys were there first. There's nothing we can do about it.

Andrew: We would give you a courtesy notice when we go through there.

Wayne: Yes, I would appreciate that.

Andrew discusses temporary impacts, closely adjacent to an easement, and a temp disturbance corridor. I mention that to say whether we can avoid easements with our temporary impacts. Addressing other linear features that run along easements.

Wayne: If there is no wetland in that temporary area, you're good. If there is a wetland, we will need another meeting.

Andrew: I think that's it for the meeting.

Andrew addresses group asking if there are any more questions on the call.

Wayne: When do you anticipate starting construction?

Mark Crowl explains Badger Wind is planning for Q4 2025 or Q1 2026 for start of construction.

Andrew: Thanks for asking that Wayne.

Andrew confirms the previous timeline being 30-45 days overall for your processing of SUPs.

Wayne: The more time you can give me, the better off we are.

Andrew: Any more questions?

Sonia: In terms of obtaining SUP, any type of leveling wouldn't fly? Is there anything else that's not allowed?

Wayne: Any surface disturbance would require a SUP. A shovel? No, but crane paths would. That's where I would need a scope of work to address that in my paperwork. Any reclamation, if you reclaim crane paths at end it will be a lot easier than if you are leaving them.

Andrew: It sounded like leveling is your rule of thumb. Are there any other obvious things we can't do?

Wayne: I can't think of any off top of my head, give me time to think and especially after I see scope of work.

Andrew: If we provide a draft scope of work, can you take a look and provide feedback?

Wayne: Yes.

David Streier: On other wind projects, we have been asked by financing to obtain something like a LONO. If asked by a lender would you be open to a letter or documentation proving you don't need an easement to cure title?

Wayne – Yes.

Andrew wraps up meeting.

Meeting Minutes

Meeting **Badger Wind, U.S. Fish and Wildlife Service (USFWS), North Dakota Game and Fish (NDGF), and North Dakota Department of Agriculture (NDAA) Environmental Studies and Mitigation Discussion**

Meeting Date 30 January 2024

Virtual Meeting Participants

Heidi Riddle – Fish and Wildlife Biologist, USFWS
Elisha Mueller – Conservation Biologist, NDGF
Bruce Kreft – Conservation Supervisor, NDGF
Dutch Bialke – General Counsel and Senior Policy Advisor, NDDA
Adam Miller – Conservation Expert, NDDA
Mark Crowl – Development Director, Orsted
Andrew Krieger – Permitting Manager, Orsted
Chris Farmer – Principle Onshore Biologist, Orsted
Clayton Derby – CEO, WEST
Kristen Chodachek – Project Manager and Wildlife Biologist, WEST

Minutes

Historical Layout / Footprint of the Project

Originally permitted with the PSC in November 2022 for:

- 79 total positions
- Project capacity – approximately 252 MW
- Turbine Type – GE 3.4 MW; hub height – up to 98m and rotor diameter – up to 140m
- COD 2025
- Interconnection agreement signed with MDU and MISO to interconnect to the Wishek Junction 230-kV substation

Proposed Updates

- 103 total positions; will build up to 93 turbines (with 10 alternates)
- Project capacity – approximately 252 MW
- Turbine Type - GE 2.8 MW; hub height – up to 89m and rotor diameter – up to 127m
- COD – 2026
- Interconnection agreement signed with MDU and MISO to interconnect to the Wishek Junction 230-kV substation

Historical Permitting Overview

Local Permitting:

- McIntosh County– no zoning permits are required; signed road use agreement on March 24, 2022
- Logan County granted CUP on May 11, 2022 and signed Road Use Agreement on June 27, 2022
- Currently amending and updating the Logan County CUP to reflect new footprint – submitted on November 30, 2022; currently in review

State of North Dakota Permitting:

- Certificate of Site Compatibility (CSC) issued on November 30, 2022
- Anticipate submitting CSC amendment in February 2024

Additional Studies Completed in 2023

Grasslands
- Grassland mapping in expansion area in August 2023
- No turbines or pads within unbroken grasslands
- One alternate turbine that is within broken grassland and within 2 miles of a sharp-tailed grouse lek (unlikely to build this alternate turbine location)

Bird and Bat Conservation Strategy
- Updated in January 2024

Whooping Crane Contingency Plan
- In progress

Bald Eagle Nest Verification
- In-use nest identified in 2019; nest structure missing in 2021 and 2024 field verification
- New in-use nest identified in 2021; present in 2024; nest is greater than 2 mi from the closest turbine

Wetland Delineation and Mapping
- Completed for the expansion area and shifted infrastructure in Fall 2023

Cultural Resources Survey
- Completed for the expansion area and shifted infrastructure in Fall 2023

Ongoing and Planned Studies

Eagle Use Surveys
- One year of surveys; began in August 2023 and will continue through July 2024 in expansion area to provide information on eagle use patterns

Eagle Nest Surveys
- Spring 2024 for entire Project Area

Eagle Management Plan or Eagle Conservation Plan
- Planning to develop one of these in 2024

Impact Assessment

Indirect Wetland Impacts
- Calculated impacts on the 93 turbines Badger Wind intends to build (does not include alternates); this is the max number of turbines they plan to build and will submit for in the CSC application
- Used a 0.5 mile radius centered on turbines
- Final calculations will be based on turbines selected prior to construction; if turbines change for some reason, impacts will be addressed accordingly

Indirect Grassland Impacts

- Calculated impacts on the 93 turbines (does not include alternates) that Badger Wind intends to build; this is the max number of turbines they plan to build and will submit for in the CSC application
- Evaluated indirect impacts to unbroken grasslands within 300 m radius centered on turbines

- Final calculations will be based on turbines selected prior to construction; if final turbines constructed change for some reason, impacts will be addressed accordingly

Badger Wind Offset Calculations

Assumptions

- Based on 93 turbine locations
- Grasslands – 300-m buffer radius centered on the turbine
- Wetlands – 0.5-mile radius centered on the turbine
- Final calculations will be based on final, selected turbines to be provided prior to construction

Calculations

- Based on 378.6 ac of grassland habitat
- Based on 74.9 ac of wetland habitat

Impact Notes

- No turbines or turbine pads are within unbroken grasslands; one alternate turbine is placed in an unbroken grassland and is within two miles of field identified sharp-tailed grouse lek. This is an alternate turbine that Badger Wind is unlikely to build.

Discussion

Andrew asked for NDGFD and USFWS feedback on proposed surveys.

- Heidi mentioned she has not seen the revised IPaC report and will review as soon as she receives. Andrew stated he will send again.

Bruce inquired as to why Orsted wouldn't use alternate turbine locations that appear to have less impact offsets in the northeast.

- Andrew explained that primary turbine locations are selected based on how energetic the turbines are. The alternate turbine locations in the central location of the Project Area are in an area with a dip and as such, wind is not the same quality as the other areas.
- Chris stated other non-biological constraints (i.e. dwellings) are considered with turbine location selection.
- Andrew noted that all turbine locations are permitted with the PSC and as such they have a backup option if needed.

Heidi inquired about other constraints; is it a County specific regulation (i.e., set back from homes)?

- Andrew stated both County and State setbacks. Orsted tries to consolidate all setbacks to create a global "buildable area" to determine where they can site turbines.

Andrew inquired with NDGFD if they had any feedback on impact calculations.

- Elisha stated Sandy (GIS expert with NDGFD) ran the analysis using their desktop data. NDGFD calculated slightly different acres because they used desktop grasslands data (rather than the field verified data used by Badger Wind), but these differences are not unusual, and NDGF accepts Badger Wind's calculation as accurate.

Andrew asked if Badger Wind could provide any further information to help agencies evaluate the Project.

- No comments.

Elisha asked about alternate turbines and offsets; typically there is a trigger to when offsets would be expected or the timeline, especially if delays occur. Turbines 1, 2, and 3 in the northwest region of the Project Area have a lot more grass around them. The impact might look different if Orsted were to not use other turbines and replace with these turbines. Is there a way to include this thought into the commitment.

- Andrew stated Badger Wind will have a final calculation prior to construction and compare to what is shown in the PowerPoint. They will adjust impact calculations based on this analysis. Badger Wind proposed this approach earlier when speaking to North Dakota Department of Agriculture.

Elisha asked if the commitment for mitigation will be included in the BBCS.

- Andrew stated it can be.
- Dutch reiterated based on previous discussions, that any MOU that is entered upon between NDDA and Badger Wind will include these commitments.

Andrew inquired if memorializing the MOU and BBCS with this update, would suffice?

- Heidi stated, can reference the MOU with the NDDA within the BBCS and include a small amount of text in the BBCS. Heidi requested that a draft BBCS be provided for them to comment upon.

Andrew reiterated question from earlier – what other information Orsted can provide prior to submitting the CSC application or the PSC Hearing.

- There was no additional information requested.

Greg asked Dutch if offsets are restored in the Project Area and using willing landowners. Is it using some kind of trigger when the Project starts? This is important for the NDGFD and should be encapsulated in the MOU.

- Dutch replied that he anticipates the MOU for Badger will be substantially similar to Oliver IV, if not identical so that there is consistent treatment between the Projects. Any MOU that the NDDA and the Agricultural Commissioner enter into will not contain any surprises.

Andrew asked again if there were other questions or feedback?

- Chris mentioned the timing on the BBCS; may be delayed if Orsted is going to include the MOU language for impact assessments, depending on the timing of MOU completion.
- Elisha reminded all that NDGFD is required to provide a letter to the PSC 30 days prior to the public hearing.
- Andrew stated Orsted is hopeful to have the BBCS in a week for review by the NDGFD and USFWS. He mentioned the BBCS will be submitted as an appendix to the CSC amendment; however, it is a living document.
- Heidi stated the USFWS is not constrained to the 30 days prior to the hearing.
- Andrew stated Orsted will send the BBCS to the NDGFD and USFWS as soon as possible and would be happy to have another meeting to discuss these documents.

Appendix D

Agency Correspondence

Department of Defense

Badger Wind, LLC
February 2024

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From: OSD Pentagon OUSD A-S Mailbox ASD EIE-RP-SC
To: Evans, Ian
Cc: De Caro, David; Wallace, Erin; OSD Pentagon OUSD A-S Mailbox ASD EIE-RP-SC
Subject: RE: Badger Wind Farm - Request for DOD Siting Clearinghouse Informal Review
Date: Friday, January 19, 2024 12:16:08 PM
Attachments: image001.jpg

Ian,

Nope, not necessary. Completely understood. I'll get this update out right away.

As the person who presents the projects to the DoD, I just try to get the answers to any questions that I think I will be asked once I release the project.

Everything looks great. I should be able to handle it from here. Thank you and have a nice weekend.

Respectfully,

Dan Townes
Military Aviation and Installation Assurance Siting Clearinghouse
Office of the Assistant Secretary of Defense (Energy, Installations and Environment)
Desk: 571-372-8414 *(limited access/shared line)*
NIPR: daniel.w.townes.ctr@mail.mil

From: Evans, Ian <Ian.Evans@dnv.com>
Sent: Friday, January 19, 2024 2:08 PM
To: OSD Pentagon OUSD A-S Mailbox ASD EIE-RP-SC <osd.pentagon.ousd-a-s.mbx.asd-eie-rp-sc@mail.mil>
Cc: De Caro, David <David.Decaro@dnv.com>; Wallace, Erin <Erin.Wallace@dnv.com>
Subject: RE: Badger Wind Farm - Request for DOD Siting Clearinghouse Informal Review

Hello Dan,

I can confirm that is indeed the only change. My rationale for sending you files that "entirely replace" the old ones was so that you would not need to do any consolidation of the old and new – you can just use the new ones.

However, If you'd prefer, I could send a kmz containing only the changed location.

Work-life balance is important! I do not expect you to respond to, or take action on this email outside of your normal working hours.
Best regards,

Ian Evans (he/him/his)
GIS Analyst - Energy Systems

From: OSD Pentagon OUSD A-S Mailbox ASD EIE-RP-SC <osd.pentagon.ousd-a-s.mbx.asd-eie-rp-sc@mail.mil>
Sent: Friday, January 19, 2024 12:22 PM
To: Evans, Ian <Ian.Evans@dnv.com>
Cc: De Caro, David <David.Decaro@dnv.com>; Wallace, Erin <Erin.Wallace@dnv.com>; OSD Pentagon OUSD A-S Mailbox ASD EIE-RP-SC <osd.pentagon.ousd-a-s.mbx.asd-eie-rp-sc@mail.mil>
Subject: RE: Badger Wind Farm - Request for DOD Siting Clearinghouse Informal Review

Good afternoon Mr. Evans,

Thank you for the update.

On the request form, when you say "the only change is that turbine 74 has shifted approximately 125 ft to the southwest", is that indeed the only change?

The reason I ask is that you also state that "the updated files entirely replace these files that I sent previously" and "this version completely replaces the version from December 22, 2023". Are there any other changes to the project that I am missing? I checked with my colleagues and we did not notice any additional changes based on our comparison.

Please advise. Thank you.

Respectfully,

Dan Townes
Military Aviation and Installation Assurance Siting Clearinghouse
Office of the Assistant Secretary of Defense (Energy, Installations and Environment)
Desk: 571-372-8414 *(limited access/shared line)*
NIPR: daniel.w.townes.ctr@mail.mil

From: Evans, Ian <Ian.Evans@dnv.com>
Sent: Friday, January 19, 2024 9:34 AM
To: OSD Pentagon OUSD A-S Mailbox ASD EIE-RP-SC <osd.pentagon.ousd-a-s.mbx.asd-eie-rp-sc@mail.mil>
Cc: De Caro, David <David.Decaro@dnv.com>; Wallace, Erin <Erin.Wallace@dnv.com>
Subject: Re: Badger Wind Farm - Request for DOD Siting Clearinghouse Informal Review

Hello,

There has been a small change to the layout: T74 has shifted approximately 125 ft to the southwest.

I have attached an updated KMZ file and pdf form. The updated files entirely replace these files that I sent previously:

Old	New
10455420-HOU-R-05-A Badger Wind Farm DOD Clearinghouse_231220_DD.pdf	10455420-HOU-R-05-A Badger Wind Farm DOD Clearinghouse_**240111**.pdf
10455420-HOU-R-05-A Badger Wind Farm DOD Clearinghouse_231220.kmz	10455420-HOU-R-05-A Badger Wind Farm DOD Clearinghouse_**240111**.kmz

Work-life balance is important! I do not expect you to respond to, or take action on this email outside of your normal working hours.

Best regards,

Ian Evans (he/him/his)

GIS Analyst - Energy Systems

From: OSD Pentagon OUSD A-S Mailbox ASD EIE-RP-SC
Sent: Thursday, December 28, 2023 9:08 AM
To: Evans, Ian
Cc: De Caro, David; Wallace, Erin; OSD Pentagon OUSD A-S Mailbox ASD EIE-RP-SC
Subject: RE: Badger Wind Farm - Request for DOD Siting Clearinghouse Informal Review

Good morning Mr. Evans,

Your Informal Review request for the Badger Wind Farm project has been received. We will begin processing the request shortly.

Thank you for the opportunity to review the project.

Very Respectfully,

The Clearinghouse

DNV Canada Ltd.
ian.evans@dnv.com

dnv.com | LinkedIn



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January 26, 2024

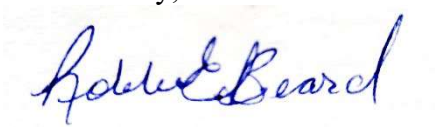
Ian Evans
Badger Wind, LLC
401 N Michigan Ave; Suite 501
Chicago, IL 60611

Dear Mr. Evans,

As requested, the Military Aviation and Installation Assurance Siting Clearinghouse coordinated within the Department of Defense (DoD) an informal review of the Badger Wind Farm Project. The results of our review indicated that the wind project, located in Logan and McIntosh Counties, North Dakota, as proposed, will have minimal impact on military operations conducted in the area.

Please note that this informal review by the DoD Military Aviation and Installation Assurance Siting Clearinghouse does not constitute an action under 49 United States Code Section 44718 and that the DoD is not bound by the conclusion arrived at under this informal review. To expedite our review in the Obstruction Evaluation Airport Airspace Analysis (OE/AAA) process, please add the project number 2023-12-W-DEV-32 in the comments section of the filing. If you have any questions, please contact me at robbin.e.beard.civ@mail.mil.

Sincerely,



Robbin Beard
Deputy Director
Military Aviation and Installation
Assurance Siting Clearinghouse

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Appendix D

Agency Correspondence

North Dakota Geological Survey

Badger Wind, LLC
February 2024

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From: Anderson, Fred J. <fjanderson@nd.gov>
Sent: Tuesday, January 9, 2024 11:01 AM
To: Mark Crowl <MCROW@orsted.com>
Cc: Amanda Coletti <AMCOL@orsted.com>
Subject: N.D. Geological Survey Comments regarding the Proposed Updates to the Badger Wind Project Boundary

Mr. Crowl,

The North Dakota Geological Survey, a division of the North Dakota Department of Mineral Resources, appreciates the notification and opportunity to review and provide comment on this proposed wind energy project.

After careful review of the proposed project area boundary and revised expansion areas, as described in the comment solicitation letter sent to the N.D. Geological Survey on December 13, 2023, we would not note any geologic concerns within the proposed updated project boundary area.

Please contact our offices if there are any additional questions or comments regarding this review.

Regards,

Fred J. Anderson
Geologist, North Dakota Geological Survey

701.328.8000 (Survey Main Office) • 701.328.8037 (Office Direct) • fjanderson@nd.gov • www.dmr.nd.gov/ndgs

NORTH Dakota | Mineral Resources
Be Legendary.

701.328.8020 (Front Office) • oilandgasinfo@nd.gov • www.dmr.nd.gov • 600 E Boulevard Ave, Dept. 405 • Bismarck, ND 58505

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Appendix D

Agency Correspondence

North Dakota Game and Fish Department

Badger Wind, LLC
February 2024

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NDGFD
Bruce Kreft – Conservation Supervisor
Elisha Mueller – Conservation Biologist

Ørsted
Mark Crowl – Development Director
Chris Farmer – Principal Biologist
Andrew Krieger – Western Permitting Manager

WEST
Martin Piorkowski – Consulting Ecologist/Project Manager
Kristen Chodachek – Wildlife Biologist/Project Manager

Introduction
Chris Farmer went through introductions and introduced team and the changes for the Badger/Ørsted team. Would like North Dakota Game and Fish Department (NDGFD) reactions and recommendations for the Badger Wind Project.

Chris – Introduced himself; worked for consultants prior to joining the development side; joined Ørsted recently; he is a subject matter expert.

Andrew Krieger – Western Permitting Manager; oversees Projects in the western US; decade of experience working with and for environmental agencies; has worked in offshore industry; worked in this position since May.

Mark Crowl – Project Development Director for Badger Wind; relatively new to the Ørsted organization. Has experience with US based developers in Midwest, from TX to ND. Will be involved in day-to-day management of Badger Wind.

Martin Piorkowski – Project manager out of Bismarck. Been with WEST for 6 years, five of which in ND. Has worked for wind Projects since 2003 and occasionally with solar.

Kristen Chodachek – Project manager out of Bismarck. Been with WEST for 15 years and has primarily worked on wind Projects throughout the Midwest and Southern Plains.

Bruce Kreft – fishery biologist for the last 24 years. Has worked on wildlife crossings with highways. Has been in this position for a couple of months; replacing Steve Dyke. He is here to learn and will lean on Elisha.

Elisha Mueller – Conservation biologist with NDGF for wind development.

Meeting Goals:
- Reintroduce Ørsted team and company.

- Overview of the Project and what has been done to date with a focus on the proposed expansion area.

Previous Survey Efforts

a. Grassland Survey – 2021
b. Wetland mapping – 2020 and 2022
c. Bat Acoustic – summer/fall 2019
d. Whooping Crane Habitat Assessment – 2021
e. Bat Desktop Habitat Assessment
f. Avian Use surveys – 2019 – 2021 (included eagle use; 3 whooping cranes observed)
g. Raptor Nest Surveys 2019, 2020, 2021
h. Sharp-tailed Grouse lek surveys – 2019
i. Sharp-tailed Grouse conservation strategy – fall 2022
j. Developed Bird and Bat Conservation Strategy (BBCS) – 2022

Path Forward for Expanded Footprint

Updated Layout and Technology – would like NDGF feedback.

a. Ørsted securing lease agreements to the west; would like to expand the footprint of the Project towards the west and south of the currently permitted project.
b. Ørsted showed the indicative turbines; but is still working on siting.
c. Change from a 3.4 MW turbine to a smaller 2.8 MW turbine. Change would result in 106 turbines locations rather than 79 turbines as originally permitted. The plan would be to submit an Amendment to the Public Service Commission (PSC) for this change. Total nameplate capacity would be very similar to the original permit.
d. Also looking at a change in point of interconnect in order to connect to Southern Power Pool (SPP).
e. New turbines would be an amendment to the current permit from PSC and McIntosh permit.

Elisha inquired about what has been permitted if any construction had been completed or started; Andrew stated no construction; it is waiting until the newly proposed project footprint is permitted.

Elisha inquired about a new interconnect and whether there will be new transmission; Mark stated the collector sub would be adjacent to the existing substation; very short span.

Elisha inquired if new proposed turbines will be in unbroken grasslands and leased lands. Mark answered about lease status – all are on agreements that were previously acquired for original Permitted area or through a recent acquisition. Leasing and land control are fully completed and finished up.

Expanded Footprint and Grasslands

Ørsted showed the proposed expanded footprint and 2014 native grasslands layer – this is desktop layer and would need to be field verified. Desktop visual analysis shows the westerly and southern expansion of the footprint is away from concentrations of unbroken grasslands in the

north and east. Expansion is in areas of agriculture; confident in stating all new turbine locations will be in agricultural fields.

Bruce mentioned that grasslands are of importance, in particular native unbroken grasslands; they just wanted to verify the proposed turbine locations.

Ørsted showed turbines and NWI wetlands. Proposed turbine positions are not in dense wetland areas.

Elisha mentioned impact analysis; stated NDGF runs the impact analysis, and that the developer should also run the same analysis following the BMPs. She recommends they run the analysis even if the turbines are in cultivated land and then meet again with the NDGF. NDGF is mostly concerned with drafting and sending a letter to the PSC that will not be a surprise to Ørsted.

Additional Planned Studies and Docs
Looking for feedback form NDGF for proposed field studies needed in the expanded area for the amendment to the permit:

- Grassland assessment
- Cultural
- Wetland delineation
- Additional year of avian use surveys with focus on eagles (large birds only)
- Raptor nest surveys – within or before 6 months of construction (at least the spring prior to construction)
- Develop a whooping crane contingency plan
- Revise/update the BBCS
- Develop an Eagle Management Plan (EMP) or Eagle Conservation Plan (ECP) – depends on the results from the eagle use surveys

Andrew asked Bruce and Elisha on initial feedback of list.

Elisha –recommended Ørsted reach out to Heidi Riddle with U.S. Fish and Wildlife Service (USFWS); NDGF takes a really supportive role with the USFWS – would like to hear what USFWS recommends for federal species of concern. Elisha recommended avoiding turbine placement within 2 miles of a sharp-tailed grouse lek, in grasslands. If no surveys are done and all turbines placed in croplands, they are okay with this. However, if some of these turbines are placed in grasslands within 2 miles of a lek, further discussion will be required. Elisha mentioned HAPET model for wetland (waterfowl) impacts and NDGF grassland (breeding grassland bird) impacts. Definitely recommend running the models. If avoiding unbroken prairie (this is where they have the most concern); this may reduce the amount you have to put in on the forefront of surveys.

Chris inquired about grassland survey – does NDGF like to see survey methodology or can they go out and conduct survey and then review. Elisha stated you can follow the BMPs, but they will still run their own analysis using their data. No need to provide a survey plan before going out and conducting assessment.

Ørsted Questions:
Mark is interested in any feedback/general thoughts on offsets and how NDGF proposed how they go about implementing these offsets in light of the environmental offset legislation. The original plan was to use the Meadowlark initiative but that may no longer work.

Elisha mentioned this is a great question. This is a voluntary offset and should not be affected by the new bill. The new legislation does not compel you to do it any certain way. Elisha suggested they continue with the Meadowlark Initiative. NDGF is looking at acres, not the cost. They just want to see the acres on the ground. Elisha is unsure how they would get there to put money in the account for a commitment of acreage offsets.

Mark stated this makes sense. Ørsted stated they are trying to do the right thing. They feel they will be able to do something close to what they originally planned on. They have biodiversity goals, and this is an opportunity to work towards those goals.

The Meadowlark Initiative and offset impact analysis is a good tool for renewable energy development. If this tool goes away, the PSC's job will be harder. If money goes into an account that does not go toward the impacts and conservation this could make offset strategies more complicated. They want to see mitigation and acres on the ground. Elisha is agnostic on how you get those acres. Bruce is happy to see the first slide stating Ørsted is committed to conservation especially with biodiversity goals. He stated we will get through this new bill and process.

Elisha stated the NDGF letter to the PSC always references acres that are being impacted and what impacts need to be offset. The NDGF will always use acres as units, not dollars. Andrew asked what the next logical touch point between Ørsted is and NDGF. For grasslands, WEST does assessment and runs impact and then Elisha runs her analysis.

Elisha inquired as to when they plan to submit the amendment to the PSC. Mark mentioned relatively soon. They need to work through surveys and conditional use permit with McIntosh County. Still trying to determine how long this will take. Generally safe to say by the end of Q3.

Elisha stated the next step is to touch base with USFWS. She would like another meeting with USFWS and NDGF. After the impact analysis is completed, she would like to have another meeting. Elisha is unaware of how an amendment to the siting permit works. She needs to provide her feedback 30 days before hearing.

Bruce mentioned open communication is key. Please maintain and reach out with any questions.

Appendix D

Agency Correspondence

Logan County

Badger Wind, LLC
February 2024

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From: Amanda Coletti
To: Kristiansen, Jody
Subject: RE: May Logan County Commissioners Meeting
Date: Tuesday, May 30, 2023 1:33:00 PM
Attachments: image001.png
image002.png

Thank you!

Best regards,
Amanda Coletti
Senior Associate, Project Development
Region Americas

Ørsted
Tel. +17738021321

From: Kristiansen, Jody <jkristiansen@nd.gov>
Sent: Tuesday, May 30, 2023 10:56 AM
To: Amanda Coletti <AMCOL@orsted.com>
Subject: RE: May Logan County Commissioners Meeting

Yes

Jody Kristiansen
Logan County Treasurer/Auditor
301 Broadway
Napoleon, ND 58561
701-754-2286
jkristiansen@nd.gov

From: Amanda Coletti <AMCOL@orsted.com>
Sent: Tuesday, May 30, 2023 10:53 AM
To: Kristiansen, Jody <jkristiansen@nd.gov>
Subject: RE: May Logan County Commissioners Meeting

***** **CAUTION:** This email originated from an outside source. Do not click links or open attachments unless you know they are safe. *****

Hi Jody,

I hope you had a good Memorial Day holiday! I just wanted to confirm that the Logan County Commissioners will be meeting at the following address next week on June 7th:

- 301 Broadway
- Napoleon, ND 58561

Please let me know if this is correct.

Thank you,

Best regards,
Amanda Coletti
Senior Associate, Project Development
Region Americas

Ørsted
Tel. +17738021321

From: Kristiansen, Jody <jkristiansen@nd.gov>
Sent: Wednesday, March 22, 2023 1:08 PM
To: Amanda Coletti <AMCOL@orsted.com>
Subject: RE: May Logan County Commissioners Meeting

Our June meeting is scheduled for June 7th, 2023. I have you down at 2:30pm.

Thanks!

Jody Kristiansen
Logan County Treasurer
301 Broadway
Napoleon, ND 58561
701-754-2286
jkristiansen@nd.gov

From: Amanda Coletti <AMCOL@orsted.com>
Sent: Wednesday, March 22, 2023 12:00 PM
To: Kristiansen, Jody <jkristiansen@nd.gov>
Subject: RE: May Logan County Commissioners Meeting

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Hi Jody,

Thanks for getting back to me so quickly!

I talked with the other members of my team, and it turns out that we actually have an Orsted company event to attend on May 10th. Unfortunately, that means we won't be able to attend the May Logan County Commissioners meeting that day.

Would you be able to put us on the schedule for June instead? The meeting would be on Wednesday,
th

June 14 , right?

Thank you!

Best regards,
Amanda Coletti
Senior Associate, Project Development
Region Americas

Ørsted
Tel. +17738021321

From: Kristiansen, Jody <jkristiansen@nd.gov>
Sent: Monday, March 20, 2023 12:01 PM
To: Amanda Coletti <AMCOL@orsted.com>
Subject: RE: May Logan County Commissioners Meeting

I have you on May 10th, 2023 at 2pm. Please let me know if you need anything else.

Thanks!

Jody Kristiansen
Logan County Treasurer
301 Broadway
Napoleon, ND 58561
701-754-2286
jkristiansen@nd.gov

From: Amanda Coletti <AMCOL@orsted.com>
Sent: Monday, March 20, 2023 11:58 AM
To: Kristiansen, Jody <jkristiansen@nd.gov>
Cc: Nicholas Gebauer <NIGEB@orsted.com>; Mark Crowl <MCROW@orsted.com>
Subject: May Logan County Commissioners Meeting

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***** **CAUTION:** This email originated from an outside source. Do not click links or open attachments unless you know they are safe. *****

Hi Jody,

My name is Amanda and I am a member of the Orsted team working on the Badger Wind Farm in Logan and McIntosh counties. I have been working on the project along with Nick, our Sr. Director, and Mark, our Director. I have copied them both here.

We would like to meet with the Logan County Commissioners to share the latest information about the project when we are in the area in May. Blanche pointed me in your direction for getting on the meeting agenda. Will there be room on the agenda for Orsted to speak at the May Logan County Commissioners

meeting? Additionally, what day(s) will the meeting be held in May?

Thank you!

Best regards,
Amanda Coletti
Senior Associate, Project Development
Region Americas

Tel. +17738021321
amcol@orsted.com



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Chicago, IL 60611



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5. Cattle Guard Grenz & Kroeber Township underground cattle pass

NEW BUSINESS (ACTION REQUIRED)

1. Rear CAT Tires
2. Co extension fund
3. Building permit
4. Community Service Administration Agreement
5. Health Insurance Premiums
6. July meeting date
7. Budget meeting
8. Letter to county employees
9. Letter to county resident

NEW BUSINESS (INFORMATIVE MATERIAL)

1. Accounts receivable report for the County Highway Department for the period ending May 31, 2023
2. General accounts receivable report for period ending May 31, 2023
3. 6 County Organization Meeting June 13, 2023, Ashley, ND
4. Allied Energy Out of Gas Policy
5. Letter from Widmer Roel
6. Snow removal assistance program update

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Appendix D

Agency Correspondence

McIntosh County

Badger Wind, LLC
February 2024

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From: Amanda Coletti
To: Ketterling, Gina L.
Subject: RE: June McIntosh County Commission Board Meeting
Date: Wednesday, May 31, 2023 1:33:00 PM
Attachments: image001.png
image002.png

Thank you!

Best regards,
Amanda Coletti
Senior Associate, Project Development
Region Americas

Ørsted
Tel. +17738021321

From: Ketterling, Gina L. <gketterl@nd.gov>
Sent: Wednesday, May 31, 2023 2:19 PM
To: Amanda Coletti <AMCOL@orsted.com>
Subject: RE: June McIntosh County Commission Board Meeting

Hi Amanda

Yes, that is correct. You are on the agenda for 10:00 am

Gina Ketterling
McIntosh County Auditor
PO Box 39
Ashley, ND 58413
701-288-5140 Ext 1
gketterl@nd.gov

From: Amanda Coletti <AMCOL@orsted.com>
Sent: Tuesday, May 30, 2023 10:49 AM
To: Ketterling, Gina L. <gketterl@nd.gov>
Subject: RE: June McIntosh County Commission Board Meeting

***** **CAUTION:** This email originated from an outside source. Do not click links or open attachments unless you know they are safe. *****

Hi Gina,

I hope you had a good Memorial Day holiday! I just wanted to confirm that the McIntosh County Commission Board will be meeting at the following address next week on June 7th:

- McIntosh County Courthouse, 112 1st Street NE, Ashley ND

Please let me know if this is correct.

Thank you,

Amanda Coletti
Senior Associate, Project Development
Region Americas

Ørsted
Tel. +17738021321

From: Ketterling, Gina L. <gketterl@nd.gov>
Sent: Friday, March 24, 2023 2:34 PM
To: Amanda Coletti <AMCOL@orsted.com>
Subject: RE: June McIntosh County Commission Board Meeting

Okay I will put you on the agenda at 10 am June 7th.

Gina Ketterling
McIntosh County Auditor

From: Amanda Coletti <AMCOL@orsted.com>
Sent: Friday, March 24, 2023 2:31 PM
To: Ketterling, Gina L. <gketterl@nd.gov>
Subject: RE: June McIntosh County Commission Board Meeting

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Hi Gina,

That works out very well for us! We will be headed to the Logan County meeting in the afternoon, so we can definitely be there for 10am.

Looking forward to it.

Best regards,
Amanda Coletti
Senior Associate, Project Development
Region Americas

Ørsted
Tel. +17738021321

From: Ketterling, Gina L. <gketterl@nd.gov>
Sent: Friday, March 24, 2023 1:52 PM

To: Amanda Coletti <AMCOL@orsted.com>
Subject: RE: June McIntosh County Commission Board Meeting

Hi Amanda

The McIntosh County Commission is meeting on June 7th also. We start our meeting at 9:00 a.m. If you could come to the meeting in the morning, around 10:00 or 11:00 a.m. that would work for us.

Gina Ketterling
McIntosh County Auditor
PO Box 39
Ashley, ND 58413
701-288-5140 Ext 1
gketterl@nd.gov

From: Amanda Coletti <AMCOL@orsted.com>
Sent: Thursday, March 23, 2023 4:18 PM
To: Ketterling, Gina L. <gketterl@nd.gov>
Cc: Nicholas Gebauer <NIGEB@orsted.com>; Mark Crowl <MCROW@orsted.com>
Subject: June McIntosh County Commission Board Meeting

You don't often get email from amcol@orsted.com. Learn why this is important

***** **CAUTION:** This email originated from an outside source. Do not click links or open attachments unless you know they are safe. *****

Hi Gina,

I hope your week is going well! My name is Amanda and I am a member of the Orsted team that is working on the Badger Wind Farm in McIntosh and Logan counties. I have been working on the project along with Nick, our Sr. Director, and Mark, our Director. I have copied them both here.

We were recently in Wishek for a landowner meeting, and we will also be returning to the area in June. We would like to meet with the McIntosh County Commission Board to share the latest information about the project when we are there in a few months. During this visit, we will also be meeting with the Logan County Commissioners. I know that the Logan County Commissioners' meeting will be held on Wednesday, June 7th. Does the McIntosh County Commission Board meet during that same week? It would work out very well for us if we could get a meeting set up around that same time, but the month of June in general is still good timing.

I'd really appreciate if you could let me know when the McIntosh County Commission Board meeting(s) will be held in June.

Thank you!

Best regards,
Amanda Coletti
Senior Associate, Project Development
Region Americas

Tel. +17738021321
amcol@orsted.com



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Chicago, IL 60611



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MCINTOSH COUNTY PROCEEDINGS

June 7, 2023 **9:15 a.m.**

The meeting was called to order by Chairman Neil Meidinger. Present were Perry Turner, Jim Heinrich, and Gary G. Hoffman.

The Pledge of Allegiance was recited by all.

The agenda was reviewed. Jim Heinrich asked to add the landscaping issue. Perry Turner would like to add the "No Parking signs issue. Perry Turner moved to approve the agenda with the two additions, Jim Heinrich seconded. Motion carried.

The minutes of the last meeting and special meeting were read. Neil Meidinger stated that the following comment in the regular meeting minutes, "trail is on private land," should be removed. The culvert that needs to be replaced is on a county road. Jim Heinrich moved to approve the minutes with the above-mentioned correction, Perry Turner seconded. Motion carried.

Two Applications for Classification as Inundated Agricultural Land from Alvin and Rodney Feist were reviewed. After some discussion, Perry Turner moved to approve both applications. Jim Heinrich seconded. Motion carried.

Kary Lindgren of Farmers Union Insurance met with the board to present the coverage renewal proposal for liability insurance for the county. She reviewed Claim losses and asked if they wanted to take full coverage off of the 2005 Ford ¾ ton. Board decided to drop to liability only. Jim Heinrich moved to take this vehicle off of full coverage, Perry Turner seconded. Motion carried. Total premium came to $41,454.00 per year with a $2 million liability. Board decided they wanted $5 million liability and that adds $2,182.00. Total premium would be $43,636.00. Perry Turner moved to accept this proposal. Jim Heinrich seconded. Discussed the $5 million liability option. She stated that they could go to $10 million. Board decided to keep at $5 million. On the vote being taken, the following voted in favor thereof: Jim Heinrich, Perry Turner, and Neil Meidinger. Against the same: None. Motion carried. Mrs. Lindgren stated that NDIRF is offering a cybersecurity discount. The county can get a 4% discount, at no cost to the county if they participate. She will have someone contact the auditor.

The Plat for Outlot A located in the SE1/4SW1/4 of Section 6-129-73 was reviewed. Perry Turner moved to approve said plat as presented. Jim Heinrich seconded. Motion carried.

The Auditor, Gina Ketterling, presented the Board with some check the county received from the North Dakota Association of Counties reflecting discounts from Workforce Safety and Insurance. They were as follows:

- 2022 LMS Discount - $702.25
- 2022 Premium Dividend Credit - $3,706.09
- Safety Discount - $702.25

The letter from Widmer Roel CPAs related to the audit they are currently conducting for the county was reviewed and filed.

The McIntosh County Housing Board needs a new member. Darwin Golz resigned. Jim Heinrich moved to appoint Jasmine Ulmer to replace Mr. Golz. Perry Turner seconded. Motion carried.

Chris Opsahl, Highway Superintendent, met with the Board on the following matters:

- Mark Kraft and Amanda Collette, representatives from Orstad (Badger Wind) met with the Board. They updated the commission on the progress of this project. They stated that they have met with the Agriculture Commissioner and the Governor. They presented the Board with maps of the project. The first map shows where the turbines would be located. They stated that they are looking at a 2025 start date. Perry Turner asked about rumors that were going around that the project was scrapped. They stated that those rumors are not true.
- Discussed the $49,785.07 Covid money that the county received. Bryon Fuchs of NDDOT sent an email out that they just received notice that as part of the Debt Ceiling limit deal that was reached involves the COVID funds referred to above. As part of this deal, Congress is rescinding these Covid funds for any obligated balances. So, North Dakota does not lose these funds, NDDOT has requested FHWA obligate these remaining funds on a project. NDDOT will be replacing the Covid funds that we had to obligate with regular federal aid funds.
- Mowing of some property along the southeast part of Ashley was discussed. The county owns 36' x 166' from the curb. Board decided that this is all the county is going to mow.
- Parcel #09510000 in Lehr was discussed. Robin Opsahl is offering $25.00 for the lot. Jim Heinrich moved to sell the lot to Robin Opsahl. Perry Turner seconded. Motion carried.
- Jerry Levi is mowing county lots in Zeeland with the county lawn mower. This mower needs to be replaced. Chris asked if it is okay to get quotes. Board gave their approval to get quotes on a "zero turn" mower.
- Jim Heinrich asked about the tire machine. Jim Heinrich moved to purchase the tire machine. Perry Turner seconded. On the vote being taken, the following voted in favor thereof: Jim Heinrich, Perry Turner, and Neil Meidinger. Against the same: None. Motion carried.
- Chris stated that they had to stop rubbering because the cracks are closing. They will be going full scale graveling next week.
- Chris asked about a two-post lift to do oil changes. He was instructed to get prices.

- Gary Hoffman has a spot on the road by his place that needs some work. Chris will look at it.
- Perry Turner discussed the "No Parking" signs on the road going to Tony Schneiders. Commissioner Turner has received calls on this. He was told that big equipment pulled up behind an older person and the person did not hear it. Commission Turner is concerned about the county's liability. He feels it must be managed better. Commissioner Heinrich is going to talk to the State's Attorney and the Sheriff about this. It was also discussed about putting signs on the road by Goettle's. Also, the "Road Closed" signs on this road will stay up until the bad spot is fixed.
- He is getting a load of cold mix to fix the culvert on the Green Lake Road.
- The Road Crew is taking Monday, July 3rd off and working Friday, July 7th.

Jim Heinrich moved that the courthouse will be closed Monday, July 3, and July 4. Perry Turner seconded. Motion carried.

Landscaping in front of courthouse was discussed. Jim Heinrich feels that the county spent the money on the annual plants and they should stay there. The Janitor feels he cannot do it. Commissioner Heinrich does not like the pots he put in. Board decided to keep the Daylilies.

Office vouchers were reviewed and filed.

The following bills were reviewed. Perry Turner moved to pay said bills. Jim Heinrich seconded. On the vote being taken, the following voted in favor thereof: Jim Henrich, Perry Turner, and Neil Meidinger. Against the same: None. Motion carried.

810-811	Internal Revenue Service	Federal, SS & Medicare WTH	19,442.59
812	McIntosh County Bank	Direct Deposit Fees	8.45
91520	Visa	Gas Fills, PPE, Pump, Supplies	3,007.76
E1662-E1683	McIntosh County	Payroll - Electronic	56,672.63
91521-91528	McIntosh County	Payroll - Paper	16,605.42
91529	Smith, Mary	Overpayment on Taxes	379.03
91530-91558	Collections	Collections	76,163.02
91559	A & B Business Solutions, Inc.	Service Contracts	99.44
91560	ACME Tools	Finish Nailer & Nails	352.98
91561	Aflac	Supplemental Insurance	817.67
91562	Amazon Capital Services	Frames (10)	27.56
91563	American Solutions for Business	Office Supplies	438.43
91564	Aramark	Rental Supplies	833.14
91565	Ashley Super Valu	Meeting Supplies	7.00
91566	Attorney General	Scram Fees	155.00
91567	BEK	Phones	98.72
91568	Butler Machinery	Equipment Parts	224.88
91569	Capfirst Equipment Finance, Inc	Loader Annual Payment	20,416.00
91570	CDFC	Supplies, Unleaded, Repairs	429.74
91571	Central Iron Repair and Mfg.	Car Trailer Repairs	249.58
91572	CHS, Inc	Gas Fills	100.47
91573	CHS, Inc	Bulk Fuel Oil	3,829.22
91574	City of Wishek	Water, Sewer, Garbage	57.00
91575	City of Zeeland	Water, Sewer, Garbage	72.88
91576	CNH Industrial Accounts	Equipment Hauling	997.50
91577	Cole Papers, Inc.	Janitor Supplies	303.30
91578	Colonial Life	Supplemental Insurance	868.25
91579	Computer Express	Laptop Dock	925.00
91580	County Treasurer	Postage Meter	1,151.30
91581	Delzer, Steven	Coroner Fees	300.00
91582-91583	DRN	Phones, SMA, Security, Webhost, 911	1,048.91
91584	DMC Wear Parts, LLC	Carbide Cutting Edges	2,414.26
91585	Eve's Floral & Gifts	Flowers for Services and Courthouse	397.69
91586	Fettig's Sprinkler Service	Sprinkler Repairs	600.00
91587	Fey, Carol	Travel Expense	28.00
91588	G & G Implement, Inc.	Oil Change, Parts, Battery	334.31
91589	General Roofing & Construction	Courthouse Dome Repairs	35,772.00
91590	ITD	Emails, Netmotion, Circuit	792.40
91591	JDF	Shop Supplies	223.58
91592	Kedish House	Victim-Witness Fees	410.00
91593	KEM	Electricity	246.70
91594	Link's Do It Best	Supplies, Fertilizer, Weed Killer	2,288.34
91595	Martell's Carquest	Supplies, Repair Parts, Oil	1,363.50
91596	Martell's True Value	Shop Supplies	752.12
91597	Meidinger, Neil	Travel Expense	43.23
91598	MDU	Electricity	848.51
91599	NRG	New Computer, Support	2,215.17
91600	NDSU	Exhibit Tags	25.00
91601	Nelson International	Equipment Repairs	1,396.48

91602	NDACO	D&A Testing	30.00
91603	NDCSE	Child Support	362.00
91604	Northwestern Mutual	Deferred Comp	2,276.00
91605	Northwest Tire	Tires	601.80
91606	Pfeifle Ford	Vehicle Repairs & Maintenance	1,907.67
91607	Quadient Finance USA, Inc	Postage Meter Funds	2,000.00
91608	Q's Welding & Machine, LLC	Repairs to Blades	230.00
91609	Quality Inn	Lodging	176.40
91610	Rocky's Fuel Oil & Gas	Bulk Fuel Oil	2,916.87
91611	Salzer Electric	50' P/Cord & Labor	276.10
91612	Schnieder, Hope	Travel Expense	287.20
91613	SCRWD	Water	21.80
91614	Stutsman Co Correction Center	Prisoner Housing	3,225.00
91615	Tri State Water, Inc.	Water & Coolers	89.50
91616	Tyler Technologies, Inc.	Doc Pro Server Migration	1,425.00
91617	Van Diest Supply Company	Plateau Chemical	2,511.00
91618	Verizon Wireless	Cell Phones, Laptops	299.63
91619	Vetters Vehicle Detailing	Wash & Detail	120.00
91620	VSP Vision	Vision Insurance	59.02
91621	Westside Heating And AC, LLC	Replace Hose/Fittings on Tank	336.20
91622	Wishek Electric	Wiring New Door	377.62
91623	Zeeland Oil LLC	Gas Fills, Bulk Fuel, Supplies	2,193.21
91624	Curts-Sinclair Service	Gas Fills	457.10

Jim Heinrich moved to recess until 1:00 p.m. Perry Turner seconded. Motion carried.

This being the time set for the Board of Equalization meeting, the Board convened as the Board of Equalization. Also attending was Hope Schnieder, Tax Director, and several other individuals. Ms. Schnieder discussed the following:

- Homestead Credit. There were 70 applications. All were approved but one, then the Legislature passed a bill that increased the limit and then the one that was not approved got approved. New applications have been coming in.
- Disabled Veterans Credit. The had 8 applicants
- 44 mobile homes on fille
- 231 applications for the Farm Resident exemption were filed.
- 35 applications for the Exempt Property exemption were filed.
- Renaissance Zone applications – 4 – 5-year applications and 1 – 20-year application.
- Ag land value was discussed. She is recommending "No Change" on the Ag values. She is going to continue to work on actual use. Perry Turner moved to keep the Ag Value at 92.5%. Jim Heinrich seconded. Motion carried.
- Notices of Increase. The Cities of Ashley and Wishek all had increases. County came in at 73% and she had to get it to 90%.
- Perry Turner asked about the property tax refund. She has not seen anything on the application forms.
- Vern Harildstad attended the meeting. He discussed the scrap iron mess by his property that he feels lowers the value of his property. He wants the assessor to create another zone by that area to lower the value. He has been to the City Board of Equalization about this but they have not done anything. He does not like the fact that the neighbors do not take care of their properties and he feels that an algorithm is not fair and he does not like being told that it is a Bismarck or a company out of Minnesota setting the rules. Perry Turner stated that we must keep our values at or above 90% and we must have it there or the State will make us change it. Mr. Harildstad feels a 10% increase on his property would be fair. Ms. Schnieder stated that if she did this for him, she would have to do it for everyone in that neighborhood. Ms. Schnieder said she would be willing to reassess his property and he stated he would like that.
- Patricia Entzi also attended the meeting. She was worried about her taxes. He was told she qualifies for Homestead Credit.

There being no further business, Jim Heinrich moved to adjourn as the Board of Equalization and reconvene as the Board of Commissioners. Perry Turner seconded. Motion carried.

Next meeting will be July 10, 2023 at 9:00 a.m.

Jim Heinrich moved to adjourn. Perry Turner seconded. Motion carried. Meeting adjourned.

_____
Neil Meidinger, Board Chairman

Attest: _____
Gina Ketterling, Auditor

From: Ketterling, Gina L.
To: Amanda Coletti
Subject: RE: Badger Wind Update and McIntosh County Zoning Confirmation
Date: Tuesday, August 29, 2023 7:52:58 AM
Attachments: image002.png
image006.png

Hi Amanda

McIntosh County does not require zoning permits. They do require overweight permits through Loadpass.

Gina Ketterling
McIntosh County Auditor
Po Box 39
Ashley, ND 58413
701-288-5140 Ext 1
getterl@nd.gov

From: Amanda Coletti <AMCOL@orsted.com>
Sent: Monday, August 28, 2023 12:22 PM
To: Ketterling, Gina L. <gketterl@nd.gov>
Cc: Mark Crowl <MCROW@orsted.com>
Subject: RE: Badger Wind Update and McIntosh County Zoning Confirmation

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Hi Gina,

I wanted to follow up on my previous email that I sent earlier this month. Would you be able to confirm that McIntosh County has not enacted a zoning ordinance and that the Badger Wind project does not need to obtain any zoning permits from McIntosh County?

We are just looking for a quick confirmation here via email. Thank you!

Best regards,
Amanda Coletti
Senior Associate, Project Development
Region Americas

Ørsted
Tel. +17738021321

From: Amanda Coletti
Sent: Monday, August 7, 2023 4:19 PM
To: Ketterling, Gina L. <gketterl@nd.gov>
Cc: Mark Crowl <MCROW@orsted.com>
Subject: Badger Wind Update and McIntosh County Zoning Confirmation

Hello Gina,

First of all, I'd like to follow up and say thank you for allowing us to provide an update to the McIntosh County Board of County Commissioners in June. During the Commissioners meeting, we made the announcement that Orsted and Badger Wind acquired a competitor project immediately adjacent to our previous footprint. After more thoroughly assessing the acquired property, we strongly believe that portions of the acquisition would be a great fit as an addition to the original Badger Wind project area.

As such, I'm reaching out to provide notice to the County of our intent to expand the Badger project to accommodate an additional ~4,125 acres of land within Logan and McIntosh counties. Adding this property would slightly expand our project area, but more importantly would expand the pool of local participants that want to see this project constructed while extending project benefits to more members of the local community.

On December 1, 2021, the McIntosh County Board of County Commissioners provided the attached letter confirming that McIntosh County had not enacted a zoning ordinance and that the project did not need to obtain any zoning permits from McIntosh County. Would you be able to confirm here via email that this is still the case?

I look forward to hearing from you.

Best regards,
Amanda Coletti
Senior Associate, Project Development
Region Americas

Tel. +17738021321
amcol@orsted.com



Learn more at us.orsted.com

401 N Michigan Ave., Suite 501
Chicago, IL 60611



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From: Amanda Coletti
To: Ketterling, Gina L.
Cc: Mark Crowl
Subject: Badger Wind Project Update
Date: Monday, January 29, 2024 10:58:00 AM
Attachments: image001.png
image002.png

Hi Gina,

I hope this email finds you well. I am reaching out to you today to provide an update to McIntosh County regarding the Badger Wind Project. You should have recently received a letter from Ørsted providing some general updates on the project, but I wanted to send over some additional, more specific information as well. The biggest update is that we have submitted our updated Conditional Use Permit application to Logan County and our Public Hearing has been scheduled with the County on February 14th. Mark and I will be in attendance at the Hearing in a few weeks. We are hoping that the Hearing is uneventful and that our updated permit application is approved with no issues like the last time we went through this process in 2022. Shortly after the Logan County Public Hearing in mid-February, we will be looking to submit our permit amendment application to the North Dakota Public Service Commission.

In addition to this email update, we would love the opportunity to update the McIntosh County Commission Board in person – is there any time within the next few months that might work for us to stop in and visit with the Commission Board in person? Or is this written update sufficient?

Please feel free to send any questions from McIntosh County over to us via email, and don't hesitate to contact me by phone with any questions as well.

Thank you!

Best regards,
Amanda Coletti
Senior Associate, Project Development
West Regional Development 1
Region Americas

Tel. +17738021321
amcol@orsted.com



Learn more at us.orsted.com

401 N Michigan Ave., Suite 501
Chicago, IL 60611



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Appendix D

Agency Correspondence

Red Lake Township

Badger Wind, LLC
February 2024

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From: Chuck Fettig
To: Amanda Coletti
Subject: Re: Badger Wind Update and Red Lake Township Zoning Confirmation
Date: Friday, September 8, 2023 6:24:21 AM

Yes. This confirmation is right.

Sent from my iPhone

> On Aug 29, 2023, at 10:50 AM, Amanda Coletti <AMCOL@orsted.com> wrote:
>
> Hi Chuck,
>
> Thank you for taking my call yesterday. As we discussed on the phone, Orsted and Badger Wind recently acquired a competitor project immediately adjacent to our previous footprint. After more thoroughly assessing the acquired property, we strongly believe that portions of the acquisition would be a great fit as an addition to the original Badger Wind project area.
>
> As such, it is our intent to expand the Badger project to accommodate an additional ~4,125 acres of land within Logan and McIntosh counties. Adding this property would slightly expand our project area, but more importantly would expand the pool of local participants that want to see this project constructed while extending project benefits to more members of the local community.
>
> On March 4, 2022, Red Lake Township provided the attached letter confirming that the Township had not enacted a zoning ordinance and that the project did not need to obtain any zoning or land use permits from Red Lake Township. On the phone, you told me verbally that this is still the case. Would you also be able to confirm here via email that the project will not need to obtain any zoning or land use permits from Red Lake Township?
>
> Thank you!
>
> Best regards,
> **Amanda Coletti**
> Senior Associate, Project Development
> Region Americas
>
> Tel. +17738021321
> amcol@orsted.com
>
> <image001.png>
>
> Learn more at us.orsted.com
>
> 401 N Michigan Ave., Suite 501
> Chicago, IL 60611
>
> <image002.png>

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<Red Lake Township Zoning Letter.pdf>

Appendix D

Agency Correspondence

North Dakota Department of Agriculture

Badger Wind, LLC
February 2024

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From: Bialke, Joseph P. <bialkej@nd.gov>
Sent: Thursday, December 28, 2023 3:45 PM
To: Mark Crowl <MCROW@orsted.com>
Cc: Amanda Coletti <AMCOL@orsted.com>; Miller, Adam M. <admmiller@nd.gov>
Subject: Badger Wind Project - Logan & McIntosh Counties -- NDDA mitigation program
Importance: High

Mark/Amanda

Please allow me to introduce myself. I'm Dutch Bialke, General Counsel at the North Dakota Department of Agriculture (NDDA).

Agriculture Commissioner Goehring is in receipt of your attached letter, dated December 19, 2023. Thank you for your detailed correspondence.

I know the issue of potential environmental mitigation may still be a year or two into the future. Nonetheless, I thought I'd proactively reach out to you in relation to mitigating or offsetting potential direct or indirect adverse environmental impacts associated with the construction and operation of your Badger Wind Project.

As you are aware, earlier this year, North Dakota enacted new laws establishing an environmental mitigation program within NDDA to better address adverse environmental impacts resulting from the construction and operation of energy facilities in the State. These new applicable laws are attached.

Prior to the Public Service Commission issuing a permit or certificate to an applicant under NDCC chapter 49-22, Commissioner Goehring must notify the Public Service Commission of mitigation efforts to create, restore, or mitigate similar habitat affected by the construction or operation of an energy conversion or transmission facility.

Accordingly, these new laws create transparency and ensure that mitigation is properly structured to reflect the project.

Additionally, these new laws ensure that mitigation projects may no longer result in perpetual easements that affect agricultural land and future infrastructure projects. Now, according to the new laws, perpetual easements are not permitted. A conservation easement, in relation to an energy facility mitigation project, must be limited in time to no longer than the operational life of the facility.

Since these laws became effective on July 1, 2023, NDDA has made extensive progress in creating and implementing an approach that provides certainty and avoids further unintended consequences.

In particular, NDDA manages the environmental impact mitigation fund. These funds are used by NDDA, in accordance with N.D.C.C. § 4.1-01-21.1, primarily to create, restore, or mitigate similar habitat affected by the construction or operation of an energy conversion or transmission facility.

Further, NDDA lowers mitigation effort overhead costs, as appropriate, by partnering with local government conservation agencies (*e.g.*, Soil Conservation Districts) to assist in planning and implementing appropriate mitigation efforts.

We look forward to working with you in relation to any necessary environmental mitigation project that you may contemplate.

Please contact either me or Adam Miller, cc'ed above, if you have any questions or if we can be of any assistance.

All the best,

Dutch

J.P. "Dutch" Bialke
General Counsel/Senior Policy Advisor
Special Assistant Attorney General
ND Department of Agriculture
600 E. Boulevard Ave., Dept. 602 | Bismarck, ND 58505-0020
P: 701.328.1496 | F: 701.328.4567
bialkej@nd.gov
www.nd.gov/ndda

4.1-01-21.1. Environmental impact mitigation fund - Report to legislative management - Continuing appropriation.

1. There is created in the state treasury the environmental impact mitigation fund. The fund consists of all moneys deposited in the fund under section 49-22-09.2. All moneys in the fund are appropriated to the commissioner on a continuing basis for disbursement by the commissioner in accordance with this section.

2. Moneys in the fund may be used only for:

    a. Consultation with environmental scientists or engineers, industry specialists, or others for relevant services to analyze or implement mitigation required from the impact of development; and

    b. Creation, restoration, or mitigation of similar habitat affected by the construction or operation of an energy conversion or transmission facility. Mitigation of adverse impacts from development under this section shall be conducted in the following order of priority:

        (1) The area immediately impacted by the development;
        (2) The county impacted by the development;
        (3) The region impacted by the development; and
        (4) Other areas within the state.

3. The commissioner is not subject to chapter 54-44.4 when contracting for services under this chapter.

4. In consultation with the federal environmental law impact review committee, the commissioner shall adopt rules pursuant to chapter 28-32 to implement the provisions of this section.

5. Easements or leaseholds purchased by a person to mitigate adverse environmental effects of the construction or operation of an energy conversion or transmission facility under chapter 49-22 must be limited to the operational life of the facility as defined under chapter 49-22. Any payment made to mitigate adverse environmental effects of the construction or operation of an energy conversion or transmission facility under chapter 49-22 must be made to the commissioner who shall deposit the payment into the environmental impact mitigation fund. Prior to the public service commission issuing a permit or certificate to an applicant under chapter 49-22, the commissioner shall notify the public service commission of mitigation efforts under this section to create, restore, or mitigate similar habitat affected by the construction or operation of an energy conversion or transmission facility.

6. The commissioner shall provide a biennial report of environmental impact mitigation fund disbursements to the legislative management.

7. For purposes of this section, the environmental impact mitigation fund is not subject to subsection 2 of section 4.1-01-18.

49-22-09.2. Mitigating environmental impacts.

If an applicant elects to provide a payment to mitigate the environmental impact of the construction or operation of an energy conversion or transmission facility, the payment must be made to the agriculture commissioner who shall deposit the payment into the environmental impact mitigation fund under section 4.1-01-21.1. Nothing in this section shall be construed to limit an applicant from conducting mitigation activities.

Meeting Minutes

Meeting **Badger Wind and North Dakota Department of Agriculture (NDDA)**
Meeting Date 24 January 2024
Virtual Meeting Participants
Dutch Bialke, General Counsel and Senior Policy Advisor, NDDA
Adam Miller, Conservation Expert, NDDA
Mark Crowl, Development Director, Orsted
Amanda Coletti, Senior Associate Developer, Orsted
Andrew Krieger, Permitting Manager, Orsted
Chris Farmer, Principle Onshore Biologist, Orsted
Clayton Derby, CEO, WEST
Kevin Shelley, Ecologist, WEST

Minutes

- Introductions made from Orsted and NDDA.
- Mark Crowl gave a brief presentation and overview of the project, culminating with Orsted's proposed voluntary offset payment amounts and structure.
- NDDA indicated the top-line figures are likely acceptable as they are very much in line with the spirit of previous payments under the new Environmental Impact Mitigation Fund process.
- NDDA would like to keep Badger Winds payments and process congruent with NextEra Energy and Oliver Wind to the extent practicable.
    - Overall, this is a proposal that Counsel feels they can recommend to the Commissioner - they intend to be consistent and equitable in treatment of projects.
- NDDA stated that they need to review the potential payment schedule that includes instalments over the first five years of operations to determine if that is feasible. This approach could potentially conflict with the state budgeting process that is on a two-year cycle.
- Next steps were discussed and Orsted formally requested the Memorandum of Understanding (MOU) that was agreed to with NDDA and Oliver Wind.
- Orsted agreed to keep any comments or edits to the previous MOU at a minimum, so that approval can be expedited and NDDA can ensure that all projects are being treated in a fair and equitable manner.
    - Timeline to execute MOU (proposed February 16, 2024) may be too ambitious, but NDDA will work with Orsted to the extent they are able to meet the deadline, or something close to it.
- Once Orsted drafts edits to the MOU, the Agriculture Commissioner, Counsel, and NDDA consultants will review and provide comments.
- NDDA made a schedule note – the NDDA letter to the Public Service Commission (PSC) has to be submitted 30 days prior to the PSC hearing.
- NDDA asked to attend the NDGF meeting and asked that NDGF be allowed to comment on a "final" draft MOU.

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Appendix D

Agency Correspondence

North Dakota Department of Environmental Quality

Badger Wind, LLC
February 2024

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January 17, 2024

Mark Crowl
Director of Development
Orstad
mcrow@orsted.com
Denver, CO

Re: Badger Wind Project Updates in Logan and McIntosh Counties

Dear Mr. Crowl:

The North Dakota Department of Environmental Quality (Department) has reviewed the information concerning the above-referenced project received at the Department on December 27, 2023, with respect to possible environmental impacts.

1. All necessary measures must be taken to minimize fugitive dust emissions created during construction activities. Any complaints that may arise are to be dealt with in an efficient and effective manner.

2. Care is to be taken during construction activity near any water of the state to minimize adverse effects on a water body. This includes minimal disturbance of stream beds and banks to prevent excess siltation, and the replacement and revegetation of any disturbed area as soon as possible after work has been completed. Caution must also be taken to prevent spills of oil and grease that may reach the receiving water from equipment maintenance and/or the handling of fuels on the site. Guidelines for minimizing degradation to waterways during construction are attached.

3. Projects disturbing one or more acres are required to have a permit to discharge stormwater runoff until the site is stabilized by the re-establishment of vegetation or other permanent cover. Further information on the stormwater permit may be obtained from the Department's website or by calling the Division of Water Quality at 701-328-5210. Also, cities may impose additional requirements and/or specific best management practices for construction affecting their storm drainage system. Check with the local officials to be sure any local stormwater management considerations are addressed.

   A total maximum daily load (TMDL) allocation for fecal coliform bacteria has been developed for Beaver Creek and its tributaries. Stormwater runoff from the project should not contribute to the impairment if the appropriate practices are in place to manage sanitary waste.

4. The construction project is in the vicinity of the Wishek and South Branch Beaver Creek aquifers. Numerous stock and domestic water wells are located within the project areas. Care should be taken to avoid spills of any materials that may have an adverse effect on groundwater quality. All spills must be immediately reported to this Department and appropriate remedial actions performed.

5. All solid waste materials must be managed and transported in accordance with the state's solid and hazardous waste rules. Appropriate efforts to reduce, reuse and/or recycle waste materials are strongly encouraged. As appropriate, segregation of inert waste from non-inert waste can generally reduce the cost of waste management. Wind turbine blades are prohibited from disposal in landfills unless resource recovery markets are not available, and then disposal must be approved by the Department in accordance with North Dakota Century Code Subsections 23.1-08-08(2) and (3). Used wind turbine blades are not to be stockpiled without Department approval. Further information on waste management and recycling is available from the Department's Division of Waste Management at 701-328-5166.

The Department owns no land in or adjacent to the proposed improvements, nor does it have any projects scheduled in the area. In addition, we believe the proposed activities are consistent with the State Implementation Plan for the Control of Air Pollution for the State of North Dakota.

If you have any questions regarding our comments, please feel free to contact this office.

Sincerely,

L. David Glatt, P.E., Director
North Dakota Department of Environmental Quality

LDG:ll
Attach.

Construction and Environmental Disturbance Requirements

The following are the minimum requirements of the North Dakota Department of Environmental Quality for projects that involve construction and environmental disturbance in or near waters of the State of North Dakota. They ensure that minimal environmental degradation occurs as a result of construction or related work which has the potential to affect waters of the state. All projects must be constructed to minimize the loss of soil, vegetative cover, and pollutants (chemical or biological) from a site.

Soils

Prevent the erosion and sediment loss using erosion and sediment controls. Fragile and sensitive areas such as wetlands, riparian zones, delicate flora, and land resources must be prohibited against compaction, vegetation loss and unnecessary damage.

Surface Waters

All construction must be managed to minimize impacts to aquatic systems. Follow safe storage and handling procedures to prevent the contamination of water from fuel spills, lubricants, and chemicals. Stream bank and stream bed disturbances must be contained to minimize silt movement, nutrient upsurges, plant dislocations, and any physical chemicals, or biological disruption. The use of pesticides or herbicides in or near surface waters is allowed under the department's pesticide application permit with notification to the department.

Fill Material

Any fill material placed below the ordinary high-water mark must be free of topsoil, decomposable materials, and persistent synthetic organic compounds, including, but not limited to, asphalt, tires, treated lumber, and construction debris. The department may require testing of fill material. All temporary fills must be removed. Debris and solid waste must be properly disposed or recycled. Impacted areas must be restored to near original condition.

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Appendix D

Agency Correspondence

North Dakota Department of Water Resources

Badger Wind, LLC
February 2024

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NORTH Dakota | Water Resources
Be Legendary.

January 19, 2024

Mark Crowl
Director Development
mcrow@orsted.com

Dear Mr. Crowl:

This is in response to your request for a review of the environmental impacts associated with the Updates to the Badger Wind Project located in Logan and McIntosh Counties, ND.

The proposed project has been reviewed by Department of Water Resources, and the following comments are provided:

- The Department of Water Resources (DWR) Engineering and Permitting Section and Water Resource Districts are responsible for regulating drainage and water management in North Dakota. The DWR Engineering and Permitting Section also regulates the construction and modification of any dike, diversion, restoration, or other device. Consequently, the DWR requests to be notified regarding a proposed project's impacts, if any, to water resources, such as watercourses (i.e. streams or rivers), agricultural drains, wetlands (i.e. ponds, sloughs, lakes, or any series thereof), and dikes, diversion, restorations, and other water control devices, as any alterations, modifications, improvements, or impacts may require a drainage permit(s) or construction permit(s). For more information on these requirements, please visit the Regulation & Appropriation tab on the DWR website (dwr.nd.gov), or contact the Regulatory Division directly at 701-328-2750 or dwrregpermits@nd.gov.

- There are no current effective FEMA National Flood Insurance Program (NFIP) floodplains identified or mapped where the proposed project is to take place. However, preliminary Flood Insurance Rate Maps identify areas within the project area within a special flood hazard area. The preliminary maps may go effective prior to project start. Currently, no permit relative to the NFIP are likely required based on the current effective Flood Insurance Rate Map and State minimum standards. However, flood risk has been identified through the North Dakota Risk Assessment Mapservice and Base Level Engineering (BLE) (ndram.dwr.nd.gov). In the absence of FEMA NFIP data, BLE is often considered best available data and is recommended to be considered in the design process. The State of North Dakota has no formal NFIP permitting authority as all NFIP permitting decisions are considered by impacted NFIP participating communities, the community with zoning authority for the area in question. Please work directly with the local floodplain administrators of the zoning authorities impacted.

- Initial review indicates the project does not require a conditional or temporary permit for water appropriation. However, if surface water or groundwater will be diverted for construction of the project, a water permit will be required per North Dakota Century Code § 61-04-02. Please consult with the Department of Water Resources Water

1200 Memorial Hwy | Bismarck, ND 58504 | 701.328.2750 | DWR.nd.gov

Appropriation Division if you have any questions at (701) 328-2754 or appropinfo@nd.gov.

- The Department of Water Resources maintains a network of observation wells across the state for monitoring the water levels and quality in glacial and bedrock aquifers. These wells are often installed in road and highway rights-of-way to limit inconvenience to the adjacent landowners. Department of Water Resources observation wells have a yellow protective casing extending between 1 and 3 feet above ground surface, and their locations are marked with a stake. If an observation well is encountered during project activities and must be removed, please contact the Water Appropriation Division. The Department of Water Resources hopes to keep all observation wells, but otherwise will ensure the well is properly abandoned.

Thank you for the opportunity to provide review comments. Should you have further questions, please contact me at 701-328-4970 or vdavila@nd.gov.

Sincerely,

Vanessa Davila

Vanessa Davila
Water Resource Planner

VD:dm/1570

Appendix D

Agency Correspondence

North Dakota Parks and Recreation Department

Badger Wind, LLC
February 2024

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January 10, 2024

Mark Crowl
Orsted Energy Company

Re: Badger Wind Project in Logan and McIntosh Counties

Dear Mark,

The North Dakota Parks and Recreation Department (NDPRD) has reviewed the above-proposed Updates to the Badger Wind Project in Logan and McIntosh Counties

NDPRD's scope of authority and expertise covers properties that NDPRD owns, leases, or manages; properties protected under Section 6(f) of the Land and Water Conservation Fund (LWCF); rare plants; and ecological communities established through the Natural Heritage Program.

The project does not appear to affect properties NDPRD owns, leases, or manages.

The projects does not appear to affect properties protected under Section 6(f) of the LWCF.

A North Dakota Natural Heritage biological conservation database query determines if any current or historical plant or animal species of concern or other significant ecological communities are known to occur within an approximate one-mile radius of the project area. Based on this review, no known plant or animal species of concern or significant ecological communities are documented within or immediately adjacent to the project site.

We appreciate your commitment to rare plant, animal, and ecological community conservation, management, and inter-agency cooperation. For additional information, contact Natural Resources Division Chief Kathy Duttenhefner at 701-328-5370, 701-220-3377 (cell), or kgduttenhefner@nd.gov.

Thank you for the opportunity to comment on the proposed project.

Sincerely,
Kathy Duttenhefner
Kathy Duttenhefner, Chief Natural Resources Division

From: Amanda Coletti
To: De Caro, David; Wallace, Erin
Cc: Andrew Krieger
Subject: FW: Badger Wind Project in Logan and McIntosh Counties
Date: Wednesday, January 17, 2024 11:58:44 AM
Attachments: image001.jpg
Orsted_Wind_Project_McIntosh_Lobgan_Co_KD_Responce_Letter_DL1.11._2024.pdf
PROPOSED_UPDATES_TO_THE_BADGER_WIND_PROJECT_LOGAN_MCINTOSH_COUNTIES_DL1.11.24_HERITAGE.pdf
PROPOSED_UPDATES_TO_THE_BADGER_WIND_PROJECT_LOGAN_MCINTOSH_COUNTIES_DL1.11.24_LWCF.pdf
PROPOSED_UPDATES_TO_THE_BADGER_WIND_PROJECT_LOGAN_MCINTOSH_COUNTIES_DL1.11.24_MAP.pdf

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FYI

Best regards,
Amanda Coletti
Senior Associate, Project Development
West Regional Development 1
Region Americas

Ørsted
Tel. +17738021321

From: Duttenhefner, Kathleen G. <kgduttenhefner@nd.gov>
Sent: Wednesday, January 17, 2024 12:21 PM
To: Mark Crowl <MCROW@orsted.com>; Amanda Coletti <AMCOL@orsted.com>
Subject: Re: Badger Wind Project in Logan and McIntosh Counties

Re: Badger Wind Project in Logan and McIntosh Counties

North Dakota Parks and Recreation Department's Environmental Review Response letter is attached.

Kathy Duttenhefner
Natural Resources Division Chief
701.328.5370 • 701.220.3377 • parkrec.nd.gov
ND Parks & rec orange 173C & BLK

Appendix D

Agency Correspondence

State Historical Society of North Dakota

Badger Wind, LLC
February 2024

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Logs

Log Entry

Date/Time	1/23/2024 11:36:47 AM
User	Username: shscontractor11 Real Name: SHSContractor11 IP Address: 69.144.223.34 Agent: Chrome Browser 120.0.0.0
File	Path: /Home/shsndgis/shscontractor11 / Badgerwind_Architectural_Report_information.zip ID: 125794483 Size: 18,847,424 bytes Duration: 13.8967847 seconds Rate: 1,356,243 bytes/second
Folder	Path: /Home/shsndgis/shscontractor11 ID: 316049210
Description	Uploaded file Badgerwind_Architectural_Report_information.zip (#125794483) to folder /Home/shsndgis/shscontractor11; integrity verified.
Technical	Error Code: 0
Notes	

Return to Logs

De Caro, David

From: Rigden Glaab <Rigden.Glaab@westwoodps.com>
Sent: Friday, January 26, 2024 10:50 AM
To: Andrew Krieger; De Caro, David; Wallace, Erin
Cc: Ryan Grohnke; Ryan Steeves
Subject: FW: Westwood Submittal: Badger Wind Project, Logan and McIntosh Counties, ND

Follow Up Flag: Follow up
Flag Status: Flagged

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Confirmation email to the ND SHPO.

Thanks,

Rigden

Rigden Glaab, RPA
Senior Archaeological Principal Investigator
rigden.glaab@westwoodps.com

cell (701) 425-9523
direct (952) 697-5791
main (952) 937-5150

Westwood
12701 Whitewater Drive, Suite 300
Minnetonka, MN 55343

westwoodps.com
(888) 937-5150

From: Rigden Glaab
Sent: Friday, January 26, 2024 9:49 AM
To: Meidinger, Lorna B. <lbmeidinger@nd.gov>
Cc: Reed, Timothy A. <treed@nd.gov>; Ryan Grohnke <Ryan.Grohnke@westwoodps.com>
Subject: Westwood Submittal: Badger Wind Project, Logan and McIntosh Counties, ND

Good morning Lorna,

We have mailed the report for the Badger Wind Project along with the processing check. The GIS data and digital version of the document have also been uploaded to the FTP site (Badger_Wind_Project folder).

Thank you, and please let me know if you have any questions.

Best regards,

Rigden Glaab, RPA
Senior Archaeological Principal Investigator
rigden.glaab@westwoodps.com

cell (701) 425-9523
direct (952) 697-5791
main (952) 937-5150

Westwood
12701 Whitewater Drive, Suite 300
Minnetonka, MN 55343

westwoodps.com
(888) 937-5150

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Scheduled Delivery Date: Friday, 01/26/2024

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From:	WESTWOOD PROFESSIONAL SERV
Tracking Number:	1ZF444191398264933
Ship To:	Lorna Meidinger State Historical Society of ND 612 East Boulevard Avenue BISMARCK, ND 585056100 US
UPS Service:	UPS NEXT DAY AIR SAVER
Number of Packages:	1
Scheduled Delivery:	01/26/2024
Weight:	2.0 LBS
Reference Number 1:	R0031120.00 7 4210
Reference Number 2:	RAG

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Appendix D

Agency Correspondence

Wishek Airport

Badger Wind, LLC
February 2024

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RE: Badger Project: Turbine Updates

AC

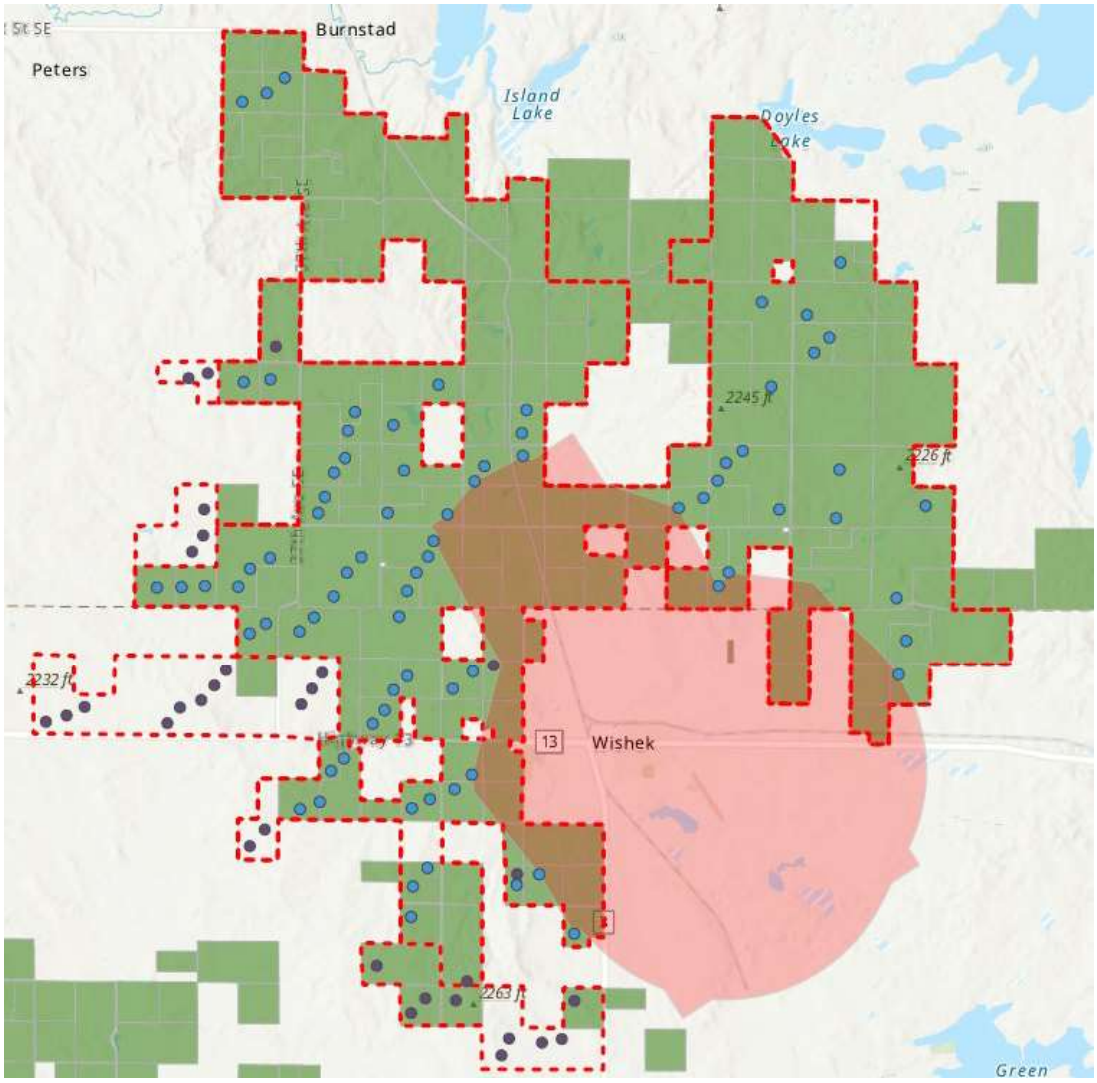
Amanda Coletti
To lorren@bektel.com
Cc Mark Crowl

Hi Lorren,

It was nice talking with you today. Thank you for confirming over the phone that the Wishek Airport does not have any issues with the proposed Badger turbine locations depicted on the map below.

Since there will be no other turbine locations added to the layout, would you be able to confirm here via email that the Wishek Airport does not have any concerns with the proposed Badger turbine layout?

Thank you!



Best regards,
Amanda Coletti
Senior Associate, Project Development
West Regional Development 1
Region Americas

Ørsted
Tel. +17738021321

From: Amanda Coletti
Sent: Monday, October 30, 2023 11:50 AM
To: lorren@bektel.com
Cc: Mark Crowl <MCROW@orsted.com>
Subject: RE: Badger Project: Turbine Updates

Hi Lorren,

I hope this email finds you well. I wanted to send a follow up note to ask if you had heard back from the aeronautics department? I understand the timeline for feedback was about two weeks, so please let us know if you have heard from aeronautics, or if there is an update on when we can expect to hear back from the department.

Thank you!

Best regards,
Amanda Coletti
Senior Associate, Project Development
Region Americas

Ørsted
Tel. +17738021321

From: Amanda Coletti
Sent: Tuesday, September 12, 2023 12:37 PM
To: lorren@bektel.com
Cc: Mark Crowl <MCROW@orsted.com>
Subject: RE: Badger Project: Turbine Updates

Hi Lorren,

Thank you for letting me know the timeline for the aeronautics review.

To answer your questions, the elevation numbers on the map show the elevation of the land only. The map discloses all of our proposed turbine locations, so there will not be any other locations added. We are planning on building up to 93 turbines. There are more than 93 turbines on the map, because the map represents both primary and alternate turbine locations. We wanted to be conservative and give you the view of all of the possible locations, but only a smaller subset will actually be built (again, up to 93).

None of the new proposed turbines are closer to the Wishek Airport than you were previously comfortable with, so we took the airport into consideration when designing the new layout to make sure it would work for you.

Please let me know if you have any other questions.

Best regards,
Amanda Coletti
Senior Associate, Project Development
Region Americas

Ørsted
Tel. +17738021321

From: lorren@bektel.com <lorren@bektel.com>
Sent: Monday, September 11, 2023 12:11 PM
To: Amanda Coletti <AMCOL@orsted.com>
Subject: Re: Badger Project: Turbine Updates

Talked with aeronautics. It will be about 2 weeks for an answer. I will be out of the country for about 16 days. Have bee looking at the map. It appears to me there is a purple dot that may have been added that appears to be North west of Wishek. When looking at the map. Concerning the elevations…is that the height of the proposed towers or is that the elevation of the land?
When will you notify us as to the number of towers and locations of any new towers not disclosed on the map.

Thanks

Lorren

On 2023-09-08 14:39, lorren@bektel.com wrote:

Amanda,

We have sent the amended plan to the North Dakota department for their review. When we here from them I will pass it in to you.

Lorren

On 2023-08-24 17:29, Amanda Coletti wrote:

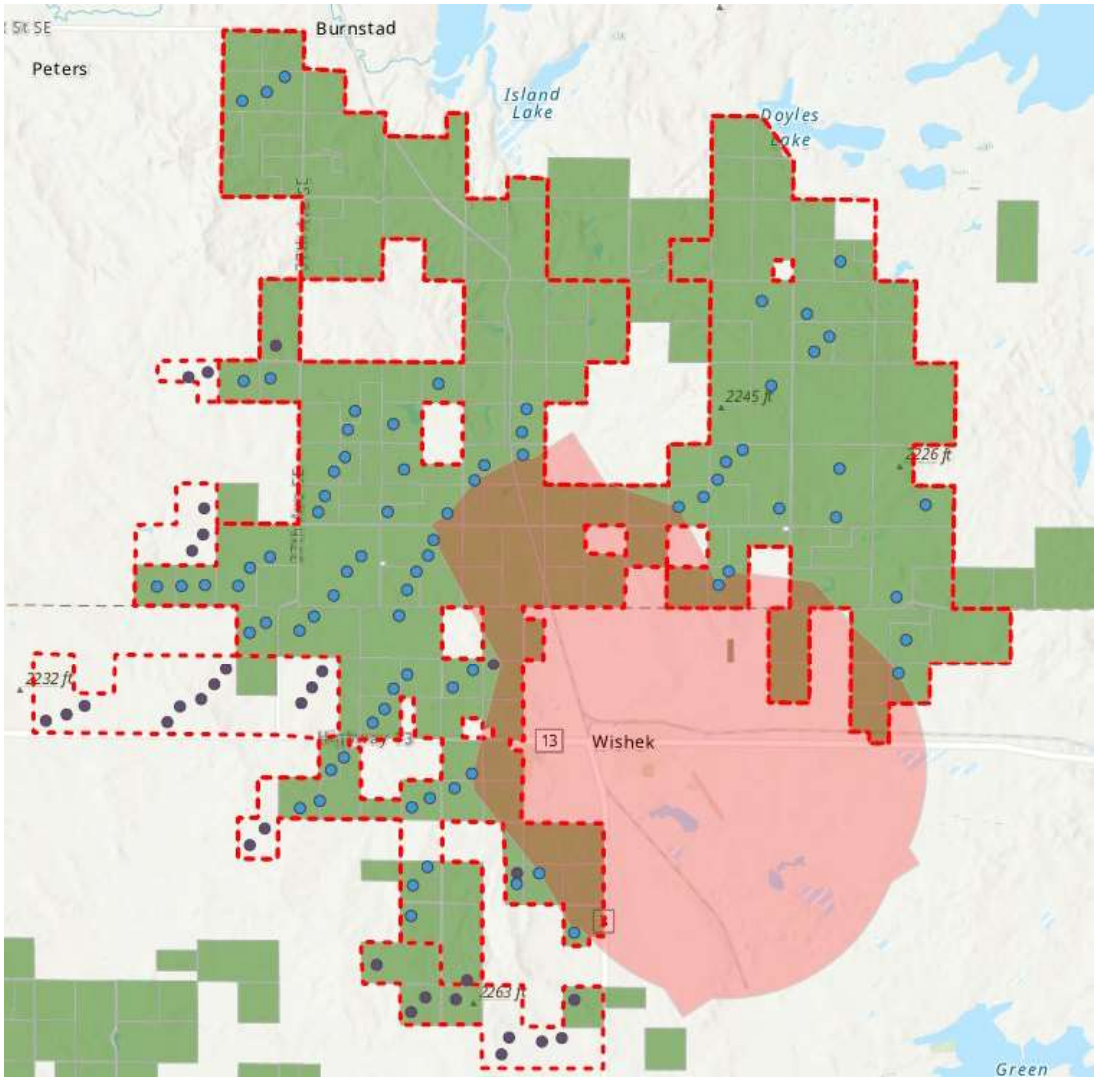
Hi Lorren,

Thank you for taking my call last week. I wanted to send over the updated Badger project map to show you, in greater detail, the proposed locations of the additional wind turbines in the Badger project area. The map below shows:

- Previously approved turbine locations in blue
- New proposed turbine locations in black
- The area surrounding the Wishek Airport that we are avoiding, shaded in light red

As an additional note, we have secured lease agreements and have site control for all of the land that is inside the red dashed lines. Some of the parcels aren't showing up in green because our system hasn't been updated yet.

It would be great if you could respond to this email stating that the Wishek Airport has no concerns with the updates that the Badger project is proposing. Please give me a call or respond to this email if you have any additional questions as well.



Thank you!

Best regards,
Amanda Coletti
Senior Associate, Project Development
Region Americas

Tel. +17738021321
amcol@orsted.com

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Learn more at us.orsted.com

401 N Michigan Ave., Suite 501
Chicago, IL 60611



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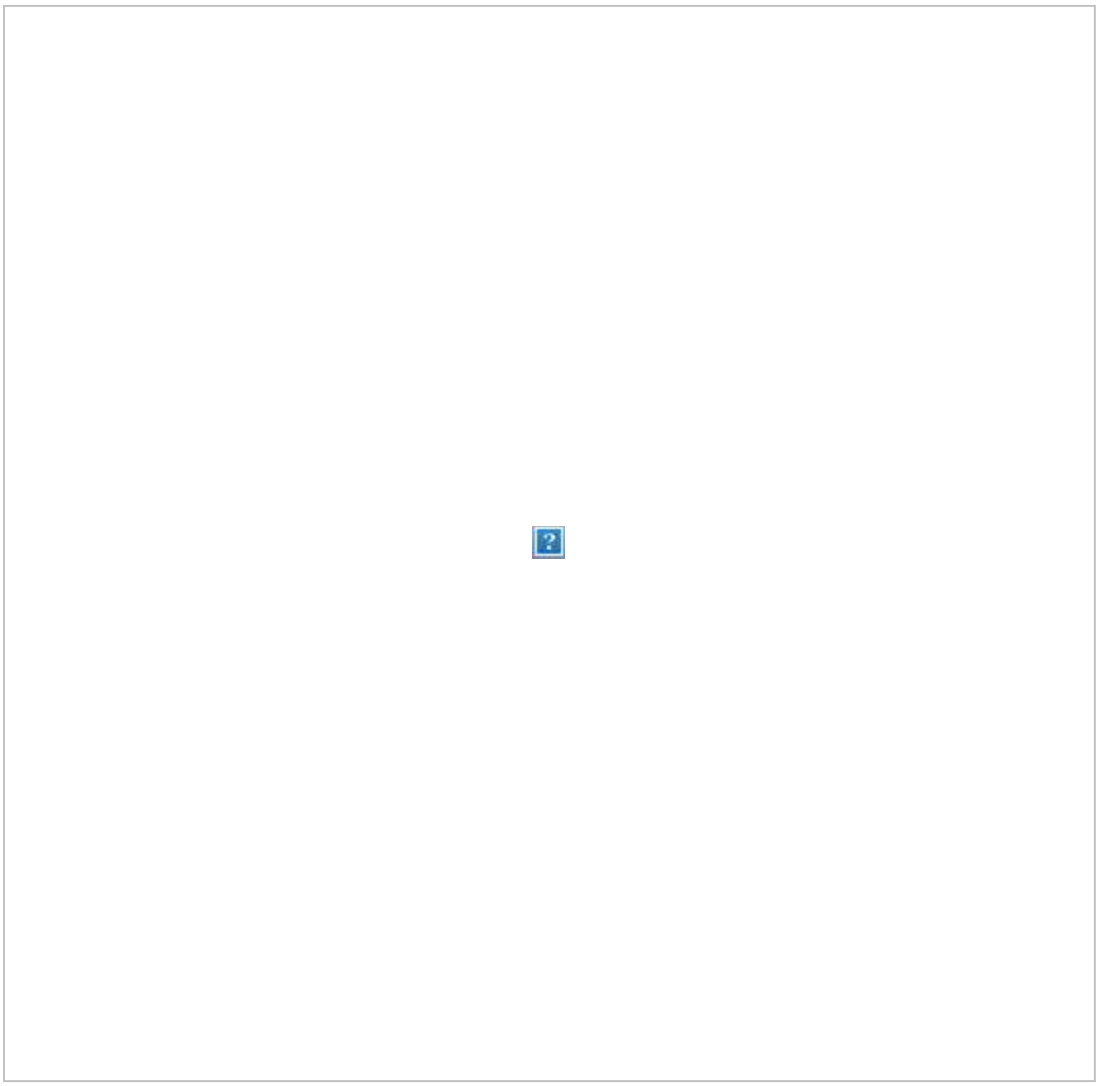
From:	Amanda Coletti
To:	lorren@bektel.com
Cc:	Mark Crowl
Subject:	RE: Badger Project: Turbine Updates
Date:	Friday, November 17, 2023 4:12:00 PM
Attachments:	image001.png image002.png image003.png

Hi Lorren,

It was nice talking with you today. Thank you for confirming over the phone that the Wishek Airport does not have any issues with the proposed Badger turbine locations depicted on the map below.

Since there will be no other turbine locations added to the layout, would you be able to confirm here via email that the Wishek Airport does not have any concerns with the proposed Badger turbine layout?

Thank you!



Best regards,
Amanda Coletti

Senior Associate, Project Development
West Regional Development 1
Region Americas

Ørsted
Tel. +17738021321

From: Amanda Coletti
Sent: Monday, October 30, 2023 11:50 AM
To: lorren@bektel.com
Cc: Mark Crowl <MCROW@orsted.com>
Subject: RE: Badger Project: Turbine Updates

Hi Lorren,

I hope this email finds you well. I wanted to send a follow up note to ask if you had heard back from the aeronautics department? I understand the timeline for feedback was about two weeks, so please let us know if you have heard from aeronautics, or if there is an update on when we can expect to hear back from the department.

Thank you!

Best regards,
Amanda Coletti
Senior Associate, Project Development
Region Americas

Ørsted
Tel. +17738021321

From: Amanda Coletti
Sent: Tuesday, September 12, 2023 12:37 PM
To: lorren@bektel.com
Cc: Mark Crowl <MCROW@orsted.com>
Subject: RE: Badger Project: Turbine Updates

Hi Lorren,

Thank you for letting me know the timeline for the aeronautics review.

To answer your questions, the elevation numbers on the map show the elevation of the land only. The map discloses all of our proposed turbine locations, so there will not be any other locations added. We are planning on building up to 93 turbines. There are more than 93 turbines on the map, because the map represents both primary and alternate turbine locations. We wanted to be conservative and give you the view of all of the possible locations, but only a smaller subset will actually be built (again, up to 93).

None of the new proposed turbines are closer to the Wishek Airport than you were previously comfortable with, so we took the airport into consideration when designing the new layout to make sure it would work for you.

Please let me know if you have any other questions.

Best regards,
Amanda Coletti
Senior Associate, Project Development
Region Americas

Ørsted
Tel. +17738021321

From: lorren@bektel.com <lorren@bektel.com>
Sent: Monday, September 11, 2023 12:11 PM
To: Amanda Coletti <AMCOL@orsted.com>
Subject: Re: Badger Project: Turbine Updates

Talked with aeronautics. It will be about 2 weeks for an answer. I will be out of the country for about 16 days. Have bee looking at the map. It appears to me there is a purple dot that may have been added that appears to be North west of Wishek. When looking at the map. Concerning the elevations…is that the height of the proposed towers or is that the elevation of the land?
When will you notify us as to the number of towers and locations of any new towers not disclosed on the map.

Thanks

Lorren

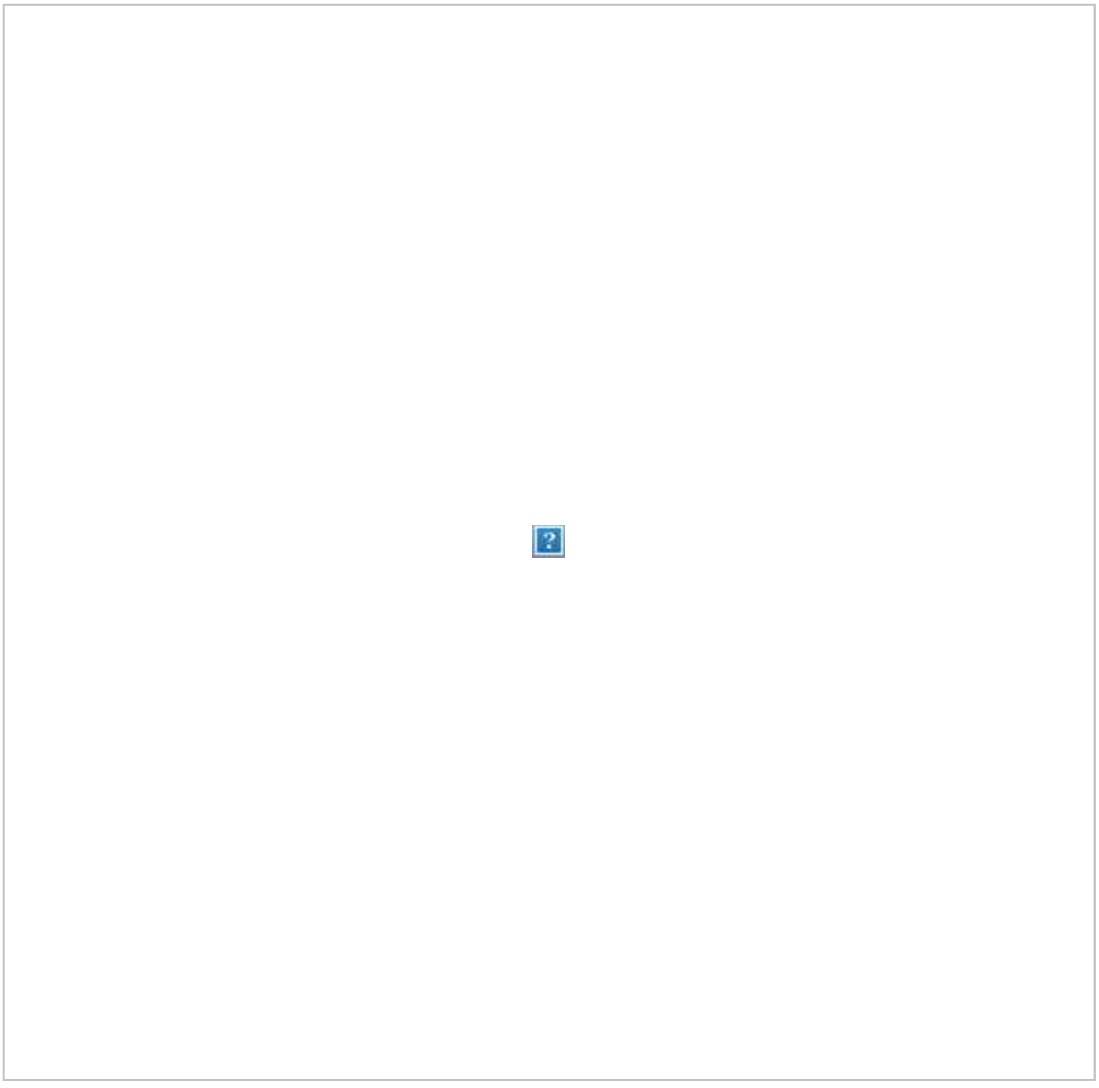
On 2023-09-08 14:39, lorren@bektel.com wrote:

> Amanda,
>
> We have sent the amended plan to the North Dakota department for their review. When we here from them I will pass it in to you.
>
> Lorren
>
> On 2023-08-24 17:29, Amanda Coletti wrote:
>
> > Hi Lorren,
> >
> > Thank you for taking my call last week. I wanted to send over the updated Badger project map to show you, in greater detail, the proposed locations of the additional wind turbines in the Badger project area. The map below shows:

- Previously approved turbine locations in blue
- New proposed turbine locations in black
- The area surrounding the Wishek Airport that we are avoiding, shaded in light red

As an additional note, we have secured lease agreements and have site control for all of the land that is inside the red dashed lines. Some of the parcels aren't showing up in green because our system hasn't been updated yet.

It would be great if you could respond to this email stating that the Wishek Airport has no concerns with the updates that the Badger project is proposing. Please give me a call or respond to this email if you have any additional questions as well.



Thank you!

Best regards,
Amanda Coletti
Senior Associate, Project Development
Region Americas

Tel. +17738021321
amcol@orsted.com



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Appendix E
Updated Sound Analysis Report

Badger Wind, LLC
February 2024

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BADGER WIND FARM

Sound Assessment

Badger Wind, LLC

Document No.: 10455420-HOU-R-01
Issue: C**, Status:** Final
Date: 26 January 2024



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Project name:	Badger Wind Farm	DNV Energy USA Inc.
Report title:	Sound Assessment	9665 Chesapeake Dr., Suite 435, San
Customer:	Badger Wind, LLC	Diego, CA 92123 USA
	401 N Michigan Ave, Suite 501	Tel: +1 619 340 1800
	Chicago, IL 60611	Enterprise No.: 23-2625724
Contact person:	Andrew Krieger	
Date of issue:	26 January 2024	
Project No.:	10455420	
Proposal Reference:	315673-HOU-P-01-B	
Document No.:	10455420-HOU-R-01	
Issue/Status:	C/Final	

Task and objective:
This report presents the results of a sound analysis conducted by DNV on behalf of Badger Wind, LLC.

Prepared by:	Verified by:	Approved by:
Justin Puggioni Siting and Acoustics Engineer, Environment and Permitting Services	Aren Nercessian Project Siting Engineer, Environment and Permitting Services	Gabriel Constantin Director, Environment and Permitting Services

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Keywords:

Sound, Badger Wind, North Dakota

Issue	Date	Reason for Issue	Prepared by	Verified by	Approved by
C	26 January 2024	Modified Design Layout	J. Puggioni	A. Nercessian	G. Constantin

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EXECUTIVE SUMMARY

DNV Energy USA Inc. (“DNV”) has conducted a sound assessment for the Badger Wind Farm (the “Project”) located in Logan County and McIntosh County, North Dakota. Badger Wind proposes 103 total turbine positions and two step-up transformers within the proposed substation. There are no neighboring wind farms or solar farms near the Project. Only up to 93 of the 103 turbines and one substation are planned to be constructed.

53 sound receptors, representing inhabited residences or community buildings, within one mile of a WTG or substation transformer have been included in this report.

The sound pressure level (SPL) at each receptor for the aggregate of all WTGs and transformers was calculated based on the ISO 9613-2 method.

The calculated results include a +2 dB adjustment to the published wind turbine sound power level (PWL).

The loudest cumulative sound pressure level is 49.3 dBA at participant receptor 1064. There are 6 participant receptors with sound levels above 45.0 dBA and 3 non-participant receptors with sound levels above 45.0 dBA.

The three non-participant receptors have or are in the process of signing good neighbor agreements which allow for higher sound levels than the prescribed limit. All other non-participant receptors are compliant with sound levels at or below the 45.0 dBA limit.

Calculations were performed at the receptor location and at a distance of 100 feet from the respective noise sensitive building in the loudest direction as per North Dakota Administrative Code Section 69-06-08-01.

The total turbine count includes one pair of turbine positions (73 and 73B) that are designed to be mutually exclusive such that only one of these two positions can be constructed due to their proximity and mutual waking. A primary result and an alternative result were provided at the most affected receptor 492 in the case where T73B is selected as a turbine location instead of T73 or vice versa. Both layout options were compliant with the sound regulation.

1 INTRODUCTION

Badger Wind, LLC ("Badger" or the "Customer") requested that DNV Energy USA Inc. ("DNV") perform a noise analysis for the Badger Wind Farm (the "Project") located in Logan County and McIntosh County, North Dakota.

The Project layout considered for the noise analysis includes 103 GE 2.8-127 wind turbine generators (WTGs) with a hub height of 292 ft (89 m) and two step-up transformers within the substation. Only up to 93 of the 103 turbine locations and one substation in this analysis are planned to be constructed.

The objective of this assessment was to predict the sound levels generated by the Project WTGs and substation transformers at all receptors within one mile of the Project's sound emitting equipment using the International Organization for Standardization (ISO) standard 9613-2 sound propagation model [1] and to compare the results with applicable regulations.

2 ENVIRONMENTAL SOUND BACKGROUND

Sound levels are expressed in the decibel unit and are quantified on a logarithmic scale to account for the large range of acoustic pressures to which the human ear is exposed. A decibel (dB) is used to quantify sound levels relative to a 0 dB reference. The reference level of 0 dB is defined as a sound pressure level of 20 micropascals (μPa), which is the typical lower threshold of hearing for humans.

Sound levels can be presented both in broadband (i.e., sound energy summed across the entire audible frequency spectrum) and in octave band spectra (i.e., audible frequency spectrum divided into bands). Frequency is expressed in the Hertz unit (Hz), measuring the cycles per second of the sound pressure waves. The human auditory range spans from 20 to 20,000 Hz. Since the human ear does not perceive every frequency with equal loudness, spectrally varying sounds are often adjusted with a weighting filter. The A-weighting filter is applied to closely approximate the human ear's response to sound. This scale is commonly used in environmental and industrial sound. Sound expressed in the A-weighted scale is denoted dBA. This is used as the weighting in this report.

A sound source has a certain sound power level rating, which describes the amount of sound energy per unit of time. This is a basic measure of how much acoustical energy it can produce and is independent of its surroundings. Sound pressure is created as sound energy flows away from the source. The measured sound pressure level (SPL) at a given point depends not only on the power rating of the source and the distance between the source and the measurement point (geometric divergence), but also on the amount of sound energy absorbed by environmental elements between the source and the measurement point (attenuation). Sound attenuation factors include meteorological conditions such as wind direction, temperature, and humidity, sound interaction with the ground, atmospheric absorption, terrain effects, diffraction of sound around objects and topographical features, and foliage.

3 APPLICABLE REGULATIONS

Sound emanating from the Project is subject to the *North Dakota Administrative Code Section 69-06-08-01* [2]. The regulations state:

> *A wind energy conversion facility site must not include a geographic area where, due to operation of the facility, the sound levels within one hundred feet of an inhabited residence or a community building will exceed forty-five dBA. The sound level avoidance area criteria may be waived in writing by the owner of the occupied residence or the community building.*

The applicable sound regulation is therefore 45 dBA within 100 feet of an inhabited residence or a community building that is not subject to a waiver.

4 DESCRIPTION OF THE PROJECT SITE

4.1 Site description

The Project is situated in relatively simple terrain, consisting of flat farmland, with project equipment base elevations ranging from approximately 2,000 to 2,200 feet above sea level. The ground cover on and near the site is primarily composed of farmland or open fields. Dwellings are interspersed throughout the Project site.

The Project is located in Logan County and McIntosh County, west of the town of Wishek, North Dakota.

4.2 Project layout

The Project layout included in this assessment consists of 10 GE2.8-127 WTGs with a hub height of 292 ft (89 m). Two step-up transformers were included in the Project substation. Only up to 93 of the 103 turbines and one of the substations included in this analysis are planned to be constructed.

The coordinates of the Project equipment included in the modeling are presented in Appendix A. The turbine layout and substation transformer locations were provided by the Customer [3].

4.3 Neighboring wind farms

There are no neighboring operational wind or solar farms near the Project.

4.4 Receptor locations

A list of receptors was provided by the Customer [4], most of which were clustered in the nearby town of Wishek over 1 mile from the nearest turbine. Of the total number of identified receptors, results for 53 field verified receptors within one mile of the Project equipment were included in this assessment. Coordinates of each receptor point are presented in Appendix B.

5 SOUND ASSESSMENT

5.1 Description of the sound sources

The sources of sound considered in this analysis are the WTGs and substation transformers. Sound associated with other sources in the vicinity of the Project, such as construction activities, have not been considered in this report.

5.1.1 Project turbines

Project specific total broadband and octave band sound power levels for the General Electric GE 2.8-127 WTG at a hub height of 292 ft (89 m) are contained in the manufacturer documentation [5]. The maximum sound power level for the GE 2.8-127 turbine model is 108.5 dBA. A +2 dB adjustment was applied to ensure conservatism in the assessment for a total modeled sound power level of 110.5 dBA. The sound power levels used in the analysis were at hub height wind speeds of 10-15 m/s, which were reported to have the same octave band sound levels for each wind speed within that range. Low Noise Trailing Edge Technology (LNTE) is included in this model as per the manufacturer documentation [5].

Table 5-1 shows the octave band sound power levels associated with the turbines used in this analysis.

Table 5-1 WTG sound power levels [dBA]

WTG Model	Frequency [Hz]									Broadband
	31.5	63	125	250	500	1000	2000	4000	8000	
GE2.8-127 (+2dB)	84.8	94.6	99.2	100.2	102.4	105.8	104.7	97.0	78.9	110.5

5.1.2 Substation transformers

There are two transformers planned at the Project substation. Two Hyundai 167 MVA 230 kV transformers were modeled at the MISO substation.

The total broadband sound power levels were estimated for each transformer according to the Institute of Electrical and Electronics Engineers Standards Association (IEEE) standard C57.12.90-2015 [6]. A tonality penalty of 5 dB is included in this value in accordance with ISO-1996-2 [7].

A typical transformer octave band distribution [8] was used. The octave band sound power levels of the Project transformers are shown in Table 5-2.

Table 5-2 Transformer sound power levels [dBA]

Transformer	Frequency [Hz]									Broadband
	31.5	63	125	250	500	1000	2000	4000	8000	
Hyundai 167 MVA - 230 kV	65.9	85.1	97.2	99.7	105.1	102.3	98.5	93.3	84.2	108.7

5.2 Assessment methodology

The sound pressure level at each receptor for the aggregate of all WTGs and transformers associated with the Project was calculated using CadnaA acoustic modeling software based on the ISO 9613-2 method [1]. The simulation was performed using the maximum sound power level of the turbines and transformers, including upward corrections or safety margins. The Project's turbines were modeled with a 292 ft (89 m) hub height. Substation transformers were modeled at a height of 3.7 m (12.1 ft).

The ISO 9613-2 standard provides a prediction of the equivalent continuous SPL at a distance from one or more point sources. The method consists of octave-band algorithms (i.e., with nominal mid band frequencies from 31.5 Hz to 8 kHz) for calculating the attenuation of the emitted sound. The algorithm takes into account the following physical effects:

- Geometrical divergence – attenuation due to spherical spreading from the sound source
- Atmospheric absorption – attenuation due to absorption by the atmosphere
- Ground absorption – attenuation due to the acoustical properties of the ground

The ISO 9613-2 standard calculates attenuation "under meteorological conditions favorable to propagation from sources of sound emission." These meteorological conditions are for "downwind propagation or, equivalently, propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs at night". In other words, though a physical impracticality, the ISO 9613-2 standard treats every receptor as being downwind from every source of sound emission (i.e., transformers and turbines).

The ISO 9613-2 standard accounts for ground absorption by assigning a numerical coefficient (G) with a value ranging from 0 to 1. A value of G = 0 represents hard ground (e.g., paving, water, ice, concrete, tamped ground, and other ground surfaces with a low porosity), while a G = 1 value represents porous ground (e.g., ground covered by grass, trees, or other vegetation, and other ground surfaces suitable for the growth of vegetation such as farming land). Though the ground use on and around the site is farming, a mixed (i.e., semi-reflective) global ground factor of G = 0.5 was used in this assessment.

Additionally, temperature, barometric pressure, and humidity parameters were selected to represent typical local annual averages, and topographical information to accurately represent terrain in three-dimensions was included in this assessment.

Specifically, the ISO 9613-2 parameters were set as follows:

- Ambient air temperature: 50º F (10º C)
- Ambient barometric pressure: 101.32 kPa
- Humidity: 70%
- Overall ground factor: 0.5
- Topography included (10 m elevation intervals)

Additional attenuation from foliage was not considered in this assessment, implying that lower sound levels are expected in areas where there is foliage present in the line of sight between any turbine and a sound receptor. Similarly, because the model assumes every receptor is downwind of every sound source at all times, lower sound levels are expected at times when a receptor is upwind of any sound source.

6 RESULTS

A detailed map illustrating predicted sound pressure levels at receptors located in the vicinity of the Project is presented in Figure 6-1, at 4 m height. This figure illustrates the scenario with turbine 73 included. An alternate scenario with 73B replacing 73 would be quieter at the nearest receptors and compliant.

The predicted sound levels at each of the receptors located within 1 mile of the Project equipment are presented in Appendix B.

For each receptor, the following information is provided:

- ID
- Coordinates in UTM projection and NAD83 Datum
- Closest noise generating equipment
- Distance to the closest noise generating equipment
- Sound pressure levels (SPL) in dBA for each receptor

Two sets of results were calculated for each receptor:

1. At a distance of 100 feet from the receptor in the loudest direction, at a height of 5 ft (1.5 m)
2. At the building location at a height of 13 ft (4 m).

The greater of the two sound levels was reported in the results in Appendix B for each receptor and compared to the prescribed sound level limits in accordance with North Dakota Administrative Code Section 69-06-08-01.

The highest modelled sound level throughout the Project area is is 49.3 dBA at participant receptor 1064. There are 6 participant receptors with sound levels above 45.0 dBA and 3 non-participant receptors with sound levels above 45.0 dBA.

The three non-participant receptors have or are in the process of signing good neighbor agreements which allow for higher sound levels than the prescribed limit. All other non-participant receptors are compliant with sound levels at or below the 45.0 dBA limit.

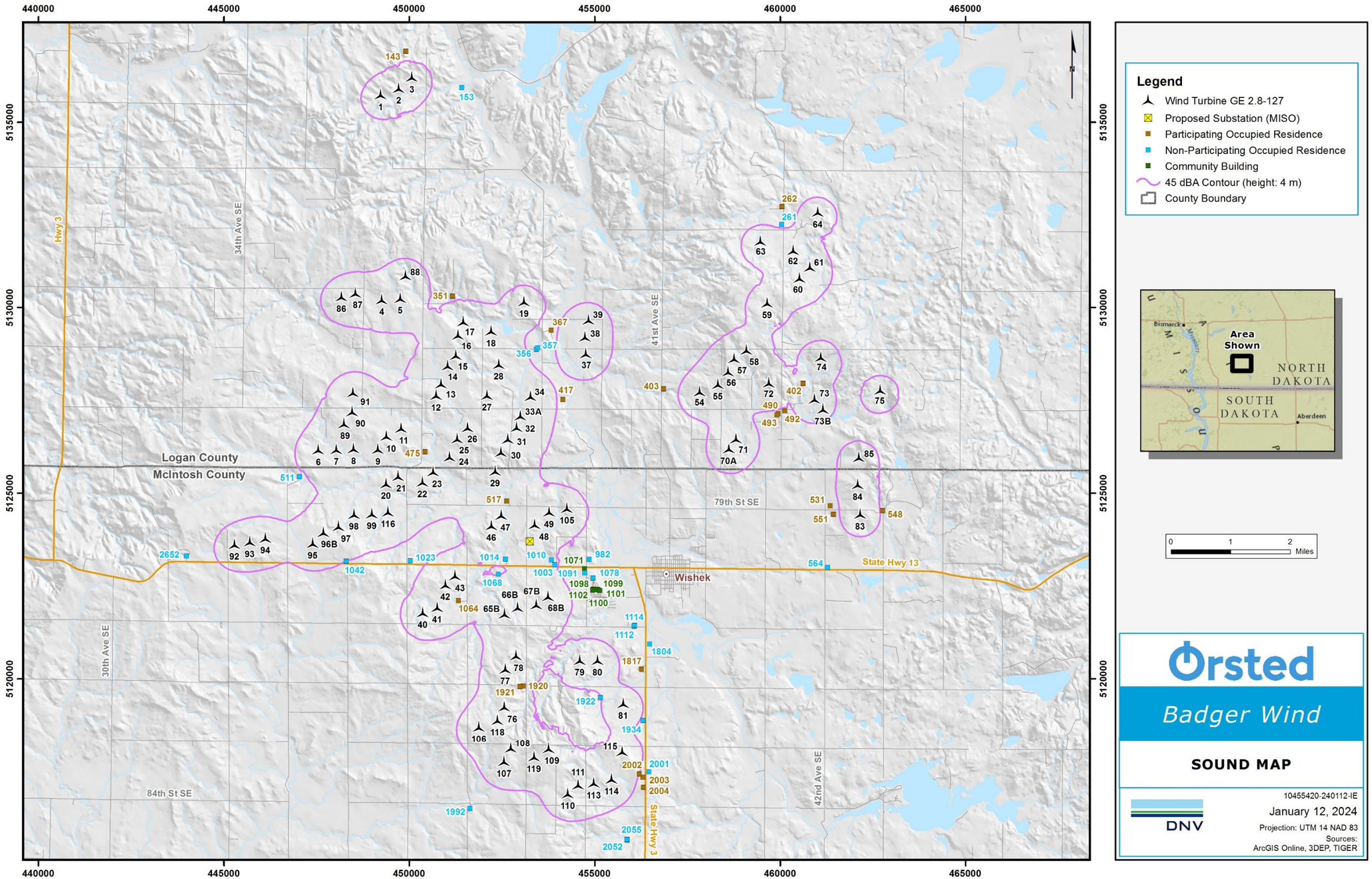

Figure 6-1 Modeled sound levels at the Badger Wind Farm

7 CONCLUSION

DNV has conducted an analysis to determine the maximum predicted sound levels at receptors in the vicinity of the Badger Wind Farm in Logan County and McIntosh County, North Dakota. The Project equipment considered in the analysis were 103 GE 2.8-127 WTGs with a hub height of 292 ft (89 m) and two step-up transformers at the substation. Only up to 93 of the 103 turbine locations and one substation in this analysis are planned to be constructed. Sound levels in this report may be overestimated in areas where no turbines will eventually be built.

Results are presented for receptors within approximately one mile of a sound source. The loudest cumulative sound pressure level is 49.3 dBA at participant receptor 1064. There are 6 participant receptors with sound levels above 45.0 dBA and 3 non-participant receptors with sound levels above 45.0 dBA.

The three non-participant receptors have or are in the process of signing good neighbor agreements which allow for higher sound levels than the prescribed limit. All other non-participant receptors are compliant with sound levels below the 45.0 dBA limit.

Calculations were performed at the receptor location and at a distance of 100 feet from the building in the loudest direction as per North Dakota Administrative Code Section 69-06-08-01. Badger Wind has obtained or is in the process of obtaining waivers from the owners of receptors modeled above the 45 dBA sound limit.

8 REFERENCES

[1] International Organization for Standardization. *ISO 9613-2: Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation*. 15 December 1996.

[2] North Dakota Administrative Code Section 69-06-08-01 Energy Conversion Facility Siting Criteria item 4 Additional Avoidance Areas for Wind Energy Conversion Facilities

[3] Turbine locations provided by Badger Wind on 9 November 2023, filename “2023-11-3 Badger Wind 30% Civil Design.kmz”

[4] Receptor locations sent by Orsted to DNV, “*Receptors_Badger_230724.shp*” with some subsequent minor updates based on field verifications performed in August 2023. November 2023.

[5] GE “2.3 - Noise_Emission-NO_2.x-DFIG-127-60Hz_1-2MW_LNTE_EN_r05.pdf””18 Sep 2022

[6] C57.12.90-2015 IEEE Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers. 11 March 2016.

[7] International Organization for Standardization. *ISO 1996-2: Acoustics – Description, measurement and assessment of environmental noise -Part 2: Determination of sound pressure levels*. July 2017

[8] *Handbook of Acoustics*. Edited by Malcolm J. Crocker. John Wiley & Sons. 1998.

APPENDIX A – SOUND SOURCE LOCATIONS

ID	UTM Zone 14, NAD 83 Datum	
	Easting [m]	Northing [m]
TR1	453233	5123739
TR2	453259	5123740
T1	449232	5135638
T2	449714	5135812
T3	450071	5136111
T4	449260	5130118
T5	449758	5130152
T6	447550	5126069
T7	448035	5126080
T8	448497	5126098
T9	449154	5126084
T10	449386	5126438
T11	449781	5126652
T12	450728	5127537
T13	450860	5127853
T14	451041	5128333
T15	451256	5128620
T16	451315	5129160
T17	451460	5129521
T18	452210	5129270
T19	453099	5130065
T20	449376	5125160
T21	449699	5125356
T22	450359	5125200
T23	450646	5125478
T24	451091	5125879
T25	451295	5126363
T26	451577	5126666
T27	452097	5127541
T28	452421	5128376
T29	452323	5125495
T30	452479	5126004
T31	452664	5126361
T32	452894	5126680
T33-A	453003	5126987

ID	UTM Zone 14, NAD 83 Datum	
	Easting [m]	Northing [m]
T34	453276	5127510
T37	454764	5128664
T38	454742	5129112
T39	454835	5129566
T40	450370	5121682
T41	450760	5121822
T42	450982	5122434
T43	451235	5122676
T46	452216	5124027
T47	452481	5124306
T48	453381	5124054
T49	453778	5124395
T54	457834	5127638
T55	458325	5127835
T56	458601	5128175
T57	458765	5128525
T58	459094	5128759
T59	459656	5130026
T60	460523	5130695
T61	460803	5130994
T62	460359	5131441
T63	459474	5131693
T64	461020	5132473
T65	452574	5121646
T66	452928	5121822
T67B	453431	5121899
T68B	453743	5122114
T70-A	458619	5126099
T71	458816	5126367
T72	459697	5127871
T73	460934	5127435
T73B	461159	5127167
T74	461104	5128566
T75	462699	5127679
T76	452565	5119147

ID	UTM Zone 14, NAD 83 Datum	
	Easting [m]	Northing [m]
T77	452596	5120163
T78	452882	5120526
T79	454604	5120400
T80	455082	5120401
T81	455774	5119232
T83	462165	5124334
T84	462095	5125131
T85	462125	5125862
T86	448174	5130196
T87	448552	5130291
T88	449901	5130762
T89	448243	5126773
T90	448461	5127094
T91	448482	5127610
T92	445292	5123520
T93	445705	5123590
T94	446125	5123690
T95	447398	5123549
T96	447688	5123845
T97	448092	5124004
T98	448512	5124333
T99	448991	5124344
T105	454252	5124496
T106	451880	5118601
T107	452555	5117661
T108	452740	5118025
T109	453762	5118008
T110	454279	5116798
T111	454557	5117036
T113	454981	5117083
T114	455457	5117189
T115	455748	5117927
T116	449433	5124398
T118	452384	5118784
T119	453366	5117786

Transformer IDs (TR1 and TR2) have been added for the purpose of this report.

APPENDIX B – RECEPTOR RESULTS

Receptor ID	UTM Coordinates Zone 14, NAD 83 Datum		Nearest Sound Source [ID]	Distance to Nearest Sound Source [feet]	Sound Pressure Level at Receptor [dBA]	Participant Status / Waiver Status
	Easting [m]	Northing [m]				
143	449910	5136911	T3	2675	41.3	P
153	451414	5135938	T3	4440	36.2	NP
261	460040	5132243	T63	2587	44.2	NP
262	460052	5132724	T64	3281	41.3	P
351	451171	5130311	T17	2760	44.1	P
356	453428	5128874	T28	3686	44.1	NP
357	453463	5128918	T28	3854	44.1	NP
367	453827	5129394	T38	3140	43.6	P
402	460620	5127961	T73	2007	46.1	P
403	456860	5127809	T54	3246	41.3	P
417	454147	5127522	T34	2858	43.7	P
475	450426	5126113	T23	2204	49.0	P
490	459950	5127152	T72	2501	44.2	P
492[1]	460131	5127219	T72	2568	44.5	P
493	459917	5127112	T72	2592	44.0	P
511	447037	5125452	T6	2635	44.1	NP
517	452631	5124788	T47	1652	48.5	P
531	461350	5124665	T84	2884	42.6	P
548	462767	5124527	T83	2073	44.0	P
551	461444	5124433	T83	2389	43.1	P
564	461281	5123004	T83	5239	34.3	NP
982	454849	5123219	T105	4628	40.7	NP
1003	453922	5123072	TR2	3086	45.5	NP Waiver pending
1010	453837	5123201	TR2	2590	46.7	NP Waiver pending
1014	452598	5123225	TR1	2681	45.5	NP Waiver obtained
1023	450024	5123180	T42	3984	43.7	NP
1042	448303	5123172	T97	2817	45.0	NP
1064	451329	5122110	T42	1558	49.3	P
1068	452406	5122819	T66	3692	44.9	NP
1071	454729	5122962	T68B	4263	41.2	NP
1078	454738	5122856	T68B	4070	41.2	NP
1091	454957	5122712	T68B	4436	40.3	NP
1098	454969	5122422	T68B	4145	40.6	NP
1099	455092	5122408	T68B	4528	40.0	NP
1100	455124	5122382	T68B	4612	39.9	NP
1101	455138	5122382	T68B	4658	39.9	NP
1102	454951	5122389	T68B	4063	40.7	NP
1112	456064	5121418	T80	4635	38.4	NP
1114	456081	5121438	T80	4721	38.2	NP
1804	456482	5120937	T80	4917	37.7	NP
1817	456265	5120265	T81	3750	40.5	P
1920	453076	5119807	T77	1960	47.2	P
1921	452989	5119794	T77	1768	47.7	P
1922	455159	5119498	T81	2200	44.9	NP
1934	456308	5118878	T81	2101	44.0	NP
1992	451637	5116504	T107	4848	38.2	NP
2001	456463	5117481	T115	2764	42.6	NP
2002	456205	5117426	T115	2224	44.9	P
2003	456305	5117334	T115	2670	43.6	P
2004	456317	5117069	T114	2848	42.6	P
2052	455875	5115654	T114	5219	38.0	NP
2055	455871	5115671	T114	5162	38.1	NP
2652	443993	5123311	T92	4317	37.0	NP

[1] The sound pressure level in the case where T73B (461159.00, 5127167.00) is used in place of T73 is 44.0 dBA.



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Appendix F
Updated Shadow Flicker Analysis Report

Badger Wind, LLC
February 2024

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BADGER WIND FARM

Shadow Flicker Analysis Report

Badger Wind, LLC

Document No.: 10455420-HOU-R-02
Issue: C**, Status:** Final
Date: 26 January 2024





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Project name:	Badger Wind Farm	DNV Energy USA Inc.
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Date of issue:	26 January 2024	
Project No.:	10455420	
Proposal Reference:	315673-HOU-P-01-B	
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Issue/Status:	C/Final	

Task and objective:
This report presents the results of a shadow flicker analysis conducted by DNV on behalf of Badger Wind, LLC.

Prepared by:	Verified by:	Approved by:
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Issue	Date	Reason for Issue	Prepared by	Verified by	Approved by
C	26 January 2024	Modified Design Layout	A. Nercessian	J. Puggioni	G. Constantin

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EXECUTIVE SUMMARY

DNV Energy USA Inc. (“DNV”) has conducted an analysis to predict the duration of shadow flicker expected to be experienced at receptors near the Badger Wind Farm (the “Project”). The site is located in Logan County and McIntosh County, North Dakota. At the request of Badger Wind, LLC (“the “Customer”), this analysis includes a total of 103 wind turbine generators (WTGs), of which up to 93 will ultimately be constructed. There are no neighboring wind farms or solar farms near the Project.

There were 44 receptors, representing inhabited residences, identified within 5,003 feet (1,525 m) of a Project turbine, which is the equivalent of ten tip heights of the WTG.

While there are no regulatory limits regarding shadow flicker directly applicable to the Project, the Customer has voluntarily kept annual shadow flicker durations under 30 hours per year at non-participant receptors without a waiver, which is the industry standard, as recommended by American Wind Energy Association (AWEA). In the current model, all receptors respect the 30-hour limit, regardless of participant or waiver status.

Receptor 475 is predicted to experience the most shadow flicker per year (expected case), with a total of 27 hours. This is a participating receptor. 40 of the 44 receptors included in this assessment have predicted annual shadow flicker durations under 10 hours, which is well under the recommended annual limit.

There are certain simplifications and conservative assumptions inherent within the model that may result in an overestimation of shadow flicker duration. These are further explained in the report.

1 INTRODUCTION

Badger Wind, LLC (the “Customer”) retained DNV Energy USA Inc. (“DNV”) to perform a shadow flicker assessment for the Badger Wind Farm (the “Project”) located in Logan County and McIntosh County, North Dakota.

The Project layout considered for the analysis includes 103 GE 2.8-127 wind turbine generators with a hub height of 292 ft (89 m). The turbine layout was provided by the Customer [1]. Only up to 93 of the 103 turbines in this analysis are planned to be constructed.

The GE 2.8-127 has a maximum blade tip height of 500 feet (152.5 m), a hub height of 292 feet (89 m), and a rotor diameter of 417 feet (127 m).

The purpose of this shadow flicker assessment is to calculate the predicted shadow flicker duration for the proposed Project at nearby receptor locations. This report includes a brief presentation of the Project site, a description of the shadow flicker assessment methodology, results of the analysis including a map illustrating areas prone to shadow flicker and concluding comments. This report presents the results of DNV’s analysis.

1.1 Shadow flicker definition

Shadow flicker is defined as the modulation of light levels resulting from the periodic passage of a rotating wind turbine blade between the sun and a viewer. The duration of shadow flicker experienced at a specific location can be determined using a purely geometric analysis which takes into account the relative positions of the sun throughout the year, the wind turbines at the site, and the viewer. This method has been used to determine the shadow flicker duration at sensitive locations in the vicinity of the Project.

It should be noted, as described in Section 3, that there are certain simplifications and conservative assumptions inherent within the model that may result in an overestimation of shadow flicker duration.

2 DESCRIPTION OF THE WIND FARM SITE

2.1 Site description

The Project is situated in relatively simple terrain, consisting of flat farmland, with wind turbine base elevations ranging from approximately 2,000 feet to 2,200 feet above sea level. The ground cover on and near the site is primarily composed of farmland and open fields. Dwellings are interspersed throughout the Project site.

The site is in Logan County and McIntosh County, west of the town of Wishek, North Dakota.

2.2 Wind farm layout and turbine model

The current Project layout consists of 103 GE 2.8-127 WTGs. Ultimately, up to 93 of these turbines will be constructed. The turbine layout was provided by the Customer [1].

The GE 2.8-127 has a maximum blade tip height of 500 feet (152.5 m), a hub height of 292 feet (89 m), and a rotor diameter of 417 feet (127 m).

The coordinates of the Project equipment included in the assessment are presented in Appendix A.

2.3 Neighboring wind farms

There are no neighboring wind farms in the vicinity of the Project.

2.4 Receptor locations

A list of receptors was provided by the Customer [4], most of which were clustered in a nearby town of Wishek over 1 mile from the nearest turbine. DNV completed a desktop review of these receptor locations in November 2023 and identified one additional location.

Of the total number of identified receptors, results for 44 receptors, representing inhabited residence, located within the affected study area defined in Section 3.2 are reported. Coordinates of each receptor are presented in Appendix B.

2.5 Applicable regulations

No applicable shadow flicker regulations were identified at the state and county level when the report was issued.

In 2020, the American Wind Energy Association (AWEA) issued a publication [5] recommending 30 hour per year limits for shadow flicker duration, based on the “expected” or “realistic” case,

Additionally, the 2022 PSC order states: *The Project will comply with Badger Wind’s voluntary commitment of 30 hours per year or less of shadow flicker at all residences, absent a waiver.*

The Customer continues to voluntarily apply this shadow flicker duration limit at all inhabited participating and non-participating receptors, absent a waiver.

3 SHADOW FLICKER ASSESSMENT

3.1 Overview

Shadow flicker may occur under certain combinations of circumstances with regard to the sun's position and wind direction; when the sun passes behind the rotating blades of a wind turbine, a moving shadow is cast in front of or behind the turbine. When viewed from a stationary position, the moving shadows cause periodic flickering of the sunlight, otherwise known as the "shadow flicker" phenomenon.

The effect is most noticeable inside buildings, where the flicker appears through a window opening. The likelihood and duration of the effect depends on a number of variables, namely:

- Orientation of the building and windows relative to the turbine;
- Wind direction: The shape and intensity of the shadow are determined by the position of the sun relative to the blades (the turbine rotor continuously yaws to face the wind so the rotor plane will always be perpendicular to the wind direction);
- Distance from turbine: The farther the observer from the turbine, the less pronounced the effect;
- Turbine height and rotor diameter: A larger turbine rotor diameter will cast a larger shadow, meaning a larger area will be prone to incidences of shadow flicker;
- Time of year and day: Position of sun relative to the horizon;
- Weather conditions: Cloud cover reduces the occurrence of shadow flicker;
- Vegetation and other obstacles that help to mask shadows;
- Operational status of turbines.

3.2 Assessment methodology

The number of hours of shadow flicker experienced annually at a given location can be calculated using a geometrical model which takes into account the sun's position, topography of the wind farm site, and wind turbine specifications such as rotor diameter and hub height.

Shadow flicker has been calculated at the subject receptors (i.e. residences) at a height of 6.5 feet (2 m) to represent ground floor windows. Rather than facing a particular direction, shadow flicker receptors (windows) are simulated as horizontal planes, meaning they experience shadow flicker over 360°, often referenced as the "greenhouse" scenario; this assumption therefore represents a worst-case scenario. Simulations with WindFarmer Analyst software have been carried out with a resolution of 1 minute; if shadow flicker occurs in any 1-minute period, the model registers this as 1 minute of shadow flicker.

It is generally accepted that shadow flicker from wind turbines does not occur beyond a distance, D, from a given wind turbine. The UK wind industry considers this distance to be equivalent to 10 rotor diameters [2], while the Danish wind industry suggests a value of between 1,640 feet and 3,281 feet (500 m and 1,000 m) [3]. Similarly to the UK standard, the common approach for US projects is to use 10 rotor diameters. However, DNV has adopted a conservative approach and has assumed the length, D, that a shadow can be cast to be defined as follows:

$$D = 10 \times (\text{hub height} + \text{rotor radius})$$

Beyond this distance, a viewer does not perceive the turbine blade to be chopping the light, but rather as an object passing in front of the sun.

The annual hours of shadow flicker at receptors have been calculated in two steps:

1) A “worst case” or astronomical worst-case, which represents the number of hours of annual shadow flicker that does not take into account attenuating factors, such as cloud cover or the site-specific wind rose.

2) An “expected case” that considers cloud cover and the site-specific wind rose in order to get a more realistic estimate, as described below. It is noted that additional attenuation factors are still not considered (see Section 3.4), and therefore, the “expected case” is still conservative.

In the case of this Project, 10 x (hub height + rotor radius) is equal to 5,003 feet (1,525 m).

The annual hours of shadow flicker at receptors have been calculated using an “expected case” approach.

An “expected case” considers cloud cover and the site-specific wind rose in order to get a more realistic shadow flicker estimate, as described below. It is noted that additional attenuation factors are still not considered (see Section 3.4), and therefore, the “expected case” is still conservative.

3.3 Attenuations

Shadow flicker calculations can be adjusted using average monthly cloud coverage, which is based on historical meteorological data and statistics. According to data gathered from the Bismarck, ND, and Aberdeen, SD, National Oceanic and Atmospheric Administration (NOAA) stations, monthly cloud cover can be estimated and applied as a percentage decrease in flicker duration. Cloud cover percentages are shown in Table 3-1.

Table 3-1 Monthly cloud cover percentage (%) reduction

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Percentage	64.1	64.9	68.0	65.0	61.3	55.9	43.5	43.5	50.8	56.5	69.2	66.1

The annual site-specific wind direction distribution was used in order to consider the probability of the turbines being oriented in a given direction. This produces a more accurate estimate of shadow flicker duration at receptors. The directional wind frequency that was measured on site [6] is shown in Table 3-2.

Table 3-2 Site specific directional frequencies (%) (Mast ID: M2000)

Sector (°)	0	30	60	90	120	150	180	210	240	270	300	330
Percentage	9.6	6.4	5.1	5.1	6.7	10.4	10.2	6.2	7.7	8.6	11.0	12.9

Note: The sectors are defined as 30° sectors centered at the given value.

No attempt has been made to account for vegetation or other shielding effects around each shadow receptor in the calculations of shadow flicker duration. Similarly, turbine operational shut-down has not been considered in this analysis. Consideration of these factors could lead to a reduction of the levels of shadow flicker predicted.

3.4 Simplifications and conservative assumptions

Shadow flicker duration calculated in the manner described above has several limitations and may over-estimate the annual number of hours of shadow flicker experienced at a specified location for several reasons, namely:

- The modeling of the wind turbine blades as discs rather than individual blades results in an overestimate of shadow flicker duration.
- Turbine blades are of non-uniform thickness with the thickest part of the blade (maximum chord) close to the hub and the thinnest part (minimum chord) at the tip. Diffusion of sunlight, as discussed above, results in a limit to the maximum distance that a shadow can be perceived. This maximum distance will also be dependent on the thickness of the turbine blade and the human threshold for perception of light intensity variation. As such, a shadow cast by the blade tip will be shorter than the shadow cast by the thickest part of the blade [7]. These distinctions are not modeled and shadow cast from any part of the blade is considered a shadow flicker event.
- Additionally, the orientation of windows on a given residence has not been taken into account, i.e. the model assumes that a window is always facing the turbine(s).
- Aerosols (moisture, dust, smoke, etc.) in the atmosphere have the ability to influence shadows cast by a wind turbine. The length of the shadow cast by a wind turbine is dependent on the degree that direct sunlight is diffused, which in turn is dependent on the amount of dispersants (humidity, smoke and other aerosols) in the path between the light source (sun) and the receiver [7]. The model does not consider any such factors.
- The presence of vegetation or other physical barriers around a receptor location may shield the view of the wind turbine, and therefore reduce the incidence of shadow flicker. No physical barriers have been modeled.
- Periods where Project wind turbines are not in operation due to low winds, high winds, or for operational and maintenance reasons will also reduce shadow flicker occurrence but are not considered herein.

In light of the reasons listed above, it is likely that the shadow flicker durations presented in Appendix B can be regarded as conservative.

4 RESULTS AND CONCLUSION

The results of the shadow flicker assessment (in terms of expected total hours per year) are presented in tabular format in Appendix B for all receptor locations in the study area.

Detailed daily results per wind turbine (in terms of maximum minutes per day) for every receptor experiencing shadow flicker are shown in Appendix C.

Results for the “expected case” in hours per year take into account the average monthly cloud cover from two NOAA meteorological stations at Bismarck, ND, and Aberdeen, SD. The annual site specific wind directional frequencies were gathered from a meteorological mast deployed on site [6].

A detailed map illustrating predicted “expected case” shadow flicker duration at receptors lying within 5,003 feet (1,525 m) of the Badger Wind Farm are presented in Figure 4-1. The map takes into account average monthly cloud cover and annual wind direction distribution. Shadow flicker is shown in isopleths of 30 hours per year or more.

While there are no regulatory limits regarding shadow flicker directly applicable to the Project, the Customer has voluntarily kept annual shadow flicker durations under 30 hours per year at non-participant receptors without a waiver, which is the industry standard, as recommended by AWEA. Additionally, the 2022 PSC order states: *The Project will comply with Badger Wind’s voluntary commitment of 30 hours per year or less of shadow flicker at all residences, absent a waiver.* In the current model, all receptors respect the 30-hour limit, regardless of waiver status.

Receptor 475 is predicted to experience the most shadow flicker per year (expected case), with a total of 27. This is a participating receptor. 40 of the 44 receptors included in this assessment have predicted annual shadow flicker durations under 10 hours, which is well under the recommended annual limit.

As described in Section 3, certain conservative assumptions have been made in this analysis, which likely results in an overestimation of the shadow flicker impacts that may be experienced at each receptor. Additionally, only up to 93 of the 103 turbines included in this analysis will be built. Results may be overestimated in areas where turbines may not end up being constructed.

The astronomical worst case represents a theoretical, extreme situation in which no cloud cover occurs at any point during the year. Furthermore, it assumes that all turbine rotors are always perpendicular to any given receptor, which is unfeasible. As a result, the astronomical worst case can be assumed to be an extreme, theoretical example which is extremely unlikely to occur, and can be considered informative.

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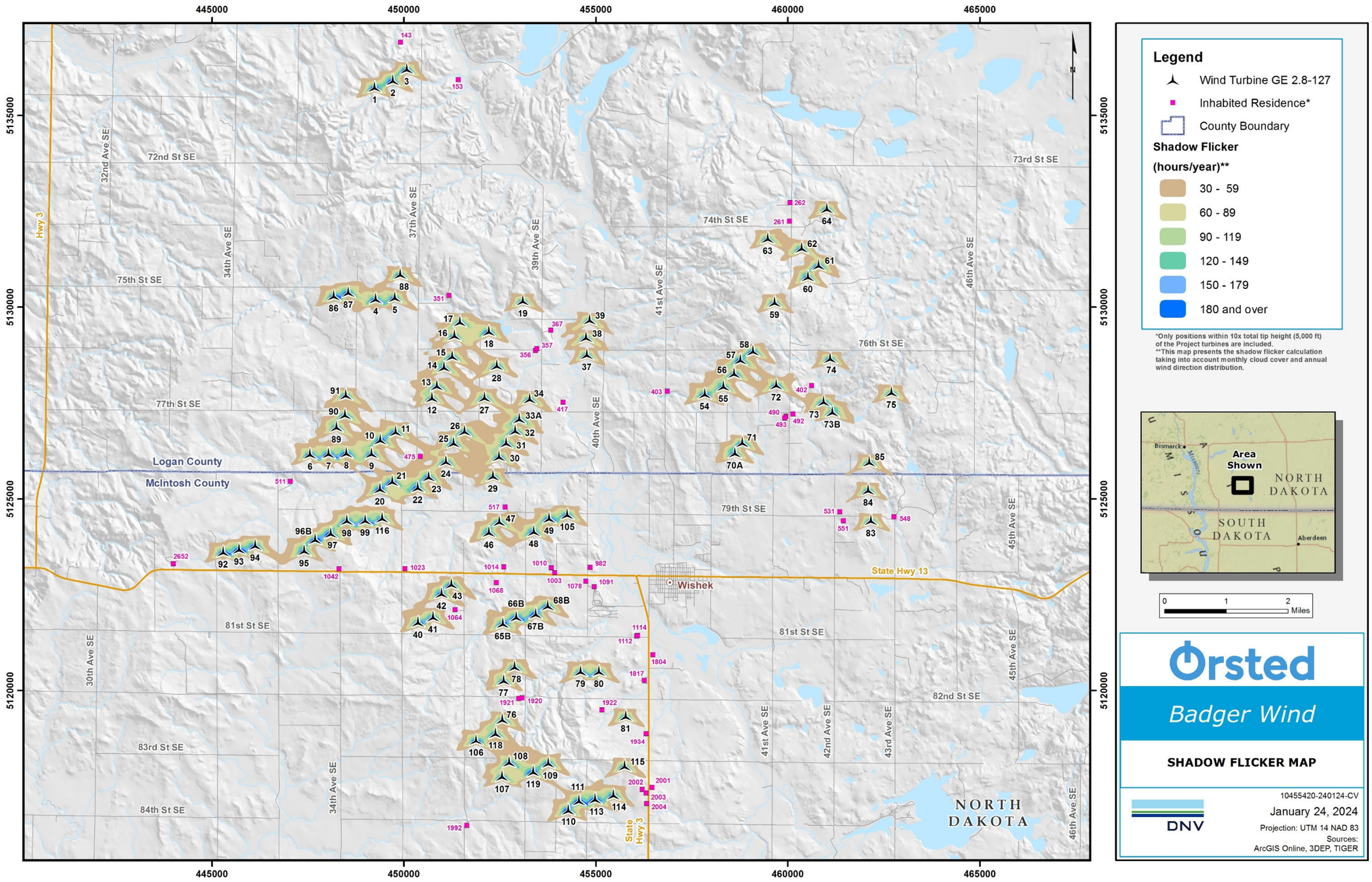

Figure 4-1 Modeled hours of shadow flicker (Expected Case)

5 REFERENCES

[1] Badger Wind Turbine locations received 9 November 2023

[2] Department for Business Enterprise & Regulatory Reform, UK, “Onshore Wind: Shadow Flicker”, http://webarchive.nationalarchives.gov.uk/20090609003228/http:/www.berr.gov.uk/whatwedo/energy/sources/renewables/planning/onshore-wind/shadow-flicker/page18736.html . Accessed December 2021.

[3] Danish Wind Industry Association, "Shadow variations from Wind turbines", http://xn--drmstrre-64ad.dk/wp-content/wind/miller/windpower%20web/en/tour/env/shadow/shadow2.htm . Accessed December 2021.

[4] Receptor locations sent by Orsted to DNV, “Receptors_Badger_230724.shp” with some subsequent minor updates based on a field verifications performed in August 2023.

[5] AWEA, *Wind Turbines and Shadow Flicker: Facts and Proven Mitigation Strategies.* November 2020

[6] Annual site-specific wind direction distribution for Badger Wind sent by email, by Orsted to DNV on 22 September 2021, “*M2000_WindRose_12sector.xlsx*”

[7] Freud H-D, Kiel F.H., "Influences of the opaqueness of the atmosphere, the extension of the sun and rotor blade profile on the shadow impact of wind turbine", DEWI Magazine No. 20 pp 43-51, February 2002.

APPENDIX A – WIND TURBINE COORDINATES

ID	UTM Zone 14, NAD 83 Datum	
	Easting [m]	Northing [m]
1	449232	5135638
2	449714	5135812
3	450071	5136111
4	449260	5130118
5	449758	5130152
6	447550	5126069
7	448035	5126080
8	448497	5126098
9	449154	5126084
10	449386	5126438
11	449781	5126652
12	450728	5127537
13	450860	5127853
14	451041	5128333
15	451256	5128620
16	451315	5129160
17	451460	5129521
18	452210	5129270
19	453099	5130065
20	449376	5125160
21	449699	5125356
22	450359	5125200
23	450646	5125478
24	451091	5125879
25	451295	5126363
26	451577	5126666
27	452097	5127541
28	452421	5128376
29	452323	5125495
30	452479	5126004
31	452664	5126361
32	452894	5126680
33A	453003	5126987
34	453276	5127510
37	454764	5128664

ID	UTM Zone 14, NAD 83 Datum	
	Easting [m]	Northing [m]
38	454742	5129112
39	454835	5129566
40	450370	5121682
41	450760	5121822
42	450982	5122434
43	451235	5122676
46	452216	5124027
47	452481	5124306
48	453381	5124054
49	453778	5124395
54	457834	5127638
55	458325	5127835
56	458601	5128175
57	458765	5128525
58	459094	5128759
59	459656	5130026
60	460523	5130695
61	460803	5130994
62	460359	5131441
63	459474	5131693
64	461020	5132473
65B	452574	5121646
66B	452928	5121822
67B	453431	5121899
68B	453743	5122114
70A	458619	5126099
71	458816	5126367
72	459697	5127871
73	460934	5127435
73B	461159	5127167
74	461104	5128566
75	462699	5127679
76	452565	5119147
77	452596	5120163
78	452882	5120526

ID	UTM Zone 14, NAD 83 Datum	
	Easting [m]	Northing [m]
79	454604	5120400
80	455082	5120401
81	455774	5119232
83	462165	5124334
84	462095	5125131
85	462125	5125862
86	448174	5130196
87	448552	5130291
88	449901	5130762
89	448243	5126773
90	448461	5127094
91	448482	5127610
92	445292	5123520
93	445705	5123590
94	446125	5123690
95	447398	5123549
96B	447688	5123845
97	448092	5124004
98	448512	5124333
99	448991	5124344
105	454252	5124496
106	451880	5118601
107	452555	5117661
108	452740	5118025
109	453762	5118008
110	454279	5116798
111	454557	5117036
113	454981	5117083
114	455457	5117189
115	455748	5117927
116	449433	5124398
118	452384	5118784
119	453366	5117786

APPENDIX B – RECEPTOR LOCATIONS & RESULTS

Receptor ID	UTM Easting [m]	UTM Northing [m]	Total Hours in Year [hrs/yr]		Closest Turbine		
			Astronomical Worst Case	Expected Case with Monthly Cloud Cover and Wind Rose	Distance [ft]	Distance [m]	Turbine ID
475	450426	5126113	110	27	2204	672	23
261	460040	5132243	57	12	2587	789	63
367	453827	5129394	47	12	3140	957	38
1064	451329	5122110	48	11	1558	475	42
357	453463	5128918	38	9	3854	1175	28
492	460131	5127219	34	9	2568	783	72
356	453428	5128874	32	8	3686	1123	28
1922	455159	5119498	32	8	2200	671	81
548	462767	5124527	35	8	2073	632	83
1068	452406	5122819	32	7	3692	1125	66B
417	454147	5127522	33	7	2858	871	34
517	452631	5124788	29	7	1652	504	47
1042	448303	5123172	23	7	2817	859	97
490	459950	5127152	29	7	2501	762	72
2004	456317	5117069	26	7	2848	868	114
493	459917	5127112	29	7	2592	790	72
551	461444	5124433	26	6	2389	728	83
2001	456463	5117481	25	6	2764	842	115
1023	450024	5123180	24	6	3984	1214	42
531	461350	5124665	25	5	2884	879	84
2002	456205	5117426	23	5	2224	678	115
403	456860	5127809	19	5	3246	989	54
2003	456305	5117334	18	4	2670	814	115
351	451171	5130311	14	4	2760	841	17
402	460620	5127961	15	4	2007	612	73
1078	454738	5122856	19	3	4070	1241	68B
262	460052	5132724	12	3	3281	1000	64
1817	456265	5120265	9	3	3750	1143	81
153	451414	5135938	7	2	4440	1353	3
1091	454957	5122712	8	2	4436	1352	68B
2652	443993	5123311	6	2	4317	1316	92
1920	453076	5119807	10	1	1960	597	77
1934	456308	5118878	8	1	2101	640	81
1804	456482	5120937	5	1	4917	1499	80
1014	452598	5123225	5	1	2681	817	46
511	447037	5125452	4	1	2635	803	6
1921	452989	5119794	0	0	1768	539	77
143	449910	5136911	0	0	2675	815	3
1010	453837	5123201	0	0	2590	789	48
1003	453922	5123072	0	0	3086	941	68B
982	454849	5123219	0	0	4628	1411	105
1112	456064	5121418	0	0	4635	1413	80
1114	456081	5121438	0	0	4721	1439	80
1992	451637	5116504	0	0	4848	1478	107

APPENDIX C – SHADOW FLICKER PER DAY RECEPTOR RESULTS

Receptor: 153
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
3	6:37

Astronomical Worst Case (hours): 7
Reduction Factor: 0.29
Expected Case (hours): 2

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below
Turbine 3

Day	Maximum Minutes	Start Time	End Time
2-Apr	3	18:45	18:48
3-Apr	6	18:43	18:49
4-Apr	9	18:41	18:50
5-Apr	12	18:40	18:52
6-Apr	14	18:39	18:53
7-Apr	16	18:38	18:54
8-Apr	18	18:38	18:56
9-Apr	20	18:37	18:57
10-Apr	21	18:37	18:58
11-Apr	20	18:38	18:58
12-Apr	19	18:38	18:57
13-Apr	16	18:39	18:55
14-Apr	14	18:40	18:54
15-Apr	9	18:42	18:51
25-Aug	10	18:44	18:54
26-Aug	14	18:41	18:55
27-Aug	17	18:40	18:57
28-Aug	19	18:38	18:57
29-Aug	21	18:37	18:58
30-Aug	20	18:37	18:57
31-Aug	19	18:36	18:55
1-Sep	18	18:36	18:54
2-Sep	16	18:36	18:52
3-Sep	14	18:36	18:50
4-Sep	12	18:36	18:48
5-Sep	10	18:36	18:46
6-Sep	7	18:37	18:44
7-Sep	3	18:39	18:42

Receptor: 261
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
63	43:10
64	13:22

Astronomical Worst Case (hours): 57
Reduction Factor: 0.21
Expected Case (hours): 12

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below

Turbine	63			64		
Day	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time
1-Jan	40	15:43	16:23	0	00:00	00:00
2-Jan	39	15:44	16:23	0	00:00	00:00
3-Jan	40	15:44	16:24	0	00:00	00:00
4-Jan	39	15:45	16:24	0	00:00	00:00
5-Jan	40	15:45	16:25	0	00:00	00:00
6-Jan	39	15:46	16:25	0	00:00	00:00
7-Jan	39	15:46	16:25	0	00:00	00:00
8-Jan	39	15:47	16:26	0	00:00	00:00
9-Jan	39	15:47	16:26	0	00:00	00:00
10-Jan	38	15:48	16:26	0	00:00	00:00
11-Jan	38	15:48	16:26	0	00:00	00:00
12-Jan	38	15:49	16:27	0	00:00	00:00
13-Jan	37	15:50	16:27	0	00:00	00:00
14-Jan	37	15:50	16:27	0	00:00	00:00
15-Jan	36	15:51	16:27	0	00:00	00:00
16-Jan	35	15:52	16:27	0	00:00	00:00
17-Jan	33	15:53	16:26	0	00:00	00:00
18-Jan	32	15:54	16:26	0	00:00	00:00
19-Jan	31	15:55	16:26	0	00:00	00:00
20-Jan	29	15:56	16:25	0	00:00	00:00
21-Jan	28	15:57	16:25	0	00:00	00:00
22-Jan	26	15:58	16:24	0	00:00	00:00
23-Jan	23	16:00	16:23	0	00:00	00:00
24-Jan	21	16:01	16:22	0	00:00	00:00
25-Jan	16	16:04	16:20	0	00:00	00:00
26-Jan	10	16:07	16:17	0	00:00	00:00
13-Apr	0	00:00	00:00	2	06:17	06:19
14-Apr	0	00:00	00:00	6	06:15	06:21
15-Apr	0	00:00	00:00	8	06:14	06:22
16-Apr	0	00:00	00:00	11	06:12	06:23
17-Apr	0	00:00	00:00	14	06:10	06:24
18-Apr	0	00:00	00:00	17	06:08	06:25
19-Apr	0	00:00	00:00	18	06:07	06:25
20-Apr	0	00:00	00:00	20	06:05	06:25
21-Apr	0	00:00	00:00	22	06:03	06:25
22-Apr	0	00:00	00:00	23	06:02	06:25
23-Apr	0	00:00	00:00	25	06:00	06:25
24-Apr	0	00:00	00:00	27	05:58	06:25
25-Apr	0	00:00	00:00	27	05:57	06:24
26-Apr	0	00:00	00:00	28	05:56	06:24
27-Apr	0	00:00	00:00	27	05:56	06:23
28-Apr	0	00:00	00:00	25	05:57	06:22
29-Apr	0	00:00	00:00	24	05:57	06:21
30-Apr	0	00:00	00:00	22	05:58	06:20
1-May	0	00:00	00:00	20	05:59	06:19
2-May	0	00:00	00:00	16	06:01	06:17
3-May	0	00:00	00:00	12	06:03	06:15

4-May	0	00:00	00:00	3	06:07	06:10
7-Aug	0	00:00	00:00	8	06:14	06:22
8-Aug	0	00:00	00:00	13	06:11	06:24
9-Aug	0	00:00	00:00	17	06:09	06:26
10-Aug	0	00:00	00:00	21	06:07	06:28
11-Aug	0	00:00	00:00	23	06:06	06:29
12-Aug	0	00:00	00:00	24	06:05	06:29
13-Aug	0	00:00	00:00	26	06:04	06:30
14-Aug	0	00:00	00:00	27	06:03	06:30
15-Aug	0	00:00	00:00	29	06:02	06:31
16-Aug	0	00:00	00:00	28	06:03	06:31
17-Aug	0	00:00	00:00	26	06:05	06:31
18-Aug	0	00:00	00:00	25	06:06	06:31
19-Aug	0	00:00	00:00	23	06:07	06:30
20-Aug	0	00:00	00:00	22	06:08	06:30
21-Aug	0	00:00	00:00	20	06:09	06:29
22-Aug	0	00:00	00:00	18	06:11	06:29
23-Aug	0	00:00	00:00	16	06:12	06:28
24-Aug	0	00:00	00:00	14	06:13	06:27
25-Aug	0	00:00	00:00	12	06:14	06:26
26-Aug	0	00:00	00:00	8	06:16	06:24
27-Aug	0	00:00	00:00	5	06:17	06:22
28-Aug	0	00:00	00:00	1	06:18	06:19
14-Nov	8	15:40	15:48	0	00:00	00:00
15-Nov	15	15:37	15:52	0	00:00	00:00
16-Nov	19	15:35	15:54	0	00:00	00:00
17-Nov	23	15:33	15:56	0	00:00	00:00
18-Nov	25	15:32	15:57	0	00:00	00:00
19-Nov	28	15:31	15:59	0	00:00	00:00
20-Nov	29	15:31	16:00	0	00:00	00:00
21-Nov	31	15:30	16:01	0	00:00	00:00
22-Nov	32	15:30	16:02	0	00:00	00:00
23-Nov	34	15:29	16:03	0	00:00	00:00
24-Nov	35	15:29	16:04	0	00:00	00:00
25-Nov	35	15:29	16:04	0	00:00	00:00
26-Nov	36	15:29	16:05	0	00:00	00:00
27-Nov	37	15:29	16:06	0	00:00	00:00
28-Nov	37	15:29	16:06	0	00:00	00:00
29-Nov	38	15:29	16:07	0	00:00	00:00
30-Nov	39	15:29	16:08	0	00:00	00:00
1-Dec	38	15:30	16:08	0	00:00	00:00
2-Dec	39	15:30	16:09	0	00:00	00:00
3-Dec	39	15:30	16:09	0	00:00	00:00
4-Dec	40	15:30	16:10	0	00:00	00:00
5-Dec	39	15:31	16:10	0	00:00	00:00
6-Dec	40	15:31	16:11	0	00:00	00:00
7-Dec	40	15:31	16:11	0	00:00	00:00
8-Dec	40	15:32	16:12	0	00:00	00:00
9-Dec	40	15:32	16:12	0	00:00	00:00
10-Dec	40	15:33	16:13	0	00:00	00:00
11-Dec	40	15:33	16:13	0	00:00	00:00
12-Dec	40	15:34	16:14	0	00:00	00:00
13-Dec	40	15:34	16:14	0	00:00	00:00
14-Dec	40	15:35	16:15	0	00:00	00:00
15-Dec	40	15:35	16:15	0	00:00	00:00
16-Dec	39	15:36	16:15	0	00:00	00:00
17-Dec	40	15:36	16:16	0	00:00	00:00
18-Dec	39	15:37	16:16	0	00:00	00:00
19-Dec	40	15:37	16:17	0	00:00	00:00
20-Dec	39	15:38	16:17	0	00:00	00:00
21-Dec	40	15:38	16:18	0	00:00	00:00
22-Dec	39	15:39	16:18	0	00:00	00:00
23-Dec	40	15:39	16:19	0	00:00	00:00
24-Dec	39	15:40	16:19	0	00:00	00:00
25-Dec	40	15:40	16:20	0	00:00	00:00
26-Dec	39	15:41	16:20	0	00:00	00:00
27-Dec	40	15:41	16:21	0	00:00	00:00

28-Dec	39	15:42	16:21	0	00:00	00:00
29-Dec	40	15:42	16:22	0	00:00	00:00
30-Dec	39	15:43	16:22	0	00:00	00:00
31-Dec	40	15:43	16:23	0	00:00	00:00

Receptor: 262
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
64	11:40

Astronomical Worst Case (hours): 12
Reduction Factor: 0.25
Expected Case (hours): 3

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below
Turbine 64

Day	Maximum Minutes	Start Time	End Time
24-Feb	3	07:50	07:53
25-Feb	7	07:48	07:55
26-Feb	10	07:47	07:57
27-Feb	13	07:45	07:58
28-Feb	16	07:43	07:59
29-Feb	18	07:41	07:59
1-Mar	21	07:39	08:00
2-Mar	23	07:37	08:00
3-Mar	25	07:35	08:00
4-Mar	26	07:34	08:00
5-Mar	27	07:32	07:59
6-Mar	29	07:30	07:59
7-Mar	27	07:31	07:58
8-Mar	26	07:31	07:57
9-Mar	24	07:32	07:56
10-Mar	21	07:33	07:54
11-Mar	18	07:34	07:52
12-Mar	12	07:37	07:49
29-Sep	11	07:18	07:29
30-Sep	17	07:15	07:32
1-Oct	20	07:13	07:33
2-Oct	23	07:11	07:34
3-Oct	25	07:10	07:35
4-Oct	26	07:09	07:35
5-Oct	28	07:08	07:36
6-Oct	29	07:07	07:36
7-Oct	27	07:09	07:36
8-Oct	25	07:10	07:35
9-Oct	23	07:12	07:35
10-Oct	22	07:13	07:35
11-Oct	20	07:14	07:34
12-Oct	17	07:16	07:33
13-Oct	15	07:17	07:32
14-Oct	12	07:19	07:31
15-Oct	9	07:20	07:29
16-Oct	6	07:21	07:27

Receptor: 351
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
5	5:10
88	9:04

Astronomical Worst Case (hours): 14
Reduction Factor: 0.29
Expected Case (hours): 4

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below

Turbine	5			88		
Day	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time
9-Mar	3	18:12	18:15	0	00:00	00:00
10-Mar	7	18:10	18:17	0	00:00	00:00
11-Mar	9	18:09	18:18	0	00:00	00:00
12-Mar	11	18:08	18:19	0	00:00	00:00
13-Mar	14	18:07	18:21	0	00:00	00:00
14-Mar	15	18:07	18:22	0	00:00	00:00
15-Mar	18	18:06	18:24	0	00:00	00:00
16-Mar	19	18:06	18:25	0	00:00	00:00
17-Mar	18	18:07	18:25	0	00:00	00:00
18-Mar	17	18:07	18:24	0	00:00	00:00
19-Mar	13	18:09	18:22	0	00:00	00:00
20-Mar	9	18:11	18:20	0	00:00	00:00
26-Apr	0	00:00	00:00	5	19:14	19:19
27-Apr	0	00:00	00:00	7	19:13	19:20
28-Apr	0	00:00	00:00	9	19:12	19:21
29-Apr	0	00:00	00:00	11	19:11	19:22
30-Apr	0	00:00	00:00	14	19:10	19:24
1-May	0	00:00	00:00	16	19:09	19:25
2-May	0	00:00	00:00	17	19:09	19:26
3-May	0	00:00	00:00	18	19:09	19:27
4-May	0	00:00	00:00	20	19:09	19:29
5-May	0	00:00	00:00	21	19:09	19:30
6-May	0	00:00	00:00	22	19:09	19:31
7-May	0	00:00	00:00	21	19:09	19:30
8-May	0	00:00	00:00	20	19:10	19:30
9-May	0	00:00	00:00	19	19:10	19:29
10-May	0	00:00	00:00	17	19:11	19:28
11-May	0	00:00	00:00	15	19:12	19:27
12-May	0	00:00	00:00	11	19:14	19:25
13-May	0	00:00	00:00	7	19:16	19:23
27-Jul	0	00:00	00:00	4	19:28	19:32
28-Jul	0	00:00	00:00	10	19:25	19:35
29-Jul	0	00:00	00:00	13	19:23	19:36
30-Jul	0	00:00	00:00	16	19:22	19:38
31-Jul	0	00:00	00:00	17	19:21	19:38
1-Aug	0	00:00	00:00	19	19:20	19:39
2-Aug	0	00:00	00:00	21	19:19	19:40
3-Aug	0	00:00	00:00	21	19:19	19:40
4-Aug	0	00:00	00:00	22	19:18	19:40
5-Aug	0	00:00	00:00	20	19:18	19:38
6-Aug	0	00:00	00:00	19	19:18	19:37
7-Aug	0	00:00	00:00	18	19:18	19:36
8-Aug	0	00:00	00:00	16	19:18	19:34
9-Aug	0	00:00	00:00	15	19:18	19:33
10-Aug	0	00:00	00:00	13	19:18	19:31
11-Aug	0	00:00	00:00	11	19:19	19:30
12-Aug	0	00:00	00:00	9	19:19	19:28
13-Aug	0	00:00	00:00	7	19:20	19:27
14-Aug	0	00:00	00:00	3	19:22	19:25

20-Sep	6	17:58	18:04	0	00:00	00:00
21-Sep	13	17:54	18:07	0	00:00	00:00
22-Sep	16	17:52	18:08	0	00:00	00:00
23-Sep	18	17:51	18:09	0	00:00	00:00
24-Sep	19	17:50	18:09	0	00:00	00:00
25-Sep	18	17:49	18:07	0	00:00	00:00
26-Sep	16	17:49	18:05	0	00:00	00:00
27-Sep	15	17:48	18:03	0	00:00	00:00
28-Sep	13	17:48	18:01	0	00:00	00:00
29-Sep	10	17:49	17:59	0	00:00	00:00
30-Sep	8	17:49	17:57	0	00:00	00:00
1-Oct	5	17:50	17:55	0	00:00	00:00
2-Oct	1	17:52	17:53	0	00:00	00:00

Receptor: 356
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
18	9:24
28	11:40
37	4:37
38	6:00

Astronomical Worst Case (hours): 32
Reduction Factor: 0.25
Expected Case (hours): 8

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below

Turbine	18			28			37			38		
Day	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time
31-Jan	0	00:00	00:00	4	17:13	17:17	0	00:00	00:00	0	00:00	00:00
1-Feb	0	00:00	00:00	7	17:11	17:18	0	00:00	00:00	0	00:00	00:00
2-Feb	0	00:00	00:00	10	17:10	17:20	0	00:00	00:00	0	00:00	00:00
3-Feb	0	00:00	00:00	13	17:09	17:22	0	00:00	00:00	0	00:00	00:00
4-Feb	0	00:00	00:00	15	17:08	17:23	0	00:00	00:00	0	00:00	00:00
5-Feb	0	00:00	00:00	17	17:08	17:25	0	00:00	00:00	0	00:00	00:00
6-Feb	0	00:00	00:00	19	17:07	17:26	0	00:00	00:00	0	00:00	00:00
7-Feb	0	00:00	00:00	21	17:07	17:28	0	00:00	00:00	0	00:00	00:00
8-Feb	0	00:00	00:00	23	17:07	17:30	0	00:00	00:00	0	00:00	00:00
9-Feb	0	00:00	00:00	24	17:07	17:31	0	00:00	00:00	0	00:00	00:00
10-Feb	0	00:00	00:00	26	17:07	17:33	0	00:00	00:00	0	00:00	00:00
11-Feb	0	00:00	00:00	26	17:07	17:33	0	00:00	00:00	0	00:00	00:00
12-Feb	0	00:00	00:00	26	17:07	17:33	0	00:00	00:00	0	00:00	00:00
13-Feb	0	00:00	00:00	24	17:08	17:32	0	00:00	00:00	0	00:00	00:00
14-Feb	0	00:00	00:00	24	17:08	17:32	0	00:00	00:00	0	00:00	00:00
15-Feb	0	00:00	00:00	22	17:09	17:31	0	00:00	00:00	0	00:00	00:00
16-Feb	0	00:00	00:00	20	17:10	17:30	0	00:00	00:00	0	00:00	00:00
17-Feb	0	00:00	00:00	16	17:12	17:28	0	00:00	00:00	0	00:00	00:00
18-Feb	0	00:00	00:00	11	17:14	17:25	0	00:00	00:00	0	00:00	00:00
6-Mar	0	00:00	00:00	0	00:00	00:00	2	07:30	07:32	0	00:00	00:00
7-Mar	0	00:00	00:00	0	00:00	00:00	5	07:28	07:33	0	00:00	00:00
8-Mar	0	00:00	00:00	0	00:00	00:00	7	07:26	07:33	0	00:00	00:00
9-Mar	0	00:00	00:00	0	00:00	00:00	10	07:24	07:34	0	00:00	00:00
10-Mar	0	00:00	00:00	0	00:00	00:00	12	07:22	07:34	0	00:00	00:00
11-Mar	0	00:00	00:00	0	00:00	00:00	13	07:20	07:33	0	00:00	00:00
12-Mar	0	00:00	00:00	0	00:00	00:00	15	07:18	07:33	0	00:00	00:00
13-Mar	0	00:00	00:00	0	00:00	00:00	16	07:16	07:32	0	00:00	00:00
14-Mar	0	00:00	00:00	0	00:00	00:00	17	07:14	07:31	0	00:00	00:00
15-Mar	0	00:00	00:00	0	00:00	00:00	17	07:13	07:30	0	00:00	00:00
16-Mar	0	00:00	00:00	0	00:00	00:00	14	07:14	07:28	0	00:00	00:00
17-Mar	0	00:00	00:00	0	00:00	00:00	10	07:16	07:26	0	00:00	00:00
9-Apr	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	2	06:24	06:26
10-Apr	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	5	06:23	06:28
11-Apr	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	7	06:21	06:28
12-Apr	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	10	06:19	06:29
13-Apr	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	12	06:17	06:29
14-Apr	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	14	06:15	06:29
15-Apr	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	15	06:14	06:29
16-Apr	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	17	06:12	06:29
17-Apr	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	18	06:10	06:28
18-Apr	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	19	06:08	06:27
19-Apr	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	18	06:08	06:26
20-Apr	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	17	06:08	06:25
21-Apr	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	14	06:10	06:24

22-Apr	2	19:12	19:14	0	00:00	00:00	0	00:00	00:00	9	06:12	06:21
23-Apr	6	19:09	19:15	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
24-Apr	8	19:08	19:16	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
25-Apr	11	19:06	19:17	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
26-Apr	13	19:06	19:19	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
27-Apr	15	19:05	19:20	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
28-Apr	17	19:04	19:21	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
29-Apr	18	19:04	19:22	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
30-Apr	20	19:04	19:24	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
1-May	21	19:04	19:25	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
2-May	22	19:04	19:26	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
3-May	22	19:04	19:26	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
4-May	22	19:04	19:26	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
5-May	20	19:05	19:25	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
6-May	18	19:06	19:24	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00

7-May	16	19:07	19:23	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
8-May	14	19:08	19:22	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
9-May	11	19:09	19:20	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
10-May	5	19:12	19:17	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
31-Jul	8	19:21	19:29	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
1-Aug	13	19:18	19:31	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
2-Aug	15	19:17	19:32	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
3-Aug	17	19:16	19:33	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
4-Aug	19	19:15	19:34	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
5-Aug	21	19:14	19:35	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
6-Aug	22	19:13	19:35	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
7-Aug	22	19:13	19:35	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
8-Aug	22	19:12	19:34	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
9-Aug	21	19:12	19:33	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
10-Aug	19	19:12	19:31	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
11-Aug	18	19:12	19:30	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
12-Aug	16	19:12	19:28	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
13-Aug	15	19:12	19:27	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
14-Aug	12	19:13	19:25	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
15-Aug	10	19:13	19:23	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
16-Aug	8	19:14	19:22	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
17-Aug	5	19:15	19:20	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
18-Aug	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	2	06:21	06:23
19-Aug	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	11	06:16	06:27
20-Aug	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	15	06:14	06:29
21-Aug	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	18	06:12	06:30
22-Aug	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	19	06:11	06:30
23-Aug	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	19	06:12	06:31
24-Aug	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	18	06:13	06:31
25-Aug	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	17	06:14	06:31
26-Aug	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	15	06:16	06:31
27-Aug	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	13	06:17	06:30
28-Aug	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	12	06:18	06:30
29-Aug	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	10	06:19	06:29
30-Aug	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	8	06:20	06:28
31-Aug	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	4	06:22	06:26
1-Sep	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	2	06:23	06:25
24-Sep	0	00:00	00:00	0	00:00	00:00	7	07:01	07:08	0	00:00	00:00
25-Sep	0	00:00	00:00	0	00:00	00:00	13	06:58	07:11	0	00:00	00:00
26-Sep	0	00:00	00:00	0	00:00	00:00	16	06:56	07:12	0	00:00	00:00
27-Sep	0	00:00	00:00	0	00:00	00:00	18	06:55	07:13	0	00:00	00:00
28-Sep	0	00:00	00:00	0	00:00	00:00	16	06:57	07:13	0	00:00	00:00
29-Sep	0	00:00	00:00	0	00:00	00:00	15	06:58	07:13	0	00:00	00:00
30-Sep	0	00:00	00:00	0	00:00	00:00	14	06:59	07:13	0	00:00	00:00
1-Oct	0	00:00	00:00	0	00:00	00:00	12	07:01	07:13	0	00:00	00:00
2-Oct	0	00:00	00:00	0	00:00	00:00	11	07:02	07:13	0	00:00	00:00
3-Oct	0	00:00	00:00	0	00:00	00:00	9	07:03	07:12	0	00:00	00:00
4-Oct	0	00:00	00:00	0	00:00	00:00	6	07:05	07:11	0	00:00	00:00
5-Oct	0	00:00	00:00	0	00:00	00:00	3	07:06	07:09	0	00:00	00:00
22-Oct	0	00:00	00:00	12	16:44	16:56	0	00:00	00:00	0	00:00	00:00
23-Oct	0	00:00	00:00	16	16:42	16:58	0	00:00	00:00	0	00:00	00:00
24-Oct	0	00:00	00:00	20	16:40	17:00	0	00:00	00:00	0	00:00	00:00
25-Oct	0	00:00	00:00	22	16:39	17:01	0	00:00	00:00	0	00:00	00:00
26-Oct	0	00:00	00:00	24	16:38	17:02	0	00:00	00:00	0	00:00	00:00
27-Oct	0	00:00	00:00	25	16:37	17:02	0	00:00	00:00	0	00:00	00:00
28-Oct	0	00:00	00:00	26	16:37	17:03	0	00:00	00:00	0	00:00	00:00
29-Oct	0	00:00	00:00	27	16:36	17:03	0	00:00	00:00	0	00:00	00:00
30-Oct	0	00:00	00:00	26	16:36	17:02	0	00:00	00:00	0	00:00	00:00
31-Oct	0	00:00	00:00	25	16:36	17:01	0	00:00	00:00	0	00:00	00:00
1-Nov	0	00:00	00:00	23	16:36	16:59	0	00:00	00:00	0	00:00	00:00
2-Nov	0	00:00	00:00	20	16:37	16:57	0	00:00	00:00	0	00:00	00:00
3-Nov	0	00:00	00:00	19	16:37	16:56	0	00:00	00:00	0	00:00	00:00
4-Nov	0	00:00	00:00	17	16:37	16:54	0	00:00	00:00	0	00:00	00:00
5-Nov	0	00:00	00:00	15	16:38	16:53	0	00:00	00:00	0	00:00	00:00

6-Nov	0	00:00	00:00	13	16:39	16:52	0	00:00	00:00	0	00:00	00:00
7-Nov	0	00:00	00:00	10	16:40	16:50	0	00:00	00:00	0	00:00	00:00
8-Nov	0	00:00	00:00	8	16:41	16:49	0	00:00	00:00	0	00:00	00:00
9-Nov	0	00:00	00:00	4	16:43	16:47	0	00:00	00:00	0	00:00	00:00

Receptor: 357
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
18	8:25
28	10:45
37	5:00
38	6:25
39	7:37

Astronomical Worst Case (hours): 38
Reduction Factor: 0.24
Expected Case (hours): 9

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below

Turbine	18			28			37			38			39		
Day	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time
28-Jan	0	00:00	00:00	2	17:10	17:12	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
29-Jan	0	00:00	00:00	6	17:08	17:14	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
30-Jan	0	00:00	00:00	8	17:07	17:15	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
31-Jan	0	00:00	00:00	11	17:06	17:17	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
1-Feb	0	00:00	00:00	13	17:05	17:18	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
2-Feb	0	00:00	00:00	15	17:05	17:20	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
3-Feb	0	00:00	00:00	18	17:04	17:22	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
4-Feb	0	00:00	00:00	19	17:04	17:23	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
5-Feb	0	00:00	00:00	21	17:04	17:25	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
6-Feb	0	00:00	00:00	22	17:04	17:26	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
7-Feb	0	00:00	00:00	24	17:04	17:28	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
8-Feb	0	00:00	00:00	25	17:04	17:29	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
9-Feb	0	00:00	00:00	25	17:04	17:29	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
10-Feb	0	00:00	00:00	24	17:05	17:29	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
11-Feb	0	00:00	00:00	22	17:06	17:28	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
12-Feb	0	00:00	00:00	21	17:06	17:27	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
13-Feb	0	00:00	00:00	19	17:07	17:26	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
14-Feb	0	00:00	00:00	16	17:09	17:25	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
15-Feb	0	00:00	00:00	11	17:11	17:22	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
2-Mar	0	00:00	00:00	0	00:00	00:00	2	07:37	07:39	0	00:00	00:00	0	00:00	00:00
3-Mar	0	00:00	00:00	0	00:00	00:00	5	07:35	07:40	0	00:00	00:00	0	00:00	00:00
4-Mar	0	00:00	00:00	0	00:00	00:00	7	07:34	07:41	0	00:00	00:00	0	00:00	00:00
5-Mar	0	00:00	00:00	0	00:00	00:00	9	07:32	07:41	0	00:00	00:00	0	00:00	00:00
6-Mar	0	00:00	00:00	0	00:00	00:00	11	07:30	07:41	0	00:00	00:00	0	00:00	00:00
7-Mar	0	00:00	00:00	0	00:00	00:00	13	07:28	07:41	0	00:00	00:00	0	00:00	00:00
8-Mar	0	00:00	00:00	0	00:00	00:00	15	07:26	07:41	0	00:00	00:00	0	00:00	00:00
9-Mar	0	00:00	00:00	0	00:00	00:00	16	07:24	07:40	0	00:00	00:00	0	00:00	00:00
10-Mar	0	00:00	00:00	0	00:00	00:00	18	07:22	07:40	0	00:00	00:00	0	00:00	00:00
11-Mar	0	00:00	00:00	0	00:00	00:00	19	07:20	07:39	0	00:00	00:00	0	00:00	00:00
12-Mar	0	00:00	00:00	0	00:00	00:00	16	07:21	07:37	0	00:00	00:00	0	00:00	00:00
13-Mar	0	00:00	00:00	0	00:00	00:00	13	07:22	07:35	0	00:00	00:00	0	00:00	00:00
14-Mar	0	00:00	00:00	0	00:00	00:00	7	07:25	07:32	0	00:00	00:00	0	00:00	00:00
6-Apr	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	2	06:30	06:32	0	00:00	00:00
7-Apr	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	6	06:28	06:34	0	00:00	00:00
8-Apr	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	9	06:26	06:35	0	00:00	00:00
9-Apr	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	11	06:24	06:35	0	00:00	00:00
10-Apr	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	12	06:23	06:35	0	00:00	00:00
11-Apr	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	14	06:21	06:35	0	00:00	00:00
12-Apr	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	16	06:19	06:35	0	00:00	00:00
13-Apr	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	18	06:17	06:35	0	00:00	00:00
14-Apr	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	19	06:15	06:34	0	00:00	00:00
15-Apr	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	20	06:14	06:34	0	00:00	00:00
16-Apr	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	20	06:13	06:33	0	00:00	00:00
17-Apr	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	18	06:14	06:32	0	00:00	00:00
18-Apr	4	19:04	19:08	0	00:00	00:00	0	00:00	00:00	15	06:15	06:30	0	00:00	00:00
19-Apr	8	19:02	19:10	0	00:00	00:00	0	00:00	00:00	11	06:17	06:28	0	00:00	00:00
20-Apr	10	19:01	19:11	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
21-Apr	12	19:00	19:12	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
22-Apr	15	18:59	19:14	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
23-Apr	17	18:58	19:15	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
24-Apr	18	18:58	19:16	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
25-Apr	19	18:58	19:17	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
26-Apr	21	18:58	19:19	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
27-Apr	22	18:58	19:20	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
28-Apr	22	18:58	19:20	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
29-Apr	20	18:59	19:19	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
30-Apr	19	18:59	19:18	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00

1-May	17	19:00	19:17	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
2-May	14	19:01	19:15	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
3-May	10	19:03	19:13	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
4-May	1	19:08	19:09	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
12-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	2	05:33	05:35
13-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	4	05:32	05:36
14-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	6	05:31	05:37
15-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	7	05:30	05:37
16-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	8	05:29	05:37
17-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	9	05:28	05:37
18-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	11	05:27	05:38
19-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	12	05:26	05:38
20-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	13	05:25	05:38
21-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	14	05:24	05:38
22-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	14	05:23	05:37
23-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	15	05:22	05:37
24-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	16	05:21	05:37
25-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	16	05:21	05:37
26-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	16	05:20	05:36
27-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	15	05:21	05:36
28-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	14	05:21	05:35
29-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	13	05:22	05:35
30-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	11	05:23	05:34
31-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	8	05:25	05:33
1-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	4	05:27	05:31
10-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	7	05:33	05:40
11-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	9	05:32	05:41
12-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	11	05:31	05:42
13-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	13	05:30	05:43
14-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	14	05:30	05:44
15-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	16	05:29	05:45
16-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	16	05:29	05:45
17-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	16	05:30	05:46
18-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	15	05:31	05:46
19-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	15	05:32	05:47
20-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	14	05:33	05:47
21-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	13	05:34	05:47
22-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	13	05:35	05:48
23-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	12	05:36	05:48
24-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	11	05:37	05:48
25-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	10	05:38	05:48
26-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	8	05:39	05:47
27-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	7	05:40	05:47
28-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	5	05:42	05:47
29-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	3	05:43	05:46
30-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	1	05:44	05:45
6-Aug	7	19:14	19:21	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
7-Aug	12	19:11	19:23	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
8-Aug	16	19:09	19:25	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
9-Aug	18	19:08	19:26	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
10-Aug	19	19:07	19:26	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
11-Aug	21	19:06	19:27	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
12-Aug	21	19:06	19:27	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
13-Aug	22	19:05	19:27	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
14-Aug	20	19:05	19:25	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
15-Aug	19	19:04	19:23	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
16-Aug	18	19:04	19:22	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
17-Aug	16	19:04	19:20	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
18-Aug	14	19:04	19:18	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
19-Aug	12	19:05	19:17	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
20-Aug	10	19:05	19:15	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
21-Aug	7	19:06	19:13	0	00:00	00:00	0	00:00	00:00	4	06:24	06:28	0	00:00	00:00
22-Aug	4	19:08	19:12	0	00:00	00:00	0	00:00	00:00	12	06:20	06:32	0	00:00	00:00
23-Aug	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	15	06:18	06:33	0	00:00	00:00
24-Aug	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	17	06:17	06:34	0	00:00	00:00
25-Aug	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	20	06:15	06:35	0	00:00	00:00
26-Aug	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	19	06:16	06:35	0	00:00	00:00
27-Aug	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	19	06:17	06:36	0	00:00	00:00
28-Aug	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	18	06:18	06:36	0	00:00	00:00
29-Aug	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	16	06:19	06:35	0	00:00	00:00
30-Aug	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	15	06:20	06:35	0	00:00	00:00
31-Aug	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	12	06:22	06:34	0	00:00	00:00
1-Sep	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	11	06:23	06:34	0	00:00	00:00
2-Sep	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	8	06:24	06:32	0	00:00	00:00
3-Sep	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	6	06:25	06:31	0	00:00	00:00
4-Sep	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	2	06:27	06:29	0	00:00	00:00
27-Sep	0	00:00	00:00	0	00:00	00:00	1	07:10	07:11	0	00:00	00:00	0	00:00	00:00
28-Sep	0	00:00	00:00	0	00:00	00:00	11	07:04	07:15	0	00:00	00:00	0	00:00	00:00

29-Sep	0	00:00	00:00	0	00:00	00:00	15	07:02	07:17	0	00:00	00:00	0	00:00	00:00
30-Sep	0	00:00	00:00	0	00:00	00:00	18	07:00	07:18	0	00:00	00:00	0	00:00	00:00
1-Oct	0	00:00	00:00	0	00:00	00:00	18	07:01	07:19	0	00:00	00:00	0	00:00	00:00
2-Oct	0	00:00	00:00	0	00:00	00:00	17	07:02	07:19	0	00:00	00:00	0	00:00	00:00
3-Oct	0	00:00	00:00	0	00:00	00:00	16	07:03	07:19	0	00:00	00:00	0	00:00	00:00
4-Oct	0	00:00	00:00	0	00:00	00:00	14	07:05	07:19	0	00:00	00:00	0	00:00	00:00
5-Oct	0	00:00	00:00	0	00:00	00:00	12	07:06	07:18	0	00:00	00:00	0	00:00	00:00
6-Oct	0	00:00	00:00	0	00:00	00:00	11	07:07	07:18	0	00:00	00:00	0	00:00	00:00
7-Oct	0	00:00	00:00	0	00:00	00:00	8	07:09	07:17	0	00:00	00:00	0	00:00	00:00
8-Oct	0	00:00	00:00	0	00:00	00:00	6	07:10	07:16	0	00:00	00:00	0	00:00	00:00
9-Oct	0	00:00	00:00	0	00:00	00:00	2	07:12	07:14	0	00:00	00:00	0	00:00	00:00
25-Oct	0	00:00	00:00	11	16:41	16:52	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
26-Oct	0	00:00	00:00	15	16:39	16:54	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
27-Oct	0	00:00	00:00	19	16:37	16:56	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
28-Oct	0	00:00	00:00	21	16:36	16:57	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
29-Oct	0	00:00	00:00	23	16:35	16:58	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
30-Oct	0	00:00	00:00	24	16:34	16:58	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
31-Oct	0	00:00	00:00	25	16:34	16:59	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
1-Nov	0	00:00	00:00	25	16:34	16:59	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
2-Nov	0	00:00	00:00	24	16:33	16:57	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
3-Nov	0	00:00	00:00	23	16:33	16:56	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
4-Nov	0	00:00	00:00	20	16:34	16:54	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
5-Nov	0	00:00	00:00	19	16:34	16:53	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
6-Nov	0	00:00	00:00	18	16:34	16:52	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
7-Nov	0	00:00	00:00	15	16:35	16:50	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
8-Nov	0	00:00	00:00	13	16:36	16:49	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
9-Nov	0	00:00	00:00	11	16:36	16:47	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
10-Nov	0	00:00	00:00	8	16:38	16:46	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
11-Nov	0	00:00	00:00	6	16:39	16:45	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
12-Nov	0	00:00	00:00	3	16:41	16:44	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00

Receptor: 367
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
37	19:36
38	14:22
39	13:16

Astronomical Worst Case (hours): 47
Reduction Factor: 0.26
Expected Case (hours): 12

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below

Turbine	37			38			39		
Day	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time
1-Jan	12	08:49	09:01	0	00:00	00:00	0	00:00	00:00
2-Jan	12	08:49	09:01	0	00:00	00:00	0	00:00	00:00
3-Jan	13	08:49	09:02	0	00:00	00:00	0	00:00	00:00
4-Jan	14	08:49	09:03	0	00:00	00:00	0	00:00	00:00
5-Jan	14	08:49	09:03	0	00:00	00:00	0	00:00	00:00
6-Jan	15	08:49	09:04	0	00:00	00:00	0	00:00	00:00
7-Jan	17	08:48	09:05	0	00:00	00:00	0	00:00	00:00
8-Jan	17	08:48	09:05	0	00:00	00:00	0	00:00	00:00
9-Jan	18	08:48	09:06	0	00:00	00:00	0	00:00	00:00
10-Jan	19	08:47	09:06	0	00:00	00:00	0	00:00	00:00
11-Jan	20	08:47	09:07	0	00:00	00:00	0	00:00	00:00
12-Jan	21	08:46	09:07	0	00:00	00:00	0	00:00	00:00
13-Jan	22	08:46	09:08	0	00:00	00:00	0	00:00	00:00
14-Jan	23	08:45	09:08	0	00:00	00:00	0	00:00	00:00
15-Jan	24	08:44	09:08	0	00:00	00:00	0	00:00	00:00
16-Jan	24	08:44	09:08	0	00:00	00:00	0	00:00	00:00
17-Jan	26	08:43	09:09	0	00:00	00:00	0	00:00	00:00
18-Jan	25	08:44	09:09	0	00:00	00:00	0	00:00	00:00
19-Jan	25	08:44	09:09	0	00:00	00:00	0	00:00	00:00
20-Jan	23	08:45	09:08	0	00:00	00:00	0	00:00	00:00
21-Jan	22	08:46	09:08	0	00:00	00:00	0	00:00	00:00
22-Jan	21	08:47	09:08	0	00:00	00:00	0	00:00	00:00
23-Jan	19	08:48	09:07	0	00:00	00:00	0	00:00	00:00
24-Jan	17	08:49	09:06	0	00:00	00:00	0	00:00	00:00
25-Jan	14	08:51	09:05	0	00:00	00:00	0	00:00	00:00
26-Jan	11	08:53	09:04	0	00:00	00:00	0	00:00	00:00
27-Jan	1	08:58	08:59	0	00:00	00:00	0	00:00	00:00
20-Feb	0	00:00	00:00	5	07:57	08:02	0	00:00	00:00
21-Feb	0	00:00	00:00	9	07:56	08:05	0	00:00	00:00
22-Feb	0	00:00	00:00	13	07:54	08:07	0	00:00	00:00
23-Feb	0	00:00	00:00	16	07:52	08:08	0	00:00	00:00
24-Feb	0	00:00	00:00	19	07:50	08:09	0	00:00	00:00
25-Feb	0	00:00	00:00	22	07:48	08:10	0	00:00	00:00
26-Feb	0	00:00	00:00	23	07:47	08:10	0	00:00	00:00
27-Feb	0	00:00	00:00	25	07:45	08:10	0	00:00	00:00
28-Feb	0	00:00	00:00	28	07:43	08:11	0	00:00	00:00
29-Feb	0	00:00	00:00	30	07:41	08:11	0	00:00	00:00
1-Mar	0	00:00	00:00	30	07:40	08:10	0	00:00	00:00
2-Mar	0	00:00	00:00	30	07:40	08:10	0	00:00	00:00
3-Mar	0	00:00	00:00	30	07:40	08:10	0	00:00	00:00
4-Mar	0	00:00	00:00	29	07:40	08:09	0	00:00	00:00
5-Mar	0	00:00	00:00	27	07:41	08:08	0	00:00	00:00
6-Mar	0	00:00	00:00	26	07:41	08:07	0	00:00	00:00
7-Mar	0	00:00	00:00	23	07:42	08:05	0	00:00	00:00
8-Mar	0	00:00	00:00	20	07:44	08:04	0	00:00	00:00
9-Mar	0	00:00	00:00	16	07:45	08:01	0	00:00	00:00
10-Mar	0	00:00	00:00	8	07:49	07:57	0	00:00	00:00
7-Apr	0	00:00	00:00	0	00:00	00:00	1	06:28	06:29
8-Apr	0	00:00	00:00	0	00:00	00:00	7	06:26	06:33

9-Apr	0	00:00	00:00	0	00:00	00:00	10	06:24	06:34
10-Apr	0	00:00	00:00	0	00:00	00:00	13	06:23	06:36
11-Apr	0	00:00	00:00	0	00:00	00:00	16	06:21	06:37
12-Apr	0	00:00	00:00	0	00:00	00:00	18	06:19	06:37
13-Apr	0	00:00	00:00	0	00:00	00:00	21	06:17	06:38
14-Apr	0	00:00	00:00	0	00:00	00:00	23	06:15	06:38
15-Apr	0	00:00	00:00	0	00:00	00:00	24	06:14	06:38
16-Apr	0	00:00	00:00	0	00:00	00:00	26	06:12	06:38
17-Apr	0	00:00	00:00	0	00:00	00:00	27	06:10	06:37
18-Apr	0	00:00	00:00	0	00:00	00:00	28	06:09	06:37
19-Apr	0	00:00	00:00	0	00:00	00:00	28	06:09	06:37
20-Apr	0	00:00	00:00	0	00:00	00:00	27	06:09	06:36
21-Apr	0	00:00	00:00	0	00:00	00:00	26	06:09	06:35
22-Apr	0	00:00	00:00	0	00:00	00:00	24	06:10	06:34
23-Apr	0	00:00	00:00	0	00:00	00:00	22	06:11	06:33
24-Apr	0	00:00	00:00	0	00:00	00:00	20	06:12	06:32
25-Apr	0	00:00	00:00	0	00:00	00:00	17	06:13	06:30
26-Apr	0	00:00	00:00	0	00:00	00:00	13	06:15	06:28
27-Apr	0	00:00	00:00	0	00:00	00:00	4	06:19	06:23
14-Aug	0	00:00	00:00	0	00:00	00:00	7	06:25	06:32
15-Aug	0	00:00	00:00	0	00:00	00:00	14	06:21	06:35
16-Aug	0	00:00	00:00	0	00:00	00:00	18	06:19	06:37
17-Aug	0	00:00	00:00	0	00:00	00:00	21	06:17	06:38
18-Aug	0	00:00	00:00	0	00:00	00:00	23	06:16	06:39
19-Aug	0	00:00	00:00	0	00:00	00:00	25	06:15	06:40
20-Aug	0	00:00	00:00	0	00:00	00:00	26	06:14	06:40
21-Aug	0	00:00	00:00	0	00:00	00:00	27	06:13	06:40
22-Aug	0	00:00	00:00	0	00:00	00:00	28	06:12	06:40
23-Aug	0	00:00	00:00	0	00:00	00:00	28	06:12	06:40
24-Aug	0	00:00	00:00	0	00:00	00:00	27	06:13	06:40
25-Aug	0	00:00	00:00	0	00:00	00:00	26	06:14	06:40
26-Aug	0	00:00	00:00	0	00:00	00:00	24	06:16	06:40
27-Aug	0	00:00	00:00	0	00:00	00:00	22	06:17	06:39
28-Aug	0	00:00	00:00	0	00:00	00:00	20	06:18	06:38
29-Aug	0	00:00	00:00	0	00:00	00:00	18	06:19	06:37
30-Aug	0	00:00	00:00	0	00:00	00:00	16	06:20	06:36
31-Aug	0	00:00	00:00	0	00:00	00:00	13	06:22	06:35
1-Sep	0	00:00	00:00	0	00:00	00:00	10	06:23	06:33
2-Sep	0	00:00	00:00	0	00:00	00:00	6	06:24	06:30
3-Sep	0	00:00	00:00	0	00:00	00:00	2	06:25	06:27
1-Oct	0	00:00	00:00	3	07:31	07:34	0	00:00	00:00
2-Oct	0	00:00	00:00	14	07:25	07:39	0	00:00	00:00
3-Oct	0	00:00	00:00	18	07:23	07:41	0	00:00	00:00
4-Oct	0	00:00	00:00	23	07:20	07:43	0	00:00	00:00
5-Oct	0	00:00	00:00	25	07:19	07:44	0	00:00	00:00
6-Oct	0	00:00	00:00	26	07:18	07:44	0	00:00	00:00
7-Oct	0	00:00	00:00	28	07:17	07:45	0	00:00	00:00
8-Oct	0	00:00	00:00	29	07:16	07:45	0	00:00	00:00
9-Oct	0	00:00	00:00	30	07:15	07:45	0	00:00	00:00
10-Oct	0	00:00	00:00	30	07:15	07:45	0	00:00	00:00
11-Oct	0	00:00	00:00	31	07:14	07:45	0	00:00	00:00
12-Oct	0	00:00	00:00	28	07:16	07:44	0	00:00	00:00
13-Oct	0	00:00	00:00	27	07:17	07:44	0	00:00	00:00
14-Oct	0	00:00	00:00	24	07:19	07:43	0	00:00	00:00
15-Oct	0	00:00	00:00	23	07:20	07:43	0	00:00	00:00
16-Oct	0	00:00	00:00	21	07:21	07:42	0	00:00	00:00
17-Oct	0	00:00	00:00	17	07:23	07:40	0	00:00	00:00
18-Oct	0	00:00	00:00	15	07:24	07:39	0	00:00	00:00
19-Oct	0	00:00	00:00	11	07:26	07:37	0	00:00	00:00
20-Oct	0	00:00	00:00	8	07:27	07:35	0	00:00	00:00
21-Oct	0	00:00	00:00	2	07:29	07:31	0	00:00	00:00
14-Nov	5	08:28	08:33	0	00:00	00:00	0	00:00	00:00
15-Nov	11	08:25	08:36	0	00:00	00:00	0	00:00	00:00
16-Nov	15	08:23	08:38	0	00:00	00:00	0	00:00	00:00
17-Nov	18	08:22	08:40	0	00:00	00:00	0	00:00	00:00
18-Nov	20	08:21	08:41	0	00:00	00:00	0	00:00	00:00
19-Nov	21	08:21	08:42	0	00:00	00:00	0	00:00	00:00
20-Nov	23	08:20	08:43	0	00:00	00:00	0	00:00	00:00

21-Nov	24	08:20	08:44	0	00:00	00:00	0	00:00	00:00
22-Nov	24	08:20	08:44	0	00:00	00:00	0	00:00	00:00
23-Nov	25	08:20	08:45	0	00:00	00:00	0	00:00	00:00
24-Nov	25	08:20	08:45	0	00:00	00:00	0	00:00	00:00
25-Nov	25	08:21	08:46	0	00:00	00:00	0	00:00	00:00
26-Nov	24	08:22	08:46	0	00:00	00:00	0	00:00	00:00
27-Nov	23	08:24	08:47	0	00:00	00:00	0	00:00	00:00
28-Nov	22	08:25	08:47	0	00:00	00:00	0	00:00	00:00
29-Nov	22	08:26	08:48	0	00:00	00:00	0	00:00	00:00
30-Nov	20	08:28	08:48	0	00:00	00:00	0	00:00	00:00
1-Dec	19	08:29	08:48	0	00:00	00:00	0	00:00	00:00
2-Dec	18	08:30	08:48	0	00:00	00:00	0	00:00	00:00
3-Dec	18	08:31	08:49	0	00:00	00:00	0	00:00	00:00
4-Dec	16	08:33	08:49	0	00:00	00:00	0	00:00	00:00
5-Dec	15	08:34	08:49	0	00:00	00:00	0	00:00	00:00
6-Dec	14	08:35	08:49	0	00:00	00:00	0	00:00	00:00
7-Dec	14	08:36	08:50	0	00:00	00:00	0	00:00	00:00
8-Dec	13	08:37	08:50	0	00:00	00:00	0	00:00	00:00
9-Dec	12	08:38	08:50	0	00:00	00:00	0	00:00	00:00
10-Dec	11	08:39	08:50	0	00:00	00:00	0	00:00	00:00
11-Dec	11	08:40	08:51	0	00:00	00:00	0	00:00	00:00
12-Dec	10	08:41	08:51	0	00:00	00:00	0	00:00	00:00
13-Dec	9	08:42	08:51	0	00:00	00:00	0	00:00	00:00
14-Dec	10	08:42	08:52	0	00:00	00:00	0	00:00	00:00
15-Dec	9	08:43	08:52	0	00:00	00:00	0	00:00	00:00
16-Dec	8	08:44	08:52	0	00:00	00:00	0	00:00	00:00
17-Dec	8	08:45	08:53	0	00:00	00:00	0	00:00	00:00
18-Dec	8	08:45	08:53	0	00:00	00:00	0	00:00	00:00
19-Dec	8	08:46	08:54	0	00:00	00:00	0	00:00	00:00
20-Dec	8	08:46	08:54	0	00:00	00:00	0	00:00	00:00
21-Dec	8	08:47	08:55	0	00:00	00:00	0	00:00	00:00
22-Dec	8	08:47	08:55	0	00:00	00:00	0	00:00	00:00
23-Dec	8	08:48	08:56	0	00:00	00:00	0	00:00	00:00
24-Dec	8	08:48	08:56	0	00:00	00:00	0	00:00	00:00
25-Dec	9	08:48	08:57	0	00:00	00:00	0	00:00	00:00
26-Dec	8	08:49	08:57	0	00:00	00:00	0	00:00	00:00
27-Dec	9	08:49	08:58	0	00:00	00:00	0	00:00	00:00
28-Dec	10	08:49	08:59	0	00:00	00:00	0	00:00	00:00
29-Dec	10	08:49	08:59	0	00:00	00:00	0	00:00	00:00
30-Dec	11	08:49	09:00	0	00:00	00:00	0	00:00	00:00
31-Dec	12	08:49	09:01	0	00:00	00:00	0	00:00	00:00

Receptor: 402
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
72	15:19

Astronomical Worst Case (hours): 15
Reduction Factor: 0.27
Expected Case (hours): 4

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below
Turbine 72

Day	Maximum Minutes	Start Time	End Time
10-Mar	6	18:11	18:17
11-Mar	11	18:07	18:18
12-Mar	14	18:05	18:19
13-Mar	18	18:03	18:21
14-Mar	21	18:01	18:22
15-Mar	24	18:00	18:24
16-Mar	26	17:59	18:25
17-Mar	28	17:58	18:26
18-Mar	31	17:57	18:28
19-Mar	31	17:57	18:28
20-Mar	31	17:57	18:28
21-Mar	30	17:57	18:27
22-Mar	30	17:57	18:27
23-Mar	29	17:57	18:26
24-Mar	28	17:57	18:25
25-Mar	26	17:58	18:24
26-Mar	23	17:59	18:22
27-Mar	21	18:00	18:21
28-Mar	17	18:01	18:18
29-Mar	11	18:04	18:15
11-Sep	9	17:57	18:06
12-Sep	16	17:53	18:09
13-Sep	20	17:51	18:11
14-Sep	23	17:49	18:12
15-Sep	26	17:47	18:13
16-Sep	27	17:46	18:13
17-Sep	29	17:45	18:14
18-Sep	30	17:44	18:14
19-Sep	31	17:43	18:14
20-Sep	31	17:43	18:14
21-Sep	31	17:42	18:13
22-Sep	31	17:42	18:13
23-Sep	29	17:42	18:11
24-Sep	27	17:42	18:09
25-Sep	25	17:42	18:07
26-Sep	22	17:43	18:05
27-Sep	19	17:44	18:03
28-Sep	16	17:45	18:01
29-Sep	13	17:46	17:59
30-Sep	8	17:49	17:57

Receptor: 403
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
54	13:06
55	5:36

Astronomical Worst Case (hours): 19
Reduction Factor: 0.26
Expected Case (hours): 5

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below

Turbine	54			55		
Day	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time
4-Mar	4	07:34	07:38	0	00:00	00:00
5-Mar	9	07:32	07:41	0	00:00	00:00
6-Mar	13	07:30	07:43	0	00:00	00:00
7-Mar	16	07:28	07:44	0	00:00	00:00
8-Mar	19	07:26	07:45	0	00:00	00:00
9-Mar	22	07:24	07:46	0	00:00	00:00
10-Mar	24	07:22	07:46	0	00:00	00:00
11-Mar	26	07:20	07:46	0	00:00	00:00
12-Mar	28	07:18	07:46	0	00:00	00:00
13-Mar	29	07:17	07:46	0	00:00	00:00
14-Mar	30	07:16	07:46	0	00:00	00:00
15-Mar	29	07:16	07:45	0	00:00	00:00
16-Mar	27	07:17	07:44	0	00:00	00:00
17-Mar	26	07:17	07:43	0	00:00	00:00
18-Mar	24	07:18	07:42	0	00:00	00:00
19-Mar	23	07:18	07:41	0	00:00	00:00
20-Mar	19	07:20	07:39	0	00:00	00:00
21-Mar	14	07:22	07:36	0	00:00	00:00
22-Mar	7	07:25	07:32	0	00:00	00:00
24-Mar	0	00:00	00:00	2	06:55	06:57
25-Mar	0	00:00	00:00	6	06:53	06:59
26-Mar	0	00:00	00:00	9	06:51	07:00
27-Mar	0	00:00	00:00	12	06:49	07:01
28-Mar	0	00:00	00:00	14	06:47	07:01
29-Mar	0	00:00	00:00	16	06:45	07:01
30-Mar	0	00:00	00:00	18	06:43	07:01
31-Mar	0	00:00	00:00	20	06:41	07:01
1-Apr	0	00:00	00:00	19	06:41	07:00
2-Apr	0	00:00	00:00	17	06:42	06:59
3-Apr	0	00:00	00:00	16	06:42	06:58
4-Apr	0	00:00	00:00	12	06:44	06:56
5-Apr	0	00:00	00:00	7	06:46	06:53
5-Sep	0	00:00	00:00	6	06:42	06:48
6-Sep	0	00:00	00:00	12	06:39	06:51
7-Sep	0	00:00	00:00	15	06:37	06:52
8-Sep	0	00:00	00:00	17	06:36	06:53
9-Sep	0	00:00	00:00	18	06:35	06:53
10-Sep	0	00:00	00:00	19	06:34	06:53
11-Sep	0	00:00	00:00	18	06:35	06:53
12-Sep	0	00:00	00:00	17	06:36	06:53
13-Sep	0	00:00	00:00	14	06:38	06:52
14-Sep	0	00:00	00:00	12	06:39	06:51
15-Sep	0	00:00	00:00	10	06:40	06:50
16-Sep	0	00:00	00:00	7	06:41	06:48
17-Sep	0	00:00	00:00	3	06:43	06:46
19-Sep	5	07:13	07:18	0	00:00	00:00
20-Sep	14	07:08	07:22	0	00:00	00:00
21-Sep	18	07:06	07:24	0	00:00	00:00
22-Sep	21	07:04	07:25	0	00:00	00:00

23-Sep	24	07:02	07:26	0	00:00	00:00
24-Sep	26	07:01	07:27	0	00:00	00:00
25-Sep	27	07:00	07:27	0	00:00	00:00
26-Sep	28	06:59	07:27	0	00:00	00:00
27-Sep	29	06:58	07:27	0	00:00	00:00
28-Sep	29	06:58	07:27	0	00:00	00:00
29-Sep	29	06:58	07:27	0	00:00	00:00
30-Sep	27	06:59	07:26	0	00:00	00:00
1-Oct	25	07:01	07:26	0	00:00	00:00
2-Oct	23	07:02	07:25	0	00:00	00:00
3-Oct	21	07:03	07:24	0	00:00	00:00
4-Oct	17	07:05	07:22	0	00:00	00:00
5-Oct	15	07:06	07:21	0	00:00	00:00
6-Oct	12	07:07	07:19	0	00:00	00:00
7-Oct	7	07:09	07:16	0	00:00	00:00

Receptor: 417
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
32	7:49
33A	8:00
34	17:13

Astronomical Worst Case (hours): 33
Reduction Factor: 0.21
Expected Case (hours): 7

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below

Turbine	32			33A			34		
Day	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time
10-Jan	1	16:45	16:46	0	00:00	00:00	0	00:00	00:00
11-Jan	2	16:45	16:47	0	00:00	00:00	0	00:00	00:00
12-Jan	4	16:44	16:48	0	00:00	00:00	0	00:00	00:00
13-Jan	6	16:44	16:50	0	00:00	00:00	0	00:00	00:00
14-Jan	7	16:44	16:51	0	00:00	00:00	0	00:00	00:00
15-Jan	9	16:44	16:53	0	00:00	00:00	0	00:00	00:00
16-Jan	10	16:44	16:54	0	00:00	00:00	0	00:00	00:00
17-Jan	11	16:44	16:55	0	00:00	00:00	0	00:00	00:00
18-Jan	13	16:44	16:57	0	00:00	00:00	0	00:00	00:00
19-Jan	14	16:44	16:58	0	00:00	00:00	0	00:00	00:00
20-Jan	15	16:45	17:00	0	00:00	00:00	0	00:00	00:00
21-Jan	16	16:45	17:01	0	00:00	00:00	0	00:00	00:00
22-Jan	18	16:45	17:03	0	00:00	00:00	0	00:00	00:00
23-Jan	18	16:46	17:04	0	00:00	00:00	0	00:00	00:00
24-Jan	18	16:47	17:05	0	00:00	00:00	0	00:00	00:00
25-Jan	18	16:47	17:05	0	00:00	00:00	0	00:00	00:00
26-Jan	17	16:48	17:05	0	00:00	00:00	0	00:00	00:00
27-Jan	15	16:49	17:04	0	00:00	00:00	0	00:00	00:00
28-Jan	12	16:51	17:03	0	00:00	00:00	0	00:00	00:00
29-Jan	8	16:53	17:01	0	00:00	00:00	0	00:00	00:00
3-Feb	0	00:00	00:00	4	17:18	17:22	0	00:00	00:00
4-Feb	0	00:00	00:00	6	17:17	17:23	0	00:00	00:00
5-Feb	0	00:00	00:00	9	17:16	17:25	0	00:00	00:00
6-Feb	0	00:00	00:00	11	17:15	17:26	0	00:00	00:00
7-Feb	0	00:00	00:00	13	17:15	17:28	0	00:00	00:00
8-Feb	0	00:00	00:00	16	17:14	17:30	0	00:00	00:00
9-Feb	0	00:00	00:00	17	17:14	17:31	0	00:00	00:00
10-Feb	0	00:00	00:00	19	17:14	17:33	0	00:00	00:00
11-Feb	0	00:00	00:00	20	17:14	17:34	0	00:00	00:00
12-Feb	0	00:00	00:00	22	17:14	17:36	0	00:00	00:00
13-Feb	0	00:00	00:00	22	17:15	17:37	0	00:00	00:00
14-Feb	0	00:00	00:00	21	17:15	17:36	0	00:00	00:00
15-Feb	0	00:00	00:00	19	17:16	17:35	0	00:00	00:00
16-Feb	0	00:00	00:00	17	17:17	17:34	0	00:00	00:00
17-Feb	0	00:00	00:00	14	17:19	17:33	0	00:00	00:00
18-Feb	0	00:00	00:00	9	17:21	17:30	0	00:00	00:00
18-Mar	0	00:00	00:00	0	00:00	00:00	8	18:20	18:28
19-Mar	0	00:00	00:00	0	00:00	00:00	12	18:17	18:29
20-Mar	0	00:00	00:00	0	00:00	00:00	15	18:15	18:30
21-Mar	0	00:00	00:00	0	00:00	00:00	19	18:13	18:32
22-Mar	0	00:00	00:00	0	00:00	00:00	22	18:11	18:33
23-Mar	0	00:00	00:00	0	00:00	00:00	24	18:10	18:34
24-Mar	0	00:00	00:00	0	00:00	00:00	27	18:09	18:36
25-Mar	0	00:00	00:00	0	00:00	00:00	29	18:08	18:37
26-Mar	0	00:00	00:00	0	00:00	00:00	30	18:08	18:38
27-Mar	0	00:00	00:00	0	00:00	00:00	33	18:07	18:40
28-Mar	0	00:00	00:00	0	00:00	00:00	33	18:07	18:40
29-Mar	0	00:00	00:00	0	00:00	00:00	33	18:07	18:40
30-Mar	0	00:00	00:00	0	00:00	00:00	32	18:07	18:39

31-Mar	0	00:00	00:00	0	00:00	00:00	32	18:07	18:39
1-Apr	0	00:00	00:00	0	00:00	00:00	31	18:07	18:38
2-Apr	0	00:00	00:00	0	00:00	00:00	29	18:08	18:37
3-Apr	0	00:00	00:00	0	00:00	00:00	27	18:08	18:35
4-Apr	0	00:00	00:00	0	00:00	00:00	25	18:09	18:34
5-Apr	0	00:00	00:00	0	00:00	00:00	22	18:10	18:32
6-Apr	0	00:00	00:00	0	00:00	00:00	18	18:12	18:30
7-Apr	0	00:00	00:00	0	00:00	00:00	11	18:15	18:26
2-Sep	0	00:00	00:00	0	00:00	00:00	11	18:13	18:24
3-Sep	0	00:00	00:00	0	00:00	00:00	18	18:09	18:27
4-Sep	0	00:00	00:00	0	00:00	00:00	21	18:07	18:28
5-Sep	0	00:00	00:00	0	00:00	00:00	25	18:05	18:30
6-Sep	0	00:00	00:00	0	00:00	00:00	27	18:03	18:30
7-Sep	0	00:00	00:00	0	00:00	00:00	29	18:02	18:31
8-Sep	0	00:00	00:00	0	00:00	00:00	30	18:01	18:31
9-Sep	0	00:00	00:00	0	00:00	00:00	32	18:00	18:32
10-Sep	0	00:00	00:00	0	00:00	00:00	33	17:59	18:32
11-Sep	0	00:00	00:00	0	00:00	00:00	33	17:59	18:32
12-Sep	0	00:00	00:00	0	00:00	00:00	33	17:58	18:31
13-Sep	0	00:00	00:00	0	00:00	00:00	33	17:58	18:31
14-Sep	0	00:00	00:00	0	00:00	00:00	31	17:58	18:29
15-Sep	0	00:00	00:00	0	00:00	00:00	29	17:58	18:27
16-Sep	0	00:00	00:00	0	00:00	00:00	27	17:58	18:25
17-Sep	0	00:00	00:00	0	00:00	00:00	25	17:58	18:23
18-Sep	0	00:00	00:00	0	00:00	00:00	23	17:58	18:21
19-Sep	0	00:00	00:00	0	00:00	00:00	20	17:59	18:19
20-Sep	0	00:00	00:00	0	00:00	00:00	17	18:00	18:17
21-Sep	0	00:00	00:00	0	00:00	00:00	13	18:02	18:15
22-Sep	0	00:00	00:00	0	00:00	00:00	9	18:04	18:13
23-Sep	0	00:00	00:00	0	00:00	00:00	3	18:08	18:11
22-Oct	0	00:00	00:00	10	16:51	17:01	0	00:00	00:00
23-Oct	0	00:00	00:00	14	16:49	17:03	0	00:00	00:00
24-Oct	0	00:00	00:00	17	16:47	17:04	0	00:00	00:00
25-Oct	0	00:00	00:00	19	16:46	17:05	0	00:00	00:00
26-Oct	0	00:00	00:00	21	16:45	17:06	0	00:00	00:00
27-Oct	0	00:00	00:00	23	16:44	17:07	0	00:00	00:00
28-Oct	0	00:00	00:00	21	16:44	17:05	0	00:00	00:00
29-Oct	0	00:00	00:00	20	16:44	17:04	0	00:00	00:00
30-Oct	0	00:00	00:00	19	16:43	17:02	0	00:00	00:00
31-Oct	0	00:00	00:00	18	16:43	17:01	0	00:00	00:00
1-Nov	0	00:00	00:00	15	16:44	16:59	0	00:00	00:00
2-Nov	0	00:00	00:00	13	16:44	16:57	0	00:00	00:00
3-Nov	0	00:00	00:00	11	16:45	16:56	0	00:00	00:00
4-Nov	0	00:00	00:00	9	16:45	16:54	0	00:00	00:00
5-Nov	0	00:00	00:00	7	16:46	16:53	0	00:00	00:00
6-Nov	0	00:00	00:00	4	16:48	16:52	0	00:00	00:00
11-Nov	8	16:24	16:32	0	00:00	00:00	0	00:00	00:00
12-Nov	12	16:22	16:34	0	00:00	00:00	0	00:00	00:00
13-Nov	15	16:21	16:36	0	00:00	00:00	0	00:00	00:00
14-Nov	17	16:20	16:37	0	00:00	00:00	0	00:00	00:00
15-Nov	18	16:20	16:38	0	00:00	00:00	0	00:00	00:00
16-Nov	18	16:20	16:38	0	00:00	00:00	0	00:00	00:00
17-Nov	19	16:19	16:38	0	00:00	00:00	0	00:00	00:00
18-Nov	18	16:19	16:37	0	00:00	00:00	0	00:00	00:00
19-Nov	17	16:19	16:36	0	00:00	00:00	0	00:00	00:00
20-Nov	15	16:20	16:35	0	00:00	00:00	0	00:00	00:00
21-Nov	14	16:20	16:34	0	00:00	00:00	0	00:00	00:00
22-Nov	13	16:20	16:33	0	00:00	00:00	0	00:00	00:00
23-Nov	11	16:21	16:32	0	00:00	00:00	0	00:00	00:00
24-Nov	10	16:21	16:31	0	00:00	00:00	0	00:00	00:00
25-Nov	9	16:22	16:31	0	00:00	00:00	0	00:00	00:00
26-Nov	7	16:23	16:30	0	00:00	00:00	0	00:00	00:00
27-Nov	6	16:23	16:29	0	00:00	00:00	0	00:00	00:00
28-Nov	5	16:24	16:29	0	00:00	00:00	0	00:00	00:00
29-Nov	3	16:25	16:28	0	00:00	00:00	0	00:00	00:00
30-Nov	2	16:26	16:28	0	00:00	00:00	0	00:00	00:00

Receptor: 475
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
9	6:39
10	14:48
20	8:49
21	9:19
24	27:31
25	22:13
26	21:01

Astronomical Worst Case (hours): 110
Reduction Factor: 0.25
Expected Case (hours): 27

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below

Turbine	10			20			21			24			25			26			9		
Day	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time
1-Jan	0	00:00	00:00	16	16:10	16:26	16	15:52	16:08	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
2-Jan	0	00:00	00:00	15	16:11	16:26	15	15:53	16:08	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
3-Jan	0	00:00	00:00	13	16:12	16:25	14	15:54	16:08	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
4-Jan	0	00:00	00:00	11	16:14	16:25	11	15:56	16:07	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
5-Jan	0	00:00	00:00	10	16:15	16:25	8	15:58	16:06	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
6-Jan	0	00:00	00:00	8	16:16	16:24	3	16:01	16:04	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
7-Jan	0	00:00	00:00	3	16:19	16:22	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
15-Feb	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	8	08:06	08:14	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
16-Feb	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	13	08:04	08:17	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
17-Feb	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	16	08:03	08:19	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
18-Feb	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	20	08:01	08:21	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
19-Feb	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	23	07:59	08:22	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
20-Feb	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	26	07:57	08:23	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
21-Feb	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	28	07:56	08:24	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
22-Feb	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	31	07:54	08:25	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
23-Feb	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	34	07:52	08:26	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
24-Feb	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	36	07:50	08:26	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
25-Feb	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	38	07:48	08:26	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
26-Feb	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	39	07:47	08:26	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
27-Feb	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	41	07:45	08:26	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
28-Feb	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	41	07:45	08:26	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
29-Feb	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	41	07:45	08:26	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
1-Mar	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	41	07:45	08:26	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
2-Mar	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	40	07:45	08:25	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
3-Mar	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	40	07:45	08:25	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
4-Mar	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	39	07:45	08:24	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
5-Mar	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	37	07:46	08:23	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
6-Mar	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	36	07:46	08:22	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
7-Mar	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	34	07:47	08:21	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
8-Mar	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	31	07:48	08:19	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
9-Mar	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	29	07:49	08:18	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
10-Mar	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	24	07:51	08:15	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
11-Mar	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	20	07:53	08:13	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
12-Mar	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	12	07:57	08:09	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
17-Mar	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	1	18:25	18:26
18-Mar	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	6	18:22	18:28
19-Mar	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	8	18:21	18:29
20-Mar	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	11	18:19	18:30
21-Mar	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	14	18:18	18:32
22-Mar	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	15	18:18	18:33
23-Mar	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	17	18:17	18:34
24-Mar	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	19	18:17	18:36
25-Mar	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	20	18:17	18:37
26-Mar	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	21	18:17	18:38
27-Mar	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	20	18:17	18:37
28-Mar	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	18	18:18	18:36
29-Mar	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	15	18:19	18:34
30-Mar	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	10	18:21	18:31
20-Apr	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	7	06:05	06:12	0	00:00	00:00	0	00:00	00:00
21-Apr	5	19:07	19:12	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	11	06:03	06:14	0	00:00	00:00	0	00:00	00:00
22-Apr	10	19:04	19:14	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	14	06:02	06:16	0	00:00	00:00	0	00:00	00:00
23-Apr	13	19:02	19:15	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	17	06:00	06:17	0	00:00	00:00	0	00:00	00:00
24-Apr	15	19:01	19:16	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	20	05:58	06:18	0	00:00	00:00	0	00:00	00:00
25-Apr	17	19:00	19:17	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	22	05:57	06:19	0	00:00	00:00	0	00:00	00:00
26-Apr	20	18:59	19:19	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	24	05:55	06:19	0	00:00	00:00	0	00:00	00:00
27-Apr	22	18:58	19:20	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	26	05:54	06:20	0	00:00	00:00	0	00:00	00:00
28-Apr	23	18:58	19:21	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	28	05:52	06:20	0	00:00	00:00	0	00:00	00:00
29-Apr	25	18:57	19:22	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	29	05:51	06:20	0	00:00	00:00	0	00:00	00:00
30-Apr	27	18:57	19:24	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	31	05:49	06:20	0	00:00	00:00	0	00:00	00:00
1-May	28	18:57	19:25	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	32	05:48	06:20	0	00:00	00:00	0	00:00	00:00
2-May	27	18:57	19:24	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	33	05:47	06:20	0	00:00	00:00	0	00:00	00:00
3-May	27	18:57	19:24	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	33	05:47	06:20	0	00:00	00:00	0	00:00	00:00
4-May	27	18:57	19:24	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	33	05:47	06:20	0	00:00	00:00	0	00:00	00:00
5-May	25	18:58	19:23	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	33	05:47	06:20	0	00:00	00:00	0	00:00	00:00
6-May	25	18:58	19:23	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	31	05:48	06:19	0	00:00	00:00	0	00:00	00:00
7-May	23	18:59	19:22	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	31	05:48	06:19	0	00:00	00:00	0	00:00	00:00
8-May	21	19:00	19:21	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	30	05:48	06:18	0	00:00	00:00	0	00:00	00:00
9-May	19	19:01	19:20	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	29	05:49	06:18	0	00:00	00:00	0	00:00	00:00
10-May	17	19:02	19:19	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	27	05:50	06:17	0	00:00	00:00	0	00:00	00:00
11-May	14	19:03	19:17	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	26	05:50	06:16	0	00:00	00:00	0	00:00	00:00
12-May	10	19:05	19:15	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	24	05:51	06:15	2	05:33	05:35	0	00:00	00:00
13-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	22	05:52	06:14	4	05:32	05:36	0	00:00	00:00
14-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	19	05:54	06:13	7	05:31	05:38	0	00:00	00:00
15-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	16	05:55	06:11	8	05:30	05:38	0	00:00	00:00
16-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	11	05:58	06:09	10	05:29	05:39	0	00:00	00:00
17-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	2	06:02	06:04	12	05:28	05:40	0	00:00	00:00
18-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	13	05:27	05:40	0	00:00	00:00
19-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	15	05:26	05:41	0	00:00	00:00
20-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	16	05:25	05:41	0	00:00	00:00
21-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	17	05:24	05:41	0	00:00	00:00
22-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	19	05:23	05:42	0	00:00	00:00
23-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	20	05:22	05:42	0	00:00	00:00
24-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	21	05:21	05:42	0	00:00	00:00
25-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	21	05:21	05:42	0	00:00	00:00
26-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	22	05:20	05:42	0	00:00	00:00
27-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	23	05:19	05:42	0	00:00	00:00
28-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	23	05:19	05:42	0	00:00	00:00
29-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	23	05:19	05:42	0	00:00	00:00
30-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	23	05:19	05:42	0	00:00	00:00

31-May	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	23	05:19	05:42	0	00:00	00:00
1-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	22	05:20	05:42	0	00:00	00:00
2-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	21	05:20	05:41	0	00:00	00:00
3-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	20	05:21	05:41	0	00:00	00:00
4-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	20	05:21	05:41	0	00:00	00:00
5-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	19	05:22	05:41	0	00:00	00:00
6-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	19	05:22	05:41	0	00:00	00:00
7-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	18	05:23	05:41	0	00:00	00:00
8-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	17	05:23	05:40	0	00:00	00:00
9-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	16	05:24	05:40	0	00:00	00:00
10-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	15	05:25	05:40	0	00:00	00:00
11-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	15	05:25	05:40	0	00:00	00:00
12-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	14	05:26	05:40	0	00:00	00:00
13-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	14	05:26	05:40	0	00:00	00:00
14-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	13	05:27	05:40	0	00:00	00:00
15-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	12	05:27	05:39	0	00:00	00:00
16-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	11	05:28	05:39	0	00:00	00:00
17-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	11	05:28	05:39	0	00:00	00:00
18-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	10	05:29	05:39	0	00:00	00:00
19-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	11	05:29	05:40	0	00:00	00:00
20-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	11	05:29	05:40	0	00:00	00:00
21-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	11	05:29	05:40	0	00:00	00:00
22-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	11	05:29	05:40	0	00:00	00:00
23-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	11	05:30	05:41	0	00:00	00:00
24-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	11	05:30	05:41	0	00:00	00:00
25-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	12	05:30	05:42	0	00:00	00:00
26-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	13	05:29	05:42	0	00:00	00:00
27-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	13	05:29	05:42	0	00:00	00:00
28-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	14	05:29	05:43	0	00:00	00:00
29-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	15	05:29	05:44	0	00:00	00:00
30-Jun	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	15	05:29	05:44	0	00:00	00:00
1-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	16	05:29	05:45	0	00:00	00:00
2-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	16	05:29	05:45	0	00:00	00:00
3-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	18	05:28	05:46	0	00:00	00:00
4-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	18	05:28	05:46	0	00:00	00:00
5-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	19	05:28	05:47	0	00:00	00:00
6-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	19	05:28	05:47	0	00:00	00:00
7-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	20	05:28	05:48	0	00:00	00:00
8-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	21	05:27	05:48	0	00:00	00:00
9-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	22	05:27	05:49	0	00:00	00:00
10-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	22	05:27	05:49	0	00:00	00:00
11-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	23	05:27	05:50	0	00:00	00:00
12-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	23	05:27	05:50	0	00:00	00:00
13-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	23	05:27	05:50	0	00:00	00:00
14-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	23	05:28	05:51	0	00:00	00:00
15-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	23	05:28	05:51	0	00:00	00:00
16-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	22	05:29	05:51	0	00:00	00:00
17-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	21	05:30	05:51	0	00:00	00:00
18-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	20	05:31	05:51	0	00:00	00:00
19-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	19	05:32	05:51	0	00:00	00:00
20-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	18	05:33	05:51	0	00:00	00:00
21-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	17	05:34	05:51	0	00:00	00:00
22-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	16	05:35	05:51	0	00:00	00:00
23-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	15	05:36	05:51	0	00:00	00:00
24-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	13	05:37	05:50	0	00:00	00:00
25-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	7	06:10	06:17	12	05:38	05:50	0	00:00	00:00
26-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	13	06:07	06:20	10	05:39	05:49	0	00:00	00:00
27-Jul	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	17	06:05	06:22	8	05:40	05:48	0	00:00	00:00
28-Jul	6	19:17	19:23	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	20	06:03	06:23	5	05:42	05:47	0	00:00	00:00
29-Jul	12	19:14	19:26	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	23	06:02	06:25	3	05:43	05:46	0	00:00	00:00
30-Jul	16	19:12	19:28	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	25	06:01	06:26	0	00:00	00:00	0	00:00	00:00
31-Jul	18	19:11	19:29	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	26	06:00	06:26	0	00:00	00:00	0	00:00	00:00
1-Aug	20	19:10	19:30	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	28	05:59	06:27	0	00:00	00:00	0	00:00	00:00
2-Aug	22	19:09	19:31	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	29	05:59	06:28	0	00:00	00:00	0	00:00	00:00
3-Aug	24	19:08	19:32	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	30	05:58	06:28	0	00:00	00:00	0	00:00	00:00
4-Aug	25	19:07	19:32	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	31	05:57	06:28	0	00:00	00:00	0	00:00	00:00
5-Aug	26	19:07	19:33	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	32	05:57	06:29	0	00:00	00:00	0	00:00	00:00
6-Aug	27	19:06	19:33	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	33	05:56	06:29	0	00:00	00:00	0	00:00	00:00
7-Aug	27	19:06	19:33	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	33	05:56	06:29	0	00:00	00:00	0	00:00	00:00
8-Aug	27	19:06	19:33	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	33	05:56	06:29	0	00:00	00:00	0	00:00	00:00
9-Aug	28	19:05	19:33	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	33	05:56	06:29	0	00:00	00:00	0	00:00	00:00
10-Aug	26	19:05	19:31	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	33	05:56	06:29	0	00:00	00:00	0	00:00	00:00
11-Aug	25	19:05	19:30	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	30	05:58	06:28	0	00:00	00:00	0	00:00	00:00
12-Aug	23	19:05	19:28	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	29	05:59	06:28	0	00:00	00:00	0	00:00	00:00
13-Aug	21	19:06	19:27	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	27	06:00	06:27	0	00:00	00:00	0	00:00	00:00
14-Aug	19	19:06	19:25	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	26	06:01	06:27	0	00:00	00:00	0	00:00	00:00
15-Aug	16	19:07	19:23	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	24	06:02	06:26	0	00:00	00:00	0	00:00	00:00
16-Aug	15	19:07	19:22	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	22	06:03	06:25	0	00:00	00:00	0	00:00	00:00
17-Aug	12	19:08	19:20	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	19	06:05	06:24	0	00:00	00:00	0	00:00	00:00
18-Aug	8	19:10	19:18	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	17	06:06	06:23	0	00:00	00:00	0	00:00	00:00
19-Aug	5	19:12	19:17	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	14	06:07	06:21	0	00:00	00:00	0	00:00	00:00
20-Aug	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	11	06:08	06:19	0	00:00	00:00	0	00:00	00:00
21-Aug	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	7	06:09	06:16	0	00:00	00:00	0	00:00	00:00
10-Sep	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	9	18:14	18:23
11-Sep	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	15	18:11	18:26
12-Sep	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	18	18:09	18:27
13-Sep	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	20	18:08	18:28
14-Sep	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	21	18:07	18:28
15-Sep	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	21	18:06	18:27
16-Sep	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	20	18:05	18:25
17-Sep	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	18	18:05	18:23
18-Sep	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	16	18:05	18:21
19-Sep	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	14	18:05	18:19
20-Sep	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	12	18:05	18:17
21-Sep	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	10	18:05	18:15
22-Sep	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	7	18:06	18:13
23-Sep	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	3	18:08	18:11
29-Sep	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	8	07:39	07:47	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
30-Sep	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	18	07:34	07:52	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
1-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	23	07:31	07:54	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
2-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	27	07:29	07:56	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
3-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	30	07:27	07:57	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
4-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	33	07:25	07:58	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
5-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	35	07:24	07:59	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
6-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	36	07:23	07:59	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
7-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	38	07:22	08:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
8-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	39	07:21	08:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
9-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	40	07:20	08:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
10-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	40	07:20	08:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
11-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	41	07:19	08:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
12-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	41	07:19	08:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
13-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	41	07:19	08:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00

14-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	41	07:19	08:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
15-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	39	07:20	07:59	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
16-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	37	07:21	07:58	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
17-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	35	07:23	07:58	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
18-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	33	07:24	07:57	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
19-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	30	07:26	07:56	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
20-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	28	07:27	07:55	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
21-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	25	07:29	07:54	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
22-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	22	07:30	07:52	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
23-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	19	07:32	07:51	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
24-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	16	07:33	07:49	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
25-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	11	07:35	07:46	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
26-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	7	07:36	07:43	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
4-Dec	0	00:00	00:00	6	16:02	16:08	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
5-Dec	0	00:00	00:00	9	16:01	16:10	7	15:44	15:51	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
6-Dec	0	00:00	00:00	11	16:00	16:11	10	15:43	15:53	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
7-Dec	0	00:00	00:00	13	16:00	16:13	13	15:42	15:55	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
8-Dec	0	00:00	00:00	14	16:00	16:14	14	15:42	15:56	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
9-Dec	0	00:00	00:00	15	16:00	16:15	15	15:42	15:57	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
10-Dec	0	00:00	00:00	15	16:00	16:15	17	15:41	15:58	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
11-Dec	0	00:00	00:00	16	16:00	16:16	18	15:41	15:59	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
12-Dec	0	00:00	00:00	17	16:00	16:17	19	15:41	16:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
13-Dec	0	00:00	00:00	18	16:00	16:18	19	15:42	16:01	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
14-Dec	0	00:00	00:00	17	16:01	16:18	20	15:42	16:02	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
15-Dec	0	00:00	00:00	18	16:01	16:19	21	15:42	16:03	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
16-Dec	0	00:00	00:00	19	16:01	16:20	21	15:42	16:03	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
17-Dec	0	00:00	00:00	18	16:02	16:20	21	15:43	16:04	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
18-Dec	0	00:00	00:00	19	16:02	16:21	21	15:43	16:04	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
19-Dec	0	00:00	00:00	18	16:03	16:21	21	15:44	16:05	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
20-Dec	0	00:00	00:00	19	16:03	16:22	21	15:44	16:05	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
21-Dec	0	00:00	00:00	18	16:04	16:22	21	15:45	16:06	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
22-Dec	0	00:00	00:00	19	16:04	16:23	21	15:45	16:06	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
23-Dec	0	00:00	00:00	18	16:05	16:23	21	15:46	16:07	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
24-Dec	0	00:00	00:00	19	16:05	16:24	21	15:46	16:07	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
25-Dec	0	00:00	00:00	18	16:06	16:24	21	15:47	16:08	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
26-Dec	0	00:00	00:00	17	16:07	16:24	20	15:48	16:08	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
27-Dec	0	00:00	00:00	18	16:07	16:25	20	15:48	16:08	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
28-Dec	0	00:00	00:00	17	16:08	16:25	19	15:49	16:08	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
29-Dec	0	00:00	00:00	16	16:09	16:25	18	15:50	16:08	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
30-Dec	0	00:00	00:00	16	16:09	16:25	17	15:51	16:08	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
31-Dec	0	00:00	00:00	16	16:10	16:26	16	15:52	16:08	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00

Receptor: 490
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
71	8:16
73	13:55
73B	6:49

Astronomical Worst Case (hours): 29
Reduction Factor: 0.24
Expected Case (hours): 7

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below

Turbine	71			73			73B		
Day	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time
6-Jan	1	16:40	16:41	0	00:00	00:00	0	00:00	00:00
7-Jan	2	16:40	16:42	0	00:00	00:00	0	00:00	00:00
8-Jan	3	16:40	16:43	0	00:00	00:00	0	00:00	00:00
9-Jan	5	16:40	16:45	0	00:00	00:00	0	00:00	00:00
10-Jan	6	16:40	16:46	0	00:00	00:00	0	00:00	00:00
11-Jan	7	16:40	16:47	0	00:00	00:00	0	00:00	00:00
12-Jan	8	16:40	16:48	0	00:00	00:00	0	00:00	00:00
13-Jan	10	16:40	16:50	0	00:00	00:00	0	00:00	00:00
14-Jan	10	16:41	16:51	0	00:00	00:00	0	00:00	00:00
15-Jan	12	16:41	16:53	0	00:00	00:00	0	00:00	00:00
16-Jan	13	16:41	16:54	0	00:00	00:00	0	00:00	00:00
17-Jan	14	16:41	16:55	0	00:00	00:00	0	00:00	00:00
18-Jan	15	16:42	16:57	0	00:00	00:00	0	00:00	00:00
19-Jan	16	16:42	16:58	0	00:00	00:00	0	00:00	00:00
20-Jan	17	16:43	17:00	0	00:00	00:00	0	00:00	00:00
21-Jan	17	16:44	17:01	0	00:00	00:00	0	00:00	00:00
22-Jan	19	16:44	17:03	0	00:00	00:00	0	00:00	00:00
23-Jan	19	16:45	17:04	0	00:00	00:00	0	00:00	00:00
24-Jan	17	16:46	17:03	0	00:00	00:00	0	00:00	00:00
25-Jan	15	16:47	17:02	0	00:00	00:00	0	00:00	00:00
26-Jan	12	16:49	17:01	0	00:00	00:00	0	00:00	00:00
27-Jan	8	16:51	16:59	0	00:00	00:00	0	00:00	00:00
22-Mar	0	00:00	00:00	0	00:00	00:00	1	06:59	07:00
23-Mar	0	00:00	00:00	0	00:00	00:00	4	06:57	07:01
24-Mar	0	00:00	00:00	0	00:00	00:00	7	06:55	07:02
25-Mar	0	00:00	00:00	0	00:00	00:00	10	06:53	07:03
26-Mar	0	00:00	00:00	0	00:00	00:00	12	06:51	07:03
27-Mar	0	00:00	00:00	0	00:00	00:00	15	06:49	07:04
28-Mar	0	00:00	00:00	0	00:00	00:00	16	06:47	07:03
29-Mar	0	00:00	00:00	0	00:00	00:00	18	06:45	07:03
30-Mar	0	00:00	00:00	0	00:00	00:00	20	06:43	07:03
31-Mar	0	00:00	00:00	0	00:00	00:00	21	06:41	07:02
1-Apr	0	00:00	00:00	0	00:00	00:00	22	06:39	07:01
2-Apr	0	00:00	00:00	0	00:00	00:00	20	06:40	07:00
3-Apr	0	00:00	00:00	0	00:00	00:00	17	06:41	06:58
4-Apr	0	00:00	00:00	0	00:00	00:00	13	06:43	06:56
5-Apr	0	00:00	00:00	0	00:00	00:00	7	06:46	06:53
19-Apr	0	00:00	00:00	3	06:07	06:10	0	00:00	00:00
20-Apr	0	00:00	00:00	6	06:05	06:11	0	00:00	00:00
21-Apr	0	00:00	00:00	10	06:03	06:13	0	00:00	00:00
22-Apr	0	00:00	00:00	12	06:02	06:14	0	00:00	00:00
23-Apr	0	00:00	00:00	14	06:00	06:14	0	00:00	00:00
24-Apr	0	00:00	00:00	17	05:58	06:15	0	00:00	00:00
25-Apr	0	00:00	00:00	18	05:57	06:15	0	00:00	00:00
26-Apr	0	00:00	00:00	20	05:55	06:15	0	00:00	00:00
27-Apr	0	00:00	00:00	21	05:54	06:15	0	00:00	00:00

28-Apr	0	00:00	00:00	23	05:52	06:15	0	00:00	00:00
29-Apr	0	00:00	00:00	24	05:51	06:15	0	00:00	00:00
30-Apr	0	00:00	00:00	26	05:49	06:15	0	00:00	00:00
1-May	0	00:00	00:00	27	05:48	06:15	0	00:00	00:00
2-May	0	00:00	00:00	28	05:46	06:14	0	00:00	00:00
3-May	0	00:00	00:00	27	05:47	06:14	0	00:00	00:00
4-May	0	00:00	00:00	26	05:47	06:13	0	00:00	00:00
5-May	0	00:00	00:00	24	05:48	06:12	0	00:00	00:00
6-May	0	00:00	00:00	22	05:49	06:11	0	00:00	00:00
7-May	0	00:00	00:00	21	05:49	06:10	0	00:00	00:00
8-May	0	00:00	00:00	18	05:51	06:09	0	00:00	00:00
9-May	0	00:00	00:00	15	05:52	06:07	0	00:00	00:00
10-May	0	00:00	00:00	11	05:54	06:05	0	00:00	00:00
31-Jul	0	00:00	00:00	6	06:07	06:13	0	00:00	00:00
1-Aug	0	00:00	00:00	13	06:03	06:16	0	00:00	00:00
2-Aug	0	00:00	00:00	17	06:01	06:18	0	00:00	00:00
3-Aug	0	00:00	00:00	19	06:00	06:19	0	00:00	00:00
4-Aug	0	00:00	00:00	21	05:59	06:20	0	00:00	00:00
5-Aug	0	00:00	00:00	23	05:58	06:21	0	00:00	00:00
6-Aug	0	00:00	00:00	25	05:57	06:22	0	00:00	00:00
7-Aug	0	00:00	00:00	26	05:56	06:22	0	00:00	00:00
8-Aug	0	00:00	00:00	28	05:55	06:23	0	00:00	00:00
9-Aug	0	00:00	00:00	28	05:55	06:23	0	00:00	00:00
10-Aug	0	00:00	00:00	27	05:56	06:23	0	00:00	00:00
11-Aug	0	00:00	00:00	25	05:58	06:23	0	00:00	00:00
12-Aug	0	00:00	00:00	24	05:59	06:23	0	00:00	00:00
13-Aug	0	00:00	00:00	23	06:00	06:23	0	00:00	00:00
14-Aug	0	00:00	00:00	21	06:01	06:22	0	00:00	00:00
15-Aug	0	00:00	00:00	20	06:02	06:22	0	00:00	00:00
16-Aug	0	00:00	00:00	18	06:03	06:21	0	00:00	00:00
17-Aug	0	00:00	00:00	16	06:05	06:21	0	00:00	00:00
18-Aug	0	00:00	00:00	14	06:06	06:20	0	00:00	00:00
19-Aug	0	00:00	00:00	12	06:07	06:19	0	00:00	00:00
20-Aug	0	00:00	00:00	9	06:08	06:17	0	00:00	00:00
21-Aug	0	00:00	00:00	6	06:09	06:15	0	00:00	00:00
22-Aug	0	00:00	00:00	2	06:11	06:13	0	00:00	00:00
5-Sep	0	00:00	00:00	0	00:00	00:00	6	06:42	06:48
6-Sep	0	00:00	00:00	0	00:00	00:00	13	06:38	06:51
7-Sep	0	00:00	00:00	0	00:00	00:00	17	06:36	06:53
8-Sep	0	00:00	00:00	0	00:00	00:00	20	06:34	06:54
9-Sep	0	00:00	00:00	0	00:00	00:00	21	06:33	06:54
10-Sep	0	00:00	00:00	0	00:00	00:00	21	06:34	06:55
11-Sep	0	00:00	00:00	0	00:00	00:00	20	06:35	06:55
12-Sep	0	00:00	00:00	0	00:00	00:00	19	06:36	06:55
13-Sep	0	00:00	00:00	0	00:00	00:00	16	06:38	06:54
14-Sep	0	00:00	00:00	0	00:00	00:00	15	06:39	06:54
15-Sep	0	00:00	00:00	0	00:00	00:00	13	06:40	06:53
16-Sep	0	00:00	00:00	0	00:00	00:00	11	06:41	06:52
17-Sep	0	00:00	00:00	0	00:00	00:00	8	06:43	06:51
18-Sep	0	00:00	00:00	0	00:00	00:00	5	06:44	06:49
19-Sep	0	00:00	00:00	0	00:00	00:00	2	06:45	06:47
13-Nov	7	16:24	16:31	0	00:00	00:00	0	00:00	00:00
14-Nov	12	16:21	16:33	0	00:00	00:00	0	00:00	00:00
15-Nov	15	16:20	16:35	0	00:00	00:00	0	00:00	00:00
16-Nov	17	16:19	16:36	0	00:00	00:00	0	00:00	00:00
17-Nov	18	16:19	16:37	0	00:00	00:00	0	00:00	00:00
18-Nov	19	16:18	16:37	0	00:00	00:00	0	00:00	00:00
19-Nov	18	16:18	16:36	0	00:00	00:00	0	00:00	00:00
20-Nov	17	16:18	16:35	0	00:00	00:00	0	00:00	00:00
21-Nov	16	16:18	16:34	0	00:00	00:00	0	00:00	00:00
22-Nov	15	16:18	16:33	0	00:00	00:00	0	00:00	00:00
23-Nov	14	16:18	16:32	0	00:00	00:00	0	00:00	00:00
24-Nov	13	16:18	16:31	0	00:00	00:00	0	00:00	00:00
25-Nov	12	16:19	16:31	0	00:00	00:00	0	00:00	00:00
26-Nov	11	16:19	16:30	0	00:00	00:00	0	00:00	00:00
27-Nov	9	16:20	16:29	0	00:00	00:00	0	00:00	00:00
28-Nov	9	16:20	16:29	0	00:00	00:00	0	00:00	00:00

29-Nov	7	16:21	16:28	0	00:00	00:00	0	00:00	00:00
30-Nov	7	16:21	16:28	0	00:00	00:00	0	00:00	00:00
1-Dec	5	16:22	16:27	0	00:00	00:00	0	00:00	00:00
2-Dec	4	16:23	16:27	0	00:00	00:00	0	00:00	00:00
3-Dec	3	16:23	16:26	0	00:00	00:00	0	00:00	00:00
4-Dec	2	16:24	16:26	0	00:00	00:00	0	00:00	00:00
5-Dec	1	16:25	16:26	0	00:00	00:00	0	00:00	00:00

Receptor: 492
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
73	23:31
73B	10:22

Astronomical Worst Case (hours): 34
Reduction Factor: 0.26
Expected Case (hours): 9

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below

Turbine	73			73B		
Day	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time
15-Mar	0	00:00	00:00	1	07:12	07:13
16-Mar	0	00:00	00:00	5	07:10	07:15
17-Mar	0	00:00	00:00	9	07:08	07:17
18-Mar	0	00:00	00:00	12	07:06	07:18
19-Mar	0	00:00	00:00	14	07:05	07:19
20-Mar	0	00:00	00:00	16	07:03	07:19
21-Mar	0	00:00	00:00	18	07:01	07:19
22-Mar	0	00:00	00:00	20	06:59	07:19
23-Mar	0	00:00	00:00	22	06:57	07:19
24-Mar	0	00:00	00:00	24	06:55	07:19
25-Mar	0	00:00	00:00	25	06:53	07:18
26-Mar	0	00:00	00:00	27	06:51	07:18
27-Mar	0	00:00	00:00	26	06:51	07:17
28-Mar	0	00:00	00:00	24	06:52	07:16
29-Mar	0	00:00	00:00	22	06:52	07:14
30-Mar	0	00:00	00:00	19	06:54	07:13
31-Mar	0	00:00	00:00	15	06:55	07:10
1-Apr	0	00:00	00:00	7	06:59	07:06
16-Apr	3	06:12	06:15	0	00:00	00:00
17-Apr	8	06:10	06:18	0	00:00	00:00
18-Apr	11	06:08	06:19	0	00:00	00:00
19-Apr	14	06:07	06:21	0	00:00	00:00
20-Apr	17	06:05	06:22	0	00:00	00:00
21-Apr	20	06:03	06:23	0	00:00	00:00
22-Apr	21	06:02	06:23	0	00:00	00:00
23-Apr	24	06:00	06:24	0	00:00	00:00
24-Apr	26	05:58	06:24	0	00:00	00:00
25-Apr	28	05:57	06:25	0	00:00	00:00
26-Apr	30	05:55	06:25	0	00:00	00:00
27-Apr	31	05:54	06:25	0	00:00	00:00
28-Apr	33	05:52	06:25	0	00:00	00:00
29-Apr	34	05:51	06:25	0	00:00	00:00
30-Apr	35	05:49	06:24	0	00:00	00:00
1-May	35	05:49	06:24	0	00:00	00:00
2-May	35	05:49	06:24	0	00:00	00:00
3-May	34	05:49	06:23	0	00:00	00:00
4-May	34	05:49	06:23	0	00:00	00:00
5-May	32	05:50	06:22	0	00:00	00:00
6-May	31	05:50	06:21	0	00:00	00:00
7-May	30	05:51	06:21	0	00:00	00:00
8-May	28	05:52	06:20	0	00:00	00:00
9-May	26	05:53	06:19	0	00:00	00:00
10-May	24	05:54	06:18	0	00:00	00:00
11-May	21	05:55	06:16	0	00:00	00:00
12-May	18	05:57	06:15	0	00:00	00:00
13-May	14	05:59	06:13	0	00:00	00:00
14-May	7	06:02	06:09	0	00:00	00:00
28-Jul	11	06:10	06:21	0	00:00	00:00

29-Jul	16	06:08	06:24	0	00:00	00:00
30-Jul	19	06:06	06:25	0	00:00	00:00
31-Jul	23	06:04	06:27	0	00:00	00:00
1-Aug	25	06:03	06:28	0	00:00	00:00
2-Aug	27	06:02	06:29	0	00:00	00:00
3-Aug	29	06:01	06:30	0	00:00	00:00
4-Aug	31	06:00	06:31	0	00:00	00:00
5-Aug	32	05:59	06:31	0	00:00	00:00
6-Aug	33	05:59	06:32	0	00:00	00:00
7-Aug	34	05:58	06:32	0	00:00	00:00
8-Aug	34	05:58	06:32	0	00:00	00:00
9-Aug	35	05:57	06:32	0	00:00	00:00
10-Aug	35	05:57	06:32	0	00:00	00:00
11-Aug	34	05:58	06:32	0	00:00	00:00
12-Aug	33	05:59	06:32	0	00:00	00:00
13-Aug	32	06:00	06:32	0	00:00	00:00
14-Aug	31	06:01	06:32	0	00:00	00:00
15-Aug	29	06:02	06:31	0	00:00	00:00
16-Aug	28	06:03	06:31	0	00:00	00:00
17-Aug	25	06:05	06:30	0	00:00	00:00
18-Aug	23	06:06	06:29	0	00:00	00:00
19-Aug	21	06:07	06:28	0	00:00	00:00
20-Aug	19	06:08	06:27	0	00:00	00:00
21-Aug	17	06:09	06:26	0	00:00	00:00
22-Aug	13	06:11	06:24	0	00:00	00:00
23-Aug	10	06:12	06:22	0	00:00	00:00
24-Aug	7	06:13	06:20	0	00:00	00:00
25-Aug	2	06:14	06:16	0	00:00	00:00
9-Sep	0	00:00	00:00	8	06:52	07:00
10-Sep	0	00:00	00:00	15	06:48	07:03
11-Sep	0	00:00	00:00	19	06:46	07:05
12-Sep	0	00:00	00:00	22	06:44	07:06
13-Sep	0	00:00	00:00	23	06:43	07:06
14-Sep	0	00:00	00:00	26	06:41	07:07
15-Sep	0	00:00	00:00	27	06:40	07:07
16-Sep	0	00:00	00:00	26	06:41	07:07
17-Sep	0	00:00	00:00	24	06:43	07:07
18-Sep	0	00:00	00:00	23	06:44	07:07
19-Sep	0	00:00	00:00	21	06:45	07:06
20-Sep	0	00:00	00:00	20	06:46	07:06
21-Sep	0	00:00	00:00	17	06:48	07:05
22-Sep	0	00:00	00:00	15	06:49	07:04
23-Sep	0	00:00	00:00	13	06:50	07:03
24-Sep	0	00:00	00:00	9	06:52	07:01
25-Sep	0	00:00	00:00	6	06:53	06:59
26-Sep	0	00:00	00:00	2	06:54	06:56

Receptor: 493
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
71	8:55
73	13:25
73B	6:28

Astronomical Worst Case (hours): 29
Reduction Factor: 0.24
Expected Case (hours): 7

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below

Turbine	71			73			73B		
Day	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time
8-Jan	1	16:42	16:43	0	00:00	00:00	0	00:00	00:00
9-Jan	3	16:42	16:45	0	00:00	00:00	0	00:00	00:00
10-Jan	4	16:42	16:46	0	00:00	00:00	0	00:00	00:00
11-Jan	5	16:42	16:47	0	00:00	00:00	0	00:00	00:00
12-Jan	6	16:42	16:48	0	00:00	00:00	0	00:00	00:00
13-Jan	8	16:42	16:50	0	00:00	00:00	0	00:00	00:00
14-Jan	9	16:42	16:51	0	00:00	00:00	0	00:00	00:00
15-Jan	11	16:42	16:53	0	00:00	00:00	0	00:00	00:00
16-Jan	11	16:43	16:54	0	00:00	00:00	0	00:00	00:00
17-Jan	12	16:43	16:55	0	00:00	00:00	0	00:00	00:00
18-Jan	14	16:43	16:57	0	00:00	00:00	0	00:00	00:00
19-Jan	15	16:43	16:58	0	00:00	00:00	0	00:00	00:00
20-Jan	16	16:44	17:00	0	00:00	00:00	0	00:00	00:00
21-Jan	17	16:44	17:01	0	00:00	00:00	0	00:00	00:00
22-Jan	18	16:45	17:03	0	00:00	00:00	0	00:00	00:00
23-Jan	19	16:45	17:04	0	00:00	00:00	0	00:00	00:00
24-Jan	20	16:46	17:06	0	00:00	00:00	0	00:00	00:00
25-Jan	19	16:47	17:06	0	00:00	00:00	0	00:00	00:00
26-Jan	18	16:48	17:06	0	00:00	00:00	0	00:00	00:00
27-Jan	16	16:49	17:05	0	00:00	00:00	0	00:00	00:00
28-Jan	14	16:50	17:04	0	00:00	00:00	0	00:00	00:00
29-Jan	9	16:53	17:02	0	00:00	00:00	0	00:00	00:00
26-Mar	0	00:00	00:00	0	00:00	00:00	3	06:51	06:54
27-Mar	0	00:00	00:00	0	00:00	00:00	6	06:49	06:55
28-Mar	0	00:00	00:00	0	00:00	00:00	9	06:47	06:56
29-Mar	0	00:00	00:00	0	00:00	00:00	12	06:45	06:57
30-Mar	0	00:00	00:00	0	00:00	00:00	14	06:43	06:57
31-Mar	0	00:00	00:00	0	00:00	00:00	16	06:41	06:57
1-Apr	0	00:00	00:00	0	00:00	00:00	18	06:39	06:57
2-Apr	0	00:00	00:00	0	00:00	00:00	19	06:37	06:56
3-Apr	0	00:00	00:00	0	00:00	00:00	19	06:36	06:55
4-Apr	0	00:00	00:00	0	00:00	00:00	20	06:34	06:54
5-Apr	0	00:00	00:00	0	00:00	00:00	19	06:34	06:53
6-Apr	0	00:00	00:00	0	00:00	00:00	17	06:35	06:52
7-Apr	0	00:00	00:00	0	00:00	00:00	14	06:36	06:50
8-Apr	0	00:00	00:00	0	00:00	00:00	7	06:39	06:46
22-Apr	0	00:00	00:00	1	06:02	06:03	0	00:00	00:00
23-Apr	0	00:00	00:00	5	06:00	06:05	0	00:00	00:00
24-Apr	0	00:00	00:00	8	05:58	06:06	0	00:00	00:00
25-Apr	0	00:00	00:00	10	05:57	06:07	0	00:00	00:00
26-Apr	0	00:00	00:00	13	05:55	06:08	0	00:00	00:00
27-Apr	0	00:00	00:00	15	05:54	06:09	0	00:00	00:00
28-Apr	0	00:00	00:00	17	05:52	06:09	0	00:00	00:00
29-Apr	0	00:00	00:00	18	05:51	06:09	0	00:00	00:00
30-Apr	0	00:00	00:00	20	05:49	06:09	0	00:00	00:00
1-May	0	00:00	00:00	21	05:48	06:09	0	00:00	00:00

2-May	0	00:00	00:00	23	05:46	06:09	0	00:00	00:00
3-May	0	00:00	00:00	24	05:45	06:09	0	00:00	00:00
4-May	0	00:00	00:00	26	05:43	06:09	0	00:00	00:00
5-May	0	00:00	00:00	27	05:42	06:09	0	00:00	00:00
6-May	0	00:00	00:00	26	05:42	06:08	0	00:00	00:00
7-May	0	00:00	00:00	26	05:42	06:08	0	00:00	00:00
8-May	0	00:00	00:00	24	05:43	06:07	0	00:00	00:00
9-May	0	00:00	00:00	23	05:43	06:06	0	00:00	00:00
10-May	0	00:00	00:00	21	05:44	06:05	0	00:00	00:00
11-May	0	00:00	00:00	19	05:45	06:04	0	00:00	00:00
12-May	0	00:00	00:00	16	05:47	06:03	0	00:00	00:00
13-May	0	00:00	00:00	12	05:49	06:01	0	00:00	00:00
14-May	0	00:00	00:00	7	05:51	05:58	0	00:00	00:00
28-Jul	0	00:00	00:00	10	06:00	06:10	0	00:00	00:00
29-Jul	0	00:00	00:00	14	05:58	06:12	0	00:00	00:00
30-Jul	0	00:00	00:00	17	05:56	06:13	0	00:00	00:00
31-Jul	0	00:00	00:00	19	05:55	06:14	0	00:00	00:00
1-Aug	0	00:00	00:00	21	05:54	06:15	0	00:00	00:00
2-Aug	0	00:00	00:00	23	05:53	06:16	0	00:00	00:00
3-Aug	0	00:00	00:00	25	05:52	06:17	0	00:00	00:00
4-Aug	0	00:00	00:00	25	05:52	06:17	0	00:00	00:00
5-Aug	0	00:00	00:00	27	05:51	06:18	0	00:00	00:00
6-Aug	0	00:00	00:00	26	05:52	06:18	0	00:00	00:00
7-Aug	0	00:00	00:00	25	05:53	06:18	0	00:00	00:00
8-Aug	0	00:00	00:00	24	05:54	06:18	0	00:00	00:00
9-Aug	0	00:00	00:00	23	05:55	06:18	0	00:00	00:00
10-Aug	0	00:00	00:00	22	05:56	06:18	0	00:00	00:00
11-Aug	0	00:00	00:00	19	05:58	06:17	0	00:00	00:00
12-Aug	0	00:00	00:00	18	05:59	06:17	0	00:00	00:00
13-Aug	0	00:00	00:00	16	06:00	06:16	0	00:00	00:00
14-Aug	0	00:00	00:00	15	06:01	06:16	0	00:00	00:00
15-Aug	0	00:00	00:00	13	06:02	06:15	0	00:00	00:00
16-Aug	0	00:00	00:00	10	06:03	06:13	0	00:00	00:00
17-Aug	0	00:00	00:00	7	06:05	06:12	0	00:00	00:00
18-Aug	0	00:00	00:00	4	06:06	06:10	0	00:00	00:00
19-Aug	0	00:00	00:00	1	06:07	06:08	0	00:00	00:00
2-Sep	0	00:00	00:00	0	00:00	00:00	7	06:37	06:44
3-Sep	0	00:00	00:00	0	00:00	00:00	13	06:34	06:47
4-Sep	0	00:00	00:00	0	00:00	00:00	16	06:32	06:48
5-Sep	0	00:00	00:00	0	00:00	00:00	19	06:30	06:49
6-Sep	0	00:00	00:00	0	00:00	00:00	21	06:29	06:50
7-Sep	0	00:00	00:00	0	00:00	00:00	20	06:30	06:50
8-Sep	0	00:00	00:00	0	00:00	00:00	19	06:31	06:50
9-Sep	0	00:00	00:00	0	00:00	00:00	17	06:33	06:50
10-Sep	0	00:00	00:00	0	00:00	00:00	16	06:34	06:50
11-Sep	0	00:00	00:00	0	00:00	00:00	14	06:35	06:49
12-Sep	0	00:00	00:00	0	00:00	00:00	12	06:36	06:48
13-Sep	0	00:00	00:00	0	00:00	00:00	9	06:38	06:47
14-Sep	0	00:00	00:00	0	00:00	00:00	7	06:39	06:46
15-Sep	0	00:00	00:00	0	00:00	00:00	4	06:40	06:44
16-Sep	0	00:00	00:00	0	00:00	00:00	1	06:41	06:42
11-Nov	9	16:24	16:33	0	00:00	00:00	0	00:00	00:00
12-Nov	13	16:22	16:35	0	00:00	00:00	0	00:00	00:00
13-Nov	16	16:21	16:37	0	00:00	00:00	0	00:00	00:00
14-Nov	18	16:20	16:38	0	00:00	00:00	0	00:00	00:00
15-Nov	20	16:19	16:39	0	00:00	00:00	0	00:00	00:00
16-Nov	20	16:19	16:39	0	00:00	00:00	0	00:00	00:00
17-Nov	19	16:19	16:38	0	00:00	00:00	0	00:00	00:00
18-Nov	19	16:18	16:37	0	00:00	00:00	0	00:00	00:00
19-Nov	18	16:18	16:36	0	00:00	00:00	0	00:00	00:00
20-Nov	16	16:19	16:35	0	00:00	00:00	0	00:00	00:00
21-Nov	15	16:19	16:34	0	00:00	00:00	0	00:00	00:00
22-Nov	14	16:19	16:33	0	00:00	00:00	0	00:00	00:00
23-Nov	13	16:19	16:32	0	00:00	00:00	0	00:00	00:00
24-Nov	11	16:20	16:31	0	00:00	00:00	0	00:00	00:00
25-Nov	11	16:20	16:31	0	00:00	00:00	0	00:00	00:00
26-Nov	9	16:21	16:30	0	00:00	00:00	0	00:00	00:00
27-Nov	8	16:21	16:29	0	00:00	00:00	0	00:00	00:00

28-Nov	7	16:22	16:29	0	00:00	00:00	0	00:00	00:00
29-Nov	5	16:23	16:28	0	00:00	00:00	0	00:00	00:00
30-Nov	4	16:24	16:28	0	00:00	00:00	0	00:00	00:00
1-Dec	3	16:24	16:27	0	00:00	00:00	0	00:00	00:00
2-Dec	2	16:25	16:27	0	00:00	00:00	0	00:00	00:00

Receptor: 511
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
7	4:18

Astronomical Worst Case (hours): 4
Reduction Factor: 0.25
Expected Case (hours): 1

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below
Turbine 7

Day	Maximum Minutes	Start Time	End Time
3-Jun	2	05:15	05:17
4-Jun	3	05:15	05:18
5-Jun	3	05:15	05:18
6-Jun	5	05:14	05:19
7-Jun	5	05:14	05:19
8-Jun	6	05:14	05:20
9-Jun	6	05:14	05:20
10-Jun	8	05:13	05:21
11-Jun	8	05:13	05:21
12-Jun	8	05:13	05:21
13-Jun	9	05:13	05:22
14-Jun	9	05:13	05:22
15-Jun	9	05:13	05:22
16-Jun	10	05:13	05:23
17-Jun	10	05:13	05:23
18-Jun	10	05:13	05:23
19-Jun	11	05:13	05:24
20-Jun	10	05:14	05:24
21-Jun	10	05:14	05:24
22-Jun	10	05:14	05:24
23-Jun	10	05:14	05:24
24-Jun	9	05:15	05:24
25-Jun	10	05:15	05:25
26-Jun	10	05:15	05:25
27-Jun	9	05:16	05:25
28-Jun	9	05:16	05:25
29-Jun	8	05:17	05:25
30-Jun	8	05:17	05:25
1-Jul	7	05:18	05:25
2-Jul	6	05:19	05:25
3-Jul	6	05:19	05:25
4-Jul	5	05:20	05:25
5-Jul	4	05:20	05:24
6-Jul	3	05:21	05:24
7-Jul	2	05:22	05:24

Receptor: 517
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
48	21:46
49	7:19

Astronomical Worst Case (hours): 29
Reduction Factor: 0.24
Expected Case (hours): 7

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below

Turbine	48			49		
Day	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time
1-Jan	28	09:01	09:29	0	00:00	00:00
2-Jan	28	09:01	09:29	0	00:00	00:00
3-Jan	27	09:02	09:29	0	00:00	00:00
4-Jan	27	09:03	09:30	0	00:00	00:00
5-Jan	27	09:03	09:30	0	00:00	00:00
6-Jan	26	09:04	09:30	0	00:00	00:00
7-Jan	25	09:05	09:30	0	00:00	00:00
8-Jan	24	09:06	09:30	0	00:00	00:00
9-Jan	23	09:07	09:30	0	00:00	00:00
10-Jan	22	09:08	09:30	0	00:00	00:00
11-Jan	20	09:09	09:29	0	00:00	00:00
12-Jan	19	09:10	09:29	0	00:00	00:00
13-Jan	18	09:11	09:29	0	00:00	00:00
14-Jan	15	09:13	09:28	0	00:00	00:00
15-Jan	12	09:15	09:27	0	00:00	00:00
16-Jan	8	09:17	09:25	0	00:00	00:00
17-Feb	0	00:00	00:00	3	08:03	08:06
18-Feb	0	00:00	00:00	6	08:01	08:07
19-Feb	0	00:00	00:00	9	07:59	08:08
20-Feb	0	00:00	00:00	12	07:57	08:09
21-Feb	0	00:00	00:00	13	07:56	08:09
22-Feb	0	00:00	00:00	16	07:54	08:10
23-Feb	0	00:00	00:00	18	07:52	08:10
24-Feb	0	00:00	00:00	19	07:50	08:09
25-Feb	0	00:00	00:00	21	07:48	08:09
26-Feb	0	00:00	00:00	22	07:47	08:09
27-Feb	0	00:00	00:00	22	07:46	08:08
28-Feb	0	00:00	00:00	20	07:47	08:07
29-Feb	0	00:00	00:00	17	07:48	08:05
1-Mar	0	00:00	00:00	14	07:49	08:03
2-Mar	0	00:00	00:00	8	07:52	08:00
10-Oct	0	00:00	00:00	12	07:25	07:37
11-Oct	0	00:00	00:00	16	07:23	07:39
12-Oct	0	00:00	00:00	19	07:21	07:40
13-Oct	0	00:00	00:00	21	07:20	07:41
14-Oct	0	00:00	00:00	22	07:19	07:41
15-Oct	0	00:00	00:00	21	07:20	07:41
16-Oct	0	00:00	00:00	21	07:21	07:42
17-Oct	0	00:00	00:00	18	07:23	07:41
18-Oct	0	00:00	00:00	17	07:24	07:41
19-Oct	0	00:00	00:00	15	07:26	07:41
20-Oct	0	00:00	00:00	13	07:27	07:40
21-Oct	0	00:00	00:00	10	07:29	07:39
22-Oct	0	00:00	00:00	8	07:30	07:38
23-Oct	0	00:00	00:00	5	07:32	07:37
24-Oct	0	00:00	00:00	2	07:33	07:35
25-Nov	8	08:54	09:02	0	00:00	00:00
26-Nov	12	08:53	09:05	0	00:00	00:00
27-Nov	16	08:51	09:07	0	00:00	00:00

28-Nov	17	08:51	09:08	0	00:00	00:00
29-Nov	20	08:50	09:10	0	00:00	00:00
30-Nov	21	08:50	09:11	0	00:00	00:00
1-Dec	23	08:49	09:12	0	00:00	00:00
2-Dec	24	08:49	09:13	0	00:00	00:00
3-Dec	24	08:49	09:13	0	00:00	00:00
4-Dec	25	08:49	09:14	0	00:00	00:00
5-Dec	26	08:49	09:15	0	00:00	00:00
6-Dec	27	08:49	09:16	0	00:00	00:00
7-Dec	26	08:50	09:16	0	00:00	00:00
8-Dec	27	08:50	09:17	0	00:00	00:00
9-Dec	28	08:50	09:18	0	00:00	00:00
10-Dec	28	08:50	09:18	0	00:00	00:00
11-Dec	28	08:51	09:19	0	00:00	00:00
12-Dec	29	08:51	09:20	0	00:00	00:00
13-Dec	29	08:51	09:20	0	00:00	00:00
14-Dec	29	08:52	09:21	0	00:00	00:00
15-Dec	29	08:52	09:21	0	00:00	00:00
16-Dec	29	08:53	09:22	0	00:00	00:00
17-Dec	29	08:53	09:22	0	00:00	00:00
18-Dec	29	08:54	09:23	0	00:00	00:00
19-Dec	29	08:54	09:23	0	00:00	00:00
20-Dec	29	08:55	09:24	0	00:00	00:00
21-Dec	29	08:55	09:24	0	00:00	00:00
22-Dec	29	08:56	09:25	0	00:00	00:00
23-Dec	29	08:56	09:25	0	00:00	00:00
24-Dec	29	08:57	09:26	0	00:00	00:00
25-Dec	29	08:57	09:26	0	00:00	00:00
26-Dec	29	08:58	09:27	0	00:00	00:00
27-Dec	29	08:58	09:27	0	00:00	00:00
28-Dec	29	08:59	09:28	0	00:00	00:00
29-Dec	29	08:59	09:28	0	00:00	00:00
30-Dec	28	09:00	09:28	0	00:00	00:00
31-Dec	28	09:01	09:29	0	00:00	00:00

Receptor: 531
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
83	18:04
84	6:39

Astronomical Worst Case (hours): 25
Reduction Factor: 0.2
Expected Case (hours): 5

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below

Turbine	83			84		
Day	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time
10-Feb	4	08:14	08:18	0	00:00	00:00
11-Feb	9	08:12	08:21	0	00:00	00:00
12-Feb	12	08:11	08:23	0	00:00	00:00
13-Feb	16	08:09	08:25	0	00:00	00:00
14-Feb	18	08:08	08:26	0	00:00	00:00
15-Feb	21	08:06	08:27	0	00:00	00:00
16-Feb	24	08:04	08:28	0	00:00	00:00
17-Feb	25	08:03	08:28	0	00:00	00:00
18-Feb	28	08:01	08:29	0	00:00	00:00
19-Feb	30	07:59	08:29	0	00:00	00:00
20-Feb	32	07:57	08:29	0	00:00	00:00
21-Feb	33	07:56	08:29	0	00:00	00:00
22-Feb	33	07:56	08:29	0	00:00	00:00
23-Feb	33	07:56	08:29	0	00:00	00:00
24-Feb	32	07:56	08:28	0	00:00	00:00
25-Feb	32	07:56	08:28	0	00:00	00:00
26-Feb	30	07:57	08:27	0	00:00	00:00
27-Feb	29	07:57	08:26	0	00:00	00:00
28-Feb	27	07:58	08:25	0	00:00	00:00
29-Feb	24	07:59	08:23	0	00:00	00:00
1-Mar	21	08:01	08:22	0	00:00	00:00
2-Mar	16	08:03	08:19	0	00:00	00:00
3-Mar	9	08:06	08:15	0	00:00	00:00
7-Jun	0	00:00	00:00	7	05:15	05:22
8-Jun	0	00:00	00:00	10	05:14	05:24
9-Jun	0	00:00	00:00	11	05:14	05:25
10-Jun	0	00:00	00:00	13	05:13	05:26
11-Jun	0	00:00	00:00	14	05:13	05:27
12-Jun	0	00:00	00:00	15	05:13	05:28
13-Jun	0	00:00	00:00	15	05:13	05:28
14-Jun	0	00:00	00:00	16	05:13	05:29
15-Jun	0	00:00	00:00	16	05:13	05:29
16-Jun	0	00:00	00:00	17	05:13	05:30
17-Jun	0	00:00	00:00	17	05:13	05:30
18-Jun	0	00:00	00:00	18	05:13	05:31
19-Jun	0	00:00	00:00	18	05:13	05:31
20-Jun	0	00:00	00:00	17	05:14	05:31
21-Jun	0	00:00	00:00	17	05:14	05:31
22-Jun	0	00:00	00:00	17	05:14	05:31
23-Jun	0	00:00	00:00	18	05:14	05:32
24-Jun	0	00:00	00:00	17	05:15	05:32
25-Jun	0	00:00	00:00	17	05:15	05:32
26-Jun	0	00:00	00:00	17	05:15	05:32
27-Jun	0	00:00	00:00	15	05:16	05:31
28-Jun	0	00:00	00:00	15	05:16	05:31
29-Jun	0	00:00	00:00	14	05:17	05:31
30-Jun	0	00:00	00:00	14	05:17	05:31
1-Jul	0	00:00	00:00	12	05:18	05:30
2-Jul	0	00:00	00:00	10	05:19	05:29

3-Jul	0	00:00	00:00	8	05:20	05:28
4-Jul	0	00:00	00:00	4	05:22	05:26
9-Oct	14	07:39	07:53	0	00:00	00:00
10-Oct	19	07:36	07:55	0	00:00	00:00
11-Oct	23	07:34	07:57	0	00:00	00:00
12-Oct	26	07:32	07:58	0	00:00	00:00
13-Oct	28	07:31	07:59	0	00:00	00:00
14-Oct	30	07:30	08:00	0	00:00	00:00
15-Oct	31	07:29	08:00	0	00:00	00:00
16-Oct	32	07:28	08:00	0	00:00	00:00
17-Oct	33	07:28	08:01	0	00:00	00:00
18-Oct	34	07:27	08:01	0	00:00	00:00
19-Oct	34	07:27	08:01	0	00:00	00:00
20-Oct	33	07:27	08:00	0	00:00	00:00
21-Oct	31	07:29	08:00	0	00:00	00:00
22-Oct	30	07:30	08:00	0	00:00	00:00
23-Oct	27	07:32	07:59	0	00:00	00:00
24-Oct	25	07:33	07:58	0	00:00	00:00
25-Oct	23	07:35	07:58	0	00:00	00:00
26-Oct	21	07:36	07:57	0	00:00	00:00
27-Oct	17	07:38	07:55	0	00:00	00:00
28-Oct	15	07:39	07:54	0	00:00	00:00
29-Oct	11	07:41	07:52	0	00:00	00:00
30-Oct	8	07:42	07:50	0	00:00	00:00
31-Oct	2	07:44	07:46	0	00:00	00:00

Receptor: 548
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
83	35:27

Astronomical Worst Case (hours): 35
Reduction Factor: 0.23
Expected Case (hours): 8

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below
Turbine 83

Day	Maximum Minutes	Start Time	End Time
17-Feb	13	17:31	17:44
18-Feb	18	17:27	17:45
19-Feb	22	17:25	17:47
20-Feb	25	17:23	17:48
21-Feb	29	17:21	17:50
22-Feb	32	17:20	17:52
23-Feb	35	17:18	17:53
24-Feb	38	17:17	17:55
25-Feb	40	17:16	17:56
26-Feb	43	17:15	17:58
27-Feb	43	17:15	17:58
28-Feb	45	17:14	17:59
29-Feb	46	17:13	17:59
1-Mar	46	17:13	17:59
2-Mar	46	17:13	17:59
3-Mar	46	17:12	17:58
4-Mar	46	17:12	17:58
5-Mar	46	17:12	17:58
6-Mar	45	17:12	17:57
7-Mar	43	17:13	17:56
8-Mar	43	17:13	17:56
9-Mar	42	17:13	17:55
10-Mar	40	17:14	17:54
11-Mar	37	17:15	17:52
12-Mar	36	17:15	17:51
13-Mar	32	17:17	17:49
14-Mar	29	17:18	17:47
15-Mar	25	17:20	17:45
16-Mar	19	17:23	17:42
17-Mar	10	17:27	17:37
24-Sep	15	17:08	17:23
25-Sep	22	17:04	17:26
26-Sep	27	17:01	17:28
27-Sep	31	16:59	17:30
28-Sep	34	16:57	17:31
29-Sep	37	16:55	17:32
30-Sep	39	16:54	17:33
1-Oct	40	16:53	17:33
2-Oct	42	16:52	17:34
3-Oct	43	16:51	17:34
4-Oct	44	16:50	17:34
5-Oct	45	16:49	17:34
6-Oct	45	16:49	17:34
7-Oct	46	16:48	17:34
8-Oct	46	16:48	17:34
9-Oct	46	16:48	17:34
10-Oct	45	16:48	17:33
11-Oct	45	16:48	17:33
12-Oct	44	16:48	17:32

13-Oct	43	16:48	17:31
14-Oct	42	16:48	17:30
15-Oct	39	16:49	17:28
16-Oct	36	16:50	17:26
17-Oct	34	16:50	17:24
18-Oct	32	16:51	17:23
19-Oct	29	16:52	17:21
20-Oct	25	16:54	17:19
21-Oct	21	16:56	17:17
22-Oct	18	16:58	17:16
23-Oct	12	17:02	17:14

Receptor: 551
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
83	25:31

Astronomical Worst Case (hours): 26
Reduction Factor: 0.23
Expected Case (hours): 6

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below
Turbine 83

Day	Maximum Minutes	Start Time	End Time
7-Mar	1	07:30	07:31
8-Mar	12	07:26	07:38
9-Mar	17	07:24	07:41
10-Mar	21	07:22	07:43
11-Mar	24	07:20	07:44
12-Mar	27	07:18	07:45
13-Mar	30	07:16	07:46
14-Mar	33	07:14	07:47
15-Mar	35	07:12	07:47
16-Mar	37	07:10	07:47
17-Mar	39	07:09	07:48
18-Mar	40	07:08	07:48
19-Mar	39	07:08	07:47
20-Mar	40	07:07	07:47
21-Mar	40	07:07	07:47
22-Mar	39	07:07	07:46
23-Mar	38	07:07	07:45
24-Mar	38	07:07	07:45
25-Mar	36	07:08	07:44
26-Mar	35	07:08	07:43
27-Mar	32	07:09	07:41
28-Mar	30	07:10	07:40
29-Mar	27	07:11	07:38
30-Mar	23	07:13	07:36
31-Mar	18	07:15	07:33
1-Apr	8	07:20	07:28
9-Sep	8	07:13	07:21
10-Sep	17	07:08	07:25
11-Sep	23	07:05	07:28
12-Sep	26	07:03	07:29
13-Sep	29	07:01	07:30
14-Sep	32	06:59	07:31
15-Sep	34	06:58	07:32
16-Sep	35	06:57	07:32
17-Sep	37	06:56	07:33
18-Sep	38	06:55	07:33
19-Sep	39	06:54	07:33
20-Sep	39	06:54	07:33
21-Sep	40	06:53	07:33
22-Sep	39	06:53	07:32
23-Sep	40	06:52	07:32
24-Sep	39	06:52	07:31
25-Sep	38	06:53	07:31
26-Sep	36	06:54	07:30
27-Sep	34	06:55	07:29
28-Sep	31	06:57	07:28
29-Sep	28	06:58	07:26
30-Sep	26	06:59	07:25
1-Oct	22	07:01	07:23
2-Oct	19	07:02	07:21

3-Oct	15	07:03	07:18
4-Oct	9	07:05	07:14

Receptor: 1014
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
43	5:24

Astronomical Worst Case (hours): 5
Reduction Factor: 0.2
Expected Case (hours): 1

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below
Turbine 43

Day	Maximum Minutes	Start Time	End Time
10-Feb	4	17:29	17:33
11-Feb	6	17:28	17:34
12-Feb	9	17:27	17:36
13-Feb	11	17:27	17:38
14-Feb	13	17:26	17:39
15-Feb	15	17:26	17:41
16-Feb	16	17:26	17:42
17-Feb	18	17:26	17:44
18-Feb	18	17:27	17:45
19-Feb	18	17:27	17:45
20-Feb	15	17:28	17:43
21-Feb	12	17:30	17:42
22-Feb	7	17:32	17:39
18-Oct	8	17:03	17:11
19-Oct	13	17:00	17:13
20-Oct	16	16:59	17:15
21-Oct	17	16:58	17:15
22-Oct	19	16:57	17:16
23-Oct	18	16:56	17:14
24-Oct	16	16:56	17:12
25-Oct	14	16:56	17:10
26-Oct	13	16:56	17:09
27-Oct	11	16:56	17:07
28-Oct	8	16:57	17:05
29-Oct	6	16:58	17:04
30-Oct	3	16:59	17:02

Receptor: 1023
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
42	18:01
43	5:58

Astronomical Worst Case (hours): 24
Reduction Factor: 0.25
Expected Case (hours): 6

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below

Turbine	42			43		
Day	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time
1-Jan	11	08:49	09:00	0	00:00	00:00
2-Jan	12	08:49	09:01	0	00:00	00:00
3-Jan	12	08:49	09:01	0	00:00	00:00
4-Jan	13	08:49	09:02	0	00:00	00:00
5-Jan	14	08:49	09:03	0	00:00	00:00
6-Jan	14	08:49	09:03	0	00:00	00:00
7-Jan	16	08:48	09:04	0	00:00	00:00
8-Jan	16	08:48	09:04	0	00:00	00:00
9-Jan	17	08:48	09:05	0	00:00	00:00
10-Jan	18	08:47	09:05	0	00:00	00:00
11-Jan	19	08:47	09:06	0	00:00	00:00
12-Jan	20	08:46	09:06	0	00:00	00:00
13-Jan	21	08:46	09:07	0	00:00	00:00
14-Jan	22	08:45	09:07	0	00:00	00:00
15-Jan	23	08:44	09:07	0	00:00	00:00
16-Jan	23	08:44	09:07	0	00:00	00:00
17-Jan	24	08:43	09:07	0	00:00	00:00
18-Jan	24	08:43	09:07	0	00:00	00:00
19-Jan	23	08:44	09:07	0	00:00	00:00
20-Jan	22	08:45	09:07	0	00:00	00:00
21-Jan	21	08:46	09:07	0	00:00	00:00
22-Jan	19	08:47	09:06	0	00:00	00:00
23-Jan	18	08:48	09:06	0	00:00	00:00
24-Jan	15	08:50	09:05	0	00:00	00:00
25-Jan	11	08:52	09:03	0	00:00	00:00
26-Jan	5	08:55	09:00	0	00:00	00:00
10-Feb	0	00:00	00:00	2	08:14	08:16
11-Feb	0	00:00	00:00	5	08:12	08:17
12-Feb	0	00:00	00:00	7	08:11	08:18
13-Feb	0	00:00	00:00	10	08:09	08:19
14-Feb	0	00:00	00:00	11	08:08	08:19
15-Feb	0	00:00	00:00	14	08:06	08:20
16-Feb	0	00:00	00:00	16	08:04	08:20
17-Feb	0	00:00	00:00	16	08:03	08:19
18-Feb	0	00:00	00:00	18	08:01	08:19
19-Feb	0	00:00	00:00	19	07:59	08:18
20-Feb	0	00:00	00:00	19	07:58	08:17
21-Feb	0	00:00	00:00	17	07:59	08:16
22-Feb	0	00:00	00:00	14	08:01	08:15
23-Feb	0	00:00	00:00	9	08:03	08:12
17-Oct	0	00:00	00:00	3	07:38	07:41
18-Oct	0	00:00	00:00	11	07:34	07:45
19-Oct	0	00:00	00:00	16	07:31	07:47
20-Oct	0	00:00	00:00	18	07:30	07:48
21-Oct	0	00:00	00:00	20	07:29	07:49
22-Oct	0	00:00	00:00	19	07:30	07:49
23-Oct	0	00:00	00:00	17	07:32	07:49
24-Oct	0	00:00	00:00	17	07:33	07:50
25-Oct	0	00:00	00:00	14	07:35	07:49

26-Oct	0	00:00	00:00	13	07:36	07:49
27-Oct	0	00:00	00:00	11	07:38	07:49
28-Oct	0	00:00	00:00	9	07:39	07:48
29-Oct	0	00:00	00:00	7	07:41	07:48
30-Oct	0	00:00	00:00	5	07:42	07:47
31-Oct	0	00:00	00:00	1	07:44	07:45
15-Nov	7	08:26	08:33	0	00:00	00:00
16-Nov	12	08:24	08:36	0	00:00	00:00
17-Nov	15	08:23	08:38	0	00:00	00:00
18-Nov	17	08:22	08:39	0	00:00	00:00
19-Nov	19	08:21	08:40	0	00:00	00:00
20-Nov	21	08:20	08:41	0	00:00	00:00
21-Nov	22	08:20	08:42	0	00:00	00:00
22-Nov	23	08:20	08:43	0	00:00	00:00
23-Nov	24	08:20	08:44	0	00:00	00:00
24-Nov	24	08:20	08:44	0	00:00	00:00
25-Nov	24	08:21	08:45	0	00:00	00:00
26-Nov	23	08:22	08:45	0	00:00	00:00
27-Nov	22	08:24	08:46	0	00:00	00:00
28-Nov	21	08:25	08:46	0	00:00	00:00
29-Nov	21	08:26	08:47	0	00:00	00:00
30-Nov	19	08:28	08:47	0	00:00	00:00
1-Dec	18	08:29	08:47	0	00:00	00:00
2-Dec	17	08:30	08:47	0	00:00	00:00
3-Dec	17	08:31	08:48	0	00:00	00:00
4-Dec	15	08:33	08:48	0	00:00	00:00
5-Dec	14	08:34	08:48	0	00:00	00:00
6-Dec	14	08:35	08:49	0	00:00	00:00
7-Dec	13	08:36	08:49	0	00:00	00:00
8-Dec	12	08:37	08:49	0	00:00	00:00
9-Dec	11	08:38	08:49	0	00:00	00:00
10-Dec	11	08:39	08:50	0	00:00	00:00
11-Dec	10	08:40	08:50	0	00:00	00:00
12-Dec	9	08:41	08:50	0	00:00	00:00
13-Dec	9	08:42	08:51	0	00:00	00:00
14-Dec	9	08:42	08:51	0	00:00	00:00
15-Dec	8	08:43	08:51	0	00:00	00:00
16-Dec	8	08:44	08:52	0	00:00	00:00
17-Dec	7	08:45	08:52	0	00:00	00:00
18-Dec	7	08:45	08:52	0	00:00	00:00
19-Dec	7	08:46	08:53	0	00:00	00:00
20-Dec	7	08:46	08:53	0	00:00	00:00
21-Dec	7	08:47	08:54	0	00:00	00:00
22-Dec	7	08:47	08:54	0	00:00	00:00
23-Dec	7	08:48	08:55	0	00:00	00:00
24-Dec	7	08:48	08:55	0	00:00	00:00
25-Dec	8	08:48	08:56	0	00:00	00:00
26-Dec	8	08:49	08:57	0	00:00	00:00
27-Dec	8	08:49	08:57	0	00:00	00:00
28-Dec	9	08:49	08:58	0	00:00	00:00
29-Dec	10	08:49	08:59	0	00:00	00:00
30-Dec	10	08:49	08:59	0	00:00	00:00
31-Dec	11	08:49	09:00	0	00:00	00:00

Receptor: 1042
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
95	22:49

Astronomical Worst Case (hours): 23
Reduction Factor: 0.3
Expected Case (hours): 7

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below
Turbine 95

Day	Maximum Minutes	Start Time	End Time
30-Apr	2	19:22	19:24
1-May	5	19:20	19:25
2-May	8	19:18	19:26
3-May	11	19:16	19:27
4-May	14	19:15	19:29
5-May	16	19:14	19:30
6-May	17	19:14	19:31
7-May	19	19:13	19:32
8-May	20	19:13	19:33
9-May	23	19:12	19:35
10-May	24	19:12	19:36
11-May	25	19:12	19:37
12-May	26	19:12	19:38
13-May	27	19:12	19:39
14-May	28	19:12	19:40
15-May	29	19:12	19:41
16-May	31	19:12	19:43
17-May	30	19:12	19:42
18-May	30	19:12	19:42
19-May	29	19:13	19:42
20-May	29	19:13	19:42
21-May	27	19:14	19:41
22-May	27	19:14	19:41
23-May	25	19:15	19:40
24-May	24	19:16	19:40
25-May	23	19:16	19:39
26-May	22	19:17	19:39
27-May	20	19:18	19:38
28-May	18	19:19	19:37
29-May	17	19:20	19:37
30-May	15	19:21	19:36
31-May	12	19:23	19:35
1-Jun	8	19:25	19:33
2-Jun	2	19:28	19:30
8-Jul	7	19:33	19:40
9-Jul	11	19:31	19:42
10-Jul	13	19:30	19:43
11-Jul	15	19:29	19:44
12-Jul	18	19:28	19:46
13-Jul	20	19:27	19:47
14-Jul	21	19:26	19:47
15-Jul	22	19:26	19:48
16-Jul	24	19:25	19:49
17-Jul	25	19:25	19:50
18-Jul	26	19:24	19:50
19-Jul	27	19:24	19:51
20-Jul	28	19:23	19:51
21-Jul	29	19:23	19:52
22-Jul	29	19:23	19:52

23-Jul	30	19:22	19:52
24-Jul	31	19:22	19:53
25-Jul	30	19:22	19:52
26-Jul	29	19:22	19:51
27-Jul	28	19:22	19:50
28-Jul	27	19:22	19:49
29-Jul	25	19:22	19:47
30-Jul	24	19:22	19:46
31-Jul	23	19:22	19:45
1-Aug	22	19:22	19:44
2-Aug	20	19:22	19:42
3-Aug	18	19:23	19:41
4-Aug	17	19:23	19:40
5-Aug	14	19:24	19:38
6-Aug	12	19:25	19:37
7-Aug	10	19:26	19:36
8-Aug	7	19:27	19:34
9-Aug	4	19:29	19:33

Receptor: 1064
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
40	13:52
41	39:49
65B	6:04

Astronomical Worst Case (hours): 48
Reduction Factor: 0.23
Expected Case (hours): 11

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below

Turbine	40			41			65B		
Day	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time
30-Jan	0	00:00	00:00	13	17:02	17:15	0	00:00	00:00
31-Jan	0	00:00	00:00	18	16:59	17:17	0	00:00	00:00
1-Feb	0	00:00	00:00	21	16:57	17:18	0	00:00	00:00
2-Feb	0	00:00	00:00	25	16:55	17:20	0	00:00	00:00
3-Feb	0	00:00	00:00	28	16:54	17:22	0	00:00	00:00
4-Feb	0	00:00	00:00	30	16:53	17:23	0	00:00	00:00
5-Feb	0	00:00	00:00	33	16:52	17:25	0	00:00	00:00
6-Feb	7	17:19	17:26	35	16:51	17:26	0	00:00	00:00
7-Feb	11	17:17	17:28	38	16:50	17:28	0	00:00	00:00
8-Feb	15	17:15	17:30	41	16:49	17:30	0	00:00	00:00
9-Feb	17	17:14	17:31	42	16:48	17:30	0	00:00	00:00
10-Feb	20	17:13	17:33	43	16:48	17:31	0	00:00	00:00
11-Feb	22	17:12	17:34	44	16:47	17:31	0	00:00	00:00
12-Feb	24	17:12	17:36	45	16:47	17:32	0	00:00	00:00
13-Feb	27	17:11	17:38	45	16:47	17:32	0	00:00	00:00
14-Feb	28	17:11	17:39	46	16:46	17:32	1	08:08	08:09
15-Feb	28	17:11	17:39	46	16:46	17:32	4	08:06	08:10
16-Feb	28	17:11	17:39	46	16:46	17:32	7	08:04	08:11
17-Feb	28	17:11	17:39	46	16:46	17:32	9	08:03	08:12
18-Feb	27	17:11	17:38	46	16:46	17:32	12	08:01	08:13
19-Feb	27	17:11	17:38	46	16:46	17:32	14	07:59	08:13
20-Feb	25	17:12	17:37	45	16:46	17:31	16	07:57	08:13
21-Feb	23	17:13	17:36	44	16:47	17:31	17	07:56	08:13
22-Feb	21	17:14	17:35	43	16:47	17:30	19	07:54	08:13
23-Feb	18	17:15	17:33	41	16:48	17:29	20	07:52	08:12
24-Feb	14	17:17	17:31	40	16:48	17:28	19	07:52	08:11
25-Feb	5	17:21	17:26	38	16:49	17:27	17	07:53	08:10
26-Feb	0	00:00	00:00	36	16:50	17:26	14	07:54	08:08
27-Feb	0	00:00	00:00	34	16:51	17:25	10	07:56	08:06
28-Feb	0	00:00	00:00	30	16:53	17:23	0	00:00	00:00
29-Feb	0	00:00	00:00	27	16:54	17:21	0	00:00	00:00
1-Mar	0	00:00	00:00	21	16:57	17:18	0	00:00	00:00
2-Mar	0	00:00	00:00	13	17:01	17:14	0	00:00	00:00
9-Oct	0	00:00	00:00	16	16:34	16:50	0	00:00	00:00
10-Oct	0	00:00	00:00	22	16:31	16:53	0	00:00	00:00
11-Oct	0	00:00	00:00	27	16:28	16:55	0	00:00	00:00
12-Oct	0	00:00	00:00	31	16:26	16:57	0	00:00	00:00
13-Oct	0	00:00	00:00	34	16:24	16:58	6	07:31	07:37
14-Oct	0	00:00	00:00	36	16:23	16:59	12	07:28	07:40
15-Oct	8	16:52	17:00	39	16:21	17:00	16	07:26	07:42
16-Oct	14	16:49	17:03	41	16:20	17:01	19	07:24	07:43
17-Oct	18	16:47	17:05	42	16:19	17:01	20	07:23	07:43
18-Oct	21	16:45	17:06	43	16:19	17:02	20	07:24	07:44
19-Oct	23	16:44	17:07	44	16:18	17:02	18	07:26	07:44
20-Oct	25	16:43	17:08	45	16:17	17:02	17	07:27	07:44
21-Oct	26	16:42	17:08	45	16:17	17:02	15	07:29	07:44

22-Oct	28	16:41	17:09	46	16:17	17:03	13	07:30	07:43
23-Oct	28	16:41	17:09	47	16:16	17:03	11	07:32	07:43
24-Oct	28	16:41	17:09	46	16:16	17:02	9	07:33	07:42
25-Oct	28	16:41	17:09	46	16:16	17:02	6	07:35	07:41
26-Oct	28	16:41	17:09	46	16:16	17:02	4	07:36	07:40
27-Oct	26	16:41	17:07	46	16:16	17:02	0	00:00	00:00
28-Oct	24	16:41	17:05	44	16:17	17:01	0	00:00	00:00
29-Oct	22	16:42	17:04	44	16:17	17:01	0	00:00	00:00
30-Oct	20	16:42	17:02	43	16:17	17:00	0	00:00	00:00
31-Oct	18	16:43	17:01	42	16:18	17:00	0	00:00	00:00
1-Nov	14	16:45	16:59	41	16:18	16:59	0	00:00	00:00
2-Nov	11	16:46	16:57	38	16:19	16:57	0	00:00	00:00
3-Nov	8	16:48	16:56	36	16:20	16:56	0	00:00	00:00
4-Nov	0	00:00	00:00	33	16:21	16:54	0	00:00	00:00
5-Nov	0	00:00	00:00	31	16:22	16:53	0	00:00	00:00
6-Nov	0	00:00	00:00	28	16:24	16:52	0	00:00	00:00
7-Nov	0	00:00	00:00	25	16:25	16:50	0	00:00	00:00
8-Nov	0	00:00	00:00	22	16:27	16:49	0	00:00	00:00
9-Nov	0	00:00	00:00	18	16:29	16:47	0	00:00	00:00
10-Nov	0	00:00	00:00	14	16:32	16:46	0	00:00	00:00

Receptor: 1068
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
42	4:46
43	8:09
67B	13:46
68B	5:06

Astronomical Worst Case (hours): 32
Reduction Factor: 0.22
Expected Case (hours): 7

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below

Turbine	42			43			67B			68B		
Day	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time
1-Jan	0	00:00	00:00	0	00:00	00:00	20	08:52	09:12	0	00:00	00:00
2-Jan	0	00:00	00:00	0	00:00	00:00	20	08:53	09:13	0	00:00	00:00
3-Jan	0	00:00	00:00	0	00:00	00:00	20	08:53	09:13	0	00:00	00:00
4-Jan	0	00:00	00:00	0	00:00	00:00	19	08:54	09:13	0	00:00	00:00
5-Jan	0	00:00	00:00	0	00:00	00:00	18	08:55	09:13	0	00:00	00:00
6-Jan	0	00:00	00:00	0	00:00	00:00	17	08:56	09:13	0	00:00	00:00
7-Jan	0	00:00	00:00	0	00:00	00:00	16	08:57	09:13	0	00:00	00:00
8-Jan	0	00:00	00:00	0	00:00	00:00	15	08:58	09:13	0	00:00	00:00
9-Jan	0	00:00	00:00	0	00:00	00:00	14	08:59	09:13	0	00:00	00:00
10-Jan	0	00:00	00:00	0	00:00	00:00	12	09:00	09:12	0	00:00	00:00
11-Jan	0	00:00	00:00	0	00:00	00:00	9	09:02	09:11	0	00:00	00:00
12-Jan	0	00:00	00:00	0	00:00	00:00	6	09:04	09:10	0	00:00	00:00
30-Jan	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	1	08:29	08:30
31-Jan	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	3	08:28	08:31
1-Feb	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	5	08:27	08:32
2-Feb	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	7	08:26	08:33
3-Feb	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	10	08:24	08:34
4-Feb	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	11	08:23	08:34
5-Feb	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	13	08:21	08:34
6-Feb	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	14	08:20	08:34
7-Feb	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	16	08:18	08:34
8-Feb	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	17	08:17	08:34
9-Feb	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	17	08:16	08:33
10-Feb	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	15	08:17	08:32
11-Feb	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	13	08:18	08:31
12-Feb	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	9	08:20	08:29
22-Feb	1	17:51	17:52	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
23-Feb	4	17:49	17:53	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
24-Feb	7	17:48	17:55	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
25-Feb	9	17:47	17:56	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
26-Feb	12	17:46	17:58	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
27-Feb	13	17:46	17:59	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
28-Feb	15	17:46	18:01	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
29-Feb	16	17:46	18:02	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
1-Mar	18	17:46	18:04	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
2-Mar	17	17:46	18:03	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
3-Mar	15	17:47	18:02	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
4-Mar	11	17:49	18:00	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
5-Mar	3	17:53	17:56	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
8-Mar	0	00:00	00:00	6	18:08	18:14	0	00:00	00:00	0	00:00	00:00
9-Mar	0	00:00	00:00	9	18:06	18:15	0	00:00	00:00	0	00:00	00:00
10-Mar	0	00:00	00:00	12	18:05	18:17	0	00:00	00:00	0	00:00	00:00
11-Mar	0	00:00	00:00	15	18:03	18:18	0	00:00	00:00	0	00:00	00:00
12-Mar	0	00:00	00:00	16	18:03	18:19	0	00:00	00:00	0	00:00	00:00

13-Mar	0	00:00	00:00	19	18:02	18:21	0	00:00	00:00	0	00:00	00:00
14-Mar	0	00:00	00:00	21	18:01	18:22	0	00:00	00:00	0	00:00	00:00
15-Mar	0	00:00	00:00	23	18:01	18:24	0	00:00	00:00	0	00:00	00:00
16-Mar	0	00:00	00:00	24	18:01	18:25	0	00:00	00:00	0	00:00	00:00
17-Mar	0	00:00	00:00	23	18:01	18:24	0	00:00	00:00	0	00:00	00:00
18-Mar	0	00:00	00:00	21	18:02	18:23	0	00:00	00:00	0	00:00	00:00
19-Mar	0	00:00	00:00	20	18:02	18:22	0	00:00	00:00	0	00:00	00:00
20-Mar	0	00:00	00:00	17	18:03	18:20	0	00:00	00:00	0	00:00	00:00
21-Mar	0	00:00	00:00	13	18:05	18:18	0	00:00	00:00	0	00:00	00:00
22-Mar	0	00:00	00:00	5	18:09	18:14	0	00:00	00:00	0	00:00	00:00
19-Sep	0	00:00	00:00	11	17:53	18:04	0	00:00	00:00	0	00:00	00:00
20-Sep	0	00:00	00:00	16	17:50	18:06	0	00:00	00:00	0	00:00	00:00

21-Sep	0	00:00	00:00	19	17:48	18:07	0	00:00	00:00	0	00:00	00:00
22-Sep	0	00:00	00:00	21	17:47	18:08	0	00:00	00:00	0	00:00	00:00
23-Sep	0	00:00	00:00	23	17:45	18:08	0	00:00	00:00	0	00:00	00:00
24-Sep	0	00:00	00:00	23	17:45	18:08	0	00:00	00:00	0	00:00	00:00
25-Sep	0	00:00	00:00	23	17:44	18:07	0	00:00	00:00	0	00:00	00:00
26-Sep	0	00:00	00:00	22	17:43	18:05	0	00:00	00:00	0	00:00	00:00
27-Sep	0	00:00	00:00	20	17:43	18:03	0	00:00	00:00	0	00:00	00:00
28-Sep	0	00:00	00:00	18	17:43	18:01	0	00:00	00:00	0	00:00	00:00
29-Sep	0	00:00	00:00	16	17:43	17:59	0	00:00	00:00	0	00:00	00:00
30-Sep	0	00:00	00:00	13	17:44	17:57	0	00:00	00:00	0	00:00	00:00
1-Oct	0	00:00	00:00	10	17:45	17:55	0	00:00	00:00	0	00:00	00:00
2-Oct	0	00:00	00:00	7	17:46	17:53	0	00:00	00:00	0	00:00	00:00
3-Oct	0	00:00	00:00	3	17:48	17:51	0	00:00	00:00	0	00:00	00:00
6-Oct	8	17:27	17:35	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
7-Oct	13	17:24	17:37	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
8-Oct	16	17:22	17:38	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
9-Oct	18	17:21	17:39	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
10-Oct	18	17:20	17:38	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
11-Oct	16	17:20	17:36	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
12-Oct	15	17:19	17:34	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
13-Oct	13	17:19	17:32	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
14-Oct	11	17:19	17:30	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
15-Oct	8	17:20	17:28	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
16-Oct	6	17:20	17:26	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
17-Oct	3	17:21	17:24	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00
28-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	2	07:53	07:55
29-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	10	07:49	07:59
30-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	14	07:47	08:01
31-Oct	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	16	07:46	08:02
1-Nov	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	18	07:45	08:03
2-Nov	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	16	07:47	08:03
3-Nov	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	16	07:48	08:04
4-Nov	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	14	07:50	08:04
5-Nov	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	13	07:51	08:04
6-Nov	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	11	07:53	08:04
7-Nov	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	10	07:54	08:04
8-Nov	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	7	07:56	08:03
9-Nov	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	5	07:58	08:03
10-Nov	0	00:00	00:00	0	00:00	00:00	0	00:00	00:00	3	07:59	08:02
29-Nov	0	00:00	00:00	0	00:00	00:00	7	08:44	08:51	0	00:00	00:00
30-Nov	0	00:00	00:00	0	00:00	00:00	10	08:43	08:53	0	00:00	00:00
1-Dec	0	00:00	00:00	0	00:00	00:00	12	08:42	08:54	0	00:00	00:00
2-Dec	0	00:00	00:00	0	00:00	00:00	14	08:41	08:55	0	00:00	00:00
3-Dec	0	00:00	00:00	0	00:00	00:00	16	08:41	08:57	0	00:00	00:00
4-Dec	0	00:00	00:00	0	00:00	00:00	17	08:41	08:58	0	00:00	00:00
5-Dec	0	00:00	00:00	0	00:00	00:00	17	08:41	08:58	0	00:00	00:00
6-Dec	0	00:00	00:00	0	00:00	00:00	18	08:41	08:59	0	00:00	00:00
7-Dec	0	00:00	00:00	0	00:00	00:00	19	08:41	09:00	0	00:00	00:00
8-Dec	0	00:00	00:00	0	00:00	00:00	20	08:41	09:01	0	00:00	00:00
9-Dec	0	00:00	00:00	0	00:00	00:00	20	08:41	09:01	0	00:00	00:00
10-Dec	0	00:00	00:00	0	00:00	00:00	20	08:42	09:02	0	00:00	00:00
11-Dec	0	00:00	00:00	0	00:00	00:00	21	08:42	09:03	0	00:00	00:00
12-Dec	0	00:00	00:00	0	00:00	00:00	21	08:42	09:03	0	00:00	00:00
13-Dec	0	00:00	00:00	0	00:00	00:00	21	08:43	09:04	0	00:00	00:00
14-Dec	0	00:00	00:00	0	00:00	00:00	22	08:43	09:05	0	00:00	00:00
15-Dec	0	00:00	00:00	0	00:00	00:00	22	08:43	09:05	0	00:00	00:00
16-Dec	0	00:00	00:00	0	00:00	00:00	22	08:44	09:06	0	00:00	00:00
17-Dec	0	00:00	00:00	0	00:00	00:00	21	08:45	09:06	0	00:00	00:00
18-Dec	0	00:00	00:00	0	00:00	00:00	22	08:45	09:07	0	00:00	00:00
19-Dec	0	00:00	00:00	0	00:00	00:00	21	08:46	09:07	0	00:00	00:00
20-Dec	0	00:00	00:00	0	00:00	00:00	22	08:46	09:08	0	00:00	00:00
21-Dec	0	00:00	00:00	0	00:00	00:00	21	08:47	09:08	0	00:00	00:00
22-Dec	0	00:00	00:00	0	00:00	00:00	22	08:47	09:09	0	00:00	00:00
23-Dec	0	00:00	00:00	0	00:00	00:00	21	08:48	09:09	0	00:00	00:00

24-Dec	0	00:00	00:00	0	00:00	00:00	22	08:48	09:10	0	00:00	00:00
25-Dec	0	00:00	00:00	0	00:00	00:00	22	08:48	09:10	0	00:00	00:00
26-Dec	0	00:00	00:00	0	00:00	00:00	22	08:49	09:11	0	00:00	00:00
27-Dec	0	00:00	00:00	0	00:00	00:00	22	08:49	09:11	0	00:00	00:00
28-Dec	0	00:00	00:00	0	00:00	00:00	21	08:50	09:11	0	00:00	00:00
29-Dec	0	00:00	00:00	0	00:00	00:00	22	08:50	09:12	0	00:00	00:00
30-Dec	0	00:00	00:00	0	00:00	00:00	21	08:51	09:12	0	00:00	00:00
31-Dec	0	00:00	00:00	0	00:00	00:00	20	08:52	09:12	0	00:00	00:00

Receptor: 1091
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
68B	7:52

Astronomical Worst Case (hours): 8
Reduction Factor: 0.25
Expected Case (hours): 2

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below
Turbine 68B

Day	Maximum Minutes	Start Time	End Time
1-Feb	3	17:15	17:18
2-Feb	7	17:13	17:20
3-Feb	10	17:12	17:22
4-Feb	11	17:12	17:23
5-Feb	14	17:11	17:25
6-Feb	15	17:11	17:26
7-Feb	18	17:10	17:28
8-Feb	20	17:10	17:30
9-Feb	21	17:10	17:31
10-Feb	21	17:11	17:32
11-Feb	21	17:11	17:32
12-Feb	20	17:11	17:31
13-Feb	19	17:12	17:31
14-Feb	16	17:13	17:29
15-Feb	13	17:15	17:28
16-Feb	7	17:18	17:25
24-Oct	8	16:47	16:55
25-Oct	13	16:45	16:58
26-Oct	16	16:43	16:59
27-Oct	18	16:42	17:00
28-Oct	20	16:41	17:01
29-Oct	21	16:40	17:01
30-Oct	22	16:40	17:02
31-Oct	21	16:40	17:01
1-Nov	19	16:40	16:59
2-Nov	17	16:40	16:57
3-Nov	16	16:40	16:56
4-Nov	13	16:41	16:54
5-Nov	12	16:41	16:53
6-Nov	10	16:42	16:52
7-Nov	7	16:43	16:50
8-Nov	4	16:45	16:49

Receptor: 1078
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
68B	18:58

Astronomical Worst Case (hours): 19
Reduction Factor: 0.16
Expected Case (hours): 3

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below
Turbine 68B

Day	Maximum Minutes	Start Time	End Time
1-Jan	9	16:27	16:36
2-Jan	10	16:27	16:37
3-Jan	11	16:27	16:38
4-Jan	12	16:27	16:39
5-Jan	13	16:27	16:40
6-Jan	14	16:27	16:41
7-Jan	15	16:27	16:42
8-Jan	16	16:27	16:43
9-Jan	18	16:27	16:45
10-Jan	18	16:28	16:46
11-Jan	19	16:28	16:47
12-Jan	20	16:28	16:48
13-Jan	22	16:28	16:50
14-Jan	23	16:28	16:51
15-Jan	24	16:29	16:53
16-Jan	25	16:29	16:54
17-Jan	25	16:29	16:54
18-Jan	25	16:30	16:55
19-Jan	25	16:30	16:55
20-Jan	24	16:31	16:55
21-Jan	24	16:31	16:55
22-Jan	23	16:32	16:55
23-Jan	21	16:33	16:54
24-Jan	20	16:34	16:54
25-Jan	18	16:35	16:53
26-Jan	16	16:36	16:52
27-Jan	13	16:38	16:51
28-Jan	8	16:41	16:49
12-Nov	6	16:13	16:19
13-Nov	12	16:10	16:22
14-Nov	15	16:09	16:24
15-Nov	17	16:08	16:25
16-Nov	20	16:07	16:27
17-Nov	21	16:06	16:27
18-Nov	22	16:06	16:28
19-Nov	23	16:06	16:29
20-Nov	24	16:06	16:30
21-Nov	24	16:06	16:30
22-Nov	25	16:06	16:31
23-Nov	25	16:06	16:31
24-Nov	25	16:06	16:31
25-Nov	24	16:07	16:31
26-Nov	23	16:07	16:30
27-Nov	22	16:07	16:29
28-Nov	21	16:08	16:29
29-Nov	20	16:08	16:28
30-Nov	19	16:09	16:28
1-Dec	17	16:10	16:27
2-Dec	17	16:10	16:27

3-Dec	15	16:11	16:26
4-Dec	14	16:12	16:26
5-Dec	14	16:12	16:26
6-Dec	12	16:13	16:25
7-Dec	11	16:14	16:25
8-Dec	10	16:15	16:25
9-Dec	9	16:16	16:25
10-Dec	9	16:16	16:25
11-Dec	8	16:17	16:25
12-Dec	7	16:18	16:25
13-Dec	6	16:19	16:25
14-Dec	5	16:20	16:25
15-Dec	5	16:21	16:26
16-Dec	5	16:21	16:26
17-Dec	4	16:22	16:26
18-Dec	3	16:23	16:26
19-Dec	4	16:23	16:27
20-Dec	3	16:24	16:27
21-Dec	4	16:24	16:28
22-Dec	3	16:25	16:28
23-Dec	4	16:25	16:29
24-Dec	5	16:25	16:30
25-Dec	4	16:26	16:30
26-Dec	5	16:26	16:31
27-Dec	6	16:26	16:32
28-Dec	7	16:26	16:33
29-Dec	8	16:26	16:34
30-Dec	8	16:26	16:34
31-Dec	8	16:27	16:35

Receptor: 1804
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
80	5:28

Astronomical Worst Case (hours): 5
Reduction Factor: 0.2
Expected Case (hours): 1

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below
Turbine 80

Day	Maximum Minutes	Start Time	End Time
12-Feb	2	17:34	17:36
13-Feb	6	17:32	17:38
14-Feb	8	17:31	17:39
15-Feb	11	17:30	17:41
16-Feb	13	17:29	17:42
17-Feb	15	17:29	17:44
18-Feb	16	17:29	17:45
19-Feb	18	17:29	17:47
20-Feb	19	17:29	17:48
21-Feb	18	17:29	17:47
22-Feb	16	17:30	17:46
23-Feb	13	17:31	17:44
24-Feb	8	17:34	17:42
16-Oct	10	17:05	17:15
17-Oct	14	17:03	17:17
18-Oct	16	17:02	17:18
19-Oct	18	17:00	17:18
20-Oct	19	17:00	17:19
21-Oct	18	16:59	17:17
22-Oct	17	16:59	17:16
23-Oct	15	16:59	17:14
24-Oct	13	16:59	17:12
25-Oct	10	17:00	17:10
26-Oct	9	17:00	17:09
27-Oct	5	17:02	17:07
28-Oct	2	17:03	17:05

Receptor: 1817
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
80	9:22

Astronomical Worst Case (hours): 9
Reduction Factor: 0.33
Expected Case (hours): 3

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below
Turbine 80

Day	Maximum Minutes	Start Time	End Time
1-Apr	5	18:41	18:46
2-Apr	10	18:38	18:48
3-Apr	12	18:37	18:49
4-Apr	15	18:35	18:50
5-Apr	18	18:34	18:52
6-Apr	20	18:33	18:53
7-Apr	21	18:33	18:54
8-Apr	24	18:32	18:56
9-Apr	24	18:32	18:56
10-Apr	24	18:32	18:56
11-Apr	23	18:32	18:55
12-Apr	22	18:32	18:54
13-Apr	20	18:33	18:53
14-Apr	18	18:34	18:52
15-Apr	15	18:35	18:50
16-Apr	10	18:37	18:47
24-Aug	10	18:40	18:50
25-Aug	15	18:37	18:52
26-Aug	19	18:35	18:54
27-Aug	20	18:34	18:54
28-Aug	22	18:33	18:55
29-Aug	23	18:32	18:55
30-Aug	24	18:31	18:55
31-Aug	24	18:31	18:55
1-Sep	24	18:30	18:54
2-Sep	22	18:30	18:52
3-Sep	20	18:30	18:50
4-Sep	18	18:30	18:48
5-Sep	15	18:31	18:46
6-Sep	12	18:32	18:44
7-Sep	9	18:33	18:42
8-Sep	5	18:35	18:40

Receptor: 1920
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
76	9:31

Astronomical Worst Case (hours): 10
Reduction Factor: 0.1
Expected Case (hours): 1

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below
Turbine 76

Day	Maximum Minutes	Start Time	End Time
1-Jan	16	15:24	15:40
2-Jan	15	15:25	15:40
3-Jan	13	15:26	15:39
4-Jan	10	15:28	15:38
5-Jan	4	15:32	15:36
6-Dec	8	15:16	15:24
7-Dec	12	15:14	15:26
8-Dec	14	15:14	15:28
9-Dec	16	15:13	15:29
10-Dec	17	15:13	15:30
11-Dec	18	15:13	15:31
12-Dec	19	15:13	15:32
13-Dec	20	15:13	15:33
14-Dec	21	15:13	15:34
15-Dec	22	15:13	15:35
16-Dec	23	15:13	15:36
17-Dec	23	15:13	15:36
18-Dec	23	15:14	15:37
19-Dec	23	15:14	15:37
20-Dec	23	15:15	15:38
21-Dec	23	15:15	15:38
22-Dec	23	15:16	15:39
23-Dec	23	15:16	15:39
24-Dec	23	15:17	15:40
25-Dec	22	15:18	15:40
26-Dec	22	15:18	15:40
27-Dec	21	15:19	15:40
28-Dec	20	15:20	15:40
29-Dec	19	15:21	15:40
30-Dec	18	15:22	15:40
31-Dec	17	15:23	15:40

Receptor: 1922
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
81	31:30

Astronomical Worst Case (hours): 32
Reduction Factor: 0.25
Expected Case (hours): 8

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below
Turbine 81

Day	Maximum Minutes	Start Time	End Time
6-Feb	6	08:20	08:26
7-Feb	11	08:18	08:29
8-Feb	14	08:17	08:31
9-Feb	18	08:15	08:33
10-Feb	21	08:14	08:35
11-Feb	24	08:12	08:36
12-Feb	26	08:11	08:37
13-Feb	29	08:09	08:38
14-Feb	31	08:08	08:39
15-Feb	33	08:06	08:39
16-Feb	36	08:04	08:40
17-Feb	37	08:03	08:40
18-Feb	40	08:01	08:41
19-Feb	42	07:59	08:41
20-Feb	44	07:57	08:41
21-Feb	44	07:57	08:41
22-Feb	44	07:57	08:41
23-Feb	43	07:57	08:40
24-Feb	43	07:57	08:40
25-Feb	42	07:57	08:39
26-Feb	42	07:57	08:39
27-Feb	40	07:58	08:38
28-Feb	39	07:58	08:37
29-Feb	37	07:59	08:36
1-Mar	35	08:00	08:35
2-Mar	32	08:01	08:33
3-Mar	29	08:03	08:32
4-Mar	25	08:04	08:29
5-Mar	19	08:07	08:26
6-Mar	12	08:10	08:22
5-Oct	7	07:50	07:57
6-Oct	17	07:45	08:02
7-Oct	24	07:41	08:05
8-Oct	27	07:39	08:06
9-Oct	31	07:37	08:08
10-Oct	34	07:35	08:09
11-Oct	36	07:34	08:10
12-Oct	38	07:33	08:11
13-Oct	39	07:32	08:11
14-Oct	41	07:31	08:12
15-Oct	42	07:30	08:12
16-Oct	43	07:29	08:12
17-Oct	43	07:29	08:12
18-Oct	44	07:28	08:12
19-Oct	44	07:28	08:12
20-Oct	44	07:28	08:12
21-Oct	43	07:29	08:12
22-Oct	41	07:30	08:11
23-Oct	39	07:32	08:11

24-Oct	37	07:33	08:10
25-Oct	35	07:35	08:10
26-Oct	33	07:36	08:09
27-Oct	30	07:38	08:08
28-Oct	28	07:39	08:07
29-Oct	25	07:41	08:06
30-Oct	23	07:42	08:05
31-Oct	20	07:44	08:04
1-Nov	17	07:45	08:02
2-Nov	13	07:47	08:00
3-Nov	10	07:48	07:58
4-Nov	4	07:50	07:54

Receptor: 1934
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
81	8:10

Astronomical Worst Case (hours): 8
Reduction Factor: 0.12
Expected Case (hours): 1

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below
Turbine 81

Day	Maximum Minutes	Start Time	End Time
5-Jun	3	19:55	19:58
6-Jun	10	19:52	20:02
7-Jun	12	19:50	20:02
8-Jun	14	19:49	20:03
9-Jun	16	19:48	20:04
10-Jun	16	19:48	20:04
11-Jun	18	19:47	20:05
12-Jun	18	19:47	20:05
13-Jun	19	19:47	20:06
14-Jun	19	19:47	20:06
15-Jun	19	19:47	20:06
16-Jun	20	19:47	20:07
17-Jun	20	19:47	20:07
18-Jun	20	19:47	20:07
19-Jun	21	19:47	20:08
20-Jun	21	19:47	20:08
21-Jun	21	19:47	20:08
22-Jun	20	19:48	20:08
23-Jun	20	19:48	20:08
24-Jun	19	19:49	20:08
25-Jun	19	19:49	20:08
26-Jun	18	19:50	20:08
27-Jun	18	19:50	20:08
28-Jun	17	19:51	20:08
29-Jun	16	19:52	20:08
30-Jun	15	19:53	20:08
1-Jul	14	19:54	20:08
2-Jul	13	19:55	20:08
3-Jul	10	19:57	20:07
4-Jul	5	20:00	20:05

Receptor: 2001
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
114	11:46
115	13:12

Astronomical Worst Case (hours): 25
Reduction Factor: 0.24
Expected Case (hours): 6

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below

Turbine	114			115		
Day	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time
20-Feb	4	17:44	17:48	0	00:00	00:00
21-Feb	8	17:42	17:50	0	00:00	00:00
22-Feb	12	17:40	17:52	0	00:00	00:00
23-Feb	15	17:38	17:53	0	00:00	00:00
24-Feb	18	17:37	17:55	0	00:00	00:00
25-Feb	20	17:36	17:56	0	00:00	00:00
26-Feb	22	17:36	17:58	0	00:00	00:00
27-Feb	24	17:35	17:59	0	00:00	00:00
28-Feb	26	17:35	18:01	0	00:00	00:00
29-Feb	28	17:34	18:02	0	00:00	00:00
1-Mar	28	17:34	18:02	0	00:00	00:00
2-Mar	26	17:35	18:01	0	00:00	00:00
3-Mar	26	17:35	18:01	0	00:00	00:00
4-Mar	25	17:35	18:00	0	00:00	00:00
5-Mar	23	17:36	17:59	0	00:00	00:00
6-Mar	20	17:37	17:57	0	00:00	00:00
7-Mar	16	17:39	17:55	0	00:00	00:00
8-Mar	10	17:42	17:52	0	00:00	00:00
30-May	0	00:00	00:00	6	19:50	19:56
31-May	0	00:00	00:00	9	19:48	19:57
1-Jun	0	00:00	00:00	11	19:47	19:58
2-Jun	0	00:00	00:00	13	19:46	19:59
3-Jun	0	00:00	00:00	15	19:45	20:00
4-Jun	0	00:00	00:00	15	19:45	20:00
5-Jun	0	00:00	00:00	17	19:44	20:01
6-Jun	0	00:00	00:00	18	19:44	20:02
7-Jun	0	00:00	00:00	19	19:43	20:02
8-Jun	0	00:00	00:00	20	19:43	20:03
9-Jun	0	00:00	00:00	21	19:43	20:04
10-Jun	0	00:00	00:00	21	19:43	20:04
11-Jun	0	00:00	00:00	22	19:43	20:05
12-Jun	0	00:00	00:00	22	19:43	20:05
13-Jun	0	00:00	00:00	23	19:43	20:06
14-Jun	0	00:00	00:00	23	19:43	20:06
15-Jun	0	00:00	00:00	23	19:43	20:06
16-Jun	0	00:00	00:00	24	19:43	20:07
17-Jun	0	00:00	00:00	24	19:43	20:07
18-Jun	0	00:00	00:00	24	19:43	20:07
19-Jun	0	00:00	00:00	24	19:44	20:08
20-Jun	0	00:00	00:00	24	19:44	20:08
21-Jun	0	00:00	00:00	24	19:44	20:08
22-Jun	0	00:00	00:00	24	19:44	20:08
23-Jun	0	00:00	00:00	23	19:45	20:08
24-Jun	0	00:00	00:00	23	19:45	20:08
25-Jun	0	00:00	00:00	23	19:45	20:08
26-Jun	0	00:00	00:00	22	19:46	20:08
27-Jun	0	00:00	00:00	22	19:46	20:08
28-Jun	0	00:00	00:00	22	19:46	20:08
29-Jun	0	00:00	00:00	21	19:47	20:08

30-Jun	0	00:00	00:00	21	19:47	20:08
1-Jul	0	00:00	00:00	20	19:48	20:08
2-Jul	0	00:00	00:00	19	19:49	20:08
3-Jul	0	00:00	00:00	18	19:49	20:07
4-Jul	0	00:00	00:00	17	19:50	20:07
5-Jul	0	00:00	00:00	16	19:51	20:07
6-Jul	0	00:00	00:00	14	19:52	20:06
7-Jul	0	00:00	00:00	13	19:53	20:06
8-Jul	0	00:00	00:00	11	19:54	20:05
9-Jul	0	00:00	00:00	10	19:55	20:05
10-Jul	0	00:00	00:00	7	19:57	20:04
11-Jul	0	00:00	00:00	4	20:00	20:04
2-Oct	3	17:24	17:27	0	00:00	00:00
3-Oct	13	17:18	17:31	0	00:00	00:00
4-Oct	17	17:16	17:33	0	00:00	00:00
5-Oct	21	17:14	17:35	0	00:00	00:00
6-Oct	24	17:12	17:36	0	00:00	00:00
7-Oct	25	17:11	17:36	0	00:00	00:00
8-Oct	27	17:10	17:37	0	00:00	00:00
9-Oct	28	17:09	17:37	0	00:00	00:00
10-Oct	28	17:09	17:37	0	00:00	00:00
11-Oct	27	17:09	17:36	0	00:00	00:00
12-Oct	26	17:08	17:34	0	00:00	00:00
13-Oct	24	17:08	17:32	0	00:00	00:00
14-Oct	21	17:09	17:30	0	00:00	00:00
15-Oct	19	17:09	17:28	0	00:00	00:00
16-Oct	16	17:10	17:26	0	00:00	00:00
17-Oct	14	17:10	17:24	0	00:00	00:00
18-Oct	11	17:12	17:23	0	00:00	00:00
19-Oct	8	17:13	17:21	0	00:00	00:00
20-Oct	3	17:16	17:19	0	00:00	00:00

Receptor: 2002
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
113	6:27
114	22:00

Astronomical Worst Case (hours): 23
Reduction Factor: 0.22
Expected Case (hours): 5

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below

Turbine	113			114		
Day	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time
16-Feb	0	00:00	00:00	1	17:41	17:42
17-Feb	0	00:00	00:00	9	17:35	17:44
18-Feb	0	00:00	00:00	13	17:32	17:45
19-Feb	0	00:00	00:00	17	17:30	17:47
20-Feb	0	00:00	00:00	19	17:29	17:48
21-Feb	2	17:48	17:50	23	17:27	17:50
22-Feb	6	17:46	17:52	26	17:26	17:52
23-Feb	8	17:45	17:53	28	17:25	17:53
24-Feb	11	17:44	17:55	31	17:24	17:55
25-Feb	13	17:43	17:56	32	17:24	17:56
26-Feb	16	17:42	17:58	35	17:23	17:58
27-Feb	17	17:42	17:59	36	17:23	17:59
28-Feb	19	17:42	18:01	37	17:23	18:00
29-Feb	20	17:42	18:02	38	17:22	18:00
1-Mar	22	17:42	18:04	37	17:22	17:59
2-Mar	20	17:43	18:03	37	17:22	17:59
3-Mar	17	17:44	18:01	36	17:22	17:58
4-Mar	15	17:45	18:00	34	17:23	17:57
5-Mar	9	17:48	17:57	33	17:23	17:56
6-Mar	0	00:00	00:00	31	17:24	17:55
7-Mar	0	00:00	00:00	29	17:25	17:54
8-Mar	0	00:00	00:00	26	17:26	17:52
9-Mar	0	00:00	00:00	22	17:28	17:50
10-Mar	0	00:00	00:00	18	17:30	17:48
11-Mar	0	00:00	00:00	10	17:33	17:43
30-Sep	0	00:00	00:00	15	17:11	17:26
1-Oct	0	00:00	00:00	20	17:08	17:28
2-Oct	0	00:00	00:00	25	17:05	17:30
3-Oct	0	00:00	00:00	27	17:04	17:31
4-Oct	0	00:00	00:00	30	17:02	17:32
5-Oct	0	00:00	00:00	32	17:01	17:33
6-Oct	12	17:23	17:35	33	17:00	17:33
7-Oct	15	17:21	17:36	35	16:59	17:34
8-Oct	18	17:19	17:37	36	16:58	17:34
9-Oct	20	17:18	17:38	37	16:57	17:34
10-Oct	21	17:17	17:38	37	16:57	17:34
11-Oct	20	17:16	17:36	37	16:57	17:34
12-Oct	18	17:16	17:34	37	16:56	17:33
13-Oct	17	17:15	17:32	36	16:56	17:32
14-Oct	15	17:15	17:30	34	16:56	17:30
15-Oct	12	17:16	17:28	32	16:56	17:28
16-Oct	10	17:16	17:26	29	16:57	17:26
17-Oct	7	17:17	17:24	27	16:57	17:24
18-Oct	5	17:18	17:23	25	16:58	17:23
19-Oct	2	17:19	17:21	22	16:59	17:21
20-Oct	0	00:00	00:00	19	17:00	17:19
21-Oct	0	00:00	00:00	16	17:01	17:17
22-Oct	0	00:00	00:00	13	17:03	17:16
23-Oct	0	00:00	00:00	8	17:06	17:14

Receptor: 2003
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
113	5:37
114	17:42

Astronomical Worst Case (hours): 18
Reduction Factor: 0.22
Expected Case (hours): 4

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below

Turbine	113			114		
Day	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time
1-Mar	2	18:02	18:04	0	00:00	00:00
2-Mar	5	18:00	18:05	0	00:00	00:00
3-Mar	8	17:58	18:06	9	17:57	18:06
4-Mar	11	17:57	18:08	14	17:54	18:08
5-Mar	13	17:56	18:09	17	17:52	18:09
6-Mar	15	17:56	18:11	20	17:51	18:11
7-Mar	16	17:56	18:12	23	17:49	18:12
8-Mar	19	17:55	18:14	26	17:48	18:14
9-Mar	19	17:56	18:15	28	17:47	18:15
10-Mar	19	17:56	18:15	31	17:46	18:17
11-Mar	17	17:57	18:14	32	17:46	18:18
12-Mar	14	17:58	18:12	34	17:45	18:19
13-Mar	9	18:00	18:09	34	17:45	18:19
14-Mar	0	00:00	00:00	33	17:45	18:18
15-Mar	0	00:00	00:00	33	17:45	18:18
16-Mar	0	00:00	00:00	32	17:45	18:17
17-Mar	0	00:00	00:00	31	17:45	18:16
18-Mar	0	00:00	00:00	29	17:46	18:15
19-Mar	0	00:00	00:00	28	17:46	18:14
20-Mar	0	00:00	00:00	25	17:47	18:12
21-Mar	0	00:00	00:00	21	17:49	18:10
22-Mar	0	00:00	00:00	17	17:51	18:08
23-Mar	0	00:00	00:00	10	17:54	18:04
17-Sep	0	00:00	00:00	6	17:44	17:50
18-Sep	0	00:00	00:00	15	17:39	17:54
19-Sep	0	00:00	00:00	20	17:36	17:56
20-Sep	0	00:00	00:00	24	17:34	17:58
21-Sep	0	00:00	00:00	27	17:32	17:59
22-Sep	0	00:00	00:00	28	17:31	17:59
23-Sep	0	00:00	00:00	31	17:29	18:00
24-Sep	0	00:00	00:00	32	17:28	18:00
25-Sep	0	00:00	00:00	32	17:28	18:00
26-Sep	0	00:00	00:00	33	17:27	18:00
27-Sep	6	17:43	17:49	34	17:26	18:00
28-Sep	12	17:40	17:52	34	17:26	18:00
29-Sep	16	17:38	17:54	33	17:26	17:59
30-Sep	18	17:36	17:54	31	17:26	17:57
1-Oct	20	17:35	17:55	29	17:26	17:55
2-Oct	19	17:34	17:53	27	17:26	17:53
3-Oct	17	17:34	17:51	24	17:27	17:51
4-Oct	16	17:33	17:49	22	17:27	17:49
5-Oct	14	17:33	17:47	19	17:28	17:47
6-Oct	12	17:33	17:45	15	17:30	17:45
7-Oct	9	17:34	17:43	12	17:31	17:43
8-Oct	7	17:34	17:41	7	17:34	17:41
9-Oct	4	17:35	17:39	0	00:00	00:00
10-Oct	1	17:37	17:38	0	00:00	00:00

Receptor: 2004
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
113	5:58
114	19:37

Astronomical Worst Case (hours): 26
Reduction Factor: 0.27
Expected Case (hours): 7

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below

Turbine	113			114		
Day	Maximum Minutes	Start Time	End Time	Maximum Minutes	Start Time	End Time
21-Mar	3	18:29	18:32	0	00:00	00:00
22-Mar	6	18:27	18:33	0	00:00	00:00
23-Mar	9	18:25	18:34	0	00:00	00:00
24-Mar	12	18:24	18:36	0	00:00	00:00
25-Mar	14	18:23	18:37	0	00:00	00:00
26-Mar	15	18:23	18:38	0	00:00	00:00
27-Mar	18	18:22	18:40	0	00:00	00:00
28-Mar	19	18:22	18:41	0	00:00	00:00
29-Mar	20	18:22	18:42	0	00:00	00:00
30-Mar	19	18:23	18:42	0	00:00	00:00
31-Mar	18	18:23	18:41	0	00:00	00:00
1-Apr	14	18:25	18:39	0	00:00	00:00
2-Apr	9	18:27	18:36	0	00:00	00:00
3-Apr	0	00:00	00:00	9	18:40	18:49
4-Apr	0	00:00	00:00	13	18:37	18:50
5-Apr	0	00:00	00:00	18	18:34	18:52
6-Apr	0	00:00	00:00	20	18:33	18:53
7-Apr	0	00:00	00:00	23	18:31	18:54
8-Apr	0	00:00	00:00	26	18:30	18:56
9-Apr	0	00:00	00:00	28	18:29	18:57
10-Apr	0	00:00	00:00	30	18:28	18:58
11-Apr	0	00:00	00:00	31	18:28	18:59
12-Apr	0	00:00	00:00	34	18:27	19:01
13-Apr	0	00:00	00:00	34	18:27	19:01
14-Apr	0	00:00	00:00	33	18:27	19:00
15-Apr	0	00:00	00:00	34	18:26	19:00
16-Apr	0	00:00	00:00	33	18:26	18:59
17-Apr	0	00:00	00:00	32	18:27	18:59
18-Apr	0	00:00	00:00	31	18:27	18:58
19-Apr	0	00:00	00:00	30	18:27	18:57
20-Apr	0	00:00	00:00	28	18:28	18:56
21-Apr	0	00:00	00:00	26	18:29	18:55
22-Apr	0	00:00	00:00	24	18:30	18:54
23-Apr	0	00:00	00:00	21	18:31	18:52
24-Apr	0	00:00	00:00	17	18:33	18:50
25-Apr	0	00:00	00:00	11	18:36	18:47
15-Aug	0	00:00	00:00	13	18:41	18:54
16-Aug	0	00:00	00:00	18	18:38	18:56
17-Aug	0	00:00	00:00	22	18:36	18:58
18-Aug	0	00:00	00:00	24	18:35	18:59
19-Aug	0	00:00	00:00	27	18:33	19:00
20-Aug	0	00:00	00:00	29	18:32	19:01
21-Aug	0	00:00	00:00	30	18:31	19:01
22-Aug	0	00:00	00:00	32	18:30	19:02
23-Aug	0	00:00	00:00	32	18:30	19:02
24-Aug	0	00:00	00:00	33	18:29	19:02
25-Aug	0	00:00	00:00	34	18:28	19:02
26-Aug	0	00:00	00:00	34	18:28	19:02
27-Aug	0	00:00	00:00	33	18:28	19:01

28-Aug	0	00:00	00:00	33	18:28	19:01
29-Aug	0	00:00	00:00	32	18:27	18:59
30-Aug	0	00:00	00:00	29	18:28	18:57
31-Aug	0	00:00	00:00	27	18:28	18:55
1-Sep	0	00:00	00:00	26	18:28	18:54
2-Sep	0	00:00	00:00	23	18:29	18:52
3-Sep	0	00:00	00:00	20	18:30	18:50
4-Sep	0	00:00	00:00	17	18:31	18:48
5-Sep	0	00:00	00:00	14	18:32	18:46
6-Sep	0	00:00	00:00	9	18:35	18:44
7-Sep	10	18:21	18:31	0	00:00	00:00
8-Sep	14	18:19	18:33	0	00:00	00:00
9-Sep	17	18:17	18:34	0	00:00	00:00
10-Sep	19	18:15	18:34	0	00:00	00:00
11-Sep	20	18:14	18:34	0	00:00	00:00
12-Sep	20	18:13	18:33	0	00:00	00:00
13-Sep	18	18:13	18:31	0	00:00	00:00
14-Sep	16	18:13	18:29	0	00:00	00:00
15-Sep	15	18:12	18:27	0	00:00	00:00
16-Sep	12	18:13	18:25	0	00:00	00:00
17-Sep	10	18:13	18:23	0	00:00	00:00
18-Sep	7	18:14	18:21	0	00:00	00:00
19-Sep	4	18:15	18:19	0	00:00	00:00

Receptor: 2652
Calculation: Shadow Flicker
Rotor Orientation Type: SphereAroundRotorCentre
Timezone: CST (UTC-06:00) *Daylight savings time is not considered in the timestamps in this document
Summary of turbine results:

Turbine	Annual Hours (hh:mm)
92	5:39

Astronomical Worst Case (hours): 6
Reduction Factor: 0.33
Expected Case (hours): 2

Summary of results per day: *Days with no shadow flicker events have been excluded from the table below
Turbine 92

Day	Maximum Minutes	Start Time	End Time
7-Apr	2	06:28	06:30
8-Apr	5	06:26	06:31
9-Apr	8	06:24	06:32
10-Apr	9	06:23	06:32
11-Apr	11	06:21	06:32
12-Apr	13	06:19	06:32
13-Apr	15	06:17	06:32
14-Apr	17	06:15	06:32
15-Apr	17	06:14	06:31
16-Apr	18	06:12	06:30
17-Apr	18	06:11	06:29
18-Apr	16	06:12	06:28
19-Apr	13	06:13	06:26
20-Apr	7	06:16	06:23
21-Aug	8	06:20	06:28
22-Aug	13	06:17	06:30
23-Aug	16	06:15	06:31
24-Aug	18	06:14	06:32
25-Aug	19	06:14	06:33
26-Aug	17	06:16	06:33
27-Aug	16	06:17	06:33
28-Aug	15	06:18	06:33
29-Aug	13	06:19	06:32
30-Aug	12	06:20	06:32
31-Aug	9	06:22	06:31
1-Sep	7	06:23	06:30
2-Sep	5	06:24	06:29
3-Sep	2	06:25	06:27



About DNV

DNV is a global quality assurance and risk management company. Driven by our purpose of safeguarding life, property and the environment, we enable our customers to advance the safety and sustainability of their business. We provide classification, technical assurance, software and independent expert advisory services to the maritime, oil & gas, power and renewables industries. We also provide certification, supply chain and data management services to customers across a wide range of industries. Operating in more than 100 countries, our experts are dedicated to helping customers make the world safer, smarter and greener.

Appendix G
Updated Soil Types for the Badger Wind Project

Badger Wind, LLC
February 2024

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Appendix G: Updated Soil Types for the Badger Wind Project

Map Unit Name	Soil Name	Study		Project Area		Farmland Designation	Hydric Soil	K-Factor	Wind Erodibility Group	Slope Range
		Acres	%	Acres	%					
C131C	Williams loam, 6 to 9 percent slopes	1,379.2	1.1%	810.7	2.3%	Farmland of statewide importance	Yes	0.28	6	0-1
C131C	Williams loam, 6 to 9 percent slopes	4,817.2	3.8%	519.9	1.5%	Farmland of statewide importance	No	0.02	5	6-9
C132B	Williams-Zahl loams, 3 to 6 percent slopes	409.3	0.3%	0.0	0.0%	Farmland of statewide importance	Yes	0.28	6	0-1
C132B	Williams-Zahl loams, 3 to 6 percent slopes	901.2	0.7%	451.3	1.3%	Farmland of statewide importance	No	0.24	4L	3-6
C135C	Zahl-Williams-Zahill complex, 6 to 9 percent slopes	3,346.7	2.6%	1,855.9	5.3%	Not prime farmland	No	0.24	6	6-9
C135D	Zahl-Williams loams, 9 to 15 percent slopes	2,209.0	1.7%	525.9	1.5%	Not prime farmland	No	0.24	6	6-9
C135D	Zahl-Williams loams, 9 to 15 percent slopes	3,966.1	3.1%	2,129.6	6.0%	Not prime farmland	No	0.28	6	6-9
C148C	Williams-Zahl-Parnell complex, 0 to 9 percent slopes	169.5	0.1%	83.4	0.2%	Not prime farmland	Yes	0.28	6	0-1
C153E	Zahl-Max loams, 15 to 25 percent slopes	26.6	0.0%	0.0	0.0%	Not prime farmland	No	0.20	6	6-9
C153E	Zahl-Max loams, 15 to 25 percent slopes	8.0	0.0%	0.0	0.0%	Not prime farmland	No	0.24	4L	9-15
C155F	Zahl-Max-Arnegard loams, 15 to 60 percent slopes	1,233.9	1.0%	236.1	0.7%	Not prime farmland	No	0.02	5	9-25
C156F	Zahl-Max-Bowbells loams, 6 to 35 percent slopes	916.9	0.7%	387.3	1.1%	Not prime farmland	Yes	0.28	6	0-1
C156F	Zahl-Max-Bowbells loams, 6 to 35 percent slopes	605.9	0.5%	262.8	0.7%	Not prime farmland	No	0.28	6	0-3
C162F	Max-Zahl-Arnegard complex, 9 to 35 percent slopes, very stony	175.7	0.1%	62.2	0.2%	Not prime farmland	No	0.02	5	9-25
C162F	Max-Zahl-Arnegard complex, 9 to 35 percent slopes, very stony	2,473.6	1.9%	1,376.6	3.9%	Not prime farmland	No	0.24	4L	9-35
C190C	Bearpaw loam, 6 to 9 percent slopes	11.2	0.0%	0.0	0.0%	Farmland of statewide importance	No	0.28	6	3-6
C194A	Bearpaw-Zeeland loams, 0 to 3 percent slopes	46.6	0.0%	0.0	0.0%	Farmland of statewide importance	No	0.28	6	0-3
C194B	Bearpaw-Zeeland loams, 3 to 6 percent slopes	86.1	0.1%	0.0	0.0%	Farmland of statewide importance	Yes	0.28	6	0-1
C210A	Williams-Bowbells loams, 0 to 3 percent slopes	2,911.8	2.3%	613.1	1.7%	Farmland of statewide importance	Yes	0.28	6	0-1
C210B	Williams-Bowbells loams, 3 to 6 percent slopes	3,339.2	2.6%	2,187.3	6.2%	Farmland of statewide importance	Yes	0.28	6	0-1
C210B	Williams-Bowbells loams, 3 to 6 percent slopes	9,328.7	7.3%	1,169.0	3.3%	Farmland of statewide importance	No	0.24	4L	3-6
C21A	Vallers loam, 0 to 1 percent slopes	42.1	0.0%	0.0	0.0%	Prime farmland if drained	Yes	0.28	6	0-1
C21A	Vallers loam, 0 to 1 percent slopes	22.0	0.0%	6.9	0.0%	Prime farmland if drained	No	0.20	4L	0-3
C270A	Hamerly loam, 0 to 3 percent slopes	179.9	0.1%	4.4	0.0%	All areas are prime farmland	Yes	0.20	4L	0-1
C270A	Hamerly loam, 0 to 3 percent slopes	30.5	0.0%	30.4	0.1%	All areas are prime farmland	Yes	0.28	6	0-1
C276A	Hamerly-Tonka-Parnell complex, 0 to 3 percent slopes	95.0	0.1%	28.6	0.1%	Not prime farmland	No	0.24	6	0-1
C276A	Hamerly-Tonka-Parnell complex, 0 to 3 percent slopes	17.2	0.0%	9.0	0.0%	Not prime farmland	No	0.24	6	0-3
C317B	Lihen-Telfer loamy fine sands, 0 to 6 percent slopes	40.2	0.0%	38.4	0.1%	Not prime farmland	No	0.02	3	2-6
C317B	Lihen-Telfer loamy fine sands, 0 to 6 percent slopes	133.5	0.1%	4.9	0.0%	Not prime farmland	No	0.15	3	3-6
C317C	Lihen-Telfer loamy fine sands, 6 to 9 percent slopes	67.0	0.1%	17.9	0.1%	Not prime farmland	No	0.05	2	6-9
C337D	Telfer-Lihen loamy fine sands, 9 to 15 percent slopes	17.6	0.0%	1.0	0.0%	Not prime farmland	No	0.02	2	9-15
C350A	Flaxton fine sandy loam, 0 to 3 percent slopes	61.9	0.0%	0.0	0.0%	Farmland of statewide importance	No	0.10	2	0-6
C350B	Flaxton fine sandy loam, 3 to 6 percent slopes	92.3	0.1%	0.0	0.0%	Farmland of statewide importance	No	0.10	2	0-6
C356B	Flaxton-Williams complex, 0 to 6 percent slopes	62.2	0.0%	35.1	0.1%	Farmland of statewide importance	No	0.28	6	3-6
C356C	Flaxton-Williams complex, 6 to 9 percent slopes	65.8	0.1%	24.9	0.1%	Not prime farmland	No	0.10	3	6-9
C3A	Parnell silty clay loam, 0 to 1 percent slopes	152.2	0.1%	7.9	0.0%	Not prime farmland	Yes	0.24	6	0-1
C3A	Parnell silty clay loam, 0 to 1 percent slopes	196.8	0.2%	108.6	0.3%	Not prime farmland	Yes	0.28	6	0-1
C403A	Tansem-Makoti complex, 0 to 2 percent slopes	26.9	0.0%	0.0	0.0%	All areas are prime farmland	No	0.28	6	0-2
C403B	Tansem-Makoti complex, 2 to 6 percent slopes	245.2	0.2%	110.0	0.3%	All areas are prime farmland	No	0.32	4L	2-6
C406B	Makoti-Sakakawea complex, 2 to 6 percent slopes	44.3	0.0%	9.0	0.0%	All areas are prime farmland	No	0.28	6	0-2
C409B	Sakakawea silty clay loam, 2 to 6 percent slopes	6.3	0.0%	0.0	0.0%	Not prime farmland	No	0.32	6	2-6
C411A	Makoti silty clay loam, 0 to 2 percent slopes	25.4	0.0%	4.9	0.0%	All areas are prime farmland	No	0.37	6	0-2
C416A	Farnuf loam, 0 to 2 percent slopes	386.5	0.3%	45.0	0.1%	Farmland of statewide importance	No	0.20	6	0-2
C419A	Wildrose silty clay, 0 to 2 percent slopes	7.3	0.0%	0.0	0.0%	All areas are prime farmland	Yes	0.28	6	0-1
C451A	Arnegard loam, 0 to 2 percent slopes	368.4	0.3%	268.5	0.8%	All areas are prime farmland	No	0.20	6	0-2

C451A	Arnegard loam, 0 to 2 percent slopes	473.1	0.4%	51.8	0.1%	All areas are prime farmland	No	0.28	6	0-2
C451B	Arnegard loam, 2 to 6 percent slopes	3,050.0	2.4%	933.7	2.7%	All areas are prime farmland	No	0.20	6	2-6
C471A	Grail silty clay loam, 0 to 2 percent slopes	175.8	0.1%	30.0	0.1%	All areas are prime farmland	No	0.20	6	0-2
C471B	Grail silty clay loam, 2 to 6 percent slopes	768.8	0.6%	89.4	0.3%	All areas are prime farmland	No	0.20	6	2-6
C50A	Lowe-Fluvaquents channeled, complex, 0 to 2 percent slopes, flooded	40.4	0.0%	10.5	0.0%	Not prime farmland	No	0.20	4L	0-2
C524A	Daglum-Belfield complex, 0 to 2 percent slopes	3,155.3	2.5%	302.9	0.9%	Not prime farmland	No	0.28	6	0-2
C524A	Daglum-Belfield complex, 0 to 2 percent slopes	195.0	0.2%	123.7	0.4%	Not prime farmland	No	0.28	6	0-3
C54A	Lowe loam, 0 to 2 percent slopes, occasionally flooded	358.7	0.3%	105.7	0.3%	Not prime farmland	Yes	0.02	4L	0-1
C54A	Lowe loam, 0 to 2 percent slopes, occasionally flooded	167.5	0.1%	137.5	0.4%	Not prime farmland	No	0.20	4L	0-2
C580A	Harriet-Regan-Stirum complex, 0 to 2 percent slopes, occasionally flooded	1,054.5	0.8%	851.7	2.4%	Not prime farmland	No	0.28	5	0-3
C584A	Harriet loam, 0 to 2 percent slopes	2,561.7	2.0%	225.4	0.6%	Not prime farmland	No	0.24	6	0-2
C591C	Rhoades-Daglum complex, 2 to 9 percent slopes	95.7	0.1%	0.0	0.0%	Not prime farmland	No	-	6	3-6
C591C	Rhoades-Daglum complex, 2 to 9 percent slopes	70.5	0.1%	60.3	0.2%	Not prime farmland	No	-	4L	6-9
C5A	Southam silty clay loam, 0 to 1 percent slopes	164.4	0.1%	20.1	0.1%	Not prime farmland	No	-	4L	0-0
C665B	Noonan-Niobell-Williams loams, 0 to 6 percent slopes	286.5	0.2%	32.2	0.1%	Not prime farmland	No	0.28	6	0-6
C665B	Noonan-Niobell-Williams loams, 0 to 6 percent slopes	129.5	0.1%	76.7	0.2%	Not prime farmland	No	0.24	6	3-6
C667B	Williams-Niobell loams, 3 to 6 percent slopes	166.8	0.1%	6.4	0.0%	Farmland of statewide importance	No	0.28	5	0-3
C73A	Hamerly-Vallers loams, moderately saline, 0 to 3 percent slopes	598.2	0.5%	58.6	0.2%	Not prime farmland	Yes	0.32	6	0-1
C73A	Hamerly-Vallers loams, moderately saline, 0 to 3 percent slopes	239.8	0.2%	206.6	0.6%	Not prime farmland	No	0.28	6	0-3
C751A	Parshall fine sandy loam, 0 to 2 percent slopes	4.4	0.0%	0.0	0.0%	Farmland of statewide importance	No	0.02	3	0-2
C751A	Parshall fine sandy loam, 0 to 2 percent slopes	191.0	0.2%	38.8	0.1%	Farmland of statewide importance	No	0.02	5	0-2
C800B	Appam sandy loam, 2 to 6 percent slopes	82.1	0.1%	13.1	0.0%	Not prime farmland	Yes	0.20	4L	0-1
C800B	Appam sandy loam, 2 to 6 percent slopes	109.9	0.1%	96.7	0.3%	Not prime farmland	No	0.02	5	0-2
C814A	Bowdle-Lehr loams, 0 to 2 percent slopes	14,747.7	11.6%	2,667.9	7.6%	Not prime farmland	No	0.02	5	0-2
C817B	Lehr-Bowdle loams, 2 to 6 percent slopes	4,630.9	3.6%	1,450.5	4.1%	Not prime farmland	No	0.02	5	2-6
C825A	Divide loam, 0 to 2 percent slopes	1,913.6	1.5%	52.9	0.2%	Not prime farmland	No	0.05	3	0-2
C825A	Divide loam, 0 to 2 percent slopes	74.5	0.1%	59.3	0.2%	Not prime farmland	No	0.02	5	2-6
C829A	Marysland loam, 0 to 1 percent slopes	548.3	0.4%	22.4	0.1%	Not prime farmland	Yes	0.28	6	0-2
C829A	Marysland loam, 0 to 1 percent slopes	208.8	0.2%	135.8	0.4%	Not prime farmland	No	0.20	4L	0-3
C840B	Manning fine sandy loam, 0 to 6 percent slopes	10.0	0.0%	5.3	0.0%	Not prime farmland	No	0.05	2	0-6
C840B	Manning fine sandy loam, 0 to 6 percent slopes	197.9	0.2%	0.0	0.0%	Not prime farmland	No	0.02	3	0-6
C860B	Schaller loamy sand, 0 to 6 percent slopes	22.3	0.0%	22.3	0.1%	Not prime farmland	No	0.02	3	0-6
C860B	Schaller loamy sand, 0 to 6 percent slopes	5.8	0.0%	0.0	0.0%	Not prime farmland	No	0.02	5	2-6
C860D	Schaller loamy sand, 6 to 15 percent slopes	112.5	0.1%	107.2	0.3%	Not prime farmland	No	0.02	3	0-2
C860D	Schaller loamy sand, 6 to 15 percent slopes	24.0	0.0%	8.6	0.0%	Not prime farmland	No	0.05	2	6-15
C870E	Wabek-Lehr-Appam complex, 9 to 25 percent slopes	3,827.4	3.0%	1,897.5	5.4%	Not prime farmland	No	0.02	5	6-9
C874B	Wabek-Appam complex, 2 to 6 percent slopes	523.1	0.4%	121.4	0.3%	Not prime farmland	No	0.02	5	0-2
C874C	Wabek-Appam complex, 6 to 9 percent slopes	446.3	0.4%	288.7	0.8%	Not prime farmland	No	0.02	5	2-6
C874C	Wabek-Appam complex, 6 to 9 percent slopes	1,109.6	0.9%	167.2	0.5%	Not prime farmland	No	0.02	3	6-9
C877B	Wabek-Lehr complex, 2 to 6 percent slopes	6,925.3	5.4%	1,793.8	5.1%	Not prime farmland	No	0.02	3	2-6
C901A	Amor-Arnegard loams, 0 to 3 percent slopes	447.6	0.4%	8.4	0.0%	Farmland of statewide importance	No	-	6	0-3
C902B	Amor-Cabba loams, 3 to 6 percent slopes	115.4	0.1%	30.9	0.1%	Farmland of statewide importance	No	0.28	6	2-6
C902B	Amor-Cabba loams, 3 to 6 percent slopes	98.4	0.1%	81.8	0.2%	Farmland of statewide importance	No	-	6	3-6
C902C	Amor-Cabba loams, 6 to 9 percent slopes	2,406.2	1.9%	560.6	1.6%	Not prime farmland	No	0.20	6	2-6
C902C	Amor-Cabba loams, 6 to 9 percent slopes	776.9	0.6%	463.3	1.3%	Not prime farmland	No	-	6	6-9
C903D	Amor-Werner loams, 9 to 15 percent slopes	1,527.5	1.2%	660.0	1.9%	Not prime farmland	No	-	6	9-15
C913A	Felor loam, 0 to 2 percent slopes	654.9	0.5%	6.7	0.0%	Farmland of statewide importance	No	0.28	6	0-2
C915A	Reeder-Arnegard loams, 0 to 3 percent slopes	681.1	0.5%	176.0	0.5%	Farmland of statewide importance	No	-	6	0-3
C915B	Reeder-Arnegard loams, 3 to 6 percent slopes	5,166.9	4.1%	775.4	2.2%	Farmland of statewide importance	No	-	4L	3-6
C915B	Reeder-Arnegard loams, 3 to 6 percent slopes	1,475.5	1.2%	978.6	2.8%	Farmland of statewide importance	No	0.20	6	3-6
C953F	Flasher-Vebar-Parshall complex, 15 to 50 percent slopes	160.7	0.1%	64.1	0.2%	Not prime farmland	No	0.02	3	15-25
C954A	Regent-Wyola silty clay loams, 0 to 3 percent slopes	240.2	0.2%	16.3	0.0%	Farmland of statewide importance	No	-	6	0-3

C954B	Regent-Wyola silty clay loams, 3 to 6 percent slopes	327.3	0.3%	196.9	0.6%	Farmland of statewide importance	No	0.28	6	0-2
C954B	Regent-Wyola silty clay loams, 3 to 6 percent slopes	2,449.5	1.9%	227.5	0.6%	Farmland of statewide importance	No	0.02	5	2-6
C956A	Vebar fine sandy loam, 0 to 3 percent slopes	465.8	0.4%	69.3	0.2%	Farmland of statewide importance	No	0.20	6	0-2
C956A	Vebar fine sandy loam, 0 to 3 percent slopes	19.5	0.0%	19.5	0.1%	Farmland of statewide importance	No	-	6	0-3
C956B	Vebar fine sandy loam, 3 to 6 percent slopes	1,080.6	0.9%	379.3	1.1%	Farmland of statewide importance	No	-	6	3-6
C962F	Werner-Amor-Arnegard loams, 9 to 50 percent slopes	15.4	0.0%	0.0	0.0%	Not prime farmland	Yes	0.32	4L	0-1
C962F	Werner-Amor-Arnegard loams, 9 to 50 percent slopes	115.1	0.1%	10.3	0.0%	Not prime farmland	No	0.28	6	6-9
C977C	Vebar-Cohagen fine sandy loams, 6 to 9 percent slopes	1,103.1	0.9%	315.7	0.9%	Not prime farmland	No	-	3	6-9
C978D	Vebar-Flasher complex, 9 to 15 percent slopes	78.4	0.1%	21.5	0.1%	Not prime farmland	No	0.02	3	6-9
C978D	Vebar-Flasher complex, 9 to 15 percent slopes	391.2	0.3%	217.4	0.6%	Not prime farmland	No	-	2	9-15
C990F	Pits, gravel and sand, 0 to 60 percent slopes	57.3	0.0%	18.5	0.1%	Not prime farmland	No	-	8	0-0
C996	Water	45.6	0.0%	9.6	0.0%	Not prime farmland	No	-	-	0-0
E0445A	Daglum-Belfield loams, 0 to 2 percent slopes	157.3	0.1%	67.1	0.2%	Not prime farmland	No	0.28	6	0-2
E0515B	Rhoades-Daglum complex, 0 to 6 percent slopes	73.8	0.1%	3.5	0.0%	Not prime farmland	No	0.28	6	0-6
E0515C	Rhoades-Daglum complex, 6 to 9 percent slopes	49.3	0.0%	5.6	0.0%	Not prime farmland	No	-	6	6-9
E0807A	Grail silty clay loam,till, 0 to 2 percent slopes	13.3	0.0%	0.0	0.0%	All areas are prime farmland	No	0.28	6	0-2
E0807B	Grail silty clay loam, till, 2 to 6 percent slopes	192.6	0.2%	45.6	0.1%	All areas are prime farmland	No	0.28	6	2-6
E1025B	Regent-Wyola silty clay loams, 3 to 6 percent slopes	672.4	0.5%	247.8	0.7%	Farmland of statewide importance	No	-	6	3-6
E1301F	Cohagen-Vebar-Parshall fine sandy loams, 9 to 35 percent slopes	586.4	0.5%	125.5	0.4%	Not prime farmland	No	0.15	3	9-25
E1333C	Vebar-Cohagen fine sandy loams, 6 to 9 percent slopes	1,613.2	1.3%	61.1	0.2%	Not prime farmland	No	-	3	6-9
E1333D	Vebar-Cohagen fine sandy loams, 9 to 15 percent slopes	2,690.4	2.1%	134.9	0.4%	Not prime farmland	No	-	3	9-15
E1607D	Telfer-Parshall-Vebar complex, 6 to 15 percent slopes	46.4	0.0%	0.0	0.0%	Not prime farmland	No	0.17	3	6-9
E1625B	Vebar-Parshall fine sandy loams, 3 to 6 percent slopes	14.2	0.0%	14.2	0.0%	Farmland of statewide importance	No	0.24	6	0-2
E1625B	Vebar-Parshall fine sandy loams, 3 to 6 percent slopes	851.3	0.7%	109.7	0.3%	Farmland of statewide importance	No	0.15	3	3-6
E1823A	Parshall fine sandy loam, 0 to 2 percent slopes	126.8	0.1%	16.4	0.0%	Farmland of statewide importance	No	0.15	3	0-6
E1875B	Telfer loamy fine sand, 0 to 6 percent slopes	80.0	0.1%	0.0	0.0%	Not prime farmland	No	0.17	2	0-6
E2107B	Arnegard loam, 2 to 6 percent slopes	771.1	0.6%	291.2	0.8%	All areas are prime farmland	No	0.24	6	2-6
E2120A	Farnuf loam, 0 to 2 percent slopes	117.0	0.1%	1.0	0.0%	Farmland of statewide importance	No	0.28	6	0-2
E2607B	Amor-Werner loams, 3 to 6 percent slopes	810.8	0.6%	121.1	0.3%	Farmland of statewide importance	No	0.17	2	3-6
E2607D	Amor-Werner loams, 9 to 15 percent slopes	2,115.3	1.7%	836.9	2.4%	Not prime farmland	No	0.24	6	6-9
E2609C	Amor-Werner-Farnuf loams, 6 to 9 percent slopes	2,079.0	1.6%	793.0	2.3%	Not prime farmland	No	0.24	6	2-6
E2651F	Werner-Amor-Arnegard loams, 9 to 50 percent slopes	735.9	0.6%	236.3	0.7%	Not prime farmland	No	-	6	15-50
E2801A	Amor-Arnegard loams, 0 to 3 percent slopes	127.1	0.1%	8.1	0.0%	Farmland of statewide importance	No	0.24	6	0-2
E2819B	Reeder-Farnuf loams, 3 to 6 percent slopes	1,097.0	0.9%	600.3	1.7%	Farmland of statewide importance	No	0.28	4L	3-6
E2819B	Reeder-Farnuf loams, 3 to 6 percent slopes	32.8	0.0%	32.7	0.1%	Farmland of statewide importance	No	0.24	6	3-6
E3527B	Williams-Bowbells loams, 3 to 6 percent slopes	19.6	0.0%	9.7	0.0%	Farmland of statewide importance	No	0.32	4L	3-6
E3531C	Williams loam, 6 to 9 percent slopes	51.1	0.0%	47.2	0.1%	Farmland of statewide importance	No	0.24	6	3-6
E3555D	Zahl-Williams loams, 9 to 15 percent slopes	120.7	0.1%	57.2	0.2%	Not prime farmland	No	0.28	4L	9-15
E3567F	Zahl-Max loams, dissected, 15 to 45 percent slopes	103.5	0.1%	48.5	0.1%	Not prime farmland	No	0.24	6	15-25
E4005A	Harriet loam, 0 to 2 percent slopes, occasionally flooded	574.4	0.5%	4.0	0.0%	Not prime farmland	Yes	0.32	6	0-1
E4541A	Bowdle-Lehr loams, 0 to 2 percent slopes	149.5	0.1%	18.5	0.1%	Not prime farmland	No	0.17	5	0-2
E4542B	Lehr-Bowdle loams, 2 to 6 percent slopes	151.7	0.1%	53.3	0.2%	Not prime farmland	No	0.17	5	2-6
E4549B	Wabek-Lehr complex, 2 to 6 percent slopes	30.3	0.0%	26.1	0.1%	Not prime farmland	No	0.10	3	2-6
E4582B	Appam sandy loam, 2 to 6 percent slopes	4.5	0.0%	0.0	0.0%	Not prime farmland	No	0.15	3	2-6
E4583B	Wabek-Appam sandy loams, 2 to 6 percent slopes	9.8	0.0%	0.0	0.0%	Not prime farmland	No	0.10	3	2-6
E4583E	Wabek-Appam sandy loams, 6 to 25 percent slopes	295.7	0.2%	92.7	0.3%	Not prime farmland	No	0.10	3	15-25
E4757A	Regan silt loam, 0 to 2 percent slopes, occasionally flooded	139.1	0.1%	41.8	0.1%	Not prime farmland	No	0.20	4L	0-3
E4765A	Tonka-Hamerly complex, 0 to 3 percent slopes	33.0	0.0%	33.0	0.1%	Not prime farmland	No	0.24	6	0-3
E4767A	Regan silt loam, saline, 0 to 2 percent slopes, occasionally flooded	218.2	0.2%	15.6	0.0%	Not prime farmland	No	0.20	6	0-2
EW	Water	20.7	0.0%	19.9	0.1%	Not prime farmland	No	-	-	-
	Totals	127,091.7	100%	35,226.6	100%					

Appendix H
Updated Bird and Bat Conservation Strategy

Badger Wind, LLC
February 2024

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Bird and Bat Conservation Strategy
Badger Wind Project
Logan and McIntosh Counties, North Dakota



Prepared for:

Badger Wind, LLC

401 North Michigan Avenue, Suite 501
Chicago, Illinois 60611

June 7, 2022

Revised: February 7, 2024

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Appendix C. Key Contacts

ACRONYMS AND ABBREVIATIONS

ADLS	Aircraft Detection Lighting System
AKN	Avian Knowledge Network
AWP	Aransas/Wood Buffalo Population (whooping cranes)
APLIC	Avian Power-Line Interaction Committee
AQI	aquatic Resource Inventory
AWWI	American Wind Wildlife Institute
Badger Wind	Badger Wind, LLC
BBCS	Bird and Bat Conservation Strategy
BCC	Birds of Conservation Concern
BCR	Bird Conservation Region
BGEPA	Bald and Golden Eagle Protection Act
CFR	Code of Federal Regulations
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
DST	Local Siting Decision Support Tool
ECPG	Eagle Conservation Plan Guidance
ESA	Endangered Species Act
EVT	Existing Vegetation Type
FAA	Federal Aviation Administration
GenEst	Generalized Mortality Estimator
IBA	Important Bird Area
IPaC	Information for Planning and Consultation
Kaleidoscope	Kaleidoscope Pro 4.2.0
km	kilometer(s)
kV	kilovolt
m	meter
MBTA	Migratory Bird Treaty Act
MET tower	meteorological evaluation tower
MW	megawatt
NDGF	North Dakota Game and Fish Department
NHD	National Hydrography Dataset
NLEB	northern long-eared bat
NDDA	North Dakota Department of Agriculture
NWI	National Wetland Inventory
O&M	Operations and Maintenance
PAD-US	Protected Areas Database of the US
PCMM	post-construction mortality monitoring
PLOTS	Private Lands Open to Sportsmen
Project	Badger Wind Project
RSZ	rotor-swept zone
SCP	species of conservation priority
SOC	species of concern
SWAP	State Wildlife Action Plan
SPCC	Spill Prevention, Control, and Countermeasure
TES	threatened and endangered species
USC	US Code
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
WEG	Wind Energy Guidelines
WEST.	Western EcoSystems Technology, Inc.
WMA	Wildlife Management Area
WNS	white-nose syndrome

WOTUS	waters of the US
WPA	Waterfowl Production Area
WTG	wind turbine generator

1.0 INTRODUCTION

1.1 Background

Badger Wind, LLC (Badger Wind) is proposing the development of the Badger Wind Project (Project) located in Logan and McIntosh counties, North Dakota (Figure 1.1). Consistent with the tiered approach presented in the US Fish and Wildlife Service (USFWS) *Land-Based Wind Energy Guidelines* (WEG; USFWS 2012) and the *Eagle Conservation Plan Guidance* (ECPG; USFWS 2013a), Badger Wind has completed iterative desktop assessments and field surveys to evaluate risk in coordination with the USFWS and North Dakota Game and Fish Department (NDGFD). Results from these studies and recommendations from USFWS and NDGFD have been used to inform development of appropriate impact avoidance, minimization, monitoring, and adaptive management measures for the Project, including development of this Bird and Bat Conservation Strategy (BBCS).

Badger Wind initiated Project development in 2019 within a larger assessment area (2019 Study Area) that included portions of Logan and McIntosh counties, North Dakota. This area was refined based on the results of the Tier 1, 2, and 3 surveys to focus within a smaller Project boundary in an effort to reduce impacts to flora and fauna (Figure 1.1). The current Project Boundary (35,226.6 acres [ac]) has been reduced in size from the 2019 Study Area; however, this smaller boundary is almost entirely within the larger 2019 Study Area boundary. A total of 92.7% of the current Project Boundary is within the 2019 Study Area boundary. Therefore, results from the studies discussed in the BBCS are representative of the current Project Boundary.

1.2 Goals and Objectives

The BBCS documents Badger Wind's compliance with relevant wildlife laws and regulations, adherence to the processes outlined in the WEG and ECPG for developing, constructing, and operating wind energy projects, and to explain the analyses, studies, and reasoning that support progressing from one tier to the next in the tiered approach presented in the WEG. The Tier 4 monitoring program proposed in this BBCS has been designed to evaluate risk conclusions along with an Adaptive Management Plan to respond to findings, if necessary. The BBCS also documents the measures to be implemented during siting, construction, and operations that avoid and minimize impacts to federal-listed species and to sensitive species and habitats in North Dakota. This BBCS follows USFWS Region 6 guidance for identifying and implanting actions to conserve birds and bats during project development, construction, operation and maintenance, and decommissioning phases of the Project (USFWS 2020a).
Project Boundary

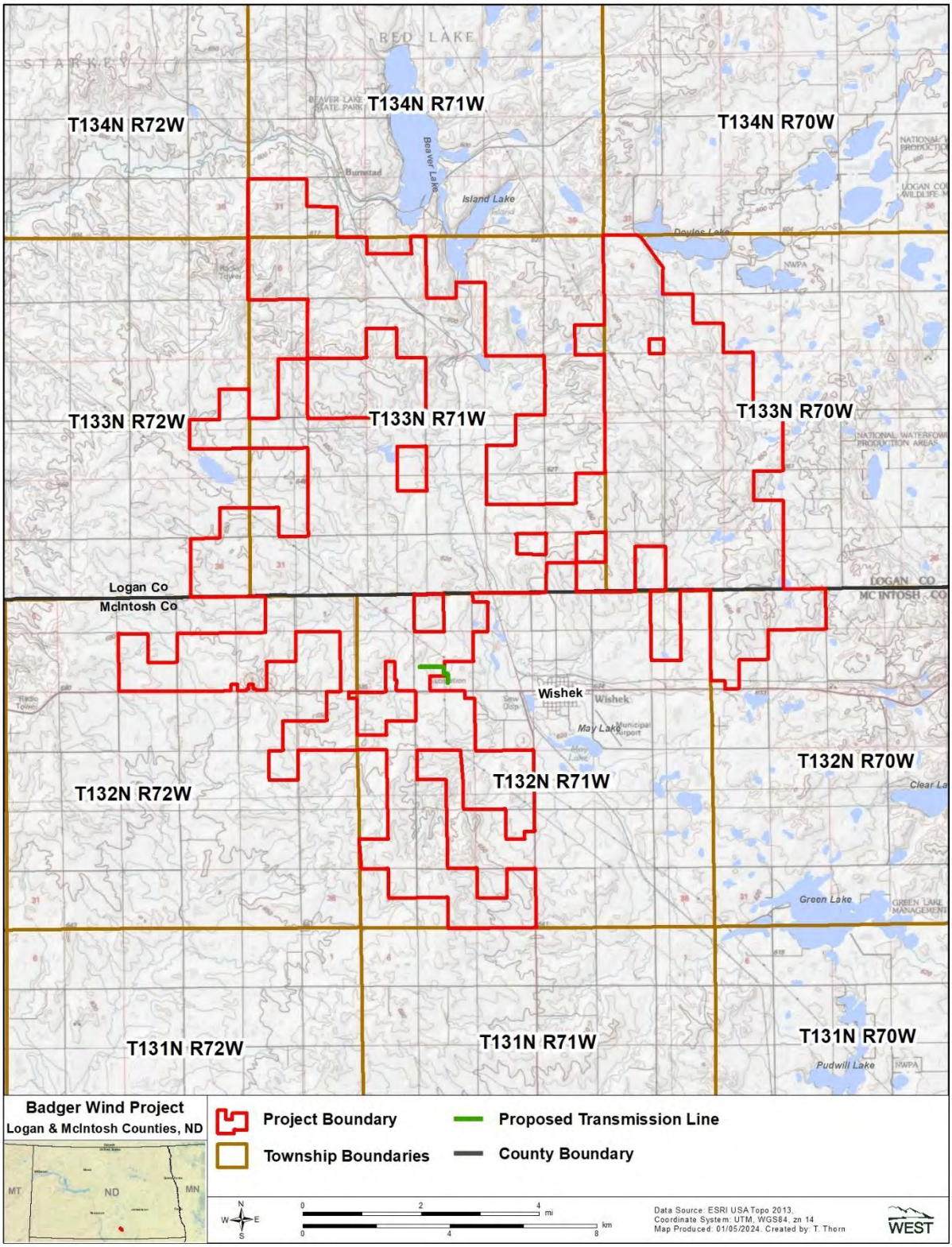

Figure 1.1. Location of the Badger Wind Project in Logan and McIntosh counties, North Dakota.

Badger Wind developed this BBCS to meet the following objectives:

1) Document coordination with federal and state agencies throughout the development of the Project;
2) Document results of the Project's desktop and field surveys and their progression through the WEG Tiers;
3) Assess potential impacts to birds and bats from the Project;
4) Identify measures that, when implemented during construction, operation, maintenance and operations, and decommissioning at the Project, will avoid and minimize potential impacts to birds and bats; and
5) Describe post-construction monitoring and adaptive management procedures.

This BBCS is a living document that will evolve throughout the life of the Project, as needed, in response to changing conditions. Additional information from avian and bat survey results, changes in our understanding of how birds and bats interact with wind turbines, or new minimization measures could be included in updated versions. This BBCS will cover the anticipated life of the Project and covers the development, construction, operation, and decommissioning phases of the Project. Should the Project be re-powered, the BBCS will remain in effect until decommissioning occurs.

1.3 Corporate Policy on Wildlife Conservation

Badger Wind has a strong commitment to protecting biodiversity, and its parent company, Ørsted, has set a goal of delivering a net-positive biodiversity impact from all new renewable energy projects it commissions beginning in 2030 at the latest. When developing new projects, Ørsted will systematically implement initiatives that ensure an overall net-positive contribution to natural ecosystems, habitats, and species in and around the company's new renewable energy projects. The core philosophy of the policy is prevention before mitigation wherever possible.

1.4 Regulatory Framework

This BBCS documents efforts by Badger Wind to comply with federal and state regulations including the Endangered Species Act (ESA) of 1973, Bald and Golden Eagle Protection Act (BGEPA) of 1940, and the Migratory Bird Treaty Act (MBTA) of 1918. North Dakota does not maintain a state-level list of threatened and endangered species. Therefore, only species listed under the ESA are considered threatened or endangered in the state. However, the North Dakota Game and Fish Department (NDGF) identifies and maintains a list of Species of Conservation Priority (SCP) within its State Wildlife Action Plan (SWAP; Dyke et al 2015). The USFWS specifically recommends that a wind energy developer "may prepare a Bird and Bat Conservation Strategy in stages, over time, as analysis and studies are undertaken for each tier" (USFWS 2012). Measures are incorporated into siting, design, and operation of the project in order to reduce or eliminate the potential for impacts to federal and state endangered and threatened species and bird and bat SOC. These measures are described in this BBCS.

1.4.1 Endangered Species Act

The ESA (1973) authorizes the USFWS (while working cooperatively with states) to identify, list, and monitor qualifying species as endangered and threatened. The process by which potential candidates are listed is determined by the vulnerability of the species population and considers a number of different factors. Species that are designated as either endangered or threatened are afforded protection from possession, sale, transport, and take. The definition of take is "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" including "incidental take" or significant habitat modification. Take, however, can be permitted by the USFWS through the ESA Section 7 consultation process among federal agencies or by individual permit under ESA Section 10(a)(1)(B) and an accompanying habitat conservation plan.

The USFWS is responsible for the protection and management of ESA-listed species, as protected under federal law. The USFWS Information for Planning and Consultation (IPaC) is an online resource that allows users to quickly search a comprehensive geo-referenced database to help assess the potential for ESA-listed endangered and threatened species (TES) to occur in an area (USFWS 2021a). The USFWS also has created a list of bird species that have the potential to become listed in the future without additional conservation actions (USFWS 2021b). Information on these species, referred to as Birds of Conservation Concern (BCC), is also included in IPaC reports. BCC species are not afforded any additional regulatory protection under the ESA.

1.4.2 Bald and Golden Eagle Protection Act

Under authority of BGEPA, 16 U.S. Code (USC) 668–668d, bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) are afforded legal protections in addition to the MBTA. BGEPA prohibits the take, sale, purchase, barter, offer of sale, transport, export, or import, at any time or in any manner of any bald or golden eagle, alive or dead, or any part, nest, or egg thereof. In 16 USC 668c, the BGEPA also expands the common law scope of "take" to include "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb," and includes criminal and civil penalties for violating the statute (see 16 USC 668). The USFWS further defined the term "disturb" as agitating or bothering an eagle to a degree that causes, or is likely to cause, injury, a decrease in productivity, or nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior.

If eagles are identified as a potential risk at a project site, wind energy developers are encouraged by the USFWS to follow the Eagle Conservation Plan Guidance (ECPG; USFWS 2013a). The ECPG describes recommended actions to develop wind energy projects while protecting eagles, including guidance for applicants seeking to obtain the above permits.

1.4.3 Migratory Bird Treaty Act

The MBTA integrates and implements four international treaties that provide for the protection of migratory birds against hunters and poachers. The MBTA prohibits the taking, killing, possession, transportation, import, and export of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior" (16 USC § 703; 1918). The word "take"

is defined by regulation as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect" (50 Code of Federal Regulations [CFR] § 10.12; 1973). The USFWS maintains a list of all species protected by the MBTA at 50 CFR § 10.13 (1973). This list includes over one thousand species of migratory birds, including eagles and other raptors, waterfowl, shorebirds, seabirds, wading birds, and passerines. There currently is no permit available from the USFWS that authorizes take of migratory birds protected under the MBTA. However, the USFWS is currently evaluating proposed rulemaking that would include regulations that would authorize incidental take of migratory birds under certain prescribed conditions.

1.4.4 North Dakota Century Code Chapter 20.1-04

In accordance with North Dakota Century Code Chapter 20.1-04, no person, without a permit, "shall kill, catch, take, ship, cause to be shipped, purchase, offer, or expose for sale, sell, or have in that person's possession or under that person's control, any harmless wild bird, or any part thereof". Harmless wild birds are defined as all wild birds except blackbirds, magpies, English sparrows, and starlings. Similarly, "no person may hunt, take, kill, posses, convey, ship, or cause to be shipped, by common or private carrier, sell, or barter any game bird or any part thereof…except as provided by this title". Game birds include all varieties of geese, brant, swans, ducks, plovers, snipes, woodcocks, grouse, sagehens, pheasants, Hungarian partridges, quails, partridges, cranes, rails, coots, wild turkeys, mourning doves, and crows.

1.4.5 North Dakota's State Wildlife Action Plan

The SWAP is the principal document for safeguarding rare and declining species of fish and wildlife within the state (Dyke et al. 2015). The SWAP places an emphasis on the protection of diverse native habitats to maximize the preservation of native wildlife diversity. In addition, the SWAP denoted 115 species that are assigned to one of three conservation priority levels based on their risk level and the species-specific sources and availability of conservation funding. The SWAP defines SCP conservation levels as follows (Dyke et al. 2015):

> Level I species are those having a high level of conservation priority because of declining status in North Dakota or across their range; or have a high rate of occurrence in North Dakota, constituting the core of the species breeding range, but may be at risk range wide.
>
> Level II species are those having a moderate level of conservation priority; or a high level of conservation priority but a substantial level of non-state wildlife grant funding is available to them.
>
> Level III species are those having a moderate level of conservation priority but are believed to be peripheral or non-breeding in North Dakota.

It is understood that the SWAP has no regulatory authority over industrial development on private land. Conservation actions in the SWAP for such development include goals to foster/develop entities to administer conservation easements and to urge ecologically responsible ordinances

and suitable reclamation standards. Should project development impact SCP on private land, the SWAP will be consulted for possible mitigation actions to reduce or minimize those impacts.

1.4.6 Agency Coordination

Badger Wind has coordinated with the USFWS and NDGF during development of the Project. Periodic coordination with the wildlife agencies has continued, particularly through the process of assessing and analyzing bird and bat data collected. Coordination has included emails, conference calls, and meetings to discuss study plans and preliminary results from studies, as well as to request data from the agencies. Badger Wind has also requested that USFWS and NDGF provide recommendations to minimize potential impacts to SOC for consideration by Badger Wind. Table 1 includes a timeline of communications and coordination with federal and state wildlife agencies. Badger Wind intends to continue to coordinate with USFWS and NDGF during the development and implementation of this BBCS.

Table 1.1. Agency consultation history for the Badger Wind Project, Logan and McIntosh counties, North Dakota.

Date	Parties Involved	Correspondence Type	Correspondence Content
January 10, 2020	USFWS: Michael Erickson Atwell: Chris McCreedy	Email	Request for grassland and wetlands easements data.
January 14, 2020	USFWS: Michael Erickson Atwell: Chris McCreedy	Email	Response to request for grassland and wetlands easements data.
January 21, 2020	USFWS: Michael Erickson Atwell: Chris McCreedy	Email	Answers to follow-up questions, including how to get shapefile and KMZ spatial data of easements.
January 28, 2020	USFWS: Drew Becker, Heidi Riddle NDGF: Steve Dyke, Elisha Mueller, Sandra Johnson, Kevin Kading, Renae Schultz Ørsted: Jon Baker Atwell: Emily Cooper, Chris McCreedy	Meeting	Agency project introduction meeting—included summary of studies completed to date.
February 12–18, 2020	NDGF: Sandra Johnson Atwell: Chris McCreedy	Email	Request to discuss available data layers NDGF has developed to inform analysis for the Project and to establish a data-sharing agreement. S. Johnson requested shapefiles of the latest project boundary. C. McCreedy sent the shapefiles and set up a follow-up meeting to discuss the shapefiles.
February 25–27, 2020	NDGF: Sandra Johnson Atwell: Chris McCreedy	Email	S. Johnson provided the data-sharing agreement, along with data for sharp-tailed grouse, native grassland, whooping crane, and bald eagle nests, as well as manuscripts to inform impact assessment and recommendations for offsets. C. McCreedy responded confirming the one bald eagle nest in the Project Boundary was the one Atwell identified. C. McCreedy also provided coordinates for that nest, as well as four ferruginous hawk nest locations.

Date	Parties Involved	Correspondence Type	Correspondence Content
February 25–26, 2020	USFWS: Heidi Riddle, NDGF: Elisha Mueller, Kevin Kading, Renae Schultz Ørsted: Jon Baker Atwell: Emily Cooper, Chris McCreedy	Email	C. McCreedy requested final comments on the draft minutes from the January 28 meeting. E. Mueller recommended that developers perform lek surveys and requested that the meeting minutes reflect that recommendation.
March 11–20, 2020	NDGF: Elisha Mueller, Sandra Johnson Atwell: Chris McCreedy	Email	C. McCreedy inquired about the availability of the grassland habitat tool. E. Mueller confirmed NDGF had just received that data and will follow up when they determine how they may be able to share it. In another follow-up, E. Mueller indicated there was a delay due to staff working remotely, but Sandra would be in touch when the data can be shared.
March 12, 2020	NDGF: Sandra Johnson Atwell: Chris McCreedy	Email	Follow-up response to agency meeting requesting to create a data-sharing agreement with the agency to obtain North Dakota grassland habitat decision support tool.
April 3, 2020	USFWS: Heidi Riddle NDGF: Elisha Mueller Atwell: Emily Cooper, Chris McCreedy	Meeting	Agency meeting regarding aerial survey safety precautions. Given (a) health concerns regarding the COVID-19 virus and (b) safety concerns stemming from recent incidents during nesting raptor surveys at wind facilities in nearby states. Atwell inquired whether a hybrid aerial survey and ground-based survey approach could meet the goals and expectations for Year 2 pre-construction raptor nest and lek surveys. USFWS and NDGF indicated their acceptance of a hybrid survey approach, with a scaled-back aerial survey focusing on areas within the 2019 Study Area that lack roads and cannot be easily accessed during ground-based survey.
April 22, 2020	USFWS: Heidi Riddle Atwell: Chris McCreedy	Phone Call	Discussion of whooping crane sightings near Wishek.

Date	Parties Involved	Correspondence Type	Correspondence Content
May 15, 2020	USFWS: Heidi Riddle NDGF: Elisha Mueller Atwell: Aaron McAlexander	Email	Provided draft bat habitat assessment and Year 1 acoustic monitoring results for review and comment. Recommendation is that summer potential for northern long-eared bats may be limited within the Project Boundary. Requested input on whether the Project should be concerned with impacts to bats, particularly northern long-eared bats, and whether the agencies feel summer presence/probable absence (p/a) surveys (in accordance with the 2020 Range-Wide Indiana Bat Survey Guidelines) are warranted.
May 22, 2020	USFWS: Heidi Riddle Atwell: Aaron McAlexander	Email	Follow-up to May 15, 2021, email.
May 27, 2020	USFWS: Heidi Riddle, Michael Erickson Ørsted: Jon Baker Atwell: Emily Cooper, Tara Corbett	Meeting	Discussion of USFWS wetland easements in Badger Project Boundary.
October 28, 2020	USFWS: Heidi Riddle NDGF: Elisha Mueller Atwell: Chris McCreedy	Email	Submitted initial Grasslands Report to agency. Request to schedule meeting to provide update on Project and discuss findings for avian studies and grassland assessment.
October 28, 2020	USFWS: Heidi Riddle NDGF: Elisha Mueller, Sandra Johnson, Steve Dyke, Greg Link Atwell: Chris McCreedy	Email	Response to receipt of report and how the contents relate to regulatory guidance and prior January 28, 2020 meeting.
October 30, 2020	USFWS: Heidi Riddle NDGF: Elisha Mueller, Sandra Johnson, Steve Dyke, Greg Link Atwell: Chris McCreedy, Maureen O'Shea-Stone	Email (2)	1) NDGF response to grassland assessment, noting specific definition of unbroken grasslands are grasslands that have not been plowed. Presence of haying, grazing, or undesirable species do not indicate disturbance. NDGF noted they… "*are discouraging efforts to try to classify "high quality" or "native" grassland as not worthwhile, and are focusing instead on the unbroken classification as the conservation priority."* 2) NDGF provided contact information for Chuck Loesch, USFWS HAPET and recommendation he would be best contact for moving forward with a wetland/waterfowl impact analysis using the Local Siting Decision Support Tool (DST).

Date	Parties Involved	Correspondence Type	Correspondence Content
October 30, 2020	NDGF: Elisha Mueller Atwell: Maureen O'Shea-Stone, Chris McCreedy	Meeting	Phone meeting to discuss E. Mueller's comments on the draft grassland report. E. Mueller provided contact information (Chuck Loesch, USFWS HAPET) for moving forward with wetland/waterfowl impact analysis; C. Loesch should be able to provide the Local Siting DST.
November 2–6, 2020	USFWS: Heidi Riddle NDGF: Elisha Mueller, Steve Dyke, Greg Link, Sandra Johnson Atwell: Tara Corbett, Chris McCreedy, Maureen O'Shea-Stone, Emily Cooper,	Email	E. Mueller responded to M. O'Shea-Stone's email with some edits to her list of understanding points/action items and then asked S. Johnson to add anything she missed. S. Johnson responded and said that she will send the base raster layer for native prairie (unbroken grassland) and attached an email she sent C. McCreedy in February 2020. Revisions to notes re: understanding points and action items were finalized based on E. Mueller's requests.
November 6, 2020	USFWS: Heidi Riddle NDGF: Elisha Mueller, Sandra Johnson, Steve Dyke, Greg Link Atwell: Chris McCreedy, Tara Corbett, Maureen O'Shea-Stone	Email	Response to November 2, 2020, email from E. Mueller. Email outlines list of further understanding points from conversations and action items to complete to address issue.
December 8, 2020	USFWS: Heidi Riddle, Drew Becker NDGF: Elisha Mueller, Sandra Johnson, Steve Dyke, Greg Link Ørsted: Sam Lodge, Jon Baker, Nick Lindsey Atwell: Chris McCreedy, Tara Corbett, Maureen O'Shea-Stone	Meeting	Meeting to provide a project update and grassland discussion.
January 15, 2021	NDGF: Elisha Mueller Atwell: Maureen O'Shea-Stone	Phone Call	Discussion of native grassland impacts and voluntary offsets.
January 19, 2021	NDGF: Elisha Mueller Atwell: Maureen O'Shea-Stone	Email	Draft guidance regarding wetland and grassland mitigation.
February 2, 2021	USFWS: Heidi Riddle Atwell: Chris McCreedy	Email	USFWS response to Project, including recommended guidance and required compliance for development of Badger Wind Project.

Date	Parties Involved	Correspondence Type	Correspondence Content
May 20–25, 2021	USFWS: Heidi Riddle NDGF: Sandra Johnson, Elisha Mueller Atwell: Chris McCreedy	Email	Guidance regarding raptor nest buffers and removal.
August 9, 2021	USFWS: Heidi Riddle NDGF: Elisha Mueller Ørsted: Charlie Smith, Francesca Martella, Sarah Aftergood Atwell: Maureen O'Shea-Stone, Tara Corbett, Chris McCreedy	Meeting	Project update meeting.
September 1, 2021	USFWS: Heidi Riddle NDGF: Elisha Mueller Ørsted: Francesca Martella, Charlie Smith, June Marie Gray, Sarah Aftergood Atwell: Christopher Rutledge, Maureen O'Shea-Stone	Phone Call	Informal project update meeting.
September 20, 2021	USFWS: Heidi Riddle NDGF: Elisha Mueller Ørsted: Francesca Martella, Claire Dittrich, Sarah Aftergood WEST: Kurt Smith, Martin Piorkowski Atwell: Christopher Rutledge, Maureen O'Shea-Stone, Tanya Johnson	Meeting	Meeting to discuss grassland assessment, avian species impact analysis, and sharp-tailed grouse leks.

Date	Parties Involved	Correspondence Type	Correspondence Content
December 8, 2021	USFWS: Heidi Riddle NDGF: Elisha Mueller Ørsted: Francesca Martella, June Marie Grey, Lucas Buseck, Sarah Aftergood WEST: Kurt Smith, Martin Piorkowski Atwell: Christopher Rutledge, Tanya Johnson, Caitlin Cyrus, Alan Plumeau Frederickson: Mollie Smith, Bridget Duffus	Meeting	Project update meeting. Ørsted presented the preliminary project layouts, working through how they have been sited to address USFWS and NDGF concerns. Western Ecosystems Technology, Inc. (WEST) presented results of Year 2 grassland habitat surveys and sharp-tailed grouse lek surveys. The remainder of the meeting focused on discussions relating to how to address impacts and potential mitigation measures. The USFWS and NDGF pointed Ørsted toward the Shaffer and Loesch models for calculating offsets to grassland birds and waterfowl.
June 27, 2022	USFWS: Drew Becker NDGF: Greg Link NDPSC: Steven Kahl Ørsted: Sarah Aftergood	Letter	Letter providing comments on BBCS
June 29, 2023	NDGF: Elisha Mueller; Bruce Kreft Ørsted: Mark Crowl, Andrew Krieger, Dr. Chris Farmer WEST: Kristen Chodachek, Martin Piorkowski	Meeting	Project update meeting. Ørsted introduced new Project team, overview of Project and what has been done to date with a focus on the proposed expansion area. Reviewed previous survey efforts, preliminary plan moving forward for the updated layout, and additional planned studies. The remainder of the meeting focused on discussions relating to how to address impacts and potential mitigation measures. The NDGF pointed Ørsted toward the Shaffer and Loesch models for calculating offsets to grassland birds and waterfowl.
August 15, 2023	USFWS: Heidi Riddle NDGF: Elisha Mueller; Bruce Kreft Ørsted: Nick Gebauer, Mark Crowl, Ellen Crivella, Carl Poole, Andrew Krieger, Dr. Chris Farmer WEST: Kristen Chodachek, Martin Piorkowski	Meeting	Project update meeting. Ørsted introduced new Project team, overview of Project and what has been done to date with a focus on the proposed expansion area. Reviewed previous survey efforts, preliminary plan moving forward for the updated layout, and additional planned studies. The remainder of the meeting focused on discussions relating to how to address impacts and potential mitigation measures.

Date	Parties Involved	Correspondence Type	Correspondence Content
August 16, 2023	USFWS IPaC Orsted	Letter	USFWS provided an official list of threatened and endangered species that may occur in the Project or may be affected by the proposed Project
January 30, 2024	USFWS: Heidi Riddle NDGF: Elisha Mueller; Bruce Kreft, Greg Link Ørsted: Andrew Krieger, Mark Crowl, Amanda Coletti, Dr. Chris Farmer WEST: Kristen Chodachek, Clayton Derby NDDA: Adam Miller, Joseph Bialke	Meeting	Orsted reviewed findings of 2023 surveys with the agencies and presented calculated indirect impact acreages for grasslands and wetlands. Discussion with the agencies focused on offset commitments and MOU as well as revisions to the Project BBCS. Orsted will provide relevant reports to the agencies for review, including BBCS and Whooping Crane Contingency Plan.

2.0 PROJECT DESCRIPTION

2.1 Facility Description

The Project Boundary spans approximately 35,227 ac within Red Lake Township and three unorganized townships (T133N R70W, T133N R71W, and T133N R72W) in Logan County, North Dakota, and four unorganized townships (T132N R70W, T132N R71W, T132N R72W, and T131N R72W) in McIntosh County, North Dakota (Figure 1.1).

The Project has proposed an installed nameplate capacity up to 262.26-megawatts (MW), consisting of up to 103 wind turbine generator (WTG) locations, including 93 primary and 10 alternate WTG locations. One, a 0.75-mile (mi)-long transmission line will extend east and south from the central portion of the Project Boundary (2.0 mi west-northwest of Wishek, McIntosh County, North Dakota) to the Wishek Junction 230-kV substation 1.5 mi west of Wishek, McIntosh County, North Dakota. The proposed route travels through Section 8 of T132N R71W in McIntosh County, North Dakota (Figure 1.1).

Project infrastructure would include 56.3 mi of permanent access roads, an underground electric collection line system totaling 79.5 mi, temporary laydown/staging areas totaling 29.9 ac, 2.1 ac for the proposed electric substations, and 1.7 ac for the Operations and Maintenance (O&M) facility. In addition, a haul route with multiple temporary road intersection improvements and temporary disturbance from construction crane paths will be required for construction of the Project. WTGs and permanent infrastructure for the Project layout have been sited to reduce the potential for impacts to sensitive wildlife and habitat to the maximum extent practicable. Total permanent impacts from all project infrastructure will comprise 141.5 ac (0.4% of the Project Boundary), and temporary construction impacts will account for 1,650.0 ac (4.7% of the Project).

2.2 Environmental Setting and Habitat

The Project is predominately within the Missouri Coteau Slope Level IV Ecoregion, with portions of the eastern boundary extending upward into the Missouri Coteau Level IV Ecoregion (Bryce et al. 1996). The Level IV Ecoregions are located within the Northwestern Glaciated Plains Level III Ecoregion. The region was once dominated by prairie grasses (spear, grama, and wheat grasses) and shrubs. Forested area consisting of scrubby aspen, box elder, cottonwood, and willow is limited to shaded slopes in the valleys and river terraces (EPA 2002). The Missouri Coteau is an escarpment of glacial till containing numerous hills, small lakes, and poorly drained depressions that are referred to as “potholes” that receive most of their water from snow melt and precipitation (Bryce et al. 1996). The Missouri Coteau Slope descends westward toward the Missouri River from the Coteau and is characterized by a thinner glacial till layer and integrated drainages that flow toward the Missouri River (Clayton 1962). Soils in the ecoregion consist of mollisols and some entisols.

A review of the NLCD (2021) identified grassland/herbaceous (47.4%) and cultivated crops (42.4%) as the major land cover types within the Project Boundary (Figure 2.1), followed by

hay/pasture (3.7%), developed (3.1%), and water/wetland (2.6%); all other land cover types accounted for 1% or less of the Project (Figure 2.1). According to the U.S. Geological Survey (USGS) Protected Areas Database of the U.S. (PAD-US), protected lands within the Project Boundary consist of several USFWS grassland and wetland easements, as well as one state-owned land parcel. Additional USFWS easements and state-owned lands (including state wildlife management areas) are located within one mi of the Project Boundary (Figure 2.2; USGS 2020a). See Section 4.2 for more detailed information on protected areas or federal- or state-owned lands that occur in and near the Project.

Analysis of aerial imagery, the USGS National Hydrography Dataset (NHD), and USFWS National Wetland Inventory (NWI) databases confirms that scattered woodlots, tree lines, riparian corridors, and mapped surface water features (i.e., streams) and/or wetlands exist within the Project Boundary.

The NWI (USFWS NWI 2023) data includes approximately 1,500 ac of potential wetlands and waterbodies within the Project Boundary, representing 4.3% of the total Project. NWI wetlands are scattered throughout the Project Boundary and appear to be concentrated along stream corridors (Figure 2.3). Freshwater emergent wetlands were the most common NWI category with 1,296 ac (3.6% of the Project), followed by riverine with 99.5 ac (0.3%), and freshwater pond with 71.6 ac (0.2%; Figure 2.3). The remaining categories, including lake (21.9 ac), other (10.9 ac), and freshwater forested /shrub wetland (0.1 ac) combined were less than 0.1% of the Project (Figure 2.3). NHD data includes 141.5 mi of flowlines of watercourse, 222.3 ac (0.6%; USGS NHD 2022) of the Project (Figure 2.4).

The northeastern portion of the Project Boundary appears to have the relatively highest concentration of prairie pothole features with associated emergent wetlands. Prairie potholes are depressional freshwater wetlands found mostly in the upper Midwest. The prairie pothole region is a complex system of wetlands and surrounding grasslands that serves as crucial habitat for waterfowl, grassland species, and migratory birds. However, more than half of the region has been converted to cropland.

Filter strips (also referred to as buffer strips) are common within agricultural areas in this region. Filter strips are vegetated areas similar to pastures and grasslands. These areas serve as buffers to protect surface water from agricultural runoff and provide potential habitat for wildlife.

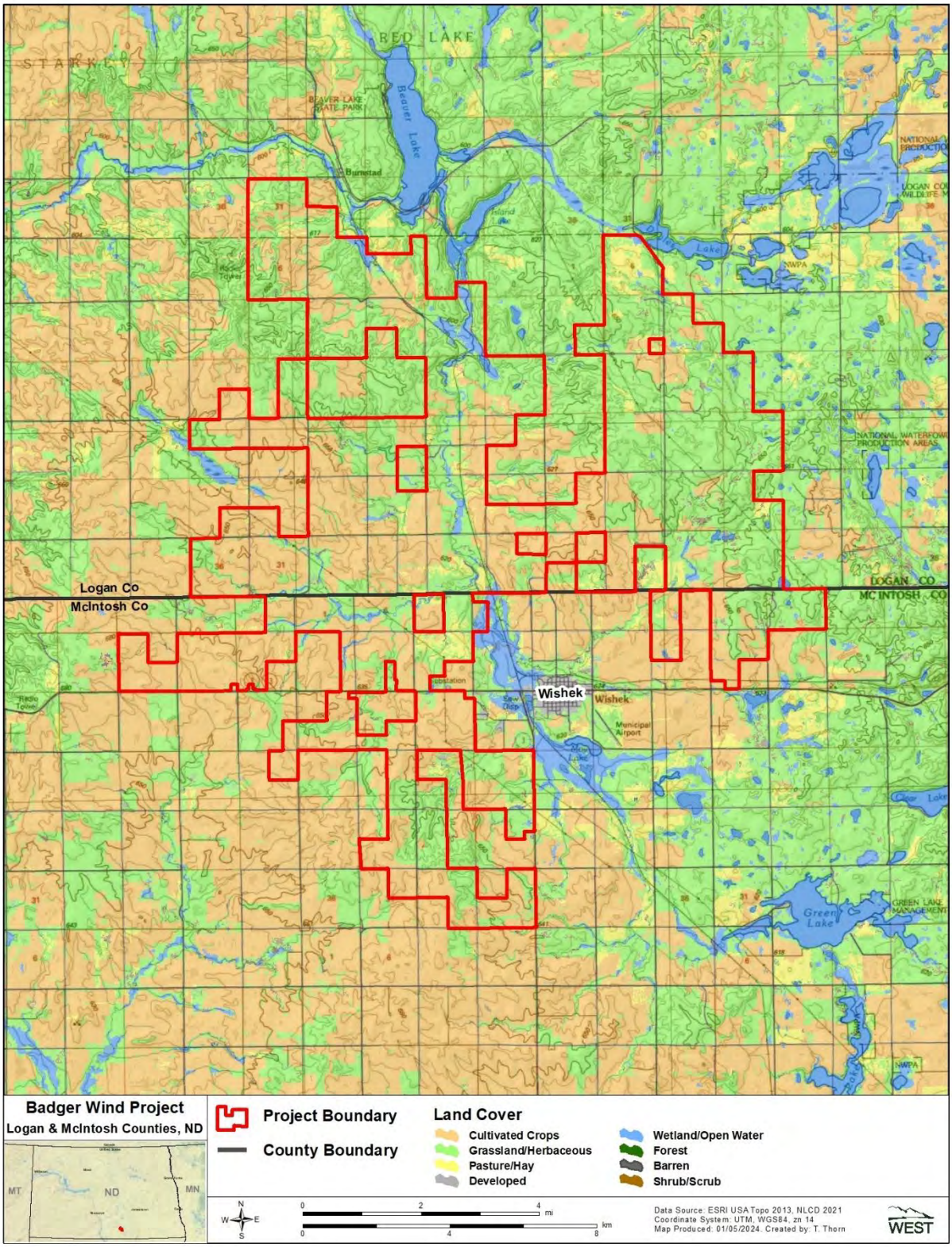

Figure 2.1. Land cover types within the Badger Wind Project in Logan and McIntosh counties, North Dakota.

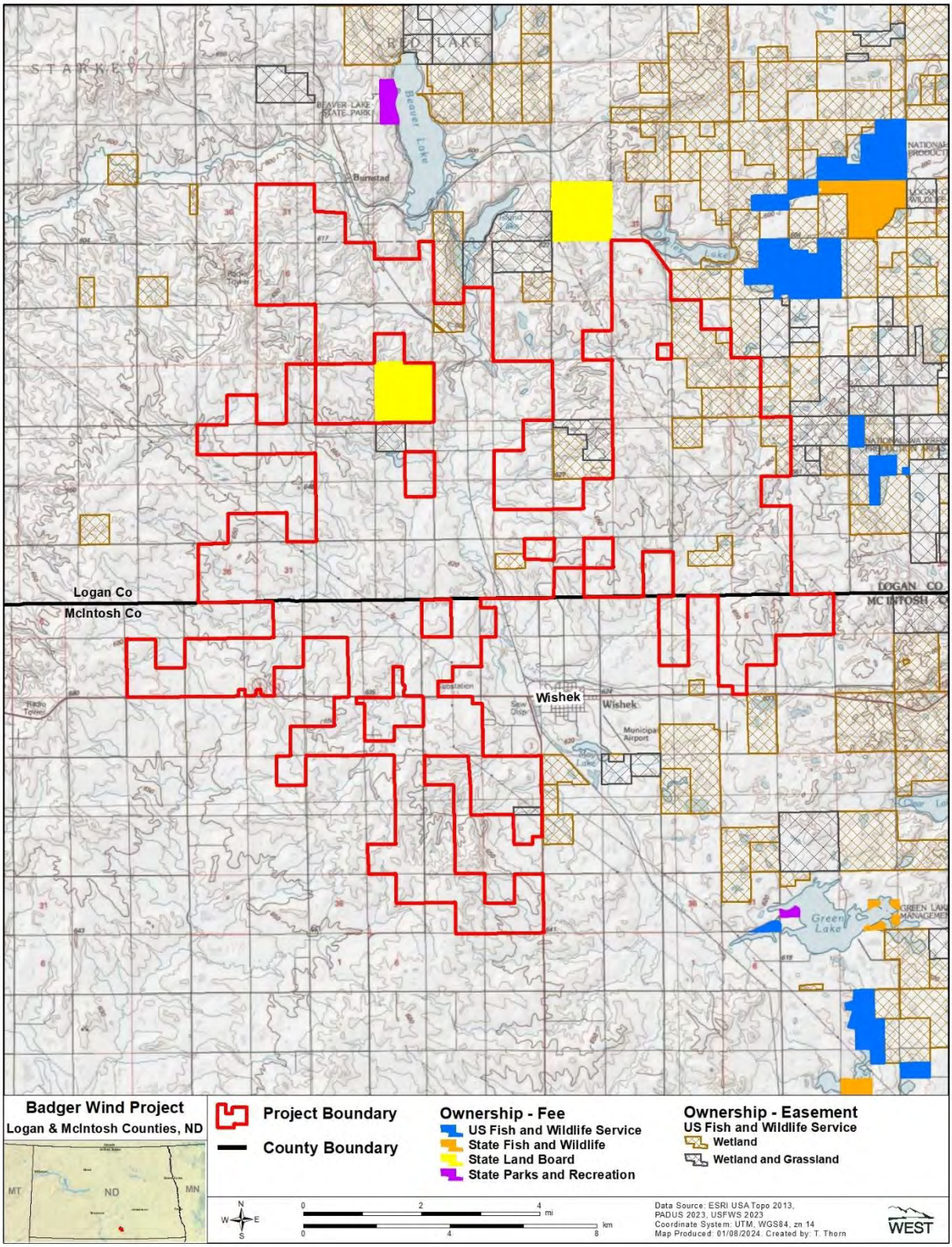

Figure 2.2. Federally administered and state-managed lands within Badger Wind Project in Logan and McIntosh counties, North Dakota.

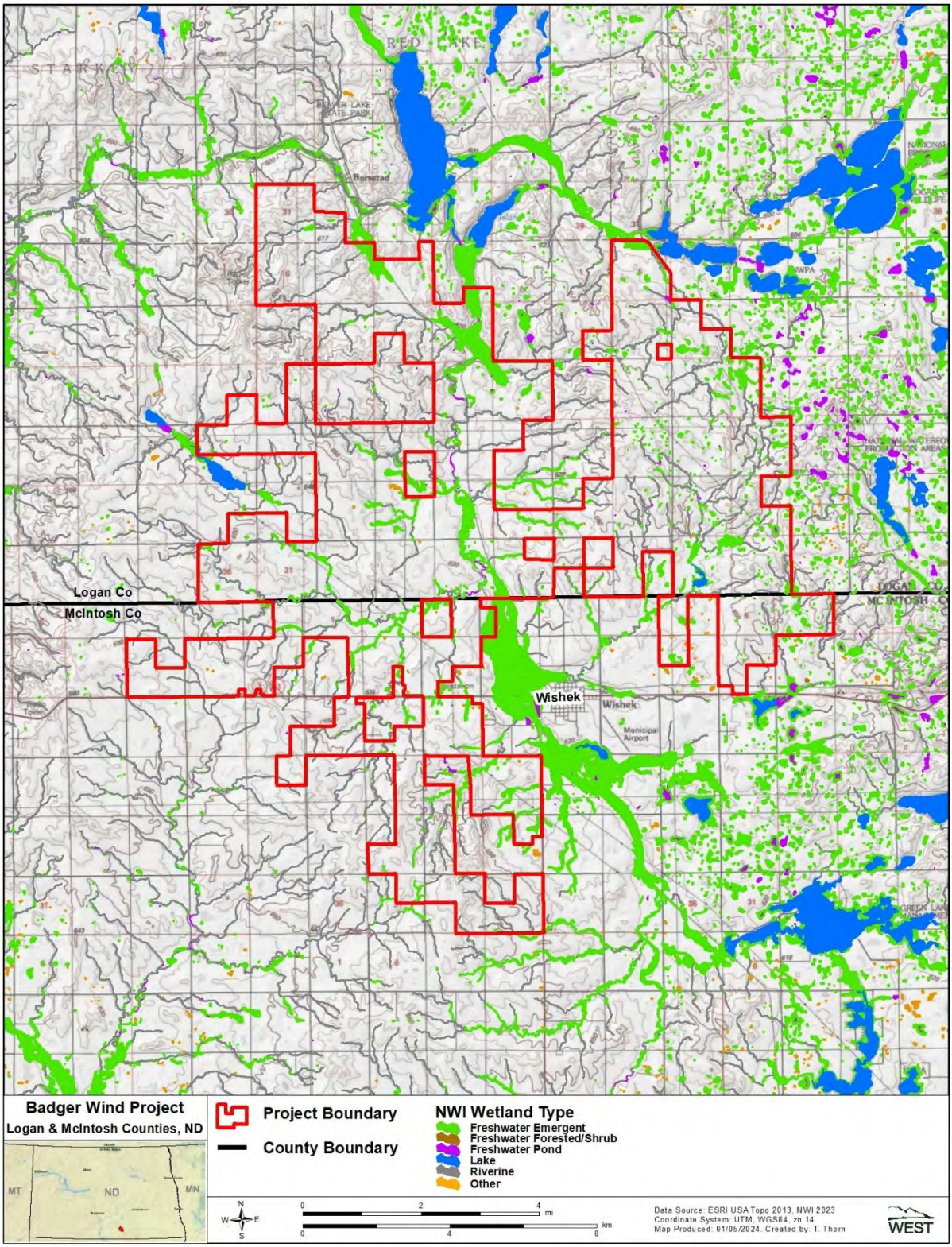

Figure 2.3. National Wetlands Inventory (NWI) wetland types within the Badger Wind Project in Logan and McIntosh counties, North Dakota.

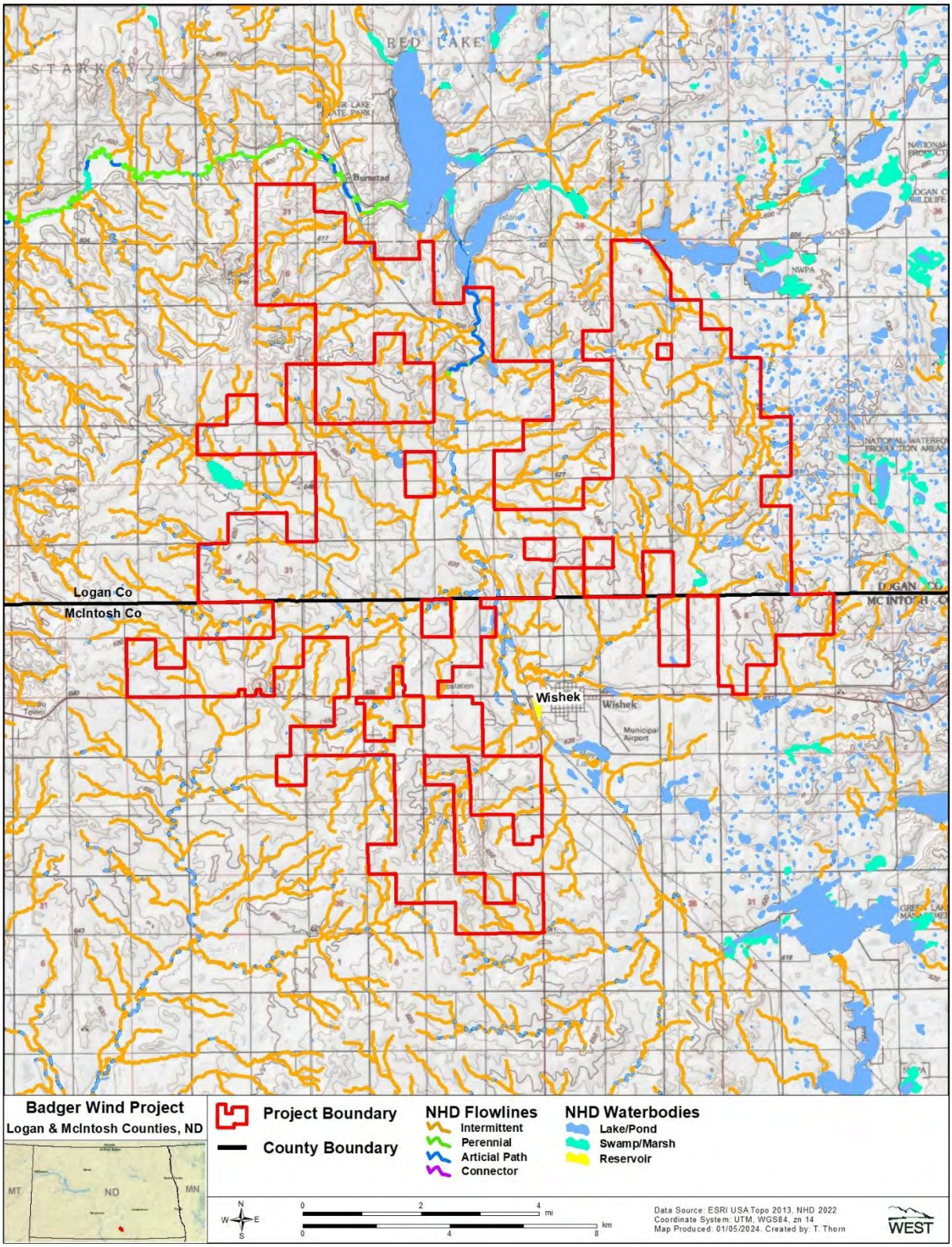

Figure 2.4. National Hydrography Dataset (NHD) waterbodies and flowlines within the Badger Wind Project in Logan and McIntosh counties, North Dakota.

The Project is located in the Prairie Pothole Bird Conservation Region (BCR; NABCI 2021). BCRs are ecologically distinct regions in North America with similar bird communities, habitats, and resource management issues. The Prairie Potholes BCR stretches from the prairie provinces in Canada into northern Montana, the Dakotas, western Minnesota, and northern Iowa and is an area characterized by mixed-grass and tallgrass prairie marked by thousands of shallow wetlands (i.e., potholes). This BCR is important to North American waterfowl production, despite years of extensive wetland drainage and agricultural conversion. Dabbling and diving duck densities, in addition to upland nesting shorebird species, can be notably high in this region of North Dakota. Important habitat for dozens of other nesting and migrant conservation priority species is present throughout the BCR (Fitzgerald et al. 1999). Based on USFWS waterfowl nesting density data provided to Atwell in 2017 by the NDGF, the Project is located primarily within a region that supports approximately 40 pairs of waterfowl or less per square mile. This is relatively low compared to much of the region to the north and east of the Project Boundary, which supports more than 100 pairs of waterfowl per square mile (NABCI 2021). The overall landscape within the Project Boundary is fragmented, consisting of 42.9% cultivated crops (NLCD 2021), consistent with the described modern use of this BCR. According to USFWS, 34 species are considered BCC for the U.S. portion of the Prairie Pothole BCR, eight of which do not breed within the BCR (USFWS 2021b). The BCC with potential to occur in the Project are discussed in Sections 4.1 and 5.4 and Tables 4.1, 4.2, and 5.2 below.

3.0 DESCRIPTION OF WEG TIERED APPROACH

In March 2012, the USFWS released the final WEG, which uses a tiered approach as an interactive decision-making process. This tier process collects information in increasing detail to identify avian and bat SOC to determine how a proposed development may impact such species, both directly and indirectly (USFWS 2012). This section provides an overview of the tiered approach outlined in the WEG.

Tier 1 of the WEG is a preliminary site evaluation on a broad geographical scale that is undertaken to understand which SOC may be present, what critical habitat may exist, and whether areas of wildlife concentration are present. Tier 2 typically consists of the same review but on a site-level scale. For Tier 2, the proposed development footprint within site boundaries is evaluated relative to the potential for SOC to occupy the site, and potential impacts to those species are assessed. The specific objectives of the Tier 1 and Tier 2 evaluations as they pertain to the Project include the following:

Tier 1—Preliminary Site Evaluation

- Identify SOC and/or their habitats in the region surrounding the proposed project.
- Identify critical habitats, areas of conservation concern, and state/local habitat areas that could harbor or concentrate species of known conservation concern in the region surrounding the proposed project.
- Review known areas of wildlife concentration, large habitat patches, and known movement corridors in the region surrounding the proposed project.

Tier 2—Site Characterization

- Conduct the same analysis as Tier 1, but on a more refined site-specific scale.
- Review which species of birds and bats are known to be at risk from wind energy development and operation and are likely to use or move through the site.
- Assess potential impacts to SOC.

During Tier 3, field studies are conducted to determine the use of the site by avian and bat species, including SOC. Information gathered from Tier 3 studies is used to evaluate potential risks to birds and bats and to inform the project design to avoid or minimize significant impacts to species and habitats. The specific objectives of the Tier 3 evaluations are summarized as follows:

Tier 3—Wildlife Field Studies and Impact Prediction

- Evaluate potential risks to bird and bat species.
- Design and conduct wildlife surveys/studies to determine use of the site by SOC.
- Use study results to inform project design to avoid and/or minimize significant adverse impacts, identify potential mitigation measures, and determine level of effort needed for post-construction studies.

For the Tier 4 evaluation, potential impacts are evaluated through post-construction mortality studies. If additional information is needed, other post-construction studies or a more formalized research program may be deemed necessary, and these studies may be implemented as part of a Tier 5 process. The specific objectives of the Tier 4 and 5 evaluations include the following:

Tier 4—Post-construction Studies to Estimate Impacts

- Conduct fatality studies to assess whether predictions of fatality risk and direct and indirect impacts were correct.
- Compare fatality rates within the Project, and among other nearby projects, relative to bird and bat use of the Project.
- Assess direct and indirect impacts of habitat loss, degradation, and fragmentation.

Tier 5—Other Post-Construction Studies and Research

- Implement additional post-construction studies or research only if additional information is needed.

Tier 4 studies will be undertaken after the completion of project construction and in accordance with the post-construction monitoring program. The results of these studies may be used to inform updates to this BBCS, as appropriate.

At the conclusion of each tiered analysis, a series of decision points are evaluated prior to moving to the next tier. Decisions are based on the information obtained from answering a series of questions in each tier. Part of the decision process for each tier is an evaluation of risk. Estimates of risk will typically be qualitative but are based on quantitative information.

The BBCS summarizes the results of/answers to questions posed in each tier of the WEG. The BBCS document serves as the primary synthesis of information gathered during the tiered siting process, details each specific question for each WEG tier, provides a response to that question, and ultimately addresses how this information was used to avoid and reduce potential impacts to birds and bats.

4.0 TIERS 1 AND 2 – PRELIMINARY SITE EVALUATION AND SITE CHARACTERIZATION

A preliminary site evaluation was conducted to review habitat characteristics and historic bird and bat occurrence data at a regional level. As part of this evaluation, a Tier 1 analysis was completed to assess the likelihood of federal and state species to occur within the general vicinity of the Project Boundary. IPaC analyses were performed for the 2019 Study Area and a 10-mi buffer in July 2019, February 2022, and August 2023, and the Project Boundary in January 2024 (Appendix A) to provide regional context regarding potential resources relevant to birds and bats in the surrounding area.

Following the Tier 1 evaluation, Tier 2 studies were conducted for the Project, including a desktop bat habitat characterization (with site visit; Atwell 2020a), desktop whooping crane (*Grus americana*) stopover habitat assessment (Atwell 2021a), and a desktop grassland assessment (with site visit; Chodachek and Piorkowski 2024; Appendix B). The bat habitat assessment was conducted for the 2019 Study Area, while the whooping crane stopover habitat assessment was conducted for the December 2020 Project Boundary that was similar to (though slightly larger than) the current Project Boundary, and the desktop grassland assessment was conducted for a preliminary site layout within the Project Boundary. As stated above (Section 1.0), the Project Boundary encompasses 92.7% of the 2019 Study Area; therefore results from the studies discussed hereafter are representative of the Project Boundary.

Publicly available information that was reviewed as part of Tier 1 and Tier 2 analyses included, but was not limited to:

- USGS 7.5-minute quadrangle maps
- USGS PAD-US
- USGS NHD
- USGS National Land Cover Database
- USFWS NWI data
- USFWS Critical Habitat Portal
- USFWS IPaC tool
- USFWS and NDGF websites (including species profiles)
- North Dakota SWAP

Data that were utilized for the preliminary site evaluation were compiled into a site evaluation map (Figure 2.5) that was subsequently used to inform site characterization (Tier 2), baseline avian

and bat studies (Tier 3), project planning and site layout and design, and project infrastructure micrositing.

4.1 Questions and Responses

1. Are known species of concern present on the proposed site, or is habitat (including designated critical habitat) present for these species?

Tier 1 and 2 analyses indicated that the Project Boundary is within the range of 34 SOC, including five ESA-listed threatened, endangered, or candidate species and species listed as USFWS BCC and SCP per North Dakota's SWAP. ESA-listed species identified as having the potential to occur within the Project Boundary include piping plover (*Charadrius melodus*), rufa red knot (*Calidris canutus rufa*), whooping crane, northern long-eared bat (NLEB; *Myotis septentrionalis*), and monarch butterfly (*Danaus plexippus*; Table 4.1). Bald and golden eagles, which are protected under BGEPA, were also identified during Tier 1 and 2 analyses as being likely to occur within the Project Boundary (Table 4.1). Suitable nesting and foraging habitat for bald eagles and piping plovers and potential suitable stopover habitat for golden eagles, rufa red knot, and whooping cranes is present in the Project Boundary and vicinity, which may increase the potential for use of the Project. Limited suitable summer habitat is present for NLEB. Species accounts are provided for those species listed in Table 4.1 that could be a priority for agencies. Additionally, taxa of interest (e.g., bats) to agencies are also discussed below.

Table 4.1. Federal and State-listed Species or Special Status Species with potential to occur in the Badger Wind Project, Logan and McIntosh counties, North Dakota.

Common Name (Scientific Name)	Federal Status[a]	State Status[b]	Habitat Requirements	Likelihood of Occurrence[c]
BIRDS				
American Bittern (*Botaurus lentiginosus*)	BCC[e]	SCP I	Wetlands with tall emergent vegetation or tall grasslands adjacent to wetlands.	Moderate
American Golden-plover (*Pluvialis dominica*)	BCC[f]	N/A	Uses native prairie, pastures, farmland, and shorelines during migration.	Low
Baird's Sparrow (*Ammodramus bairdii*)	BCC[f]	SCP I	A variety of open grassland habitats, including native and tame grasslands, hayfields, no-till croplands, wet meadows, etc., with moderate-to-tall dense vegetation.	Moderate
Bald Eagle (*Haliaeetus leucocephalus*)	BGEPA; BCC[e]	SCP II	Inhabits isolated and undisturbed areas near large waterbodies. Nests in forest stands with large trees near open water, wetlands, or rivers.	High
Black Tern (*Chlidonias niger*)	BCC	SCP I	A variety of wetland types with relatively shallow water and an even mix of open water and emergent vegetation, preferably surrounded by grassland.	Moderate
Bobolink (*Dolichonyx oryzivorus*)	BCC	SCP II	A variety of open grassland habitats, including native and tame grasslands, hayfields, no-till croplands, wet meadows, etc., with moderate-to-tall dense vegetation.	High
California Gull (*Larus californicus*)	BCC[f]	N/A	Utilize large inland freshwater lakes and marshes during the breeding season.	Moderate
Canvasback (*Aythya valisineria*)	N/A	SCP II	Deep, semipermanent wetlands and lakes with emergent vegetation.	Moderate
Chestnut-collared Longspur (*Calcarius ornatus*)	BCC	SCP I	Shortgrass prairie or mixed-grass prairie that has been grazed or mowed.	High
Chimney Swift (*Chaetura pelagica*)	BCC[f]	N/A	Open country, savanna, wooded slopes, and humid forests.	Low
Clark's Grebe (*Aechmophorus clarkii*)	BCC[f]	N/A	Utilize large inland freshwater lakes with a mix of open water and emergent vegetation during the breeding season.	Low
Ferruginous Hawk (*Buteo regalis*)	BCC[f]	SCP I	Expansive open grasslands and shrublands; often nests in solitary trees or shrubs, though will sometimes nest on the ground.	High

Franklin's Gull (*Leucophaeus pipixcan*)	BCC	SCP I	Large prairie wetlands with a mix of open water and emergent vegetation; will use agricultural fields for foraging.	High
Golden Eagle (*Aquila chrysaetos*)	BGEPA	SCP II	Open habitats with nesting often occurring in association with cliffs.	High
Golden-winged Warbler (*Vermivora chrysoptera*)	BCC[f]	N/A	Open woodlands, brushy clearings with patches of weeds, shrubs, and scattered trees.	Low
Henslow's Sparrow (*Centronyx henslowii*)	BCC[f]	N/A	Breed in wet meadows, weedy pastures, lowland prairies, and cultivated hayfields when habitat is limited.	Moderate
Lark Bunting (*Calamospiza melanocorys*)	BCC[f]	SCP I	Mixed-grass prairie with scattered shrubs, such as sagebrush. Will also use tame grasslands, hayfields, no-till croplands, wet meadows, etc., with low-to-moderate height vegetation.	Moderate
Lesser Yellowlegs[f] (*Tringa flavipes*)	BCC	N/A	Fresh and brackish wetlands, including, but not limited to marshes, lake and pond edges, and flooded agricultural fields.	Low
Lesser Scaup (Aythya affinis)	N/A	SCP II	Large wetlands with emergent vegetation and associated upland habitat.	Moderate
Long-eared Owl (*Asio otus*)	BCC[f]	N/A	A variety of open grasslands with scattered trees and shrubs; will also use cropland and pastures.	Moderate
Marbled Godwit (*Limosa fedoa*)	BCC	SCP I	Expansive wetland complexes with associated grasslands; will also use uplands and roadside ditches for foraging.	Moderate
Nelson's Sparrow* (*Ammospiza nelsoni*)	BCC[e]	SCP I	Freshwater wetlands or moist areas with dense emergent vegetation or dense grass.	Moderate
Northern Harrier (*Circus hudsonius*)	BCC[f]	SCP II	Large, open grasslands or marshes with tall, dense vegetation; will also use cropland, pastures, shrubby fields, and fallow fields for foraging.	High
Northern Pintail (*Anas acuta*)	N/A	SCP II	Wetland complexes with open water and associated upland prairie; prefers native prairie but will also use Conservation Reserve Program (CRP) lands, hayfields, pastures, and weedy field borders.	Moderate
Pectoral Sandpiper[f] (*Calidris melanotos*)	BBC	N/A	Wet grassy areas, including, lake and pond edges, and flooded agricultural fields	Low
Piping Plover (*Charadrius melodus*)	FT	SCP II	Alkali lakes, freshwater lakes, reservoirs, and rivers.	Low
Prairie Falcon (*Falco mexicanus*)	BCC[f]	SCP II	Nests along cliffs and rock outcroppings. Forages in open grasslands.	Low

Rufa Red Knot (*Calidris canutus rufa*)	FT	SCP III	Natural wetland features such as freshwater lakeshores and alkali lakes for migration stopover habitat.	Low
Sharp-tailed Grouse (*Tympanuchus phasianellus*)	N/A	SCP II	Mixed-grass prairie with scattered shrubs or small trees; leks are generally found on elevated, less vegetated areas compared to the surrounding area.	Moderate
Sprague's Pipit (*Anthus spragueii*)	BCC[f]	SCP I	Requires large areas of native mixed-grass prairie.	Moderate
Swainson's Hawk (*Buteo swainsoni*)	BCC[e]	SCP I	A variety of open grasslands with scattered trees and shrubs; will also use cropland and pastures. Nests may be placed in small clumps of isolated trees or shelterbelts, though will sometimes nest on the ground.	High
Western grebe (*Aechmophorus occidentalis*)	BCC[f]	N/A	Requires large lakes with emergent vegetation for breeding; open water is preferred for foraging and courtship.	Low
Willet (*Tringa semipalmata*)	BCC	SCP II	Expansive wetland complexes with associated grasslands; prefers shallow wetlands without dense emergent vegetation.	Moderate
Wilson's Phalarope (*Phalaropus tricolor*)	N/A	SCP I	Open wetlands with associated upland grasslands or wet meadows.	Moderate
Whooping Crane (*Grus americana*)	FE	SCP III	Inhabits open habitats such as grasslands, marshes, and agricultural fields. Nest selection varies from natural cavities to fabricated structures.	Moderate
BATS				
Big Brown Bat (*Eptesicus fuscus*)	N/A	SCP I	Habitat generalist, including urban and rural habitats, but often associated with trees; will also use fabricated structures for roosting.	High
Little Brown Bat (*Myotis lucifugus*)	N/A	SCP I	Inhabits caves, mines, forests, and agricultural areas. Colonies can be found in fabricated structures as well.	Moderate
Northern Long-eared Bat (*Myotis septentrionalis*)	FE	SCP I	Interior forest species; however, will use a variety of woodland habitats. Roost generalist. Roosts under bark, cavities, or crevices of dead and living trees during summer. Colonies can be found in fabricated structures as well.	Low
INSECTS				
Monarch Butterfly (*Danaus plexippus*)	FC	SCP I	Breeds and forages on various milkweed (*Asclepias spp*.) within a variety of habitats including rangelands, agricultural areas, riparian habitats, and wetlands.	Moderate

[a] Federal status: BCC= Bird of Conservation Concern (USFWS 2008); BGEPA = Bald and Golden Eagle Protection Act; FE = ESA-listed as endangered; FT = ESA-listed as threatened; FC = ESA-listed as a candidate species; N/A = No federal and/or state status.
[b] State status indicates North Dakota SWAP (Dyke et al. 2015) SCP Level I, II, or III.
[c] Likelihood of Occurrence: Low = species range intersects the Project Boundary but no or minimal suitable habitat is present; Moderate = species range intersects the Project Boundary and suitable habitat is likely present or the species is known to have occurred within the Project Boundary or the general vicinity; High = species range intersects the Project Boundary and high-quality suitable habitat is present within and/or populations are known to exist within the general vicinity of the Project Boundary; Unknown = species range intersects the Project Boundary but the extent of suitable habitat within the Project Boundary is unknown.
[e] At the time of Tier 1 through 3 studies, this species was considered BCC (USFWS 2008). However, the USFWS has since removed this species from their list of BCC for the Prairie Pothole BCR (USFWS 2021a).
[f] At the time of Tier 1 through 3 studies, this species was not considered BCC (USFWS 2008). However, the USFWS has since added this species to their list of BCC for the Prairie Pothole BCR (USFWS 2021a).

4.1.1 Federally Protected Species Accounts

Bald eagle

Bald eagles require large mature trees that have the branch structure necessary in which to build their nests, typically near open water to provide foraging opportunities (Buehler 2020). They have strong nest site fidelity and will often build more than one nest within their territory (Buehler 2000).

A 2009 statewide census did not document any bald eagle nests in Logan or McIntosh counties; however, two occupied nests were documented in southern Kidder County, north of the Project Boundary along the Missouri River (Johnson 2009; specific locations within the county were not disclosed in this report). Since the publication of this report, the nesting bald eagle population in North Dakota has increased from 50 nests in 2008 to nearly 350 nests (NDGF 2022). It is possible that bald eagles may have begun nesting in Logan or McIntosh County since data was last published. For example, citizen science data from Logan County indicates some small lakes, such as Beaver Lake, may host one or more nesting pairs (AKN 2019).

Bald eagles likely utilize the Project Boundary across multiple seasons within the annual cycle, particularly during spring and fall migration periods (AKN 2019). Small, isolated patches of trees associated with wetlands or riparian areas within the Project Boundary may provide suitable bald eagle breeding habitat. Based on the distribution of the species, presence of nesting and foraging habitats, and sightings, occurrence of bald eagles within the Project Boundary is likely.

Golden eagle

Golden eagles inhabit rolling foothills and mountainous terrain including prairies, wide, arid plateaus deeply cut by streams and canyons, and open mountain slopes; this species is most closely associated with open country habitats in mountainous regions during the breeding season (Cornell Lab of Ornithology 2023). Golden eagles exhibit a strong preference for establishing nests and breeding territories on cliffs and rocky outcrops and constructing large platform nests of sticks and greenery on rock ledges or cliffs. While uncommon, golden eagles may also nest in large trees, anthropogenic structures, and occasionally on the ground (Katzner et al. 2020). Golden eagles commonly breed in the western US (Kochert et al. 2020), including western North Dakota (Dyke et al. 2015; AKN 2019).

Golden eagles likely migrate through the Project Boundary and are known to winter within south-central counties of North Dakota (Kochert et al. 2002; AKN 2019). As such, it is possible that golden eagles occur within the Project Boundary across multiple seasons, but are unlikely to nest in the Project.

Piping plover

In the Northern Great Plains, piping plovers nest on the unvegetated shorelines of alkali lakes, freshwater lakes, reservoirs, and river sandbars. In North Dakota, nesting activity is primarily on the Missouri River sandbars. They also can be found in other scattered locations in the State, including the alkali lakes core area in northwestern and central North Dakota, where suitable sandy habitat exists, but distribution is limited and rare outside of the Missouri River system (North

Dakota Department of Agriculture 2023). No critical habitat occurs within the Project Boundary; however, Logan County does contain designated critical habitat for the piping plover within Baltzer Waterfowl Production Area, approximately 3 mi northeast of the Project Boundary (Figure 4.1). McIntosh County also contains critical habitat for this species, 10.5 mi east of the Project Boundary (USFWS 2019d). The northeastern portion of the Project Boundary has the greatest concentration of prairie pothole features with associated emergent wetlands, which may provide potentially suitable habitat for piping plovers, though unlikely as the surrounding areas have similar habitat. As such, piping plovers have a low likelihood of occurrence within the Project.

Rufa red knot

Natural wetland features such as freshwater lakeshores and alkali lakes may also provide suitable migration stopover habitat for the rufa red knot, another ESA-listed threatened migratory shorebird species. Rufa red knots do not breed in North Dakota, and critical habitat has not been designated for this species (USFWS 2019a). In general, the rufa red knot is a scarce migrant within the state (Avian Knowledge Network [AKN] 2019); however, it is possible that rufa red knots could use similar wetland features within piping plover designated critical habitat in Logan or McIntosh counties. As such, the Project Boundary could provide suitable stopover habitat for the rufa red knot; however, likelihood of occurrence is low.

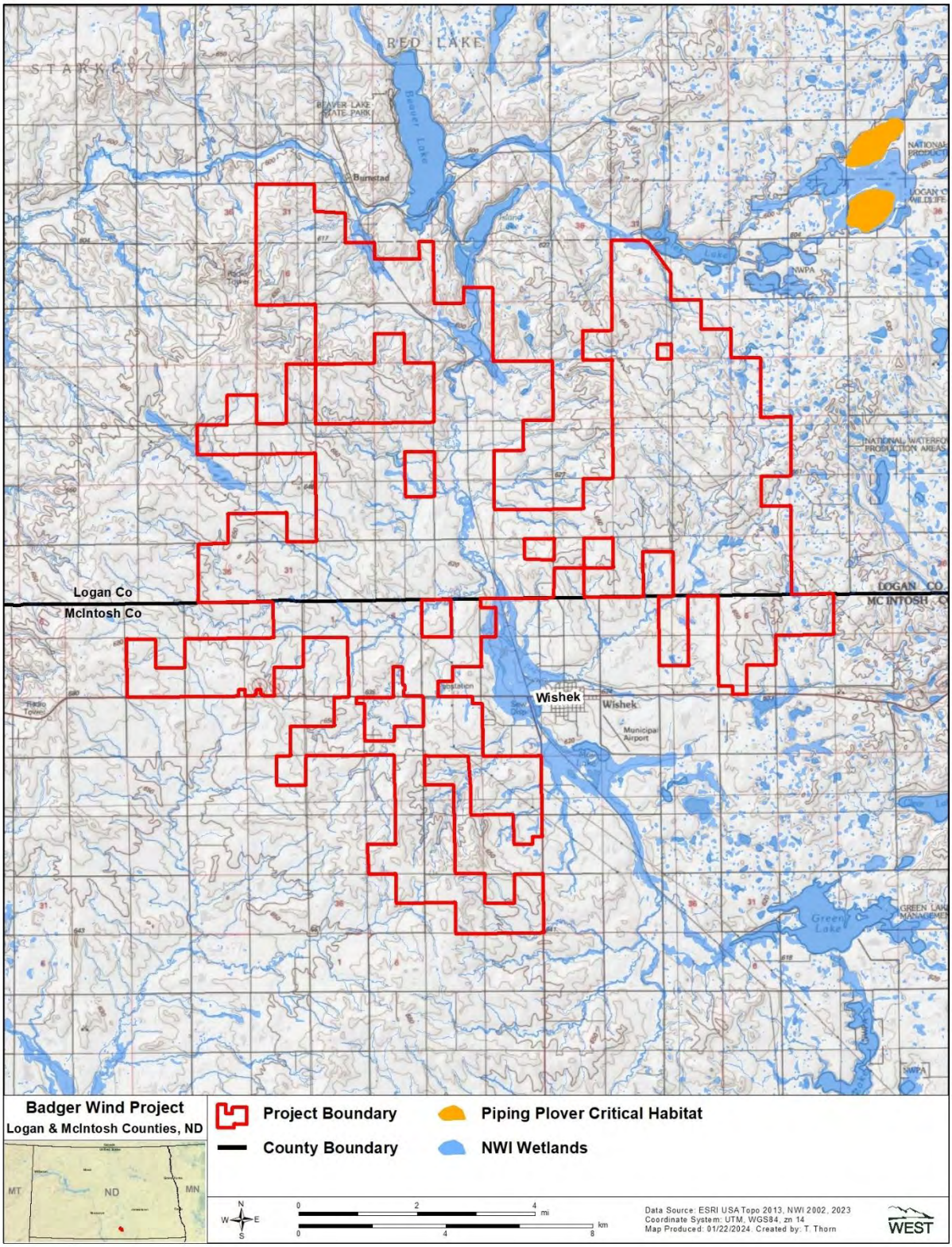

Figure 4.1. Piping plover critical habitat near the Badger Wind Project in Logan and McIntosh counties, North Dakota.

Whooping crane

The whooping crane is ESA-listed as endangered and are a NDGFD SCP LI (Dyke et al. 2015). Only one self-sustaining wild population of this species exists, which breeds in Wood Buffalo National Park in Canada and winters in the coastal marshes of Texas, including in the Aransas National Wildlife Refuge (Urbanek and Lewis 2020). The last survey from the USFWS winter 2022–2023 estimated 536 whooping cranes, indicating the population has remained stable over the past couple years (Butler et al. 2023). Whooping crane spring and fall migration covers approximately 2,500 mi between their breeding and wintering sites, along a migratory corridor through Alberta, Saskatchewan, Montana, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and into Texas (USGS 2018; Figure 4.2). The same path is taken in the spring and fall, with 75% of whooping crane sightings occurring within a 183-mi wide migratory corridor (Pearse et al. 2018).

Whooping cranes occur in North Dakota during the spring and fall migration periods; however, this species does not breed in North Dakota (Urbanek and Lewis 2015). Whooping cranes migrate and stopover along habitats including shallow wetlands and marshes, edges and sandbars of shallow rivers, and agricultural fields near a water source (Baasch et al. 2019). Whooping cranes forage on invertebrates, small vertebrates, berries, and grains, and typically roost or loaf in shallow water wetlands and forage in wet meadows or cultivated agricultural lands (Urbanek and Lewis 2020). Designated critical habitat for whooping crane is not present within Logan or McIntosh counties, North Dakota (USFWS 2016a; USFWS 2019d). Potentially suitable stopover habitat exists within the Project Boundary; including wetlands associated with stream corridors, particularly in the southern and northeastern portions of the Project Boundary and prairie potholes in I northeastern portion of the Project Boundary (Figure 2.1).

No confirmed telemetry observations have been recorded within the Project Boundary (Pearse et al. 2020); however, other confirmed telemetry observations have been reported within five mi of the Project Boundary (USFWS 2022; Figure 4.3). The observations occurred between October 31 and November 6, 2011 and consisted of four individuals loafing in a pond and feeding in nearby fields approximately 5 mi southwest of the Project Boundary. One group of three whooping cranes was recorded within the Project Boundary April 15 – 17, 2020 during avian use surveys (Atwell 2020c; Figure 4.3). Based on the distribution of the species, the Project's location in the migration corridor, and the confirmed sightings, whooping cranes may occur in the Project Boundary during the spring and fall migration.

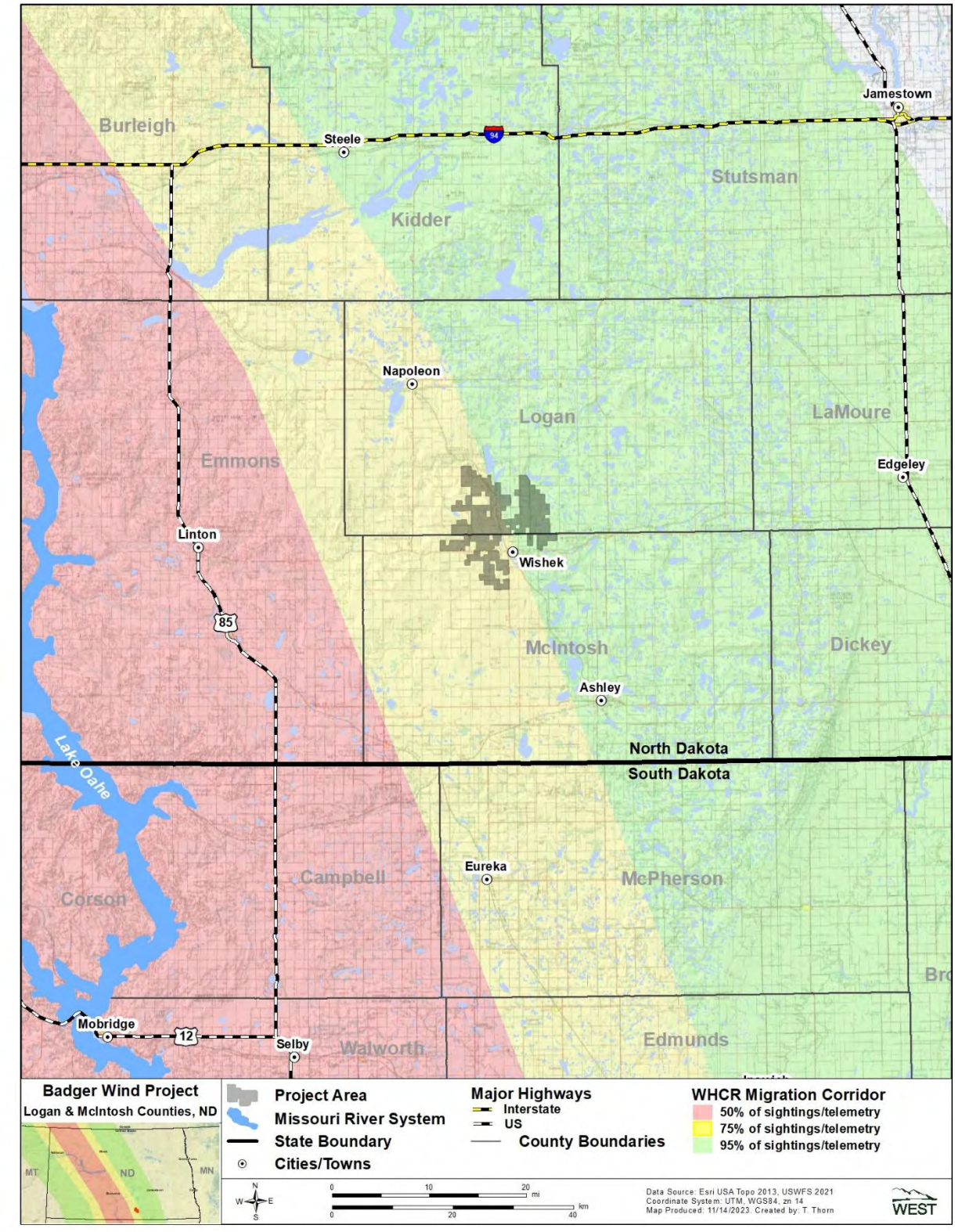

Figure 4.2. Location of the Badger Wind Project in Logan and McIntosh Counties, North Dakota within the whooping crane migration corridor.

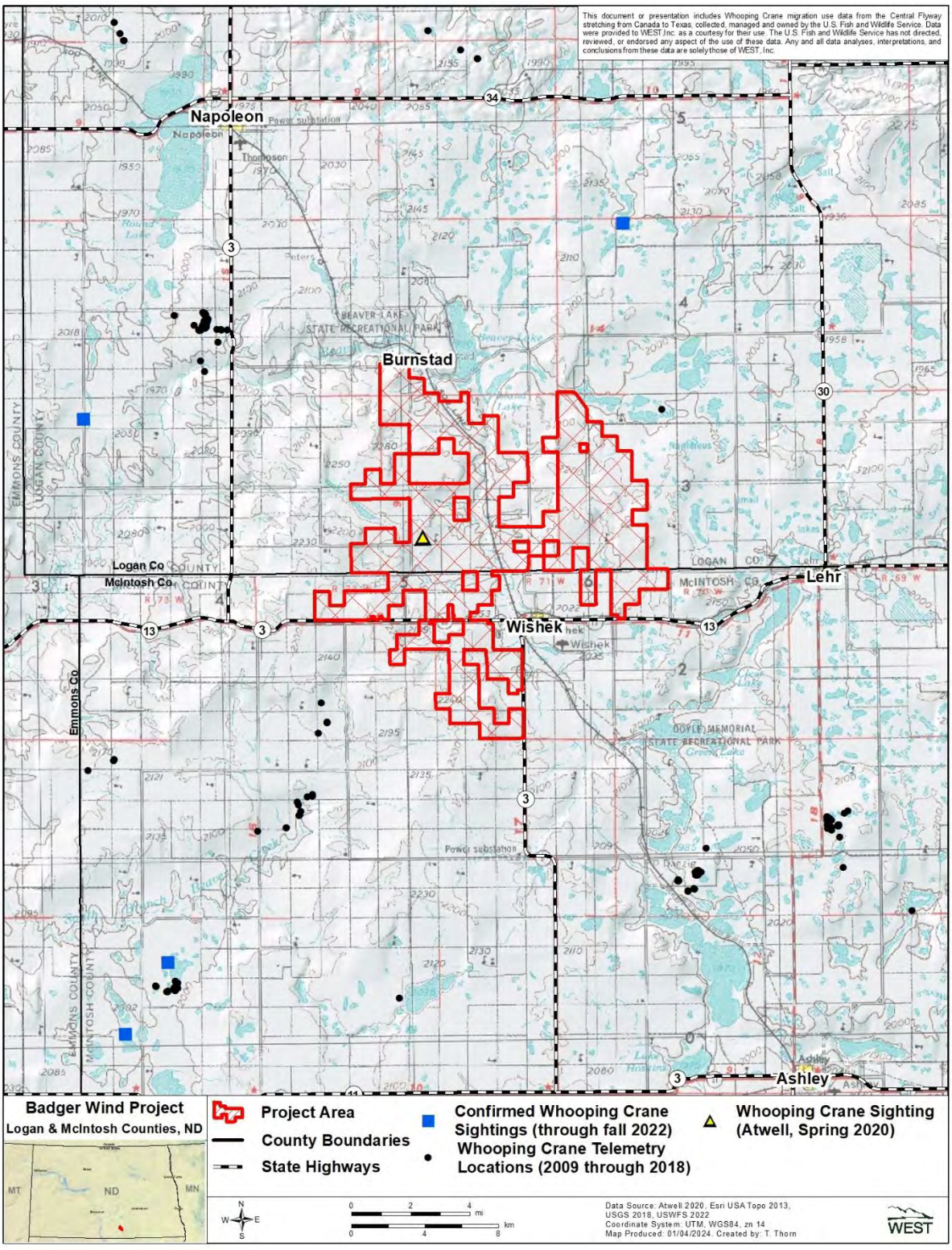

Figure 4.3. Whooping crane observations and telemetry locations relative to the Badger Wind Project in Logan and McIntosh counties, North Dakota.

Northern long-eared bat

The federally endangered (NLEB) can be found in the US from Maine to North Carolina on the Atlantic coast, westward to eastern Oklahoma and northward through parts of South Dakota and North Dakota (USFWS 2023a), and more specifically the Project (USFWS 2023b). The Project Boundary is located within the possible range for NLEB (see Section 5, Figure 5.5; USFWS 2023a; Dyke et al. 2015).

Suitable summer habitat for NLEB consists of a wide variety of forested/wooded habitats, as well as interspersed non-forested habitats (i.e., emergent wetlands, shelterbelts adjacent to agriculture fields, and pastures). NLEB prefer mature forest as foraging habitat but can also use younger riparian forests, open forest corridors, wooded ponds, emergent wetlands, adjacent agriculture fields, and wooded shelterbelts (Foster and Kurta 1999). Linear features, such as fencerows, riparian forests, and other wooded corridors, can serve as suitable habitat for NLEB.

NLEB are roost generalists and utilize a broad array of roost characteristics, including roost types (e.g., cavities, crevices, exfoliating bark) and tree species (Carter and Feldhamer 2005; Timpone et al. 2010). NLEB roost species can vary by geographic location and site characteristics (Whalen and Krusac 2014).

USFWS guidelines define suitable NLEB habitat as forests and woodlots containing potential roost trees; however, buildings, barns, bridges, and bat houses may also be considered potential summer habitat for northern long-eared bat. Trees with a diameter at breast height greater than or equal to 3.0 inches and that have exfoliating bark and/or cavities are defined as potential roosts. NLEB roost trees may include individual trees when they exhibit characteristics of a potential roost and are within 1,000 feet (ft) of other forested/wooded habitat (USFWS 2019c).

No maternity roost trees or hibernacula have been reported for this species in North Dakota (USFWS 2019b); the closest hibernacula and maternity roosts are located in central Minnesota, approximately 200 mi northeast of the Project Boundary (Minnesota Department of Natural Resources and USFWS 2021). The SWAP identifies the Turtle Mountains and riparian corridors of the Little Missouri and Missouri Rivers as key areas of NLEB habitat. The Turtle Mountains are approximately 180 mi north of the Project Boundary; the Missouri River is approximately 33 mi west.

Publicly documented NLEB presence in North Dakota is west of the Missouri River within the Missouri River Valley, the Badlands of North Dakota, and the Moreau Prairie. Confirmed northern long-eared presence via acoustic recordings or mist netting ranged from approximately 53 to 187 mi west and northwest of the Project Boundary (Nelson et al. 2015; Shank et al. 2015).

Tier 2 desktop analysis identified 426.9 ac (0.35% of the 2019 Study Area) of potentially suitable NLEB habitat from 248 forested areas and wooded shelterbelts (see Section 5, Figure 5.5). The median forested area of potential suitable habitat was 1.4 ac. The size of woodlots ranges from 0.09 to 8.65 ac. On-site reconnaissance confirmed that forested area within the 2019 Study Area has low connectivity and high fragmentation, which limits the potential for foraging, commuting,

and suitable NLEB habitat. However, as previously mentioned, NLEB are roost generalists, and roost tree species exhibiting preferential roost characteristics were documented within the 2019 Study Area during a site visit on June 12–June 13, 2019 (Atwell 2020a). Therefore, occurrence of NLEB within the Project is low.

Monarch butterfly

The monarch butterfly is a globally distributed butterfly that is currently listed as a federal candidate species (USFWS 2023c). Within North America, there are two distinct populations, eastern and western, that migrate from their summer range in southern Canada, the Great Lakes region, and the Northeast US down to their overwintering sites in Mexico and California, respectively (NatureServe 2023). Monarch butterflies in North Dakota are part of the eastern North American population. Adult monarch butterflies require a diversity of blooming nectar resources during the migration and breeding periods to ensure their success; additionally, they require their obligatory milkweed host plant (*Asclepias* spp.) for egg laying and larval development (USFWS 2023c; NatureServe 2023). Monarchs are found throughout North Dakota, including Logan and McIntosh counties (Dyke et al. 2015). Based on the information above, the likelihood of the monarch butterfly to occur within the Project is moderate.

4.1.2 Birds of Conservation Concern

The Tier 1 and 2 analysis identified 26 avian species and two bat species designated as BCC that have potential to occur in the Project (Table 4.1; Appendix A). A majority of BCC species identified in the IPaC report (USFWS 2024) are designated as breeders (i.e., species that may breed in the Project Boundary or its vicinity; Table 4.1) and have a moderate-to-high likelihood of occurrence within the Project. The Project Boundary also intersects the primary range for most of these species (Dyke et al. 2015).

4.1.3 North Dakota Species of Conservation Priority

Tier 1 and 2 analyses identified 29 species designated as North Dakota SCP that may occur within the Project (Table 4.1; Appendix A). SCP species are not afforded any additional regulatory protection under the ESA or North Dakota state law. Most of these species have a moderate-to-high likelihood of occurrence within the Project.

The northeastern portion of the Project contains the highest density of grassland habitat and pothole wetlands compared to the remainder of the Project. As a result, this portion of the Project is likely to see relatively higher abundance of grassland and wetland avian species, such as sharp-tailed grouse (*Tympanuchus phasianellus*; SCP Level II); Wilson's phalarope (*Phalaropus tricolor*; SCP Level I); a variety of duck species like northern pintail (*Anas acuta*; SCP Level II), lesser scaup (*Aythya affinis*; SCP Level II), and canvasback (*Aythya valisineria*; SCP Level II); and many of the SCP species listed above, such as chestnut-collared longspur, marbled godwit, and willet.

Raptor species have historically received more attention in collision analyses, due to an apparent higher probability of collision than other bird species given equal exposure to operating turbines (Strickland et al. 2011). Non-eagle raptor SCP species that may occur within the Project, particularly as breeding species, include ferruginous hawks (*Buteo regalis*; SCP Level I),

Swainson's hawks (*Buteo swainsoni*; SCP Level I), and northern harriers (*Circus hudsonius*; SCP Level II).

Eleven bat species are known to occur in North Dakota, six of which may occur within the Project. Of the six species with ranges intersecting the Project Boundary, three species, including the NLEB, big brown bat (*Eptesicus fuscus*), and little brown bat (*Myotis lucifugus*) are considered Level I North Dakota SCP (Dyke et al. 2015; NDGF 2016c; NDGF 2016d; BCI 2019). Given the habitat requirements of these species and the presence of potentially suitable habitat within the Project Boundary, there is a low likelihood for NLEB to occur and moderate-to-high likelihood of occurrence of big brown and little brown bat within the Project Boundary.

4.1.4 Designated Critical Habitat and Habitat for Species of Concern

There is no USFWS designated Critical Habitat for birds or bats within the Project Boundary. The nearest Critical Habitat for piping plovers is approximately 3 mi northeast of the Project Boundary in Logan County (Figure 4.1).

Patches of habitat that may be potentially used by TES and SCP can be found within the Project Boundary. NLCD indicated the Project Boundary contains 47.4% of the Project as herbaceous/grasslands and 3.7% as pasture/hayland cover (NLCD 2021). TES and North Dakota SPC such as bobolink, chestnut-collared longspur, and northern harrier may utilize these hay/pasture areas.

The Project Boundary is dominated by herbaceous/grassland and cultivated cropland with very little wooded habitat and no known caves or other karst landforms. Wooded bat habitat is limited to 7.8 ac of deciduous forest, primarily consisting of small woodlots and shelterbelts scattered throughout the Project Boundary. Most riparian areas in the Project Boundary do not support adjacent woodlands. Although it is possible that TES such as NLEB could use these wooded habitats, because of the limited size and fragmentation of woodlands within the Project Boundary, there is low potential for TES species to use these areas.

In general, use of the Project Boundary by SOC is not anticipated to be higher than the surrounding regional landscape. Some species have potential to move through the Project Boundary during spring and fall migration, though potential stopover habitat that might cause congregations of large groups of migrating birds and bats is generally limited within the Project Boundary.

2. Does the landscape contain areas where development is precluded by law or designated as sensitive according to scientifically credible information?

At the time of the Tier 1 and 2 analyses, USGS PAD-US version 2.0 identified one USFWS Waterfowl Production Area (WPA), two North Dakota State Lands parcels, and one USFWS Wildlife Management Area (WMA) that intersect the Project Boundary (USGS 2018). WPAs are public lands managed by the USFWS to preserve habitat for waterfowl and other wildlife, whereas WMAs are owned by the state of North Dakota and were established to protect and manage lands

and waters for wildlife production, public hunting, trapping, fishing, and other recreational activities. Additional review of spatial data from NDGF indicated that there are no Private Lands Open to Sportsmen (PLOTS) parcels located within or intersecting the Project Boundary (NDGF 2021). The closest PLOTS parcel is one mi south of the Project Boundary. This PLOTS parcel was cross listed as Conservation Reserve Enhancement Program (CREP) easements. The NDGF holds PLOTS agreements with private landowners to conserve habitat for fish and wildlife populations while also allowing walk-in public access for hunting. Normal farming and ranching activities are allowed in these PLOTS parcels.

Review of the USGS PAD-US version 2.1 (USGS 2020b) for the Project Boundary identified 17 locations within or partially within the Project where development is precluded by law of where the areas are identified as sensitive according to scientifically credible information. A 14.6-acre portion of a parcel identified as North Dakota Surface Trust land overlaps the central portion of the Project Boundary (USGS 2020b). In addition, 16 areas contain USFWS wetland or grassland easements, some of which contain both. In total, approximately 2,414 acres of USFWS easements were identified within the Project Boundary, including approximately 275 acres of USFWS grassland easements and 2,138 acres of USFWS wetland easements. Note that in some locations, grassland and wetland easements overlap (USGS 2020b). Refer to Figure 2.2).

Publicly available CRP spatial data were not readily available for Tier 2 studies.

3. Are there plant communities of concern present or likely to be present within the site(s)?

The North Dakota Parks and Recreation Department maintains the North Dakota Natural Heritage Inventory database containing the known locations of rare animal and plant species and significant ecological communities within the state. In a November 2021 guidance letter and a review of the NatureServe online database (NatureServe) in January 2024, the Department indicates there are no known rare species or significant ecological communities documented within or immediately adjacent to the Project Boundary.

Some vegetation communities dominated by grasses have been described as native, or unbroken, prairie by NDGF. These areas are used as a proxy to estimate potential impacts to grassland breeding bird habitat; however, these areas have no jurisdictional protection or management mandates. Field verification of grassland habitat conditions further refined an understanding of where areas defined by NDGF as unbroken have been converted to agricultural production. These areas were used to focus siting Project infrastructure to avoid impacts to unbroken grassland habitat to the extent practicable.

Badger Wind continues to coordinate with USFWS and NDGF to refine a site layout that minimizes impacts to unbroken grassland habitat and wetlands to the extent practicable.

4. Are there known critical areas of congregation of species of concern, including, but not limited to: maternity roosts, hibernacula, staging areas, winter ranges, nesting sites, migration stopovers or corridors, leks, or other areas of seasonal importance?

Based on Tier 2 site reconnaissance and desktop study results, no known critical areas of congregation for SOC were identified within the Project Boundary, though it is possible that the Project supports potential stopover habitat for ESA-listed endangered whooping cranes, nesting habitat for sharp-tailed grouse, and nesting sites for raptors.

No globally or state recognized Important Bird Areas (IBA) are within 10 mi of the Project. The closest IBA is Appam Lake Waterfowl Protection Area (located approximately 16 mi to the north of the Project in Kidder and Logan Counties, N46.655954° W99.56191°). This IBA is a state-recognized IBA (National Audubon Society 2019) and provides important breeding habitat for piping plovers (Chipley et al. 2003).

No maternity roost trees or hibernacula have been reported for NLEB in North Dakota (USFWS 2019b). While some small forests, woodlots, and shelterbelts may provide suitable summer habitat for NLEB, maternity roosts are unlikely within the Project Boundary given a lack of available forested habitat. This species may occur as spring or fall migrants within the Project.

Potential suitable stopover habitat may exist within the Project Boundary for whooping cranes. The Tier 2 desktop stopover habitat assessment was conducted to assess the likelihood of whooping crane stopover use within the Project Boundary relative to four reference areas (Atwell 2021a). This assessment was conducted for a December 2020 Project Boundary (hereafter referred to as the whooping crane assessment area) that is similar in size and location to the current Project Boundary and four reference areas (Atwell 2021a). The reference areas were of equal shape and dimension at equal distances from the Project's centroid in each of the four cardinal directions (north, south, east, and west). The reference areas were spaced to be adjacent to, but without overlapping, the whooping crane assessment area. Due to the whooping crane assessment area configuration and to avoid overlap, the west and east reference areas were slightly farther from the whooping crane assessment area than the north and south reference areas. The results of the analysis generally confirmed that on a regional basis, and in comparison, to four reference areas adjacent to the whooping crane assessment area, the Project had been sited in an area that has relatively lower quality and quantity whooping crane stopover habitat. The whooping crane assessment area primarily comprises croplands, has a relatively low proportion of wetland and water habitat, and is located in the 75th percentile of the whooping crane migration corridor. Areas to the west (which are located in the 50th percentile migration corridor) and to the north and east (which have a relatively higher percentage of wetlands and waters) have relatively more potentially suitable whooping crane stopover habitat (Atwell 2021a).

Sharp-tailed grouse is a North Dakota SCP Level II species that likely occurs year-round within the Project (Dyke et al. 2015). This species utilizes a breeding strategy known as "lekking" in which multiple males gather at a particular site to display and compete for spectating females (i.e., potential mates). The North Dakota SWAP identified Logan and McIntosh counties as being entirely within the primary range for this species and indicates that sharp-tailed grouse are most common within the Missouri Slope region. Preferred habitat includes mixed-grass prairie with scattered shrubs or small trees. Leks are generally found on elevated, less vegetated areas

compared to the surrounding area (Dyke et al. 2015). As such, the Project Boundary is likely to contain habitat to support sharp-tailed grouse leks, particularly in the north and northeastern portions of the Project.

Raptors may migrate over the Project Boundary but are generally expected to be dispersed over the broader landscape prior to reaching the Project. Migrating raptor species will often use ridgelines and shorelines of large bodies of water to assist with thermal lift and navigation during migration (Liguori 2005), potentially resulting in high concentrations near these features during migration. Topography throughout most of the Project Boundary is generally similar to the surrounding landscape and is not expected to attract or concentrate migrating raptors. However, steeper topographic relief associated with the Missouri Coteau in the northern and northeastern portions of the Project has potential to create thermals and attract migrating raptors. Furthermore, grassland and wetland habitats located in the northern and northeastern portions of the Project Boundary may provide a larger prey base for raptors compared to the more cropland-heavy areas in the southern portion of the Project. Therefore, raptor use may be relatively higher in northern and northeastern portions of the Project.

No landscape features identified within the Project Boundary are expected to concentrate migrating passerines, which could result in higher-than-expected fatality rates. The Project is predominantly herbaceous/grassland and cultivated cropland, with very little forested and wetland habitat. No particular habitat resources are likely to attract passerine migrants to the Project.

5. Using best available scientific information has the developer or relevant federal, state, tribal, and/or local agency identified the potential presence of a population of a species of habitat fragmentation concern?

Within North Dakota, there are 19 species identified as Species of Habitat Fragmentation Concern (SHFC; USFWS 2013b) of which 18 have the potential to occur within the Project (Table 3). These bird species are dependent on large tracts of unbroken grasslands and or wetland habitats and may be susceptible to fragmentation from Project infrastructure. Due to the loss of these habitats and increased fragmentation of available habitats, breeding success of these species has declined (USFWS 2013b; eBird 2023; NatureServe 2023). The Project Boundary consists of 47.4% herbaceous/grasslands and 2.6% of water/wetlands (NLCD 2021).

Table 4.2. Species of Habitat Fragmentation Concern in Logan and McIntosh counties, North Dakota, and their potential to occur within the Badger Wind Project.

Common Name	Scientific Name	Status	Potential to Occur[2]
Baird's Sparrow	*Centronyx bairdii*	BCC; SHFC	Y
Burrowing Owl	*Athene cunicularia*	SHFC	Y
Chestnut-Collared Longspur	*Calcarius ornatus*	BCC; SHFC	Y
Clay-Colored Sparrow	*Spizella pallida*	SHFC	Y
Greater Prairie-Chicken	*Tympanuchus cupido*	SHFC	Y
Greater Sage-Grouse	*Centrocercus urophasianus*	SHFC	N
Grasshopper Sparrow	*Ammodramus savannarum*	BCC; SHFC	Y
Lark Bunting	*Calamospiza melanocorys*	SHFC	Y
LeConte's Sparrow	*Ammodramus leconteii*	BCC; SHFC	Y
Long-Billed Curlew	*Numenius americanus*	BCC; SHFC	Y
Marbled Godwit	*Limosa fedoa*	BCC; SHFC	Y
Northern Harrier	*Circus hudsonius*	BCC; SHFC	Y
Savannah Sparrow	*Passerculus sandwichensis*	SHFC	Y
Sedge Wren	*Cistothorus platensis*	SHFC	Y
Sprague's Pipit	*Anthus spragueii*	BCC; SHFC	Y
Upland Sandpiper	*Bartramia longicauda*	SHFC	Y
Western Meadowlark	*Sturnella neglecta*	SHFC	Y
Willet	*Tringa semipalmata*	BCC; SHFC	Y
Wilson's Phalarope	*Phalaropus tricolor*	SHFC	Y

[1]. BCC = Federal Bird of Conservation Concern; SHFC = Species of Habitat Fragmentation Concern.

[2]. Y = Yes: the area overlaps the species' known current distribution, the area contains suitable habitat, or the area contains previous records of the species; N = No: the areas is located outside the species' known distribution, no previous records were found of the species in the area, or the area does not contain suitable habitat.

Sources: USFWS 2013b; eBird 2023; NatureServe 2023.

6. Which species of birds and bats, especially those known to be at risk by wind energy facilities, are likely to use the proposed site based on an assessment of site attributes?

Landscape characteristics within the Project Boundary and publicly available information of distribution ranges, habitat requirements, and known occurrences in North Dakota collectively indicate that several species of birds and bats known to be vulnerable to impacts from wind energy facilities may use the Project on a limited basis. These species also have potential to use relatively higher quality habitat in the vicinity of the Project Boundary. These species include, but are not limited to, cave and tree-roosting migratory bats, nesting and migrating raptors (i.e., bald eagles and other non-eagle raptors), and breeding and migratory birds, including whooping cranes that will likely migrate over the Project during spring and fall migration periods. Project development is not expected to have significant adverse impacts on bird and bat species.

4.1.5 Cave and Tree-roosting Migratory Bats

As previously mentioned, 11 species of bats are known to occur in North Dakota, six of which may occur within the Project Boundary. This includes big brown bat, eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), little brown bat, NLEB, and silver-haired bat (*Lasiurus cinereus*; NDGF 2016c; NDGF 2016d; BCI 2019). The NLEB, is ESA-listed as endangered (USFWS 2023a) and is also considered a Level I North Dakota SCP. Two additional species, big brown bat and little brown bat are also considered Level I North Dakota SCP. SCP are a

conservation priority for the state under the North Dakota SWAP (Dyke et al. 2015) but are not protected under state law. The little brown bat is known for forming maternity colonies in artificial structures and foraging over water (BCI 2019). The little brown bat was heavily impacted by white-nose syndrome (WNS) in the eastern part of its range and is currently under review for federal listing (USFWS 2019e).

Arnett and Baerwald (2013) summarized the results of post-construction bat mortality monitoring studies at wind facilities across five regions in the United States and Canada between 2000 and 2011. The Great Plains region (which includes North Dakota) had moderately high fatality rates on average, though results were highly variable. This region had the second lowest fatality estimate of the five regions examined (Arnett and Baerwald 2013). While Arnett and Baerwald (2013) do not focus heavily on habitat features, they note that wind facilities within the Great Basin/Southwest Open Range-Desert region typically reported the lowest mean fatality rates and were generally located in areas with few roosting and foraging areas, and possibly outside of migratory pathways (Arnett and Baerwald 2013). This suggests that placing turbines away from potential roosting and foraging areas may help to reduce bat fatalities. Given the overall land cover within the Project Boundary, the Project is not expected to take bats at a greater rate than other wind facilities in the Great Plains region.

Migratory tree bats are among the most affected species at wind farms across North America and Canada (Arnett and Baerwald 2013). Collision risk for bats within the Project Boundary is expected to follow national trends with migratory tree bats, such as eastern red, hoary, and silver-haired bats, comprising the majority of fatalities. It is unlikely that bats would utilize the Project for summer roosting given the relative lack of forested roosting habitat within the Project Boundary. More likely utilization of the Project would be during migration.

The known distribution and specific habitat requirements of NLEB indicate that this species could potentially occur within the Project Boundary (USFWS 2019f). In particular, this species may occur as a migrant within the Project, but the absence of high-quality woodlands within the Project Boundary limit the species' likelihood to occur. Limited patches of deciduous woodland that may provide summer roosting habitat and foraging habitat exist within the Project.

Using aerial imagery, potential bat habitat was delineated within the Project Boundary by using a 1,000-ft buffer around forested areas greater than 5 ac and around connective woodlands (i.e., forest patches of less than 5 ac connected to the larger forest parcels; See Section 5, Figure 5.6). The highest concentration of bat habitat occurs south of the Project Boundary and is generally associated with shelterbelts (Figure 5.6). Bat use is expected during the summer months, with potential risk greater during the fall migration period.

4.1.6 Nesting and Migratory Raptors

The predominance of open, agricultural cropland and herbaceous/grassland habitat greatly reduces the Project's suitability for tree-nesting raptors. Occasional shelterbelts and small woodlots identified during site reconnaissance may provide suitable raptor nesting habitat, but the overall density of breeding raptors in the Project is expected to be low. BGEPA species and

state raptor SCP with potential to occur within the Project Boundary are discussed in more detail below.

Bald eagles are known to occur within Logan and McIntosh counties (AKN 2019). This species prefers to nest in tall trees near bodies of water where prey resources (e.g., fish, waterfowl) are available (Buehler 2000). While the Project generally lacks the habitat features typical for nesting bald eagles, the NDGF indicated that bald eagles have nested in Kidder County, north of the Project Boundary (Johnson 2009), and an increasing bald eagle population in the state (NDGF 2022) may indicate a possibility that bald eagle nests exist in Logan and McIntosh counties. Therefore, this species likely uses the Project, most likely during both spring and fall migration periods. The absence of large riparian zones, lakes, and other concentrating natural features may decrease bald eagle use of the Project. Bald eagle winter roosts likely do not occur within the Project Boundary because few habitat features conducive to large winter roosts, such as larger super-canopy trees within a woodland tract near water, are present (Buehler 2000).

As previously mentioned, golden eagles are more likely to nest in the western portion of North Dakota (Dyke et al. 2015; AKN 2019); however, this species is known to have a limited and scattered presence in the vicinity of the Project Boundary and may occur within the Project during spring and fall migratory periods, as well as in winter (AKN 2019).

The Project also has potential habitat to support other species of breeding and migratory raptors, such as red-tailed hawk (*Buteo jamaicensis*), ferruginous hawk (SCP Level I), Swainson's hawk (SCP Level I), and northern harrier (SCP Level II) among others. Beston et al. (2016) found that in general, Accipitriformes (i.e., diurnal birds of prey) tended to have a higher proportion of fatalities due to turbines and a higher risk of turbine-caused fatality compared to other species groups. The risk of collision mortality for some raptor species, such as northern harrier, tended to be rather low (Smith et al. 2011; Beston et al. 2016)

Eagles and other raptors are likely to occur during all seasons with the potential risk being greater during the spring and fall migration periods.

4.1.7 Breeding and Migratory Birds

A variety of migratory birds may move through and utilize the Project seasonally. Neotropical migrant species likely move over the Project Boundary during both during the day and nocturnally (AKN 2021). The Project includes limited woodland and/or shrubland habitat that could be used by neotropical migrants during stopover events. Habitat and topographical features found within the Project Boundary are not expected to attract large congregations of birds during migration at a rate greater than the surrounding landscape. Although habitat features (e.g., water bodies, escarpments, conservation areas) that would concentrate large numbers of birds are minimal throughout most of the Project Boundary, the occurrence of any scattered wetlands, small open water features, or seasonally flooded agricultural fields could potentially provide stopover or breeding habitat for shorebirds, waterbirds, and waterfowl species. The northeastern portion of the Project contains prairie potholes and relatively larger tracts of herbaceous land cover. This

area may receive higher use by waterfowl, waterbirds, shorebirds, and grassland birds compared to more southern portions of the Project.

At the time of Tier 1 and 2 studies, the USFWS list of BCC species for the Prairie Potholes BCR contained 27 species. IPaC analyses for the Project Boundary specifically indicate 26 BCC species that are either BCC for the Prairie Potholes BCR or BCC throughout their ranges within the continental United States and Alaska. These include species with potential to breed within or migrate through the Project Boundary (Table 4.1).

Several avian species are common in agricultural areas of North Dakota and have potential to occur in the Project. In particular, the horned lark (*Eremophila alpestris*) is one of the most widely distributed species in North America (Beason 2020), and dramatic declines are widespread (Sauer et al. 2017). Horned Larks are one of the most commonly recorded mortalities at North American wind farms (Erickson et al. 2001; Erickson et al. 2014).

7. Is there a potential for significant impacts to species of concern based on the answers to the questions above, and considering the design of the proposed site?

The potential for significant impacts to SOC within the Project is expected to be low. Like other wind energy projects in the Midwest, there is potential for the Project to impact some bird and bat species of conservation concern, including TES and SCP, migratory bat species, migrating and nesting raptors, and grassland birds. Siting of Project infrastructure in agricultural lands and away from proximate areas of relatively higher quality habitat and the avoidance of herbaceous/grassland is expected to reduce impacts to SOC. Adverse population-level impacts to SOC are unlikely to occur. Minimizing turbine placement within the vicinity of wetland-grassland complexes to the greatest extent practicable will likely reduce direct impacts to avian species, such as collisions with turbines and habitat loss, as well as indirect impacts, such as displacement (Shaffer and Buhl 2016). Reducing turbine placement within suitable bat habitat and a 1,000-ft buffer to the greatest extent practicable may help to reduce impacts to bats during Project operation. Impacts to woodland habitat will be avoided where practicable; if tree removal is unavoidable, this removal will be completed in accordance with tree clearing restrictions for NLEB (USFWS 2023a) or coordinated with USFWS prior to tree clearing activities.

Based on the responses provided to Questions 1-7, adverse population-level impacts to SOC are not expected to occur.

4.2 Tiers 1 and 2 Decision Point

Tier 1 and Tier 2 review results indicated that ESA-listed species have known ranges that intersect the Project Boundary and habitat for these species may exist within the Project Boundary. While a large portion (42.9%) of the Project Boundary consists of active croplands; mixed grass prairie, planted grasslands, and herbaceous riparian areas accounts for 47.4% of the Project Boundary. These communities are present particularly in the northern and northeastern portions of the Project. Open water and wetland habitat (2.6% of the Project Boundary) is also present, including prairie potholes in the northeastern portion of the Project (USGS 2020a). These habitats may

attract a variety of avian SOC, including TES and SCP. Several species identified as SCP are also susceptible to grassland habitat fragmentation.

Several bat species are likely to migrate through the Project. The potential for maternity roosts of protected bat species to occur within the Project Boundary is low, as minimal habitat exists within the Project. While bald eagle nests are not known to occur in Logan or McIntosh counties, the nesting bald eagle population in North Dakota is increasing, and habitat within the vicinity of the Project Boundary may support nests that were not previously known. Furthermore, bald eagles may move through the Project during migration or travel between foraging and breeding or roosting sites. Similarly, a variety of other breeding and migratory raptors, land birds, waterfowl, and shorebirds are likely to use the Project and surrounding region.

Tier 3 field studies provide additional information to further assess potential impacts to bird and bat species that may use the Project, such as migratory tree bats, breeding and migratory birds, sharp-tailed grouse, and nesting and migratory raptors. Based on the Tier 1 and 2 analysis, Tier 3 pre-construction studies were concluded to be warranted to further assess the potential for direct and indirect impacts from the Project on bird and bat species. In the interest of completing a more robust due diligence Badger Wind completed a full suite of Tier 3 field studies including avian point count surveys, nesting eagle and raptor surveys, prairie grouse lek surveys, bat acoustic surveys, whooping crane habitat assessment, grassland habitat mapping, and wetland delineations and mapping.

5.0 TIER 3 – FIELD STUDIES TO DOCUMENT SITE WILDLIFE AND HABITAT AND PREDICT PROJECT IMPACTS

Based on the results of the Tier 1 and 2 reviews and in coordination with USFWS and NDGFD input, Tier 3 surveys (Table 5.1) were designed and completed at the Project Boundary and vicinity to understand wildlife usage, evaluate risk, and inform siting and operational protocols. Tier 3 pre-construction studies for the Project were conducted from May 2019 to November 2023, based on Tier 1 and Tier 2 analyses and coordination with USFWS and NDGF (Table 1.1). As described previously in Section 2, the Badger Wind Project Boundary has been reconfigured over the course of Project development. Tier 3 field studies were developed using various Project boundaries as Badger Wind progressed through the WEG. All map figures included in this BBCS show the Project Boundary. A discussion of applicability of these survey results relative to the 2023 Project Boundary can be found in Section 6 - Facility Design To Reduce Wildlife Conflict. Final reports for Tier 3 studies are provided in Appendix B.

Table 5.1. Avian, bat, and habitat monitoring and survey efforts conducted for the Badger Wind Project, Logan and McIntosh counties, North Dakota.

Study Type	Study Period	Reference
Avian Use Surveys	May 2019 – April 2020	Atwell 2020c
Avian Use Surveys	May 2020 – April 2021	Atwell 2021c
Avian Use Surveys	August 2023 – Present	---
Raptor Nest Survey and Monitoring	April 2019	Atwell 2020c
Raptor Nest Survey and Monitoring	April, May 2020	Atwell 2021c
Prairie Grouse Lek Monitoring	May 2019	Atwell 2020c
Prairie Grouse Lek Monitoring	April 2020	Atwell 2021c
Bat Acoustic Monitoring	May – October 2019	Atwell 2020b
Bat Acoustic Monitoring	April – October 2020	Atwell 2021b
Northern Long-eared Bat Habitat Assessment	January 2020	Atwell 2020a
Whooping Crane Habitat Assessment	September 2021	Atwell 2021a
Sharp-tailed Grouse Conservation Plan	November 2021	LeBeau et al. 2021
Native Grassland Assessment	September 2021 and 2023	Chodachek and Piorkowski 2024
Aquatic Resources Inventory	September and October 2020, September and October 2021, and May 2022	Atwell 2022
Wetlands and Waterbody Mapping	October and November 2023	Chodachek and Welsch 2024

5.1 Birds

5.1.1 Eagle Use and Avian Point Count Surveys

Atwell, LLC (Atwell) conducted eagle use and avian use point count studies between May 2019 and April 2021 (Atwell 2020c; Atwell 2021c; Appendix B) and WEST started eagle use surveys in August 2023. The objective of these surveys was to evaluate species composition and seasonal and spatial use of the Project Boundary by birds, with a particular focus on eagles and SOC. Survey methods were developed in accordance with recommendations outlined in the WEG (USFWS 2012), Appendix C(1)(a) of the ECPG (USFWS 2013), December 2016 Final Eagle Rule (USFWS 2016) and recommendations from USFWS and the NDGFD. Figure 5.1 provides an overview of the points inside the current Study Area and current Project Boundary.

2019 − 2020

Atwell conducted eagle use and avian point count surveys between May 2019 and April 2020 (2020c). A total of 53 point-count stations were included in surveys, which encompassed the Study Area and Project boundary (Figure 5.1). All 53 point-count stations were surveyed for eagles and other raptors out to 800 meters (m; the sample plot) for 60 minutes, typically once per month, when practicable. Due to the inaccessibility of some point count stations between late fall and early spring, some points were not surveyed every month, whereas others were surveyed twice per month to achieve survey effort goals. For avian use surveys, the same 53 point count stations were surveyed for all avian species out to 150 m for small-bodied bird species and 800 m for larger-bodied bird species for 10 minutes, typically once per month (when practicable) during the spring (May 2019 and March and April 2020) and fall (August through November 2019) monitoring periods (Atwell 2020c).

2020 − 2021

Atwell conducted eagle use and avian point count studies at the same 53 point-count stations between May 2020 and April 2021 (2021c). The 53 point-count stations encompassed the Study Area and Project boundary (Figure 5.1). Eagles and other raptors were recorded within the sample plot for 60 minutes, typically once per month, when practicable. Due to the inaccessibility of some point count stations between late fall and early spring, some points were not surveyed every month, whereas others were surveyed twice per month to achieve survey effort goals. For diurnal avian activity surveys, the same 53 point count stations were surveyed for all avian species out to 300 m for small-bodied bird species and 800 m for larger-bodied bird species for 10 minutes, typically once per month (when practicable) during the spring (May 2020 and March and April 2021) and fall (August through November 2020) monitoring periods (Atwell 2021c).

2023 − 2024

WEST began eagle use studies at 12 point-count stations within the Project Boundary in August 2023 (Figure 5.1). Eagles and other large birds are recorded within the sample plot for 60 minutes, typically once per month, when practicable. These surveys are ongoing as of January 2024 and will continue until August 2024.

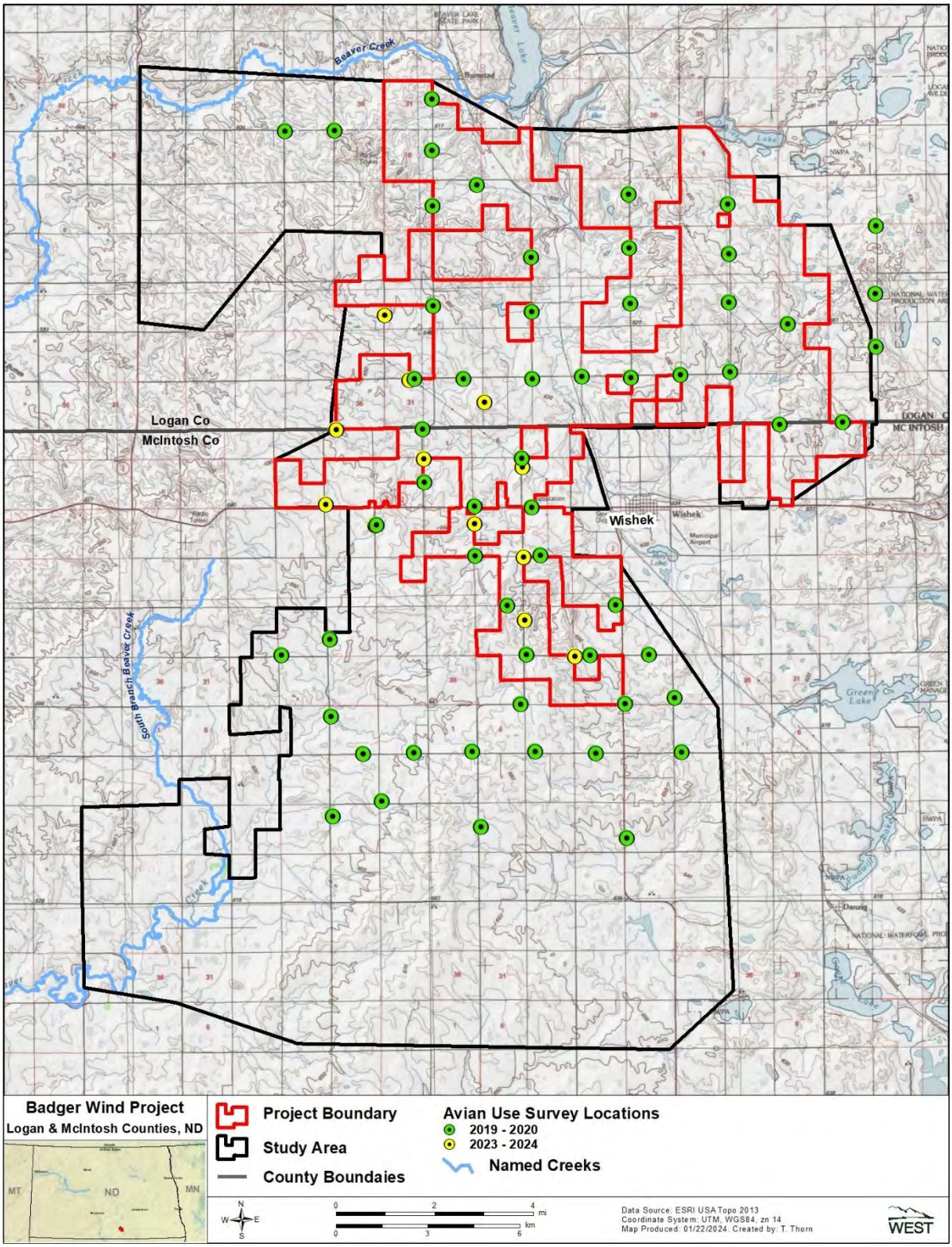

Figure 5.1. Location of fixed-point avian use survey locations and associated 800-meter radius plots for avian use surveys completed from May 2019 – April 2021 and August 2023 – Present at the Badger Wind Project in Logan and McIntosh counties, North Dakota.

5.1.2 Bald Eagle and Raptor Nest Surveys

Atwell, LLC (Atwell) conducted eagle and raptor nest surveys in May 2019 and April and May 2020 (Atwell 2020c; Atwell 2021c; Appendix B). The objective of surveys was identify and record the location and status of all eagle nests within the Project Boundary and surrounding areas. Survey methods were developed in accordance with recommendations outlined in the ECPG (USFWS 2013) and December 2016 Final Eagle Rule (USFWS 2016). Figures 5.2 and 5.3 provide an overview of the survey areas within the current Study Area and Project Boundary.

2019 Surveys

Eagle and raptor nest surveys were conducted by Atwell on May 1–3, 2019 (Atwell 2020c). The raptor nest survey area encompassed the Project Boundary and extended out 2 mi from the Study Area boundary (raptor nest survey area) and 10 mi from the Study Area boundary (eagle nest survey area; Figure 5.2). All non-eagle raptor nests were recorded within the raptor nest survey area and all eagle nests were recorded within the eagle nest survey area. Aerial transect surveys were flown via a fixed-wing Cessna Skyhawk 172M, with transects spaced 0.5 mi apart (Atwell 2020c). One active bald eagle nest (BAEA19_01) was located during the 2020 surveys (Atwell 2020c; Figure 5.2).

2020 Surveys

Eagle and raptor nest surveys were conducted by Atwell during April and May of 2020 through a combination of targeted aerial surveys conducted on April 10, 2020, and ground-based surveys that continued through May 15, 2020 (Atwell 2021c). Flight time was restricted to one day of aerial surveys due to safety concerns regarding: (a) the COVID-19 coronavirus outbreak across the United States, and (b) recent aircraft incidents associated with aerial wildlife surveys at other proposed wind facilities in the region. Areas targeted for aerial surveys included the following:

- Roadless portions of the eagle nest survey area.
- Habitat-based focal areas within the eagle nest survey area, which were identified using desktop analysis of the eagle nest survey area. Large bodies of water, riparian areas, and areas with large trees that could serve as potential eagle nesting sites were prioritized when identifying target areas.
- Known eagle nests and nests of other raptor species that were found during the Year 1 survey in 2019.

Within most targeted areas, north–south oriented transects were flown via a fixed-wing Cessna Skyhawk 172M with transects spaced 0.5 mi apart. However, riparian-based transects were flown along the northern and southern edges of the Beaver Creek riparian corridor between Beaver Lake and the western edge of the eagle nest survey area. All raptor nests were recorded within the Study Area and a 2-mi buffer and all eagle nests were recorded within the Study Area and a 10 mi buffer, both of which encompassed the Project Boundary (Figure 5.3).

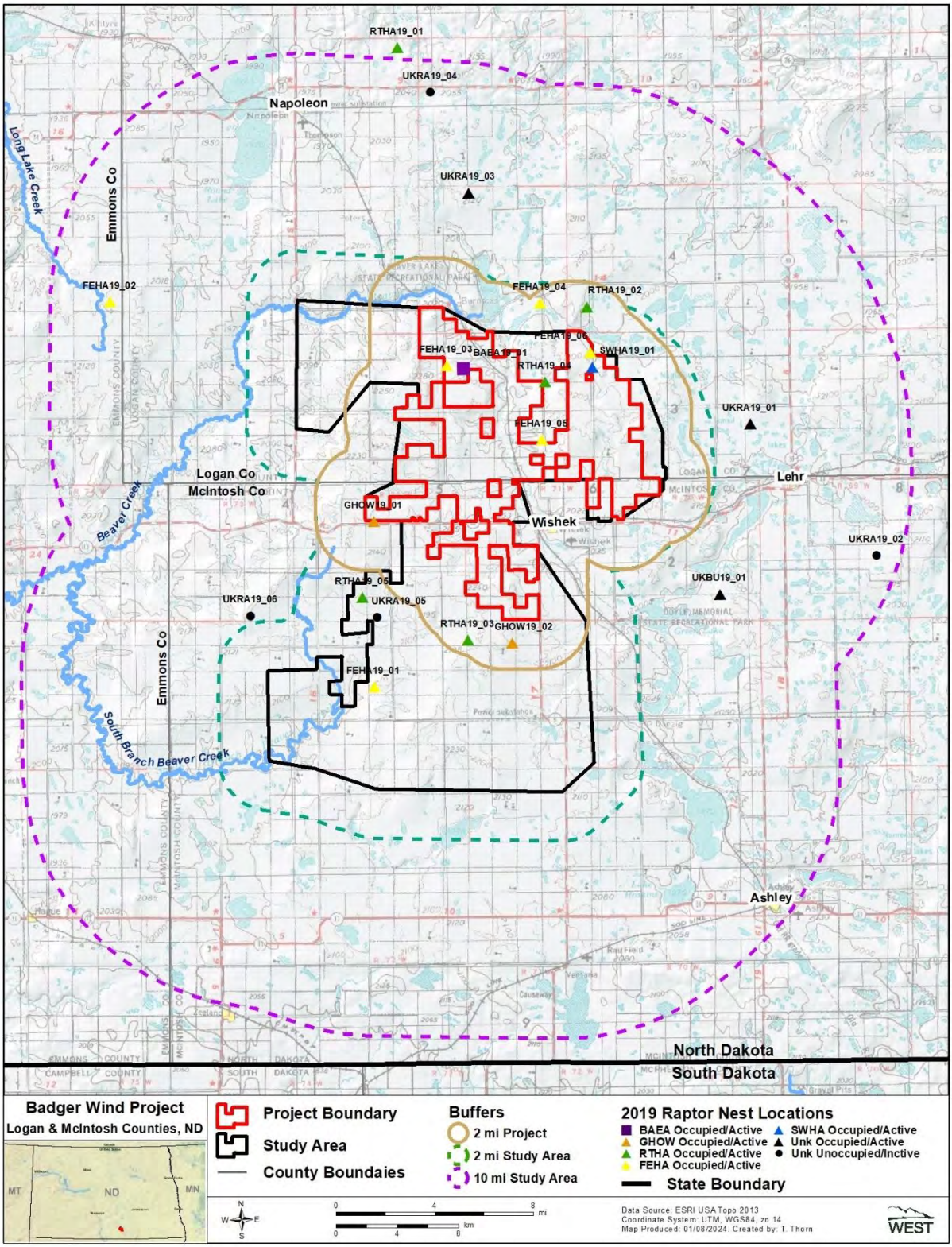

Figure 5.2. Raptor nest locations for surveys conducted in 2019 within the Badger Wind Project in Logan and McIntosh counties, North Dakota and a 10-mile buffer.

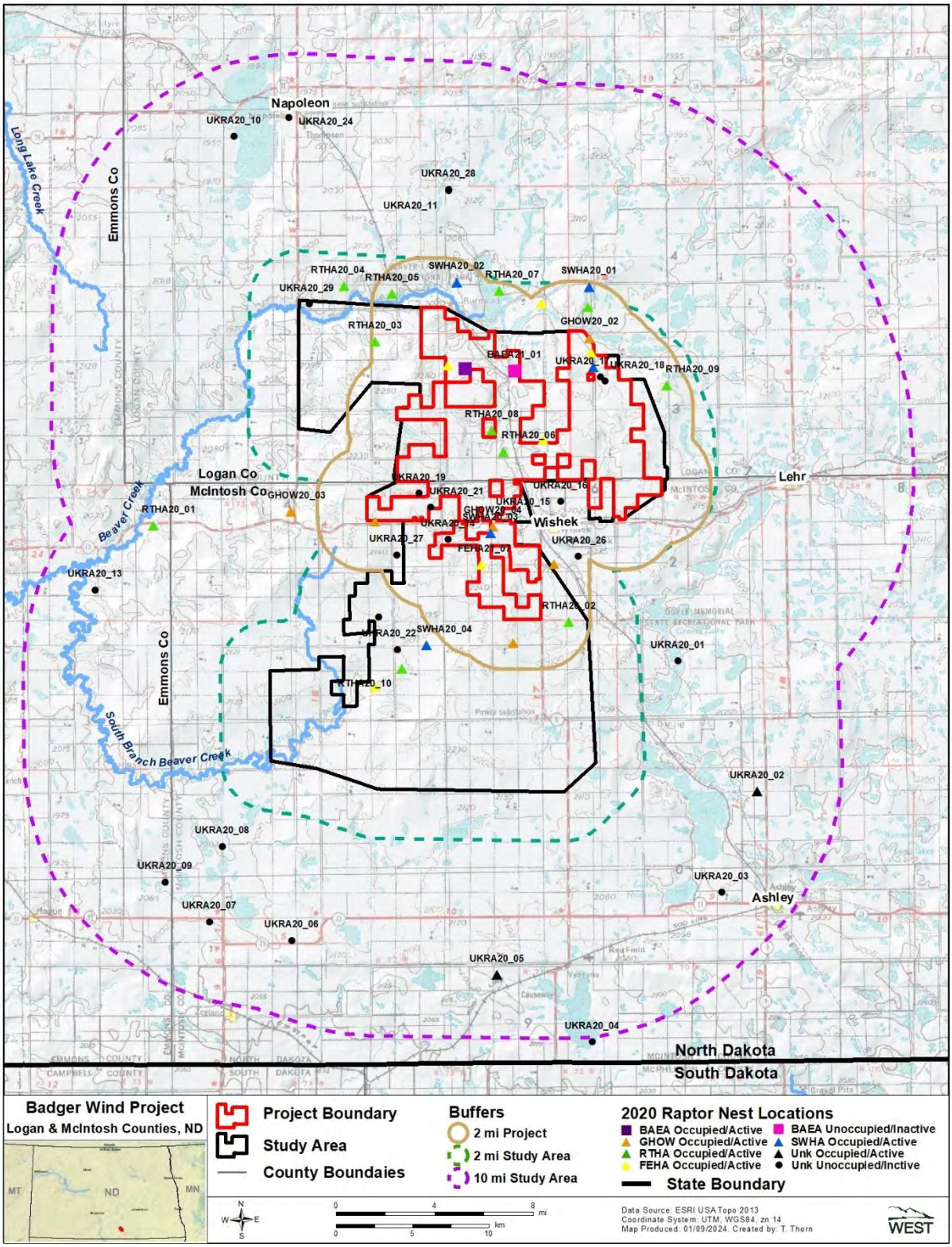

Figure 5.3. Raptor nest locations for surveys conducted in 2020 within the Badger Wind Project in Logan and McIntosh counties, North Dakota and a 10-mile buffer.

In addition to aerial nest surveys, all raptor nests that were incidentally found during other tier 3 surveys and incidentally were also mapped and assessed for nesting status, and were added to the project nest database. Ground-based follow-up surveys were conducted to confirm species and status for nests that could not be attributed to species during the aerial survey (Atwell 2021c). One occupied active bald eagle nest (BAEA19_01) and one unoccupied inactive large stick nest (BAEA21_01) were located during surveys in 2020 (Atwell 2021c; Figure 5.3).

2021 Surveys

Nest surveys were not conducted in 2021; rather Atwell incidentally observed an adult bald eagle on the large stick nest (BAEA21_01) discovered during 2020 surveys (Atwell 2021c). Nest BAEA21_01 was occupied active and after sever nest checks, nest BAEA19_01 was classified as missing (Atwell 2021).

2024 Surveys

A ground-based nest verification check for BAEA19_01 and BAEA21_01 nest locations was conducted by WEST (Chodachek 2024) on January 5, 2024. The biologist spent a maximum of 15 minutes at each nest location to verify their presence from a public road within line of sight of the nest. Data recorded included date of the survey, time of survey, weather conditions at the time of survey, nest status, nest condition, nest substrate, and any relevant comments. Nest BAEA21_01 was present with an undetermined status during the nest check and nest BAEA19_01 was missing (Chodachek 2024).

5.1.3 Sharp-tailed Grouse Lek Surveys

Atwell, LLC (Atwell) conducted aerial and ground based lek surveys in May 2019 and April and May 2020 (Atwell 2020c; Atwell 2021c; Appendix B). The objective of lek surveys was identify and record the location and status of all sharp-tailed grouse leks within the Project Boundary and vicinity. Survey methods were developed in accordance with recommendations outlined in the WEG (USFWS 2012), NDGF SWAP, and the Nebraska Game and Parks Commission Avian Assessment Guidance for Wind Energy Facilities in Nebraska version 3.5 (NGPC 2018). Figure 5.4 provides an overview of the survey area within the current Study Area and Project Boundary.

2019 Sharp-tailed Grouse Lek Surveys

Sharp-tailed grouse lek surveys were conducted by Atwell between May 2 and May 10, 2019 (2020c). The grouse survey area encompassed the Project Boundary and extended 1 mi from Study Area boundary. Aerial transect surveys were flown via a fixed-wing Cessna Skyhawk 172M with transects spaced 0.5 mi apart. Surveys began approximately 10 minutes before sunrise and ended approximately two hours after sunrise. Confirmed leks were defined as two or more birds together, with at least one male displaying. Possible leks were defined as auditory detections of multiple grouse that could not be verified visually after their initial detection on a ground-based survey (Atwell 2020c). One sharp-tailed grouse lek location and two possible lek locations were recorded during surveys (Figure 5.4).

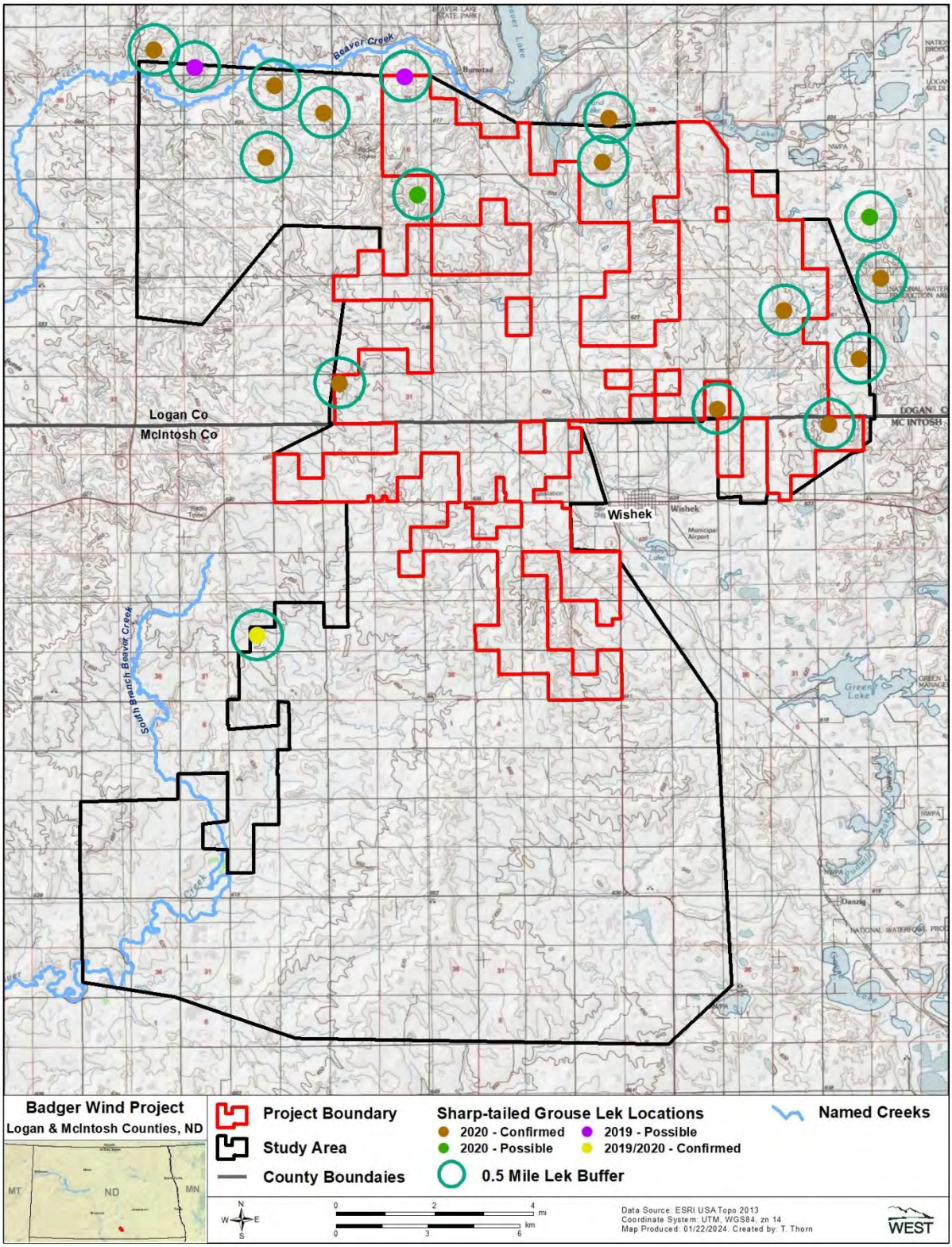

Figure 5.4. Sharp-tailed grouse lek locations surveyed in 2019 and 2020 at the Badger Wind Project in Logan and McIntosh counties, North Dakota.

2020 Sharp-tailed Grouse Lek Surveys

Atwell conducted sharp-tailed grouse lek surveys using both aerial and ground-based survey methods (2021c). Targeted portions of the Study Area were assessed via aerial transects on April 10, 2020. As described above (see Section 5.1.2), safety concerns limited flight time to one morning of aerial surveys that targeted specific areas within the Study Area and focused on portions of the Study Area that could not be reached or observed from publicly accessible roadside vantage points. Targeted aerial survey areas were believed to have a higher likelihood of harboring grouse leks based on the following:

- Results from 2019 aerial grouse lek surveys.
- Observations of grouse recorded incidentally during Year 1 and avian use surveys.
- Identification of potential sharp-tailed grouse breeding habitat through desktop review.

Three rounds of ground-based surveys were completed in additional parts of the Study Area from April 11 - May 15, 2020 (Atwell 2021c). Survey rounds were spaced 8 to 10 days apart. During each survey round, a biologist surveyed 77 publicly accessible roadside points spaced 0.5 miles (800 m) apart for two minutes, scanning visually and listening for sharp-tailed grouse vocalizations and other non-vocal sounds associated with lekking behavior. Twelve sharp-tailed grouse lek locations and two possible lek locations were recorded during surveys (Figure 5.4).

2021 Sharp-tailed Grouse Conservation Plan

To evaluate potential impacts to the local sharp-tailed grouse population at both the landscape and site-specific levels, various available resources and existing literature were reviewed and summarized in the sharp-tailed grouse conservation plan (see North Dakota Public Service Commission [PSC] Case PU-22-086, Exhibit 10; LeBeau et al. 2021). Based on this review, sharp-tailed grouse are most likely to occur in suitable habitat in the northern portion of the Project Boundary. To minimize impacts, wind turbines will be placed within previously fragmented areas, specifically avoiding areas in the northern portion of the Project Boundary and by siting turbines away from leks where the majority of seasonal habitat use by sharp-tailed grouse is expected to occur.

5.2 Bats

5.2.1 Bat Acoustic Surveys

Atwell, LLC (Atwell) conducted acoustic bat surveys between May – October 2019 and April – October 2020 (Atwell 2020b and Atwell 2021b; Appendix B). The objective of these surveys was to evaluate species composition and seasonal and spatial use of the Project Boundary by bats. Survey methods were developed in accordance with recommendations outlined in the WEG (USFWS 2012). Figure 5.5 provides an overview of the detector locations.

2019 Acoustic Bat Surveys

Acoustic bat monitoring occurred within the Study Area from May 23–October 16, 2019, at one meteorological evaluation tower (MET tower) and four ground-based locations representative of potential turbine locations within the Project Boundary and surrounding area (Figure 5.5). The raised MET tower location was paired with a ground-based location. Three of the four locations

are located within the Project Boundary, while the fourth ground unit was placed approximately two mi southwest of the Project Boundary (Figure 5.5). Song Meter full spectrum ultrasonic detectors (SM3 or SM4) were used throughout the duration of the study. The four ground-based units were deployed May 23, 2019 and remained in place over the course of the entire survey period (with the exception of one unit, which only recorded through October 9, 2019 due to technical issues). The one raised MET tower unit was deployed July 30, 2019, due to damaged MET tower components that delayed deployment until repairs were made. Calls were recorded from one half hour before sunset to one half hour after sunrise. Calls were then analyzed for species identification using Kaleidoscope Pro version 4.2.0 (Kaleidoscope; Wildlife Acoustics 2019). All calls underwent qualitative analysis by a biologist with sufficient bat acoustic call vetting experience through visual comparison of echolocation call metrics (i.e., call sequence activity and call duration, call slope, minimum frequency, and individual call characteristics representative of individual species; Atwell 2020b).

2020 Acoustic Bat Surveys

Acoustic bat monitoring occurred within the Study Area from April 14–October 15, 2020, at two MET towers and four ground-based locations representative of potential turbine locations within the Project (Figure 5.5). Raised MET tower locations were paired with ground-based locations. Song Meter full spectrum ultrasonic detectors (SM3 or SM4) were used throughout the duration of the study. The one raised MET tower was deployed on April 14, 2020, and the four ground-based units were deployed on April 15, 2020. All detectors remained in place over the course of the entire survey period. Calls were recorded from one half hour before sunset to one half hour after sunrise. Calls were analyzed for species identification using Kaleidoscope. All calls identified by the software as a potential *Myotis* species or unidentified species underwent qualitative analysis by a biologist with sufficient bat acoustic call vetting experience through visual comparison of echolocation call metrics (i.e., call sequence activity and call duration, call slope, minimum frequency, and individual call characteristics representative of individual species; Atwell 2021b).

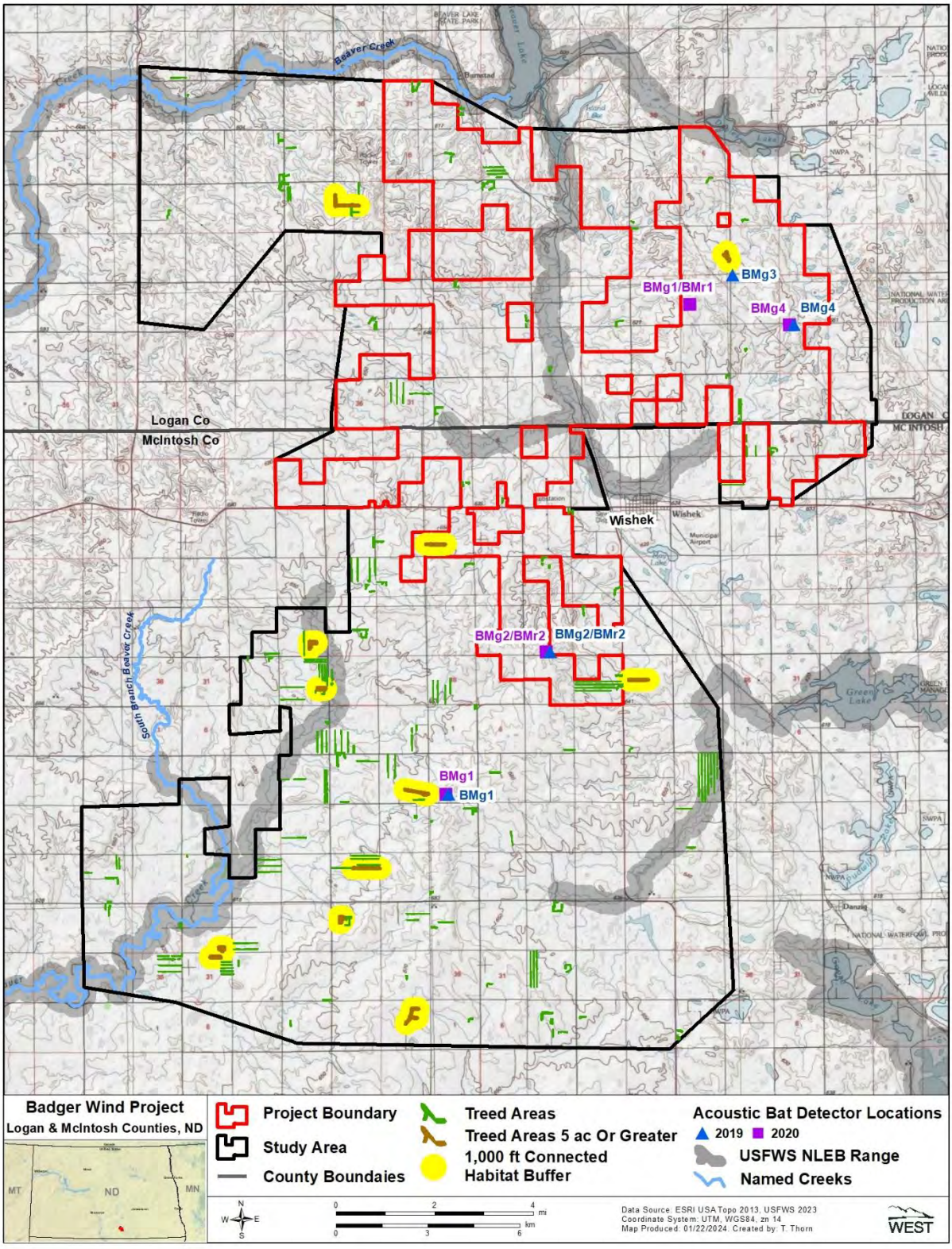

Figure 5.5. Bat resources within the Badger Wind Project in Logan and McIntosh counties, North Dakota.

5.3 Habitat Assessments and Wetland and Waterbody Assessments

5.3.1 2021 Grassland Habitat Assessment

A grassland habitat assessment was completed by WEST (Arellano and Piorkowski 2021) to identify areas of potential unbroken native grasslands (i.e., shows no evidence of soil disturbance) or previously broken grasslands (i.e., soil has been disturbed in some fashion) within the Project Area (2021 Grassland Survey Area; Figure 5.6) to inform proposed development areas. The grassland habitat assessment consisted of a desktop assessment and a field survey. The desktop assessment included a review of publicly available datasets (historical and recent aerial imagery and publicly available land cover databases) and NDGF Native Habitat Layer (NDGF 2016) using Esri software (ArcGIS 10.7). A digital data layer classifying polygons as unbroken or broken grasslands was created and used in the field assessment. During the field survey, a qualified biologist visually assessed the grassland parcels from public roads and on foot where access was permitted between September 29 – October 2, 2021. Areas that differed from the desktop review were delineated and sod types were identified as unbroken native prairie or previously broken grassland. Based on the desktop and field surveys, a total of 3,188.7 ac of grasslands classified as broken and 18,463.0 ac of unbroken grasslands within the 2021 Grassland Survey Area (Figure 5.6).

5.3.2 2023 Grassland Habitat Assessment

A grassland habitat assessment was completed to identify areas of potential unbroken native grasslands or previously broken grasslands within the 2023 Grassland Survey Area (Figure 5.6).. The 2023 Grassland Survey Area was defined by buffering leased lands by one mile that were located outside of the 2021 Grassland Survey Area. The grassland habitat assessment consisted of a desktop assessment and a field survey. The desktop assessment included a review of publicly available datasets (historical and recent aerial imagery and publicly available land cover databases) and the NDGF Native Habitat Layers (NDGF 2016 and 2022) using Esri software (ArcGIS 10.8.1). This resulted in a digital data layer of polygons delineating grassland cover. A qualified biologist completed both pedestrian and ocular surveys from publicly accessible roadsides from August 17 – 18, 2023. Grassland polygons created from the desktop review were confirmed as broken or unbroken, dominant grass and forb species were recorded as indicators of quality, and areas that differed from the desktop review were delineated. Based on the desktop and field surveys, a total of 2,265.8 ac of grasslands classified as broken and 5,804.6 ac classified as unbroken within the 2023 Grassland Survey Area (Figure 5.6).

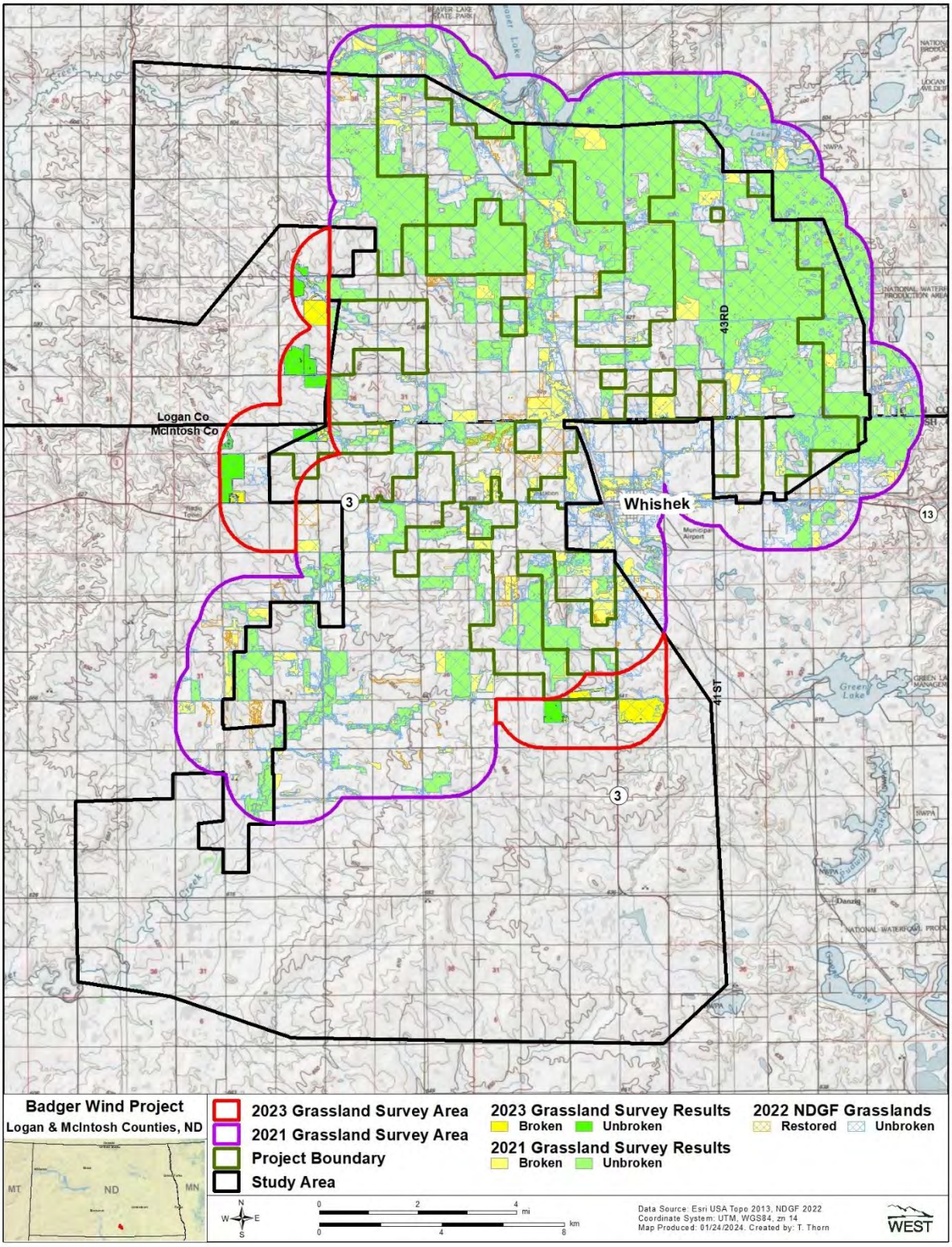

Figure 5.6. Results of the desktop review and field assessment of potential grassland habitat within the 2021 and 2023 Grassland Survey Areas of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021 and August 17 – 18, 2023.

5.3.3 Aquatic Resources Inventory 2020 and 2021

An aquatic resources inventory (AQI) was completed by Atwell and WEST to identify and delineate locations of wetlands and waterbodies within the Project Area (Atwell 2022). The AQI consisted of a desktop assessment and a field verification. The desktop assessment included a review of USGS topographic maps, soil survey information from the Natural Resource Conservation Service (NRCS), USFWS NWI maps, and the USGS NHD. Based on this review, all areas identified as potentially being wetlands or waters of the US (WOTUS) were targeted for field verification. The Survey Area consisted of Project infrastructure, including turbines, access road, crane walk paths, and collection lines that were buffered by 300-ft, 200-ft, 100-ft, and 150-ft, respectively. Qualified biologists completed the field verification in September and October 2020 and September and October 2021.

5.3.4 Aquatic Resources Inventory 2022

An AQI was completed to identify, describe, and document aquatic resource boundary determinations within a revised Project Area. The AQI consisted of a desktop assessment and a field verification. The desktop assessment included a review of USGS topographic maps, soil survey information from the county, USFWS NWI maps, and the USGS NHD, and Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMS). Based on this review, all areas identified as potentially being wetlands or WOTUS were targeted for field verification. The Survey Area consisted of Project infrastructure, including turbines, access roads, crane walk paths, and collection lines that were buffered by 300-ft, 200-ft, 100-ft, and 150-ft, respectively. Qualified biologists completed the field verification in May 2022

5.3.5 Wetlands and Waterboy Assessment 2023

A wetlands and waterbody assessment was completed to identify, delineate, and map locations of wetlands and waterbodies within the 2023 Wetland Survey Area (Figure 5.7). The 2023 Wetland Survey Area consisted of proposed Project infrastructure not previously delineated and infrastructure specific buffers. Buffers included a 250-ft radius centered around turbines, 300-ft wide corridor for turbine access roads, 100-ft wide corridor for underground collection lines, and 200-ft wide corridor for aircraft detection and lighting system tower, batch plant, crane walk paths, laydown yard, met towers, operations and maintenance facility, marshaling yard, substation, transmission line, and turning radii locations. The assessment consisted of a desktop assessment and a field assessment. The desktop assessment included a review of US Department of Agriculture (USDA) National Agriculture Imagery Program (NAIP), USFWS NWI maps, USGS NHD, and past data collected in 2020, 2021, and 2022. Based on the desktop assessment, all areas identified as potentially being wetlands or WOTUS were targeted for the field assessment. Qualified biologists completed the field assessment in October and November 2023. Wetland delineations were conducted on October 24 – 25, 2023; while methods shifted to wetland mapping on October 31, November 1-2, and November 17 and 20, 2023 due to poor weather and late season conditions, which prevented the full wetland delineation protocol to be adequately performed.

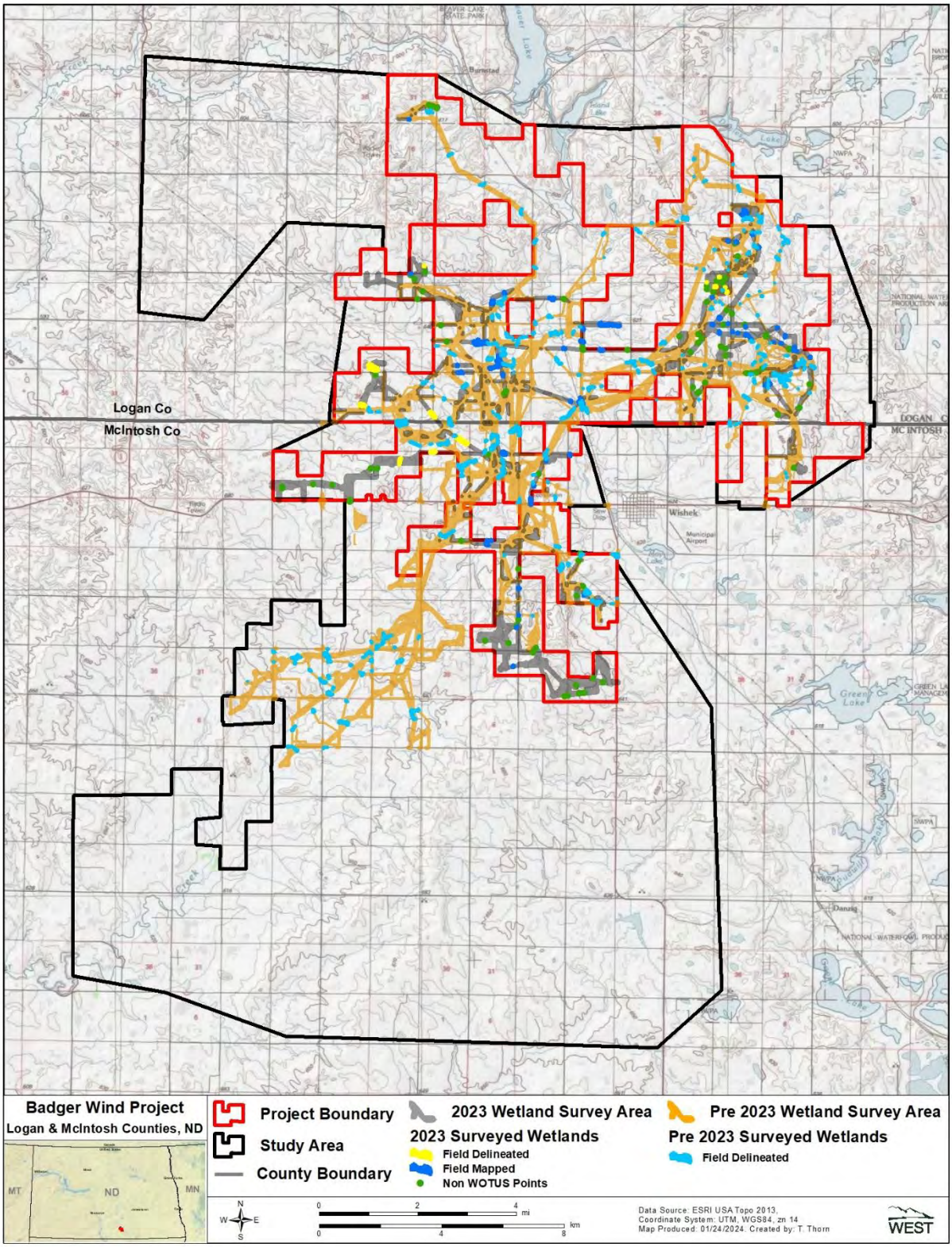

Figure 5.7. Aquatic Resources Inventory and Wetlands and Waterbody Assessment results for surveys completed in 2020, 2021, 2022, and 2023 at the Badger Wind Project in Logan and McIntosh counties, North Dakota.

Wetlands were delineated in accordance with the 1987 *Corps of Engineers Wetlands Delineation Manual* (US Army Corps of Engineers [USACE] 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains* (Version 2.0; USACE 2010). The 1987 manual outlines a three-parameter approach, which requires presence of hydrophytic plants (dominant vegetative cover), hydric soils, and wetland hydrology. All three parameters must be present and meet the wetland criteria of each parameter in order for an area to be considered a wetland. Wetland mapping used a two-parameter approach, which requires presence of hydrophytic plants and wetland hydrology. Both efforts evaluate the high water mark for field digitization.

The results of these studies are discussed in the following subsections.

5.4 Questions and Responses

1. Do field studies indicate that species of concern are present on or likely to use the proposed site?

In total, 37 SOC, including ESA-listed threatened or endangered species, eagle species listed under the BGEPA, and species listed as SCP per North Dakota's SWAP, were detected during Tier 3 field studies (Table 5.2). Whooping crane, listed as endangered under the ESA was detected within the Project Boundary during Tier 3 studies. One unknown *Myotis* bat species) was detected during bat acoustic studies but could not be identified to species as the calls contained characteristics of both little brown or NLEB.

One ESA-listed endangered bird species (whooping crane), two species protected under BGEPA (bald and golden eagle), 12 SHFC, and 35 North Dakota SCP (including whooping crane, bald eagle, and golden eagle) were detected incidentally and during avian use surveys (see Table 5.2).

Twenty-two SCP species in Table 5.2 are also listed by the USFWS as BCC species for the Prairie Pothole BCR and/or throughout its range in the continental United States and Alaska (USFWS 2024). Although protected under the MBTA, similar to SCP, these species are not afforded additional protection under federal or state regulations but have been identified as part of conservation planning efforts by the USFWS.

Bat acoustic surveys confirmed the presence of one bat SCP (little brown bat) and the likely presence of a second bat SCP (big brown bat; Table 5.2). Big brown and silver-haired bat calls were combined in the analysis due to similarities in call characteristics between the two species. This group was one of the more commonly detected species during acoustic surveys; however, while big brown bat is considered a North Dakota SCP, silver-haired bat is not currently listed as such. After excluding "noise", analysis of acoustic data with Kaleidoscope software identified 2,026 bat calls in 2019 and 1,134 calls in 2020. In 2019, this included 757 big brown bat/silver-haired bat calls and four little brown bat calls. In 2020, this included 485 big brown bat/silver-haired bat calls and three little brown bat calls. Two calls identified as an unknown *Myotis* species were also recorded but, as previously mentioned, were not identified to species as they contained

characteristics of both NLEB and little brown bat and there were not a sufficient number of passes to identify to species (Atwell 2020b; Atwell 2021b).

Additional discussions of species listed in Table 5.2 that could be a priority for agencies are discussed below. Additionally, taxa of interest (e.g., bats) to agencies are also discussed below.

Table 5.2. Seasonal occurrence of Species of Concern detected during Tier 3 field surveys (2019 – 2021).

Common Name[a] (*Scientific Name*)	Federal Status[b]	State Status[c]	Expected Seasonal Occurrence	Seasons Detected (Year 1)[d]	Seasons Detected (Year 2)[d]	References
Birds						
Whooping Crane* (*Grus americana*)	FE	SCP III	SP, FA	SP	Not Detected	Atwell 2020c
Bald Eagle (*Haliaeetus leucocephalus*)	BGEPA; BCC[e]	SCP II	SP, SU, FA, WI	SP, SU, FA, WI	SP, SU, FA, WI	Atwell 2020c; Atwell 2021c
Golden Eagle (*Aquila chrysaetos*)	BGEPA	SCP II	SP, FA, WI	SP, FA, WI	SP, FA, WI	Atwell 2020c; Atwell 2021c
American Avocet* (*Recurvirostra americana*)	N/A	SCP II	SP, FA, SU	SU, FA	FA	Atwell 2020c; Atwell 2021c
American Bittern (*Botaurus lentiginosus*)	BCC[e]	SCP I	SP, FA, SU	SU, FA	SP, SU, FA	Atwell 2020c; Atwell 2021c
American Kestrel (*Falco sparverius*)	N/A	SCP II	SP, FA, SU	SP, SU, FA	SP, SU, FA	Atwell 2020c; Atwell 2021c
American White Pelican (*Pelecanus erythrorhynchos*)	N/A	SCP II	SP, FA, SU	SU, FA	SP, SU, FA	Atwell 2020c; Atwell 2021c
Baird's Sparrow* (*Centronyx bairdii*)	BCC, SHFC	SCP I	SP, FA, SU	SP	Not Detected	Atwell 2020c
Black Tern (*Chlidonias niger*)	BCC	SCP I	SP, FA, SU	SP, SU, FA	SP, SU, FA	Atwell 2020c; Atwell 2021c
Bobolink (*Dolichonyx oryzivorus*)	BCC	SCP II	SP, FA, SU	SP, SU, FA	SP, SU, FA	Atwell 2020c; Atwell 2021c
Burrowing Owl* (*Athene cunicularia*)	SHFC	SCP II	SP, FA, SU	FA	Not Detected	Atwell 2020c
Canvasback (*Aythya valisineria*)	N/A	SCP II	SP, FA, SU	SU	SP, SU	Atwell 2020c; Atwell 2021c
Chestnut-collared Longspur (*Calcarius ornatus*)	BCC, SHFC	SCP I	SP, FA, SU	SP, SU, FA	SP, SU, FA	Atwell 2020c; Atwell 2021c
Dickcissel* (*Spiza americana*)	BCC[e]	SCP II	SP, FA, SU	SU	SU, FA	Atwell 2020c; Atwell 2021c

Common Name[a] (*Scientific Name*)	Federal Status[b]	State Status[c]	Expected Seasonal Occurrence	Seasons Detected (Year 1)[d]	Seasons Detected (Year 2)[d]	References
Ferruginous Hawk (*Buteo regalis*)	BCC[f]	SCP I	SP, FA, SU	SP, SU, FA	SP, SU, FA	Atwell 2020c; Atwell 2021c
Franklin's Gull (*Leucophaeus pipixcan*)	BCC	SCP I	SP, FA, SU	SP, SU, FA	SP, SU, FA	Atwell 2020c; Atwell 2021c
Grasshopper Sparrow (*Ammodramus savannarum*)	BCC, SHFC	SCP I	SP, FA, SU	SP, SU, FA	SP, SU, FA	Atwell 2020c; Atwell 2021c
Horned Grebe (*Podiceps auritus*)	BCC[e]	SCP I	SP, FA, SU	SP, SU	SP, SU	Atwell 2020c; Atwell 2021c
LeConte's Sparrow* (*Ammospiza leconteii*)	BCC[f], SHFC	SCP II	SP, FA, SU	Not Detected	SU, FA	Atwell 2020c
Lesser Scaup (*Aythya affinis*)	N/A	SCP II	SP, FA, SU	SP, SU	SP, SU	Atwell 2020c; Atwell 2021c
Loggerhead Shrike* (*Lanius ludovicianus*)	N/A	SCP II	SP, FA, SU	Not Detected	SP, SU	Atwell 2020c
Marbled Godwit (*Limosa fedoa*)	BCC, SHFC	SCP I	SP, FA, SU	SP, SU	SP, SU	Atwell 2020c; Atwell 2021c
Nelson's Sparrow* (*Ammospiza nelson*)	BCC[e]	SCP I	SP, FA, SU	SU	SU, FA	Atwell 2020c; Atwell 2021c
Northern Harrier (*Circus hudsonius*)	BCC[f], SHFC	SCP II	SP, FA, SU	SP, SU, FA	SP, SU, FA	Atwell 2020c; Atwell 2021c
Northern Pintail (*Anas acuta*)	N/A	SCP II	SP, FA, SU	SP, SU	SP, SU, FA	Atwell 2020c; Atwell 2021c
Peregrine Falcon (*Falco peregrinus*)	BCC[e]	SCP III	SP, FA	SP	SP	Atwell 2020c; Atwell 2021c
Prairie Falcon (*Falco mexicanus*)	BCC[f]	SCP II	SP, SU, FA, WI	FA	SU, FA, WI	Atwell 2020c; Atwell 2021c
Red-headed Woodpecker (*Melanerpes erythrocephalus*)	BCC	SCP I	SP, FA, SU	SU, FA	SU, FA	Atwell 2020c; Atwell 2021c
Sharp-tailed Grouse (*Tympanuchus phasianellus*)	SHFC	SCP II	SP, SU, FA, WI	SP, SU, FA, WI	SP, SU, FA, WI	Atwell 2020c; Atwell 2021c

Common Name[a] (*Scientific Name*)	Federal Status[b]	State Status[c]	Expected Seasonal Occurrence	Seasons Detected (Year 1)[d]	Seasons Detected (Year 2)[d]	References
Sprague's Pipit (*Anthus spragueii*)	BCC, SHFC	SCP I	SP, FA, SU	SU, FA	SU, FA	Atwell 2020c; Atwell 2021c
Swainson's Hawk (*Buteo swainsoni*)	BCC[e]	SCP I	SP, FA, SU	SP, SU, FA	SP, SU, FA	Atwell 2020c; Atwell 2021c
Upland Sandpiper (*Bartramia longicauda*)	BCC[e]	SCP II	SP, FA, SU	SP, SU	SP, SU, FA	Atwell 2020c; Atwell 2021c
Western Meadowlark (*Sturnella neglecta*)	SHFC	SCP II	SP, FA, SU	SP, SU, FA	SP, SU, FA	Atwell 2020c; Atwell 2021c
Willet (*Tringa semipalmata*)	BCC, SHFC	SCP II	SP, FA, SU	SP, SU, FA	SP, SU, FA	Atwell 2020c; Atwell 2021c
Wilson's Phalarope (*Phalaropus tricolor*)	SHFC	SCP I	SP, FA, SU	SP, SU	SP, SU	Atwell 2020c; Atwell 2021c
Bats						
Big Brown Bat/ Silver-haired Bat[g] (*Eptesicus fuscus/ Lasionycteris noctivagans*)	N/A	SCP I	SP, FA, SU	SU, FA	SP, SU, FA	Atwell 2020c; Atwell 2021c
Little Brown Bat (*Myotis lucifugus*)	N/A	SCP I	SP, FA, SU	SU, FA	SU, FA	Atwell 2020c; Atwell 2021c
Unknown *Myotis* Species[h] (*Myotis sp.*)	N/A	SCP I	SP, FA, SU	Not Detected	FA	Atwell 2020c

[a] Common names marked with an asterisk indicate that the species was as an incidental observation only during two years of avian surveys.
[b] BCC= Bird of Conservation Concern (USFWS 2008); SHFC = Species of Habitat Fragmentation (USFWS 2013b); BGEPA = Bald and Golden Eagle Protection Act; FE = ESA Endangered; N/A = No federal status.
[c] North Dakota State Wildlife Action Plan (SWAP; Dyke et al. 2015) Species of Conservation Priority (SCP) Level I, II, or III.
[d] For birds: SP = March–May; SU = June–July; FA = August–November; WI = December–February. Includes species detected incidentally within the Project Boundary. For bats: SP = April 1–May 15; SU = May 16–July 31; FA = August 1–October 16. Year 1 bat acoustic surveys did not conducted surveys in the spring.
[e] Previously considered BCC (USFWS 2008); USFWS has removed this species as a BCC for the Prairie Pothole BCR (USFWS 2021a)
[f] Previously this species was not considered BCC (USFWS 2008); however, the USFWS has since added this species to their list of BCC for the Prairie Pothole BCR (USFWS 2021a)
[g] Big brown and silver-haired bats were lumped during analysis due to similarities in call characteristics between the two species. Big brown bat is considered a North Dakota SCP, but silver-haired bat is not currently listed as such.
[h] Calls had characteristics of northern long-eared bat and little brown bat so a species-level classification could not be determined.

2. Do field studies indicate the potential for significant adverse impacts on affected populations of species of habitat fragmentation concern?

Based on Tier 3 studies, there is potential for impacts to grassland SHFC. Herbaceous/grassland makes up 47.4% of the Project Boundary (NLCD 2021), with relatively large tracts of grassland present, particularly within the northern and northeastern portions of the Project Boundary. In total, 12 birds listed as SHFC were recorded during Tier 3 surveys and are likely to breed within the Project Boundary (Table 5.2). Project infrastructure has been removed from within grasslands to the extent possible and impacts to SHFC are expected to be low.

Tier 1 and 2 desktop studies found that extensive forested habitat is not generally found within the Project Boundary and a high degree of woodland habitat fragmentation already exists (Atwell 2019; Atwell 2020a). Therefore, impacts to woodland SHFC are not likely to occur. Furthermore, results from Tier 3 bat surveys do not indicate that the Project will significantly and adversely impact threatened or endangered bat species by fragmenting roosting habitat.

3. What is the distribution, relative abundance, behavior, and site use of species of concern identified in Tiers 1 or 2, and to what extent do these factors expose these species to risk from the proposed wind energy site?

4. What are the potential risks of adverse impacts of the proposed wind energy site to individuals and local populations of species of concern and their habitats? (In the case of rare or endangered species, what are the possible impacts to such species and their habitats?)

SOC identified in Tiers 1 and 2 and documented within the Project Boundary as part of Tier 3 studies are summarized in Tables 4.1, 4.2, and 5.2. Whooping cranes have been observed in the Project during Tier 3 surveys and may migrate over the Project during the spring and fall migration periods; however, the likelihood of occurrence is moderate. Bald eagle and golden eagle use was low and risk to eagles due to Project development is expected to be low. Badger Wind has focused on minimizing direct and indirect impacts to SOC as well as grasslands and grassland dependent species by removing Project infrastructure from within grasslands and siting in cultivated cropland to the extent possible.

5.4.1 ESA-Listed Avian Species

Whooping crane (ESA-listed endangered): Whooping crane was the only bird species listed as threatened or endangered under the ESA that was observed during Tier 3 field studies. As previously mentioned, the Project Area is located within the 75th percentile of the migration corridor for this species. During Year 1 avian use studies, three adult whooping cranes were detected within the Project during surveys completed between April 15 - 17, 2020. The cranes were initially observed flying north at heights ranging from 2 to 7 m above the ground (i.e., below the rotor-swept zone [RSZ]) and later observed foraging in unharvested corn fields (Figure 4.3).

Some data indicate that cranes in general are at low risk of collision with wind turbines (Nagy et al. 2012). To date, no known whooping crane mortality event has occurred at an operational wind turbine (USFWS 2009; NGPC 2018). Currently, the USFWS (2009) accepts that whooping cranes actively avoid wind energy facility infrastructure out to at least 0.5 miles. Similarly, USFWS acknowledges that whooping cranes typically migrate above typical industry standard rotor-swept heights. However, data and expert biologist opinion indicate that daily forage-to-roosting flights do occur at risky flight heights, and these low flights can occur for distances up to 2 miles. If visibility conditions are poor, USFWS indicates that risky flights may occur up to 5 miles from migration stopover sites.

5.4.2 BGEPA Species

Bald eagle (BGEPA and SCP II): A total of 69 bald eagle detections were recorded during two years of surveys at the Project (Atwell 2020c; Atwell 2021c). Observations were recorded throughout each year; however, most detections occurred during the spring and fall migratory periods. A total of 81 bald eagle minutes were recorded during 636 hours of surveys in Year 1, of which 30.3 were risk minutes observed within 800 m from the survey point and at or below 200 m above ground level (i.e., the risk cylinder; Atwell 2020c). In Year 2, a total of 77 bald eagle minutes were recorded during 636 hours of survey, with 42.9 risk minutes (Atwell 2021c).

Bald eagle mean use rates were generally low. Across both survey years, Station 4 recorded13 of the 69 (19%) bald eagle observations. Stations 11, 18, and 12 also had increased number of bald eagle observations over the other stations (Atwell 202c; Atwell 2021c). Stations 11, 12, and 18 are proximate to one another, and all three points are within 2 mi of a creek that flows northward from Wishek to Beaver Lake. Increased use rates may be attributed to active migration along this watercourse (Atwell 2020c; 2021c).

One bald eagle nest, BAEA21_01 is located within the Project Boundary (Figure 5.3), 2.02 mi from the nearest Project turbine location. A nest verification check was completed in January 2024, nest location BAEA21_01 was present and undetermined occupancy and nest location BAEA19_01 was missing (Chodachek 2024). No other eagle nests have been found during surveys or incidentally from 2019 to 2024(Atwell 2020c; Atwell 2021c). Badger Wind has sited turbines at least 2 mi from nest BAEA21_01 to reduce the risk of collision with turbines.

Bald eagle collision mortality associated with wind farm operations within the United States has not been widely documented (Bay et al. 2016; USFWS 2018b). However, eagles migrating through the Project Boundary or using the Project Boundary for breeding or wintering are at risk of collision with turbines. Cumulatively, 157 total bald eagle flight minutes were recorded over two years of surveys, and bald eagles were often observed within the RSZ. Risk to bald eagles from construction and operations of the Project is moderate; tier 4 post-construction monitoring will provide more clarity regarding any impacts to bald eagles.

Golden eagle (BGEPA and SCP II): A total of 12 golden eagle detections were recorded during two years of survey at the Project, including six observations during both Year 1 and Year 2 surveys (Atwell 2020c; Atwell 2021c). During Year 1, observations occurred across the spring,

fall, and winter, whereas in Year 2, observations only occurred in fall and winter. A total of 21 golden eagle minutes were recorded during 636 hours of surveys in Year 1, of which 10.6 were risk minutes (Atwell 2020c). In Year 2, a total of 26 golden eagle minutes were recorded during 636 hours of survey, with 11.8 risk minutes (Atwell 2021c).

Cumulatively, 22.4 eagle risk minutes were recorded over 1,272 hours of surveys. While studies conducted in the western United States have shown golden eagles to be susceptible to collision mortality at wind farms (Smallwood and Thelander 2008), low observed mean use rates suggest that golden eagle use of the Project Boundary is minimal. Risk to golden eagles from construction and operations of the Project is low; tier 4 post-construction monitoring will provide more clarity regarding any impacts to golden eagles.

5.4.3 North Dakota Avian Species of Conservation Priority

Several non-raptor species that are listed as North Dakota SCP were detected during 10-minute diurnal avian activity point count surveys or incidentally (Atwell 2020c; Atwell 2021c). These species are summarized below:

Non-Passerines and Passerines

Baird's sparrow (SCP Level I): Baird's sparrow (*Centronyx bairdii*) was not observed during avian use surveys. During Year 1, two individuals were detected incidentally in May of 2019, in the northern and northeastern portions of the Project Boundary (Atwell 2020c; Atwell 2021c). This species prefers large, contiguous tracts of native prairie, though it will also use non-native grasslands and pastures (Dyke et al. 2015). Suitable nesting habitat may exist within the Project Boundary, particularly in the northern and northeastern portions, but the lack of observations over the course of two years of surveys indicates that breeding is unlikely and the observed individuals likely represented migrants. Therefore, this species is not likely to experience significant impacts as a result of Project construction and operations given the general lack of detections within the Project Boundary.

Bobolink (SCP Level II): Bobolink were commonly recorded during the spring and fall migration periods and summer breeding season during both years of surveys (Atwell 2020c; Atwell 2021c). Bobolink is a fairly common to abundant species that will use a variety of open habitats, including native grasslands, hayfields and pastures, old fields, and no-till cropland (Dyke et al. 2015). Given this species' level of use and presence of suitable habitat throughout much of the Project Boundary, development and operation of the Project may impact this species. Tier 4 post-construction monitoring will provide more clarity regarding any impacts to bobolinks.

Chestnut-collared longspur (SCP Level I): Chestnut-collared longspur were a common observation during spring and fall migration periods and summer during the two years of survey (Atwell 2020c; Atwell 2021c). While observed throughout the Project Boundary, chestnut-collared longspurs were most frequently observed in the northern and northeastern portions of the Project that are higher in elevation and are dominated by herbaceous cover as shown in Figure 2.2. Given the level of use and the presence of suitable habitat throughout much of the Project Boundary, development and operation of the Project may impact this species. Badger Wind has voluntarily

sited all turbine locations in already disturbed habitats (i.e., agricultural fields) to minimize impacts, though collisions with turbines are still possible. Tier 4 post-construction monitoring will provide more clarity regarding any impacts to chestnut-collared longspurs.

Dickcissel (SCP Level II): Although dickcissels (*Spiza americana*) were not observed during avian use surveys, this species was observed on multiple occasions throughout the Project Boundary Area during the summer season when surveys for small-bodied species did not take place. Dickcissel is a fairly common to uncommon species that will nest in a variety of grassland types, including hayfields and road ROW (Dyke et al. 2015). Given this species' level of use and presence of suitable habitat throughout much of the Project Boundary, development and operation of the Project may impact this species. Badger Wind has voluntarily sited all turbine locations in already disturbed habitats (i.e., agricultural fields) to minimize impacts, though collisions with turbines are still possible. Tier 4 post-construction monitoring will provide more clarity regarding any impacts to Dickcissels.

Grasshopper sparrow (SCP Level I): Grasshopper sparrows were recorded during the spring and fall migration periods and summer during both years of surveys (Atwell 2020c; Atwell 2021c). Grasshopper sparrows were detected much more frequently during the summer survey period and likely breed within the Project Boundary. The majority of incidental observations occurred in June or July, which was outside of the spring and fall survey periods. Given this species' level of use and the presence of suitable habitat throughout much of the Project Boundary, development and operation of the Project may impact this species. Badger Wind has voluntarily sited all turbine locations in already disturbed habitats (i.e., agricultural fields) to minimize impacts, though collisions with turbines are still possible. Tier 4 post-construction monitoring will provide more clarity regarding any impacts to grasshopper sparrows.

Sprague's pipit (SCP Level I): Two Sprague's pipit detections were recorded incidentally during the second year avian use surveys, during fall migration, after July 28, 2020 (Atwell 2021c). The majority (11 of 13 detections) of observations occurred in the northern half of the Project Boundary, within Logan County. Behaviors that would confirm local breeding (e.g., song displays, nesting material carries, food carries to dependent young, dependent fledglings) were not observed during the 13 detections. Observations occurred in wheat stubble and on grassy hilltops, habitat features found throughout the Project. While nesting is possible within the Project Boundary, it is not anticipated that this species will be a common breeder or would experience significant impacts, given the general lack of detections during surveys. Furthermore, Badger Wind has voluntarily sited all turbine locations in already disturbed habitats (i.e., agricultural fields) to minimize impacts, though collisions with turbines are still possible.

Western meadowlark (SCP Level II): Western meadowlark were a common observation during spring and fall migration periods and summer during the two years of survey (Atwell 2020c; Atwell 2021c). Western meadowlark is a common to uncommon species that prefers native grasslands but will also occur in hayfields, weedy fields, and within the grassy margins of croplands and roadsides (Davis and Lanyon 2008; Dyke et al. 2015). Given this species' level of use and presence of suitable habitat throughout much of the Project Boundary, development and

operation of the Project may impact this species. Badger Wind has voluntarily sited all turbine locations in already disturbed habitats (i.e., agricultural fields) to minimize impacts, though collisions with turbines are still possible. Tier 4 post-construction monitoring will provide more clarity regarding any impacts to western meadowlarks.

Loggerhead shrike (SCP Level II): Limited observations of loggerhead shrike (*Lanius ludovicianus*) were recorded during surveys or incidentally within the Project Boundary (Atwell 2020c; Atwell 2021c). Loggerhead shrike was documented incidentally during Year 1 surveys, once during avian use surveys in Year 2, and incidentally in the summer while traveling between points during Year 1 surveys. These observations likely represent migrating individuals. While nesting is possible within the Project Boundary, it is not anticipated that this species will be a common breeder or experience significant impacts, given the general lack of detections within the Project Boundary.

Red-headed woodpecker (SCP Level I): One red-headed woodpecker (*Melanerpes erythrocephalus*) was observed over the course of two years of avian use surveys (Atwell 2020c; Atwell 2021c). This species was detected within the Study Area incidentally on several occasions, typically in the fall. Observations occurred exclusively in the southwestern portion of the Study Area. Red-headed woodpeckers prefer deciduous woodlots and may use shelterbelts within agricultural landscapes for breeding (Dyke et al. 2015). While nesting is possible within the Project, it is not anticipated that this species will be a common breeder or will experience significant impacts, given the presence of limited habitat and general lack of detections.

LeConte's sparrow (SCP Level II): LeConte's sparrow (*Ammospiza leconteii*) was not observed during avian use surveys; however, singing males were detected incidentally near riverine wetlands in the summer during Year 2 avian use surveys. While nesting is possible within the Project Boundary, it is not anticipated that this species will be a common breeder or experience significant impacts, given the general lack of detections during surveys.

Nelson's sparrow (SCP Level I): Limited observations of Nelson's sparrow were recorded during the two years of survey (Atwell 2020c; Atwell 2021c) This species prefers shallow marsh edges and wet meadows (Dyke et al. 2015) and may nest locally in appropriate habitats within the Project Boundary. While nesting is possible within the Project Boundary, it is not anticipated that this species will be a common breeder or experience significant impacts, given the general lack of detections during surveys. Furthermore, direct, and indirect impacts from construction and operations and maintenance of the Project should be minimized since Project infrastructure has been sited to avoid wetlands and waterbodies.

Shorebirds

Marbled godwit (SCP Level I): Marbled godwit, a Level I SCP, was recorded during the spring migration in Year 1 and Year 2 of avian use surveys (Atwell 2020c; Atwell 2021c). It is not anticipated that this species will experience significant impacts given the relatively low number of detections during avian use surveys. Furthermore, direct, and indirect impacts from construction and operations and maintenance of the Project should be minimized since Project infrastructure

has been sited to avoid wetlands and waterbodies. Tier 4 post-construction monitoring will provide more clarity regarding any impacts to marbled godwits.

Wilson's phalarope (SCP Level I): Two detections of six Wilson's phalarope individuals were made during avian use surveys in Year 1, and three detections of four individuals were made in Year 2. Wilson's phalaropes were observed at the same two stations in both survey years, suggesting that they may locally breed at some wetlands within the Project Boundary. It is not anticipated that this species will experience significant impacts given the limited number of detections during avian use surveys; however, breeding is possible within the Project. Impacts to wetland habitat should be minimized since Project infrastructure has been sited to avoid wetlands and waterbodies.

American avocet (SCP Level II): American avocets (*Recurvirostra americana*) were only observed incidentally during Year 1 and Year 2 avian use surveys at scattered locations throughout the Project Boundary, typically during the fall. One summer observation of four birds flying occurred in the northeastern portion of the Project. This species generally prefers to nest in sparsely vegetated areas on exposed shorelines of wetlands or lakes (Dyke et al. 2015). Nesting habitat for American avocets is more prevalent outside of the Project to the northeast; however, wetlands in the northeastern portion of the Project may provide suitable habitat.

Willet (SCP Level I): One willet was observed during the spring migration over the course of two years of avian use surveys (Atwell 2020c; 2021c). This species was detected within the Project Boundary incidentally on multiple occasions throughout the spring, summer, and fall during both years of survey. Most observations occurred in the northern and northeastern portions of the Project, where the highest degree of suitable breeding habitat (i.e., large tracts of grassland habitat with adjacent shallow, wetland features with sparsely vegetated shoreline; Dyke et al. 2015) are located. Although, breeding habitat primarily occurs outside of the Project Boundary to the northeast, limited suitable breeding habitat within the Project Boundary may support nesting willets. It is not anticipated that this species will experience significant impacts given that breeding habitat appears limited within the Project and construction of Project infrastructure is not planned in the vicinity of prairie potholes where most detections of this species occurred.

Upland sandpiper (SCP Level II): During Year 1 avian use surveys, 9 detections of 11 individual upland sandpipers were observed in the spring only. During Year 2 avian use surveys, 26 detections of 34 individual upland sandpipers were observed in the spring and fall into mid-August of Year 2. Upland sandpipers were detected at 36% of point count stations in Year 2. Upland sandpipers likely nest in roadside habitats/ditches, grasslands, and cropland (particularly no-till) habitats throughout the Project Boundary. Given this species level of use of the Project and presence of suitable habitat throughout much of the Project Boundary, development and operation of the Project may impact this species. To minimize potential impacts, Badger Wind has voluntarily sited all turbine locations in already disturbed habitats (i.e., agricultural fields). Tier 4 post-construction monitoring will provide more clarity regarding any impacts to upland sandpipers.

Waders

American bittern (SCP Level I): American bittern nests in wetlands with tall emergent vegetation (Dyke et al. 2015). Incidental observations of American bitterns were recorded north and east of the Project Boundary during Year 1 surveys and one was recorded vocalizing at a wetland within the vicinity of previous observations east of the Project Boundary during Year 2 surveys. Bitterns were not observed at this location on subsequent surveys, but individuals are difficult to detect from roadsides when silent and may nonetheless nest at this location. It is not anticipated that this species will experience significant impacts given the overall low number of detections and the fact that breeding habitat appears limited within the Project Boundary. Construction of Project infrastructure is not anticipated in areas where this species was detected. Furthermore, Project infrastructure has been sited to avoid wetlands and waterbodies.

Waterbirds

Horned grebe (SCP Level I): Horned grebe (*Podiceps auratus*) was observed east of the Project Boundary during avian use surveys in the spring and summer in Year 1 (Atwell 2020c). and incidentally within the Project Boundary during the spring and summer in Year 2 (Atwell 2021c). Significant impacts to this species are not anticipated due to the limited habitat within the Project Boundary, as well Project infrastructure has been sited to avoid wetlands and waterbodies.

American white pelican (SCP Level II): American white pelican was recorded during spring and fall migrations and summer in both years of survey (Atwell 202c; Atwell 2021c). Nesting colonies were not observed and are not known to exist within the Project Boundary. While breeding is not likely within the Project Boundary, this species can migrate through the Project in large numbers and may be at risk of collision with operational turbines. Tier 4 post-construction monitoring will provide more clarity regarding any impacts to American white pelicans.

Black tern (SCP Level I): Black terns were observed during spring and fall migration seasons and incidentally in summer during Year 1 and Year 2 of avian use surveys (Atwell 2020c; Atwell 2021c). Black terns were generally observed in low numbers in the northeastern portion of the Project Boundary in association with greater wetland density. Nesting colonies were not observed within the Project Boundary. Black terns may be at risk of collision with operational turbines during migration and foraging. Tier 4 post-construction monitoring will provide more clarity regarding any impacts to the black tern.

Franklin's gull (SCP Level I): Franklin's gulls were observed flying through the Project Boundary more frequently in the fall than the spring over both the Year 1 and Year 2 study periods (Atwell 2020c; Atwell 2021c). There are no known Franklin's gull nesting colony sites within the Project Boundary, and fall detections appear to represent post-breeding movements from locations outside the Project. Reasons for diminished numbers observed during the fall period in Year 2 may be attributed to changing weather patterns, food source availability, etc. During Year 1 and Year 2, large flocks were found opportunistically foraging in agricultural habitats following harvesting and haying activities (Atwell 2020c; Atwell 2021c). Franklin's gull may be at risk of collision with operational turbines during spring and fall migration periods. Tier 4 post-construction monitoring will provide more clarity regarding any impacts to Franklin's gulls.

Waterfowl

Northern Pintail (SCP Level II): Northern pintails were commonly observed during the spring and fall migration and summer periods during the Year 1 and Year 2 study periods. Northern pintails were usually observed in wetlands and cropland habitats throughout the Project Boundary. This species is relatively common and moves through the Project Boundary while migrating and foraging. Therefore, it may be at risk of collision with operational turbines. Tier 4 post-construction monitoring will provide more clarity regarding any impacts to northern pintail.

Canvasback (SCP Level II): Four canvasback were observed during Year 1 surveys, and two canvasback were observed during Year 2 surveys. No evidence of breeding within the Project was observed. It is not anticipated that this species will experience significant impacts given the general lack of habitat in the Project Boundary, as well Project infrastructure has been sited to avoid wetlands and waterbodies.

Lesser Scaup (SCP Level I): Five lesser scaup were observed in May in the northeastern portion of the Project Boundary and incidentally in summer during Year 1 surveys. During Year 2 surveys, lesser scaup were only observed incidentally in the northeastern portion of the Project Boundary in spring and summer. Significant impacts are not anticipated for lesser scaup given the general lack of habitat in the Project Boundary, as well Project infrastructure has been sited to avoid wetlands and waterbodies.

Prairie Grouse (Sharp-tailed Grouse [SCP Level II])

One possible and three confirmed sharp-tailed grouse lek locations were recorded within the Project Boundary during Year 1 and Year 2 grouse lek surveys, respectively (Figure 5.4; Atwell 2020c, Atwell 2021c). Sharp-tailed grouse were also detected during spring and fall during Year 1 and Year 2 diurnal avian activity surveys (Atwell 2020c; Atwell 2021c). Given this species' level of use and presence of suitable habitat throughout much of the Project Boundary, development and operation of the Project may impact this species. Badger Wind has voluntarily sited all turbine locations in already disturbed habitats (i.e., agricultural fields) to minimize impacts, though collisions with turbines are still possible. Tier 4 post-construction monitoring will provide more clarity regarding any impacts to sharp-tailed grouse.

Nesting Raptor Species

Aerial and ground-based raptor nest surveys were completed in May 2019 and April and May 2020. The following raptor species were recorded nesting in the Project Boundary: bald eagle, ferruginous hawk, great-horned owl, red-tailed hawk, Swainson's hawk, and unknown raptor (Figures 5.2 and 5.3). Recommended setbacks to raptor nests were used to assist with siting project infrastructure to minimize impacts to nesting raptors (USFWS 2020b; NDGF 2021).

Non-eagle raptor SOC observed within the Project Boundary during Tier 3 field studies included American kestrel (*Falco sparverius*; SCP Level II), burrowing owl (*Athene cunicularia*; SCP Level II), ferruginous hawk (SCP Level I), northern harrier (SCP Level II), peregrine falcon (*Falco peregrinus*; SCP Level III), prairie falcon (*Falco mexicanus;* SCP Level II), and Swainson's hawk (SCP Level I). Standardized observations of peregrine falcon and prairie falcon were relatively

infrequent, and burrowing owl was only detected once incidentally within the Project Boundary. These species are likely uncommon migrants through the Project Boundary, and significant impacts from project operation are not anticipated.

Raptor mean use recorded during avian use surveys was primarily driven by detections of red-tailed hawks, Swainson's hawks, and northern harriers. During Year 1, these species collectively accounted for approximately 68% of raptor detections in the spring season and 82% of detections in the fall season (Atwell 2020c). During Year 2, these species collectively accounted for approximately 66% of raptor detections in the spring season and about 65% of detections in the fall (Atwell 2021c). Red-tailed hawks, Swainson's hawks, and ferruginous hawks were commonly recorded within the RSZ, though northern harriers and American kestrels tended to fly below the RSZ (Atwell 2020c; Atwell 2021c). Red-tailed hawk, Swainson's hawk, and Ferruginous hawk may be at relatively higher risk because of their level of use of the Project; however, measures taken to avoid and minimize potential impacts of the Project to non-cultivated habitat along with proposed measures to avoid and minimize potential impacts, including establishing species-specific raptor nest buffers for wind turbines, are expected to reduce this risk.

5.4.4 ESA Listed Bat Species

Northern long-eared bat (Endangered): Acoustic monitoring was conducted in 2019 and 2020 at one MET tower location and ground-based monitoring was conducted in the vicinity of woodlot patches (Figure 5.5). NLEB were not detected during acoustic monitoring in 2019 and 2020 (Atwell 2020b; Atwell 2021b), though unknown *Myotis* species calls were detected. While the potential for these calls to be attributed to NLEB could not be ruled out, there was not a sufficient number of pulse calls to attribute these calls to species. Risk is anticipated to be low based on the limited and highly fragmented summer roosting habitat within the Project Boundary, and direct and indirect impacts to woodlots will generally be avoided as wind turbines were sited at least 1,000 ft, to the extent practicable, from smaller, fragmented woodlot patches.

5.4.5 North Dakota Bat Species of Conservation Priority

Big brown bat (SCP Level I): Due to similarities in call signatures between big brown bat (Level I SCP) and silver-haired bat (non-SCP), these two species were grouped during acoustic analysis. This group had the highest frequency of bat calls (485 calls; 42.8%) during Year 2 studies and the second highest frequency of bat calls during Year 1 studies (757 calls; 37.3%). Big brown bat/silver-haired bat activity was detected at all acoustic monitoring stations during Year 1 and Year 2 surveys. While peaks in activity during spring and fall are likely attributable to silver-haired bat activity, which are not year-round residents in the Project, summer activity is likely from big brown bats as they are year-round residents throughout North Dakota (Atwell 2020b; Atwell 2021b). Big brown bat mortality is possible as a result of project operation, particularly during migration or summer periods; however, it is expected to reflect the national trends of mortality for this species (Arnett and Baerwald 2013; Allison 2018; AWWI 2018), and no population-level effects are expected to occur as a result of project operation.

Risk may be reduced to big brown bats from the 1,000-foot buffer around suitable NLEB habitat. The number of turbines within this forest buffer will be reduced to the extent practicable, and tree

clearing of suitable bat habitat is expected to be minimal. Any proposed tree clearing will follow guidelines presented in Section 6.3. Tier 4 post-construction monitoring will provide more clarity regarding any impacts to big brown bats.

Little brown bat (SCP Level I): Little brown bats were infrequently (0.2% of call in Year 1 and 0.3% of calls in Year 2) detected during Tier 3 acoustic monitoring studies. Calls were recorded at acoustic monitoring stations within the Project Boundary and south of the Project Boundary (Atwell 2020b; Atwell 2021b). Little brown bat mortality due to project operation is possible, particularly during migration or summer periods; however, it is expected to reflect the relatively low national trends of mortality for this species (Arnett and Baerwald 2013; Allison 2018; AWWI 2018), and no population-level effects are expected to occur as a result of project operation.

Risk may be reduced to little brown bats from the 1,000-foot buffer around suitable NLEB habitat. The number of turbines located near woodlots has been limited to the extent practicable, and tree clearing of suitable bat habitat and specifically removal of potential roost trees is expected to be minimal. Any proposed tree clearing will follow guidelines presented in Section 6.3. Tier 4 post-construction monitoring will provide more clarity regarding any impacts to little brown bats.

5. How can developers mitigate identified significant adverse impacts?

Badger Wind is voluntarily adhering to guidance included in the WEG, ECPG, and 2016 Eagle Rule revision to minimize potential effects from the Project on birds and bats through development and implementation of this BBCS. Project design and construction best management practices (BMP) were developed based on the results of the Tier 3 studies and agency coordination. The Project was designed to avoid and minimize use of high-quality habitat and/or areas that may be suitable for TES and other sensitive SOC to the greatest extent practicable. Badger Wind has sited all turbines outside of unbroken grasslands, with most infrastructure in locations that are predominantly agricultural. Badger Wind is also coordinating with the North Dakota Department of Agriculture to determine potential voluntary offsets for indirect impacts to grassland species. The results of this analysis will help to guide additional conservation measures that can be implemented such as the preservation of existing grassland habitat or creation of new habitat that can support grassland bird species.

6. Are there studies that should be initiated at this stage that would be continued in post-construction?

Other than those studies conducted adhering to the WEG, no other Tier 3 studies are proposed at this time. While the Project is not likely to have significant impacts to SOC based on Tier 1, 2, and 3 analyses, the Project will conduct post-construction avian and bat mortality monitoring for at least one year following construction and adhering to the WEG. Post-construction surveys will serve to estimate mortality rates of birds and bats for the Project to further assess potential impacts and validate the efficacy of avoidance, minimization, and mitigation measures. Tier 4 monitoring methods are summarized in Section 7.

5.5 Tier 3 Decision Point

Tier 3 analyses indicate that the Project presents a low to moderate risk to TES and other sensitive SOC. Grassland bird species may be impacted if turbine infrastructure is placed within grassland habitat; however, Badger Wind proposes to minimize impacts to native grasslands to the extent practicable by siting infrastructure in cultivated cropland.

Badger Wind has decided to voluntarily proceed to Tier 4 surveys per WEG recommendations to further assess potential impacts to birds and bats and validate the efficacy of avoidance, minimization, and mitigation measures. Table 5.3 summarizes specific Tier 3 results and Badger Wind's decision to continue with further Tier 4 studies and analysis.

Table 5.3. Wind Energy Guidelines Tier 3 Decision Analysis per Ecological Constraint.

Species/ Resource	Resource Constraints within the Project Boundary	Status of Resource Constraint within the Project Boundary	Tier 3 Decision Point	Direct Impact Avoidance	Tier 4 Analysis Procedure
Avian Resources					
Grasslands	Presence of herbaceous grassland habitat through Tier 2 land-cover analysis (e.g., Figure 2.2).	Present as contiguous grassland parcels, particularly within the northern and northeastern portions of the Project Boundary.	Proceed to Tier 4b through assessment of resource impact to specific wildlife species. Proceed to Tier 4a to help validate predictions about likely minimal direct impacts to grassland avian species.	Avoid operational infrastructure development within grassland habitat to greatest extent practicable; implement habitat mitigation protocols including voluntary offsets for impacts to native prairie.	Incorporate avoidance and minimization measures for herbaceous grassland into BBCS; Preliminary Post-Construction Fatality Monitoring; revision of BBCS, as needed.
Whooping Crane	Project is within 75% migration corridor for this species. Stopover habitat quantity and quality generally lower than reference areas.	Rare. One incidental detection of three whooping cranes.	Proceed to Tier 4a to help validate predictions about likely minimal direct impacts to the species. Conduct post-construction mortality monitoring and build adaptive response.	Avoid operational infrastructure development near high-quality stopover habitat to greatest extent practicable; Adhere to APLIC guidelines.	Conduct preliminary post-construction fatality monitoring; revision of BBCS, as needed. Badger Wind will also develop a Whooping Crane Contingency Plan that outlines measures to be taken in the event that whooping cranes are observed in the project vicinity during operations.
Bald Eagle	Primarily spring and fall use of Project Boundary, with less summer and winter use. One known nest	Common . One in-use nest within Project Boundary.	Proceed to Tier 4a to help validate predictions about likely minimal direct impacts to the species. Conduct post-construction	Situate Project to avoid construction of turbines within 1.5 miles of known eagle nest.	Conduct preliminary post-construction fatality monitoring; revision of BBCS, as needed. Badger Wind continues to coordinate with USFWS to avoid and

	within the Project Boundary.		mortality monitoring and build adaptive response.		minimize potential impacts to eagles to the extent practical.
Species/ Resource	**Resource Constraints within the Project Boundary**	**Status of Resource Constraint within the Project Boundary**	**Tier 3 Decision Point**	**Direct Impact Avoidance**	**Tier 4 Analysis Procedure**
Golden Eagle	Primarily fall and spring use of Project Boundary. Not likely to breed within Project Boundary.	Relatively rare within the Project Boundary, but occurrence in small numbers likely regular.	Proceed to Tier 4a to help validate predictions about likely minimal direct impacts to the species. Conduct post-construction mortality monitoring and build adaptive response.	Situate project operational infrastructure to avoid potential foraging habitat.	Conduct preliminary post-construction fatality monitoring; revision of BBCS, as needed.
Other Nesting Raptors (including North Dakota SCP)	Known nesting raptors within Project Boundary, primarily red-tailed hawks, ferruginous hawks, Swainson's hawks and great horned owls.	Uncommon and sparsely distributed within isolated woodlots.	Proceed to Tier 4a to help validate predictions about likely minimal direct impacts to the species. Conduct post-construction mortality monitoring and build adaptive response.	Site wind turbines away from known nests. Review on case-by-case basis if woodland habitat is proposed for removal. Site infrastructure outside of recommended nest setback buffers. Monitor nests for disturbance during construction when timeline overlaps with nesting season.	Conduct preliminary post-construction fatality monitoring; revision of BBCS, as needed.
North Dakota Avian Species of Conservation Priority	Thirty-seven avian SCP detected within the Project Boundary during Tier 3 surveys and incidentally (excluding species list above).	Rare to common within the Project Boundary, depending on species and time of year. Many are likely breeders, particularly in the	Proceed to Tier 4a to help validate predictions about likely minimal direct impacts to the species. Conduct post-construction mortality monitoring and build adaptive response.	Avoid operational infrastructure development within grasslands and wetlands to greatest extent practicable.	Conduct preliminary post-construction fatality monitoring; revision of BBCS, as needed.

	Primarily grassland and wetland species.	northern and northeastern portions of the Project Boundary.			
Species/ Resource	**Resource Constraints within the Project Boundary**	**Status of Resource Constraint within the Project Boundary**	**Tier 3 Decision Point**	**Direct Impact Avoidance**	**Tier 4 Analysis Procedure**
Bat Resources					
Deciduous Woodland	Presence of some deciduous woodland (7.8% of total Project Boundary acreage).	Few isolated deciduous woodlots and shelterbelts scattered throughout Project Boundary; largest woodlots in southern portion of Project Boundary.	No need to proceed to Tier 4b through assessment of resource impact to specific wildlife species. Bat impacts already assessed in Tier 2.	Avoid forested habitat removal during June through July; avoid siting infrastructure in the vicinity of potential bat habitat. Avoid tree removal and specifically removal of potential roost trees to extent practicable.	Incorporate avoidance and minimization measures for deciduous woodland into BBCS. Revision of BBCS, as needed.
Northern long-eared bat	Potential migration through project airspace; summer roosting possible but not likely.	Not confirmed during Tier 3 field studies.	Proceed to Tier 4a to validate predictions of low impacts from operation of the Project and efficacy of avoidance and minimization measures.	Avoid forested habitat removal during June through July; avoid siting infrastructure in the vicinity of potential bat habitat. Avoid tree removal and specifically removal of potential roost trees to extent practicable.	Conduct preliminary post-construction fatality monitoring; revision of BBCS, as needed.
North Dakota bat Species of Conservation Priority	Potential use of project air space while foraging or migrating.	Little brown bat confirmed during Tier 3 acoustic studies. Big brown bat likely present but difficult to separate	Proceed to Tier 4a to validate predictions of low impacts from operation of the Project and efficacy of avoidance and minimization measures.	Avoid siting infrastructure in the vicinity of potential bat habitat. Avoid tree removal and specifically removal of potential	Conduct preliminary post-construction fatality monitoring; revision of BBCS, as needed.

	calls from silver-haired bat (not SCP).	roost trees to extent practicable.

6.0 FACILITY DESIGN TO REDUCE WILDLIFE CONFLICT

6.1 Project Facilities Design and Consideration

6.1.1 Turbine Locations and Design

The project layout includes up to 103 WTG locations; 93 primary and 10 alternate WTG locations. Turbines are primarily sited within agricultural portions of the Project Boundary. The WTG site layout has been configured to avoid areas with higher documented use by raptors and other species of wildlife protected under the ESA, BGEPA, and MBTA, to the extent practicable. Habitat that was identified as potentially suitable for SOC was also avoided to the maximum extent practicable when siting the Project. Reducing turbine placement within a 1,000-ft buffer around forested areas greater than 5 ac and around connective woodlands to the greatest extent practicable may help to reduce impacts to bats during project operation. Minimizing turbine placement within the vicinity of this wetland-grassland complex to the greatest extent practicable may reduce direct impacts to avian species, such as collisions with turbines and habitat loss, as well as indirect impacts, such as displacement (Shaffer and Buhl 2016).

In addition, un-guyed tubular towers will be used for the Project wind turbines, which are documented to lower the potential for raptor and other bird collisions (Gehring et al. 2009). Bird flight diverters will be installed in the event that guyed MET towers are used for the Project.

6.1.2 Facilities

The Project's associated facilities will be sited and designed to avoid and reduce potential impacts to birds and bats, and the collection and communication system will be buried underground in accordance with industry standards. Impacts of these systems on birds and bats will be eliminated since they are underground. The Project Boundary and associated project infrastructure will be primarily located within cultivated agriculture areas, thereby minimizing project-related land disturbance of habitat for sensitive species. New land disturbance will be limited to the extent practicable. The existing road system will be utilized to the maximum extent practicable, thereby reducing additional land disturbance. Newly constructed access roads will be placed along section lines, within agricultural fields, and outside of wetlands and waterbodies to the extent practicable to reduce habitat fragmentation. The overhead transmission lines will be located primarily within agricultural upland habitat. Pole placement in wetlands will be avoided to the extent possible. The transmission line will parallel existing roadways and transmission lines for large portions of the route, thereby helping to reduce additional disturbance to bird and bat habitat. Furthermore, the transmission line will be designed to APLIC standards, including the use of avian flight diverters, to reduce the risk of electrocution and collision to birds.

Appropriately designed bird flight diverters (BFD) will be installed every 16.4-feet on the overhead ground wire (OHGW) and/or optical ground wire (OPGW) of the proposed overhead gen-tie line where it crosses a wetland (Figure 1.1) to reduce collision risk for whooping cranes. Increasing a line's profile and visibility is an accepted risk minimization approach with utility practices in the US and Canada and vetted by the USFWS (Heck 2007, APLIC 2012). Options for BFD include static

marking devices, dynamic marking devices, or hybrid (both dynamic and static) marking devices. The best available BFD will be selected for installation for the Project.

6.1.3 Lighting

Wind Turbines

The Project will comply with Federal Aviation Administration (FAA) guidelines. Gehring et al. (2009) reported that flashing red lights attract much lower numbers of nocturnal migrants compared to steady red lights and, in turn, should reduce avian and bat fatalities. The FAA recently amended its recommended lighting standards for wind facilities to follow this recommendation of utilizing flashing red lights in an effort to reduce the potential impacts to migratory species (FAA 2015), and the Project will comply with this standard. Furthermore, the Project will utilize an Aircraft Detection Lighting System (ADLS), subject to FFA approval, which will turn on lights for up to 93 turbine locations and up to 3 permanent meteorological tower locations when and aircraft is in proximity to the Project. As such, the amount of time lights are on will be reduced, thereby reducing the potential for lighting to attract birds.

Project Facilities

Lighting of ancillary structures (i.e., collector substation, and Operations and Maintenance building) will be minimized and downward-facing lights and/or motion-sensing lights will be installed, as practicable, to minimize attracting birds/bats. This approach to lighting should further minimize the attractiveness of the Project Boundary to nocturnal avian and bat migrants and thus reduce bird and bat mortalities (Gehring et al. 2009).

6.2 Measures to Offset and/or Compensate for Habitat-related Impacts

With respect to the Project site, a key concern identified by the agencies was potential impact to unbroken grasslands (i.e., native prairie grassland) and the potential displacement of grassland birds, as documented in Shaffer and Buhl (2016) at other wind project sites. Badger Wind is meeting with the Commissioner of the North Dakota Department of Agriculture to discuss voluntary mitigation options. In coordination with the North Dakota Department of Agriculture and North Dakota Department of Game and Fish, Badger Wind plans to offset its indirect impacts to grassland and wetland habitat by protecting and/or restoring 378.6 acres of grassland habitat and 74.0 acres of wetland habitat. Ongoing Project layouts have incorporated avoidance of the direct placement of primary and spare turbine locations on unbroken grasslands. Disturbance to unbroken grasslands has been and will continue to be avoided where possible.

6.3 Specific Avoidance Measures

Badger Wind has implemented the policy of avoidance, minimization, and mitigation as part of developing the Project. In past discussions regarding the Project, the USFWS and NDGF have outlined their preferences for avoidance and minimization of unbroken native prairie grasslands, where possible. Avoidance and minimization measures have included: relocating large portions of the Project away from more sensitive landscapes, placing roads along edges of section lines to minimize further fragmentation, moving turbines off of unbroken native prairie grasslands, and

implementation of voluntary offsets using best available science to mitigate any remaining potential displacement to grassland birds.

In addition, the following measures will be implemented to avoid and minimize potential impacts to birds and bats:

6.3.1 Electrocution

- APLIC best practices will be followed to reduce potential for electrocution and collision.
- Electrical collection lines will be buried.

6.3.2 Collision

- Tubular wind turbine towers will be used (not lattice towers) to minimize perching opportunities.
- All guy wires on MET towers (if applicable) and aboveground transmission lines will be marked with avian flight diverters.
- Wind turbine and MET tower lighting will comply with FAA requirements, including use of an FAA-approved ADLS, which will activate lights when an aircraft is detected in the vicinity of the Project. As such lighting that may attract birds will be reduced. Lighting of ancillary structures will be minimized and downward-facing lights and/or motion-sensing lights will be installed, as practicable, to minimize attracting birds/bats.

6.3.3 Habitat Loss

- Surface disturbance footprints will be limited to the extent practicable to minimize habitat disturbance.
- Existing roads will be used wherever possible.
- Badger Wind has voluntarily implemented the following avoidance and minimization measures for unbroken grasslands
    - Results of the grassland field verification studies were used to evaluate and inform project infrastructure siting decisions to avoid and minimize potential impacts to unbroken grassland habitat.
    - The Project Boundary was revised to avoid large areas of intact unbroken grasslands.
    - Focused leasing efforts on more actively managed agricultural lands.
    - Placed access roads along section lines and within agricultural fields, to the extent practicable, to minimize further fragmentation.
    - Sited wind turbines within already disturbed agricultural lands.
- Access roads have been sited outside of wetlands and waterbodies to the extent practicable. Where impacts are unavoidable, potential impacts to potential wildlife habitat, wetlands, and forested areas will be limited to the extent practicable.

- Impacts to jurisdictional wetlands and waters will be limited to the maximum extent practicable.
- The final site plan for the Project will exclude all WMAs, WPAs, PLOTs, and other protected federal and state lands.
- The final site plan for the Project will avoid permanent impacts to protected USFWS easements, including wetland and grassland easements.
- Badger Wind is coordinating with the North Dakota Department of Agriculture on potential offsets.
- A Stormwater Pollution Prevention Plan will be developed and implemented to limit potential for erosion-related impacts to wildlife or sensitive habitats.

6.3.4 Tree Removal

- Removal of trees will be avoided to the extent practicable.
- If tree removal is unavoidable, this removal will be completed in accordance with tree clearing restrictions or coordinated with the USFWS prior to tree clearing activities.
- As appropriate, wooded areas will be checked for potential bat roosts prior to disturbance.

6.3.5 Construction Measures

- As appropriate, areas will be checked for nests and potential bat roosts prior to disturbance and/or surface disturbance, and tree removal will be completed outside the avian nesting (April – July) and bat roosting (May – August) season.
    - The following measures will be implemented to avoid and minimize potential impacts to sharp-tailed grouse leks:
        - Badger Wind has voluntarily sited all wind turbines away from known sharp-tailed grouse leks and within previously fragmented areas in coordination with USFWS and NDGF.
        - The above-ground transmission line was not sited within one mile of sharp-tailed grouse leks, to the extent practicable.
        - The area disturbed for siting and construction activities will be minimized to the extent practicable.
        - Off-road travel will be minimized and on-site speed limits on roads will be implemented.
    - The following measures will be implemented to avoid and minimize potential impacts to nests:
        - Direct impacts to bird nests will be avoided to the extent practicable.
        - Roads and laydown areas will be located in previously disturbed areas, such as cultivated agricultural areas, to the extent practicable.

- Wind turbines were sited at least two miles from eagle nests and 0.25 mi from identified active, occupied raptor nests to the extent practical.
- Construction activities will be limited in the vicinity of raptor nests during the nesting season to the extent practical.
- Construction activities will be initiated prior to the raptor nesting season (February – June), to the extent practical.
- In cases where construction activity occurs in proximity to active nests, the nest activity will be monitored during the nesting season by a qualified biologist.
- Where turbines cannot be sited away from a raptor nest, Badger Wind will consult with USFWS and NDGF to determine appropriate mitigation measures, including potentially removing or relocating the nest outside of the nesting season.

o Badger Wind is consulting with USFWS on specific measures to avoid and minimize potential impacts to whooping cranes.

o Temporary disturbance areas will be reclaimed, fertilized, and reseeded according to NRCS recommendations, unless otherwise specified by the landowner and approved by the North Dakota PSC, as detailed in the Badger Wind Reclamation and Weed Management Plan.

6.3.6 Construction/Operational Measures

- All contractors and sub-contractors will be required to attend wildlife awareness training.
- Vehicles will be limited to roads or specific construction paths and will adhere to established on-site speed limits.
- Good housekeeping measures will be implemented during the construction period and over the operational life of the Project (e.g., collection and disposal of trash, debris, and limiting unharvested crops, as practicable).
- Wildlife carrion and/or roadkill identified by operations and maintenance (O&M) staff within the project footprint will be promptly removed and disposed of to avoid attracting scavenger wildlife or prey species.
- Noxious weeds will be managed in accordance with applicable regulations and the Badger Wind Reclamation and Noxious Weed Management Plan.
- Pesticide, herbicide, fertilizer, and other chemical treatments will be used in accordance with federal and state regulations and laws to minimize drift and other potential impacts on native habitat.
- A Spill Prevention, Control, and Countermeasure (SPCC) Plan will be developed to outline spill response/containment and clean up procedures.
- Post-Construction Mortality Monitoring (PCMM) will be conducted for at least one-year after construction. The PCMM program will include searches for bird and bat carcasses and will correct for potential searcher efficiency and carcass removal biases.

- An adaptive management program will be implemented in accordance with this BBCS.

This BBCS is considered a living document and will be updated over the operational life of the Project as deemed necessary.

6.4 Bird and Bat Conservation Strategy

As part of due diligence efforts and the adaptive management program Badger Wind is implementing for the Project, this BBCS has been developed to document the studies completed to help understand potential risk to avian and bat species from the Project and to describe the measures that will be implemented to avoid and minimize these potential impacts, including conservation strategies that will be implemented over the life of the Project. The BBCS outlines the progression of the Project from the preliminary due diligence phases of site assessment through the field studies and discusses minimization measures implemented by Badger Wind based on the results of the Tier 1 desktop analysis through Tier 3 field studies. Tier 4 studies (Section 7) will be used to evaluate the efficacy of avoidance and minimization measures designed to limit potential impacts to birds and bats. This document is considered a living document and will be updated as deemed necessary.

7.0 TIER 4 – POST-CONSTRUCTION STUDIES TO ESTIMATE IMPACTS

To substantiate the findings of the Tier 1 through Tier 3 assessment process, Badger Wind proposes to conduct PCMM studies, following completion of construction, to assess risk and estimate impacts to avian and bat species, including TES and other SOC. The Tier 4 PCMM study design will incorporate guidelines presented in the USFWS Land-based WEG (USFWS 2012).

7.1 Monitoring Methods

Once the Project is operational, PCMM studies will be conducted for one year, as follows:

- Searches for birds and bats will occur for one calendar year.
- Searches will occur on roads and pads at all Project turbines and square plot searches at a subset of Project turbines.
- Mortality rates will be calculated using GenEst (a generalized estimator of fatality; Dalthorp et al. 2018, Simonis et al. 2018) for both birds and bats on a per megawatt and per turbine basis, accounting for potential searcher efficiency and carcass removal biases.

Importantly, the complex task of determining fatality rate estimates will follow a rigorous approach to provide the best possible data for calculating these statistics. An annual report will be compiled upon completion of the mortality monitoring study. Items discussed will include:

- Standardized carcass searches of search plots at selected turbines.
- Combined searcher efficiency and carcass removal/persistence bias trials to estimate the probability that a carcass was available to be detected.

Estimates of project-related fatalities will be based on:

- Latest available estimator models (e.g., GenEst).
- Observed number of carcasses found during searches within the monitoring survey period for which the cause of death is either unknown or is probably project related.
- Measured rates of availability and detectability (by taxa size class).
- Area searched.

7.2 Reporting Mechanisms

The proposed avian and bat mortality monitoring studies will follow parameters set forth within a study plan completed prior to the start of monitoring. An annual report will be compiled detailing findings for the mortality study. The annual report will be shared with the USFWS and NDGF and Badger Wind will coordinate with these agencies to determine if adaptive management measures are warranted. Should operations staff or contractors confirm fatality of a species protected under the ESA or BGEPA, USFWS and NDGF will be notified within 24 hours. Key contacts for reporting avian and bat wildlife incidents, if applicable, are included in Appendix C.

7.3 Adaptive Management

This BBCS addresses the potential for "*significant adverse impacts*" (i.e., USFWS 2012) to SOC and their habitats. Potential significant adverse impacts to a broad spectrum of wildlife resources have not been identified as a possible outcome of developing and operating the Project, and this BBCS was created to provide an efficient means of navigating through project operations. If significant adverse impacts are found to have occurred, adaptive management measures will be discussed with the USFWS and NDGF and implemented accordingly to avoid, minimize, and mitigate these impacts and to monitor the efficacy of these measures. Federal and state wildlife agencies have not set potential impact threshold scenarios (e.g., species group per-megawatt collision mortality thresholds) that would qualify as significant adverse impacts in this region of North Dakota. However, certain scenarios, such as the discovery of a new eagle nest within the Project Boundary or the discovery of a fatality confirmed to be an ESA-listed TES or eagle species, will trigger agency coordination to assess whether adaptive management responses are warranted (Table 7.1).

Similarly, population-level bird and bat effects and significant avian-bat mortality events (e.g., "mass mortality events") at the Project are not expected based on the analysis of Tier 3 study data as presented within this BBCS. A certain level of avian-bat fatality is expected at any modern wind energy generation facility (Arnett et al. 2008; Loss et al. 2013), and residual fatality events do not necessarily equate to significant adverse impacts, as described by USFWS (2012). This BBCS has laid out a comprehensive pathway by which Badger Wind has taken a multi-tiered approach toward reducing potential direct and indirect impacts to both birds and bats.

Relatively speaking "mass mortality events" at operational wind energy facilities remain rare events (e.g., Loss et al. 2013). The occurrence of abnormally large mortality events often have been associated with inclement weather conditions and deviations from facility lighting BMP

(Johnson et al. 2000; Kerns and Kerlinger 2004; American Bird Conservancy 2011). In the unlikely event of a mass fatality, the wind site manager will determine the best course of action regarding communication to appropriate agency personnel. Recurring mortality of SOC or species susceptible to population-level impacts (see Beston et al. 2016) will also be considered when coordinating with appropriate agency personnel.

Table 7.1. Example triggers and responses in the Badger Wind Project Adaptive Management Strategy

Trigger	Response
A qualified biologist positively identifies a carcass of an Endangered Species Act-listed species with take prohibitions applicable to the Project	• Notification of the US Fish and Wildlife Service (USFWS) within one business day, or as soon as possible thereafter in the event of unique circumstances that would prevent such immediate contact. • Investigation of the circumstances under which the event occurred, the species affected, and whether population-level impacts may be occurring. • Coordination with the USFWS to determine next steps.
A qualified biologist positively identifies an eagle carcass	• Notification of the USFWS within one business day, or as soon as possible thereafter in the event of unique circumstances that would prevent such immediate contact. • Investigation of the circumstances under which the event occurred, the species affected, and whether population-level impacts are suspected. • Re-evaluation of the Project's risk to eagles, to be summarized in a memo provided to the Project owner. Information considered will include: o Incidental observations of eagles at the Project. o Badger Wind, LLC reports of new eagle nest locations near the Project. o Incidental Monitoring and Reporting System (or similar) data. • Coordination with the USFWS to determine avoidance measures or to apply for an eagle take permit.
Discovery of a cluster (at least 5 carcasses) of bird or bat fatalities in space (i.e., at one turbine or other component of Project infrastructure) or time (i.e., found or estimated to have occurred on the same day)	• Completion of a root cause analysis and implementation of appropriate measures, or consultation with the USFWS to determine next steps or further study.
A qualified biologist positively identifies an eagle nest within the Project	• Notification of the USFWS and North Dakota Game and Fish Department within one business day or as soon as possible thereafter in the event of unique circumstances that would prevent such immediate contact.

8.0 IMPLEMENTATION OF THE BADGER WIND PROJECT BBCS

8.1 Document Availability

This BBCS is subject to future revisions, as needed, and will be maintained by Badger Wind environmental staff. This BBCS will be kept on site throughout the operation of the Project.

8.2 Reporting

Any documented mortality of ESA-listed species or of either eagle species will be reported to the USFWS within 24 hours of discovery for the life of the Project. Badger Wind will communicate and coordinate with the USFWS and/or NDGF, as appropriate (Appendix C).

9.0 MITIGATION AND CONSERVATION DURING DECOMMISSING

At the end of the operational life of the Project, Bowman Wind will reclaim disturbed areas in accordance with lease requirements with landowners. Decommissioning may include removing any and all aboveground equipment, including towers, concrete pads, anchors, guy wires, fences, fixtures, materials, buildings, structures, improvements, and personal property installed by the Project or the Project's affiliates. In addition, foundations to a depth of 1.5 m (or as specified by applicable regulations or Bowman Wind approved Decommissioning Plan) and equipment on the surface shall be removed and Bowman Wind will cover up all pit holes, trenches, or other borings or excavations (but not roads selected by the landowner) and restore the Project area to a clean condition reasonably similar to its original condition and land use.

The following decommissioning BMPs, as outlined in the WEG, will be implemented during the decommissioning process:

- Decommissioning methods will minimize new site disturbance and removal of native vegetation, to the greatest extent practicable.
- Foundations will be removed to a minimum of 1.5 m below surrounding grade (or as otherwise required by state regulation and the approved decommissioning plan) so subsurface structures do not substantially disrupt ground water movements. This depth (1.5 m) is typically adequate for agricultural lands.
- If topsoil is removed during decommissioning, it will be stockpiled and reused when restoring plant communities. Once decommissioning activity is complete, topsoil will be restored to assist in establishing and maintaining pre-construction conditions to the extent possible, consistent with landowner objectives.
- Surface water flows will be restored to pre-disturbance conditions consistent with storm water management objectives and requirements. This will include removal of stream crossings, roads, and pads.
- Overhead power lines no longer needed will be removed.
- After decommissioning, erosion control measures will be installed in all areas of disturbance where potential for erosion exists, consistent with storm water management objectives and requirements.
- Fencing will be removed unless the landowner wishes to utilize the fence.

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Appendix A. 2019, 2022, 2023, and 2024 IPaC Analyses for the Badger Wind Project, Logan and McIntosh Counties, North Dakota

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IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

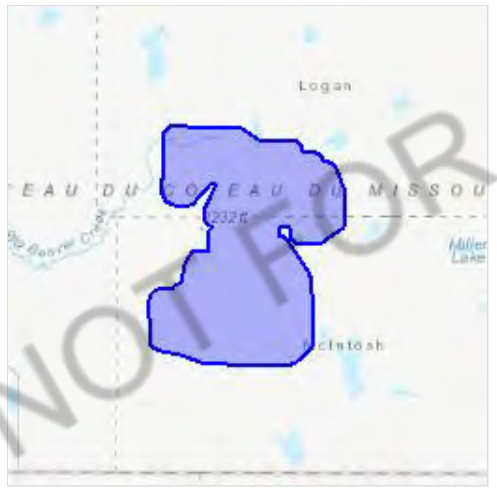
This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

NOT FOR CONSULTATION

Location

Logan and McIntosh counties, North Dakota



Local office

North Dakota Ecological Services Field Office

(701) 250-4481
(701) 355-8513

3425 Miriam Avenue
Bismarck, ND 58501-7926

http://www.fws.gov/northdakotafieldoffice/endspecies/endangered_species.htm

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS

Northern Long-eared Bat Myotis septentrionalis No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Threatened

Birds

NAME	STATUS
Piping Plover Charadrius melodus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/6039	Threatened
Red Knot Calidris canutus rufa No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1864	Threatened
Whooping Crane Grus americana There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/758	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

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Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php

- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

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NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
American Bittern Botaurus lentiginosus This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/6582	Breeds Apr 1 to Aug 31
American Golden-plover Pluvialis dominica This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere

Black Tern Chlidonias niger — Breeds May 15 to Aug 20
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/3093

Bobolink Dolichonyx oryzivorus — Breeds May 20 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Chestnut-collared Longspur Calcarius ornatus — Breeds May 1 to Aug 10
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Franklin's Gull Leucophaeus pipixcan — Breeds May 1 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Lesser Yellowlegs Tringa flavipes — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9679

Marbled Godwit Limosa fedoa — Breeds May 1 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9481

Nelson's Sparrow Ammodramus nelsoni — Breeds May 15 to Sep 5
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Willet Tringa semipalmata — Breeds Apr 20 to Aug 5
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

NOT FOR CONSULTATION

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be

used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

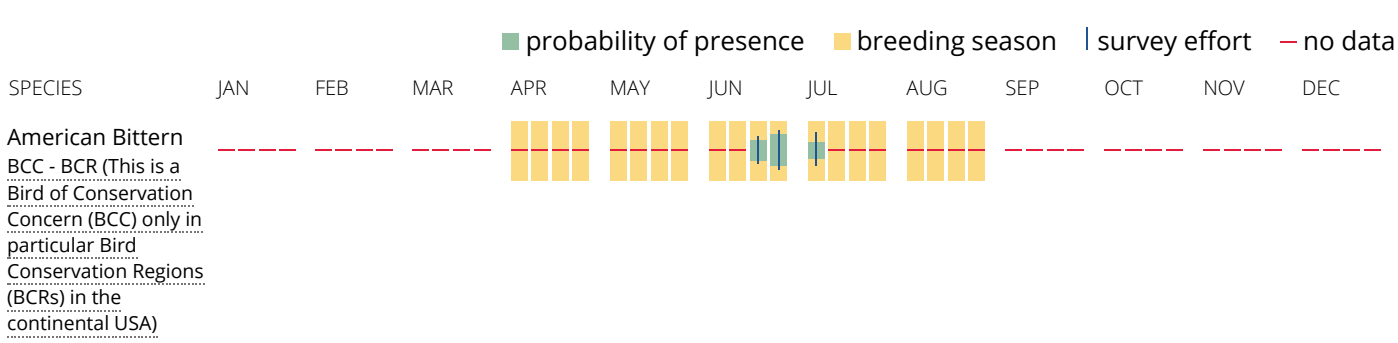
Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



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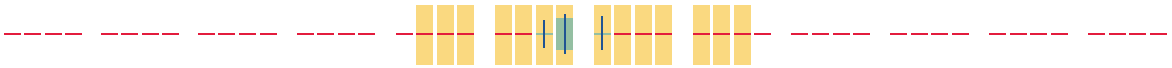
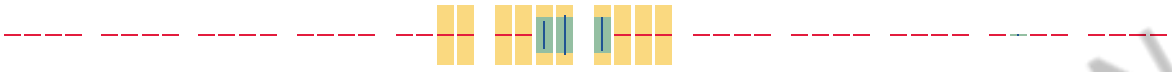
American Golden-plover
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



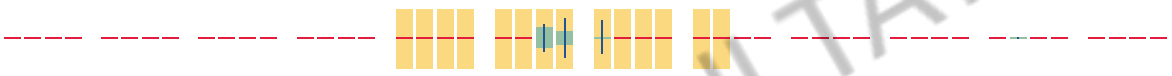
Black Tern
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



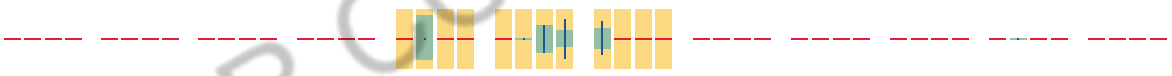
Bobolink
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Chestnut-collared Longspur
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



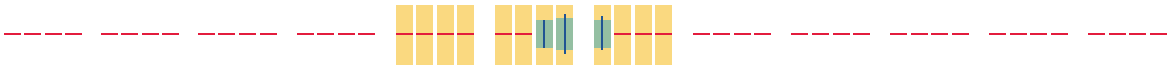
Franklin's Gull
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



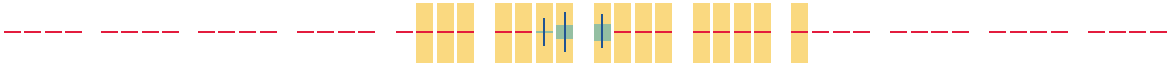
Lesser Yellowlegs
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Marbled Godwit
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

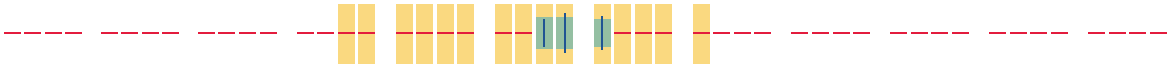


Nelson's Sparrow
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



NOT FOR CONSULTATION

Willet
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

NOT FOR CONSULTATION

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ “What does IPaC use to generate the migratory birds potentially occurring in my specified location”. Please be aware this report provides the “probability of presence” of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the “no data” indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ “Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds” at the bottom of your migratory bird trust resources page.

NOT FOR CONSULTATION

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

This location overlaps the following National Wildlife Refuge lands:

LAND	ACRES
Kulm Wetland Management District	1,358.57 acres

(701) 647-2866
(701) 647-2221

MAILING ADDRESS
P.O. Box E
Kulm, ND 58456-0170

PHYSICAL ADDRESS
1 First Street Sw
Kulm, ND 58456-7112

https://www.fws.gov/refuges/profiles/index.cfm?id=62630

NOT FOR CONSULTATION

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

The area of this project is too large for IPaC to load all NWI wetlands in the area. The list below may be incomplete. Please contact the local U.S. Fish and Wildlife Service office or visit the NWI map for a full list.

FRESHWATER EMERGENT WETLAND

- PEM1A
- PEM1C
- PEM1Ax
- PEM1F
- PEM1Cx

FRESHWATER FORESTED/SHRUB WETLAND

- PFOA

FRESHWATER POND

- PABFh
- PABFx

RIVERINE

- R4SBC
- R5UBH

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NOT FOR CONSULTATION

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

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Location

Logan and McIntosh counties, North Dakota



Local office

North Dakota Ecological Services Field Office

(701) 250-4481
(701) 355-8513

3425 Miriam Avenue
Bismarck, ND 58501-7926

http://www.fws.gov/northdakotafieldoffice/endspecies/endangered_species.htm

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

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NAME	STATUS
Northern Long-eared Bat Myotis septentrionalis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Threatened

Birds

NAME	STATUS
Piping Plover Charadrius melodus There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/6039	Threatened
Red Knot Calidris canutus rufa Wherever found There is **proposed** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/1864	Threatened
Whooping Crane Grus americana There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/758	Endangered

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

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Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES

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	THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
American Golden-plover Pluvialis dominica This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Black Tern Chlidonias niger This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3093	Breeds May 15 to Aug 20
Bobolink Dolichonyx oryzivorus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31
Chestnut-collared Longspur Calcarius ornatus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 10
Franklin's Gull Leucophaeus pipixcan This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31
Golden-winged Warbler Vermivora chrysoptera This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8745	Breeds May 1 to Jul 20
Lesser Yellowlegs Tringa flavipes This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Marbled Godwit Limosa fedoa This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9481	Breeds May 1 to Jul 31
Willet Tringa semipalmata This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 5

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Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

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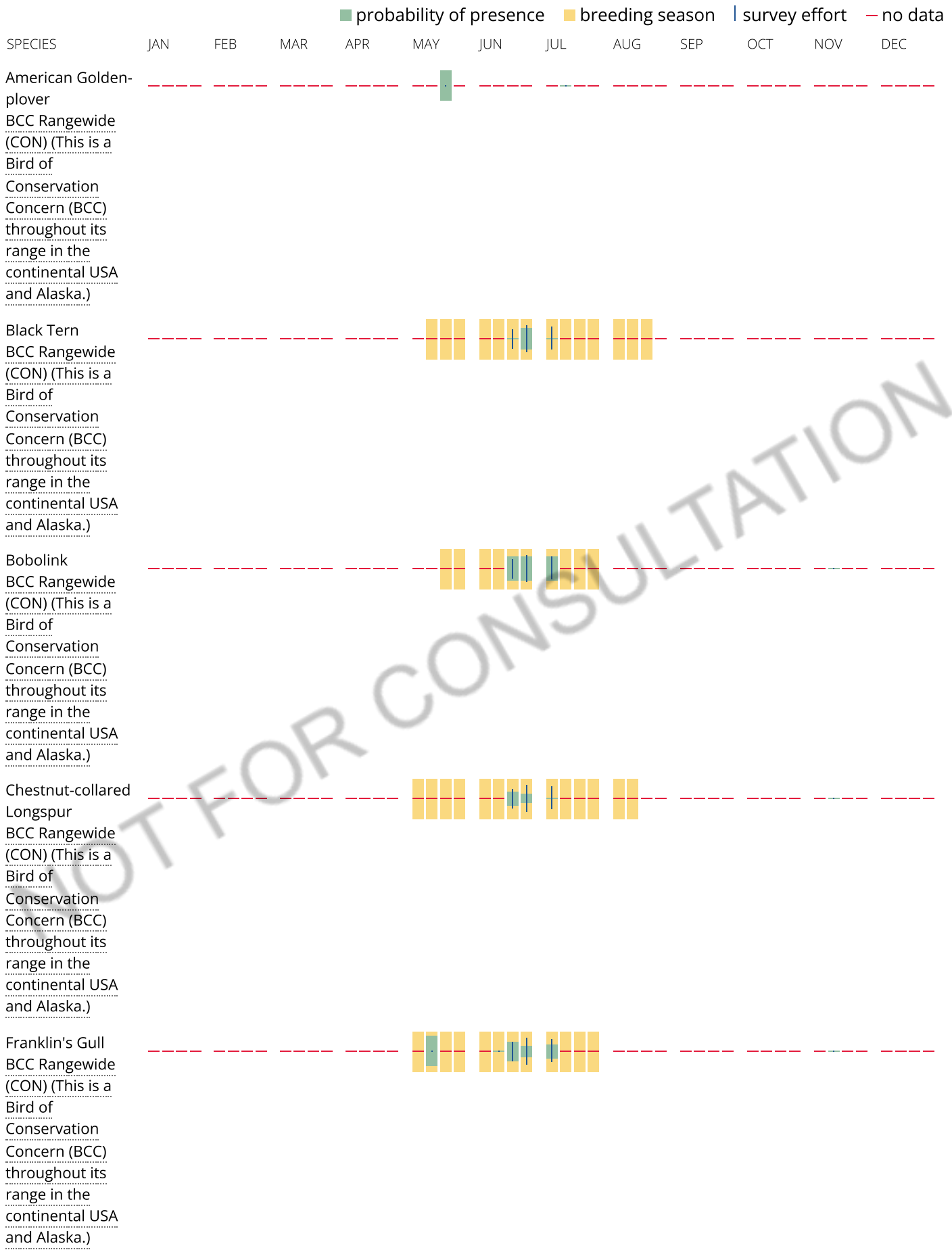

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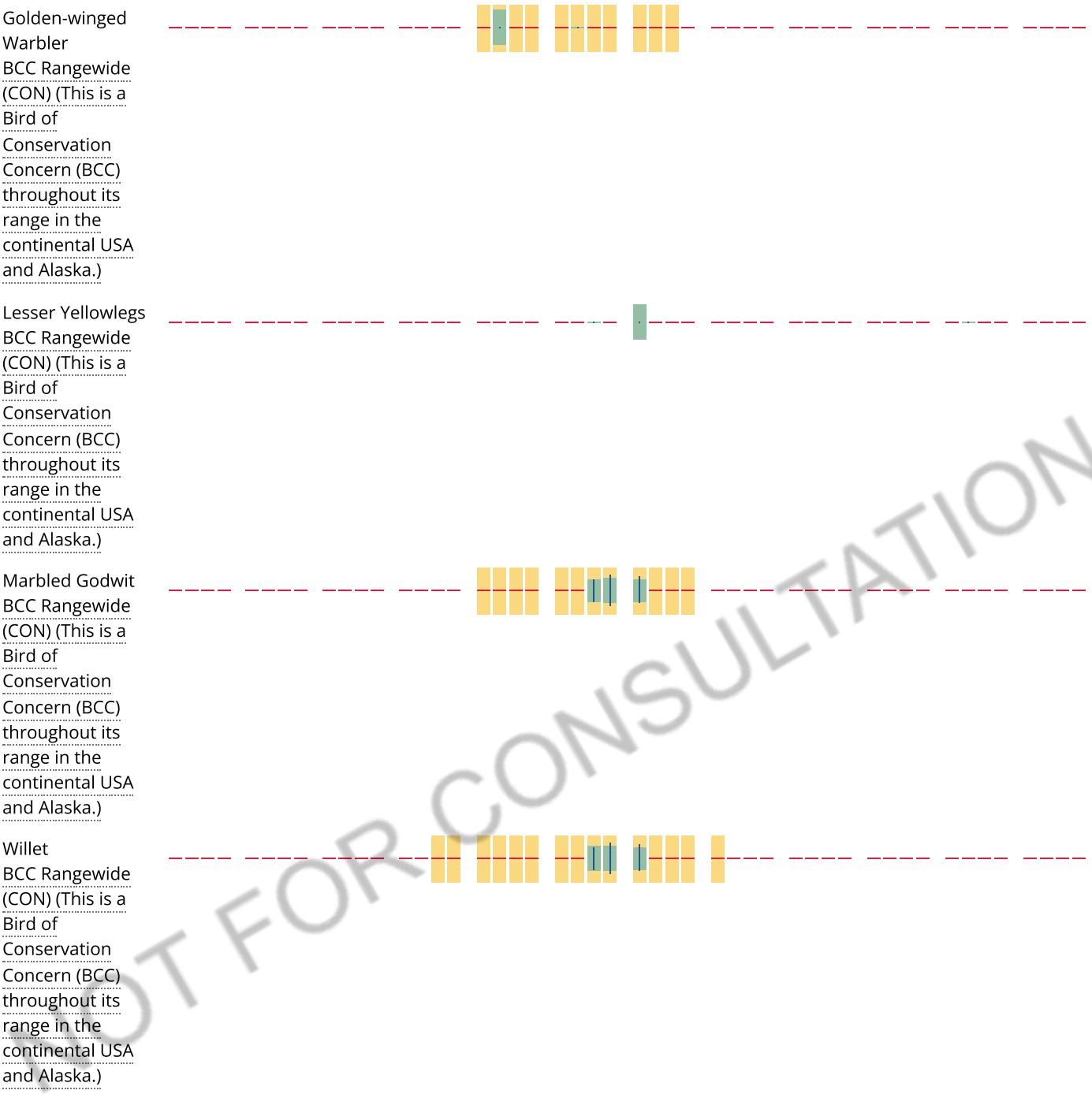

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Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review.

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Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

NOT FOR CONSULTATION

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

This location overlaps the following National Wildlife Refuge lands:

LAND	ACRES
LOGAN COUNTY WATERFOWL PRODUCTION AREA	1,358.57 acres

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

The area of this project is too large for IPaC to load all NWI wetlands in the area. The list below may be incomplete. Please contact the local U.S. Fish and Wildlife Service office or visit the NWI map for a full list.

FRESHWATER EMERGENT WETLAND

- PEM1A
- PEM1/ABF

FRESHWATER POND

- PAB/EM1F
- PABFh
- PABFx
- PABF

LAKE

- L1UBG
- L2ABG

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

NOT FOR CONSULTATION

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
North Dakota Ecological Services Field Office
3425 Miriam Avenue
Bismarck, ND 58501-7926
Phone: (701) 250-4481 Fax: (701) 355-8513

In Reply Refer To: August 16, 2023
Project Code: 2023-0117948
Project Name: Badger Wind Project

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

Section 7 of the Endangered Species Act

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The Act requires that actions authorized, funded, or carried out by Federal agencies not jeopardize federally threatened or endangered species or adversely modify designated critical habitat. To fulfill this mandate, Federal agencies (or their designated non-federal representative) must consult with the Service *if they determine their project and associated actions "may affect" listed species or critical habitat*. If Federal agencies or their non-federal representatives determine their project and associated actions will have "no effect" on listed species, their habitats, or designated critical habitat, consultation is not required. However, if a "no effect" is determined, we recommend that you maintain a written record in support of your conclusion.

Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act

Additionally, while not all are listed as threatened or endangered, eagles and migratory birds

have protections under the Bald and Golden Eagle Protection Act (BGEPA) and the Migratory Bird Treaty Act (MBTA). The BGEPA prohibits take which is defined as, “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb” (50 CFR 22.3). Disturb is defined in regulations as, “to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.”. The MBTA makes it unlawful without a waiver to pursue, hunt, take, capture, kill, or sell birds listed as migratory birds, including eagles. The statute does not discriminate between live or dead birds and also grants full protection to any bird parts including feathers, eggs, and nests.

Service Property Interests

As part of the National Wildlife Refuge System, the Service administers fee title Refuge and Waterfowl Production Areas, as well as wetland and grassland easements, throughout North Dakota. For exact locations of Service interest lands, please contact the appropriate Wetland Management Districts (WMD) for guidance regarding FWS easements.

Northwest ND WMD Complex: Kyle Flanery, (701) 768-2548
Eastern ND WMD Complex: Dave Azure, (701) 285-3341
Central ND WMD Complex (also covers south and west): Todd Luke, (701) 442-5474

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

North Dakota Ecological Services Field Office
3425 Miriam Avenue
Bismarck, ND 58501-7926
(701) 250-4481

PROJECT SUMMARY

Project Code: 2023-0117948
Project Name: Badger Wind Project
Project Type: Power Gen - Wind
Project Description: Wind energy project near Wishek, North Dakota comprised of up to 109 wind turbines
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@46.29386975,-99.5783625999317,14z



Counties: Logan and McIntosh counties, North Dakota

ENDANGERED SPECIES ACT SPECIES

There is a total of 5 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered

BIRDS

NAME	STATUS
Piping Plover *Charadrius melodus* Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered. There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6039	Threatened
Red Knot *Calidris canutus rufa* There is **proposed** critical habitat for this species. Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened
Whooping Crane *Grus americana* Population: Wherever found, except where listed as an experimental population There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/758	Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus*	Candidate

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/9743

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

The following FWS National Wildlife Refuge Lands and Fish Hatcheries lie fully or partially within your project area:

FACILITY NAME	ACRES
LOGAN COUNTY WATERFOWL PRODUCTION AREA https://www.fws.gov/refuges/profiles/index.cfm?id=62630	0

WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

Due to your project's size, the list below may be incomplete, or the acreages reported may be inaccurate. For a full list, please contact the local U.S. Fish and Wildlife office or visit https://www.fws.gov/wetlands/data/mapper.HTML

FRESHWATER EMERGENT WETLAND

- PEM1Ch
- PEM1B

- PEM1Cx
- PEM1Ad
- PEM1F
- PEM1Ah
- PEM1A
- PEM1Ax
- PEM1C

FRESHWATER POND
- PABF
- PABFh
- PABKx
- PUSA
- PABG
- PAB/EM1F
- PABFx

RIVERINE
- R4SBCx
- R4SBAx
- R4SBA
- R4SBC

LAKE
- L2ABGx
- L2ABG

OTHER
- Pf

IPAC USER CONTACT INFORMATION

Agency:	Private Entity
Name:	Christopher Farmer
Address:	Orsted
Address Line 2:	110 Edison Place
City:	Newark
State:	NJ
Zip:	07102
Email	chfar@orsted.com
Phone:	7739653238

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

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Project information

NAME

Logan-McIntosh

LOCATION

Logan and McIntosh counties, North Dakota



DESCRIPTION

None

Local office

North Dakota Ecological Services Field Office

(701) 250-4481
(701) 355-8513

3425 Miriam Avenue
Bismarck, ND 58501-7926

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Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Log in to IPaC.
2. Go to your My Projects list.
3. Click PROJECT HOME for this project.
4. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of

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Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Northern Long-eared Bat Myotis septentrionalis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Endangered

Birds

NAME	STATUS
Piping Plover Charadrius melodus There is **final** critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/6039	Threatened
Rufa Red Knot Calidris canutus rufa Wherever found There is **proposed** critical habitat for this species. https://ecos.fws.gov/ecp/species/1864	Threatened
Whooping Crane Grus americana There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/758	Endangered

Insects

NAME	STATUS
Dakota Skipper Hesperia dacotae Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/1028	Threatened
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

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Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

This location overlaps the critical habitat for the following species:

NAME	TYPE
Piping Plover Charadrius melodus https://ecos.fws.gov/ecp/species/6039#crithab	Final

Bald & Golden Eagles

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

There are bald and/or golden eagles in your project area.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON

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Bald Eagle Haliaeetus leucocephalus — Breeds Dec 1 to Aug 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Golden Eagle Aquila chrysaetos — Breeds Jan 1 to Aug 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1680

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

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3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

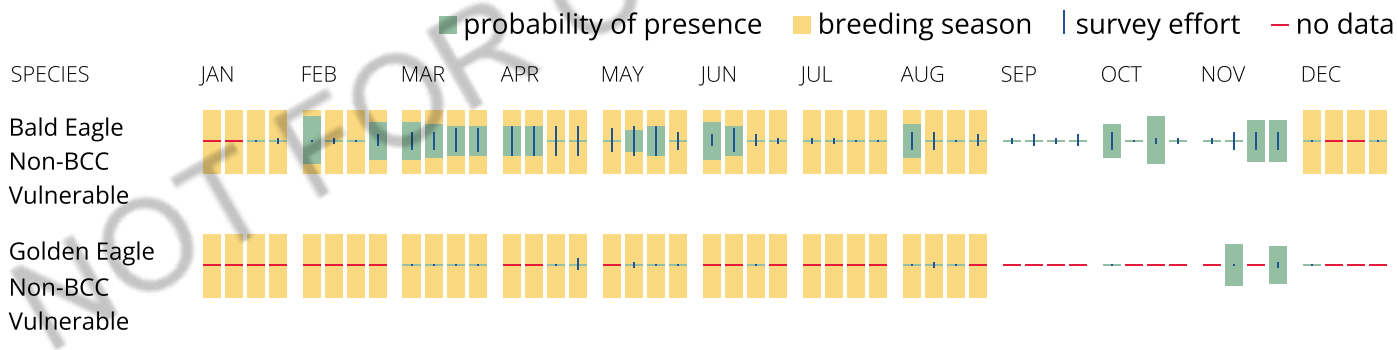
Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



NOT FOR CONSULTATION

What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply). To see a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs of bald and golden eagles in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur. Please contact your local Fish and Wildlife Service Field Office if you have questions.

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Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

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NAME	BREEDING SEASON
American Golden-plover Pluvialis dominica This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Baird's Sparrow Ammodramus bairdii This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/5113	Breeds May 20 to Aug 15
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Dec 1 to Aug 31
Black Tern Chlidonias niger This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3093	Breeds May 15 to Aug 20
Bobolink Dolichonyx oryzivorus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31

California Gull Larus californicus — Breeds Mar 1 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Chestnut-collared Longspur Calcarius ornatus — Breeds May 1 to Aug 10
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Chimney Swift Chaetura pelagica — Breeds Mar 15 to Aug 25
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Clark's Grebe Aechmophorus clarkii — Breeds Jun 1 to Aug 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Ferruginous Hawk Buteo regalis — Breeds Mar 15 to Aug 15
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/6038

Franklin's Gull Leucophaeus pipixcan — Breeds May 1 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Golden Eagle Aquila chrysaetos — Breeds Jan 1 to Aug 31
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1680

Golden-winged Warbler Vermivora chrysoptera — Breeds May 1 to Jul 20
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8745

Henslow's Sparrow Ammodramus henslowii — Breeds May 1 to Aug 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/3941

NOT FOR CONSULTATION

Hudsonian Godwit Limosa haemastica — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Lark Bunting Calamospiza melanocorys — Breeds May 10 to Aug 15

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Lesser Yellowlegs Tringa flavipes — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9679

Long-eared Owl asio otus — Breeds Mar 1 to Jul 15

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/3631

Marbled Godwit Limosa fedoa — Breeds May 1 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9481

Pectoral Sandpiper Calidris melanotos — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Prairie Falcon Falco mexicanus — Breeds Mar 1 to Jul 31

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/4736

Red-headed Woodpecker Melanerpes erythrocephalus — Breeds May 10 to Sep 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Ruddy Turnstone Arenaria interpres morinella — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

NOT FOR CONSULTATION

Short-billed Dowitcher Limnodromus griseus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9480	Breeds elsewhere
Sprague's Pipit Anthus spragueii This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8964	Breeds May 10 to Aug 31
Western Grebe aechmophorus occidentalis This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/6743	Breeds Jun 1 to Aug 31
Willet Tringa semipalmata This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 5

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

NOT FOR CONSULTATION

2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

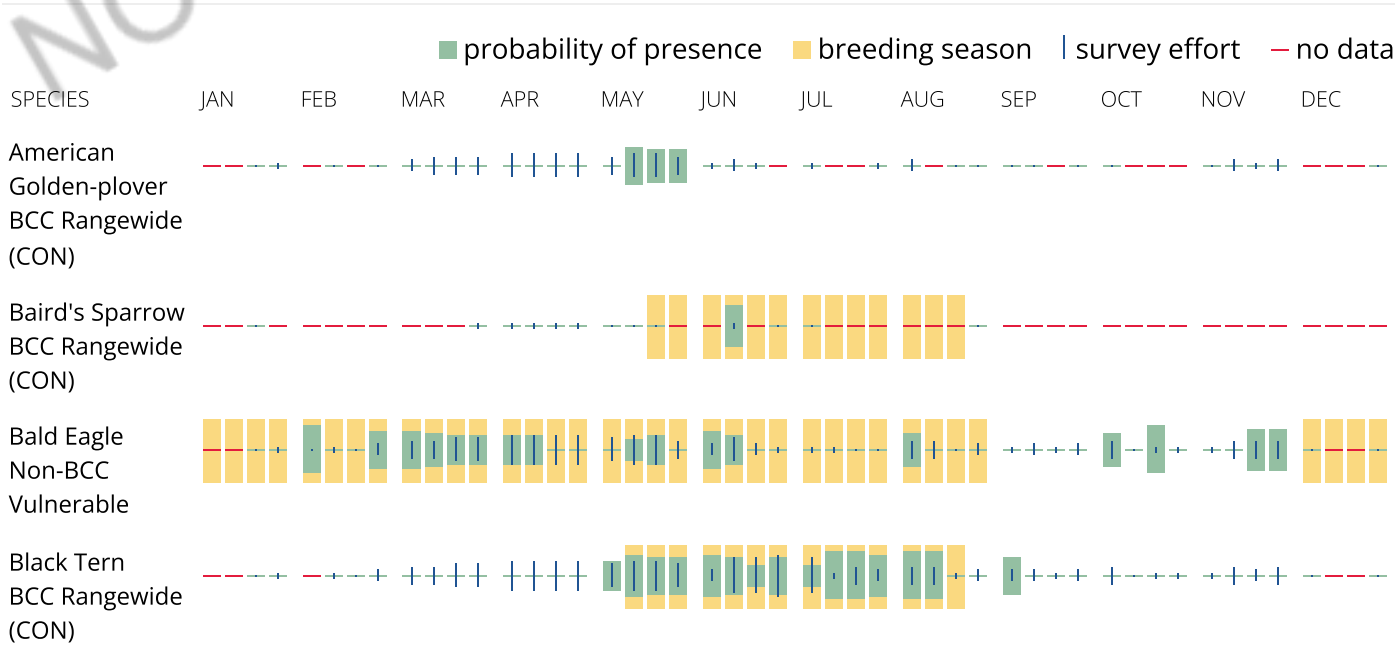
Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



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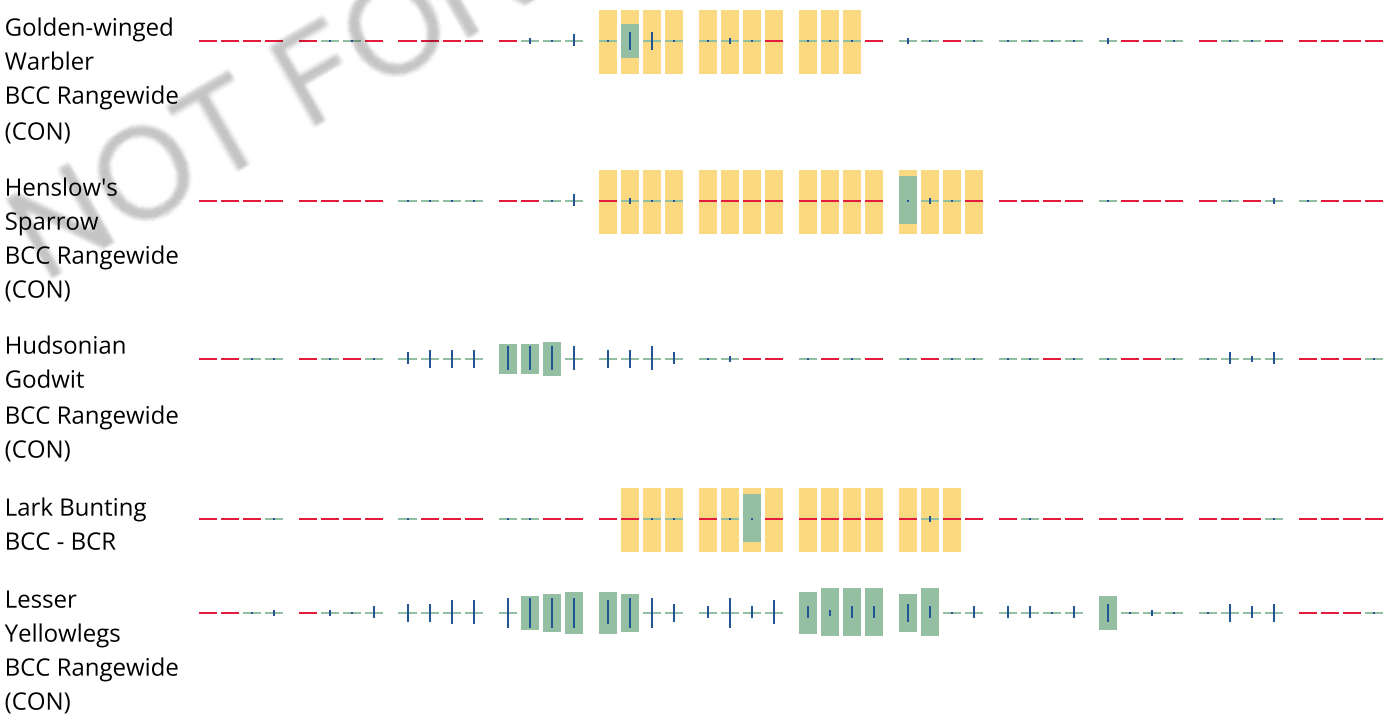



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Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

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Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

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Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

This location overlaps the following National Wildlife Refuge lands:

LAND	ACRES
DAKOTA GRASSLAND CONSERVATION AREA	0 acres
MCINTOSH COUNTY WATERFOWL PRODUCTION AREA	29,603.06 acres

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Wetland information is not available at this time

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

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Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

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IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

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Location

Logan and McIntosh counties, North Dakota



Local office

North Dakota Ecological Services Field Office

(701) 250-4481
(701) 355-8513

3425 Miriam Avenue
Bismarck, ND 58501-7926

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Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).

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2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Northern Long-eared Bat Myotis septentrionalis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Endangered

Birds

NAME	STATUS
Piping Plover Charadrius melodus There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/6039	Threatened
Rufa Red Knot Calidris canutus rufa Wherever found There is **proposed** critical habitat for this species. https://ecos.fws.gov/ecp/species/1864	Threatened
Whooping Crane Grus americana There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/758	Endangered

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

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Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

You are still required to determine if your project(s) may have effects on all above listed species.

Bald & Golden Eagles

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

There are bald and/or golden eagles in your project area.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON

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Bald Eagle Haliaeetus leucocephalus — Breeds Dec 1 to Aug 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)

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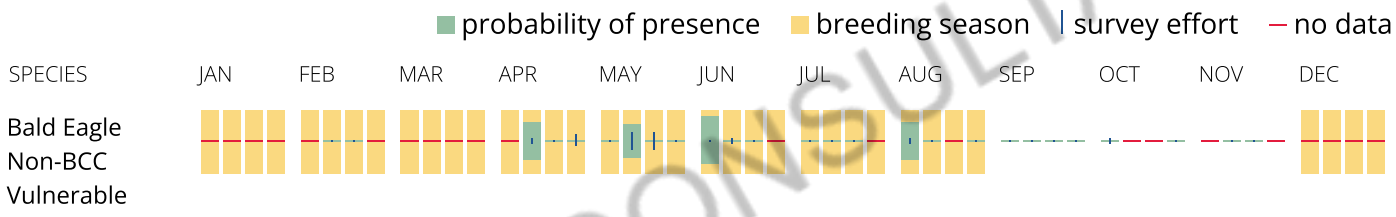
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



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What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply). To see a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs of bald and golden eagles in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur. Please contact your local Fish and Wildlife Service Field Office if you have questions.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your

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list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
American Golden-plover *Pluvialis dominica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Dec 1 to Aug 31
Black Tern *Chlidonias niger* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3093	Breeds May 15 to Aug 20
Bobolink *Dolichonyx oryzivorus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31
California Gull *Larus californicus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 1 to Jul 31
Chestnut-collared Longspur *Calcarius ornatus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 10
Chimney Swift *Chaetura pelagica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25

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Franklin's Gull Leucophaeus pipixcan This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31
Golden-winged Warbler Vermivora chrysoptera This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8745	Breeds May 1 to Jul 20
Lesser Yellowlegs Tringa flavipes This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Marbled Godwit Limosa fedoa This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9481	Breeds May 1 to Jul 31
Pectoral Sandpiper Calidris melanotos This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Western Grebe aechmophorus occidentalis This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/6743	Breeds Jun 1 to Aug 31
Willet Tringa semipalmata This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 5

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Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
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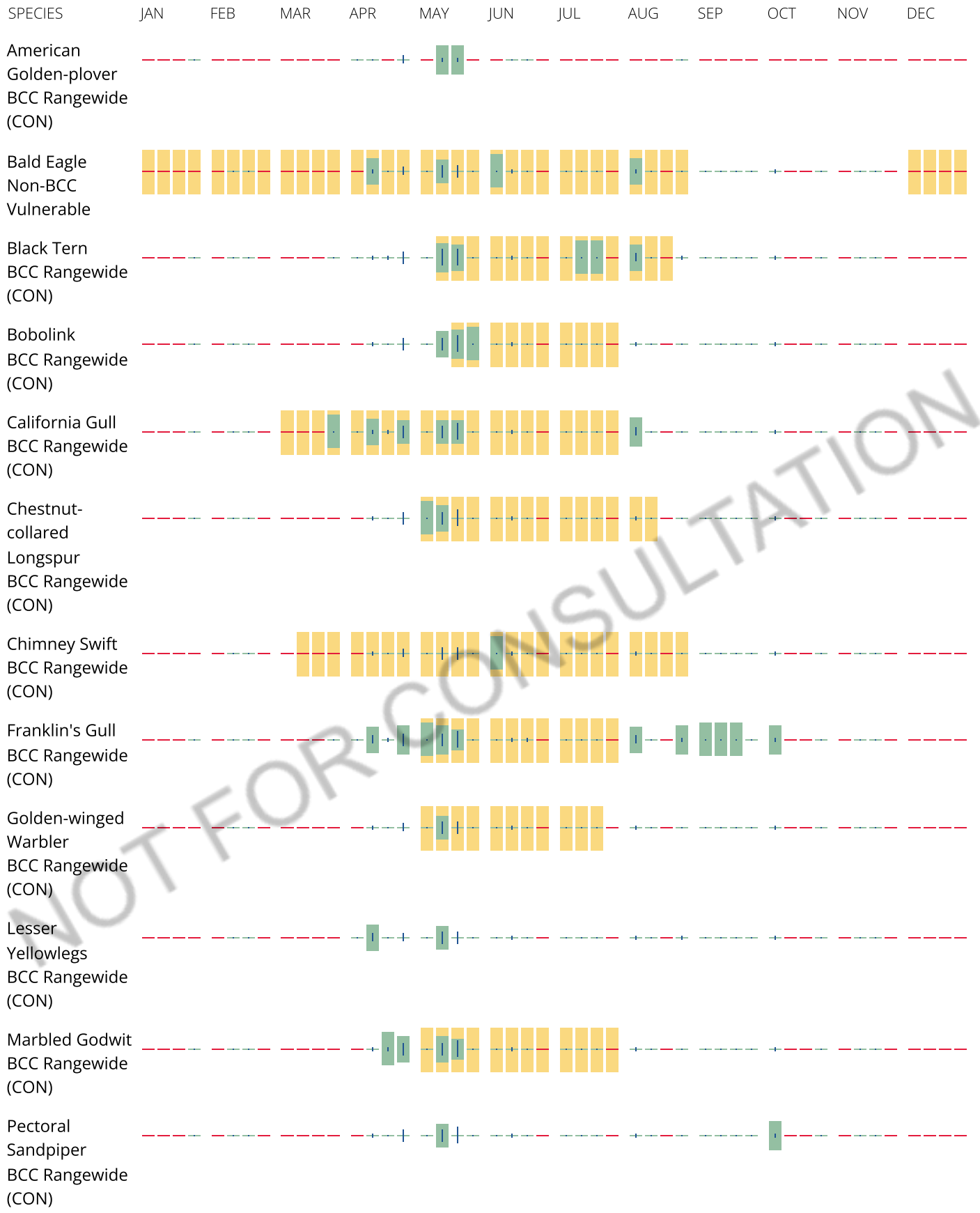

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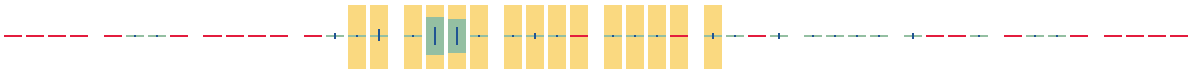

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird

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on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key

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component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

This location overlaps the following National Wildlife Refuge lands:

LAND	ACRES
DAKOTA GRASSLAND CONSERVATION AREA	0 acres

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Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Wetland information is not available at this time

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

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Appendix B. Selected Tier 2 and 3 Bird and Bat Study Reports for the Badger Wind Project, Logan and McIntosh Counties, North Dakota

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PRE-CONSTRUCTION AVIAN STUDIES
YEAR 1
MAY 2019 THROUGH APRIL 2020

BADGER WIND PROJECT
LOGAN AND MCINTOSH COUNTIES, NORTH DAKOTA

Prepared for

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November 2020

EXECUTIVE SUMMARY

This report summarizes the results of pre-construction avian studies conducted by Atwell, LLC (Atwell) on behalf of Badger Wind, LLC (Badger Wind) for the proposed Badger Wind Project (the project) in Logan and McIntosh counties, North Dakota. Field studies were designed to document avian and raptor use, raptor nest activity, and Sharp-tailed Grouse (*Tympanuchus phasianellus*) lekking activity in the vicinity of the project.

Avian use studies were conducted in accordance with the United States Fish and Wildlife Service Land-Based Wind Energy Guidelines (USFWS WEG; USFWS 2012), the Eagle Conservation Plan Guidance: Module 1 - Land-based Wind Energy, Version 2 (ECPG; USFWS 2013), and the Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests (i.e., "final Eagle Rule"; USFWS 2016). The WEG recommend avian studies to document horizontal and vertical avian use, avian use by habitat type, raptor nest presence and activity, and species of concern presence and activity. The ECPG recommends studies to document eagle use, including occurrence, use during spring and fall migration seasons, and nest territory occupancy. The avian studies summarized in this report were designed to collect data in accordance with these guidelines.

Avian studies conducted during the first year of surveys included: nest surveys for Bald Eagles (*Haliaeetus leucocephalus*), Golden Eagles (*Aquila chrysaetos*), and other raptor species; lek surveys for Sharp-tailed Grouse; a full year of monthly eagle use surveys; and diurnal avian activity surveys during the spring and fall migration periods. The studies described in this report were conducted between May 2019 and April 2020.

Key results are summarized below.

Raptor Nests

- During aerial nest surveys, one in-use Bald Eagle nest was found within the project area and no nests were observed within the surrounding 10-mile buffer. This nest in the project area fledged young later in the season. No Golden Eagle nests were found within the project area or 10-mile buffer during the study period.
- Five in-use Ferruginous Hawk (*Buteo regalis*) nests, four Red-tailed Hawk (*Buteo jamaicensis*) nests, one Swainson's Hawk (*Buteo swainsoni*), and two Great Horned Owl nests (*Bubo virginianus*) were found within the project area and a surrounding two-mile buffer.

Sharp-tailed Grouse

- One confirmed Sharp-tailed Grouse lek was observed within the project boundary during aerial surveys in May 2019. In addition, two possible lek locations were detected during

May 2019 ground-based surveys within the project boundary. Cumulatively, six individual Sharp-tailed Grouse detections were recorded during lek surveys. Thirty-eight additional Sharp-tailed Grouse detections were recorded during diurnal avian use surveys in the spring and fall.

Bald Eagle and Golden Eagle Use of the Project Area

- Thirty-Four Bald Eagles were observed over the course of 636 hours of standardized eagle use surveys over the study period. An additional 46 Bald Eagles were detected incidental to standardized surveys. Incidental observations include sightings outside of the standardized sample plot and encounters outside of 60-minute eagle use survey periods.
- Six Golden Eagles were observed over the course of 636 hours of standardized eagle use surveys over the study period. Seven additional Golden Eagles were detected incidentally to standardized use surveys.
- Bald Eagle mean use rates were highest during the spring period, followed by the fall. Only one Bald Eagle was observed during standardized use surveys in the summer and only two were observed in the winter. Golden Eagle mean use rates were highest in the fall and winter.

Use of the Project Area by Species Listed under the Endangered Species Act

- Three Whooping Cranes (*Grus americana*) were observed within the project area from April 15 to 17, 2020. The cranes were first observed during eagle use surveys at a nearby point count station. Return visits found that the cranes foraged during daylight hours in unharvested corn and roosted in riverine wetlands nearby at night. This is the first known observation of Whooping Crane recorded within the project boundary.
- No other federally listed endangered or threatened species were observed within the project boundary during the study period.

General Avian Use of the Project Area

- Many of the most commonly observed species were generalists that are often observed in agricultural areas, including Mourning Doves (*Zenaida macroura*), Rock Pigeons (*Columba livia*), and American Crows (*Corvus brachyrhynchos*). Larger groups of birds were also observed, perhaps as part of seasonal migrations including Franklin's Gull (*Leucophaeus pipixcan*), Lapland Longspurs (*Calcarius lapponicus*), Red-winged Blackbird (*Agelaius phoeniceus*), and Sandhill Cranes (*Grus canadensis*).
    - Small-bodied passerines (particularly Lapland Longspurs) and waterfowl (particularly Snow Geese [*Chen caerulescens*]) together comprised the majority (98%) of avian detections during the spring.

  - Small-bodied passerines (particularly Red-winged Blackbirds), and waterbirds (particularly Franklin's Gull) together comprised the majority (83%) of avian detections during the fall.

- Avian species groups with mean flight heights within the pre-defined 35 – 150-meter rotor-swept zone included large-bodied corvids (e.g., crows and ravens), raptors, waterbirds (e.g., gulls, pelicans, cormorants), and waterfowl.
- Species of conservation priority observed more frequently in grassland habitats during diurnal avian use surveys included Chestnut-collared Longspur (*Calcarius ornatus*), Grasshopper Sparrow (*Ammodramus savannarum*), Bobolink (*Dolichonyx oryzivorus*), and Western Meadowlark (*Sturnella neglecta*).
- All raptor-species use rates were highest during the fall, driven by detections of Broad-winged Hawks (*Buteo platypterus*), Northern Harrier (*Circus hudsonius*), Red-tailed Hawk, and Swainson's Hawk.

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ACRONYMS AND ABBREVIATIONS

AKN	Avian Knowledge Network
Atwell	Atwell, LLC
BGEPA	Bald and Golden Eagle Protection Act
ECPG	United States Fish and Wildlife Service Eagle Conservation Plan Guidance: Module 1 - Land-based Wind Energy Version 2
ESA	Endangered Species Act
km	kilometer(s)
m	meter(s)
MBTA	Migratory Bird Treaty Act
MCP	Minimum Convex Polygon
MW	Megawatt
NDGFD	North Dakota Game and Fish Department
ND SWAP	North Dakota State Wildlife Action Plan
NGPC	Nebraska Game and Parks Commission
NLCD	National Land Cover Database
QA/QC	Quality Assurance/Quality Control
project	Badger Wind Project
RSZ	rotor-swept zone
SCP	Species of Conservation Priority
SD	standard deviation
TES	Threatened and Endangered Species
USFWS	United States Fish and Wildlife Service
WEG	United States Fish and Wildlife Service 2012 Land-Based Wind Energy Guidelines
WTG	Wind Turbine Generator

1 INTRODUCTION

Atwell, LLC (Atwell) was contracted by Badger Wind, LLC (Badger Wind) to conduct avian studies for the proposed Badger Wind Project (the project) in Logan and McIntosh counties, North Dakota (Figure 1). The 250-megawatt (MW) project includes the development of 60 - 120 wind turbine generators (WTGs), associated collection lines, access roads, and a collector substation.

The current project boundary (April 2019) is depicted in Figure 1. The project area is an estimated 121,695 acres, with approximately 60% of its area (73,390 acres) in McIntosh County and approximately 40% (48,315 acres) in Logan County. The general topography is undulating and rises from the west to the east, with approximate elevations between 1,970 and 2,200 feet above mean sea level within the project boundary. The project is predominately within the Missouri Coteau Slope Level IV Ecoregion, with portions of the project area's eastern boundary extending upward into the Missouri Coteau Level IV Ecoregion (Bryce et al. 1996). The Missouri Coteau is an escarpment of glacial till containing numerous hills, small lakes, and poorly drained depressions that are referred to as "potholes" that receive most of their water from snow melt and precipitation (Bryce et al. 1996). The Missouri Coteau Slope descends westward toward the Missouri River from the Coteau and is characterized by a thinner glacial till layer and integrated drainages flowing toward the Missouri River (Clayton 1962).

According to the 2016 U.S. Geological Survey National Land Cover Database (NLCD; Yang et al. 2018), the project area is composed primarily of cultivated crops (56.0%) and herbaceous/grassland (35.1%; Figure 2). Wetlands and open water comprise 2.4% of the project area. Other land cover types found within the project area include developed areas (2.9% of the project area), pasture/hay (2.4%), shrub/scrub (1.1%), woodland forest (0.1%), and barren land (less than 0.1%; Figure 2).

The objectives of the studies summarized in this report were to document avian and raptor use, raptor nest activity, and grouse lekking activity in the vicinity of the project. Survey protocols described herein were designed to adhere to Tier 3 of the United States Fish and Wildlife Service (USFWS) 2012 Land-Based Wind Energy Guidelines (WEG) and Stage 2 assessments described in the USFWS Eagle Conservation Plan Guidance: Module 1 - Land-based Wind Energy Version 2 (ECPG; USFWS 2012; USFWS 2013). These two documents provide wind energy developers and operators guidance for adhering to the Migratory Bird Treaty Act (MBTA) and Bald and Golden Eagle Protection Act (BGEPA), respectively. Additionally, Atwell utilized industry standard approaches for avian use studies as promoted by the National Wind Wildlife Collaborative (Strickland et al. 2011). Table 1 includes a summary of avian studies conducted over the May 2019 to April 2020 study period and their respective survey extents, survey frequencies, and survey durations.

This report adheres to avian taxonomy outlined in the American Ornithological Society's Online Checklist of North & Middle American Birds: 61st Supplement (Chesser et al. 2020).

2 METHODS

2.1 BALD EAGLE AND RAPTOR NEST SURVEY

The eagle and raptor nest surveys were conducted from May 1 to 3, 2019. The eagle nest survey area, depicted with black outline in Figure 3, includes the project area and extends 10 miles from the project boundary, following recommendations in the ECPG and final Eagle Rule (USFWS 2013; USFWS 2016). The smaller non-eagle raptor nest survey area, depicted with purple outline in Figure 3, includes the project area and extends two miles from the project boundary, following recommendations in the WEG (USFWS 2012).

Aerial transect surveys were conducted in a fixed-wing Cessna Skyhawk 172M by an Atwell avian biologist. Transects were flown by North Dakota-based Bismarck Aero at speeds of approximately 70 to 120 knots at altitudes from approximately 400 to 1,000 feet, depending on landscape conditions. North-south survey transects were spaced one mile apart. The plane occasionally deviated from the transect to specifically circle potential nesting habitat patches when they were encountered. The plane then returned to resume the transect once the habitat patch was assessed.

An area extending to 0.5-mile on each side of each transect was scanned for eagle and other raptor nests. Surveys were flown prior to bud-break and leaf extension, resulting in minimal canopy obstruction of nests. Coniferous trees that may obscure nest locations were relatively scarce and were usually associated with homesteads.

In addition to the aerial nest survey, raptor nests that were located incidentally during ground-based eagle use and diurnal avian activity surveys were also recorded and added to the project nest database.

When a raptor nest was encountered, the following data were collected:

- Nesting species;
- Nest location (decimal degrees);
- Nest substrate (deciduous or coniferous);
- Nest status (in-use or alternate);
- Nest condition (good, fair, or poor); and
- Nest contents (number of eggs or young).

Following completion of the surveys, data were reviewed and uploaded into the project database as part of the quality assurance/quality control (QA/QC) program.

2.2 SHARP-TAILED GROUSE LEK SURVEYS

The Sharp-tailed Grouse (*Tympanuchus phasianellus*) lek survey was conducted between May 2 and May 10, 2019. The grouse lek survey area included the project area and extended one mile from the project boundary, following guidance described in the WEG, the North Dakota Game and Fish Department (NDGFD) North Dakota Wildlife Action Plan (ND SWAP; Dyke et al. 2015), and the Nebraska Game and Parks Commission (NGPC) Avian Assessment Guidance for Wind Energy Facilities in Nebraska version 3.5 (NGPC 2018; Figure 4).

Aerial transect surveys were conducted in a fixed-wing Cessna Skyhawk 172M by Atwell avian biologists. Transects were flown by North Dakota-based Bismarck Aero at speeds from approximately 50 to 135 knots at an approximate altitude of 400 feet, depending on landscape conditions and safety concerns. North-south survey transects were flown 0.5 miles apart, with surveyors scanning out to 0.25 mile on each side of the aircraft. Surveys began approximately ten minutes before sunrise and ended approximately two hours after sunrise.

When a potential grouse lek was encountered, the plane deviated from the transect and circled the area where grouse were observed to mark the coordinates of the location, document habitat features, and to count all grouse present. Once the lek was assessed, the aircraft then returned to continue the transect.

An Atwell biologist conducted an informal ground-based lek survey on May 2, 2019, after the morning's scheduled aerial survey was cancelled due to fog. The biologist drove 71st St SE from State Highway 3 to the Village of Burnstad. The biologist stopped every 0.5 mile to visually scan for grouse and to listen for grouse vocalizations over a five-minute survey period at each stop (Strickland et al. 2011; Newell 2016).

All grouse observed incidental to other project-related activities such as eagle nest surveys and eagle use point count surveys were recorded and added to the project's grouse data set.

When a Sharp-tailed Grouse lek was encountered, the following data were collected:

- Lek location (decimal degrees);
- Number of individuals present;
- Observed behaviors;
- Land use; and

Lek locations were additionally referenced with nearby landmarks (e.g., hilltops, potholes or wetlands, trees) to improve location precision and to help relocate the lek if assessed for ground-based lek counts at a later date.

Confirmed leks were defined as two or more birds together, with at least one male displaying. Possible leks were defined as auditory detections of multiple grouse that could not be verified visually after their initial detection on a ground-based survey.

Following completion of the surveys, data were reviewed and uploaded into the project database as part of the QA/QC program.

2.3 EAGLE USE SURVEYS

A long-duration, fixed-point protocol (Strickland et al. 2011) was used to document seasonal activity and behavior of eagles and other raptor species within the project. All eagle detections and other raptor detections within a three-dimensional cylindrical plot (the sample plot) were recorded, following a fixed-radius, point count survey approach (Hutto et al. 1986; Ralph et al. 1993) that is referenced in the ECPG (USFWS 2013). Though fixed-radius plots were used, the distance to each detection was estimated to allow for density estimation (Reynolds et al. 1980). Sample plots measured 2,625 feet (800 meters [m]) in radius by 656 feet (200 m) in height, as described in the final Eagle Rule (USFWS 2016).

Study Period

Eagle use surveys were conducted over one full year to encompass the wintering season, spring and fall migrations, and the breeding season (Strickland et al. 2011). Each sample plot was visited for one hour each month, as described in the final Eagle Rule (USFWS 2016). Seasonal periods were defined as spring (March through May), summer (June through July), fall (August through November), and winter (January through February). The study period began on May 1, 2019 and ended on April 30, 2020.

Survey Methodology

Consistent with the Eagle Rule, a one-hour survey duration was used throughout the study period for all visits (USFWS 2016). Surveys were conducted between dawn and dusk. Surveys were conducted in all weather conditions provided that conditions were safe for the observer and that horizontal visibility was at least 800 m and vertical visibility was at least 200 m. A starting point was randomly selected from the 53-monitoring stations before each of the 12 survey events across the year.

While broadly referred to here as point count surveys, the ECPG recognizes that eagle and raptor use surveys are more accurately described as a ‘point-based recording of activity duration (minutes of flight)’ within the sample plot (USFWS 2013).

The following information was recorded for each eagle or raptor individual that was observed:

- Species or parent taxa group (e.g., Accipiter species);
- Age (adult, immature, juvenile);
- Time of day at first and final observation within the sample plot;
- Behavior;
- Flight direction;
- Habitat;
- Horizontal distance to initial observation and to closest observation;
- Flight height within the sample plot (initial height, minimum height, maximum height);
- For eagles and species as endangered or threatened under the Endangered Species Act (ESA), flight path mapped through the sample plot;
- Duration of flight within the rotor-swept zone's (RSZ) portion of the sample plot (35 to 150 m in height), to the nearest 0.1 minute; and
- Duration of flight within the entire (0 to 200 m in height) sample plot for eagles only (i.e. eagle minutes described in the ECPG [USFWS 2013]).

At the completion of each survey, the observer confirmed that data sheets were complete and legible prior to proceeding to the next point count station. Following completion of the surveys, data were reviewed and uploaded into the project database as part of the QA/QC program.

Selection and Location of Point Count Stations

Fifty-three point count stations were established overall within the study area overall (Figure 5). Point count station coordinates are detailed in Appendix A. Consistent with guidelines in the final Eagle Rule (USFWS 2016) and the Appendix C of the ECPG (USFWS 2013), Atwell established 18 point count stations to achieve 30% spatial coverage of an approximately 28,269-acre minimum convex polygon (MCP). The MCP is depicted by the blue polygon in Figure 5 and was generated from a preliminary turbine array provided by Badger Wind. The MCP encompasses the potentially hazardous area around the turbines and their associated infrastructure.

An additional 35 point count stations were added to provide coverage of the project area given a potential for future expansion and/or modification of the project area. Three of these 35 stations were positioned to the east and outside of the project boundary, in an area that was also under consideration for development at the start of surveys.

The following criteria were used when selecting point count station locations:

- Stations should be located on low-traffic roadways for safety and to minimize noise disturbance during surveys.
- Stations should be located within or adjacent habitat types that are representative of the project area.
- Stations should be spaced so that sample plots do not overlap.
- Stations should provide a 360-degree view of the horizon to the extent feasible.
- Stations should be accessible year-round.

Atwell ground-truthed all 53 point count stations in May 2019. Stations with landowner conflicts, an inadequate viewshed, or anticipated poor observer access during heavy precipitation were adjusted as necessary.

Land cover types were reviewed during ground-truthing to confirm that the survey points were representative of habitats found within the project area. The point count stations were located within represented land cover types as follows: 53.6% cultivated crops, 38.1% herbaceous cover, 3.6% open-space developed areas, 1.9% hay/pastureland, 1.1% emergent herbaceous wetland, and 1.0% shrub scrub. The following land cover types each represented less than 1% of the area covered by survey point count stations: development (low, medium, and high intensities), open water, woody wetland, deciduous forest, and barren land.

Alternate Point Count Station Strategy for Winter Surveys

Point count stations were surveyed for eagle use during the winter (December through February) to the extent feasible. There are 12 point count stations with potential safety or access issues during winter storm events. Point count station 14, 21, 22, 30, 32, 35, 36, 40 and 48, are located on infrequently traveled roads with uncertain plowing frequency. These stations were potentially inaccessible during periods of high snow depths. Point count station 26, 39, and 50 are on frequently traveled roads with minimal roadside clearance. Roadside snowbanks that accumulated during plowing could further limit roadside clearance, rendering these points unsafe during surveys.

Nearby point count stations were pre-selected as to serve alternates for the above point count stations in the event that these stations could not be accessed in inclement weather (Table 2). Alternate points were proximate in location and were located within similar habitats when possible. This strategy allowed surveyors to safely meet standardized survey effort goals for the winter and early spring seasons while maintaining appropriate spatial coverage of the study area.

2.4 DIURNAL AVIAN ACTIVITY POINT COUNT SURVEYS

A short-duration, fixed-point protocol (Strickland et al. 2011) was used to characterize general avian use for all species within the study area, consistent with the WEG (USFWS 2012). Diurnal avian activity surveys were used to estimate mean use and species richness and to determine presence of species of concern and concentrations of avian use within the study area.

Detections of small-bodied birds and large-bodied birds were recorded within a three-dimensional cylindrical plot (the sample plot), following a fixed-radius plot point count survey approach described in Section 2.3. Small-bodied birds included hummingbirds, cuckoos, doves, swifts, woodpeckers, and most passerines. Sample plots for small-bodied birds measured 492 feet (150 m) in radius by 656 feet (200 m) in height. Large-bodied birds included upland game birds, waterfowl, waterbirds (wading birds, cormorants, pelicans, grebes), shorebirds, raptors, nightjars, pigeons, and large corvids (crows [*Corvus brachyrhynchos*] and Common Ravens [*Corvus corax*]). Sample plots for large-bodied birds measured 2,625 feet (800 m) in radius by 656 feet (200 m) in height.

Study Period and Study Area

Diurnal avian activity surveys were completed during the spring (May 2019, and March to April 2020) and fall (August to November 2019) seasons. The same 53 point count station locations established for eagle and raptor use surveys were also used for diurnal avian activity surveys (Figure 5).

Survey Methodology

Diurnal activity surveys followed point count methodology described in Ralph et al. (1993; 1995) and summarized in the WEG (USFWS 2012) and in standard industry recommendations (National Wind Coordinating Committee 1999; Strickland et al. 2011). Though a fixed-radius protocol was used (Hutto et al. 1986; Ralph et al. 1993), distance estimates to each detection were also recorded, allowing for calculation of density estimates (Reynolds et al. 1980).

Diurnal avian activity surveys were 10 minutes in duration. Surveys were conducted after the completion of the eagle and raptor use survey (Section 3.6), so birds had settled after initial disturbance created by the observer's arrival at the point count station.

All birds that were seen or heard during the survey were recorded, up to distances of 150 m for small-bodied birds and 800 m for large-bodied birds. Surveys were conducted throughout the day, their timing contingent on the completion of the preceding eagle and raptor use survey.

The following information was recorded for each auditory and visual detection:

- Species or parent taxa group (e.g., sparrow species);
- Age (adult, immature, and juvenile);
- Time of day at first detection;
- Behavior;
- Flight Direction;
- Habitat;
- Horizontal distance to initial observation and to closest observation;
- Flight height within the sample plot (initial height, minimum height, and maximum height); and
- Flight paths of federally listed threatened and endangered species mapped through the sample plot.

At the completion of each survey, the observer confirmed that data sheets were complete and legible prior to proceeding to the next point count station. Following completion of the surveys, data were reviewed and uploaded into the project database as part of the QA/QC program.

2.5 INCIDENTAL DATA COLLECTION AND LISTED SPECIES

Incidental detections of eagles, federally listed threatened or endangered (TES), and North Dakota species of conservation priority (SCP) as defined by the ND SWAP (Dyke et al. 2015) were recorded during survey activities. Incidental detections include observations recorded while en route to point count stations, non-raptor observations during eagle use surveys, raptor observations outside of the 800 m-radius survey plot, and observations that were recorded at point count stations but outside the survey period.

3 RESULTS

3.1 BALD EAGLE AND RAPTOR NEST SURVEY

3.1.1 Eagle Nests

Atwell detected one in-use Bald Eagle (*Haliaeetus leucocephalus*) nest within the eagle nest survey area during the May 2019 aerial surveys (Figure 3). This nest was located within the project area, in a small cluster of deciduous trees southwest of Beaver Lake in Logan County (46.3490°N, 99.6275°W). An adult Bald Eagle was observed incubating eggs at the time of observation. No other eagle nests were detected within the eagle nest survey area. One individual subadult Bald Eagle was observed soaring within the project area during aerial surveys (Figure 3). Golden Eagles (*Aquila chrysaetos*) were not observed during the aerial survey and no Golden Eagle nests were found during the study period.

3.1.2 Non-Eagle Raptor Nests

Atwell identified nine non-eagle raptor nests within the project area boundary and four non-eagle raptor nests within the surrounding two-mile raptor nest survey buffer. All 13 nests are depicted in Figure 3 and are summarized in Table 3. No federally listed raptor species were recorded as nesting during raptor nest surveys. Several of the 13 non-eagle raptor nests were found during ground-based eagle use and avian use surveys.

Five occupied Ferruginous Hawk (*Buteo regalis*) nests were found during the survey period, including three nests within the project area boundary and two nests within the 2-mile raptor nest survey buffer (Figure 3). All five nest structures were located in deciduous trees.

Four occupied Red-tailed Hawk (*Buteo jamaicensis*) nests were found during the survey period, including three nests within the project area and one nest within the two-mile raptor nest survey buffer. All four nest structures were constructed in deciduous trees.

The remaining four non-eagle raptor nests included: one Swainson's Hawk (*Buteo swainsoni*) nest observed during the nest building stage at an unusually late date inside of the project area boundary; one occupied Great Horned Owl (*Bubo virginianus*) nest within the project area and one occupied Great Horned Owl nest within the 2-mile raptor nest survey buffer; and one unoccupied raptor nest structure built by an unknown raptor species within the project area boundary. This structure was believed to be too small to be a Bald Eagle nest and of dimensions consistent with a hawk nest. The nest was found in poor condition.

3.2 SHARP-TAILED GROUSE LEK SURVEYS

One confirmed lek location, two possible lek locations, and six individual Sharp-tailed Grouse were observed within the grouse survey area during standardized grouse lek surveys (Figure 4). Confirmed and possible leks are shown with 0.5-mile buffers to represent likely nesting areas for females, following home range information provided in the ND SWAP (Dyke et al. 2015).

The confirmed lek was observed during the aerial survey on May 3, 2019, and it was observed again by aircraft on May 10, 2019. The lek was located approximately 7.75 miles southwest of Wishek and just inside of the project area boundary (Figure 4). On both visits, 16 to 18 individuals were observed at the lek. This lek location is managed as herbaceous habitat by the NDGFD (part of the CoverLocks program) according to signage posted on-site.

Of the two possible leks, both were discovered from auditory detections heard during ground-based surveys that were conducted on May 2, 2020 during inclement fog conditions that prevented visual confirmation of the leks on that date. In both cases, an unknown number of individuals were heard in the early morning hours from the biologist's roadside location. Neither potential lek could be confirmed in subsequent visits to the locations.

Of the six individual Sharp-tailed Grouse detected during the lekking season, one grouse was detected during aerial surveys within the project area and the other five grouse were detected incidentally during follow-up ground surveys between May 17 and May 20, 2019. Of these six birds, three were observed within the project area and three were observed outside of the project area but within the grouse survey area (Figure 4).

3.3 EAGLE USE SURVEYS

Eagle use survey results, along with discussion regarding annual and seasonal patterns, spatial distribution (where sample size allowed), directional movements, and flight heights are presented below.

3.3.1 Eagle Use Survey Effort

Table 4 summarizes survey effort by point during the survey period. Eagle use surveys occurred over 636 total hours of standardized survey effort during the study period. Total effort included 159 hours of spring surveys, 106 hours of summer surveys, 212 hours of fall surveys, and 159 hours of winter surveys.

Over the course of the study period, two point count stations (27 and 28) were shifted to new locations (54 and 55) to avoid landowner conflicts. Stations 14, 19, 22, 30, and 40 were not accessible during the winter and early spring so their paired replacement stations were surveyed instead following the alternative point strategy outlined in Section 2.4 above. Alternative points

were also used for stations 35 and 36 during the winter and spring due inaccessibility and to avoid potential landowner conflicts. Point count stations 35 and 36 will eventually be replaced with new point count stations during the second year of eagle use surveys.

3.3.2 Cumulative Detections of Bald Eagles and Golden Eagles

Overall, 34 Bald Eagles were detected over 636 hours across one year of standardized eagle use survey effort (Figure 6). This total only includes Bald Eagles observed during standardized use surveys within the point count stations' sample plots.

An additional 46 incidental detections of Bald Eagles were documented across the project area during the survey period. Incidental detections included eagles observed from point count stations but flying outside of the sample plot boundary or outside of the 60-minute eagle use survey window, including nine Bald Eagles observed only during 10-minute diurnal avian use surveys that were conducted immediately after the 60-minute eagle use surveys were completed. Eagles detected while traveling en route to point count stations were also included as incidental detections (Figure 6).

Six Golden Eagles were detected over 636 hours across one year of standardized eagle use survey effort (Figure 6). This total only included eagles observed during standardized use surveys that were detected within 800 m of the point count station. An additional seven incidental Golden Eagle detections were documented across the project area during the one-year survey period.

3.3.3 Seasonality

Bald Eagles were recorded as standardized detections throughout the year, though most detections occurred during the spring and fall migratory periods. Standardized mean use within the project area was:

- 0.11 Bald Eagle detections/60-minute survey/800 m plot (standard deviation [SD] = 0.37) during the spring survey period;
- 0.01 Bald Eagle detections/60-minute survey/800 m plot (SD = 0.10) during the summer period, 0.06 Bald Eagle detections/60-minute survey/800 m plot (SD = 0.28) during the fall period; and
- 0.01 Bald Eagle detections/60-minute survey/800 m plot (SD = 0.11) during the winter period, (Table 5).

Accounting for the total eagle use survey effort across the project area during the year, the equivalent of one Bald Eagle was detected for every 8.8 hours, 106.0 hours, 16.3 hours, and 79.5

hours of standardized eagle use survey effort during the spring, summer, fall, and winter survey periods, respectively.

Standardized Golden Eagle detections were spread across the spring, fall, and winter seasons, with most detections occurring during the fall season. Golden Eagles were not observed during standardized surveys in the summer. Standardized mean use within the project area was:

- 0.01 Golden Eagle detections/60-minute survey/800 m plot (SD=0.08) during the spring period;
- 0.01 Golden Eagle detections/60-minute survey/800 m plot (SD = 0.12) during the fall period; and
- 0.01 Golden Eagle detections/60-minute survey/800 m plot (SD = 0.11) during the winter period.

Accounting for the total eagle use survey effort across the project area during the year, the equivalent of one Golden Eagle was detected for every 159.0 hours 70.7 hours, and 79.5 hours during the spring, fall, and winter survey periods, respectively.

3.3.4 Spatial Distribution of Detections

Bald Eagle mean use rates were low across the project area (see Table 6 for a summary of use and Figure 5 for point count station locations). Point count stations with highest observed Bald Eagle use tended to be between Wishek and Beaver Lake in Logan County though this pattern was not well defined, and a second year of eagle use surveys will provide additional context on the persistence of this pattern. Point count station 4 was within 800 m of an in-use Bald Eagle nest (Section 3.1.1) and this point count station had the highest estimated Bald Eagle use of the sample set (Table 6). Point count stations 12 and 18 north of Wishek were the only other stations with more than two Bald Eagle detections over the one year of surveys.

There was no apparent spatial pattern to standardized Golden Eagle detections. Thirteen Golden Eagle sightings (six recorded during standardized surveys and seven recorded incidentally to surveys) were distributed across the project area, with six detections in Logan County and seven detections in McIntosh County.

3.3.5 Directional Movements

Bald Eagle movements tended to be toward the north in the spring and toward the south in the fall, suggesting that most of the Bald Eagles observed during these seasons were migrating through the project area.

Eighteen Bald Eagle detections occurred during the spring season, 10 of which were headed in a northerly direction (i.e., north, northeast, northwest, north-northeast, or north-northwest). Only three spring observations were moving in a southerly direction (i.e., south, southeast, southwest, south-southeast, or south-southwest). Five spring observations did not show any directional movement (i.e., either perched, circling, or mixed flight directions). One of the three southbound spring observations was associated with the known nest within the project area.

Thirteen Bald Eagle detections occurred during the fall season, seven of which were headed in a southerly direction. Only two fall observations were for eagles moving in a northerly direction, two eagle observations were seen flying westward, and another two eagle observations did not show any directional movement. Two Bald Eagles were detected flying south in early to mid-December, suggesting that Bald Eagle fall migrations may continue through late fall.

In contrast to Bald Eagles, Golden Eagles observed during standardized eagle use surveys did not generally follow expected seasonal directional movements (e.g., northbound in the spring and southbound in the fall). This pattern suggests that most of the Golden Eagles seen during the study period were not actively migrating at the time of observation, perhaps using the project area in postnatal dispersal movements or as migratory stopover habitat while observed from point count stations.

3.3.6 Flight Heights

Table 7 summarizes the mean distributions of minimum and maximum flight heights for raptor species detected during standardized eagle use surveys. Mean minimum and maximum flight heights within the project area were highest during the spring survey period for Bald Eagles, Golden Eagles, and the raptor group in general. Mean raptor flight heights steadily decreased through the seasons from the spring to the following winter. A time within RSZ summary for Bald and Golden Eagles is presented in Table 8.

Bald Eagle mean minimum and maximum flight heights were within the RSZ during the spring, and Bald Eagle mean maximum flight heights were within the RSZ during the fall and winter. Sample sizes were low during some seasons, with only one Bald Eagle observed during standardized surveys in the summer and only two Bald Eagles observed in the winter. Bald Eagles were observed within the RSZ for 30.3 minutes over 636 hours of standardized survey effort across the study period. Similar to a seasonal pattern of observation described in Section 3.3.3, rates of Bald Eagle time within the RSZ were highest in the spring (0.11 minutes/survey hour) and fall (0.05).

Golden Eagle sample size was also small, and three of the six Golden Eagles were observed during standardized surveys at heights within the RSZ. Golden Eagles were observed within the RSZ for 10.6 minutes over 636 hours of standardized survey effort across the study period. Golden Eagle

rates of observation within the RSZ were also highest in the spring (0.04 minutes/survey hour) and fall (0.02 minutes/survey hour).

3.3.7 Eagle-Minutes Summary

Eagle-minutes represent accrued minutes of eagle observations for flying eagles within the 800 m-radius by 200 m-high sample plot. Perched eagles or eagles observed outside of the sample plot are not assigned eagle-minutes (USFWS 2013). Eagle-minutes are summarized by season in Table 8.

Similar to patterns described in Sections 3.3.3 and 3.3.6 above, Bald Eagle seasonal eagle-minute rates were highest in the spring (0.26 Bald Eagle-minutes per hour of standardized eagle use observation) and fall (0.16 Bald Eagle-minutes per survey hour). Bald Eagle-minute rates were lowest in the winter (0.03 Bald Eagle-minutes per survey hour) and summer (0.01 Bald-Eagle minutes per survey hour). Cumulatively, 81 total Bald Eagle-minutes were recorded over 636 hours of standardized survey effort across the study period.

Observed Golden Eagle-minute rates were highest in the fall (0.056 Golden Eagle minutes per survey hour) and spring (0.04 Golden Eagle minutes per survey hour). Golden Eagle minute rates were lowest in the winter (0.02 Golden Eagle minutes per survey hour) and the summer, when they were not observed. Cumulatively, 21 Golden Eagle-minutes were recorded over 636 hours of standardized survey effort.

3.3.8 Use of the Project Area by Other Raptor Species

Overall, mean raptor use was highest during the fall survey period (3.37 raptors/60-minute survey/800 m plot; Table 5). Detections of Red-tailed Hawks, Swainson's Hawks, and Northern Harriers (*Circus hudsonius*) collectively accounted for 70.3% of raptor detections during the fall season. Broad-winged Hawks (*Buteo platypterus*) made up an additional 12.3% of raptor detections in the fall. All but one of the 88 Broad-winged Hawks that were reported in the fall were observed over the course of one September survey at point count station 25.

Mean use rates were similar during the summer and spring survey periods (summer: 2.39 raptors/60-minute survey/800 m plot; spring: 2.01 raptors/60-minute survey/800 m plot). Similar to the fall season, Red-tailed Hawks, Swainson's Hawks, and Northern Harriers comprised the bulk of raptor detections in both the summer (78.2%) and the spring (76.4%).

Winter mean use was very low compared to the other three seasons (0.069 raptors/60-minute survey/800 m plot). A total of 11 raptors representing five species were observed over 159 hours of standardized eagle use surveys over the full winter season. Three of the five species detected in the winter were not observed during standardized eagle use surveys during any other season,

including Northern Goshawk (*Accipiter gentilis*), Great Horned Owl, and Snowy Owl (*Bubo scandiacus*). Snowy Owls were the most common raptor detections (45.5%).

Fourteen raptor species were observed during standardized surveys in the fall, the highest raptor diversity noted in any season over the first year of surveys. Twelve raptor species were detected during the spring, seven species in the summer, and five in the winter.

A review of the entire raptor group across all point count stations shows that raptors generally did not exhibit strong inter-seasonal patterns of spatial use within the project area that might suggest local concentrations of use (Table 9 and Figure 5 for point count station locations). However, contrary to Bald Eagle observations described above, point count stations with the highest raptor use rates tended to be in the southern and central portions of the project area. Point count station 25, located west of Wishek in McIntosh County, had the highest mean use overall (8.92 raptors/60-minute survey/800 m plot). This result was driven by a large group of migrating Broad-winged Hawks detected at this station on September 19, 2019.

Mean minimum and maximum flight heights were within the RSZ during the spring for several raptor species (Table 7) including Ferruginous Hawk, Northern Harrier, Red-tailed Hawk, Rough-legged Hawk (*Buteo lagopus*), Swainson's Hawk, and Turkey Vulture (*Cathartes aura*). Summer and fall mean minimum and maximum flight heights were within or near the RSZ for Ferruginous Hawk, Red-tailed Hawk, Swainson's Hawk, and Turkey Vulture.

3.3.9 Federally Listed Threatened and Endangered Species

Three adult Whooping Cranes (*Grus americana*) were detected within the project area during standardized surveys on April 15, 2020. The cranes were initially observed at 46.304° N, 99.640° W, within 250 m of point count station 16, flying north at heights ranging from 2 to 7 m above the ground (i.e., below RSZ). This is the first known occurrence of this federally listed endangered species within the project area.

The Whooping Cranes were observed foraging in corn throughout the day, approximately four miles northwest of Wishek, North Dakota. Of note, due to poor harvesting conditions during the fall of 2019, the Whooping Cranes were foraging in unharvested stands of corn. The Atwell biologist noted in April 2020 that there were other areas of unharvested corn within the project area, perhaps dispersing Whooping Crane stopover use farther from the migration corridor's centerline than expected.

The nocturnal roosting location was not obtained on April 15. The Whooping Cranes were again present on April 16 and 17, 2020 and they roosted 0.7 miles (1.1 kilometer [km]) from their foraging location on those days. The roosting location is at the confluence of two riverine wetlands with seasonally flooded water regime classifications within the project area.

This was the only sighting of a federally listed threatened or endangered species within the project area during the study period.

3.4 DIURNAL AVIAN ACTIVITY POINT COUNT SURVEYS

The following sections summarize the results of the diurnal avian activity surveys, including mean use and mean flight height statistics.

3.4.1 General Avian Use

Standardized mean use data for all 110 species observed during 10-minute diurnal avian activity surveys in the spring and fall are presented in Appendix B. A list of all species observed within the project area over the course of eagle use and diurnal avian activity surveys (including incidentally observed species) is included in Appendix C.

Passerine, non-passerine, upland gamebird, raptor, wader, waterbird, and waterfowl statistics, discussed in more detail below, are summarized by species group in Table 10 and by individual species in Appendix B. Mean use statistics are summarized for all detections within the 800 m-radius by 200 m-high sample plot for large-bodied species and within the sample plot for small-bodied species as described in Section 2.5.

In addition, several large-bodied species of multiple species groups were frequently detected outside the sample plot at above 200 m in altitude. To provide additional information on use of the project area by these species, mean use statistics are also summarized for all detections within 800 m of the point regardless of flight height. In Table 10 and Appendix B, this is noted in a second line of data with an italicized “all” suffix after the species group or species name.

3.4.2 Species Group Use of the Project Area during Spring and Fall Migration

Large-bodied Corvids

Large-bodied corvids include crows and ravens and were recorded out to 800 m during diurnal avian activity surveys. Mean use rates within the project area were lower in the spring (0.05 detections/10-minute survey/800 m plot) than in the fall (0.11 detections/10-minute survey/800 m plot). This species group represented less than 0.1% of all spring detections and 0.4% of all fall detections in the project area during diurnal avian activity surveys. Nearly all large-bodied corvid detections (all spring detections and 96% of fall detections) were American Crows. One Common Raven was detected in the fall.

Large-bodied Non-Passerines

Large-bodied non-passerines include nightjars and Rock Pigeons (*Columba livia*) and were recorded out to 800 m during diurnal avian activity surveys. Large-bodied non-passerine mean use within the project area was slightly higher in the spring (0.56 detections/10-minute survey/800 m plot) than the fall (0.44 detections/10-minute survey/800 m plot). Large-bodied non-passerines represented 0.4% of spring detections and 2% of fall detections during diurnal avian activity surveys. Nearly all large non-passerine detections (all spring large-bodied non-passerines detections and 99% of fall large-bodied non-passerine detections) were Rock Pigeons. One Common Nighthawk (*Chordeiles minor*) was detected in the fall.

Non-Passerines (Small)

Small-bodied non-passerines include doves (excluding Rock Pigeon), cuckoos, swifts, hummingbirds, kingfishers, and woodpeckers were recorded out to 150 m during diurnal avian activity surveys. Small-bodied non-passerine mean use within the project area was three times higher in the fall (0.32 detections/10-minute survey/150 m plot) than in the spring (0.10 detections/10-minute survey/150 m plot). Much of this seasonal difference was attributable to higher numbers of Mourning Doves (*Zenaida macroura*) detected during the fall season.

Small-bodied non-passerines represented less than 0.1% of all spring detections and just over 1% of all fall detections during diurnal avian activity surveys. Mourning Doves were the most common small-bodied non-passerine detected and accounted for 81% of the observations of this species group in the spring and 94% of the observations of birds within this group in the fall.

Passerines (including Small-bodied Corvids)

Passerine species (perching birds) and small-bodied corvids (e.g., Blue Jay [*Cyanocitta cristata*]) were recorded out to 150 m and accounted for a large portion of all avian detections both in the spring (34% of all detections) and fall (44% of all detections). Passerine mean use of the project area was much higher in the spring, with mean use rates of 45.89 detections/10-minute survey/150 m plot in the spring and 11.77 detections/10-minute survey/150 m plot in the fall. Lapland Longspur (*Calcarius lapponicus*) accounted for much of the seasonal difference in passerine use; 6,245 Lapland Longspurs were detected during spring surveys, which equates to 86% of all spring passerine/small-bodied corvid detections. Only 498 Lapland Longspurs were detected during avian use surveys in the fall.

Fifty-one passerine and small-bodied corvid species were recorded during standardized diurnal avian activity surveys. Lapland Longspurs and Red-winged Blackbirds (*Agelaius phoeniceus*) were detected in large flocks on multiple occasions in cropland habitats, or in cropland/grassland margins. Red-winged Blackbirds are common breeders in cropland, grassland, and wetland

habitats within the project boundary and are abundant during migration in the spring and fall. Lapland Longspurs are also abundant in cropland habitats during spring and fall migration and may continue into the winter season contingent on seasonal weather conditions. Taken together, these two species represented 82% of 9,781 cumulative passerine detections recorded over the spring and fall seasons.

In the spring, migrating Lapland Longspurs accounted for the highest spring mean use rate any species (39.28 detections/10-minute survey/150 m plot) and made up 86% of all passerine detections. In the fall, flocks of staging and migrating Red-winged Blackbirds produced the highest fall mean use of any species (4.99 detections/10-minute survey/150 m plot) and made up 43% of all fall passerine detections. Migrating Lapland Longspurs were also numerous in the fall, accounting for an additional 20% of the fall passerine detections.

Counts of more than 500 Lapland Longspurs were recorded on two spring surveys (510 birds at point count station 32 on March 18, 2020 and 590 birds at point count station 17 on March 19, 2020) and counts between 300 and 500 Lapland Longspurs occurred at nine point count stations during the spring.

Encounters with large flocks of longspurs or blackbirds were not attributable to unique habitats and/or physiography present at stations with highest recorded mean use rates for these species, and the Atwell biologist noted that it was apparent that these longspur and blackbird flocks could have appeared at any location in the project area during migration. Spring Lapland Longspur counts within the project area generally peaked in early to mid-March, with a second, smaller peak in early to mid-April. This trend matches similar regional patterns reported for Logan and McIntosh counties (AKN 2020).

Several North Dakota SCP were detected during diurnal avian use surveys including:

- Chestnut-collared Longspur ([*Calcarius ornatus*], SCP Level I, 22 spring detections and 11 fall detections);
- Grasshopper Sparrow ([*Ammodramus savannarum*], SCP Level I, 4 spring detections and 1 fall detection);
- Bobolink ([*Dolichonyx oryzivorus*], SCP Level II, 19 spring detections and 4 fall detections); and
- Western Meadowlark ([*Sturnella neglecta*], SCP Level II, 66 spring detections and 22 fall detections).

Each of these species was found in generally low numbers with more detections during the spring season than in the fall season. This seasonal difference can likely be attributed to higher rates of detectability for vocalizing, territorial birds in the spring. Level I SCP (Chestnut-collared Longspur and Grasshopper Sparrow) detections tended to be in northern and eastern portions of the project area that are higher in elevation and are dominated by herbaceous, grassland cover. Highest Bobolink numbers were recorded southwest of Wishek, in fragmented grasslands near point count stations 32 and 34. Western Meadowlarks detections were more widespread across the project area but generally followed the spatial pattern observed for Chestnut-collared Longspurs.

Raptors

Raptors include eagles, falcons, harriers, hawks, owls, and vultures and were recorded out to 800 m during diurnal avian activity surveys. Additional raptor results recorded during eagle use surveys are summarized in Section 3.3.6. Mean raptor use recorded during diurnal avian use surveys was lower within the survey area during the spring survey period compared to the fall survey period. This pattern mirrored seasonal differences in raptor use found during eagle use surveys (Table 5).

Similar to results from eagle use surveys, raptor mean use recorded during diurnal avian use surveys was primarily driven by detections of Red-tailed Hawks, Swainson's Hawks, and Northern Harriers. In particular, Swainson's Hawks accounted for approximately 46% of all raptor detections during fall avian use surveys.

The ND SWAP lists several raptor species as SCP (Dyke et al. 2015) and several of these raptor species were observed during diurnal avian use surveys. Level I SCP observed during avian use surveys included: Ferruginous Hawk (3 spring detections and 1 fall detection) and Swainson's Hawk (8 spring detections and 62 fall detections). Level II SCP observed during avian use surveys included: American Kestrel (3 spring detections and 3 fall detections), Bald Eagle (7 spring detections and 4 fall detections), Golden Eagle (1 spring detection), and Northern Harrier (16 spring detections and 21 fall detections).

Shorebirds

Shorebirds include avocets, plovers, curlews, dowitchers, godwits, knots, phalaropes, sandpipers, snipes, stilts, turnstones, and woodcocks and were recorded out to 800 m during diurnal avian activity surveys. Shorebird mean use rates within the project area was similar in the spring (0.54 detections/10-minute survey/800 m plot) and fall (0.58 detections/10-minute survey/800 m plot). Shorebird detections represented 0.41% of all spring detections and 2.18% of all fall detections during diurnal avian activity surveys.

A large proportion of shorebirds observed in the fall were unidentifiable to species, belying higher shorebird species richness reported in the spring. A total of seven shorebird species were detected during the study period. Species that likely nest within the project area, including Killdeer and Upland Sandpiper (*Bartramia longicauda*), represented a majority of shorebird detections. Killdeer accounted for the greatest proportion of shorebirds in both seasons (65% in spring and 49% in fall).

Shorebirds were encountered in low numbers and frequencies throughout the project area and across several habitats. There was some indication that shorebirds may be found in higher densities in higher elevation grassland/pothole habitats along the project area's northeastern boundary, particularly near point count stations 22, 51, and 52. Killdeer accounted for the most significant proportion of higher shorebird concentrations in this portion of the study area.

The ND SWAP lists several shorebird species as SCP (Dyke et al. 2015). Several of these species were observed during diurnal avian use surveys, including:

- Marbled Godwit ([*Limosa fedoa*], SCP Level I, 5 spring detections);
- Wilson's Phalarope ([*Phalaropus tricolor*], SCP Level I, 6 spring detections); and
- Upland Sandpiper (SCP Level II, 11 spring detections).

Upland Gamebirds

Upland gamebirds include bobwhite, grouse, partridge, prairie-chickens, and turkey and were recorded out to 800 m during diurnal avian activity surveys. Upland gamebird mean use within the project area was higher in the spring (0.26 detections/10-minute survey/800 m plot) than the fall (0.10 detections/10-minute survey/800 m plot) during diurnal avian activity surveys.

Upland gamebirds represented 0.20% of all spring detections and 0.38% of all fall detections during diurnal avian activity surveys. Only two upland gamebird species were detected, Ring-necked Pheasant (*Phasianus colchicus*) and Sharp-tailed Grouse, a ND SWAP Level II SCP (Dyke et al. 2015). Ring-necked Pheasants were detected more frequently in the fall, with 15 fall detections and 10 spring detections. Sharp-tailed Grouse were detected more frequently in the spring, with 32 spring detections and six fall detections. These species are non-migratory and are present year-round within the project area; seasonal differences are attributable to seasonal differences in detectability stemming from grouse behavior and vocalization frequency.

Waders

Waders include cranes, bitterns, egrets and herons and were recorded out to 800 m during diurnal avian activity surveys. In addition to the previously mentioned Whooping Crane observations in the fall of 2019, only Sandhill Cranes (*Grus canadensis*) were observed in the spring and only Great Blue Herons (*Ardea herodias*) were observed in the fall.

A large proportion of Sandhill Cranes (including one group of 270 individuals) were observed flying over 200 m in altitude, above the sample plot and also above the RSZ. When observations greater than 200 m in height are excluded from analysis, wader spring mean use was 0.52 detections/10-minute survey/800 m plot and waders comprised 0.39% of all standardized spring avian observations. However, when Sandhill Cranes detected at heights over 200 m are included in analysis, spring mean increased to 2.42 detections/10-minute survey/800 m plot with waders comprising 1.77% of all standardized spring avian observations during diurnal avian activity surveys. Only three Great Blue Herons were detected during standardized avian use surveys in the fall.

Waterbirds

The waterbirds group includes cormorants, grebes, gulls, and loons. Waterbirds represented less than 1% of all spring detections and 38% of all fall detections during avian use surveys. Overall, waterbird mean use was 0.83 detections/10-minute survey/800 m plot in the spring and 10.13 detections/10-minute survey/800 m plot in the fall.

Most of this difference in observed seasonal use of the project area can be attributed to patterns in Franklin's Gull (*Leucophaeus pipixcan*) use. Only two Franklin's Gulls were observed during spring avian use surveys, a mean use rate of 0.01 detections/10-minute survey/800 m plot. In contrast, 2,023 Franklin's Gulls were observed during fall avian use surveys, a mean use rate of 9.54 detections/10-minute survey/800 m plot. Franklin's Gulls accounted for 94% of all fall waterbird detections during avian use surveys.

Nearly all Franklin's Gull detections were observed at just four surveys in the fall:

- August 27, 2019 - 500 individuals were seen at point count station 36 south of Wishek;
- September 6, 2019 - 300 individuals were seen at point count station 12 north of Wishek;
- August 28, 2020 - 200 individuals were seen at point count station 55 northwest of Wishek; and
- September 26, 2019 - 1,000 individuals were seen at point count station 2 near Beaver Lake.

Franklin's Gulls were generally observed in flight as they moved through the project area, and all gulls observed during the September 26, 2019 observation were in flight. On occasion, large flocks were found opportunistically foraging in agricultural habitats following harvesting and haying activities (e.g., the August 27, 2019 observation of 500 individuals), an expected observation for gulls moving in large numbers over agricultural cropland habitats. There are no known Franklin's Gull nesting colony sites within the project area and fall detections appear to represent post-breeding movements from locations beyond the project area.

The ND SWAP lists several waterbird species as SCP (Dyke et al. 2015). Waterbird SCP observed during diurnal avian use surveys included:

- Black Tern ([*Chlidonias niger*], SCP Level I, 1 fall detection); Franklin's Gull (SCP Level I, 2 spring detections and 2,023 fall detections);
- Horned Grebe ([*Podiceps auratus*], SCP Level I, 2 spring detections); and
- American White Pelican ([*Pelecanus erythrorhynchos*], SCP Level II, 21 fall detections).

Waterfowl

Waterfowl refers to the taxonomic order Anseriformes, including geese and ducks. Waterfowl mean use rates were significantly higher in the spring (84.18 detections/60-minute survey/800 m plot) than in the fall (2.31 detections/10-minute survey/800 m plot) and were the primary reason for higher overall avian use recorded in the spring than in the fall. There were 13,385 waterfowl detections during the spring season, 63% of all spring detections during avian use surveys. Only 489 waterfowl detections were recorded in the fall.

Migrating Snow Geese (*Chen caerulescens*), Greater White-fronted Geese (*Anser albifrons*), and Canada Geese (*Branta canadensis*) together accounted for 12,799 of 13,385 (96%) of spring waterfowl detections and 60% of all detections during avian use surveys. Groups of over 100 Snow Geese were regularly observed in flight and one flock of approximately 3,000 Snow Geese was observed flying northeastward on March 24, 2020 at point count station 40. This flock alone accounted for 14% of all of the spring detections combined. The spring mean use rates for the most commonly observed geese species included: 68.50 detections/60-minute survey/800 m plot for Snow Goose, 8.08 detections/10-minute survey/800 m plot for Canada Goose, and 3.91 detection/10-minute survey/800 m plot for Greater White-fronted Goose.

As noted for large observed flocks of passerines described above, there were no discernible habitat or physiographic characteristics that appeared to attract large groups of Snow Geese to these particular stations. Large flocks of geese were generally in flight when observed at point count stations across the project area.

Prairie pothole habitats are concentrated on the northeastern edge of the project area, particularly within the one-mile buffer surrounding the project area northeast of Wishek. Point count stations 51, 52, 53 within the one-mile buffer and point count station 22 within the project area boundary had waterfowl species richness values of 10 species or above.

The above statistics were calculated only from individuals observed within the sample plot. Waterfowl were frequently observed at altitudes over 200 m, and mean use statistics are also summarized for all detections regardless of flight height for Greater White-fronted Goose, Mallard (*Anas platyrhynchos*), Northern Pintail (*Anas acuta*), Ross's Goose (*Chen rossii*), and Snow Goose in Appendix B. Large proportions of detections of Greater White-fronted Geese, Mallards, and Snow Geese were observed above 200 m in altitude in the fall, and waterfowl mean use rates double in the fall to 5.77 detection/10-minute survey/800 m plot if detections over 200 m in altitude are included in mean use calculations.

3.4.3 Flight Heights by Species Group during Spring and Fall Migration

Table 11 details mean flight height statistics for species groups detected during diurnal avian use surveys in the spring and fall. Mean minimum and maximum flight heights are summarized for the spring survey period, the fall survey period, and for spring and fall observations combined. Flight heights are summarized by flock and not by individual; lone birds were counted as a flock of size of one.

Mean minimum and maximum flight heights were similar in the spring and fall for all birds combined, with mean minimum heights between 25 to 30 m and mean maximum heights around 35 m. The most notable seasonal differences were observed in waders and waterfowl. Mean flight heights were around 450 m for waders in the spring and under 20 m in the fall, attributable to high-flying migrating Sandhill Cranes observed only during the spring period and low-flying Great Blue Herons observed in the fall (see Waders subsection in Section 3.4.2 above). Waterfowl flight heights tended to be higher during the fall season (mean heights approximately 210 m) than in the spring (mean heights around 50 m).

Species groups with mean flight heights within or near the RSZ included raptors, shorebirds, waterbirds, and waterfowl.

4 CONCLUSIONS

During this pre-construction avian use study, a total of 62 species were recorded within the project area (Appendix C). Over the course of 2019 and 2020 standardized field studies, data were recorded for over 29,404 individual bird observations. Six hundred and thirty-six hours of standardized eagle use survey effort and 61.8 hours of standardized diurnal avian use surveys were completed for this avian use study.

One Bald Eagle nest was found within the project area during the aerial nest survey. No other Bald Eagle nests were found within 10 miles of the project boundary, and no Golden Eagle nests were found during the nest survey.

One confirmed Sharp-tailed Grouse lek was found within the project area during aerial lek surveys. Two possible lek locations were identified within the project area during ground-based surveys in fog. Lekking grouse were heard but not seen due to visibility conditions, and no grouse were observed at either location during follow-up visits.

Bald Eagle mean use rates were highest in the spring and fall, suggesting that most of the eagle use observed within the project area was comprised of migrating individuals heading northward in the spring and southward in the fall. Golden Eagles were rarely encountered during standardized use surveys, with highest mean use rates in the fall and winter.

Passerines and waterfowl together accounted for over 95% of bird detections recorded during spring diurnal avian use surveys. Large groups of Lapland Longspurs and Snow Geese in particular influenced this pattern. Passerines and waterbirds accounted for over 80% of bird detections during fall avian use surveys, driven by large groups of Red-winged Blackbirds and Franklin's Gulls. Significant numbers of Sandhill Cranes (spring) and waterfowl (fall) were observed flying at high altitudes well above the 200 m-high sample plot and the RSZ.

Three Whooping Cranes were observed within the project area over three-day span in April of 2020. Whooping Cranes are listed under the ESA as an endangered species. Though this is the first known observation within the project area boundary, the project area is within the Whooping Crane migration corridor and may be used by migrating cranes in the spring and fall (Pearse et al. 2018). The three individuals were observed foraging in unharvested corn during daylight hours and were observed flying to a roosting location in a nearby riverine wetland at dusk.

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FIGURES

DRAFT

Badger Wind

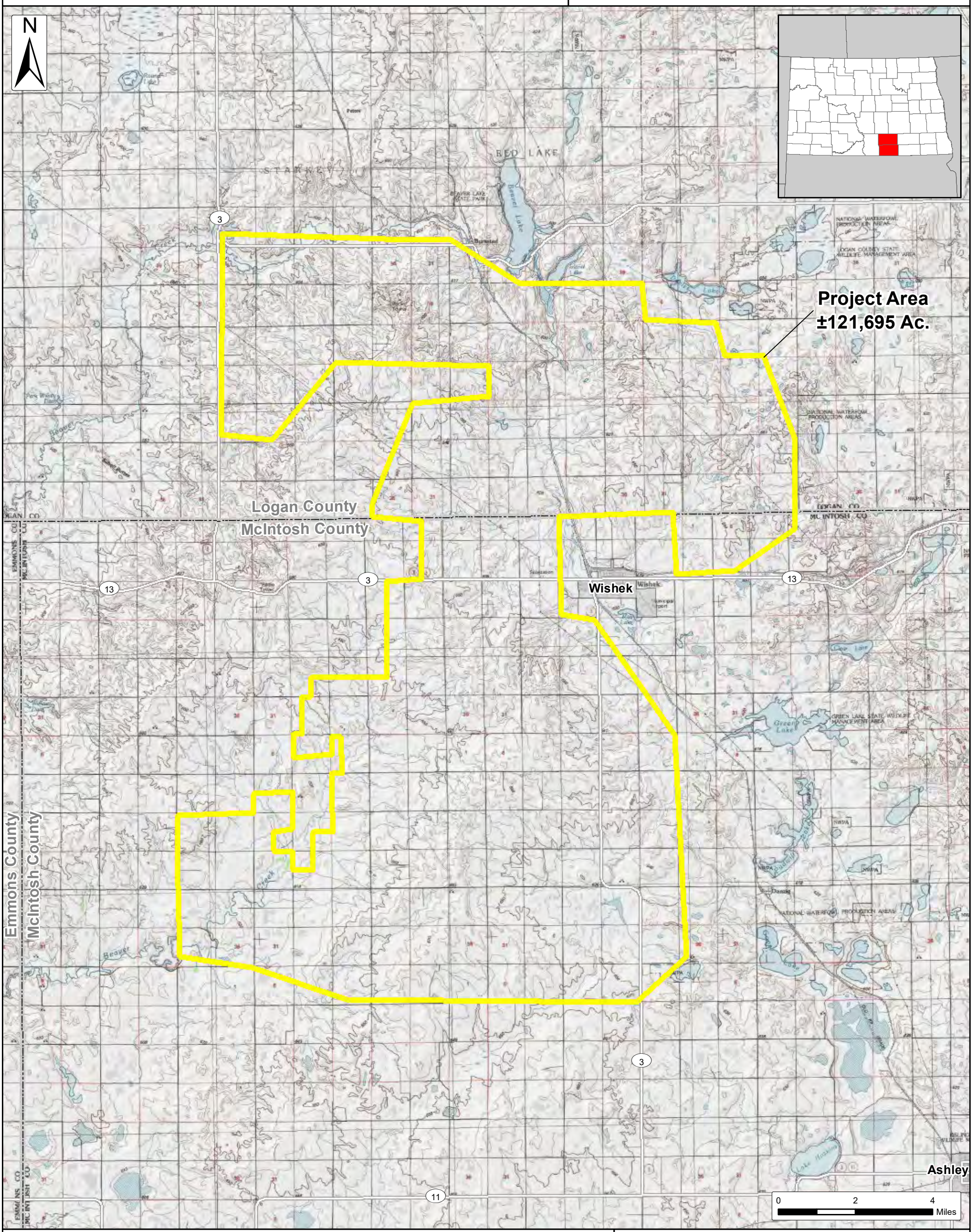
Figure 1. Site Location

Logan County & McIntosh County, North Dakota

Client:
Ørsted Onshore North America

Issue Date:
11/18/2020

Atwell, LLC Project:
19000785



Project Area
04/15/2019 (±121,695 Ac.)

City/Village

Counties

SOURCE: USGS TOPO QUADS

ATWELL

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Badger Wind

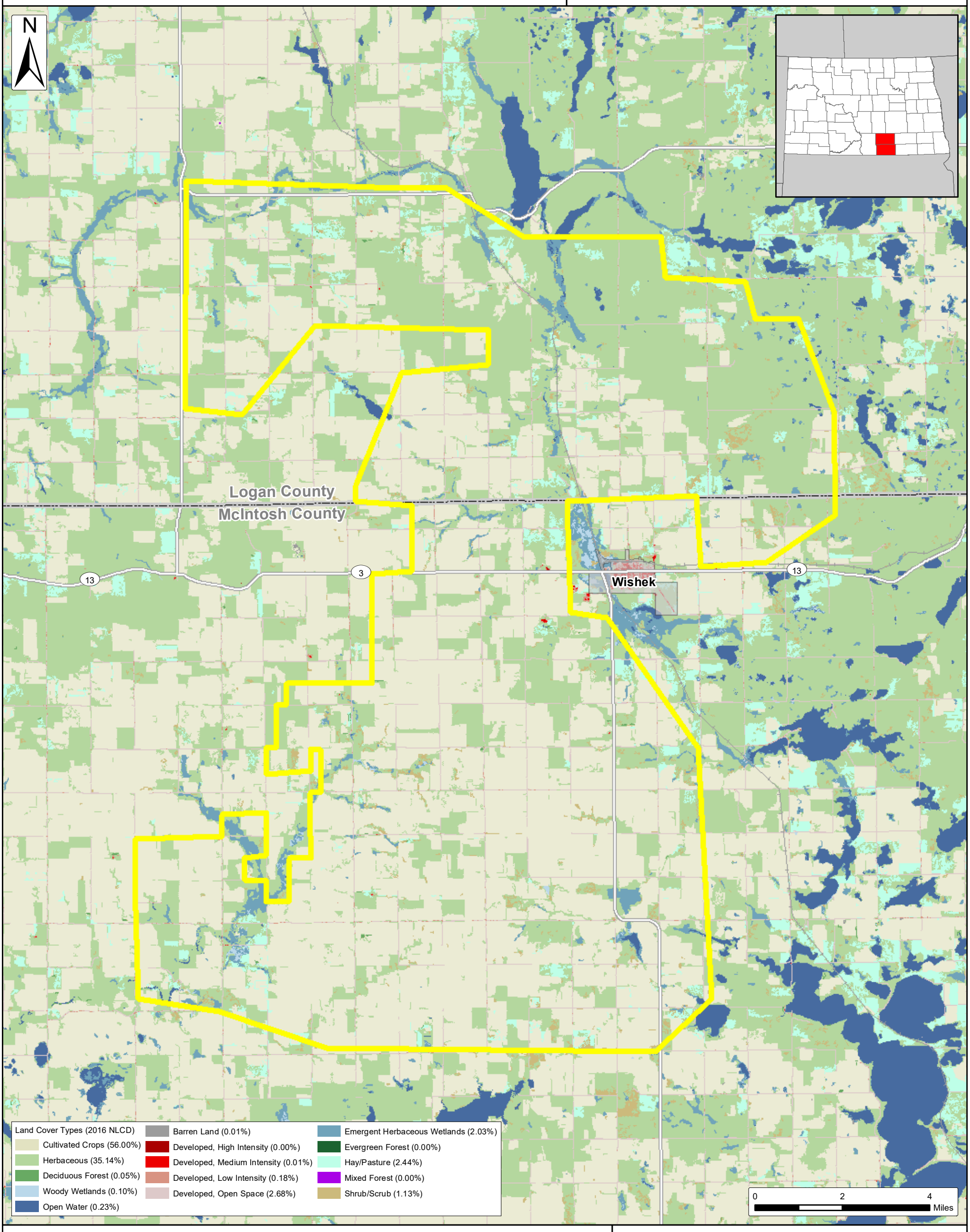
Figure 2. Land Cover Types within the Project Area

Logan County & McIntosh County, North Dakota

Client:
Ørsted Onshore North America

Issue Date:
11/18/2020

Atwell, LLC Project:
19000785



Project Area
04/15/2019 (±121,695 Ac.)

City/Village

Counties

SOURCE: NATIONAL LAND COVER DATABASE 2016 (USGS)

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Badger Wind

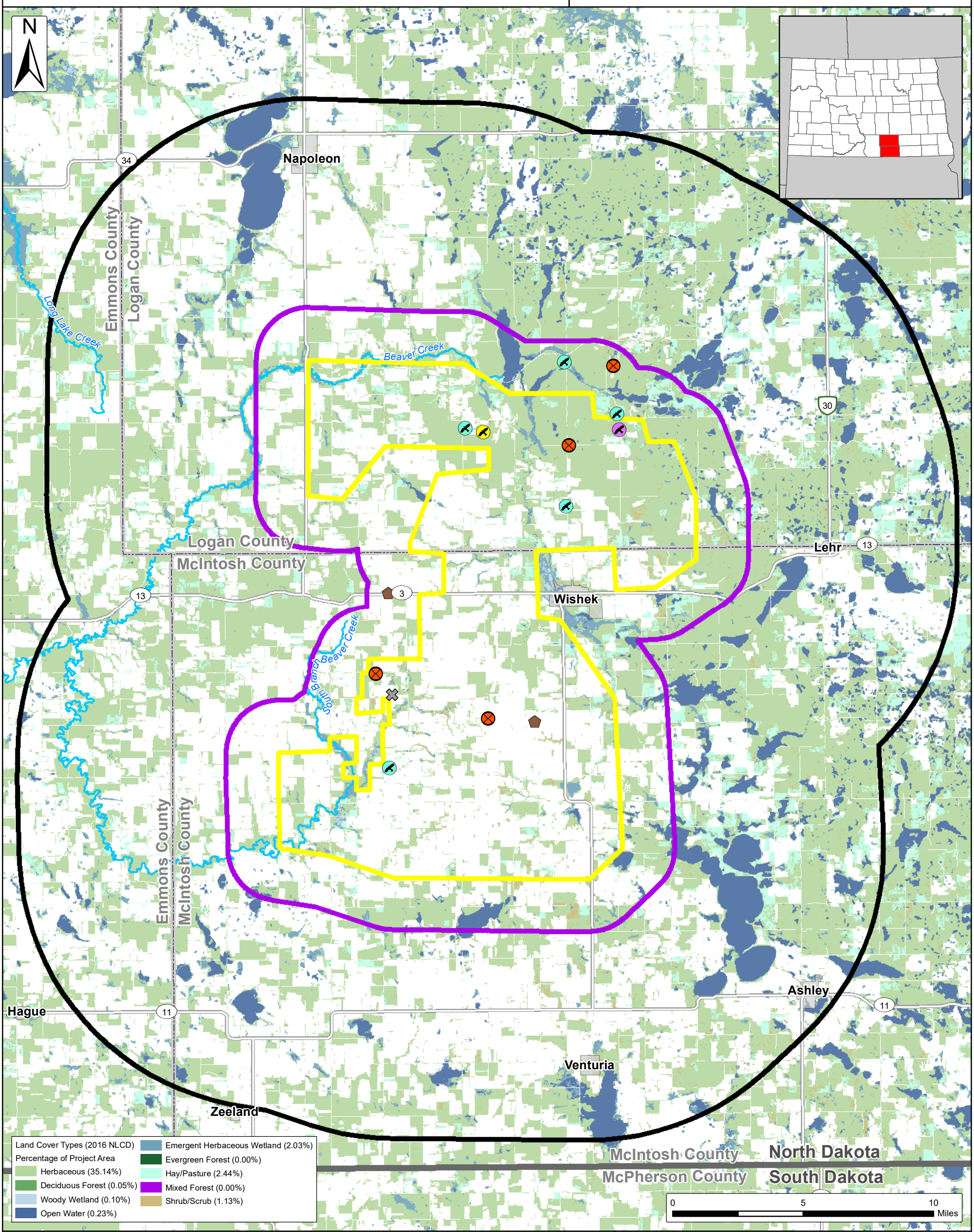
Figure 3. Eagle and Raptor Nests

Logan and McIntosh Counties, North Dakota

Client:
Ørsted Onshore North America

Issue Date:
8/17/2020

Atwell, LLC Project:
19000785



Raptor Nests Identified during 2020 Surveys
- Bald Eagle, In-Use
- Ferruginous Hawk, In-Use
- Great Horned Owl, In-Use
- Red-tailed Hawk, In-Use
- Swainson's Hawk, Nest Building
- Unknown, Not Occupied

- Major Watercourse (National Hydrography Dataset)
- Project Area 04/15/2019 (~121,695 acres)
- Raptor Nest Survey Area (2-Mile Buffer)
- Eagle Nest Survey Area (10-Mile Buffer)
- City/Village
- County
- State Boundary

SOURCE: USGS NATIONAL LAND COVER DATABASE (NLCD) 2016

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Badger Wind

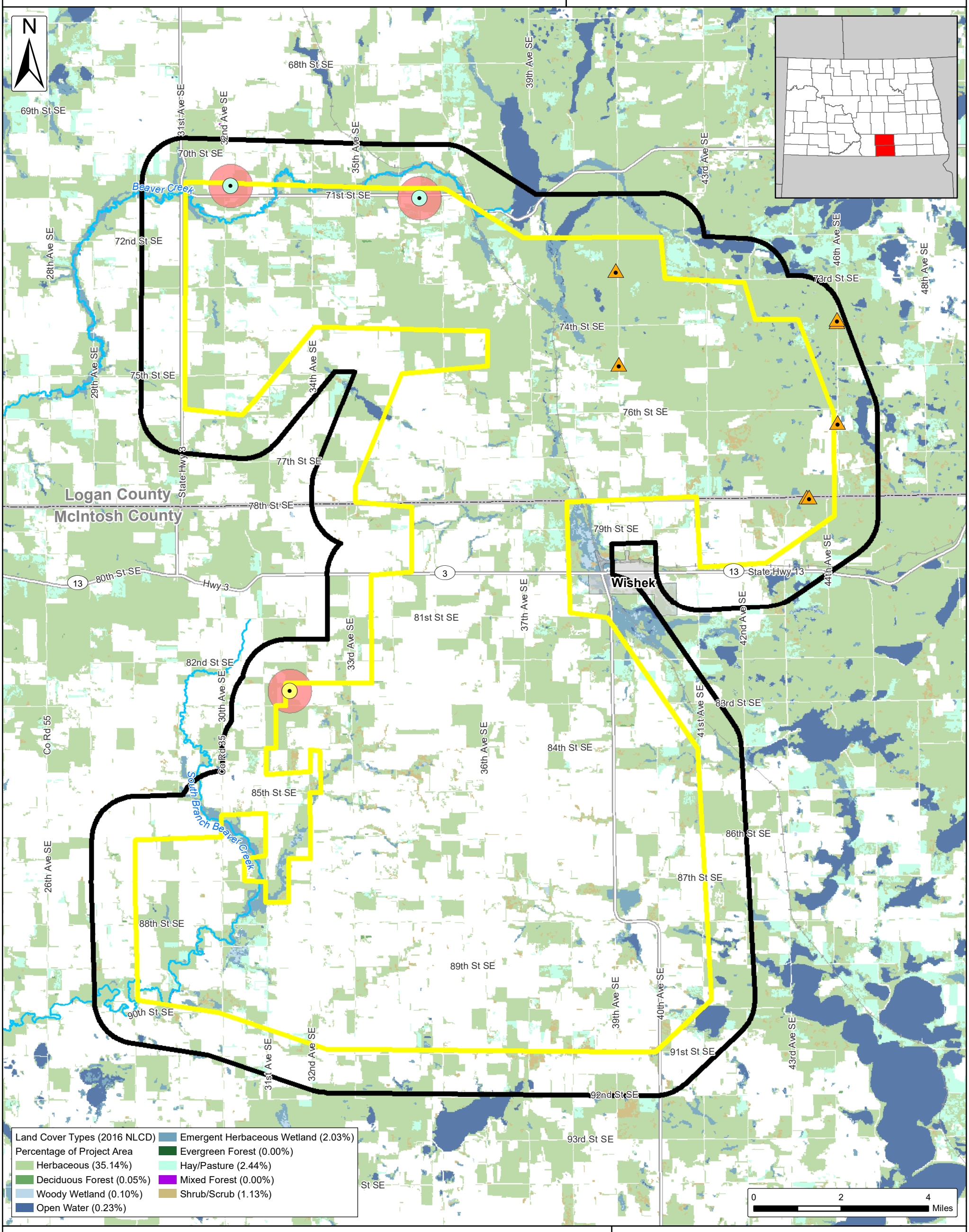
Figure 4. Sharp-Tailed Grouse Lek Survey

Logan and McIntosh Counties, North Dakota

Client:
Ørsted Onshore North America

Issue Date:
8/17/2020

Atwell, LLC Project:
19000785



Grouse and Leks Identified during 2019 Surveys
- Lone Individual
- Confirmed Lek
- Possible Lek

Grouse Lek Study Point 0.5-Mile Buffer

Project Area
04/15/2019 (~121,695 acres)

Grouse Survey Area (1-Mile Buffer)

Major Watercourse (National Hydrography Dataset)

City/Village

County

SOURCE: USGS NATIONAL LAND COVER DATABASE (NLCD) 2016

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Badger Wind

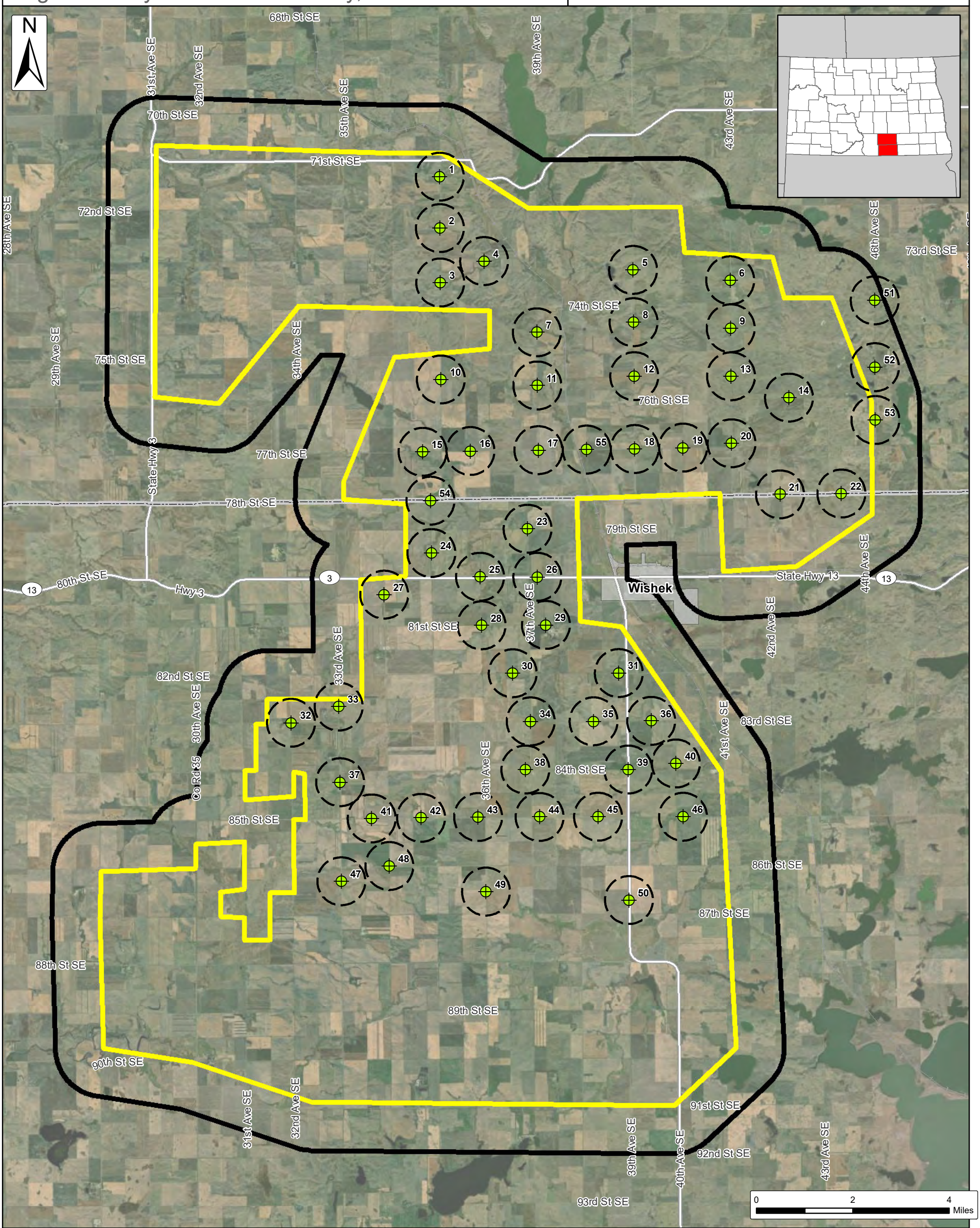
Figure 5. Avian and Eagle Use Point Count Stations

Logan County & McIntosh County, North Dakota

Client:
Ørsted Onshore North America

Issue Date:
8/18/2020

Atwell, LLC Project:
19000785



Point Count Station

800 m-radius Avian Sample Plot

Project Area
04/15/2019 (±121,695 Ac.)

1 Mile Buffer

City/Village

Counties

SOURCE: ESRI BASEMAPS

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Badger Wind

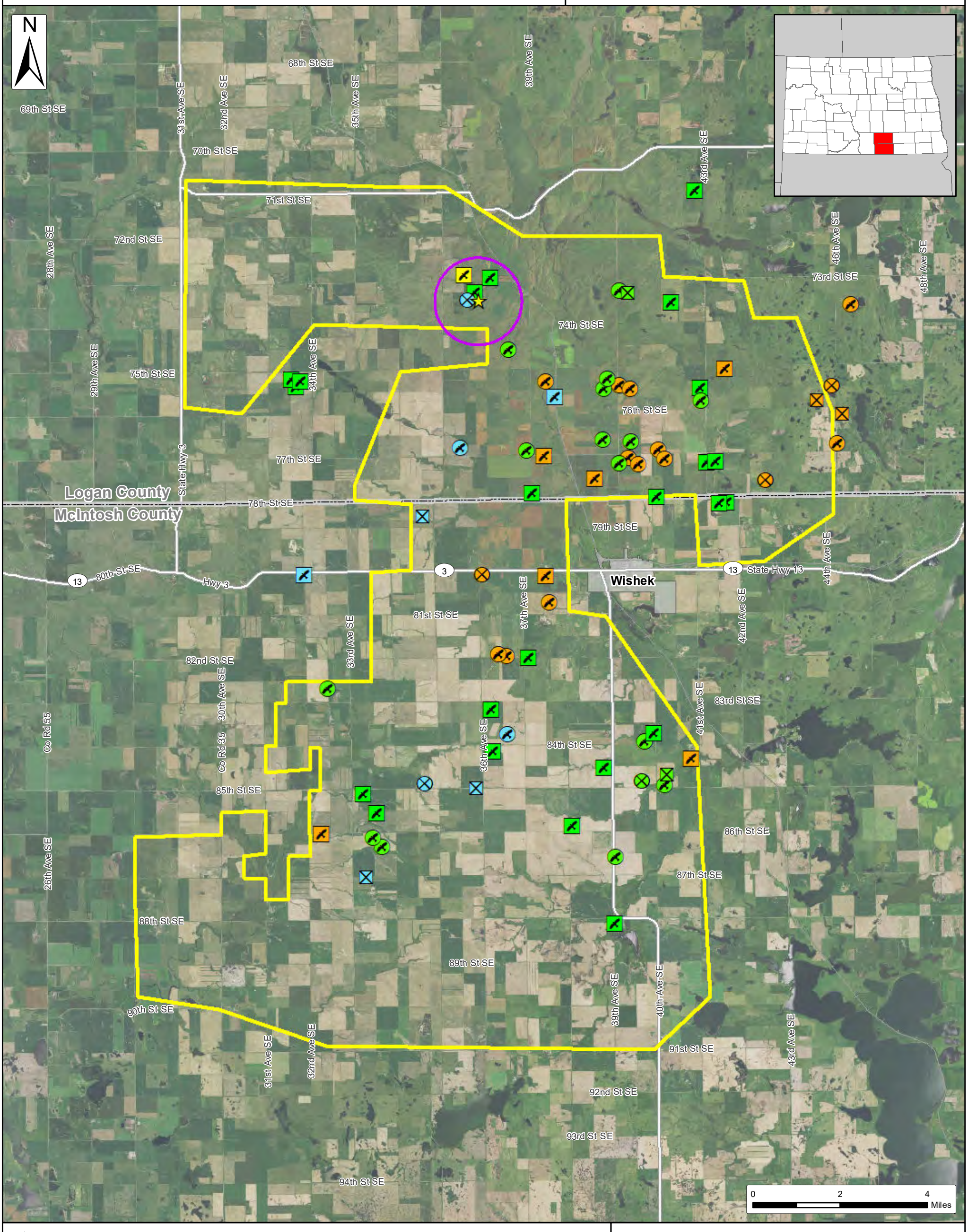
Figure 6. Bald Eagle and Golden Eagle Observations

Logan and McIntosh Counties, North Dakota

Client:
Ørsted Onshore North America

Issue Date:
11/18/2020

Atwell, LLC Project:
19000785



In-Use Bald Eagle Nest

Nest-Associated Observations (1-mile buffer)*

Species

- Bald Eagle - Standardized
- Bald Eagle - Incidental
- Golden Eagle - Standardized
- Golden Eagle - Incidental

Season

- Fall
- Spring
- Summer
- Winter

Project Area
04/15/2019 (~121,695 acres)

City/Village

County

*Six standardized and six incidental eagle observations associated with the in-use Bald Eagle nest were recorded within this buffer during spring, summer, and fall surveys.

Source: USDA NAIP 2019 Imagery

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TABLES

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Table 1. Survey Periods for Pre-Construction Avian Studies – Year 1

Survey	Frequency	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019	Oct 2019	Nov 2019	Dec 2019	Jan 2020	Feb 2020	Mar 2020	Apr 2020
Eagle and Raptor Nest Surveys	Single Survey Event	■											
Sharp-tailed Grouse Lek Surveys	Single Survey Event	■											
Eagle Use Surveys	Monthly	■	■	■	■	■	■	■	■	■	■	■	■
Diurnal Avian Activity Surveys	Monthly	■			■	■	■	■				■	■

Shaded boxes represent months in which the surveys occurred.

Table 2. List of Alternate Winter Point Count Stations

Original Point Count Station	Alternate Point Count Station
14	13
19	17
21	18
22	5
26	20
27[a]	23
30	11
32	33
35	49
36	37
39	46
40	47
48	42
50	44

[a] Point dropped in August 2019 due to landowner concerns, alternate point count station did not need to be used.

Table 3. Eagle Nests and Nests of Other Raptor Species

Survey Type	Date	Species	Status	Latitude	Longitude	Project Area of Nest Survey Buffer
Aerial	5/2/2019	Bald Eagle	In-Use	46.349	-99.628	Project Area
Aerial	5/2/2019	Ferruginous Hawk	In-Use	46.163	-99.706	Project Area
Ground	5/16/2019	Ferruginous Hawk	In-Use	46.351	-99.642	Project Area
Ground	5/19/2019	Ferruginous Hawk	In-Use	46.307	-99.562	Project Area
Ground	5/16/2019	Ferruginous Hawk	In-Use	46.387	-99.562	2-mile
Ground	5/19/2019	Ferruginous Hawk	In-Use	46.358	-99.520	2-mile
Ground	7/25/2019	Swainson's Hawk	Nest Building	46.349	-99.519	Project Area
Ground	5/19/2019	Red-tailed Hawk	In-Use	46.190	-99.626	Project Area
Ground	7/25/2019	Red-tailed Hawk	In-Use	46.341	-99.559	Project Area
Ground	7/29/2019	Red-tailed Hawk	In-Use	46.215	-99.716	Project Area
Ground	5/16/2019	Red-tailed Hawk	In-Use	46.385	-99.523	2-mile
Ground	5/21/2019	Great Horned Owl	In-Use	46.188	-99.589	Project Area
Aerial	5/2/2019	Great Horned Owl	In-Use	46.260	-99.705	2-mile
Aerial	5/2/2019	Unknown	Not Occupied	46.204	-99.703	Project Area

Table 4. Total Standardized Survey Effort by Point Count Station

	60 Minute Eagle Use Survey Standardized Effort (hours)[a]					10 Minute Diurnal Avian Activity Survey Standardized Effort (hours)[a]		
Point Count Station	Spring	Summer	Fall	Winter	Total Hours	Spring	Fall	Total Hours
1	3	2	4	3	12	0.50	0.67	1.17
2	3	2	4	3	12	0.50	0.67	1.17
3	3	2	4	3	12	0.50	0.67	1.17
4	3	2	4	3	12	0.50	0.67	1.17
5[a]	4	2	4	5	15	0.67	0.67	1.33
6	3	2	4	3	12	0.50	0.67	1.17
7	3	2	4	3	12	0.50	0.67	1.17
8	3	2	4	3	12	0.50	0.67	1.17
9	3	2	4	3	12	0.50	0.67	1.17
10	3	2	4	3	12	0.50	0.67	1.17
11[a]	3	2	4	5	14	0.50	0.67	1.17
12	3	2	4	3	12	0.50	0.67	1.17
13[a]	4	2	5	6	17	0.67	0.83	1.50
14[a]	2	2	3	0	7	0.33	0.50	0.83
15	3	2	4	3	12	0.50	0.67	1.17
16	3	2	4	3	12	0.50	0.67	1.17
17[a]	4	2	4	6	16	0.67	0.67	1.33
18	3	2	4	3	12	0.50	0.67	1.17
19[a]	2	2	4	0	8	0.33	0.67	1.00
20	3	2	4	3	12	0.50	0.67	1.17
21	3	2	4	3	12	0.50	0.67	1.17
22[a]	2	2	4	1	9	0.33	0.67	1.00
23	3	2	4	3	12	0.50	0.67	1.17
24	3	2	4	3	12	0.50	0.67	1.17

Table 4. Total Standardized Survey Effort by Point Count Station

	60 Minute Eagle Use Survey Standardized Effort (hours)[a]					10 Minute Diurnal Avian Activity Survey Standardized Effort (hours)[a]		
Point Count Station	Spring	Summer	Fall	Winter	Total Hours	Spring	Fall	Total Hours
25	3	2	4	3	12	0.50	0.67	1.17
26	3	2	4	3	12	0.50	0.67	1.17
27[b]	1	2	0	0	3	0.17	0.00	0.17
28[b]	1	2	0	0	3	0.17	0.00	0.17
29	3	2	4	3	12	0.50	0.67	1.17
30[a]	3	2	4	2	11	0.50	0.67	1.17
31	3	2	4	3	12	0.50	0.67	1.17
32	3	2	4	3	12	0.50	0.67	1.17
33	3	2	4	3	12	0.50	0.67	1.17
34	3	2	4	3	12	0.50	0.67	1.17
35[c]	1	2	4	1	8	0.17	0.67	0.83
36[c]	1	2	4	0	7	0.17	0.67	0.83
37[c]	5	2	4	6	17	0.83	0.67	1.50
38	3	2	4	3	12	0.50	0.67	1.17
39	3	2	4	3	12	0.50	0.67	1.17
40[a]	3	2	4	2	11	0.50	0.67	1.17
41	3	2	4	3	12	0.50	0.67	1.17
42	3	2	4	3	12	0.50	0.67	1.17
43	3	2	4	3	12	0.50	0.67	1.17
44	3	2	4	3	12	0.50	0.67	1.17
45	3	2	4	3	12	0.50	0.67	1.17
46	3	2	4	3	12	0.50	0.67	1.17
47[a]	3	2	4	4	13	0.50	0.67	1.17
48	3	2	4	3	12	0.50	0.67	1.17

Table 4. Total Standardized Survey Effort by Point Count Station

	60 Minute Eagle Use Survey Standardized Effort (hours)[a]					10 Minute Diurnal Avian Activity Survey Standardized Effort (hours)[a]		
Point Count Station	**Spring**	**Summer**	**Fall**	**Winter**	**Total Hours**	**Spring**	**Fall**	**Total Hours**
49[a]	5	2	4	4	15	0.83	0.67	1.50
50	3	2	4	3	12	0.50	0.67	1.17
51	3	2	4	3	12	0.50	0.67	1.17
52	3	2	4	3	12	0.50	0.67	1.17
53	3	2	4	3	12	0.50	0.67	1.17
54[d]	2	0	4	3	9	0.33	0.67	1.00
55[d]	2	0	4	3	9	0.33	0.67	1.00
Grand Total	**159**	**106**	**212**	**159**	**636**	**26.50**	**35.33**	**61.83**

[a] Due to the seasonal inaccessibility of some point count stations between November 2019 and March 2020, a winter alternate point count survey strategy was employed (see Section 2.4). Refer to Table 2 for a list point count stations with their paired alternate stations.

[b] Point count station dropped in August 2019 due to landowner concerns.

[c] Due to landowner concerns, the winter alternate point count station was surveyed in April 2020 (see Table 2).

[d] Point count station added in August 2019 as a replacement for dropped point count station.

Table 5. Eagle Use Surveys - Seasonal Raptor Mean Use

	Spring					Summer					Fall					Winter				
Common Name	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/60 min. survey)[c]**	**SD[d]**	**Occur. Freq.[e]**	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/60 min. survey)[c]**	**SD[d]**	**Occur. Freq.[e]**	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/60 min. survey)[c]**	**SD[d]**	**Occur. Freq.[e]**	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/60 min. survey)[c]**	**SD[d]**	**Occur. Freq.[e]**
American Kestrel[II]	11	0.034	0.069	0.452	0.038	1	0.004	0.009	0.097	0.009	17	0.024	0.080	0.335	0.066	0	-	-	-	-
Bald Eagle[II]	18	0.056	0.113	0.373	0.094	1	0.004	0.009	0.097	0.009	13	0.018	0.061	0.277	0.052	2	0.182	0.013	0.112	0.013
Broad-winged Hawk	0	-	-	-	-	0	-	-	-	-	88	0.123	0.415	5.975	0.009	0	-	-	-	-
Cooper's Hawk	3	0.009	0.019	0.136	0.019	0	-	-	-	-	1	0.001	0.005	0.069	0.005	0	-	-	-	-
Ferruginous Hawk[I]	14	0.044	0.088	0.306	0.082	14	0.055	0.132	0.392	0.113	23	0.032	0.108	0.749	0.042	0	-	-	-	-
Golden Eagle[II]	1	0.003	0.006	0.079	0.006	0	-	-	-	-	3	0.004	0.014	0.118	0.014	2	0.182	0.013	0.112	0.013
Great Horned Owl	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	1	0.091	0.006	0.079	0.006
Merlin	3	0.009	0.019	0.136	0.019	0	-	-	-	-	4	0.006	0.019	0.168	0.014	0	-	-	-	-
Northern Goshawk	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	1	0.091	0.006	0.079	0.006
Northern Harrier[II]	85	0.266	0.535	1.048	0.321	42	0.166	0.396	0.973	0.236	141	0.197	0.665	1.330	0.325	0	-	-	-	-
Prairie Falcon[II]	0	-	-	-	-	0	-	-	-	-	5	0.007	0.024	0.152	0.024	0	-	-	-	-
Red-tailed Hawk	112	0.351	0.704	1.565	0.302	81	0.320	0.764	1.246	0.377	190	0.266	0.896	1.714	0.340	0	-	-	-	-
Rough-legged Hawk	8	0.025	0.050	0.219	0.050	0	-	-	-	-	4	0.006	0.019	0.168	0.014	0	-	-	-	-
Sharp-shinned Hawk	3	0.009	0.019	0.136	0.019	0	-	-	-	-	4	0.006	0.019	0.136	0.019	0	-	-	-	-
Snowy Owl	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	5	0.455	0.031	0.175	0.031
Swainson's Hawk[I]	47	0.147	0.296	1.077	0.132	75	0.296	0.708	1.387	0.311	172	0.241	0.811	2.227	0.217	0	-	-	-	-
Turkey Vulture	9	0.028	0.057	0.258	0.050	33	0.130	0.311	0.832	0.170	29	0.041	0.137	0.657	0.075	0	-	-	-	-
Unknown Accipiter	0	-	-	-	-	0	-	-	-	-	1	0.001	0.005	0.069	0.005	0	-	-	-	-
Unknown Buteo	4	0.013	0.025	0.157	0.025	5	0.020	0.047	0.254	0.038	13	0.018	0.061	0.352	0.038	0	-	-	-	-
Unknown Falcon	0	-	-	-	-	1	0.004	0.009	0.097	0.009	0	-	-	-	-	0	-	-	-	-
Unknown Raptor	1	0.003	0.006	0.079	0.006	0	-	-	-	-	7	0.010	0.033	0.204	0.028	0	-	-	-	-
Whooping Crane[FE, III]	3	1.000	0.019	0.238	0.006	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
ALL RAPTORS	**319**	**1.000**	**2.006**	**2.920**	**0.616**	**253**	**1.000**	**2.387**	**2.012**	**0.811**	**715**	**1.000**	**3.373**	**0.505**	**0.660**	**11**	**1.000**	**0.069**	**0.255**	**0.069**
ALL TES	**3**	**1.000**	**0.019**	**0.238**	**0.006**	**0**	**-**	**-**	**-**	**-**	**0**	**-**	**-**	**-**	**-**	**0**	**-**	**-**	**-**	**-**

[a] Total Std. Detections is the total number of standardized individuals detected within the 800 m–radius by 200 m-high survey cylinder during standardized use surveys

[b] % Comp. (i.e., percent composition) is the proportion of raptors or federally threatened and endangered species (TES) that a particular species comprises using total standardized detections.

[c] Mean Use is the total standardized detections divided by the total number of 60-minute point count surveys conducted within the season.

[d] SD is the standard deviation of Mean Use

[e] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species was detected during the season

- North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priortiy (SCP) are denoted with a superscript I, II, or III following the species name to indicate that it is Level 1, Level 2, or Level 3 SCP, respectively. Federally endangered species are denoted with a superscript FE.

Table 6. Eagle Use Surveys - Seasonal Bald Eagle Mean Use by Point Count Station

Point Count Station	Spring		Summer		Fall		Winter		Full Year	
	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]
1	0	-	0	-	0	-	0	-	0	-
2	0	-	0	-	0	-	0	-	0	-
3	0	-	0	-	0	-	0	-	0	-
4	4	1.333	1	0.500	1	0.250	0	-	6	0.500
5	1	0.200	0	-	0	-	0	-	1	0.067
6	0	-	0	-	0	-	0	-	0	-
7	1	0.333	0	-	0	-	0	-	1	0.083
8	0	-	0	-	0	-	0	-	0	-
9	0	-	0	-	0	-	0	-	0	-
10	0	-	0	-	0	-	0	-	0	-
11	0	-	0	-	1	0.250	0	-	1	0.071
12	2	0.667	0	-	2	0.500	0	-	4	0.333
13	1	0.250	0	-	0	-	0	-	1	0.059
14	0	-	0	-	0	-	0	-	0	-
15	0	-	0	-	0	-	0	-	0	-
16	0	-	0	-	0	-	1	0.333	1	0.083
17	1	0.250	0	-	0	-	0	-	1	0.063
18	3	1.000	0	-	2	0.500	0	-	5	0.417
19	0	-	0	-	2	0.500	0	-	2	0.250
20	0	-	0	-	0	-	0	-	0	-
21	0	-	0	-	0	-	0	-	0	-

Table 6. Eagle Use Surveys - Seasonal Bald Eagle Mean Use by Point Count Station

Point Count Station	Spring		Summer		Fall		Winter		Full Year	
	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]
22	0	-	0	-	0	-	0	-	0	-
23	0	-	0	-	0	-	0	-	0	-
24	0	-	0	-	0	-	0	-	0	-
25	0	-	0	-	0	-	0	-	0	-
26	0	-	0	-	0	-	0	-	0	-
27	0	-	0	-	0	-	0	-	0	-
28	0	-	0	-	0	-	0	-	0	-
29	0	-	0	-	1	0.250	0	-	1	0.083
30	0	-	0	-	2	0.500	0	-	2	0.182
31	0	-	0	-	0	-	0	-	0	-
32	0	-	0	-	0	-	0	-	0	-
33	1	0.333	0	-	0	-	0	-	1	0.083
34	0	-	0	-	0	-	0	-	0	-
35	0	-	0	-	0	-	0	-	0	-
36	0	-	0	-	0	-	0	-	0	-
37	0	-	0	-	0	-	0	-	0	-
38	0	-	0	-	0	-	1	0.333	1	0.083
39	0	-	0	-	0	-	0	-	0	-
40	1	0.333	0	-	0	-	0	-	1	0.091
41	0	-	0	-	0	-	0	-	0	-
42	0	-	0	-	0	-	0	-	0	-

Table 6. Eagle Use Surveys - Seasonal Bald Eagle Mean Use by Point Count Station

Point Count Station	Spring		Summer		Fall		Winter		Full Year	
	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]
43	0	-	0	-	0	-	0	-	0	-
44	0	-	0	-	0	-	0	-	0	-
45	0	-	0	-	0	-	0	-	0	-
46	1	0.333	0	-	0	-	0	-	1	0.083
47	0	-	0	-	0	-	0	-	0	-
48	1	0.333	0	-	0	-	0	-	1	0.083
49	0	-	0	-	0	-	0	-	0	-
50	1	0.333	0	-	0	-	0	-	1	0.083
51	0	-	0	-	1	0.250	0	-	1	0.083
52	0	-	0	-	0	-	0	-	0	-
53	0	-	0	-	1	0.250	0	-	1	0.083
54	0	-	0	-	0	-	0	-	0	-
55	0	-	0	-	0	-	0	-	0	-

[a] Total Std. Detections is the total number of standardized individuals detected within the 800 m–radius survey cylinder during standardized use surveys

[b] Mean Use is the total standardized detections divided by the total number of 60-minute point count surveys conducted within the season.

Table 7. Eagle Use Surveys - Seasonal and Annual Raptor Mean Flight Heights

Species	Flight Height[a]	Spring					Summer					Fall					Winter					Year				
		Sample Size[b]	Mean Flight Height (m)	SD[c]	Upper 95% CI Bound[d]	Lower 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Upper 95% CI Bound[d]	Lower 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Upper 95% CI Bound[d]	Lower 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Upper 95% CI Bound[d]	Lower 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Upper 95% CI Bound[d]	Lower 95% CI Bound[d]
American Kestrel[II]	Min	11	7.91	11.26	15.48	0.34	1	1.00	N/A	N/A	N/A	13	12.38	13.53	20.56	4.21	-	-	-	-	-	25.00	9.96	12.36	15.06	4.86
American Kestrel[II]	Max	11	14.45	9.42	20.78	8.13	1	2.00	N/A	N/A	N/A	13	29.46	21.14	42.23	16.69	-	-	-	-	-	25.00	21.76	18.25	29.29	14.23
Bald Eagle[II]	Min	17	64.59	69.22	100.18	29.00	1	25.00	N/A	N/A	N/A	12	30.83	24.20	46.21	15.46	2	23.00	31.11	302.54	-256.54	32.00	48.09	55.08	67.95	28.23
Bald Eagle[II]	Max	17	99.41	77.88	139.45	59.37	1	30.00	N/A	N/A	N/A	12	56.25	48.53	87.08	25.42	2	37.50	31.82	323.39	-248.39	32.00	77.19	67.92	101.67	52.70
Broad-winged Hawk	Min	-	-	-	-	-	-	-	-	-	-	7	122.86	115.14	229.34	16.37	-	-	-	-	-	7	122.86	115.14	229.34	16.37
Broad-winged Hawk	Max	-	-	-	-	-	-	-	-	-	-	7	235.71	137.58	362.96	108.47	-	-	-	-	-	7	235.71	137.58	362.96	108.47
Cooper's Hawk	Min	3	25.33	21.22	78.05	-27.38	-	-	-	-	-	1	2.00	N/A	N/A	N/A	-	-	-	-	-	4	19.50	20.89	52.74	-13.74
Cooper's Hawk	Max	3	75.00	78.58	270.21	-120.21	-	-	-	-	-	1	3.00	N/A	N/A	N/A	-	-	-	-	-	4	57.00	73.57	174.07	-60.07
Ferruginous Hawk[I]	Min	14	95.14	90.52	147.41	42.88	13	27.54	30.17	45.77	9.31	20	36.05	32.52	51.27	20.83	-	-	-	-	-	47	51.30	61.93	69.48	33.11
Ferruginous Hawk[I]	Max	14	150.00	100.06	207.77	92.23	13	62.00	52.80	93.91	30.09	20	76.65	56.96	103.31	49.99	-	-	-	-	-	47	94.45	79.19	117.70	71.20
Golden Eagle[II]	Min	1	80.00	N/A	N/A	N/A	-	-	-	-	-	3	50.33	62.05	204.48	-103.81	2	13.50	9.19	96.09	-69.09	6	43.00	47.02	92.35	-6.35
Golden Eagle[II]	Max	1	150.00	N/A	N/A	N/A	-	-	-	-	-	3	71.67	70.06	245.70	-102.37	2	25.00	0.00	25.00	25.00	6	69.17	63.67	135.99	2.35
Merlin	Min	3	6.00	7.81	25.40	-13.40	-	-	-	-	-	3	13.67	10.97	40.92	-13.58	-	-	-	-	-	6	9.83	9.50	19.80	-0.13
Merlin	Max	3	8.67	9.81	33.05	-15.72	-	-	-	-	-	3	40.33	52.54	170.85	-90.18	-	-	-	-	-	6	24.50	37.99	64.37	-15.37
Northern Goshawk	Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	25.00	N/A	N/A	N/A	1	25.00	N/A	N/A	N/A
Northern Goshawk	Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	30.00	N/A	N/A	N/A	1	30.00	N/A	N/A	N/A
Northern Harrier[II]	Min	92	37.89	87.81	56.08	19.71	38	4.50	16.23	9.84	-0.84	140	4.69	14.45	7.11	2.28	-	-	-	-	-	270	15.98	54.79	22.54	9.41
Northern Harrier[II]	Max	29	49.32	89.56	67.86	30.77	38	11.76	23.05	19.34	4.19	140	12.71	33.40	18.30	7.13	-	-	-	-	-	270	25.05	60.57	32.31	17.79
Prairie Falcon[II]	Min	-	-	-	-	-	-	-	-	-	-	5	10.60	16.89	31.57	-10.37	-	-	-	-	-	5	10.60	16.89	31.57	-10.37
Prairie Falcon[II]	Max	-	-	-	-	-	-	-	-	-	-	5	20.80	22.55	48.80	-7.20	-	-	-	-	-	5	20.80	22.55	48.80	-7.20
Red-tailed Hawk	Min	119	73.18	105.97	92.41	53.94	66	35.85	42.83	46.38	25.32	161	22.72	32.64	27.80	17.64	-	-	-	-	-	346	42.58	72.08	50.20	34.96
Red-tailed Hawk	Max	119	100.23	111.23	120.42	80.04	66	86.71	79.28	106.20	67.22	161	45.36	49.01	52.99	37.73	-	-	-	-	-	346	72.12	84.72	81.08	63.16
Rough-legged Hawk	Min	9	83.56	108.68	167.09	0.02	-	-	-	-	-	4	25.00	11.55	43.37	6.63	-	-	-	-	-	13	65.54	93.27	121.90	9.18
Rough-legged Hawk	Max	9	114.44	117.57	204.81	24.08	-	-	-	-	-	4	51.25	17.50	79.10	23.40	-	-	-	-	-	13	95.00	101.06	156.07	33.93
Sharp-shinned Hawk	Min	3	17.00	17.09	59.45	-25.45	-	-	-	-	-	4	20.00	33.50	73.30	-33.30	-	-	-	-	-	7	18.71	25.71	42.49	-5.06
Sharp-shinned Hawk	Max	3	27.00	30.12	101.81	-47.81	-	-	-	-	-	4	23.50	32.15	74.66	-27.66	-	-	-	-	-	7	25.00	28.68	51.53	-1.53
Snowy Owl	Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	4.50	4.95	48.97	-39.97	2	4.50	4.95	48.97	-39.97
Snowy Owl	Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	11.00	1.41	23.71	-1.71	2	11.00	1.41	23.71	-1.71
Swainson's Hawk[I]	Min	42	59.43	54.68	76.47	42.39	75	47.89	71.27	64.29	31.50	140	41.57	56.92	51.08	32.06	-	-	-	-	-	257	46.33	61.22	53.85	38.81
Swainson's Hawk[I]	Max	42	107.74	81.91	133.26	82.21	75	120.64	113.32	146.71	94.57	140	94.43	85.87	108.78	80.08	-	-	-	-	-	257	104.25	94.47	115.86	92.65
Turkey Vulture	Min	9	93.11	158.80	215.17	-28.95	26	32.65	52.46	53.84	11.46	29	29.97	45.22	47.17	12.77	-	-	-	-	-	64	39.94	75.33	58.75	21.12
Turkey Vulture	Max	9	101.11	154.47	219.85	-17.63	26	81.35	78.63	113.11	49.59	29	52.21	49.00	70.85	33.57	-	-	-	-	-	64	70.92	82.99	91.65	50.19
Unknown Accipiter	Min	-	-	-	-	-	-	-	-	-	-	1	15.00	N/A	N/A	N/A	-	-	-	-	-	1	15.00	N/A	N/A	N/A
Unknown Accipiter	Max	-	-	-	-	-	-	-	-	-	-	1	20.00	N/A	N/A	N/A	-	-	-	-	-	1	20.00	N/A	N/A	N/A
Unknown Buteo	Min	1	20.00	N/A	N/A	N/A	3	38.33	29.30	111.11	-34.45	2	35.50	48.79	473.86	-402.86	-	-	-	-	-	6	34.33	29.51	65.30	3.37
Unknown Buteo	Max	1	30.00	N/A	N/A	N/A	3	38.33	29.30	111.11	-34.45	2	87.50	88.39	881.64	-706.64	-	-	-	-	-	6	53.33	51.15	107.02	-0.35

Table 7. Eagle Use Surveys - Seasonal and Annual Raptor Mean Flight Heights

Species	Flight Height[a]	Spring					Summer					Fall					Winter					Year				
		Sample Size[b]	Mean Flight Height (m)	SD[c]	Upper 95% CI Bound[d]	Lower 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Upper 95% CI Bound[d]	Lower 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Upper 95% CI Bound[d]	Lower 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Upper 95% CI Bound[d]	Lower 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Upper 95% CI Bound[d]	Lower 95% CI Bound[d]
Unknown Falcon	Min	-	-	-	-	-	1	15.00	N/A	N/A	N/A	-	-	-	-	-	-	-	-	-	-	1	15.00	N/A	N/A	N/A
Unknown Falcon	Max	-	-	-	-	-	1	35.00	N/A	N/A	N/A	-	-	-	-	-	-	-	-	-	-	1	35.00	N/A	N/A	N/A
Unknown Raptor	Min	2	200.50	282.14	2735.39	-2334.39	-	-	-	-	-	4	5.75	6.40	15.93	-4.43	-	-	-	-	-	6	70.67	161.43	240.07	-98.74
Unknown Raptor	Max	2	201.00	281.43	2729.54	-2327.53	-	-	-	-	-	4	9.00	5.83	18.28	-0.28	-	-	-	-	-	6	73.00	160.28	241.21	-95.21
ALL RAPTORS	**Min**	**326**	**59.64**	**94.44**	**69.93**	**49.35**	**224**	**33.45**	**53.41**	**40.48**	**26.41**	**549**	**24.87**	**42.85**	**28.46**	**21.27**	**7**	**15.29**	**15.97**	**30.05**	**0.52**	**1106**	**36.79**	**65.88**	**40.68**	**32.91**
ALL RAPTORS	**Max**	**326**	**85.25**	**102.94**	**96.47**	**74.04**	**224**	**81.79**	**92.10**	**93.92**	**69.66**	**549**	**52.88**	**69.15**	**58.68**	**47.08**	**7**	**25.29**	**17.05**	**41.05**	**9.52**	**1106**	**68.10**	**86.33**	**73.20**	**63.01**

[a] This column indicates if a particular row is providing results for the minimum (Min) or maximum (Max) flight height statistic.

[b] Sample size refers to the number of flocks (i.e., not individuals) that were detected in flight within 800 m of the point count station during standardized eagle use (60-minute) surveys. Birds that were heard-only or perched-only were not included in the flight height analysis. All detections are included in flight height analyses, independent of whether the detection occurred above or below 200 m in height

[c] SD is the standard deviation of Mean Minimum or Maximum Flight Height. N/A indicates that standard deviation could not be calculated as the sample size is one.

[d] This column indicates either the upper or lower bound of the 95% confidence interval. N/A indicates that the confidence interval could not be calculated as the sample size is one.

- North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priortiy (SCP) are denoted with a superscript I, II, or III following the species name to indicate that it is Level 1, Level 2, or Level 3 SCP, respectively.

Table 8. Eagle-Minutes and Time within Rotor Swept Zone Summaries for Bald Eagles and Golden Eagles

	Spring	Summer	Fall	Winter	Annual Total
Survey Effort (hours)	159	106	212	159	636
	EAGLE-MINUTES SUMMARY				
BAEA Eagle-Minutes[a]	42	1	33	5	81
BAEA Eagle-Minutes per Survey Hour	0.264	0.009	0.156	0.031	0.127
GOEA Eagle-Minutes	6	0	12	3	21
GOEA Eagle-Minutes per Survey Hour	0.038	0.000	0.057	0.019	0.033
	MINUTES WITHIN ROTOR SWEPT ZONE (RSZ) SUMMARY				
BAEA minutes within RSZ[b]	17.8	0	10.5	2	30.3
BAEA minutes within RSZ per Survey Hour	0.112	0.000	0.050	0.013	0.048
GOEA time within RSZ	6	0	4.6	0	10.6
GOEA minutes within RSZ per Survey Hour	0.038	0.000	0.022	0.000	0.017

[a] Minutes within the standardized 800 m-radius by 200 m-high sample plot as described by the ECPG and final Eagle Rule. Each individual observation is rounded to the next highest integer; and eagle observed for 1.3 minutes in flight within the sample plot is assigned two eagle minutes. Perched eagles and eagles outside of the sample plot are not assigned eagle minutes.

[b] Minutes within the rotor swept zone (RSZ) is used as a metric of flight behavior that could expose a passing bird to collision with operating turbine blades. RSZ represents a predetermined range of above-ground heights within a hypothetical turbine blade sweep of 35 - 150 m within the 800 m-radius sample plot. Measured to the 0.1 minute.

- BAEA represents Bald Eagle and GOEA represents Golden Eagle

Table 9. Eagle Use Surveys - Seasonal Raptor Mean Use by Point Count Station

Point Count Station	Spring		Summer		Fall		Winter		Full Year	
	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]
1	1	0.333	7	3.500	6	1.500	0	-	14	1.167
2	5	1.667	12	6.000	2	0.500	0	-	19	1.583
3	2	0.667	5	2.500	1	0.250	0	-	8	0.667
4	6	2.000	6	3.000	17	4.250	1	0.333	30	2.500
5	4	1.000	1	0.500	29	7.250	0	-	34	2.267
6	5	1.667	0	-	16	4.000	0	-	21	1.750
7	7	2.333	6	3.000	14	3.500	1	0.333	28	2.333
8	0	-	9	4.500	12	3.000	0	-	21	1.750
9	6	2.000	4	2.000	9	2.250	0	-	19	1.583
10	3	1.000	0	-	4	1.000	0	-	7	0.583
11	7	2.333	2	1.000	9	2.250	0	-	18	1.286
12	6	2.000	2	1.000	10	2.500	0	-	18	1.500
13	2	0.500	1	0.500	9	1.800	1	0.167	13	0.765
14	8	4.000	12	6.000	5	1.667	0	-	25	3.571
15	5	1.667	4	2.000	7	1.750	0	-	16	1.333
16	2	0.667	1	0.500	6	1.500	1	0.333	10	0.833
17	5	1.250	6	3.000	9	2.250	0	-	20	1.250
18	7	2.333	8	4.000	21	5.250	0	-	36	3.000
19	2	1.000	5	2.500	9	2.250	0	-	16	2.000
20	9	3.000	9	4.500	12	3.000	0	-	30	2.500
21	3	1.000	4	2.000	6	1.500	0	-	13	1.083

Table 9. Eagle Use Surveys - Seasonal Raptor Mean Use by Point Count Station

Point Count Station	Spring		Summer		Fall		Winter		Full Year	
	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]
22	2	1.000	6	3.000	15	3.750	0	-	23	2.556
23	4	1.333	5	2.500	8	2.000	0	-	17	1.417
24	5	1.667	5	2.500	9	2.250	0	-	19	1.583
25	2	0.667	6	3.000	99	24.750	0	-	107	8.917
26	7	2.333	8	4.000	26	6.500	0	-	41	3.417
27	3	3.000	6	3.000	0	-	0	-	9	3.000
28	2	2.000	10	5.000	0	-	0	-	12	4.000
29	16	5.333	2	1.000	14	3.500	0	-	32	2.667
30	1	0.333	5	2.500	18	4.500	0	-	24	2.182
31	5	1.667	8	4.000	27	6.750	0	-	40	3.333
32	15	5.000	7	3.500	15	3.750	0	-	37	3.083
33	12	4.000	6	3.000	24	6.000	0	-	42	3.500
34	3	1.000	4	2.000	6	1.500	0	-	13	1.083
35	2	2.000	6	3.000	14	3.500	0	-	22	2.750
36	2	2.000	4	2.000	14	3.500	0	-	20	2.857
37	28	5.600	1	0.500	16	4.000	1	0.167	46	2.706
38	1	0.333	3	1.500	4	1.000	2	0.667	10	0.833
39	6	2.000	8	4.000	10	2.500	0	-	24	2.000
40	9	3.000	11	5.500	7	1.750	0	-	27	2.455
41	5	1.667	3	1.500	20	5.000	1	0.333	29	2.417
42	2	0.667	3	1.500	24	6.000	1	0.333	30	2.500

Table 9. Eagle Use Surveys - Seasonal Raptor Mean Use by Point Count Station

Point Count Station	Spring		Summer		Fall		Winter		Full Year	
	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]
43	1	0.333	5	2.500	8	2.000	1	0.333	15	1.250
44	2	0.667	7	3.500	3	0.750	0	-	12	1.000
45	1	0.333	1	0.500	7	1.750	0	-	9	0.750
46	16	5.333	4	2.000	16	4.000	0	-	36	3.000
47	6	2.000	1	0.500	1	0.250	0	-	8	0.615
48	22	7.333	5	2.500	13	3.250	0	-	40	3.333
49	7	1.400	3	1.500	3	0.750	0	-	13	0.867
50	18	6.000	1	0.500	8	2.000	0	-	27	2.250
51	10	3.333	1	0.500	14	3.500	0	-	25	2.083
52	1	0.333	0	-	10	2.500	0	-	11	0.917
53	1	0.333	4	2.000	14	3.500	1	0.333	20	1.667
54	1	0.500	0	-	15	3.750	0	-	16	1.778
55	6	3.000	0	-	20	5.000	0	-	26	2.889

[a] Total Std. Detections is the total number of standardized individuals detected within the 800 m–radius survey cylinder during standardized use surveys

[b] Mean Use is the total standardized detections divided by the total number of 60-minute point count surveys conducted within the season.

Table 10. Diurnal Avian Use Surveys - Seasonal Mean Use by Species Group

	Spring					Fall				
Species Group	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/10 min. survey/survey plot)[c]**	**SD[d]**	**Occur. Freq.[e]**	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/10 min. survey/survey plot)[c]**	**SD[d]**	**Occur. Freq.[e]**
Large-bodied Corvids	8	0.038	0.050	0.433	0.019	23	0.412	0.108	1.512	0.009
Non-passerine (large)	89	0.420	0.560	2.401	0.075	94	1.682	0.443	2.604	0.047
Non-passerine (small)	16	0.075	0.101	0.424	0.063	68	1.217	0.321	1.140	0.146
Passerine	7296	34.418	45.887	98.798	0.918	2485	44.462	11.722	35.965	0.613
Raptor	66	0.311	0.415	0.705	0.314	136	2.433	0.642	1.668	0.349
Raptor_*all*	77	0.354	0.484	0.967	0.321	136	2.151	0.642	1.668	0.349
Shorebird	86	0.406	0.541	1.205	0.264	122	2.183	0.575	3.002	0.104
Unknown Species Group	2	0.009	0.013	0.159	0.006	0	-	-	-	-
Upland Gamebirds	42	0.198	0.264	1.225	0.082	21	0.376	0.099	0.664	0.038
Wader	83	0.392	0.522	3.174	0.031	3	0.054	0.014	0.153	0.009
Wader_*all*	385	1.768	2.421	22.674	0.038	3	0.047	0.014	0.153	0.009
Waterbird	125	0.590	0.786	1.564	0.296	2148	38.433	10.132	80.401	0.080
Waterbird_*all*	132	0.606	0.830	1.623	0.302	2148	33.966	10.132	80.401	0.080
Waterfowl	13385	63.143	84.182	472.342	0.478	489	8.749	2.307	14.195	0.108
Waterfowl_*all*	13646	62.657	85.824	472.602	0.484	1224	19.355	5.774	34.518	0.127
ALL BIRDS	**21198**	**100.000**	**133.321**	**483.877**	**0.975**	**5589**	**100.000**	**26.363**	**89.049**	**0.759**
ALL BIRDS_*all*	**21779**	**100.000**	**136.975**	**484.123**	**0.975**	**6324**	**100.000**	**29.830**	**93.995**	**0.769**

[a] Total Std. Detections is the total number of standardized individuals detected within the 200-m high sample plot during standardized use surveys. Survey cylinder radius extended out to 800 m for large-bodied species and 150 m for small-bodied species. Mean use also is summarized for all heights for species groups with detections over 200 m in altitude and out to the same radial distances for large and small-bodied species, noted with the suffix "_*all* " after the group name

[b] % Comp. (i.e., percent composition) is the percent of all birds that a particular species group comprises during the season

[c] Mean Use is the total standardized detections divided by the total number of 10-minute point count surveys conducted within the season

[d] SD is the standard deviation of Mean Use

[e] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species group was detected during the season

Table 11. Diurnal Avian Use Surveys - Seasonal and Annual Mean Flight Heights

Species	Flight Height[a]	Spring					Fall					Year				
		Sample Size[b]	Mean Flight Height (m)	SD[c]	Upper 95% CI Bound[d]	Lower 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Upper 95% CI Bound[d]	Lower 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Upper 95% CI Bound[d]	Lower 95% CI Bound[d]
Large-bodied Corvid	Min	3	35.00	27.84	104.16	-34.16	2	15.50	20.51	199.74	-168.74	5	27.20	24.63	57.78	-3.38
Large-bodied Corvid	Max	3	40.00	20.00	89.68	-9.68	2	36.00	48.08	468.01	-396.01	5	38.40	27.98	73.14	3.66
Non-passerine (large)	Min	16	8.25	6.81	11.88	4.62	15	11.73	10.68	17.65	5.82	31	9.94	8.92	13.21	6.66
Non-passerine (large)	Max	16	13.94	6.84	17.58	10.29	15	21.33	10.93	27.39	15.28	31	17.52	9.66	21.06	13.97
Non-passerine (small)	Min	10	4.80	3.46	7.27	2.33	36	6.00	6.94	8.35	3.65	46	5.74	6.33	7.62	3.86
Non-passerine (small)	Max	10	5.90	4.15	8.87	2.93	36	7.42	6.72	9.69	5.14	46	7.09	6.24	8.94	5.23
Passerine	Min	571	9.73	15.05	10.97	8.49	285	10.57	14.59	12.27	8.87	856	10.01	14.90	11.01	9.01
Passerine	Max	571	14.87	16.75	16.25	13.50	285	15.76	15.05	17.52	14.01	856	15.17	16.20	16.26	14.08
Raptor	Min	67	68.69	105.82	94.50	42.87	89	28.39	45.83	38.05	18.74	156	45.70	79.76	58.31	33.08
Raptor	Max	67	86.18	106.26	112.10	60.26	89	56.55	65.51	70.35	42.75	156	69.28	86.38	82.94	55.61
Shorebird	Min	32	22.38	33.20	34.34	10.41	15	6.20	6.59	9.85	2.55	47	17.21	28.53	25.59	8.84
Shorebird	Max	32	30.16	35.49	42.95	17.36	15	11.93	7.98	16.35	7.52	47	24.34	30.69	33.35	15.33
Upland Game	Min	3	10.67	16.74	52.26	-30.93	2	4.00	4.24	42.12	-34.12	5	8.00	12.57	23.61	-7.61
Upland Game	Max	3	12.00	15.59	50.72	-26.72	2	8.50	9.19	91.09	-74.09	5	10.60	12.10	25.62	-4.42
Wader	Min	10	453.50	555.74	851.05	55.95	2	8.50	9.19	91.09	-74.09	12	379.33	531.70	717.16	41.51
Wader	Max	10	456.00	553.60	852.02	59.98	2	15.00	0.00	15.00	15.00	12	382.50	529.35	718.84	46.16
Waterbird	Min	70	37.64	124.58	67.35	7.94	14	45.71	72.79	87.74	3.69	84	38.99	117.22	64.43	13.55
Waterbird	Max	70	43.87	123.62	73.35	14.39	14	81.86	66.11	120.03	43.69	84	50.20	116.59	75.50	24.90
Waterfowl	Min	212	45.55	51.87	52.57	38.53	28	210.71	347.67	345.53	75.90	240	64.82	137.31	82.28	47.36
Waterfowl	Max	212	58.59	73.90	68.60	48.59	28	217.14	344.21	350.61	83.67	240	77.09	144.25	95.43	58.75
Unknown Species Group	Min	1	1.00	N/A	N/A	N/A	-	-	-	-	-	1	1.00	N/A	N/A	N/A
Unknown Species Group	Max	1	1.00	N/A	N/A	N/A	-	-	-	-	-	1	1.00	N/A	N/A	N/A
ALL BIRDS	**Min**	**995**	**28.16**	**86.99**	**33.57**	**22.75**	**488**	**25.86**	**97.57**	**34.54**	**17.18**	**1483**	**27.40**	**90.58**	**32.02**	**22.79**
ALL BIRDS	**Max**	**995**	**35.90**	**91.01**	**41.57**	**30.24**	**488**	**36.14**	**99.80**	**45.02**	**27.26**	**1483**	**35.98**	**93.96**	**40.77**	**31.20**

[a] This column indicates if a particular row is providing results for the minimum (Min) or maximum (Max) flight height statistic

[b] Sample size refers to the number of flocks (i.e., not individuals) that were detected in flight within either the 800 m (large-bodied species) or 150 m (small-bodied species) of the point count station during standardized diurnal avian activity (10-minute) surveys. Birds that were heard-only or perched-only were not included in the flight height analysis. All observations are included in flight height analyses regardless of whether the flock was observed at above or below 200 m in height

[c] SD is the standard deviation of Mean Minimum or Maximum Flight Height. N/A indicates that standard deviation could not be calculated as the sample size is one

[d] This column indicates either the upper or lower bound of the 95% confidence interval. N/A indicates that the confidence interval could not be calculated as the sample size is one

APPENDICES

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APPENDIX A

POINT COUNT STATION LOCATIONS

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Appendix A. Point Count Station Locations

Point Count Station	Latitude	Longitude	Northing	Easting
1	46.380	-99.644	261305.231	2184491.587
2	46.365	-99.644	255663.371	2184500.034
3	46.348	-99.645	249700.860	2184534.672
4	46.354	-99.625	252051.518	2189349.957
5	46.351	-99.561	251087.624	2205682.309
6	46.348	-99.519	249948.627	2216331.143
7	46.333	-99.603	244239.141	2195133.639
8	46.336	-99.561	245351.453	2205738.269
9	46.333	-99.519	244690.246	2216389.261
10	46.319	-99.645	239070.552	2184604.957
11	46.317	-99.603	238411.779	2195187.563
12	46.319	-99.561	239433.078	2205806.507
13	46.319	-99.519	239420.642	2216424.772
14	46.312	-99.494	237079.382	2222780.975
15	46.297	-99.653	231138.422	2182598.229
16	46.297	-99.632	231228.571	2187850.204
17	46.297	-99.603	231323.198	2195298.857
18	46.297	-99.561	231450.248	2205856.453
19	46.298	-99.540	231601.896	2211160.716
20	46.299	-99.519	232076.075	2216478.600
21	46.283	-99.498	226475.597	2221795.379
22	46.283	-99.472	226566.186	2228522.830
23	46.274	-99.608	222702.669	2194112.594
24	46.267	-99.650	220043.702	2183565.178
25	46.260	-99.629	217443.492	2188900.519
26	46.259	-99.604	217433.926	2195181.774

Appendix A. Point Count Station Locations

Point Count Station	Latitude	Longitude	Northing	Easting
27	46.255	-99.670	215484.301	2178390.337
28	46.245	-99.628	212124.312	2189065.797
29	46.245	-99.600	212163.820	2196127.519
30	46.230	-99.615	206859.738	2192482.864
31	46.230	-99.569	206881.143	2204115.203
32	46.216	-99.711	201429.290	2168174.231
33	46.221	-99.691	203207.443	2173396.403
34	46.216	-99.607	201586.568	2194456.229
35	46.216	-99.580	201593.156	2201349.958
36	46.216	-99.555	201638.974	2207668.566
37	46.198	-99.690	194915.858	2173560.354
38	46.201	-99.610	196302.655	2193870.520
39	46.201	-99.565	196302.391	2205152.243
40	46.203	-99.545	196966.997	2210376.094
41	46.187	-99.677	190943.717	2177015.515
42	46.187	-99.655	191008.528	2182433.156
43	46.187	-99.631	191095.012	2188688.725
44	46.187	-99.604	191108.779	2195431.450
45	46.187	-99.579	191131.876	2201842.281
46	46.187	-99.542	191126.651	2211161.443
47	46.168	-99.690	184056.480	2173695.106
48	46.173	-99.669	185727.063	2178958.016
49	46.165	-99.628	182924.292	2189552.036
50	46.162	-99.566	181995.895	2205231.229
51	46.341	-99.456	247745.875	2232180.915
52	46.321	-99.456	240419.147	2232207.544

Appendix A. Point Count Station Locations

Point Count Station	Latitude	Longitude	Northing	Easting
53	46.305	-99.456	234631.774	2232254.113
54	46.283	-99.650		
55	46.297	-99.582		

APPENDIX B

SEASONAL SPECIES GROUP MEAN USE STATISTICS

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Appendix B-1. Seasonal Large-bodied Corvids, Large-bodied Non-Passerines, and Upland Gamebirds Use Statistics Recorded during Diurnal Avian Use Surveys

	Spring					Fall				
Common Name	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/10 min. survey/survey plot)[c]**	**SD[d]**	**Occur. Freq.[e]**	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/10 min. survey/survey plot)[c]**	**SD[d]**	**Occur. Freq.[e]**
	LARGE-BODIED CORVIDS									
American Crow	8	100.000	0.050	0.433	0.019	22	95.652	0.104	1.511	0.005
Common Raven	0	-	-	-	-	1	4.348	0.005	0.069	0.005
	LARGE-BODIED NON-PASSERINES									
Common Nighthawk	0	-	-	-	-	1	1.064	0.005	0.069	0.005
Rock Pigeon	89	100.000	0.560	2.401	0.075	93	98.936	0.439	2.604	0.042
	UPLAND GAMEBIRDS									
Ring-necked Pheasant	10	23.810	0.063	0.291	0.050	15	71.429	0.071	0.567	0.028
Sharp-tailed Grouse[II]	32	76.190	0.201	1.084	0.044	6	28.571	0.028	0.350	0.009
ALL LARGE-BODIED CORVIDS	**8**	**100.000**	**0.050**	**0.433**	**0.019**	**23**	**100.000**	**0.108**	**1.512**	**0.009**
ALL LARGE-BODIED NON-PASSERINES	**89**	**100.000**	**0.560**	**2.401**	**0.075**	**94**	**100.000**	**0.443**	**2.604**	**0.047**
ALL UPLAND GAMEBIRDS	**42**	**100.000**	**0.264**	**1.225**	**0.082**	**21**	**100.000**	**0.099**	**0.664**	**0.038**

[a] Total Std. Detections is the total number of standardized individuals detected within the 800 m–radius survey cylinder during standardized use surveys

[b] % Comp. (i.e., percent composition) is the percent of a particular species group that a particular species comprises using total standardized detections.

[c] Mean Use is the total standardized detections divided by the total number of 60-minute point count surveys conducted within the season.

[d] SD is the standard deviation of Mean Use

[e] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species was detected during the season

- North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priortiy (SCP) are denoted with a superscript I or II following the species name to indicate that it is Level I or Level II SCP, respectively.

Appendix B-2. Seasonal Small-Bodied Non-Passerine and Passerine Use Statistics within the Project Area (Diurnal Avian Activity Surveys)

Common Name	Spring					Fall				
	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]
	SMALL NON-PASSERINES									
Hairy Woodpecker	0	-	-	-	-	1	1.471	0.005	0.069	0.005
Downy Woodpecker	1	6.250	0.006	0.079	0.006	0	-	-	-	-
Mourning Dove	13	81.250	0.082	0.389	0.050	64	94.118	0.302	1.107	0.137
Northern Flicker	2	12.500	0.013	0.112	0.013	3	4.412	0.014	0.153	0.009
	PASSERINES									
American Goldfinch	12	0.164	0.075	0.399	0.050	71	2.857	0.335	1.238	0.123
American Pipit	0	-	-	-	-	44	1.771	0.208	2.154	0.024
American Robin	24	0.329	0.151	1.313	0.038	19	0.765	0.090	0.539	0.028
American Tree Sparrow	11	0.151	0.069	0.586	0.025	0	-	-	-	-
Bank Swallow	1	0.014	0.006	0.079	0.006	13	0.523	0.061	0.703	0.014
Barn Swallow	12	0.164	0.075	0.382	0.050	90	3.622	0.425	1.976	0.090
Brown-headed Cowbird	93	1.275	0.585	1.532	0.233	6	0.241	0.028	0.237	0.019
Blue Jay	1	0.014	0.006	0.079	0.006	3	0.121	0.014	0.206	0.005
Bobolink[II]	19	0.260	0.119	0.520	0.069	4	0.161	0.019	0.136	0.019
Brewer's Blackbird	25	0.343	0.157	1.128	0.044	30	1.207	0.142	0.848	0.033
Brown Thrasher	0	-	-	-	-	3	0.121	0.014	0.206	0.005
Chestnut-collared Longspur[I]	22	0.302	0.138	0.497	0.088	11	0.443	0.052	0.326	0.033
Clay-colored Sparrow	12	0.164	0.075	0.365	0.050	11	0.443	0.052	0.326	0.038
Cedar Waxwing	0	-	-	-	-	6	0.241	0.028	0.412	0.005
Chipping Sparrow	0	-	-	-	-	1	0.040	0.005	0.069	0.005
Cliff Swallow	15	0.206	0.094	0.461	0.057	3	0.121	0.014	0.206	0.005
Common Grackle	96	1.316	0.604	2.447	0.170	34	1.368	0.160	1.072	0.047

Appendix B-2. Seasonal Small-Bodied Non-Passerine and Passerine Use Statistics within the Project Area (Diurnal Avian Activity Surveys)

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]
Dark-eyed Junco	7	0.096	0.044	0.411	0.019	0	-	-	-	-
Eastern Bluebird	2	0.027	0.013	0.159	0.006	0	-	-	-	-
Eastern Kingbird	8	0.110	0.050	0.271	0.038	13	0.523	0.061	0.378	0.038
European Starling	33	0.452	0.208	1.080	0.057	166	6.680	0.783	7.072	0.038
Gray Catbird	2	0.027	0.013	0.159	0.006	1	0.040	0.005	0.069	0.005
Grasshopper Sparrow[l]	4	0.055	0.025	0.157	0.025	1	0.040	0.005	0.069	0.005
Harris's Sparrow	1	0.014	0.006	0.079	0.006	0	-	-	-	-
Horned Lark	206	2.823	1.296	1.989	0.516	123	4.950	0.580	2.014	0.160
House Sparrow	55	0.754	0.346	1.587	0.082	67	2.696	0.316	2.106	0.047
House Wren	1	0.014	0.006	0.079	0.006	2	0.080	0.009	0.097	0.009
Lapland Longspur	6245	85.595	39.277	99.106	0.346	498	20.040	2.349	12.525	0.108
Least Flycatcher	1	0.014	0.006	0.079	0.006	0	-	-	-	-
Lincoln's Sparrow	0	-	-	-	-	1	0.040	0.005	0.069	0.005
Marsh Wren	0	-	-	-	-	2	0.080	0.009	0.097	0.009
Northern Shrike	1	0.014	0.006	0.079	0.006	0	-	-	-	-
Orchard Oriole	3	0.041	0.019	0.136	0.019	3	0.121	0.014	0.206	0.005
Pine Siskin	0	-	-	-	-	20	0.805	0.094	0.608	0.033
Purple Martin	0	-	-	-	-	1	0.040	0.005	0.069	0.005
Red-winged Blackbird	225	3.084	1.415	4.414	0.277	1058	42.575	4.991	32.638	0.142
Say's Phoebe	2	0.027	0.013	0.112	0.013	0	-	-	-	-
Savannah Sparrow	9	0.123	0.057	0.258	0.050	18	0.724	0.085	0.416	0.047
Sedge Wren	0	-	-	-	-	6	0.241	0.028	0.166	0.028
Snow Bunting	4	0.055	0.025	0.250	0.013	3	0.121	0.014	0.206	0.005

Appendix B-2. Seasonal Small-Bodied Non-Passerine and Passerine Use Statistics within the Project Area (Diurnal Avian Activity Surveys)

	Spring					Fall				
Common Name	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/10 min. survey/survey plot)[c]**	**SD[d]**	**Occur. Freq.[e]**	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/10 min. survey/survey plot)[c]**	**SD[d]**	**Occur. Freq.[e]**
Song Sparrow	6	0.082	0.038	0.222	0.031	9	0.362	0.042	0.245	0.033
Swainson's Thrush	7	0.096	0.044	0.555	0.006	0	-	-	-	-
Tree Swallow	2	0.027	0.013	0.112	0.013	0	-	-	-	-
Unknown Blackbird	5	0.069	0.031	0.397	0.006	1	0.040	0.005	0.069	0.005
Unknown Finch	0	-	-	-	-	3	0.121	0.014	0.206	0.005
Unknown Passerine	6	0.082	0.038	0.273	0.025	18	0.724	0.085	0.553	0.042
Unknown Sparrow	8	0.110	0.050	0.271	0.038	15	0.604	0.071	0.322	0.052
Unknwon Swallow	0	-	-	-	-	5	0.201	0.024	0.343	0.005
Unknown Warbler	3	0.041	0.019	0.238	0.006	1	0.040	0.005	0.069	0.005
Vesper Sparrow	11	0.151	0.069	0.278	0.063	12	0.483	0.057	0.287	0.042
White-crowned Sparrow	1	0.014	0.006	0.079	0.006	0	-	-	-	-
Western Kingbird	10	0.137	0.063	0.368	0.044	11	0.443	0.052	0.340	0.033
Western Meadowlark[II]	66	0.905	0.415	0.888	0.258	22	0.885	0.104	0.411	0.071
White-throated Sparrow	0	-	-	-	-	2	0.080	0.009	0.137	0.005
Yellow Warbler	2	0.027	0.013	0.112	0.013	6	0.241	0.028	0.256	0.014
Yellow-headed Blackbird	17	0.233	0.107	0.472	0.063	39	1.569	0.184	1.387	0.042
Yellow-rumped Warbler	0	-	-	-	-	9	0.362	0.042	0.428	0.019
ALL SMALL-BODIED NON-PASSERINES	**16**	**100.000**	**0.101**	**0.424**	**0.063**	**68**	**100.000**	**0.321**	**1.140**	**0.146**
ALL PASSERINES	**7296**	**100.000**	**45.887**	**98.798**	**0.918**	**2485**	**100.000**	**11.722**	**35.965**	**0.613**

[a] Total Std. Detections is the total number of standardized individuals detected within the 800 m–radius survey cylinder during standardized use surveys

[b] % Comp. (i.e., percent composition) is the percent of a particular species group that a particular species comprises using total standardized detections.

[c] Mean Use is the total standardized detections divided by the total number of 60-minute point count surveys conducted within the season.

Appendix B-2. Seasonal Small-Bodied Non-Passerine and Passerine Use Statistics within the Project Area (Diurnal Avian Activity Surveys)

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]

[d] SD is the standard deviation of Mean Use

[e] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species was detected during the season

- North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priortiy (SCP) are denoted with a superscript I or II following the species name to indicate that it is Level I or Level II SCP, respectively.

Appendix B-3. Seasonal Raptor Use Statistics within the Project Area (Diurnal Avian Activity Surveys)

	Spring					Fall				
Common Name	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/10 min. survey/survey plot)[c]**	**SD[d]**	**Occur. Freq.[e]**	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/10 min. survey/survey plot)[c]**	**SD[d]**	**Occur. Freq.[e]**
American Kestrel[II]	3	4.545	0.019	0.136	0.019	3	2.206	0.014	0.118	0.014
Bald Eagle[II]	7	10.606	0.044	0.283	0.025	4	2.941	0.019	0.136	0.019
Bald Eagle[II]_*all*[f]	8	10.390	0.050	0.293	0.031	4	2.941	0.019	0.136	0.019
Ferruginous Hawk[I]	3	4.545	0.019	0.136	0.019	1	0.735	0.005	0.069	0.005
Golden Eagle[II]	1	1.515	0.006	0.079	0.006	0	-	-	-	-
Great Horned Owl	1	1.515	0.006	0.079	0.006	0	-	-	-	-
Merlin	0	-	-	-	-	1	0.735	0.005	0.069	0.005
Northern Goshawk	0	-	-	-	-	1	0.735	0.005	0.069	0.005
Northern Harrier[II]	16	24.242	0.101	0.393	0.075	21	15.441	0.099	0.315	0.094
Northern Harrier[II]_*all*[f]	17	22.078	0.107	0.399	0.082	21	15.441	0.099	0.315	0.094
Red-tailed Hawk	21	31.818	0.132	0.375	0.119	28	20.588	0.132	0.426	0.104
Red-tailed Hawk_*all*[f]	26	33.766	0.164	0.476	0.126	28	20.588	0.132	0.426	0.104
Rough-legged Hawk	1	1.515	0.006	0.079	0.006	0	-	-	-	-
Sharp-shinned Hawk	1	1.515	0.006	0.079	0.006	1	0.735	0.005	0.069	0.005
Sharp-shinned Hawk_*all*[f]	3	3.896	0.019	0.136	0.019	1	0.735	0.005	0.069	0.005
Swainson's Hawk[I]	8	12.121	0.050	0.219	0.050	62	45.588	0.292	1.545	0.137
Swainson's Hawk[I]_*all*[f]	9	11.688	0.057	0.232	0.057	62	45.588	0.292	1.545	0.137
Turkey Vulture	1	1.515	0.006	0.079	0.006	6	4.412	0.028	0.166	0.028
Turkey Vulture_*all*[f]	2	2.597	0.013	0.112	0.013	6	4.412	0.028	0.166	0.028
Unknown Accipiter	0	-	-	-	-	1	0.735	0.005	0.069	0.005
Unknown Buteo	1	1.515	0.006	0.079	0.006	7	5.147	0.033	0.204	0.028
Unknown Raptor	2	3.030	0.013	0.112	0.013	0	-	-	-	-
ALL RAPTORS	**66**	**100.000**	**0.415**	**0.705**	**0.314**	136	100.000	0.642	1.668	0.349
ALL RAPTORS_*all heights*[f]	**77**	**100.000**	**0.484**	**0.967**	**0.321**	136	100.000	0.642	1.668	0.349

Appendix B-3. Seasonal Raptor Use Statistics within the Project Area (Diurnal Avian Activity Surveys)

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]

[a] Total Std. Detections is the total number of standardized individuals detected within the 800 m–radius survey cylinder during standardized use surveys

[b] % Comp. (i.e., percent composition) is the percent of raptors that a particular species comprises using total standardized detections.

[c] Mean Use is the total standardized detections divided by the total number of 60-minute point count surveys conducted within the season.

[d] SD is the standard deviation of Mean Use

[e] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species was detected during the season

[f] Species or group names followed by "*_all* " indicate that presented data includes individuals greater than 200 m in height.

- North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priortiy (SCP) are denoted with a superscript I or II following the species name to indicate that it is Level I or Level II SCP, respectively.

Appendix B-4. Seasonal Shorebirds, Waders, and Waterbirds Use Statistics within the Project Area (Diurnal Avian Activity Surveys)

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]
	SHOREBIRDS									
Greater Yellowlegs	0	-	-	-	-	3	2.459	0.014	0.118	0.014
Killdeer	56	65.116	0.352	0.713	0.233	60	49.180	0.283	1.622	0.090
Marbled Godwit[I]	5	5.814	0.031	0.237	0.019	0	-	-	-	-
Red-necked Phalarope	3	3.488	0.019	0.238	0.006	0	-	-	-	-
Upland Sandpiper[II]	11	12.791	0.069	0.392	0.044	0	-	-	-	-
Wilson's Phalarope[I]	6	6.977	0.038	0.476	0.006	0	-	-	-	-
Wilson's Snipe	5	5.814	0.031	0.175	0.031	0	-	-	-	-
Unknown Shorebird	0	-	-	-	-	59	48.361	0.278	2.475	0.019
	WADERS									
Great Blue Heron	0	-	-	-	-	3	100.000	0.014	0.153	0.009
Sandhill Crane	83	100.000	0.522	3.174	0.031	0	-	-	-	-
Sandhill Crane_*all*[f]	385	100.000	2.421	22.674	0.038	0	-	-	-	-
	WATERBIRDS									
American Coot	5	4.000	0.031	0.326	0.013	16	0.745	0.075	0.500	0.033
American White Pelican[II]	0	-	-	-	-	21	0.978	0.099	1.442	0.005
American White Pelican[II]_*all*[f]	7	0.053	0.044	0.395	0.013	21	0.978	0.099	1.442	0.005
Black Tern[I]	0	-	-	-	-	1	0.047	0.005	0.069	0.005
California Gull	20	16.000	0.126	0.933	0.038	1	0.047	0.005	0.069	0.005
Double-crested Cormorant	0	-	-	-	-	81	3.771	0.382	4.592	0.009
Franklin's Gull[I]	2	1.600	0.013	0.159	0.006	2023	94.181	9.542	80.316	0.033
Horned Grebe[I]	2	1.600	0.013	0.159	0.006	0	-	-	-	-
Pied-billed Grebe	1	0.800	0.006	0.079	0.006	2	0.093	0.009	0.097	0.009
Ring-billed Gull	90	72.000	0.566	1.256	0.226	0	-	-	-	-

Appendix B-4. Seasonal Shorebirds, Waders, and Waterbirds Use Statistics within the Project Area (Diurnal Avian Activity Surveys)

	Spring					Fall				
Common Name	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/10 min. survey/survey plot)[c]**	**SD[d]**	**Occur. Freq.[e]**	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/10 min. survey/survey plot)[c]**	**SD[d]**	**Occur. Freq.[e]**
Sora	1	0.800	0.006	0.079	0.006	3	0.140	0.014	0.118	0.014
Unknown Gull	2	1.600	0.013	0.159	0.006	0	-	-	-	-
Unknown Waterbird species	2	1.600	0.013	0.159	0.006	0	-	-	-	-
ALL SHOREBIRDS	**86**	**100.000**	**0.541**	**1.205**	**0.264**	**122**	**100.000**	**0.575**	**3.002**	**0.104**
ALL WADERS	**83**	**100.000**	**0.522**	**3.174**	**0.031**	**3**	**100.000**	**0.014**	**0.153**	**0.009**
ALL WADERS_*all heights*[f]	**385**	**100.000**	**2.421**	**22.674**	**0.038**	**3**	**100.000**	**0.014**	**0.153**	**0.009**
ALL WATERBIRDS	**125**	**100.000**	**0.786**	**1.564**	**0.296**	**2148**	**100.000**	**10.132**	**80.401**	**0.080**
ALL WATERBIRDS_*all heights*[f]	**132**	**100.000**	**0.830**	**1.623**	**0.302**	**2148**	**100.000**	**10.132**	**80.401**	**0.080**

[a] Total Std. Detections is the total number of standardized individuals detected within the 800 m–radius survey cylinder during standardized use surveys

[b] % Comp. (i.e., percent composition) is the percent of a particular species group that a particular species comprises using total standardized detections.

[c] Mean Use is the total standardized detections divided by the total number of 60-minute point count surveys conducted within the season.

[d] SD is the standard deviation of Mean Use

[e] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species was detected during the season

[f] Species or group names followed by "_200" indicate that presented data includes individuals greater than 200 m in height.

- North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priortiy (SCP) are denoted with a superscript I or II following the species name to indicate that it is Level I or Level II SCP, respectively.

Appendix B-5. Seasonal Waterfowl Use Statistics within the Project Area (Diurnal Avian Activity Surveys)

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]
American Wigeon	6	0.045	0.038	0.295	0.019	0	-	-	-	-
Blue-winged Teal	27	0.202	0.170	0.756	0.063	18	3.681	0.085	0.618	0.024
Cackling Goose	198	1.479	1.245	8.044	0.044	0	-	-	-	-
Canada Goose	1285	9.600	8.082	78.736	0.164	95	19.427	0.448	3.566	0.042
Canvasback[II]	4	0.030	0.025	0.317	0.006	0	-	-	-	-
Common Merganser	2	0.015	0.013	0.159	0.006	0	-	-	-	-
Gadwall	10	0.075	0.063	0.401	0.031	13	2.658	0.061	0.647	0.014
Greater White-fronted Goose	621	4.640	3.906	31.318	0.063	40	8.180	0.189	2.747	0.005
Greater White-fronted Goose_*all*[f]	671	4.917	4.220	31.529	0.069	150	12.255	0.708	8.027	0.009
Green-winged Teal	0	-	-	-	-	4	0.818	0.019	0.217	0.009
Lesser Scaup[II]	5	0.037	0.031	0.285	0.013	0	-	-	-	-
Mallard	147	1.098	0.925	3.275	0.239	77	15.746	0.363	4.815	0.019
Mallard_*all*[f]	154	1.129	0.969	3.310	0.245	117	9.559	0.552	5.531	0.024
Northern Pintail[II]	105	0.784	0.660	3.260	0.157	0	-	-	-	-
Northern Pintail[II]_*all*[f]	109	0.799	0.686	3.271	0.164	0	-	-	-	-
Northern Shoveler	12	0.090	0.075	0.485	0.031	4	0.818	0.019	0.217	0.009
Redhead	5	0.037	0.031	0.397	0.006	0	-	-	-	-
Ross's Goose	40	0.299	0.252	1.096	0.088	1	0.204	0.005	0.069	0.005
Ross's Goose_*all*[f]	40	0.293	0.252	1.096	0.088	6	0.490	0.028	0.350	0.009
Ruddy Duck	4	0.030	0.025	0.317	0.006	0	-	-	-	-
Snow Goose	10893	81.382	68.509	377.666	0.126	180	36.810	0.849	12.362	0.005
Snow Goose_*all*[f]	11093	81.291	69.767	378.071	0.126	760	62.092	3.585	32.776	0.014
Unknown Duck	21	0.157	0.132	0.772	0.050	57	11.656	0.269	2.336	0.019

Appendix B-5. Seasonal Waterfowl Use Statistics within the Project Area (Diurnal Avian Activity Surveys)

	Spring					Fall				
Common Name	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/10 min. survey/survey plot)[c]**	**SD[d]**	**Occur. Freq.[e]**	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/10 min. survey/survey plot)[c]**	**SD[d]**	**Occur. Freq.[e]**
ALL WATERFOWL	**13385**	**100.000**	**84.182**	**472.342**	**0.478**	**489**	**100.000**	**2.307**	**14.195**	**0.108**
ALL WATERFOWL_*all heights*[f]	**13646**	**100.000**	**85.824**	**472.602**	**0.484**	**1224**	**100.000**	**5.774**	**34.518**	**0.127**

[a] Total Std. Detections is the total number of standardized individuals detected within the 800 m–radius survey cylinder during standardized use surveys

[b] % Comp. (i.e., percent composition) is the percent of waterfowl that a particular species comprises using total standardized detections.

[c] Mean Use is the total standardized detections divided by the total number of 60-minute point count surveys conducted within the season.

[d] SD is the standard deviation of Mean Use

[e] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species was detected during the season

[f] Species or group names followed by "*_all* " indicate that presented data also includes individuals flying at greater than 200 m in height.

- North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priortiy (SCP) are denoted with a superscript I or II following the species name to indicate that it is Level I or Level II SCP, respectively.

APPENDIX C

SPECIES OBSERVED DURING EAGLE USE AND DIURNAL AVIAN USE SURVEYS

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Appendix C. Species Observed during Eagle Use and Diurnal Avian Use Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Alder/Willow Flycatcher	*Empidonax alnorum/traillii*	-	Incidental	-	N/A	-	-
American Avocet	*Recurvirostra americana*	-	Incidental	Incidental	N/A	SCP II	-
American Bittern	*Botaurus lentiginosus*	-	Incidental	Incidental	N/A	SCP I	-
American Coot	*Fulica americana*	X	Incidental	X	N/A	-	-
American Crow	*Corvus brachyrhynchos*	X	N/A	X	N/A	-	-
American Goldfinch	*Spinus tristis*	X	Incidental	X	N/A	-	-
American Kestrel	*Falco sparverius*	X	X	X	-	SCP II	-
American Pipit	*Anthus rubescens*	Incidental	N/A	X	N/A	-	-
American Redstart	*Setophaga ruticilla*	Incidental	N/A	-	N/A	-	-
American Robin	*Turdus migratorius*	X	Incidental	X	N/A	-	-
American Tree Sparrow	*Spizelloides arborea*	X	N/A	-	N/A	-	-
American White Pelican	*Pelecanus erythrorhynchos*	-	Incidental	X	N/A	SCP II	-
American Wigeon	*Mareca americana*	X	Incidental	-	N/A	-	-
Baird's Sandpiper	*Calidris bairdii*	-	Incidental	-	N/A	-	-
Baird's Sparrow	*Centronyx bairdii*	Incidental	N/A	-	N/A	SCP I	-
Bald Eagle	*Haliaeetus leucocephalus*	X	X	X	X	SCP II	BGEPA
Baltimore Oriole	*Icterus galbula*	Incidental	Incidental	-	N/A	-	-
Bank Swallow	*Riparia riparia*	X	Incidental	X	N/A	-	-
Barn Swallow	*Hirundo rustica*	X	Incidental	X	N/A	-	-
Black Tern	*Chlidonias niger*	Incidental	Incidental	X	N/A	SCP I	-
Black-and-White Warbler	*Mniotilta varia*	Incidental	N/A	-	N/A	-	-
Black-bellied Plover	*Pluvialis squatarola*	Incidental	N/A	-	N/A	-	-
Black-crowned Night-Heron*	*Nycticorax nycticorax*	-	Incidental	-	N/A	-	-
Blackpoll Warbler	*Setophaga striata*	Incidental	N/A	-	N/A	-	-

Appendix C. Species Observed during Eagle Use and Diurnal Avian Use Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Blue Jay	*Cyanocitta cristata*	X	N/A	X	Incidental	-	-
Blue-winged Teal	*Spatula discors*	X	Incidental	X	N/A	-	-
Bobolink	*Dolichonyx oryzivorus*	X	Incidental	X	N/A	SCP II	-
Brewer's Blackbird	*Euphagus cyanocephalus*	X	Incidental	X	N/A	-	-
Broad-winged Hawk	*Buteo platypterus*	-	-	X	-	-	-
Brown Thrasher	*Toxostoma rufum*	-	Incidental	X	N/A	-	-
Brown-headed Cowbird	*Molothrus ater*	X	Incidental	X	N/A	-	-
Bufflehead	*Bucephala albeola*	Incidental	N/A	-	N/A	-	-
Burrowing Owl*	*Athene cunicularia*	-	N/A	Incidental	N/A	SCP II	-
Cackling Goose	*Branta hutchinsii*	X	N/A	-	N/A	-	-
California Gull	*Larus californicus*	X	Incidental	X	N/A	-	-
Canada Goose	*Branta canadensis*	X	Incidental	X	N/A	-	-
Canvasback	*Aythya valisineria*	-	Incidental	-	N/A	SCP II	-
Cattle Egret	*Bubulcus ibis*	Incidental	N/A	-	N/A	-	-
Cedar Waxwing	*Bombycilla cedrorum*	-	N/A	X	N/A	-	-
Chestnut-collared Longspur	*Calcarius ornatus*	X	Incidental	X	N/A	SCP I	-
Chipping Sparrow	*Spizella passerina*	-	Incidental	X	N/A	-	-
Clay-colored Sparrow	*Spizella pallida*	X	Incidental	X	N/A	-	-
Cliff Swallow	*Petrochelidon pyrrhonota*	X	Incidental	X	N/A	-	-
Common Goldeneye	*Bucephala clangula*	Incidental	N/A	-	N/A	-	-
Common Grackle	*Quiscalus quiscula*	X	Incidental	X	N/A	-	-
Common Merganser	*Mergus merganser*	Incidental	N/A	-	N/A	-	-
Common Nighthawk	*Chordeiles minor*	-	N/A	X	N/A	-	-
Common Raven	*Corvus corax*	-	N/A	X	N/A	-	-

Appendix C. Species Observed during Eagle Use and Diurnal Avian Use Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Common Yellowthroat	*Geothlypis trichas*	-	Incidental	-	N/A	-	-
Cooper's Hawk	*Accipiter cooperii*	-	-	X	-	-	-
Dark-eyed Junco	*Junco hyemalis*	X	N/A	-	N/A	-	-
Dickcissel	*Spiza americana*	-	Incidental	-	N/A	SCP II	-
Double-crested Cormorant	*Phalacrocorax auritus*	-	Incidental	X	N/A	-	-
Downy Woodpecker*	*Dryobates pubescens*	-	Incidental	-	N/A	-	-
Eastern Bluebird	*Sialia sialis*	X	Incidental	-	N/A	-	-
Eastern Kingbird	*Tyrannus tyrannus*	X	Incidental	X	N/A	-	-
Eurasian Collared-Dove*	*Streptopelia decaocto*	-	N/A	-	Incidental	-	
European Starling	*Sturnus vulgaris*	X	Incidental	X	N/A	-	-
Ferruginous Hawk	*Buteo regalis*	X	X	X	-	SCP I	-
Forster's Tern	*Sterna forsteri*	Incidental	Incidental	-	N/A	-	-
Franklin's Gull	*Leucophaeus pipixcan*	X	Incidental	X	N/A	SCP I	-
Gadwall	*Mareca strepera*	X	Incidental	X	N/A	-	-
Golden Eagle	*Aquila chrysaetos*	X	-	X	X	SCP II	BGEPA
Grasshopper Sparrow	*Ammodramus savannarum*	X	Incidental	X	N/A	SCP I	-
Gray Catbird	*Dumetella carolinensis*	X	N/A	X	N/A	-	-
Gray Partridge	*Perdix perdix*	Incidental	Incidental	Incidental	N/A	-	-
Gray-cheeked Thrush	*Catharus minimus*	Incidental	N/A	-	N/A	-	-
Great Blue Heron	*Ardea herodias*	-	N/A	X	N/A	-	-
Great Egret	*Ardea alba*	Incidental	Incidental	-	N/A	-	-
Great Horned Owl	*Bubo virginianus*	X	-	-	X	-	-
Greater White-fronted Goose	*Anser albifrons*	X	N/A	X	N/A	-	-
Greater Yellowlegs	*Tringa melanoleuca*	-	N/A	X	N/A	-	-

Appendix C. Species Observed during Eagle Use and Diurnal Avian Use Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Green-winged Teal	*Anas crecca*	-	Incidental	X	N/A	-	-
Hairy Woodpecker	*Dryobates villosus*	-	N/A	X	Incidental	-	-
Harris's Sparrow	*Zonotrichia querula*	X	N/A	-	N/A	-	-
Horned Grebe	*Podiceps auritus*	X	Incidental	-	N/A	SCP I	-
Horned Lark	*Eremophila alpestris*	X	Incidental	X	Incidental	-	-
House Finch	*Haemorhous mexicanus*	-	Incidental	-	N/A	-	-
House Sparrow	*Passer domesticus*	X	Incidental	X	N/A	-	-
House Wren	*Troglodytes aedon*	X	Incidental	X	N/A	-	-
Killdeer	*Charadrius vociferus*	X	Incidental	X	N/A	-	-
Lapland Longspur	*Calcarius lapponicus*	X	N/A	X	Incidental	-	-
Lark Sparrow	*Chondestes grammacus*	Incidental	N/A	-	N/A	-	-
Least Flycatcher	*Empidonax minimus*	X	Incidental	-	N/A	-	-
Least Sandpiper	*Calidris minutilla*	-	Incidental	-	N/A	-	-
Lesser Scaup	*Aythya affinis*	X	Incidental	-	N/A	SCP II	-
Lesser Yellowlegs	*Tringa flavipes*	Incidental	Incidental	-	N/A	-	-
Lincoln's Sparrow	*Melospiza lincolnii*	-	N/A	X	N/A	-	-
Mallard	*Anas platyrhynchos*	X	Incidental	X	N/A	-	-
Marbled Godwit	*Limosa fedoa*	X	Incidental	-	N/A	SCP I	-
Marsh Wren	*Cistothorus palustris*	-	Incidental	X	N/A	-	-
Merlin	*Falco columbarius*	X	-	X	-	-	-
Mourning Dove	*Zenaida macroura*	X	Incidental	X	N/A	-	-
Nelson's Sparrow	*Ammospiza nelsoni*	-	Incidental	-	N/A	SCP I	-
Northern Flicker	*Colaptes auratus*	X	Incidental	X	N/A	-	-
Northern Goshawk	*Accipiter gentilis*	-	-	X	X	-	-

Appendix C. Species Observed during Eagle Use and Diurnal Avian Use Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Northern Harrier	*Circus hudsonius*	X	X	X	-	SCP II	-
Northern Pintail	*Anas acuta*	X	Incidental	-	N/A	SCP II	-
Northern Shoveler	*Spatula clypeata*	X	Incidental	X	N/A	-	-
Northern Shrike	*Lanius borealis*	X	N/A	-	N/A	-	-
Northern Waterthrush	*Parkesia noveboracensis*	Incidental	N/A	-	N/A	-	-
Orchard Oriole	*Icterus spurius*	X	Incidental	X	N/A	-	-
Palm Warbler	*Setophaga palmarum*	-	N/A	Incidental	N/A	-	-
Pectoral Sandpiper*	*Calidris melanotos*	-	Incidental	-	N/A	-	-
Peregrine Falcon	*Falco peregrinus*	Incidental	-	-	-	SCP III	-
Pied-billed Grebe	*Podilymbus podiceps*	X	Incidental	X	N/A	-	-
Pine Siskin	*Spinus pinus*	-	N/A	X	N/A	-	-
Prairie Falcon	*Falco mexicanus*	-	-	X	-	SCP II	-
Purple Martin	*Progne subis*	-	N/A	X	N/A	-	-
Red Crossbill*	*Loxia curvirostra*	-	N/A	Incidental	N/A	-	-
Redhead	*Aythya americana*	X	N/A	-	N/A	-	-
Red-headed Woodpecker	*Melanerpes erythrocephalus*	-	Incidental	Incidental	N/A	SCP I	-
Red-necked Phalarope	*Phalaropus lobatus*	X	N/A	-	N/A	-	-
Red-tailed Hawk	*Buteo jamaicensis*	X	X	X	-	-	-
Red-winged Blackbird	*Agelaius phoeniceus*	X	Incidental	X	N/A	-	-
Ring-billed Gull	*Larus delawarensis*	X	N/A	-	N/A	-	-
Ring-necked Pheasant	*Phasianus colchicus*	X	Incidental	X	Incidental	-	-
Rock Pigeon	*Columba livia*	X	Incidental	X	Incidental	-	-
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	Incidental	N/A	-	N/A	-	-
Ross's Goose	*Anser rossii*	X	N/A	X	N/A	-	-

Appendix C. Species Observed during Eagle Use and Diurnal Avian Use Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Rough-legged Hawk	*Buteo lagopus*	X	-	X	-	-	-
Ruddy Duck	*Oxyura jamaicensis*	X	N/A	-	N/A	-	-
Sandhill Crane	*Antigone canadensis*	Incidental	N/A	Incidental	N/A	-	-
Savannah Sparrow	*Passerculus sandwichensis*	X	Incidental	X	N/A	-	-
Say's Phoebe	*Sayornis saya*	X	N/A	-	N/A	-	-
Sedge Wren	*Cistothorus platensis*	-	Incidental	X	N/A	-	-
Semipalmated Sandpiper	*Calidris pusilla*	-	Incidental	-	N/A	-	-
Sharp-shinned Hawk	*Accipiter striatus*	-	-	X	-	-	-
Sharp-tailed Grouse	*Tympanuchus phasianellus*	X	Incidental	X	Incidental	SCP II	-
Snow Bunting	*Plectrophenax nivalis*	X	N/A	X	Incidental	-	-
Snow Goose	*Anser caerulescens*	X	N/A	X	N/A	-	-
Snowy Owl	*Bubo scandiacus*	-	-	-	X	-	-
Solitary Sandpiper	*Tringa solitaria*	-	Incidental	-	N/A	-	-
Song Sparrow	*Melospiza melodia*	X	Incidental	X	N/A	-	-
Sora	*Porzana carolina*	X	Incidental	X	N/A	-	-
Spotted Sandpiper*	*Actitis macularius*	-	Incidental	-	N/A	-	-
Sprague's Pipit	*Anthus spragueii*	-	Incidental	Incidental	N/A	SCP I	-
Swainson's Hawk	*Buteo swainsoni*	X	X	X	-	SCP I	-
Swainson's Thrush	*Catharus ustulatus*	X	N/A	-	N/A	-	-
Swamp Sparrow	*Melospiza georgiana*	-	Incidental	-	N/A	-	-
Tree Swallow	*Tachycineta bicolor*	X	Incidental	-	N/A	-	-
Tundra Swan	*Cygnus columbianus*	-	N/A	Incidental	N/A	-	-
Turkey Vulture	*Cathartes aura*	X	X	X	-	-	-
Upland Sandpiper	*Bartramia longicauda*	X	Incidental	-	N/A	SCP II	-

Appendix C. Species Observed during Eagle Use and Diurnal Avian Use Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Veery	*Catharus fuscescens*	Incidental	N/A	-	N/A	-	-
Vesper Sparrow	*Pooecetes gramineus*	X	Incidental	X	N/A	-	-
Warbling Vireo	*Vireo gilvus*	-	Incidental	-	N/A	-	-
Western Kingbird	*Tyrannus verticalis*	X	Incidental	X	N/A	-	-
Western Meadowlark	*Sturnella neglecta*	X	Incidental	X	N/A	SCP II	-
White-breasted Nuthatch*	*Sitta carolinensis*	-	N/A	Incidental	N/A	-	-
White-crowned Sparrow	*Zonotrichia leucophrys*	X	N/A	-	N/A	-	-
White-faced Ibis	*Plegadis chihi*	-	Incidental	-	N/A	-	-
White-throated Sparrow	*Zonotrichia albicollis*	-	N/A	X	N/A	-	-
Whooping Crane	*Grus americana*	X	N/A	-	N/A	SCP III	FE
Willet	*Tringa semipalmata*	Incidental	Incidental	Incidental	N/A	SCP II	-
Willow Flycatcher	*Empidonax traillii*	-	Incidental	-	N/A	-	-
Wilson's Phalarope	*Phalaropus tricolor*	X	Incidental	-	N/A	SCP I	-
Wilson's Snipe	*Gallinago delicata*	X	Incidental	-	N/A	-	-
Wood Duck*	*Aix sponsa*	-	Incidental	-	N/A	-	-
Yellow Warbler	*Setophaga petechia*	X	Incidental	X	N/A	-	-
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	X	Incidental	X	N/A	-	-
Yellow-rumped Warbler	*Setophaga coronata*	-	Incidental	X	N/A	-	-

[a] An "X" within a particular seasonal column indicates that species has been detected at least once within the project area over the course of standardized field studies. Non-raptor species generally receive an "N/A" in summer and winter as standardized surveys were only conducted for raptors during these seasons. However, species marked with "Incidental" indicate that the species was observed incidentally within the project area during the season.

[b] State conservation listing status indicates North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priority (SCP) Level I, II, or III. Species marked with an asterisk (*) indicate that it was detected within the project incidentally only.

c Federal Status Codes: FE = Federally Endangered; BGEPA = Bald and Golden Eagle Protection Act

YEAR 2
PRE-CONSTRUCTION AVIAN STUDIES

BADGER WIND PROJECT
LOGAN AND MCINTOSH COUNTIES, NORTH DAKOTA

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EXECUTIVE SUMMARY

This year-two (Y2) report summarizes the results of pre-construction avian studies conducted May 2020 through April 2021 by Atwell, LLC (Atwell) on behalf of Badger Wind, LLC (Badger Wind) for the proposed Badger Wind Project (the project) in Logan and McIntosh counties, North Dakota. Field studies were designed to document avian and raptor use, raptor nest activity, and Sharp-tailed Grouse (*Tympanuchus phasianellus*) lek activity in the vicinity of the project. A year-one (Y1) report summarizes the same results from May 2019 through April 2020 (Atwell 2020a). The project area was revised in December 2020, midway through the Y2 study period.

Avian use studies were conducted in accordance with the United States Fish and Wildlife Service Land-Based Wind Energy Guidelines (USFWS WEG) (USFWS 2012), the Eagle Conservation Plan Guidance: Module 1 - Land-based Wind Energy, Version 2 (ECPG) (USFWS 2013), and the Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests (i.e., "final Eagle Rule"; USFWS 2016).

Studies conducted during the Y2 surveys included nest surveys for Bald Eagles (*Haliaeetus leucocephalus*), Golden Eagles (*Aquila chrysaetos*), and other raptor species; lek surveys for Sharp-tailed Grouse; monthly eagle use surveys; and diurnal avian use surveys during the spring and fall migration periods. Results of Y2 avian use studies are summarized below.

Raptor Nests

- A single in-use Bald Eagle nest noted in 2019 and 2020 appeared to be missing in early 2021. The nesting pair initiated a new nesting location approximately two miles to the east of the original site in March 2021. This nest was found within the project area during aerial nest surveys in 2019 was confirmed occupied in 2020. The Bald Eagle pair fledged young from this nest in 2019 and 2020.
- No Golden Eagle nests were found within the project area or ten-mile buffer.
- Four occupied Ferruginous Hawk (*Buteo regalis*) nests, seven Red-tailed Hawk (*Buteo jamaicensis*) nests, four Swainson's Hawk nests (*Buteo swainsoni*), and four Great Horned Owl nests (*Bubo virginianus*) were found within the revised December 2020 project area boundary and a surrounding two-mile buffer during Y2.

Sharp-tailed Grouse

- Thirteen confirmed Sharp-tailed Grouse leks, and two possible leks, were found during Y2 lek surveys. Four of the confirmed leks were within the December 2020 project boundary and four confirmed leks and one possible lek were within a surrounding one-mile buffer.

Bald Eagle and Golden Eagle Use

- Overall Bald Eagle use of the project area was similar over the Y1 and Y2 study periods. Thirty-Four Bald Eagles were observed over the course of 636 hours of standardized eagle use surveys over the Y1 study period and 35 Bald Eagles were observed over the same amount of survey effort during Y2. An additional 46 Bald Eagles were detected incidental to standardized surveys in Y1 and 30 incidental Bald Eagle detections were recorded during Y2. Incidental observations include sightings outside of the standardized sample plot as well as encounters outside of 60-minute eagle use survey periods.
- Golden Eagle use of the project area was also similar over the Y1 and Y2 study periods. Six Golden Eagles were observed over a year of eagle use surveys in both Y1 and Y2. Seven Golden Eagles were detected incidentally to standardized use surveys during Y1 and 6 incidental Golden Eagle detections were recorded during Y2.

  Golden Eagles were sporadically encountered during the spring, fall, and winter periods. Detections appeared to represent both migrating and wintering individuals.

  Bald Eagle mean use rates were highest during the fall and spring over the Y2 study period. Several summer Bald Eagle observations were recorded in association with the in-use nest location. Bald Eagles were infrequently observed during the winter and were never observed in January or February during the Y1 and Y2 study periods.

Species Listed under the Endangered Species Act

- Three Whooping Cranes (*Grus americana*), listed as endangered by the Endangered Species Act (ESA), were observed within the project area from April 15 to 17, 2020. The cranes were first observed during eagle use surveys at a nearby point count station. Return visits found that the cranes foraged during daylight hours in unharvested corn and roosted in riverine wetlands nearby at night. No Whooping Cranes were observed in Y2.
- No other ESA- listed avian species were observed within the project boundary during the two years of avian use studies.

General Avian Use

- Many of the bird species that were commonly observed in the project area are habitat generalists that are regularly observed in agricultural areas, including several species of blackbirds and Lapland Longspurs (*Calcarius lapponicus*). Large groups of birds were observed moving through the project area during migration. These included Snow Geese (*Anser caerulescens*), Franklin's Gulls (*Leucophaeus pipixcan*), a North Dakota species of conservation priority (SCP), and Sandhill Cranes (*Grus canadensis*).

- Small-bodied passerines (particularly Icterids and Lapland Longspurs) and waterfowl (particularly Snow Geese) together comprised the majority (93 percent) of avian detections during the Y2 study period.
- Avian species groups with mean flight heights within the pre-defined 35 to 150-meter rotor-swept zone included large-bodied corvids (e.g., crows and ravens), raptors, waterbirds (e.g., gulls, pelicans, cormorants), and waterfowl.
- Several passerine species of conservation priority that are associated with grassland habitats were observed extensively throughout the project area during diurnal avian use surveys. These included Chestnut-collared Longspur (*Calcarius ornatus*), Grasshopper Sparrow (*Ammodramus savannarum*), Bobolink (*Dolichonyx oryzivorus*), and Western Meadowlark (*Sturnella neglecta*). Nelson's Sparrows (*Ammospiza nelsoni*) and LeConte's Sparrows (*Ammospiza leconteii*) were infrequently encountered at localized sites within the project area. Sprague's Pipits (*Anthus spragueii*) were observed on infrequent occasions during fall migration, but evidence of this species breeding within the project area was not noted.

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ACRONYMS AND ABBREVIATIONS

AKN	Avian Knowledge Network
Atwell	Atwell, LLC
BGEPA	Bald and Golden Eagle Protection Act
ECPG	United States Fish and Wildlife Service Eagle Conservation Plan Guidance: Module 1 - Land-based Wind Energy Version 2
ESA	Endangered Species Act
Ft	feet
km	kilometer(s)
m	meter(s)
MBTA	Migratory Bird Treaty Act
MCP	Minimum Convex Polygon
MW	Megawatt(s)
NDGF	North Dakota Game and Fish Department
ND SWAP	North Dakota State Wildlife Action Plan
NLCD	National Land Cover Database
QA/QC	Quality Assurance/Quality Control
project	Badger Wind Project
RSZ	rotor-swept zone
SCP	Species of Conservation Priority
SD	standard deviation
T&E	Threatened and Endangered Species under ESA
USFWS	United States Fish and Wildlife Service
WEG	United States Fish and Wildlife Service 2012 Land-Based Wind Energy Guidelines
WTG	Wind Turbine Generator

1 INTRODUCTION

Atwell, LLC (Atwell) was contracted by Badger Wind, LLC (Badger Wind) to conduct avian studies for the proposed Badger Wind Project (the project) in Logan and McIntosh counties, North Dakota (Figure 1). The proposed 250-megawatt (MW) project would include the development of 60 to 120 wind turbine generators (WTGs), associated collection lines, access roads, and a collector substation.

The project boundary was modified in December 2020 and is now an estimated 57,097 acres (Figure 1). Approximately 46 percent of the project area (26,000 acres) is in McIntosh County and approximately 54 percent (31,098 acres) is in Logan County The general topography is undulating and rises from the west to the east, with approximate elevations between 1,960 and 2,230 feet above mean sea level within the project boundary. The project is predominately within the Missouri Coteau Slope Level IV Ecoregion, with portions of the project area's eastern boundary extending upward into the Missouri Coteau Level IV Ecoregion (Bryce et al. 1996). The Missouri Coteau is an escarpment of glacial till containing numerous hills, small lakes, and poorly drained depressions that are referred to as "potholes" that receive most of their water from snow melt and precipitation (Bryce et al. 1996). These potholes increase in density to the north and east of the project boundary. The Missouri Coteau Slope descends westward toward the Missouri River from the Coteau and is characterized by a thinner glacial till layer and integrated drainages flowing toward the Missouri River (Clayton 1962).

According to the 2016 U.S. Geological Survey National Land Cover Database (NLCD; MRLC 2019), the project area is composed primarily of cultivated crops (46.2 percent) and herbaceous/grassland (44.9 percent). Wetlands and open water comprise 2.5 percent of the project area. Other land cover types found within the project area include developed areas (3.1 percent), pasture/hay (2.2 percent), shrub/scrub (1.2 percent), woodland forest (less than 0.1 percent), and barren land (less than 0.1 percent) (Figure 2).

The objectives of the studies summarized in this report were to document avian and raptor use, raptor nest activity, and grouse lekking activity in the project area and its vicinity. Survey protocols described herein were designed to adhere to Tier 3 of the United States Fish and Wildlife Service (USFWS) 2012 Land-Based Wind Energy Guidelines (WEG); the USFWS Region 6 Recommended Protocol for Conducting Pre-construction Eagle Nest Surveys at Wind Energy Projects Version 3, and Stage 2 assessments described in the USFWS Eagle Conservation Plan Guidance: Module 1 - Land-based Wind Energy Version 2 (ECPG; (USFWS 2012; USFWS 2013; USFWS 2021). These two documents provide wind energy developers and operators guidance for adhering to the Migratory Bird Treaty Act (MBTA) and Bald and Golden Eagle Protection Act (BGEPA), respectively. Additionally, Atwell utilized industry standard approaches for avian use

studies as promoted by the National Wind Wildlife Collaborative (Strickland et al. 2011). This report summarizes the results of the second year of avian studies. Table 1 summarizes avian studies conducted over the two years and respective survey extents, frequencies, and durations.

This report adheres to avian taxonomy outlined in the American Ornithological Society's Online Checklist of North & Middle American Birds: 61st Supplement (Chesser et al. 2020).

2 METHODS

2.1 EAGLE AND RAPTOR NEST SURVEY

The Y2 eagle and raptor nest surveys were conducted during April and May of 2020. The project area established in April 2019 and its surrounding nest survey area were assessed through a combination of targeted aerial surveys conducted on April 10, 2020 and ground-based surveys that continued through May 15, 2020 (Figure 3). The aerial Y2 survey occurred shortly before updated USFWS eagle nest survey guidance was released that recommended a 2-mile nest survey buffer surrounding the project area (USFWS 2020). Therefore, the eagle nest survey buffer extended 10 miles from the project boundary as during the Y1 nest survey and described in the ECPG (USFWS 2013). All non-eagle raptor nests were recorded for the project area and a surrounding two-mile buffer as described in the WEG (USFWS 2012).

Flight time was restricted to one day of aerial surveys due to safety concerns regarding a) the COVID-19 coronavirus outbreak across the United States; and b) recent aircraft accidents associated with aerial wildlife surveys at other proposed wind facilities in the region. The plan for conducting restricted aerial surveys was communicated to the USFWS and North Dakota Game and Fish Department (NDGF) during a safety update meeting on April 3, 2020.

The Y2 survey's targeted aerial transect areas are depicted in purple-outlined polygons in Figure 3. Areas targeted for aerial surveys included:

- Roadless portions of the project area
- Habitat-based focal areas within the April 2019 project area and 10-mile eagle nest survey buffer
- Known eagle nests and nests of other raptor species that were found during the Y1 survey.

Habitat-based focal areas were identified using desktop analysis of the eagle nest survey area. Large bodies of water, riparian areas, and areas with large trees that could serve as potential eagle nesting sites were prioritized when identifying target areas.

Fixed-wing aerial transects were conducted by two Atwell biologists in a Cessna Skyhawk 172M on April 10, 2020. Transects were flown by locally based Bismarck Aero at speeds ranging from approximately 75-100 knots, and at an approximate altitude of 500 feet (ft). Altitude and speed varied to some degree based upon landscape conditions, safety concerns, and the need to investigate potential nests. Aerial survey transects were oriented north-south, and riparian-based transects were flown along the northern and southern edges of the Beaver Creek riparian corridor between Beaver Lake and the western edge of the eagle nest survey area (Figure 3).

In addition to aerial nest surveys, all raptor nests that were found during ground-based activities, including ground-based lek surveys, avian use surveys, and eagle use surveys were mapped, assessed for nesting status, and were added to the project nest database. Ground-based follow-up surveys were conducted to confirm species and status for nests that could not be attributed to species during the aerial survey.

When a raptor nest was encountered, the following data were collected (USFWS 2021):

- Nesting species
- Nest location (decimal degrees)
- Nest substrate (deciduous or coniferous)
- Nest status (in-use or alternate)
- Nest condition (good, fair, or poor)
- Nest contents (number of eggs or young)

Following completion of the surveys, data were reviewed and uploaded into the project database as part of the quality assurance/quality control (QA/QC) program.

Incidental observations of additional raptor nests were made during 2021 project micrositing efforts. These locations were noted by species and activity, when possible, and included in the project database.

2.2 SHARP-TAILED GROUSE LEK SURVEYS

The Y2 Sharp-tailed Grouse lek survey was also conducted using both aerial and ground-based survey methods. Targeted portions of the grouse survey area (specifically the April 2019 project area plus a one-mile buffer zone around the April 2019 project area) were assessed via aerial transects on April 10, 2020 and are depicted with black north-south transects in Figure 4.

As described above, safety concerns limited flight time to one morning of aerial surveys that targeted specific areas within the broader grouse survey area and focused on portions of the grouse survey area that could not be reached or observed from publicly accessible roadside vantage points. Targeted aerial survey areas were believed to have higher likelihood of harboring grouse leks (shaded green in Figure 4) based on 1) results from 2019 aerial grouse lek surveys, 2) observations of grouse recorded during Y1 eagle use and avian use surveys, and 3) identification of potential Sharp-tailed Grouse breeding habitat through desktop review.

Additional portions of the grouse survey area were sampled using 3 rounds of standardized ground-based surveys between April 11 and May 15, 2020. Standardized ground-based grouse survey locations are depicted with orange circles in Figure 4. Each round of surveys was spaced

approximately 8 to 10 days apart. During each survey round, an Atwell biologist surveyed 77 publicly accessible roadside points spaced 0.5 miles (800 m) apart for two minutes, scanning visually and listening for Sharp-tailed Grouse vocalizations and other non-vocal sounds associated with lekking behavior.

In addition to dedicated ground-based lek surveys, survey schedules for concurrently occurring eagle use and avian use surveys (see Sections 2.3 and 2.4 below) were modified to opportunistically increase the likelihood of incidental detections of lekking Sharp-tailed Grouse during the use surveys. Eagle use and avian use sample plots are depicted with dashed black circles in Figure 4. Survey schedules for eagle use surveys were adjusted so that plots within potential grouse habitat (shaded green in Figure 4) were surveyed earliest in the morning in the months of March, April, and May of 2020.

When a Sharp-tailed Grouse lek was encountered, the following data were collected:

- Lek location (decimal degrees)
- Number of individuals present
- Observed behaviors
- Land use

Lek locations were additionally referenced with nearby landmarks (e.g., hilltops, potholes or wetlands, trees) to improve location precision and to help relocate the lek if assessed for ground-based lek counts at a later date.

Confirmed leks were defined as two or more birds together, with at least one male displaying. Possible leks were defined as auditory detections of multiple grouse that could not be verified visually after their initial detection on a ground-based survey.

Following completion of the surveys, data were reviewed and uploaded into the project database.

2.3 EAGLE USE SURVEYS

A long-duration, fixed-point eagle use survey protocol (Strickland et al. 2011) was used to document seasonal activity and behavior of eagles and other raptor species within the project area. All eagle detections and other raptor detections within a three-dimensional cylindrical plot (the sample plot) were recorded following a fixed-radius, point count survey approach (Hutto et al. 1986; Ralph et al. 1993) that is referenced in the ECPG (USFWS 2013). Though fixed-radius plots were used, the distance to each detection was estimated to allow for density estimation (Reynolds et al. 1980). Sample plots measured 2,625 feet (800 meters [m]) in radius by 656 ft (200

m) in height, as described in the final Eagle Rule (USFWS 2016). These surveys are referred to as standardized eagle use surveys hereafter.

Study Period

Eagle use surveys were conducted over one full year to encompass spring migration and the breeding season, fall migration, and the wintering season (Strickland et al. 2011). Each sample plot was visited for one hour each month, as described in the final Eagle Rule (USFWS 2016). Seasonal periods were defined as spring (March through May), summer (June through July), fall (August through November), and winter (January through February). The Y2 study period began on May 1, 2020 and ended on April 30, 2021.

Survey Methodology

Consistent with the Eagle Rule, a one-hour survey duration was used throughout the study period for all visits (USFWS 2016). Surveys were conducted between dawn and dusk. Surveys were conducted in all weather conditions, provided that conditions were safe for the observer and that horizontal visibility was at least 800 m and vertical visibility was at least 200 m.

While broadly referred to here as point count surveys, the ECPG recognizes that eagle use surveys are more accurately described as a 'point-based recording of activity duration (minutes of flight) within the sample plot (USFWS 2013).

The following information was recorded for each individual that was observed:

- Time of day at first and final observation within the sample plot
- Species or parent taxa group if identification to species not possible (e.g., *Accipiter* species)
- Horizontal distance to initial observation and closest observation in meters
- Count
- Flight height altitude within the sample plot (initial height, minimum height, maximum height in meters)
- Flight direction
- Age (with dependent juveniles not included in mean use analyses)
- Behavior
- Duration of flight within a generic rotor-swept zone's (RSZ) portion of the sample plot (35 to 150 m in height), to the nearest 0.1 minute

- Duration of flight within the entire (0 to 200 m in height) sample plot for eagles only (i.e. eagle minutes described in the ECPG [USFWS 2013])
- Habitat
- For eagles and species as endangered or threatened under the Endangered Species Act (ESA), flight path mapped through the sample plot

A starting monitoring station was randomly selected from the 53-monitoring stations before each of the 12 survey events across the year.

At the completion of each survey, the observer confirmed that data sheets were complete and legible prior to proceeding to the next point count station. Following completion of the surveys, data were reviewed and uploaded into the project database as part of the QA/QC program.

Selection and Location of Point Count Stations

Fifty-three point count stations were established overall within a study area predicated on the previous April 2019 project boundary (Figure 5). Point count station coordinates are detailed in Appendix A. Consistent with guidelines in the final Eagle Rule (USFWS 2016) and the Appendix C of the ECPG (USFWS 2013), Atwell established 18 of the 53 point count stations within the minimum convex polygon (MCP) to achieve 30 percent spatial coverage of an approximately 28,269-acre MCP. The MCP is depicted by the blue polygon in Figure 5 and was generated from a preliminary turbine array provided by Badger Wind in April 2019. The MCP encompasses the project footprint, inclusive of the hazardous area around all turbine and associated infrastructure, including utility lines, out buildings, and roads.

An additional 35 point count stations were added to provide coverage of the project area given a potential for future expansion and/or modification of the project area. Three of these 35 stations were positioned to the east and outside of the project boundary, in an area that was also under consideration for development at the start of surveys.

The following criteria were used when selecting point count station locations:

- Stations were located on low-traffic roadways for safety and to minimize noise disturbance during surveys.
- Stations were located within or adjacent habitat types that are representative of the project area.
- Stations were spaced so that sample plots did not overlap.
- Stations provided a 360-degree view of the horizon to the extent feasible.

- Stations were located in areas accessible year-round to the extent feasible.

Atwell ground-truthed all 53 point count stations in May 2019. Stations with landowner conflicts, an inadequate viewshed, or anticipated poor observer access during heavy precipitation were adjusted as necessary.

Land cover types were reviewed during ground-truthing to confirm that the survey points were representative of habitats found within the project area. The point count stations were located within representative land cover types as follows: 53.6 percent cultivated crops, 38.1 percent herbaceous cover, 3.6 percent open-space developed areas, 1.9 percent hay/pastureland, 1.1 percent emergent herbaceous wetland, and 1.0 percent shrub scrub. The following land cover types each represented less than 1 percent of the area covered by survey point count stations: development (low, medium, and high intensities), open water, woody wetland, deciduous forest, and barren land.

Alternate Point Count Station Strategy for Winter Surveys

Point count stations were surveyed for eagle use during the winter (December through February) to the extent feasible. Twelve point count stations had safety or access issues during winter storm events. Point count station 14, 21, 22, 30, 32, 35, 36, 40 and 48 are located on infrequently traveled roads with uncertain plowing frequency. These stations were inaccessible during periods of high snow depths. Point count stations 26, 39, and 50 are located on frequently traveled roads with minimal roadside clearance. Roadside snowbanks that accumulated during plowing could further limit roadside clearance, rendering these points unsafe during surveys.

Nearby point count stations were pre-selected as to serve alternates for the above point count stations in the event that these stations could not be accessed in inclement weather (Table 2). Alternate nearby point count stations were proximate in location and were located within similar habitats when possible. This strategy allowed surveyors to safely meet standardized survey effort goals while maintaining appropriate spatial coverage of the study area.

2.4 AVIAN ACTIVITY POINT COUNT SURVEYS

Flight Height Data for Large-bodied Bird Species

Flight heights for all large-bodied bird species were recorded during the first 20 minutes of the 60-minute eagle use survey to obtain flight height data, including raptors, waterfowl, large gamebirds, grebes, nightjars, rails and cranes, shorebirds, gulls and terns, pelicans, and waders such as herons and egrets. Only eagles and other raptors were recorded during the final 40 minutes of the eagle use survey.

Short-duration Point Count Surveys

In addition, a short-duration, fixed-point protocol (Strickland et al. 2011) was used to characterize general avian use within the study area, consistent with the WEG (USFWS 2012). Diurnal avian activity surveys were used to estimate mean use and species richness, to determine presence of species of concern, and to determine areas of concentrated avian use within the study area. These surveys are referred to as standardized avian use surveys hereafter.

Detections of small-bodied birds and large-bodied birds were recorded within three-dimensional cylindrical plots (the sample plot areas varied for small-bodied and large-bodied birds), following a fixed-radius plot point count survey approach. Small-bodied birds included hummingbirds, cuckoos, doves, swifts, woodpeckers, and most passerines. Sample plots for small-bodied birds measured 492 ft (300 m) in radius. Large-bodied birds included upland game birds, waterfowl, waterbirds (wading birds, cormorants, pelicans, grebes), shorebirds, raptors, nightjars, pigeons, and large corvids (American Crows [*Corvus brachyrhynchos*] and Common Ravens [*Corvus corax*]). Sample plots for large-bodied birds measured 2,625 feet (800 meters) in radius.

Study Period and Study Area

Surveys were completed during the spring (May 2020, and March to April 2021) and fall (August to November 2020) seasons. The same 53 point count station locations established for eagle and raptor use surveys were also used for avian use surveys (Figure 5).

Survey Methodology

Short duration avian use surveys followed point count methodology as described in Ralph et al. (1993), Ralph et al. (1995), in the WEG (USFWS 2012), and in standard industry recommendations (National Wind Coordinating Committee 1999; Strickland et al. 2011). Though a fixed-radius protocol was used (Hutto et al. 1986; Ralph et al. 1993), distance estimates to each detection were also recorded, allowing for calculation of density estimates if desired (Reynolds et al. 1980).

Short duration point count surveys were 10 minutes in duration and were conducted after the completion of the 60-minute eagle use survey. All birds that were seen or heard during the survey were recorded. Surveys were conducted throughout the day, their timing contingent on the completion of the preceding eagle and raptor use survey.

The following information was recorded for each auditory and visual detection during the short-duration count:

- Species or parent taxa group (e.g., sparrow species)
- Detection type (song, visual, call, other)
- Distance to detection

- Count
- Age (with dependent fledglings not counted in mean use analyses)
- Flight height altitude at initial detection (coded as above RSZ, within RSZ, or below RSZ)
    - Numeric flight height estimate also recorded to accommodate analyses using a wider RSZ if desired
    - Whether the individual eventually entered the RSZ if not within RSZ at first detection
- Habitat
- Breeding observations (e.g., nesting material carry, food material carry, nest, copulation, etc.).

At the completion of each survey, the observer confirmed that data sheets were complete and legible prior to proceeding to the next point count station. Following completion of the surveys, data were reviewed and uploaded into the project database as part of the QA/QC program.

2.5 INCIDENTAL DATA COLLECTION AND LISTED SPECIES

Incidental detections of eagles, ESA-listed threatened or endangered species (T&E), and North Dakota species of conservation priority (SCP) as defined by the North Dakota State Wildlife Action Plan (ND SWAP) (Dyke et al. 2015) were recorded during survey activities. Level I SCP are species of high conservation priority that may be declining in North Dakota or which may occur regularly in North Dakota but are otherwise in decline range wide. Level II SCP are species with moderate conservation priority or with higher conservation priority and significant non-state wildlife grant funding available to provide for their conservation. Level III SCP have moderate conservation priority and North Dakota is ephemeral to their range (Dyke et al. 2015). Incidental detections include observations recorded while en route to point count stations, non-raptor observations during eagle use surveys, observations outside the survey plots, and observations that were recorded at point count stations but outside the survey period.

3 RESULTS

3.1 EAGLE AND RAPTOR NEST SURVEY

3.1.1 Eagle Nests

Atwell detected one in-use Bald Eagle nest within the project area during the April 2020 aerial survey (Figure 6). This nest was located in a small cluster of cottonwood (*Populus*) trees southwest of Beaver Lake, Logan County (approximate coordinates: 46.3493° N, 99.6274° W). This is the same grove of trees where a pair of Bald Eagles was observed to have successfully nested during Y1 (2019) studies (Atwell 2020a). Two adults were observed tending to the nest at the time of the aerial survey on April 10, 2020, and they continued to be seen during subsequent ground-based survey efforts into the summer, when fledged juveniles were observed near the nest. No other eagle nest structures were detected within the eagle nest survey area.

Golden Eagles were not observed during the aerial survey and no Golden Eagle nests were found during the study period.

3.1.1.1 New 2021 Bald Eagle Nest Location

Atwell located an in-use Bald Eagle nest within the project area on March 10, 2021 (approximate coordinates: 46.3474° N, 99.5856° W) (Figure 6) The nest was found incidentally during eagle-use surveys and is located in a small grove of cottonwoods immediately east of a tributary of Beaver Creek. The nest is located over a mile from a publicly accessible road and was visited on foot after permission was secured from a property owner on April 22, 2021. An adult was observed on the nest during this check, confirming its status as in-use and occupied

The 2021 nest was previously noted as unoccupied during the Y2 nest survey (Atwell 2020b). It was noted to be somewhat large but was not suspected to be an alternate to the 2019-2020 nest due to their distance apart. It was checked later in the spring of 2020 and found to still be unoccupied.

The 2019-2020 and 2021 nests are believed to belong to the same nesting territory. The 2021 Bald Eagle in-use nest is approximately 3.19 km (1.98 miles) east of the 2019-2020 nest. The 2019-2020 nest is now classified as an alternate nest site (USFWS 2013; USFWS 2016). The 2019-2020 nest was checked repeatedly after the March 10 discovery of the 2021 nest and it was found to be missing and perhaps fallen from its substrate. Bald Eagles were not observed at the old nest site during these subsequent checks.

3.1.2 Non-Eagle Raptor Nests

During the Y2 nesting raptor survey Atwell identified 20 non-eagle raptor nests within the December 2020 project area boundary and 14 non-eagle raptor nests within its surrounding 2-mile raptor nest survey buffer. All 36 nests are depicted in Figure 6 and summarized in Table 3. Several of the 34 non-eagle raptor nests were found during ground-based eagle use and avian use surveys.

Four occupied Ferruginous Hawk nests were found within the December 2020 project area and a surrounding two-mile raptor nest buffer. Two nests were found within the project area and two nests were found within the two-mile buffer (Figure 6). All 4 Ferruginous Hawk nests were initially discovered during Y1 surveys in 2019 (Atwell 2020a). A fifth occupied Ferruginous Hawk nest was found within the project area during micrositing activities in April of 2021.

Four occupied Swainson's Hawk nests were found within the December 2020 project area boundary and a surrounding 2-mile raptor nest buffer (Figure 6). One nest was found within the project area and 3 nests were found within the two-mile buffer. All Swainson's Hawk nests were found during ground-based efforts; Swainson's Hawks have later nesting phenology than other raptors found within the project area and were still scarce at the time of the aerial raptor nest survey on April 10, 2020.

Seven Red-tailed Hawk nests were found within the December 2020 project area and a surrounding two-mile raptor nest buffer (Figure 6). Five nests were found within the project area and 2 nests were found within the two-mile buffer. Two of the nests within the project area that were occupied during the Y1 survey were found unoccupied during the Y2 survey.

Five occupied Great Horned Owl nests were found within the December 2020 project area and a surrounding two-mile raptor nest buffer, 3 of them within the project boundary (Figure 6). One of the 3 nests within the project boundary was initially discovered during Y1 surveys in 2019.

Eleven likely raptor stick nests (unoccupied and not identified to species) were found within the revised December 2020 project area. Six of these were within the project area and five within the two-mile buffer (Figure 6). Ground-based follow-up surveys found the nests unoccupied and did not provide further information on the species identities for these unknown raptor nests.

3.2 SHARP-TAILED GROUSE LEK SURVEYS

Thirteen confirmed Sharp-tailed Grouse lek locations and two possible lek locations were found within the grouse survey area through a combination of aerial and ground-based efforts during the Y2 lek survey (Figure 7 and Table 4). The same area was surveyed in 2019 and 2020, which included the April 2019 project area and a surrounding one-mile survey buffer.

Four confirmed lek locations were observed within the December 2020 project area, 4 confirmed and one possible lek location were observed within the one-mile buffer, and 5 confirmed and one possible lek location were observed beyond the December 2020 project area's one-mile buffer.

Four confirmed leks were found during aerial surveys and the remaining 9 were found during ground-based surveys. Confirmed leks held 4 to 27 individuals. Confirmed and possible leks are depicted with 0.5-mile-radius buffers to represent likely nesting areas for females (Dyke et al. 2015).

3.3 EAGLE USE SURVEYS

Eagle use survey results, along with discussion regarding annual and seasonal patterns, spatial distribution of observations across the project area, individuals' directional movements at the time of observation, and flight heights are presented below.

3.3.1 Eagle Use Survey Effort

Table 5 summarizes the Y2 eagle use survey effort by point count station. Eagle use surveys occurred over 636 total hours of standardized survey effort during the study period. Total effort included 159 hours of spring surveys, 106 hours of summer surveys, 212 hours of fall surveys, and 159 hours of winter surveys. This matched seasonal and annual survey effort totals during Y1.

Over the course of the Y2 study period station 14 was not accessible during the winter and early spring, and its paired replacement (station 13) was surveyed as an alternative, as described in Section 2.3 above.

3.3.2 Cumulative Detections of Bald Eagles and Golden Eagles

Overall, 35 Bald Eagles were detected over 636 hours across one year of standardized eagle use survey effort in Y2 (Figure 8). These results were similar to the 34 detections recorded over the same amount of survey effort during Y1. An additional 30 incidental detections of Bald Eagles were documented across the project area during the Y2 survey period (Figure 8).

Six Golden Eagles were detected over 636 hours across one year of standardized eagle use survey effort in Y2, matching the number of standardized Golden Eagle detections recorded over 636 hours of standardized effort during Y1 (Figure 8). An additional 6 incidental Golden Eagle detections were documented across the project area during Y2.

3.3.3 Seasonality

During Y2 surveys Bald Eagles were recorded throughout most of the year, with most detections occurring during the fall migratory period. Bald Eagles were not detected during standardized eagle use surveys in January and February in both Y1 and Y2.

Mean use rates during the spring, summer, and winter periods were similar. Seasonal standardized mean use within the project area follows, as summarized in Table 6:

- 0.04 Bald Eagle detections/60-minute survey/800 m plot (standard deviation [SD] = 0.22) during the winter and spring periods
- 0.05 Bald Eagle detections/60-minute survey/800 m plot (SD = 0.35) during the summer period
- 0.09 Bald Eagle detections/60-minute survey/800 m plot (SD = 0.41) during the fall survey period.

Accounting for the total eagle use survey effort across the project area during the year, the equivalent of one Bald Eagle was detected for every 26.5 hours, 21.2 hours, 11.2 hours, and 26.5 hours of standardized eagle use survey effort during the spring, summer, fall, and winter survey periods, respectively.

The observed decrease in standardized spring Bald Eagle detections between Y1 and Y2 was partly attributable to the establishment of a new nesting location in 2021 that was farther away from the nearest point count station than the 2019-2020 nest. Unlike the 2019-2020 nesting location, the new 2021 nest site was beyond 800 meters from the closest point count station. Spring 2021 detections of the nesting adults were therefore outside of the sample plot, necessitating their categorization as incidental detections. All standardized summer detections were associated with the nest that was in-use in 2020.

Golden Eagle detections were noted during the fall and winter periods. Standardized mean use within the project area was:

- 0.01 Golden Eagle detections/60-minute survey/800 m plot (SD = 0.10) during the fall period
- 0.03 Golden Eagle detections/60-minute survey/800 m plot (SD = 0.16) during the winter period

Accounting for the total eagle use survey effort across the project area during the year, the equivalent of one Golden Eagle was detected for every 106 hours of survey effort during the fall period and every 39.8 hours of during the winter period.

3.3.4 Spatial Distribution of Detections

Bald Eagle mean use rates were generally low across the project area (see Table 7 for a summary of use and Figure 5 for point count station locations). Thirteen of the 69 (19 percent) Bald Eagle

observations across study area in Y1 and Y2 were recorded at station 4 and were of individuals associated with the in-use nest that was occupied in 2019 and 2020.

Among the other 52 stations, stations 11 and 18 each recorded 6 standardized Bald Eagle detections within the sample plot over the Y1 and Y2 surveys cumulatively. Station 12 recorded 5 standardized detections over the 2-year period. Observations of small migrating groups of 2 to 3 Bald Eagles, which were infrequent events during the Y1 and Y2 surveys, contributed to higher numbers recorded at these 3 stations. The remaining 39 standardized Bald Eagle detections were recorded at 26 other point count stations.

Stations 11, 12, and 18 are in proximity and all three points are within 2 miles of a creek that flows northward from Wishek to Beaver Lake (Figure 5). All of the eagles observed at these 3 stations appeared to be in active migration. It is possible that migrating eagles may loosely follow this watercourse while moving through the area, slightly increasing use rates in this portion of the project area.

There was no apparent spatial pattern to Golden Eagle detections during Y2 surveys. The 6 Golden Eagle sightings were distributed across the project area. Golden Eagle detections were also similarly spread across the project area during Y1.

3.3.5 Directional Movements

Bald Eagle movements tended northward in the spring and southward in the fall during Y2 surveys, suggesting that most of the Bald Eagles observed during these seasons were actively migrating through the project area. This pattern resembled similar movement patterns observed during Y1.

Three of 5 Bald Eagle standardized detections that occurred during the spring season showed directional movement, with one individual moving to the north-northeast, one moving northeastward, and one moving eastward. Of 19 Bald Eagles observed in the fall, 4 were moving southward, 3 to the south-southeast, 7 southeastward, and 2 eastwards.

Similar to Y1 surveys, 4 Bald Eagles were observed flying southward or southeastward in early to mid-December, suggesting that Bald Eagle fall migration continues through the project into mid-late December.

Golden Eagles were infrequently observed during Y2 surveys, and only 3 of the Golden Eagles observed showed directional movement. One individual observed on November 22, 2020 was flying southward and may have been actively migrating through the project area. Individuals observed flying northward in December and eastward in February may have been overwintering within or near the project area.

3.3.6 Flight Heights

Table 8a summarizes the mean distributions of minimum and maximum flight heights for eagles and other raptor species detected during standardized eagle use surveys. Y1 data and Y2 data have been pooled for more robust seasonal sample sizes.

Over the full 2-year study period, Bald Eagle mean minimum and maximum flight heights were within the RSZ during the spring and fall, and Bald Eagle mean maximum flight heights were within the RSZ during the winter. Sample sizes were low during some seasons, with only one Bald Eagle observed during standardized surveys in the summer and only 8 Bald Eagles observed in the winter.

Golden Eagle seasonal results were similar, with spring and fall mean flight heights within the RSZ. Winter heights were lower and only the mean maximum flight height was within the RSZ during the winter.

A summary of accrued time within RSZ for Bald and Golden Eagles for the Y2 study period is presented in Table 9. The table also pools Y1 and Y2 data for more robust seasonal sample size.

Bald Eagle rates of flying within the RSZ were highest in the fall (0.11 minutes within RSZ/ hour of standardized observation) and spring (0.06 minutes within RSZ/hour of standardized observation) over the Y1 and Y2 study periods combined. Bald Eagles were more infrequently observed within the RSZ during the winter and never observed to fly within the RSZ during the summer period over two years of observation (Table 9).

Golden Eagle rates of flying within the RSZ were similar during the spring, fall, and winter over the Y1 and Y2 study periods (Table 9). Golden Eagles were not observed to fly within the RSZ during the summer period over Y1 and Y2 surveys.

3.3.7 Eagle-Minutes Summary

Eagle-minutes represent accrued minutes of eagle observations for flying eagles within the sample plot associated with each point count station. Perched eagles or eagles observed outside of the sample plot are not assigned eagle-minutes (USFWS 2013). Eagle-minutes are summarized by season for the Y2 study period and also for Y1 and Y2 combined in Table 9. Seasonal survey effort is summarized in Section 3.3.1.

The Y2 cumulative total of 76 eagle minutes was similar to the Y1 annual total of 81 minutes over 636 hours of standardized surveys each year. Bald Eagle seasonal eagle minute rates were highest in the fall (0.23 Bald Eagle minutes per hour of standardized eagle use observation) and winter (0.12 Bald Eagle minutes per survey hour), and lower in the spring (0.05 Bald Eagle minutes per

survey hour). All Y2 summer detections were of perched Bald Eagles associated with the in-use nest location.

Cumulatively, 157 total Bald Eagle minutes were recorded over 1,272 hours over two years, a rate of 0.12 eagle minutes / hour of standardized surveys.

Cumulatively, 47 total Golden Eagle minutes were recorded over 1,272 hours over two years, a rate of 0.04 eagle minutes / hour of standardized surveys. Observed Golden Eagle-minute rates were at their relative highest in the winter (0.09 Golden Eagle minutes per survey hour) and lower in the fall (0.05 Golden Eagle minutes per survey hour) across the Y2 study period. Golden Eagle minutes were not recorded during the spring or summer during Y2 surveys.

3.4 USE OF THE PROJECT AREA BY OTHER RAPTOR SPECIES

Raptors include eagles, falcons, harriers, hawks, owls, and vultures. Raptor mean use recorded during avian use surveys was primarily driven by detections of Red-tailed Hawks, Swainson's Hawks, and Northern Harriers. In particular, Red-tailed Hawks and Northern Harriers together accounted for 61 percent of all spring raptor detections during surveys. Red-tailed Hawks and Swainson's Hawks accounted for 42 percent of all fall detections during avian use surveys

Seasonal raptor mean use rates were relatively highest during the fall in both Y1 and Y2. Raptor mean use was notably higher during the fall in Y1 (3.37 raptors/60-minute survey/800 m plot) than in Y2 (2.46 raptors/60 minute survey/800 m plot; Table 6), suggesting that regional raptor productivity was higher during the 2019 breeding season that preceded the following fall migration.

This difference may have been influenced by interannual differences in precipitation, with the region experiencing much wetter conditions in 2019. Regional precipitation in 2019 was approximately 150 percent of the average annual precipitation while 2020 was approximately 75 percent of average annual precipitation (NOAA 2021). Specifically, above average precipitation across the northern Great Plains during the winter months in early 2019 could have provided more persistent and deeper snow cover conditions that have been correlated with temporal increases in raptor prey abundance (Heisler et al. 2014). Mean use rates were higher during the fall of Y1 for the most frequently observed raptor species, including Red-tailed Hawks, Swainson's Hawks, Northern Harriers (*Circus hudsonius*), and Broad-winged Hawks (*Buteo platypterus*).

Y1 and Y2 raptor mean use rates were similar during the summer and spring survey periods (summer: 2.47 raptors/60-minute survey/800 m plot; spring: 1.94 raptors/60-minute survey/800 m plot). Red-tailed Hawks, Swainson's Hawks, and Northern Harriers together comprised the majority of raptor detections in both the summer (79 percent) and the spring (73 percent) as well.

Y2 winter raptor mean use was very low compared to the other three seasons (0.15 raptors/60-minute survey/800 m plot). A total of 24 raptors representing seven species were observed over 159 hours of standardized eagle use surveys over the full winter season.

A review of the entire raptor group across all point count stations shows that raptors generally did not exhibit strong inter-seasonal patterns of spatial use within the project area that might suggest local concentrations of use (Table 10 and Figure 5 for point count station locations).

Mean minimum and maximum raptor flight heights were highest during the spring and summer survey periods, respectively. Mean minimum and maximum raptor flight heights were slightly lower during the fall and substantially lower during the winter (Table 8a).

Approximately 41 percent (199 out of 486 total detections) of all raptors observed in flight during the summer flew within the RSZ at some point during observation. The fall (39 percent; 415 out of 1,073 total observations of flying individuals) and spring (37 percent; 236 out of 643 total observations) periods held similar proportions of raptors flying within the RSZ. Consistent with low observed mean heights in the winter, only 29 percent (6 of 21 observations) of winter observations entered the RSZ.

3.5 DIURNAL AVIAN ACTIVITY POINT COUNT SURVEYS

The following sections summarize the results of the avian use surveys.

3.5.1 General Avian Use

Mean use data for all 97 species observed during Y2 avian use surveys are presented in Appendix B. A list of species observed within the project area over the full Y1 and Y2 study periods (including incidentally observed species) is included in Appendix C.

Passerine, non-passerine, upland gamebird, wader, waterbird, and waterfowl mean use statistics, discussed in more detail below, are summarized by species group in Table 11 and by individual species in Appendix B.

3.5.2 Species Group Use of the Project Area during Spring and Fall Migration

Avian use surveys occurred over 26.50 spring hours and 35.33 fall hours at 53 point count stations (Table 5). This was the same effort completed for the Y1 avian use surveys. Interannual comparisons therefore are drawn from the same amount of survey effort in each year of study and are reported in number of standardized detections (rather than mean use rate values in units of detections/survey duration/plot radius) for readability.

Large-bodied Corvids

Large-bodied corvids include crows and ravens. Y2 results for this species group were similar to Y1,with small numbers of American Crows detected each year: Thirty-three American Crows were detected on standardized avian use surveys during Y2; and 30 American Crows were detected over the same amount of effort during Y1 (Appendix B-1). Approximately three-quarters of American Crow detections occurred in the fall in both years. One Common Raven was detected during the fall in each year of surveys.

Passerines (including Small-bodied Corvids)

This species group was analyzed out to 150 m during Y1 surveys and the plot radius was adjusted out to 300 m for the Y2 study period. This adjustment in sample plot radius better captured the effective detection radius for these and other easily-detected species in open habitats found in the project area during the spring and fall periods (Thomas et al. 2010).

As observed during Y1, passerines accounted for a large portion of all avian detections during Y2, both in the spring (76 percent of all detections) and fall (96 percent of all detections). Seasonal passerine mean use patterns were reversed from Y1, however. During Y1, passerine mean use of the project area was much higher in the spring than in the fall (45.89 detections/10-minute survey/150 m plot in the spring and 11.77 detections/10-minute survey/150 m plot in the fall). During Y2, passerine mean use was 64.23 detections/10-minute survey/300 m plot in the fall and 29.72 detections/10-minute survey/300 m plot in the spring (Appendix B-2).

The Y1 pattern of lower passerine fall mean use relative to spring mean use was unexpected and can in part be ascribed to the 150 m plot radius used during Y1 surveys. Specifically, large flocks of blackbirds were detected at distances between 150 and 300 m from the point during Y2 fall surveys. Detections of fall blackbirds at this distance were beyond 150 m and therefore regarded as incidental detections during Y1. Brewer's Blackbird (686 fall detections and 18 spring detections), Red-winged Blackbird (5,906 fall detections and 1,011 spring detections), and Common Grackle (3,968 fall detections and 317 spring detections) all contributed to this seasonal pattern during Y2.

Large flocks of several hundred to 2,000 blackbirds of various species were observed at stations 2, 3, and 4 in the northwestern portion of the project area, apparently drawn to planted sunflower crops and to adjacent woodlots and shelterbelts that provided cover and roosting opportunities in close proximity to sunflowers. In addition, large flocks were associated with a livestock feedlot at station 39 in the southern portion of the project area.

Lapland Longspurs (*Calcarius lapponicus*) contributed to higher relative spring use found during Y1 and Y2. Seasonal differences in Lapland Longspur detections were not as pronounced in Y2 as in Y1 (6,245 spring detections and 498 fall detections during Y1; 2,294 spring and 1,238 fall

detections during Y2). The observed decrease in Lapland Longspur detections between Y1 and Y2 may be due to changes in productivity on the species' breeding grounds, as longspurs were observed throughout the project area in cultivated cropland, and habitat and food availability did not appear to change for this species over the two years of study.

Encounters with large flocks of longspurs or blackbirds were not clearly attributable to unique habitats and/or physiography present at stations with highest recorded mean use rates for these species (blackbirds congregating at a feedlot near station 39 were a notable exception to this pattern), and the Atwell biologist noted that it was apparent that these longspur and blackbird flocks could have appeared at any location in the project area during migration given the condition and crops of nearby agricultural fields.

Large-bodied Non-Passerines

Large-bodied non-passerines include nightjars and Rock Pigeons (*Columba livia*). Large-bodied non-passerines were detected with less frequency during Y2 surveys (120 total detections) than during Y1 (183 total detections; Appendix B-1).

As observed during Y1, Rock Pigeons represented nearly all large-bodied non-passerine detections. Rock Pigeon were often detected near farms and home throughout the project area, and large flocks of 20 – 30 individuals were observed at a feedlot near station 39 during the Y1 study period. Large flocks of this size were not observed during Y2 surveys.

Small-bodied Non-Passerines

Small-bodied non-passerine mean use within the project area was higher in the fall (0.40 detections/10-minute survey/300 m plot) than in the spring (0.22 detections/10-minute survey/300 m plot; Appendix B-2). Mourning Doves (*Zenaida macroura*) were the most common small-bodied non-passerine detected and accounted for 86 percent of the observations of this species group in the spring and 92 percent of the observations of birds within this group in the fall. Much of the seasonal difference in mean use rate for this species group was attributable to higher numbers of Mourning Doves detected during the fall season.

Shorebirds

Shorebirds include avocets, plovers, curlews, dowitchers, godwits, knots, phalaropes, sandpipers, snipes, stilts, turnstones, and woodcocks. Interannual shorebird mean use rates within the project area were similar; 208 shorebirds were detected during standardized avian use surveys in Y1, and 206 shorebirds were detected during Y2 (Appendix B-4).

Shorebirds were encountered in low numbers and frequencies throughout the project area and across several habitats. Over both Y1 and Y2 study periods the stations with highest shorebird

detection rates were in higher elevation grassland/pothole habitats along the project area's northeastern boundary, particularly near point count stations 22, 51, and 52. Stations 51 and 52 are beyond the December 2020 project boundary. Killdeer accounted for nearly two-thirds of all shorebird detections during the Y2 study period.

Upland Gamebirds

Upland gamebirds include bobwhite, grouse, partridge, prairie-chickens, and turkey. Upland gamebird mean use within the project area was higher in the spring (0.27 detections/10-minute survey/800 m plot) than the fall (0.09 detections/10-minute survey/800 m plot) (Appendix B-1). These species are non-migratory and are present year-round within the project area. Seasonal differences are potentially attributable to seasonal differences in detectability stemming from behavior and vocalization frequency during the spring (Giudice and Ratti 2020; Connelly et al. 1998).

As a group, upland gamebird seasonal and overall mean use rates were nearly identical between Y1 (42 spring and 21 fall detections) and Y2 (43 spring and 20 fall detections). However, Sharp-tailed Grouse detections decreased between Y1 (38 detections) and Y2 (18 detections). Habitat availability appeared unchanged between Y1 and Y2. Of note, the project area experienced drier conditions during the late winter and early spring lekking period in Y2 than during the lekking period in Y1 (NOAA 2021).

All but one Sharp-tailed Grouse detection during the Y2 study period occurred within the green-shaded "Sharp-tailed Grouse Priority Areas" (Figure 7) that were used to target Y2 lek surveys (Section 2.2), suggesting that this habitat designation is a good indicator of Sharp-tailed Grouse occurrence.

Waders

Waders include cranes, bitterns, egrets, and herons. Nearly all (97 percent) Y2 detections of waders were Sandhill Cranes, and over 80 percent of Sandhill Crane detections occurred during the spring. Whooping Cranes were not observed during Y2 surveys.

Wader mean use rates were higher during the Y2 study period (526 total detections during standardized avian use surveys when considering individuals observed at all flight heights) than Y1 (388 total detections during avian use surveys at all heights). A large proportion of Sandhill Crane detections (35 percent) were noted at heights of over 200 m.

More standardized detections of waders of all species were recorded during the Y2 study period than during Y1, including Great Egret (*Ardea alba*) and American Bittern (*Botaurus lentiginosus*), two species that were only observed incidentally during the Y1 study period. The project area

experienced drier conditions during the Y2 study period than during Y1, potentially limiting the extent of foraging habitat available to wading species during the Y2 study period.

Waterbirds

Waterbirds include cormorants, grebes, gulls, and loons. Overall waterbird mean use was 2.59 detections/10-minute survey/800 m plot in the spring and 1.96 detections/10-minute survey/800 m plot in the fall during the Y2 study period.

Waterbird detection rates were seasonally similar in Y2 (412 spring detections and 416 fall detections). There were notably more fall detections in Y1 (132 spring detections and 2,148 fall detections.

Most of the observed difference in seasonal and interannual use patterns can be attributed to patterns in Franklin's Gull (*Leucophaeus pipixcan*) use, an SCP Level I species. Franklin's Gulls were observed flying through the project area more frequently in the fall over both the Y1 and Y2 study periods (Y1: 2 spring detections and 2,023 fall detections; Y2: 199 spring detections and 342 fall detections; Appendix B-4).

There are no known Franklin's Gull nesting colony sites within the project area, and fall detections appear to represent post-breeding movements from locations beyond the project area. Reasons for diminished numbers observed during the fall period in Y2 are unclear. During Y1, large flocks were found opportunistically foraging in agricultural habitats following harvesting and haying activities (e.g., the August 27, 2019 observation of 500 individuals). This is an expected observation for gulls moving in large numbers over agricultural cropland habitats, yet one not observed during standardized surveys during the fall period in Y2. As found with Snow Geese above, the observed decrease in fall Franklin's Gull detections may have been due to chance. A large group of approximately 1,000 individuals was detected incidentally beyond 800 m during standardized eagle use surveys on September 22, 2020 at station 23, demonstrating the presence of Franklin's Gull flocks during Y2 surveys.

The waterbird species that were most frequently observed at flight heights within the RSZ included Franklin's Gull, Ring-billed Gull (*Larus delawarensis*), California Gull (*Larus californicus*), American White Pelican (*Pelecanus erythrorhynchos*), and Double-crested Cormorant (*Phalacrocorax auritus*). These species tended to be observed in the northeastern third of the project area, in Logan County.

Waterfowl

The waterfowl species group refers to the taxonomic order Anseriformes and includes geese and ducks. Waterfowl mean use rates were significantly higher in the spring in both years of study, a pattern influenced by spring geese migration through the project area (Y1 spring and fall

waterfowl mean use: 84.18 and 2.31 detections/10-minute survey/800 m plot, respectively; Y2 spring and fall waterfowl mean use: 38.97 and 6.74 detections/10-minute survey/800 m plot, respectively).

Several thousand fewer Snow Geese (*Anser caerulescens*) were detected during the Y2 spring study period (5,224 detections) than during the Y1 spring study period (11,093 detections). This interannual variation may have been due to chance encounters of large flocks. Large flocks were not encountered as frequently during the short duration counts in Y2, but large numbers of Snow Geese were observed in the vicinity of the project area yet were not observed during surveys. Regionally, peak Snow Goose migration occurred during the week of March 22 during both years of study (eBird 2021). Large numbers of Snow Geese were contemporaneously reported near the project area during peak migration in Y2, including a report of 10,000 Snow Geese at nearby Beaver Lake, within a mile of the project area (eBird 2021). In addition, several large groups of Snow Geese were observed incidentally during the second half of March (e.g., over 6,000 Snow Geese were observed at station 48 on March 18, 2021).

Migrating geese species accounted for the majority of overall waterfowl use in both years and in similar relative proportions in both years. Snow Geese, Ross's Geese (*Anser rossii*), Greater White-fronted Geese (*Anser albifrons*), Cackling Geese (*Branta hutchinsii*) and Canada Geese (*Branta canadensis*) together accounted for 5,926 of 6,196 (96 percent) of spring waterfowl detections during Y2. The Y2 spring mean use rates for the most commonly observed geese species included: 32.86 detections/10-minute survey/800 m plot for Snow Geese, and 2.17 detections/10-minute survey/800 m plot for Greater White-fronted Geese (Appendix B-5).

Prairie pothole habitats in the vicinity of the project primarily occur to the northeast of the project area. Point count stations 22, 51, 52, and 53 had highest annual waterfowl species richness values during both Y1 and Y2. Stations 51, 52, and 53 are located beyond December 2020 project boundary.

3.5.3 Special Status Species

ESA-listed Species

No ESA-listed avian species were observed over the Y2 study period.

Species of Conservation Priority

Several species that are listed as North Dakota SCP were detected during standardized avian use surveys, summarized by group in the following sections.

Passerines

Sprague's Pipit: SCP Level I; zero spring detections and 2 fall detections during standardized avian use surveys; incidental detections during eagle use surveys at 10 of 53 (19 percent) point count stations. All observations occurred during fall migration, after July 28. Eleven of the 13 total Y2 observations of individuals or groups occurred in the northern half of the project area, within Logan County. It was not apparent why more observations were recorded over the Y2 study period than during Y1, when Sprague's Pipits were observed on only two occasions (also in the fall). Atwell did not note behaviors that would confirm local breeding (e.g., song displays, nesting material carries, food carries to dependent young, dependent fledglings) during the 13 detections. Observations occurred in wheat stubble and on grassy hilltops, habitat features found throughout the project area.

Grasshopper Sparrow: SCP Level I; 4 spring detections and zero fall detections during standardized avian use surveys. Atwell notes that Grasshopper Sparrows were also incidentally observed at approximately 50 percent of point count stations, were observed throughout the project area, and were often associated with grassland habitats. Grasshopper Sparrows were detected much more frequently during the summer survey period and likely breed within the project area. Atwell notes that the majority of incidental observations occurred during eagle use surveys in June or July, which was outside of the spring and fall survey periods.

Nelson's Sparrow: SCP Level I; Nelson's Sparrow was not observed during standardized avian use surveys. One individual was detected incidentally at station 37. Prefers shallow marsh edges and wet meadows (Dyke et al. 2015) and may nest locally in appropriate habitats within the project area. Station 37 is near riverine wetland associated with a tributary of the south branch of Beaver Creek flowing through the southwestern portion of the project area. Riparian areas north and west of Wishek may also support riverine wetlands that are favorable to this species.

Chestnut-collared Longspur: SCP Level I; 55 spring detections and 92 fall detections during avian use surveys. Atwell notes that Chestnut-collared Longspur was also incidentally observed at 70 percent of point count stations. Over the Y2 study period, Chestnut-collared Longspur mean use rates were 0.35 detections/10-minute survey/300 m plot during the spring and 0.43 detections/10-minute survey/300 m plot during the fall. Males were frequently seen singing, and this species likely breeds within the project area. While observed throughout the project area, Chestnut-collared Longspurs were most frequently observed in the northern and eastern portions of the project area that are higher in elevation and are dominated by herbaceous cover as shown in Figure 2 (e.g., stations 12, 13, 17, and 21).

LeConte's Sparrow: SCP Level II; LeConte's Sparrow was not observed during avian use surveys; however, singing males were detected incidentally in July at stations 37 and 57. Stations 37 and

57 are near riverine wetlands associated with tributaries of Beaver Creek. The wet/riparian areas associated with station 57 are west and outside of the December 2020 project area boundary. Similar to Nelson's Sparrow, LeConte's Sparrows may nest locally in and near similar riverine habitats within the project area.

Bobolink: SCP Level II; Bobolink was detected 22 times in the fall and 30 times in spring. Atwell notes that Bobolink were incidentally observed at 98 percent of point count stations in June and July. Dependent fledglings were observed in early August at station 32, confirming breeding. Bobolink mean use rates were 0.14 detections/10-minute survey/300 m plot during both the spring and fall.

Western Meadowlark: SCP Level II; 171 spring detections and 114 fall detections of Western Meadowlark were recorded during standardized avian use surveys. Atwell also notes that Western Meadowlark were incidentally observed at all incidental detections at all point count stations in June and July. Western Meadowlark mean use rates were 1.08 detections/10-minute survey/300 m plot during the spring and 0.54 detections/10-minute survey/300 m plot during the fall.

Shorebirds

Marbled Godwit (*Limosa fedoa*): SCP Level I; There were 7 spring detections of 9 individuals and zero fall detections of Marbled Godwit. Atwell also incidentally observed Marbled Godwit at 19 percent of point count stations. Marbled Godwits may nest within the project area in low numbers, but specific favored locations were not apparent during Y1 and Y2 surveys. During the Y1 study period, agitated behavior was recorded at station 16 on June 10, 2019, suggesting that a nest or brood was nearby. Breeding behaviors were not observed during Y2 surveys, and godwits were not observed at station 16 during the Y2 study period.

Wilson's Phalarope (*Phalaropus tricolor*): SCP Level I; 3 detections of 4 individuals and zero fall detections of Wilson's Phalarope in Y2 compared to 2 detections of 6 individuals during standardized avian use surveys in Y1. Wilson's Phalaropes were observed at stations 15 and 22 in both Y1 and Y2, suggesting that they may locally breed at some wetlands within the project area.

Upland Sandpiper (*Bartramia longicauda*): SCP Level II; 26 detections of 34 individual Upland Sandpipers were observed in the spring and fall into mid-August of Y2. Atwell notes that Upland Sandpipers were detected at 36 percent of point count stations. Upland Sandpipers likely nest in roadside habitats/ditches, grasslands, and cropland (particularly no-till) habitats throughout the project area.

Waders

American Bittern

American Bittern is a Level I SCP that nests in wetlands with tall emergent vegetation (Dyke et al. 2015) and was vocalizing at a wetland near station 53 on May 15, 2020. Bitterns were not observed at this location on subsequent surveys, but individuals are difficult to detect from roadsides when silent and may nonetheless nest at this location. Station 53 is outside of the project area's new December 2020 boundary, but this species may nest in similar habitats within the project area.

Waterbirds

Horned Grebe (*Podiceps auratus*): SCP Level I; only observed during the spring and summer in Y1 at station 52. Station 52 is near several prairie potholes and is not within the December 2020 project area.

American White Pelican: SCP Level II; 3 spring detections of 62 individuals and one fall detection of 2 individuals were recorded during surveys. American White Pelican were also incidentally observed in the spring, summer, and fall. Nesting colonies were not observed and are not known to exist within the project area. Flocks of up to 60 individuals were encountered at 20 of 53 point count stations (38 percent) throughout the project area.

Black Tern (*Chlidonias niger*): SCP Level 1; 5 spring detections and one fall detection in Y2. Black Tern were generally observed in low numbers in the northeastern portion of the project area in association with greater wetland density. Nesting colonies were not observed within the project area.

Waterfowl

Northern Pintail (*Anas acuta*): SCP Level II; 31 spring detections and 5 fall detections of Northern Pintail were documented during Y2 surveys. Atwell notes that Northern Pintail were also observed at 66 percent of point count stations during the Y2 study period. Thirty-six detections of Northern Pintail during Y2, less than 109 detections recorded in Y1. Pintails were usually observed singly or in small groups of less than five individuals in wetlands cropland habitats throughout the project area. Pintail fledglings were not noted during Y2 surveys, but this species may nest near wetland complexes in associated prairie habitats.

Canvasback (*Aythya valisineria*): SCP Level II; Two Canvasback were observed during Y2 surveys. Both observations occurred at the northeastern portion of the study area at stations 5 and 53 in May. Atwell did not observe evidence of breeding within the project area.

3.5.4 Flight Heights by Species Group during Spring and Fall Migration

Table 8b summarizes seasonal mean flight height statistics for species and species groups detected during the first 20 minutes of long-duration point counts for large-bodied birds observed during Y2 surveys. Flight heights are summarized for each flock and not by individual. Lone birds were counted as a flock of size of one.

For large bodied birds, mean flight heights were highest during the spring and fall, while many birds are actively migrating over the project area. Species groups with mean flight heights within the RSZ included large-bodied corvids, waterbirds (gulls, terns, and cormorants), and waterfowl. Mean flight heights for the waders group were over 200 m in altitude due to mean Sandhill Crane flight heights outside of the RSZ. Species with sample sizes of at least five flocks and mean flight heights within the RSZ included American White Pelican, Black Tern, Double-crested Cormorant, Franklin's Gull, Ring-billed Gull, Greater White-fronted Goose, Northern Shoveler (*Anas clypeata*), Ross's Goose, and Snow Goose (Table 8b).

For small-bodied birds, 42 of 1136 (4 percent) spring flocks and 58 of 958 (6 percent) fall flocks entered the RSZ during observation. When considering counts of individual small-bodied birds instead of flocks, 925 of 4,760 (19 percent) spring detections and 868 of 13,702 (6 percent) fall detections were observed within the RSZ. Large spring flocks of Lapland Longspurs and Red-winged Blackbirds contributed to the disproportionately high percentage of individual spring detections within the RSZ.

4 CONCLUSIONS

A total of 156 species were recorded over two years of pre-construction avian studies within the project area and its vicinity (Appendix C). Two full years of eagle use surveys have been completed, totaling 1,272 hours of observation standardized survey effort. Approximately 62 hours of surveys have been conducted over two spring and fall migratory periods. Standardized nesting raptor and grouse lek surveys were conducted in 2019 and 2020.

One active Bald Eagle nest was observed within the project area in Y2. The pair nested south of Beaver Lake in 2019, returned to the same location to nest in 2020, then apparently moved two miles to the east to a new nesting site in 2021. No other Bald Eagle nests were found within 10 miles of the project boundary, and no Golden Eagle nests were found during the nest surveys.

Thirteen confirmed Sharp-tailed Grouse leks and two possible leks were found within during the Y2 study period. Y2 surveys were conducted across a study area that included the April 2019 project area and a surrounding one-mile buffer. The project boundary was modified to cover a smaller area in December 2020, and four of the 13 confirmed lek locations are within the December 2020 boundary. Four additional confirmed leks and one of the possible lek locations are within the new boundary's one-mile buffer.

Bald Eagle mean use rates and mean flight heights were highest in the spring and fall, suggesting that most of the Bald Eagle use observed within the project area was comprised of migrating individuals heading northward in the spring and southward in the fall. Consistent with these patterns, Bald Eagles observations within the RSZ were also highest in the spring and fall.

Summer Bald Eagle use within the project area was entirely associated with the nesting pair near Beaver Lake, and Bald Eagles were not observed during January or February over both Y1 and Y2. Aside from the nesting pair, no areas of concentrated Bald Eagle use were identified in the project area, which suggests that the project area lacks physiographic features that might attract or concentrate Bald Eagle use during migration. Golden Eagles were rarely encountered during standardized eagle use surveys, with relative highest mean use rates in the fall and winter.

Passerines and waterfowl together accounted for over 93 percent of bird detections recorded during surveys in the spring and fall of the Y2 study period. Large groups of species that are typically abundant in agricultural habitats in the northern Great Plains, including blackbirds, Lapland Longspurs, and Snow Geese influenced this pattern. Sandhill Cranes were observed flying at high altitudes well above the 200 m-high sample plot and the RSZ.

Grassland-associated passerine species that are listed by the NDGF as SCP (Dyke et al. 2015), including Sprague's Pipit, Grasshopper Sparrow, Nelson's Sparrow, LeConte's Sparrow, Chestnut-Collared Longspur, Bobolink, and Western Meadowlark were detected during surveys during the

spring and fall and were also noted as incidental detections during eagle use surveys in the summer. Sprague's Pipits were only observed in the late summer and fall, but the remaining other grassland SCP listed above were observed singing on territory and likely nest within the project area. Grasshopper Sparrows, Bobolinks, and Western Meadowlarks were observed throughout the project area, Chestnut-collared Longspurs were most frequently found in grasslands near the northeastern and eastern portions of the project area, and LeConte's and Nelson's Sparrows were found on localized, single occasions in their favored habitats.

Most waterfowl detections consisted of geese flocks migrating through the project area. Locations reporting highest waterfowl species richness were found in the northeastern portion of the study area, at stations 22, 51, 52, and 53. Stations 51, 52, and 53 are beyond the December 2020 project area boundary.

Whooping Cranes are listed as endangered under the ESA. Three Whooping Cranes were observed within the project area over three-day span in April 2020 during the Y1 study period. This is the first recorded observation of Whooping Cranes within the vicinity of the project area. No Whooping Cranes were observed in Y2.

5 REFERENCES

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FIGURES

DRAFT

Badger Wind

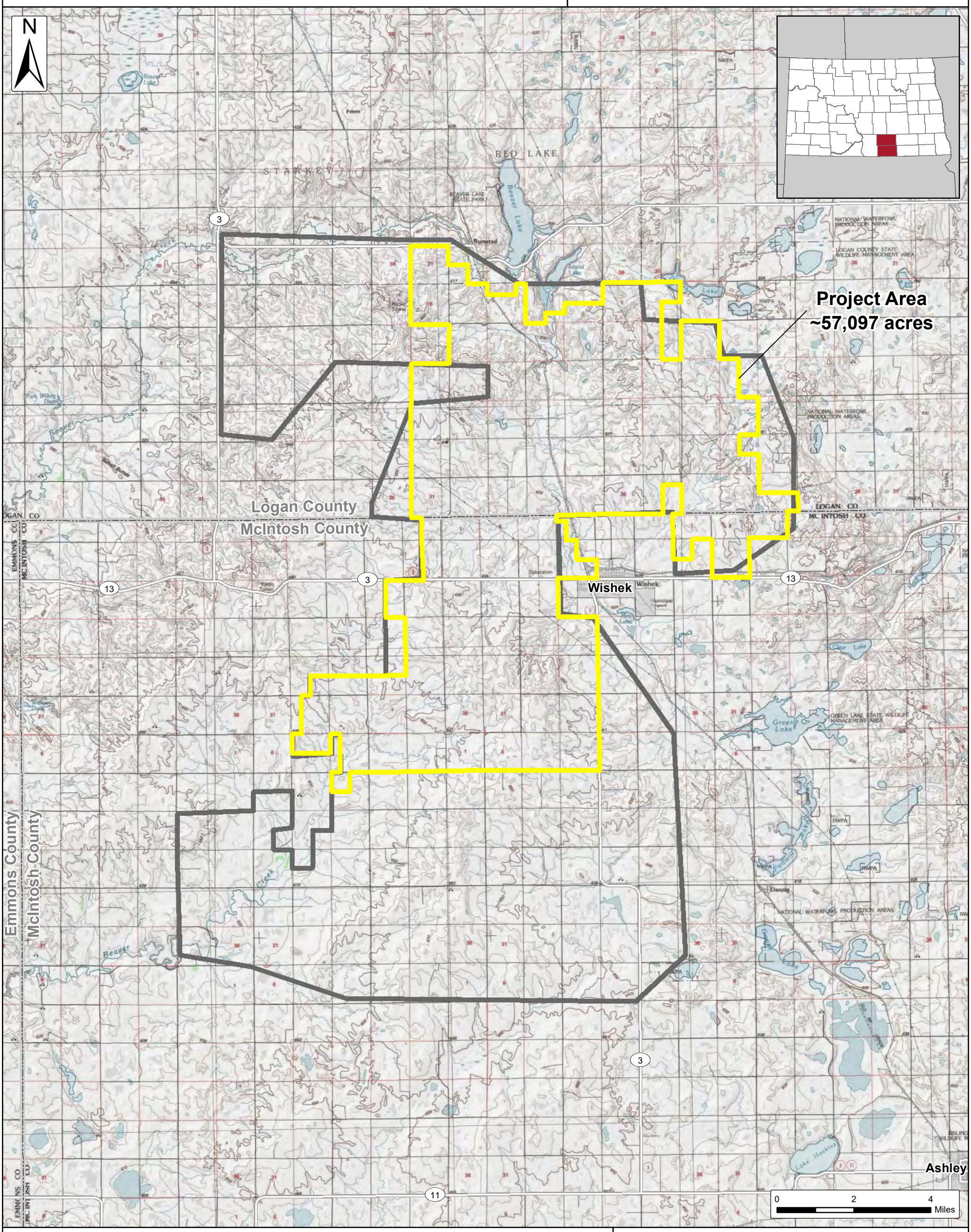
Figure 1. Site Location

Logan and McIntosh Counties, North Dakota

Client:
Badger Wind, LLC

Issue Date:
7/12/2021

Atwell, LLC Project:
19000785



Project Area
12/04/2020 (~57,097 acres)

Project Area
04/15/2019 (~121,695 acres)

City/Village

Counties

Source: USGS Topographic Quadrangle

ATWELL

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Badger Wind

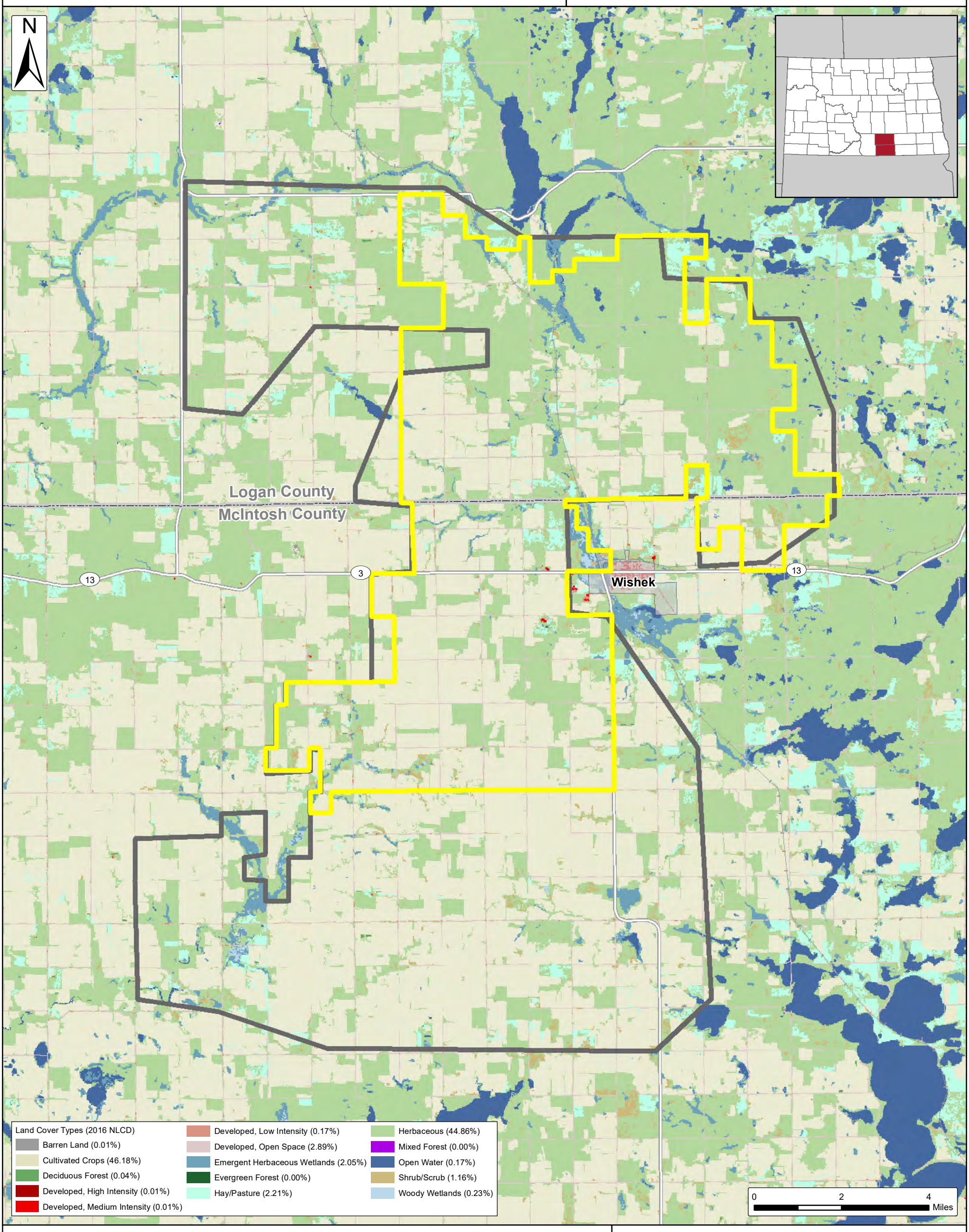
Figure 2. Land Cover Types within the Project Area

Logan and McIntosh Counties, North Dakota

Client:
Badger Wind, LLC

Issue Date:
7/12/2021

Atwell, LLC Project:
19000785



Project Area
12/04/2020 (~57,097 acres)

Project Area
04/15/2019 (~121,695 acres)

City/Village

Counties

Source: National Land Cover Database (USGS, 2016)

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Badger Wind

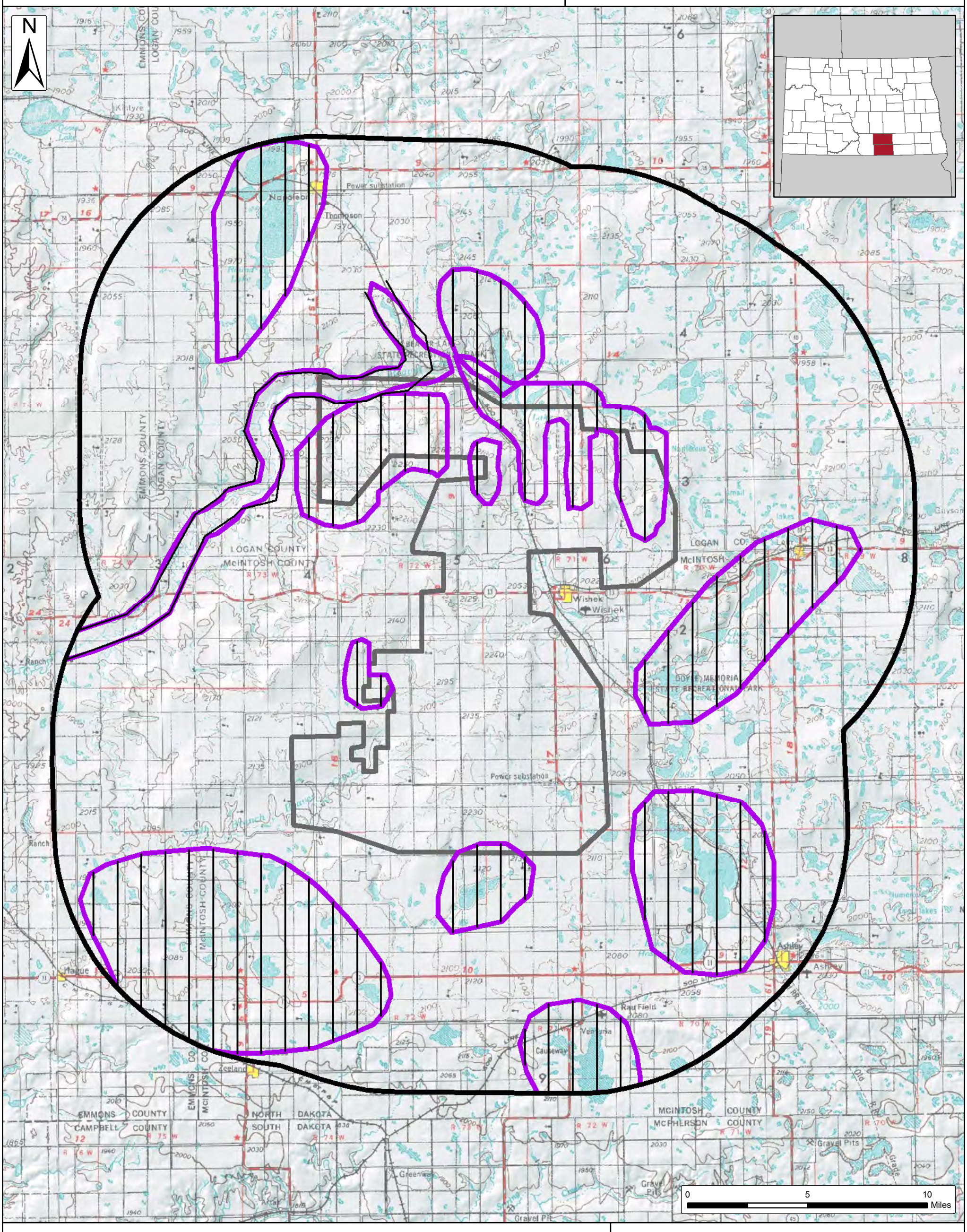
Figure 3. 2020 Raptor Nest Survey Study Plan

Logan and McIntosh Counties, North Dakota

Client:
Badger Wind, LLC

Issue Date:
7/12/2021

Atwell, LLC Project:
19000785



1-Mile Aerial Transects

Project Area
04/15/2019 (~121,695 acres)

Raptor Nest Survey Area (2-Mile Buffer)

Targeted Raptor Nest Survey Area

Eagle Nest Survey Area (10-Mile Buffer)

Source: USGS Topographic Quadrangle

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Badger Wind

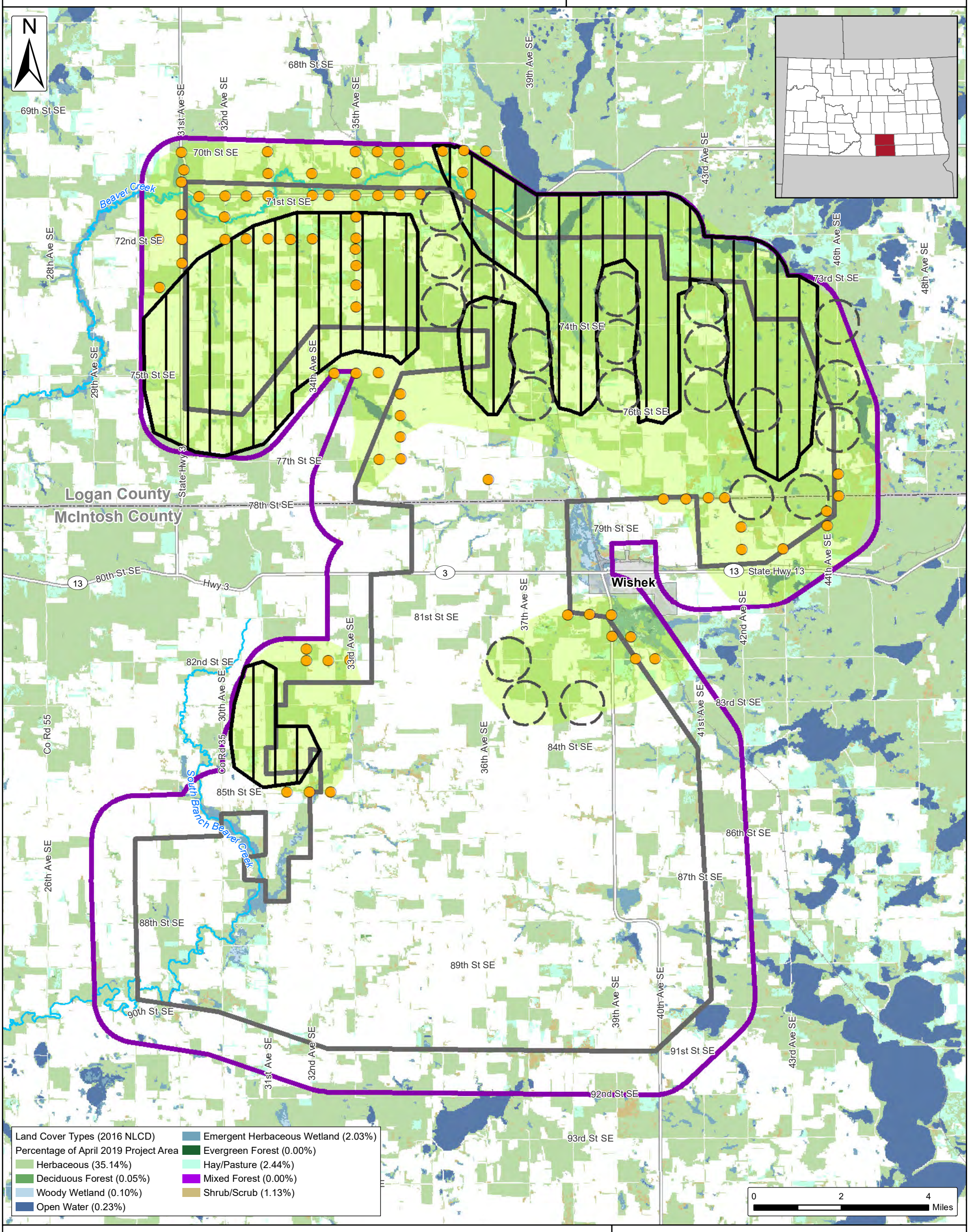
Figure 4. 2020 Sharp-tailed Grouse Lek Survey Study Plan

Logan and McIntosh Counties, North Dakota

Client:
Badger Wind, LLC

Issue Date:
7/12/2021

Atwell, LLC Project:
19000785



Standardized Ground-based Lek Survey Points
Opportunistic Ground-based Lek Survey Points
Standardized Aerial Survey Transects
2020 Aerial Lek Survey Area
Sharp-tailed Grouse Priority Areas
Major Watercourse (National Hydrography Dataset)

Project Area 04/15/2019 (~121,695 acres)
Grouse Survey Area (1-Mile Buffer)
City/Village
County

Source: National Land Cover Database (USGS, 2016)

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Badger Wind

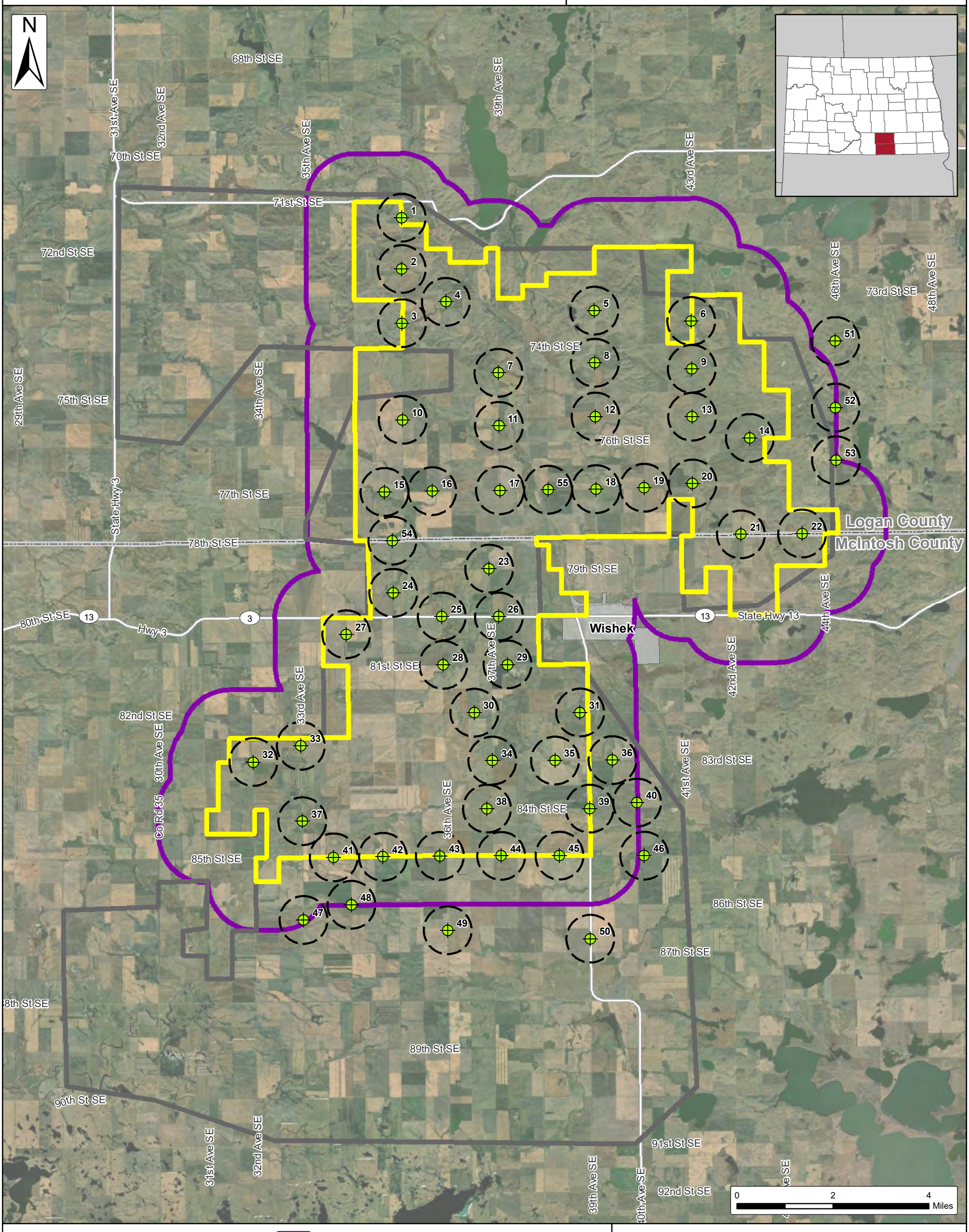
Figure 5. Avian Point Count Stations

Logan and McIntosh Counties, North Dakota

Client:
Badger Wind, LLC

Issue Date:
7/12/2021

Atwell, LLC Project:
19000785



- Avian Study Point
- 800 m-radius Avian Sample Plot
- Project Area 12/04/2020 (~57,097 acres)
- Project Area 04/15/2019 (~121,695 acres)
- 1-mile Buffer
- City/Village
- Counties

Source: Esri World Imagery

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Badger Wind

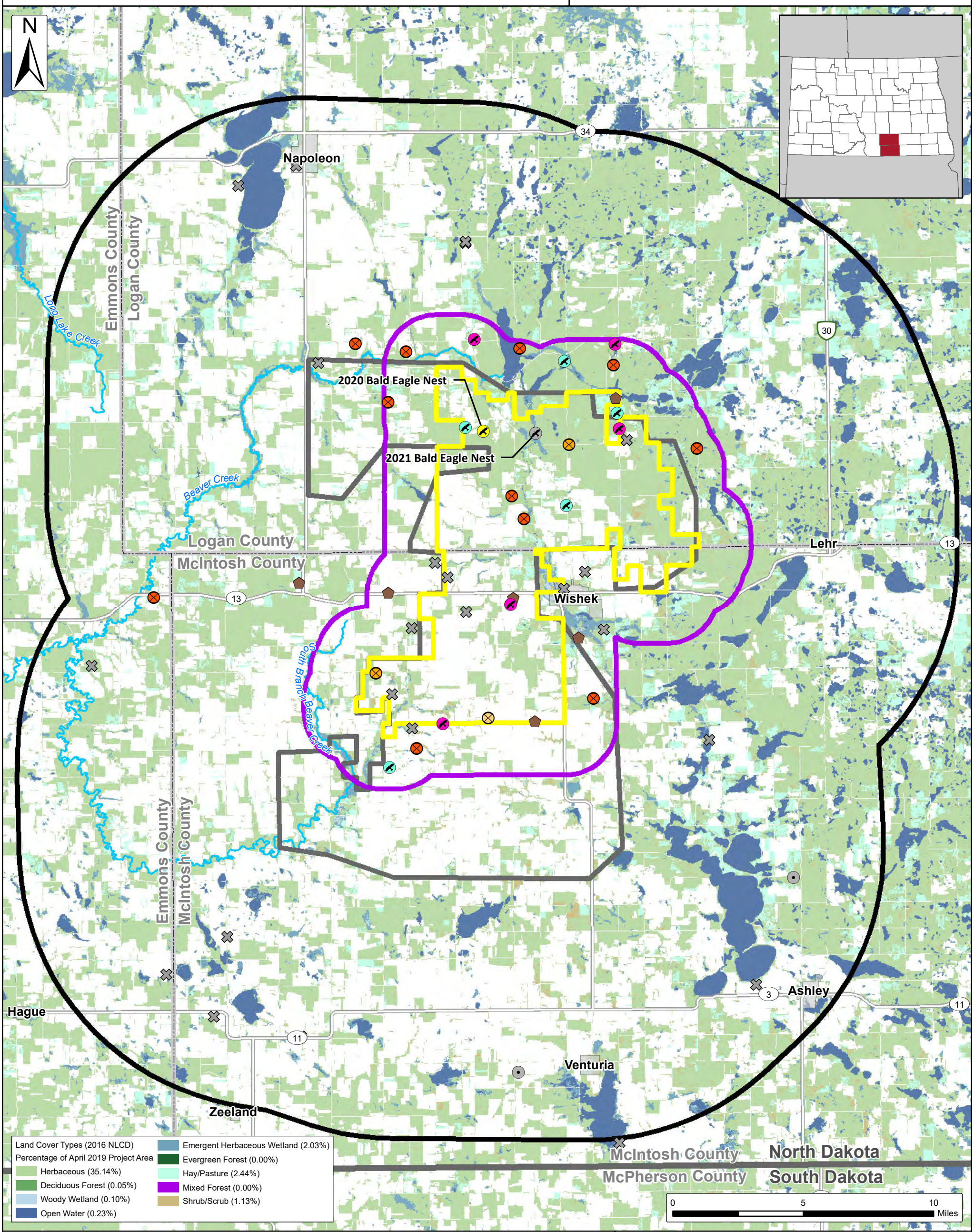
Figure 6. Eagle and Raptor Nest Survey Results

Logan and McIntosh Counties, North Dakota

Client:
Badger Wind, LLC

Issue Date:
7/12/2021

Atwell, LLC Project:
19000785



Raptor Nests Identified during 2020 Surveys
- Bald Eagle, In-Use
- Bald Eagle, Unoccupied
- Ferruginous Hawk, In-Use
- Great Horned Owl, In-Use
- Red-tailed Hawk, Missing
- Red-tailed Hawk, In-Use
- Red-tailed Hawk, Status Unknown
- Swainson's Hawk, In-Use
- Unknown raptor, In-Use
- Unknown raptor, Status Unknown
- Major Watercourse (NHD)
- Project Area 12/04/2020 (~57,097 acres)
- Project Area 04/15/2019 (~121,695 acres)
- 2-mile Buffer (12/04/2020)
- Eagle Nest Survey Area (4/15/2019 10-mile Buffer)
- City/Village
- County
- State Boundary

Source: National Land Cover Database (USGS, 2016)

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Badger Wind

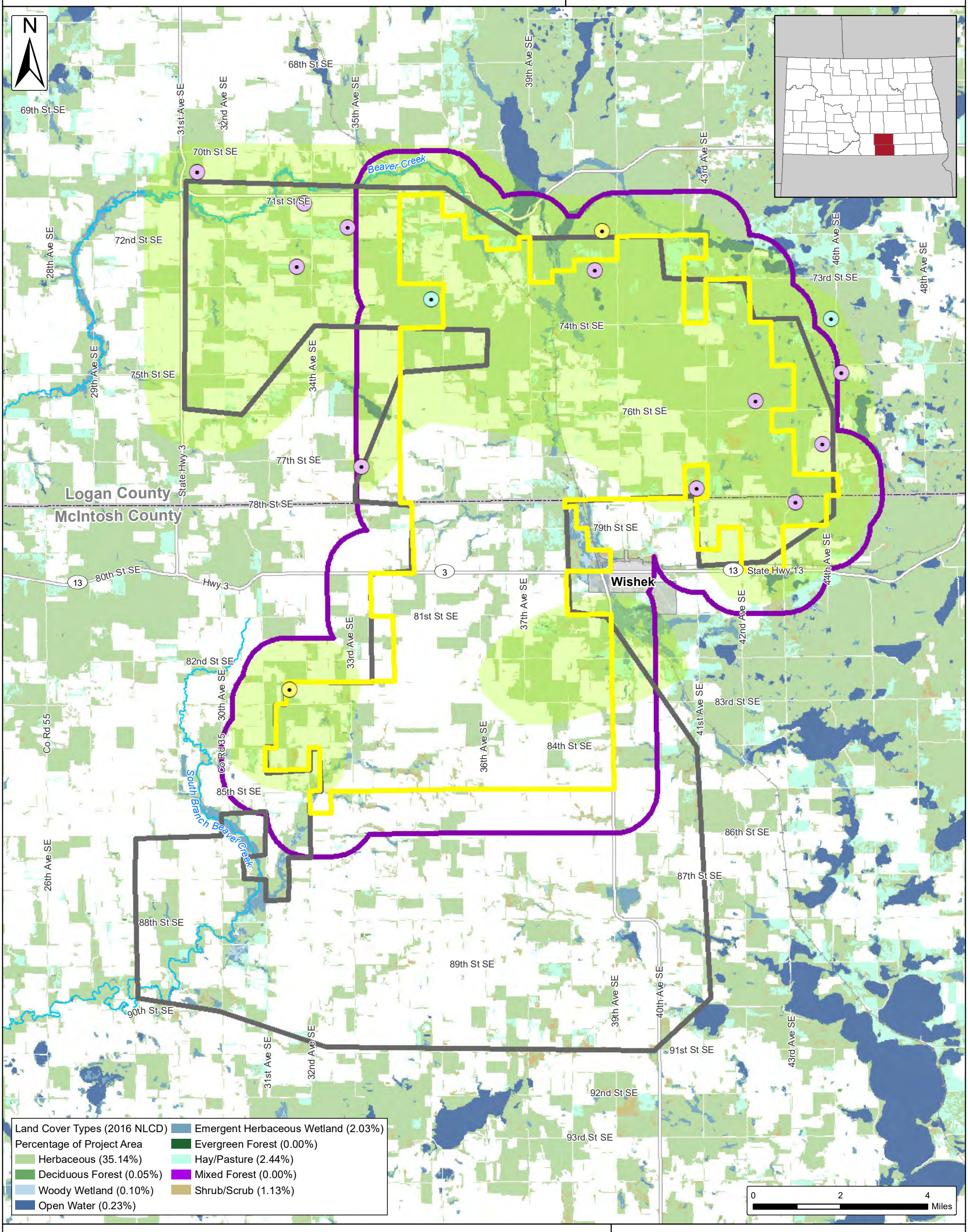
Figure 7. 2020 Sharp-tailed Grouse Lek Survey Results

Logan and McIntosh Counties, North Dakota

Client:
Badger Wind, LLC

Issue Date:
7/12/2021

Atwell, LLC Project:
19000785



Grouse Leks
- Confirmed, Aerial
- Confirmed, Ground
- Possible, Ground

Major Watercourse (NHD)

Project Area 12/04/2020 (~57,097 acres)

Project Area 04/15/2019 (~121,695 acres)

Sharp-tailed Grouse Priority Areas

Grouse Survey Area (1-Mile Buffer)

City/Village

County

Source: National Land Cover Database (USGS, 2016)

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Badger Wind

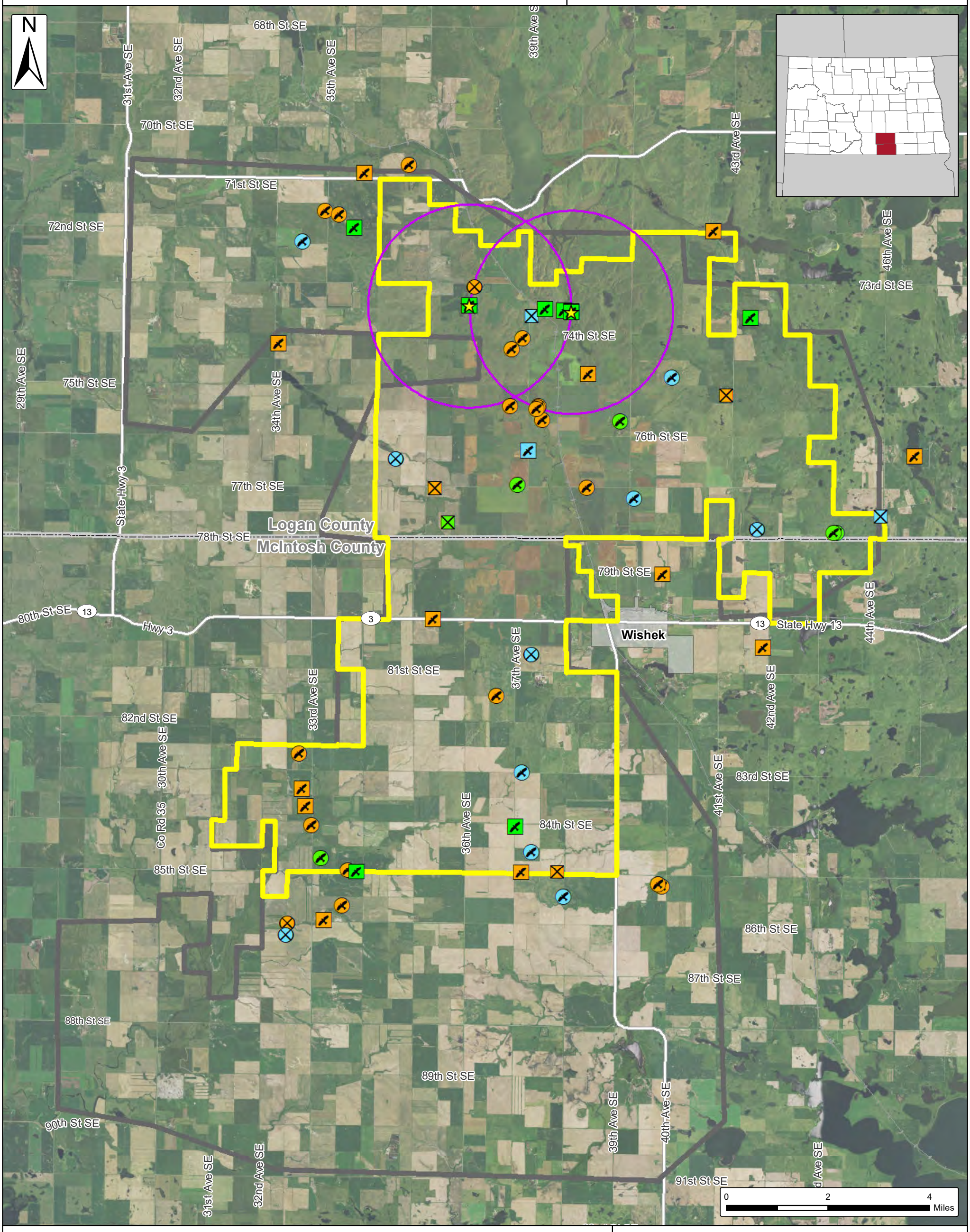
Figure 8. Bald Eagle and Golden Eagle Observations

Logan and McIntosh Counties, North Dakota

Client:
Badger Wind, LLC

Issue Date:
7/12/2021

Atwell, LLC Project:
19000785



In-Use Bald Eagle Nest

Nest-Associated Observations (2-mile buffer)*

Species

- Bald Eagle - Standardized
- Bald Eagle - Incidental
- Golden Eagle - Standardized
- Golden Eagle - Incidental

Season

- Fall
- Spring
- Summer
- Winter

- Project Area 12/04/2020 (~57,097 acres)
- Project Area 04/15/2019 (~121,695 acres)
- City/Village
- County

*Six standardized and six incidental eagle observations associated with the in-use Bald Eagle nest were recorded within this buffer during spring, summer, and fall surveys.

Source: USDA NAIP 2019 Imagery

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TABLES

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Table 1. Survey Periods for Pre-Construction Avian Studies – Year Two

Survey	Frequency	Apr 2020	May 2020	Jun 2020	Jul 2020	Aug 2020	Sep 2020	Oct 2020	Nov 2020	Dec 2020	Jan 2021	Feb 2021	Mar 2021	Apr 2021
Eagle and Raptor Nest Surveys	Single Survey Event	■	■											
Sharp-tailed Grouse Lek Surveys	Single Survey Event	■												
Eagle Use Surveys	Monthly		■	■	■	■	■	■	■	■	■	■	■	■
Diurnal Avian Activity Surveys	Monthly		■			■	■	■	■				■	■

Shaded boxes represent months in which the surveys occurred.

Table 2. List of Alternate Winter Point Count Stations

Original Point Count Station	Alternate Point Count Station
14	13
19	17
21	18
22	5
26	20
30	11
32	33
35	49
36	37
39	46
40	47
48	42
50	44

Table 3. Eagle Nests and Nests of Other Raptor Species

Territory Number[a]	Nest ID	Species	Date Found	Latitude	Longitude	Survey Type	2019 Nesting Season Status[b]	2020 Nesting Season Status[b]	2021 Nesting Season Status[c]	December 2020 Boundary Survey Buffer[d]
1	BAEA19_01	Bald Eagle	5/2/2019	46.3490	-99.6275	Aerial	In-Use, Active	In-Use, Active	Alternate, Unoccupied	Project Area
1	BAEA21_01	Bald Eagle	3/10/2021	46.3474	-99.5856	Ground	--	Alternate, Unoccupied	In-Use, Active	Project Area
--	FEHA19_03	Ferruginous Hawk	5/16/2019	46.3512	-99.6420	Ground	Occupied	Occupied	Not Checked	Project Area
--	FEHA19_04	Ferruginous Hawk	5/16/2019	46.3873	-99.5620	Ground	Occupied	Occupied	Not Checked	2-mile
--	FEHA19_05	Ferruginous Hawk	5/19/2019	46.3071	-99.5618	Ground	Occupied	Occupied	Not Checked	Project Area
--	FEHA19_06	Ferruginous Hawk	5/19/2019	46.3580	-99.5203	Ground	Occupied	Occupied	Not Checked	2-mile
--	FEHA21_07	Ferruginous Hawk	5/13/2021	46.2339	-99.6154	Micrositing	--	--	Nestlings	Project Area
--	SWHA19_01	Swainson's Hawk	7/25/2019	46.3494	-99.5188	Ground	Occupied	Occupied	Not Checked	2-mile
--	SWHA20_01	Swainson's Hawk	4/23/2020	46.3963	-99.5214	Ground	--	Occupied	Not Checked	2-mile
--	SWHA20_03	Swainson's Hawk	5/8/2020	46.2525	-99.6075	Ground	--	Occupied	To Be Determined	Project Area
--	SWHA20_04	Swainson's Hawk	5/14/2020	46.1869	-99.6626	Ground	--	Occupied	Not Checked	2-mile
--	RTHA19_03	Red-tailed Hawk	5/19/2019	46.1898	-99.6262	Ground	Occupied	Missing	Not Checked	Project Area
--	RTHA19_04	Red-tailed Hawk	7/25/2019	46.3410	-99.5591	Ground	Occupied	Unknown	Not Checked	Project Area
--	RTHA19_05	Red-tailed Hawk	7/29/2019	46.2153	-99.7157	Ground	Occupied	Unknown	Not Checked	Project Area
--	RTHA20_02	Red-tailed Hawk	4/17/2020	46.1999	-99.5420	Ground	--	Occupied	Not Checked	2-mile
--	RTHA20_05	Red-tailed Hawk	4/23/2020	46.3935	-99.6891	Ground	--	Occupied	Not Checked	2-mile
--	RTHA20_06	Red-tailed Hawk	4/15/2020	46.3002	-99.5959	Ground	--	Occupied	Not Checked	Project Area
--	RTHA20_08	Red-tailed Hawk	5/15/2020	46.3127	-99.6056	Ground	--	Occupied	Not Checked	Project Area
--	RTHA20_10	Red-tailed Hawk	4/22/2020	46.1734	-99.6837	Ground	--	Occupied	Not Checked	2-mile
--	GHOW19_01	Great Horned Owl	5/2/2019	46.2600	-99.7051	Aerial	Occupied	Occupied	Not Checked	2-mile
--	GHOW19_02	Great Horned Owl	5/21/2019	46.1879	-99.5891	Ground	Occupied	Occupied	Not Checked	Project Area
--	GHOW20_01	Great Horned Owl	5/8/2020	46.2340	-99.5535	Ground	--	Occupied	Not Checked	2-mile
--	GHOW20_02	Great Horned Owl	4/23/2020	46.3665	-99.5214	Ground	--	Occupied	Not Checked	Project Area
--	GHOW20_04	Great Horned Owl	4/17/2020	46.2564	-99.6051	Ground	--	Occupied	Not Checked	Project Area
--	UKRA19_05	Unknown Raptor	5/2/2019	46.2036	-99.7030	Aerial	Unknown	Unknown	Not Checked	Project Area
--	UKRA20_14	Unknown Raptor	4/10/2020	46.2488	-99.6432	Aerial	--	Unknown	Not Checked	Project Area
--	UKRA20_16	Unknown Raptor	4/17/2020	46.2704	-99.5476	Ground	--	Unknown	Not Checked	2-mile
--	UKRA20_17	Unknown Raptor	4/17/2020	46.3432	-99.5130	Ground	--	Unknown	Not Checked	Project Area
--	UKRA20_19	Unknown Raptor	4/17/2020	46.2762	-99.6676	Ground	--	Unknown	Not Checked	2-mile
--	UKRA20_21	Unknown Raptor	4/22/2020	46.2680	-99.6578	Ground	--	Unknown	Not Checked	Project Area
--	UKRA20_22	Unknown Raptor	4/22/2020	46.1845	-99.6872	Ground	--	Unknown	Not Checked	2-mile
--	UKRA20_25	Unknown Raptor	4/16/2020	46.3479	-99.5854	Ground	--	Unknown	Not Checked	Project Area
--	UKRA20_26	Unknown Raptor	4/10/2020	46.2382	-99.5333	Ground	--	Unknown	Not Checked	2-mile
--	UKRA20_27	Unknown Raptor	5/13/2020	46.2401	-99.6868	Ground	--	Unknown	Not Checked	2-mile
--	UKRA20_29	Unknown Raptor	5/6/2020	46.3877	-99.7595	Ground	--	Unknown	Not Checked	Project Area

[a] Territory number is used for Bald Eagles to label distinct territories that may contain both in-use and alternate nests. A territory may only have one in-use nest (USFWS 2016).

[b] 2019 and 2020 nesting season status fields classify Bald Eagle nests following USFWS (2016).

Table 3. Eagle Nests and Nests of Other Raptor Species

Territory Number[a]	Nest ID	Species	Date Found	Latitude	Longitude	Survey Type	2019 Nesting Season Status[b]	2020 Nesting Season Status[b]	2021 Nesting Season Status [c]	December 2020 Boundary Survey Buffer [d]

[c] 2020 Survey buffer describes whether the observation occurred within the project area, the 2-mile raptor nest survey buffer, or the 10-mile eagle nest survey buffer. Buffers drawn around the December 2020 boundary. Some nests found in 2020 were within the previous project area boundary's 10-mile buffer but are beyond 10-miles from the edge of the current project area boundary.

[d] Standardized surveys were not scheduled in 2021 and most of the 2020 nests were not checked in 2021. BAEA 21_01 was found during standardized eagle use surveys.

- Surveys were conducted from the ground in 2020 and nest contents could not be seen. All nests holding a sitting adult were assumed to be incubating, though it is possible that adults were brooding young chicks. All nests were built in deciduous trees.

- Nest ID numbers may not be consecutive as only raptor nests within two miles of the December 2020 project area are included.

Table 4. Sharp-tailed Grouse Lek Locations

Lek Number	Latitude	Longitude	Status	April 2019 Boundary Buffer	December 2020 Boundary Buffer	Distance to December 2020 Project Area (miles)	Maximim Count	Maximum Number of Males	Maximum Number of Females
1	46.341966	-99.458353	Possible Lek	1-mile	Beyond 1-mile	1.39	3	1	3
2	46.359088	-99.571498	Confirmed Lek	Project Area	Project Area	0.00	10 (estimate)	heard only	heard only
3	46.286172	-99.524005	Confirmed Lek	Project Area	1-mile	0.21	15 (estimate)	7	8 (estimate)
4	46.300468	-99.463506	Confirmed Lek	Project Area	1-mile	0.65	10 (estimate)	heard only	heard only
5	46.281264	-99.476778	Confirmed Lek	Project Area	Project Area	0.00	14	10	4
6	46.324065	-99.453897	Confirmed Lek	1-mile	Beyond 1-mile	1.10	10 (estimate)	heard only	heard only
7	46.22101	-99.71988	Confirmed Lek	Project Area	Project Area	0.00	4	at least 1	n/a
8	46.382441	-99.710489	Confirmed Lek	Project Area	Beyond 1-mile	2.17	5	n/a	n/a
9	46.314892	-99.495277	Confirmed Lek	Project Area	Project Area	0.00	15	at least 4	n/a
10	46.294829	-99.684162	Confirmed Lek	1-mile	1-mile	0.89	27	n/a	n/a
11	46.361242	-99.714363	Confirmed Lek	Project Area	Beyond 1-mile	2.32	6	at least 2	n/a
12	46.374129	-99.689697	Confirmed Lek	1-mile	Beyond 1-mile	1.20	10 (estimate)	heard only	heard only
13	46.349941	-99.65008	Possible Lek	Project Area	1-mile	0.25	1	may have heard more	may have heard more
14	46.394152	-99.767987	Confirmed Lek	1-mile	Beyond 1-mile	4.95	5 (estimate)	n/a	n/a
15	46.37213	-99.56779	Confirmed Lek	1-mile	1-mile	0.36	3	n/a	n/a

Table 5. Total Standardized Survey Effort by Point Count Station

Point Count Station	60 Minute Eagle Use Survey Standardized Effort (hours)[a]					10 Minute Avian Activity Survey Standardized Effort- Small-Bodied Species (hours)[a]		
	Spring	Summer	Fall	Winter	Total Hours	Spring	Fall	Total Hours
1	3	2	4	3	12	0.50	0.67	1.17
2	3	2	4	3	12	0.50	0.67	1.17
3	3	2	4	3	12	0.50	0.67	1.17
4	3	2	4	3	12	0.50	0.67	1.17
5	3	2	4	3	12	0.50	0.67	1.17
6	3	2	4	3	12	0.50	0.67	1.17
7	3	2	4	3	12	0.50	0.67	1.17
8	3	2	4	3	12	0.50	0.67	1.17
9	3	2	4	3	12	0.50	0.67	1.17
10	3	2	4	3	12	0.50	0.67	1.17
11	3	2	4	3	12	0.50	0.67	1.17
12	3	2	4	3	12	0.50	0.67	1.17
13[a]	4	2	4	6	16	0.67	0.67	1.33
14[a]	2	2	4	0	8	0.33	0.67	1.00
15	3	2	4	3	12	0.50	0.67	1.17
16	3	2	4	3	12	0.50	0.67	1.17
17	3	2	4	3	12	0.50	0.67	1.17
18	3	2	4	3	12	0.50	0.67	1.17
19	3	2	4	3	12	0.50	0.67	1.17
20	3	2	4	3	12	0.50	0.67	1.17
21	3	2	4	3	12	0.50	0.67	1.17
22	3	2	4	3	12	0.50	0.67	1.17

Table 5. Total Standardized Survey Effort by Point Count Station

Point Count Station	60 Minute Eagle Use Survey Standardized Effort (hours)[a]					10 Minute Avian Activity Survey Standardized Effort- Small-Bodied Species (hours)[a]		
	Spring	Summer	Fall	Winter	Total Hours	Spring	Fall	Total Hours
23	3	2	4	3	12	0.50	0.67	1.17
24	3	2	4	3	12	0.50	0.67	1.17
25	3	2	4	3	12	0.50	0.67	1.17
26	3	2	4	3	12	0.50	0.67	1.17
27[b]	0	0	0	0	0	0.00	0.00	0.00
28[b]	0	0	0	0	0	0.00	0.00	0.00
29	3	2	4	3	12	0.50	0.67	1.17
30	3	2	4	3	12	0.50	0.67	1.17
31	3	2	4	3	12	0.50	0.67	1.17
32	3	2	4	3	12	0.50	0.67	1.17
33	3	2	4	3	12	0.50	0.67	1.17
34	3	2	4	3	12	0.50	0.67	1.17
35[c]	0	0	0	0	0	0.00	0.00	0.00
36[c]	0	0	0	0	0	0.00	0.00	0.00
37	3	2	4	3	12	0.50	0.67	1.17
38	3	2	4	3	12	0.50	0.67	1.17
39	3	2	4	3	12	0.50	0.67	1.17
40	3	2	4	3	12	0.50	0.67	1.17
41	3	2	4	3	12	0.50	0.67	1.17
42	3	2	4	3	12	0.50	0.67	1.17
43	3	2	4	3	12	0.50	0.67	1.17
44	3	2	4	3	12	0.50	0.67	1.17
45	3	2	4	3	12	0.50	0.67	1.17

Table 5. Total Standardized Survey Effort by Point Count Station

Point Count Station	60 Minute Eagle Use Survey Standardized Effort (hours)[a]					10 Minute Avian Activity Survey Standardized Effort- Small-Bodied Species (hours)[a]		
	Spring	Summer	Fall	Winter	Total Hours	Spring	Fall	Total Hours
46	3	2	4	3	12	0.50	0.67	1.17
47	3	2	4	3	12	0.50	0.67	1.17
48	3	2	4	3	12	0.50	0.67	1.17
49	3	2	4	3	12	0.50	0.67	1.17
50	3	2	4	3	12	0.50	0.67	1.17
51	3	2	4	3	12	0.50	0.67	1.17
52	3	2	4	3	12	0.50	0.67	1.17
53	3	2	4	3	12	0.50	0.67	1.17
54[d]	3	2	4	3	12	0.50	0.67	1.17
55[d]	3	2	4	3	12	0.50	0.67	1.17
56[d]	3	2	4	3	12	0.50	0.67	1.17
57[d]	3	2	4	3	12	0.50	0.67	1.17
Grand Total	**159**	**106**	**212**	**159**	**636**	**26.50**	**35.33**	**61.83**

[a] Due to the seasonal inaccessibility of some point count stations between November 2019 and March 2020, a winter alternate point count survey strategy was employed (see Section 2.3). Refer to Table 2 for a list point

[˜] Point count station dropped in August 2019 (Year 1) due to landowner concerns

[c] Point count station dropped in April 2020 (Year 1) due to landowner concerns

[d] Point count station added in August 2019 (Year 1) as a replacement for dropped point count station

Table 6. Eagle Use Surveys - Seasonal Raptor Mean Use

Common Name	Spring					Summer					Fall					Winter				
	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/60 min. survey)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/60 min. survey)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/60 min. survey)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/60 min. survey)[c]	SD[d]	Occur. Freq.[e]
American Kestrel[II]	5	1.64%	0.031	0.237	0.019	1	0.39%	0.009	0.097	0.009	8	1.54%	0.038	0.255	0.028	0	-	-	-	-
Bald Eagle[II]	5	1.64%	0.031	0.175	0.031	5	1.95%	0.047	0.349	0.019	19	3.65%	0.090	0.409	0.061	6	25.00%	0.038	0.222	0.031
Bald Eagle[II] - *all heights*[f]	6	1.94%	0.038	0.222	0.031	5	1.91%	0.047	0.349	0.019	19	3.61%	0.090	0.409	0.061	6	25.00%	0.038	0.222	0.031
Ferruginous Hawk[I]	17	5.59%	0.107	0.458	0.069	24	9.38%	0.226	0.574	0.160	5	0.96%	0.024	0.227	0.014	0	-	-	-	-
Golden Eagle[II]	0	-	-	-	-	0	-	-	-	-	2	0.38%	0.009	0.097	0.009	4	16.67%	0.025	0.157	0.025
Great Horned Owl	1	0.33%	0.006	0.079	0.006	1	0.39%	0.009	0.097	0.009	0	-	-	-	-	1	4.17%	0.006	0.079	0.006
Merlin	3	0.99%	0.019	0.136	0.019	0	-	-	-	-	1	0.19%	0.005	0.069	0.005	4	16.67%	0.025	0.157	0.025
Northern Harrier[II]	78	25.66%	0.491	0.770	0.352	61	23.83%	0.575	1.014	0.330	119	22.84%	0.561	1.127	0.297	0	-	-	-	-
Peregrine Falcon[III]	2	0.66%	0.013	0.112	0.013	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
Peregrine Falcon[III] - *all heights*[f]	3	0.97%	0.019	0.136	0.019	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
Prairie Falcon[II]	0	-	-	-	-	1	0.39%	0.009	0.097	0.009	2	0.38%	0.009	0.097	0.009	5	20.83%	0.031	0.208	0.025
Red-tailed Hawk	102	33.55%	0.642	1.224	0.308	49	19.14%	0.462	0.978	0.264	168	32.25%	0.792	1.848	0.288	0	-	-	-	-
Red-tailed Hawk - *all heights*[f]	104	33.66%	0.654	1.232	0.314	49	18.70%	0.462	0.978	0.264	171	32.45%	0.807	1.864	0.288	0	-	-	-	-
Rough-legged Hawk	18	5.92%	0.113	0.477	0.075	0	-	-	-	-	28	5.37%	0.132	0.601	0.066	2	8.33%	0.013	0.112	0.013
Sharp-shinned Hawk	1	0.33%	0.006	0.079	0.006	0	-	-	-	-	5	0.96%	0.024	0.227	0.014	0	-	-	-	-
Snowy Owl	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	1	4.17%	0.006	0.079	0.006
Swainson's Hawk[I]	46	15.13%	0.289	0.837	0.151	92	35.94%	0.868	1.525	0.377	127	24.38%	0.599	1.783	0.217	0	-	-	-	-
Swainson's Hawk[I] - *all heights*[f]	46	14.89%	0.289	0.837	0.151	97	37.02%	0.915	1.574	0.387	128	24.29%	0.604	1.786	0.217	0	-	-	-	-
Turkey Vulture	8	2.63%	0.050	0.418	0.025	11	4.30%	0.104	0.496	0.057	15	2.88%	0.071	0.351	0.047	0	-	-	-	-
Unknown Accipiter	0	-	-	-	-	1	0.39%	0.009	0.097	0.009	0	-	-	-	-	0	-	-	-	-
Unknown Buteo	14	4.61%	0.088	0.363	0.069	3	1.17%	0.028	0.216	0.019	11	2.11%	0.052	0.279	0.038	1	4.17%	0.006	0.079	0.006
Unknown Buteo - *all heights*[f]	14	4.53%	0.088	0.363	0.069	3	1.15%	0.028	0.216	0.019	12	2.28%	0.057	0.287	0.042	1	4.17%	0.006	0.079	0.006
Unknown Falcon	0	-	-	-	-	0	-	-	-	-	1	0.19%	0.005	0.069	0.005	0	-	-	-	-
Unknown Raptor	4	1.32%	0.025	0.157	0.025	7	2.73%	0.066	0.250	0.066	10	1.92%	0.047	0.271	0.033	0	-	-	-	-
Unknown Raptor - *all heights*[f]	5	1.62%	0.031	0.175	0.031	8	3.05%	0.075	0.299	0.066	11	2.09%	0.052	0.279	0.038	0	-	-	-	-
ALL RAPTORS	**304**	100.00%	**1.912**	**2.082**	**0.692**	**256**	100.00%	**2.415**	**2.464**	**0.764**	**521**	100.00%	**2.458**	**3.054**	**0.670**	**24**	100.00%	**0.151**	**0.466**	**0.113**
ALL RAPTORS - *all heights*[f]	**309**	100.00%	**1.943**	**2.094**	**0.692**	**262**	100.00%	**2.472**	**2.523**	**0.764**	**527**	100.00%	**2.486**	**3.084**	**0.670**	**24**	100.00%	**0.151**	**0.466**	**0.113**

[a] Total Std. Detections is the total number of standardized individuals detected within the 800 m–radius by 200 m-high survey cylinder during standardized use surveys

[b] % Comp. (i.e., percent composition) is the proportion of raptors that a particular species comprises during the season using total standardized detections.

[c] Mean Use is the total standardized detections divided by the total number of 60-minute point count surveys conducted within the season.

[d] SD is the standard deviation of Mean Use.

[e] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species was detected during the season

[f] Species or group names followed by "- *all heights* " indicate that presented data includes individuals greater than 200 m in height.

- North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priortiy (SCP) are denoted with a superscript I, II, or III following the species name to indicate that it is Level 1, Level 2, or Level 3 SCP, respectively.

Table 7. Eagle Use Surveys - Seasonal Bald Eagle Mean Use by Point Count Station

Point Count Station	Spring			Summer			Fall			Winter			Full Year		
	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Standard Deviation	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Standard Deviation	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Standard Deviation	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Standard Deviation	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Standard Deviation
1	0	-	-	0	-	-	1	0.250	0.500	0	-	-	1	0.083	0.289
2	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
3	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
4	1	0.333	0.577	5	2.500	0.707	1	0.250	0.500	0	-	-	7	0.583	0.996
5	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
6	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
7	0	-	-	0	-	-	2	0.500	1.000	0	-	-	2	0.167	0.577
8	0	-	-	0	-	-	0	-	-	1	0.333	0.577	1	0.083	0.289
9	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
10	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
11	0	-	-	0	-	-	5	1.250	1.893	0	-	-	5	0.417	1.165
12	1	0.333	0.577	0	-	-	0	-	-	0	-	-	1	0.083	0.289
13	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
14[c]	0	-	-	0	-	-	0	-	-	N/A	N/A	N/A	0	-	-
15	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
16	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
17	1	0.333	0.577	0	-	-	0	-	-	0	-	-	1	0.083	0.289
18	0	-	-	0	-	-	0	-	-	1	0.333	0.577	1	0.083	0.289
19	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
20	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
21	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
22	1	0.333	0.577	0	-	-	0	-	-	0	-	-	1	0.083	0.289
23	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
24	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
25	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
26	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
29	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
30	0	-	-	0	-	-	1	0.250	0.500	0	-	-	1	0.083	0.289
31	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
32	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
33	0	-	-	0	-	-	1	0.250	0.500	0	-	-	1	0.083	0.289
34	0	-	-	0	-	-	0	-	-	1	0.333	0.577	1	0.083	0.289
37	1	0.333	0.577	0	-	-	1	0.250	0.500	0	-	-	2	0.167	0.389
38	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-

Table 7. Eagle Use Surveys - Seasonal Bald Eagle Mean Use by Point Count Station

Point Count Station	Spring			Summer			Fall			Winter			Full Year		
	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Standard Deviation	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Standard Deviation	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Standard Deviation	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Standard Deviation	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Standard Deviation
39	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
40	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
41	0	-	-	0	-	-	1	0.250	0.500	0	-	-	1	0.083	0.289
42	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
43	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
44	0	-	-	0	-	-	0	-	-	2	0.667	1.155	2	0.167	0.577
45	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
46	0	-	-	0	-	-	2	0.500	1.000	0	-	-	2	0.167	0.577
47	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
48	0	-	-	0	-	-	1	0.250	0.500	0	-	-	1	0.083	0.289
49	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
50	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
51	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
52	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
53	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
54	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
55	0	-	-	0	-	-	1	0.250	0.500	0	-	-	1	0.083	0.289
56	0	-	-	0	-	-	2	0.500	1.000	0	-	-	2	0.167	0.577
57	0	-	-	0	-	-	0	-	-	1	0.333	0.577	1	0.083	0.289

[a] Total Std. Detections is the total number of standardized individuals detected within the 800 m–radius survey cylinder during standardized use surveys

[b] Mean Use is the total standardized detections divided by the total number of 60-minute point count surveys conducted within the season.

[c] Total Std. Detections and Mean Use are not applicable (N/A) at point 14 in the winter as this point was not accessible for surveys.

- This table only includes Bald Eagles within the ample plot at some point during the survey. One Bald Eagle was only observed above 200 m in altitude at station 22 in the spring and is excluded.

Table 8a. Eagle Use Surveys - Seasonal and Annual Raptor Mean Flight Heights

Species	Flight Height[a]	Spring					Summer					Fall					Winter					Year-Round				
		Sample Size[b]	Mean Flight Height (m)	SD[c]	Low 95% CI [d]	High 95% CI [d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Low 95% CI [d]	High 95% CI [d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Low 95% CI [d]	High 95% CI [d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Low 95% CI [d]	High 95% CI [d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Low 95% CI [d]	High 95% CI [d]
American Kestrel[II]	Min	16	8.5	11.1	2.6	14.4	2	6.0	7.1	-57.5	69.5	18	15.3	20.7	5.0	25.6	-	-	-	-	-	36	11.8	16.6	6.2	17.4
American Kestrel[II]	Max	16	15.3	10.5	9.7	20.9	2	18.5	23.3	-191.2	228.2	18	32.5	28.8	18.2	46.8	-	-	-	-	-	36	24.1	23.2	16.2	31.9
Bald Eagle[II]	Min	22	87.6	114.7	36.8	138.5	1	25.0	N/A	N/A	N/A	29	40.5	38.3	26.0	55.1	8	22.0	17.3	7.5	36.5	60	55.1	77.9	34.9	75.2
Bald Eagle[II]	Max	22	130.9	148.7	65.0	196.8	1	30.0	N/A	N/A	N/A	29	67.0	54.6	46.2	87.7	8	45.0	27.3	22.2	67.8	60	86.9	102.9	60.3	113.4
Broad-winged Hawk	Min	-	-	-	-	-	-	-	-	-	-	7	122.9	115.1	16.4	229.3	-	-	-	-	-	7	122.9	115.1	16.4	229.3
Broad-winged Hawk	Max	-	-	-	-	-	-	-	-	-	-	7	235.7	137.6	108.5	363.0	-	-	-	-	-	7	235.7	137.6	108.5	363.0
Cooper's Hawk	Min	3	25.3	21.2	-27.4	78.0	-	-	-	-	-	1	2.0	N/A	N/A	N/A	-	-	-	-	-	4	19.5	20.9	-13.7	52.7
Cooper's Hawk	Max	3	75.0	78.6	-120.2	270.2	-	-	-	-	-	1	3.0	N/A	N/A	N/A	-	-	-	-	-	4	57.0	73.6	-60.1	174.1
Ferruginous Hawk[I]	Min	31	55.9	70.8	30.0	81.9	34	21.4	24.7	12.8	30.0	25	35.3	31.6	22.2	48.3	-	-	-	-	-	90	37.2	49.0	26.9	47.4
Ferruginous Hawk[I]	Max	31	93.4	86.7	61.6	125.2	34	74.9	70.4	50.3	99.5	25	70.2	54.8	47.6	92.8	-	-	-	-	-	90	79.9	72.7	64.7	95.2
Golden Eagle[II]	Min	1	80.0	N/A	N/A	N/A	-	-	-	-	-	5	40.2	46.2	-17.1	97.5	6	18.0	21.5	-4.5	40.5	12	32.4	36.5	9.2	55.6
Golden Eagle[II]	Max	1	150.0	N/A	N/A	N/A	-	-	-	-	-	5	59.0	52.6	-6.3	124.3	6	42.5	20.2	21.3	63.7	12	58.3	45.7	29.3	87.4
Great Horned Owl	Min	1	1.0	N/A	N/A	N/A	1	1.0	N/A	N/A	N/A	-	-	-	-	-	-	-	-	-	-	2	1.0	0.0	1.0	1.0
Great Horned Owl	Max	1	2.0	N/A	N/A	N/A	1	2.0	N/A	N/A	N/A	-	-	-	-	-	-	-	-	-	-	2	2.0	0.0	2.0	2.0
Merlin	Min	6	3.5	5.6	-2.4	9.4	-	-	-	-	-	4	12.8	9.1	-1.8	27.3	4	2.3	1.9	-0.8	5.3	14	5.8	7.3	1.6	10.0
Merlin	Max	6	7.7	7.8	-0.5	15.8	-	-	-	-	-	4	36.5	43.6	-32.8	105.8	4	9.0	11.1	-8.7	26.7	14	16.3	25.8	1.4	31.2
Northern Goshawk	Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	25.0	N/A	N/A	N/A	1	25.0	N/A	N/A	N/A
Northern Goshawk	Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	30.0	N/A	N/A	N/A	1	30.0	N/A	N/A	N/A
Northern Harrier[II]	Min	170	23.3	67.7	13.1	33.6	99	4.1	11.5	1.8	6.4	259	5.3	16.4	3.3	7.3	-	-	-	-	-	528	10.9	41.2	7.4	14.4
Northern Harrier[II]	Max	170	34.5	71.8	23.6	45.4	99	12.7	23.8	7.9	17.4	259	12.3	29.3	8.7	15.9	-	-	-	-	-	528	19.5	47.8	15.4	23.6
Peregrine Falcon[III]	Min	3	84.0	143.8	-273.1	441.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	84.0	143.8	-273.1	441.1
Peregrine Falcon[III]	Max	3	93.3	136.0	-244.6	431.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	93.3	136.0	-244.6	431.3
Prairie Falcon[II]	Min	-	-	-	-	-	1	1.0	N/A	N/A	N/A	7	14.7	17.7	-1.7	31.1	4	13.0	16.1	-12.6	38.6	12	13.0	16.0	2.8	23.2
Prairie Falcon[II]	Max	-	-	-	-	-	1	100.0	N/A	N/A	N/A	7	46.3	55.4	-4.9	97.5	4	25.0	20.4	-7.5	57.5	12	43.7	47.0	13.8	73.5
Red-tailed Hawk	Min	216	56.3	90.3	44.2	68.4	105	32.6	37.6	25.3	39.9	302	28.5	45.3	23.4	33.6	-	-	-	-	-	623	38.8	64.9	33.7	44.0
Red-tailed Hawk	Max	216	84.4	96.6	71.4	97.3	105	84.3	84.5	67.9	100.6	302	53.4	64.3	46.2	60.7	-	-	-	-	-	623	69.4	81.6	62.9	75.8
Rough-legged Hawk	Min	27	40.9	70.6	13.0	68.9	-	-	-	-	-	32	24.9	34.5	12.5	37.4	2	25.0	7.1	-38.5	88.5	61	32.0	53.3	18.4	45.7
Rough-legged Hawk	Max	27	65.1	76.8	34.7	95.5	-	-	-	-	-	32	44.0	39.5	29.8	58.3	2	27.5	10.6	-67.8	122.8	61	52.8	59.1	37.7	67.9
Sharp-shinned Hawk	Min	4	15.8	14.2	-6.8	38.3	-	-	-	-	-	9	24.2	31.5	0.0	48.4	-	-	-	-	-	13	21.6	27.0	5.3	37.9
Sharp-shinned Hawk	Max	4	26.5	24.6	-12.7	65.7	-	-	-	-	-	9	39.8	44.0	6.0	73.6	-	-	-	-	-	13	35.7	38.5	12.4	59.0
Snowy Owl	Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	4.5	4.9	-40.0	49.0	2	4.5	4.9	-40.0	49.0
Snowy Owl	Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	11.0	1.4	-1.7	23.7	2	11.0	1.4	-1.7	23.7
Swainson's Hawk[I]	Min	86	44.5	49.5	33.9	55.1	159	46.7	75.3	35.0	58.5	250	42.0	50.0	35.7	48.2	-	-	-	-	-	495	43.9	59.1	38.7	49.2
Swainson's Hawk[I]	Max	86	104.4	118.7	78.9	129.8	159	113.4	114.5	95.4	131.3	250	89.2	75.8	79.7	98.6	-	-	-	-	-	495	99.6	98.1	90.9	108.3
Turkey Vulture	Min	17	50.8	121.5	-11.7	113.2	36	30.0	45.2	14.7	45.3	44	39.6	46.5	25.4	53.7	-	-	-	-	-	97	38.0	65.0	24.9	51.1
Turkey Vulture	Max	17	59.9	118.4	-1.0	120.8	36	73.9	72.8	49.2	98.5	44	70.1	59.0	52.2	88.0	-	-	-	-	-	97	69.7	76.5	54.3	85.1

Table 8a. Eagle Use Surveys - Seasonal and Annual Raptor Mean Flight Heights

Species	Flight Height[a]	Spring					Summer					Fall					Winter					Year-Round				
		Sample Size[b]	Mean Flight Height (m)	SD[c]	Low 95% CI [d]	High 95% CI [d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Low 95% CI [d]	High 95% CI [d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Low 95% CI [d]	High 95% CI [d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Low 95% CI [d]	High 95% CI [d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Low 95% CI [d]	High 95% CI [d]
Unknown Accipiter	Min	-	-	-	-	-	1	25.0	N/A	N/A	N/A	1	15.0	N/A	N/A	N/A	-	-	-	-	-	2	20.0	7.1	-43.5	83.5
Unknown Accipiter	Max	-	-	-	-	-	1	40.0	N/A	N/A	N/A	1	20.0	N/A	N/A	N/A	-	-	-	-	-	2	30.0	14.1	-97.1	157.1
Unknown Buteo	Min	10	14.3	11.1	6.4	22.2	4	32.5	26.6	-9.8	74.8	10	74.1	71.7	22.8	125.4	1	5.0	N/A	N/A	N/A	25	40.8	53.7	18.6	62.9
Unknown Buteo	Max	10	21.2	14.1	11.1	31.3	4	32.5	26.6	-9.8	74.8	10	100.5	78.6	44.3	156.7	1	20.0	N/A	N/A	N/A	25	54.7	62.9	28.7	80.6
Unknown Falcon	Min	-	-	-	-	-	1	15.0	N/A	N/A	N/A	1	1.0	N/A	N/A	N/A	-	-	-	-	-	2	8.0	9.9	-80.9	96.9
Unknown Falcon	Max	-	-	-	-	-	1	35.0	N/A	N/A	N/A	1	20.0	N/A	N/A	N/A	-	-	-	-	-	2	27.5	10.6	-67.8	122.8
Unknown Raptor	Min	6	112.3	171.5	-67.6	292.3	6	106.3	242.1	-147.7	360.4	10	78.4	185.6	-54.4	211.2	-	-	-	-	-	22	95.3	189.7	11.2	179.4
Unknown Raptor	Max	6	112.5	171.4	-67.3	292.3	6	108.0	241.5	-145.5	361.5	10	79.7	185.0	-52.7	212.1	-	-	-	-	-	22	96.4	189.2	12.5	180.3
ALL RAPTORS	**Min**	**619**	**43.7**	**80.0**	**37.4**	**50.0**	**450**	**30.9**	**59.6**	**25.4**	**36.4**	**1014**	**27.9**	**47.4**	**25.0**	**30.9**	**28**	**15.5**	**16.1**	**9.3**	**21.7**	**2111**	**33.0**	**61.3**	**30.4**	**35.6**
ALL RAPTORS	**Max**	**619**	**70.4**	**98.0**	**62.6**	**78.1**	**450**	**76.3**	**96.4**	**67.4**	**85.3**	**1014**	**54.3**	**69.2**	**50.0**	**58.5**	**28**	**31.4**	**23.1**	**22.4**	**40.3**	**2111**	**63.4**	**84.8**	**59.8**	**67.0**

[a] This column indicates if a particular row is providing results for the minimum (Min) or maximum (Max) flight height statistic.

[b] Sample size refers to the number of flocks (i.e., not individuals) that were detected in flight within 800 m of the point count station during standardized eagle use (60-minute) surveys. Raptor data from Year 1 and Year 2 have been combined to provide more robust sample sizes. Birds that were heard-only or perched-only were not included in the flight height analysis. All detections are included in flight height analyses, independent of whether the detection occurred above or below 200 m in height.

[c] SD is the standard deviation of Mean Minimum or Maximum Flight Height. N/A indicates that standard deviation could not be calculated as the sample size is one.

[d] This column indicates either the upper or lower bound of the 95% confidence interval. N/A indicates that the confidence interval could not be calculated as the sample size is one.

- North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priortiy (SCP) are denoted with a superscript I, II, or III following the species name to indicate that it is Level 1, Level 2, or Level 3 SCP, respectively.

Table 8b. Seasonal and Annual Mean Flight Heights of Other Large-bodied Species

Species	Flight Height[a]	Spring					Summer					Fall					Winter					Year-Round				
		Sample Size[b]	Mean Flight Height (m)	SD[c]	Lower 95% CI Bound[d]	Upper 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Lower 95% CI Bound[d]	Upper 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Lower 95% CI Bound[d]	Upper 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Lower 95% CI Bound[d]	Upper 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Lower 95% CI Bound[d]	Upper 95% CI Bound[d]
		LARGE-BODIED CORVIDS																								
American Crow	Min	7	36.4	37.2	2.1	70.8	-	-	-	-	-	9	222.8	81.7	160.0	285.6	-	-	-	-	-	16	141.3	115.0	80.0	202.5
American Crow	Max	7	47.9	30.0	20.1	75.6	-	-	-	-	-	9	225.6	73.3	169.2	281.9	-	-	-	-	-	16	147.8	107.3	90.6	205.0
All Large-bodied Corvids	**Min**	**7**	**36.4**	**37.2**	**2.1**	**70.8**	**-**	**-**	**-**	**-**	**-**	**9**	**222.8**	**81.7**	**160.0**	**285.6**	**-**	**-**	**-**	**-**	**-**	**16**	**141.3**	**115.0**	**80.0**	**202.5**
All Large-bodied Corvids	**Max**	**7**	**47.9**	**30.0**	**20.1**	**75.6**	**-**	**-**	**-**	**-**	**-**	**9**	**225.6**	**73.3**	**169.2**	**281.9**	**-**	**-**	**-**	**-**	**-**	**16**	**147.8**	**107.3**	**90.6**	**205.0**
		LARGE-BODIED NON-PASSERINES																								
Eurasian Collared Dove	Min	1	12.0	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	12.0	NA	NA	NA
Eurasian Collared Dove	Max	1	12.0	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	12.0	NA	NA	NA
Rock Pigeon	Min	25	10.1	8.7	6.5	13.7	20	10.8	12.9	4.8	16.8	37	10.8	8.9	7.8	13.8	10	10.7	8.7	4.5	16.9	92	10.6	9.7	8.6	12.6
Rock Pigeon	Max	25	20.3	10.9	15.8	24.8	20	18.5	15.1	11.4	25.5	37	20.1	9.6	16.9	23.2	10	18.4	9.8	11.4	25.4	92	19.6	11.2	17.3	21.9
All Large-bodied Non-Passerines	**Min**	**26**	**10.2**	**8.5**	**6.7**	**13.6**	**20**	**10.8**	**12.9**	**4.8**	**16.8**	**37**	**10.8**	**8.9**	**7.8**	**13.8**	**10**	**10.7**	**8.7**	**4.5**	**16.9**	**93**	**10.6**	**9.6**	**8.6**	**12.6**
All Large-bodied Non-Passerines	**Max**	**26**	**20.0**	**10.8**	**15.6**	**24.3**	**20**	**18.5**	**15.1**	**11.4**	**25.5**	**37**	**20.1**	**9.6**	**16.9**	**23.2**	**10**	**18.4**	**9.8**	**11.4**	**25.4**	**93**	**19.5**	**11.2**	**17.2**	**21.8**
		UPLAND GAMEBIRDS																								
Gray Partridge	Min	1	1.0	NA	NA	NA	1	1.0	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	2	1.0	0.0	1.0	1.0
Gray Partridge	Max	1	1.0	NA	NA	NA	1	1.0	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	2	1.0	0.0	1.0	1.0
Ring-necked Pheasant	Min	-	-	-	-	-	-	-	-	-	-	3	1.0	0.0	1.0	1.0	-	-	-	-	-	3	1.0	0.0	1.0	1.0
Ring-necked Pheasant	Max	-	-	-	-	-	-	-	-	-	-	3	1.0	0.0	1.0	1.0	-	-	-	-	-	3	1.0	0.0	1.0	1.0
Sharp-tailed Grouse[II]	Min	12	1.3	1.2	0.6	2.1	1	1.0	NA	NA	NA	2	13.5	9.2	-69.1	96.1	10	1.0	0.0	1.0	1.0	25	2.2	4.0	0.5	3.8
Sharp-tailed Grouse[II]	Max	12	3.0	2.6	1.4	4.6	1	1.0	NA	NA	NA	2	17.5	3.5	-14.3	49.3	10	4.2	4.2	1.2	7.2	25	4.6	5.1	2.5	6.7
All Upland Gamebirds	**Min**	**13**	**1.3**	**1.1**	**0.6**	**2.0**	**2**	**1.0**	**0.0**	**1.0**	**1.0**	**5**	**6.0**	**8.2**	**-4.2**	**16.2**	**10**	**1.0**	**0.0**	**1.0**	**1.0**	**30**	**2.0**	**3.6**	**0.6**	**3.3**
All Upland Gamebirds	**Max**	**13**	**2.8**	**2.5**	**1.3**	**4.4**	**2**	**1.0**	**0.0**	**1.0**	**1.0**	**5**	**7.6**	**9.2**	**-3.8**	**19.0**	**10**	**4.2**	**4.2**	**1.2**	**7.2**	**30**	**4.0**	**4.8**	**2.2**	**5.8**
		SHOREBIRDS																								
American Avocet[II]	Min	-	-	-	-	-	-	-	-	-	-	1	5.0	NA	NA	NA	-	-	-	-	-	1	5.0	NA	NA	NA
American Avocet[II]	Max	-	-	-	-	-	-	-	-	-	-	1	30.0	NA	NA	NA	-	-	-	-	-	1	30.0	NA	NA	NA
Greater Yellowlegs	Min	2	12.5	3.5	-19.3	44.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	12.5	3.5	-19.3	44.3
Greater Yellowlegs	Max	2	17.5	10.6	-77.8	112.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	17.5	10.6	-77.8	112.8
Killdeer	Min	32	8.0	9.5	4.6	11.4	37	2.9	4.8	1.3	4.5	23	12.6	10.1	8.2	16.9	-	-	-	-	-	92	7.1	8.9	5.3	8.9
Killdeer	Max	32	14.0	12.1	9.6	18.3	37	9.7	8.1	7.0	12.4	23	16.7	9.4	12.6	20.7	-	-	-	-	-	92	12.9	10.2	10.8	15.1
Least Sandpiper	Min	-	-	-	-	-	1	1.0	NA	NA	NA	2	11.0	5.7	-39.8	61.8	-	-	-	-	-	3	7.7	7.0	-9.8	25.1
Least Sandpiper	Max	-	-	-	-	-	1	3.0	NA	NA	NA	2	15.0	0.0	15.0	15.0	-	-	-	-	-	3	11.0	6.9	-6.2	28.2
Lesser Yellowlegs	Min	1	10.0	NA	NA	NA	6	2.2	2.4	-0.4	4.7	2	1.5	0.7	-4.9	7.9	-	-	-	-	-	9	2.9	3.3	0.4	5.4
Lesser Yellowlegs	Max	1	12.0	NA	NA	NA	6	4.2	4.0	0.0	8.3	2	6.5	4.9	-38.0	51.0	-	-	-	-	-	9	5.6	4.4	2.1	9.0
Marbled Godwit[I]	Min	14	18.1	13.2	10.4	25.7	3	11.0	9.5	-12.7	34.7	-	-	-	-	-	-	-	-	-	-	17	16.8	12.7	10.3	23.4
Marbled Godwit[I]	Max	14	27.7	14.9	19.1	36.3	3	25.0	8.7	3.5	46.5	-	-	-	-	-	-	-	-	-	-	17	27.2	13.8	20.1	34.3
Pectoral Sandpiper	Min	-	-	-	-	-	3	11.0	12.5	-20.0	42.0	1	1.0	NA	NA	NA	-	-	-	-	-	4	8.5	11.4	-9.6	26.6
Pectoral Sandpiper	Max	-	-	-	-	-	3	16.7	7.6	-2.3	35.6	1	1.0	NA	NA	NA	-	-	-	-	-	4	12.8	10.0	-3.2	28.7

Table 8b. Seasonal and Annual Mean Flight Heights of Other Large-bodied Species

Species	Flight Height[a]	Spring					Summer					Fall					Winter					Year-Round				
		Sample Size[b]	Mean Flight Height (m)	SD[c]	Lower 95% CI Bound[d]	Upper 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Lower 95% CI Bound[d]	Upper 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Lower 95% CI Bound[d]	Upper 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Lower 95% CI Bound[d]	Upper 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Lower 95% CI Bound[d]	Upper 95% CI Bound[d]
Solitary Sandpiper	Min	-	-	-	-	-	1	2.0	NA	NA	NA	4	10.3	6.6	-0.3	20.8	-	-	-	-	-	5	8.6	6.8	0.2	17.0
Solitary Sandpiper	Max	-	-	-	-	-	1	2.0	NA	NA	NA	4	14.3	4.3	7.3	21.2	-	-	-	-	-	5	11.8	6.6	3.5	20.1
Spotted Sandpiper	Min	1	1.0	NA	NA	NA	1	1.0	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	2	1.0	0.0	1.0	1.0
Spotted Sandpiper	Max	1	1.0	NA	NA	NA	1	5.0	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	2	3.0	2.8	-22.4	28.4
Unknown Shorebird	Min	-	-	-	-	-	3	15.3	14.5	-20.7	51.4	3	2.7	2.1	-2.5	7.8	-	-	-	-	-	6	9.0	11.6	-3.1	21.1
Unknown Shorebird	Max	-	-	-	-	-	3	15.3	14.5	-20.7	51.4	3	8.0	3.5	-0.6	16.6	-	-	-	-	-	6	11.7	10.3	0.9	22.4
Upland Sandpiper[II]	Min	14	9.7	11.0	3.3	16.1	11	18.2	20.5	4.4	32.0	7	6.0	6.6	-0.1	12.1	-	-	-	-	-	32	11.8	14.8	6.5	17.2
Upland Sandpiper[II]	Max	14	20.8	18.3	10.2	31.3	11	28.2	21.4	13.8	42.6	7	14.7	11.4	4.2	25.3	-	-	-	-	-	32	22.0	18.4	15.4	28.6
Willet[II]	Min	1	15.0	NA	NA	NA	2	1.0	0.0	1.0	1.0	-	-	-	-	-	-	-	-	-	-	3	5.7	8.1	-14.4	25.7
Willet[II]	Max	1	50.0	NA	NA	NA	2	8.0	9.9	-80.9	96.9	-	-	-	-	-	-	-	-	-	-	3	22.0	25.2	-40.7	84.7
Wilson's Phalarope[I]	Min	9	5.0	5.2	1.0	9.0	8	5.1	3.7	2.0	8.2	-	-	-	-	-	-	-	-	-	-	17	5.1	4.4	2.8	7.3
Wilson's Phalarope[I]	Max	9	8.4	8.9	1.6	15.3	8	8.8	4.7	4.8	12.7	-	-	-	-	-	-	-	-	-	-	17	8.6	7.0	5.0	12.2
Wilson's Snipe	Min	5	23.2	16.8	2.3	44.1	3	3.0	3.5	-5.6	11.6	2	57.5	60.1	-482.5	597.5	-	-	-	-	-	10	24.0	30.4	2.2	45.8
Wilson's Snipe	Max	5	36.2	26.7	3.1	69.3	3	28.3	16.1	-11.6	68.3	2	65.0	49.5	-379.7	509.7	-	-	-	-	-	10	39.6	29.0	18.9	60.3
All Shorebirds	**Min**	**79**	**10.8**	**11.4**	**8.3**	**13.4**	**79**	**6.2**	**10.6**	**3.8**	**8.6**	**45**	**11.7**	**16.1**	**6.9**	**16.5**	**-**	**-**	**-**	**-**	**-**	**203**	**9.2**	**12.5**	**7.5**	**10.9**
All Shorebirds	**Max**	**79**	**18.7**	**16.4**	**15.1**	**22.4**	**79**	**13.3**	**13.2**	**10.3**	**16.2**	**45**	**17.1**	**15.7**	**12.4**	**21.9**	**-**	**-**	**-**	**-**	**-**	**203**	**16.3**	**15.2**	**14.1**	**18.4**
		WADERS																								
Great Blue Heron	Min	-	-	-	-	-	-	-	-	-	-	6	10.8	15.2	-5.1	26.8	-	-	-	-	-	6	10.8	15.2	-5.1	26.8
Great Blue Heron	Max	-	-	-	-	-	-	-	-	-	-	6	23.3	19.9	2.4	44.2	-	-	-	-	-	6	23.3	19.9	2.4	44.2
Great Egret	Min	1	25.0	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	25.0	NA	NA	NA
Great Egret	Max	1	35.0	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	35.0	NA	NA	NA
Sandhill Crane	Min	21	186.0	146.1	119.4	252.5	-	-	-	-	-	7	557.1	222.5	351.3	763.0	-	-	-	-	-	28	278.8	231.6	189.0	368.5
Sandhill Crane	Max	21	227.1	146.8	160.3	294.0	-	-	-	-	-	7	557.1	222.5	351.3	763.0	-	-	-	-	-	28	309.6	219.4	224.6	394.7
White-faced Ibis	Min	-	-	-	-	-	1	3.0	NA	NA	NA	3	7.0	0.0	7.0	7.0	-	-	-	-	-	4	6.0	2.0	2.8	9.2
White-faced Ibis	Max	-	-	-	-	-	1	3.0	NA	NA	NA	3	35.0	0.0	35.0	35.0	-	-	-	-	-	4	27.0	16.0	1.5	52.5
All Waders	**Min**	**22**	**178.6**	**146.7**	**113.6**	**243.7**	**1**	**3.0**	**NA**	**NA**	**NA**	**16**	**249.1**	**314.0**	**81.8**	**416.4**	**-**	**-**	**-**	**-**	**-**	**39**	**203.1**	**230.4**	**128.3**	**277.8**
All Waders	**Max**	**22**	**218.4**	**149.0**	**152.4**	**284.5**	**1**	**3.0**	**NA**	**NA**	**NA**	**16**	**259.1**	**306.1**	**96.0**	**422.2**	**-**	**-**	**-**	**-**	**-**	**39**	**229.6**	**225.9**	**156.3**	**302.8**
		WATERBIRDS																								
American White Pelican[II]	Min	9	63.3	86.1	-2.9	129.5	12	58.7	52.6	25.2	92.1	7	121.4	75.9	51.3	191.6	-	-	-	-	-	28	75.9	73.0	47.6	104.2
American White Pelican[II]	Max	9	86.1	83.0	22.3	149.9	12	110.8	140.5	21.5	200.1	7	128.6	75.1	59.1	198.0	-	-	-	-	-	28	107.3	107.8	65.5	149.1
Black Tern[I]	Min	7	44.6	50.1	-1.7	90.9	24	4.8	7.4	1.7	8.0	3	16.7	20.2	-33.6	66.9	-	-	-	-	-	34	14.1	27.9	4.3	23.8
Black Tern[I]	Max	7	63.3	66.7	1.6	125.0	24	9.6	8.5	6.0	13.2	3	21.7	15.9	-17.8	61.1	-	-	-	-	-	34	21.7	36.7	8.9	34.5
Bonaparte's Gull	Min	3	1.0	0.0	1.0	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	1.0	0.0	1.0	1.0
Bonaparte's Gull	Max	3	10.0	0.0	10.0	10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	10.0	0.0	10.0	10.0
California Gull	Min	2	1.0	0.0	1.0	1.0	15	5.6	5.2	2.7	8.5	-	-	-	-	-	-	-	-	-	-	17	5.1	5.1	2.4	7.7
California Gull	Max	2	6.5	4.9	-38.0	51.0	15	12.8	7.0	8.9	16.7	-	-	-	-	-	-	-	-	-	-	17	12.1	7.0	8.5	15.7

Table 8b. Seasonal and Annual Mean Flight Heights of Other Large-bodied Species

Species	Flight Height[a]	Spring					Summer					Fall					Winter					Year-Round				
		Sample Size[b]	Mean Flight Height (m)	SD[c]	Lower 95% CI Bound[d]	Upper 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Lower 95% CI Bound[d]	Upper 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Lower 95% CI Bound[d]	Upper 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Lower 95% CI Bound[d]	Upper 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Lower 95% CI Bound[d]	Upper 95% CI Bound[d]
Double-crested Cormorant	Min	6	28.7	18.2	9.5	47.8	7	24.3	11.3	13.8	34.8	7	51.4	21.9	31.1	71.7	-	-	-	-	-	20	35.1	20.8	25.3	44.9
Double-crested Cormorant	Max	6	40.8	13.9	26.2	55.5	7	34.3	20.1	15.7	52.9	7	68.6	44.5	27.4	109.7	-	-	-	-	-	20	48.3	32.3	33.1	63.4
Forster's Tern	Min	3	4.7	4.7	-7.1	16.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	4.7	4.7	-7.1	16.4
Forster's Tern	Max	3	20.7	21.1	-31.8	73.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	20.7	21.1	-31.8	73.1
Franklin's Gull[I]	Min	29	49.9	59.4	27.3	72.5	13	43.8	52.3	12.2	75.5	60	28.6	48.6	16.0	41.1	-	-	-	-	-	102	36.6	52.7	26.2	46.9
Franklin's Gull[I]	Max	29	61.7	59.0	39.2	84.1	13	59.6	56.5	25.4	93.8	60	87.5	60.4	71.9	103.1	-	-	-	-	-	102	76.6	60.4	64.7	88.5
Ring-billed Gull	Min	61	30.7	55.8	16.4	45.0	18	9.9	9.5	5.2	14.7	2	1.5	0.7	-4.9	7.9	-	-	-	-	-	81	25.4	49.4	14.5	36.3
Ring-billed Gull	Max	61	39.4	77.0	19.7	59.1	18	16.8	10.6	11.5	22.0	2	2.0	0.0	2.0	2.0	-	-	-	-	-	81	33.5	67.7	18.5	48.4
Unknown Gull	Min	9	11.6	10.3	3.6	19.5	28	12.0	33.4	-1.0	25.0	-	-	-	-	-	-	-	-	-	-	37	11.9	29.3	2.1	21.7
Unknown Gull	Max	9	17.0	8.4	10.6	23.4	28	16.3	33.2	3.4	29.2	-	-	-	-	-	-	-	-	-	-	37	16.5	29.0	6.8	26.2
All Waterbirds	**Min**	**129**	**34.9**	**55.3**	**25.2**	**44.5**	**117**	**18.5**	**34.1**	**12.2**	**24.7**	**79**	**37.7**	**55.1**	**25.3**	**50.0**	**-**	**-**	**-**	**-**	**-**	**325**	**29.6**	**49.3**	**24.3**	**35.0**
All Waterbirds	**Max**	**129**	**45.9**	**67.3**	**34.1**	**57.6**	**117**	**30.1**	**59.1**	**19.3**	**41.0**	**79**	**84.8**	**62.3**	**70.8**	**98.8**	**-**	**-**	**-**	**-**	**-**	**325**	**49.7**	**66.5**	**42.4**	**56.9**
		WATERFOWL																								
American Wigeon	Min	4	5.5	6.6	-5.0	16.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	5.5	6.6	-5.0	16.0
American Wigeon	Max	4	8.3	8.2	-4.8	21.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	8.3	8.2	-4.8	21.3
Blue-winged Teal	Min	8	1.0	0.0	1.0	1.0	5	1.0	0.0	1.0	1.0	1	1.0	NA	NA	NA	-	-	-	-	-	14	1.0	0.0	1.0	1.0
Blue-winged Teal	Max	8	3.5	2.9	1.1	5.9	5	4.0	2.0	1.5	6.5	1	1.0	NA	NA	NA	-	-	-	-	-	14	3.5	2.5	2.0	5.0
Cackling Goose	Min	10	58.5	28.5	38.1	78.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	58.5	28.5	38.1	78.9
Cackling Goose	Max	10	63.0	23.0	46.5	79.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	63.0	23.0	46.5	79.5
Canada Goose	Min	40	29.0	30.5	19.2	38.8	2	6.0	5.7	-44.8	56.8	22	19.3	13.0	13.6	25.1	-	-	-	-	-	64	25.0	25.8	18.5	31.4
Canada Goose	Max	40	34.1	29.6	24.6	43.6	2	10.0	7.1	-53.5	73.5	22	25.2	13.7	19.1	31.3	-	-	-	-	-	64	30.3	25.2	24.0	36.6
Common Goldeneye	Min	1	70.0	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	70.0	NA	NA	NA
Common Goldeneye	Max	1	70.0	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	70.0	NA	NA	NA
Common Merganser	Min	1	25.0	NA	NA	NA	-	-	-	-	-	1	35.0	NA	NA	NA	-	-	-	-	-	2	30.0	7.1	-33.5	93.5
Common Merganser	Max	1	25.0	NA	NA	NA	-	-	-	-	-	1	35.0	NA	NA	NA	-	-	-	-	-	2	30.0	7.1	-33.5	93.5
Gadwall	Min	14	7.7	9.3	2.4	13.1	8	7.5	9.9	-0.8	15.8	1	3.0	NA	NA	NA	-	-	-	-	-	23	7.4	9.1	3.5	11.4
Gadwall	Max	14	18.5	15.0	9.9	27.1	8	18.1	16.3	4.5	31.7	1	20.0	NA	NA	NA	-	-	-	-	-	23	18.4	14.7	12.1	24.8
Greater White-fronted Goose	Min	16	37.2	13.9	29.8	44.6	-	-	-	-	-	6	308.3	111.4	191.4	425.3	-	-	-	-	-	22	111.1	135.5	51.0	171.2
Greater White-fronted Goose	Max	16	59.4	13.4	52.2	66.5	-	-	-	-	-	6	308.3	111.4	191.4	425.3	-	-	-	-	-	22	127.3	126.3	71.3	183.3
Green-winged Teal	Min	3	1.0	0.0	1.0	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	1.0	0.0	1.0	1.0
Green-winged Teal	Max	3	18.7	27.2	-48.9	86.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	18.7	27.2	-48.9	86.3
Lesser Scaup[II]	Min	-	-	-	-	-	1	4.0	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	1	4.0	NA	NA	NA
Lesser Scaup[II]	Max	-	-	-	-	-	1	12.0	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	1	12.0	NA	NA	NA
Mallard	Min	66	18.1	28.4	11.1	25.1	25	9.3	10.8	4.9	13.8	7	23.4	16.1	8.6	38.3	-	-	-	-	-	98	16.2	24.6	11.3	21.2
Mallard	Max	66	25.2	28.0	18.3	32.1	25	16.1	11.1	11.5	20.7	7	31.0	10.7	21.1	40.9	-	-	-	-	-	98	23.3	24.2	18.4	28.1
Northern Pintail[II]	Min	25	21.6	44.9	3.1	40.1	5	2.2	2.7	-1.1	5.5	-	-	-	-	-	-	-	-	-	-	30	18.4	41.5	2.9	33.9

Table 8b. Seasonal and Annual Mean Flight Heights of Other Large-bodied Species

Species	Flight Height[a]	Spring					Summer					Fall					Winter					Year-Round				
		Sample Size[b]	Mean Flight Height (m)	SD[c]	Lower 95% CI Bound[d]	Upper 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Lower 95% CI Bound[d]	Upper 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Lower 95% CI Bound[d]	Upper 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Lower 95% CI Bound[d]	Upper 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Lower 95% CI Bound[d]	Upper 95% CI Bound[d]
Northern Pintail[II]	Max	25	29.7	44.1	11.5	47.9	5	2.6	2.5	-0.5	5.7	-	-	-	-	-	-	-	-	-	-	30	25.2	41.4	9.7	40.6
Northern Shoveler	Min	6	51.2	121.9	-76.8	179.1	6	1.0	0.0	1.0	1.0	2	15.0	0.0	15.0	15.0	-	-	-	-	-	14	24.5	79.5	-21.4	70.4
Northern Shoveler	Max	6	59.2	118.0	-64.7	183.0	6	5.0	5.1	-0.3	10.3	2	22.5	3.5	-9.3	54.3	-	-	-	-	-	14	30.7	77.8	-14.2	75.6
Redhead	Min	1	1.0	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1.0	NA	NA	NA
Redhead	Max	1	7.0	NA	NA	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	7.0	NA	NA	NA
Ross's Goose	Min	9	166.7	66.0	116.0	217.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	166.7	66.0	116.0	217.4
Ross's Goose	Max	9	166.7	66.0	116.0	217.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	166.7	66.0	116.0	217.4
Snow Goose	Min	72	142.5	104.9	117.8	167.2	-	-	-	-	-	8	111.3	64.2	57.5	165.0	-	-	-	-	-	80	139.4	101.7	116.7	162.0
Snow Goose	Max	72	150.1	99.6	126.7	173.5	-	-	-	-	-	8	126.3	59.0	76.9	175.6	-	-	-	-	-	80	147.8	96.3	126.3	169.2
Unknown Duck	Min	21	24.0	37.2	7.1	41.0	8	16.5	17.2	2.1	30.9	4	27.8	18.4	-1.6	57.1	-	-	-	-	-	33	22.7	31.2	11.6	33.7
Unknown Duck	Max	21	28.7	37.1	11.8	45.6	8	24.1	19.3	8.0	40.2	4	27.8	18.4	-1.6	57.1	-	-	-	-	-	33	27.5	31.3	16.4	38.6
Unknown Goose	Min	5	46.0	15.2	27.2	64.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	46.0	15.2	27.2	64.8
Unknown Goose	Max	5	61.0	19.5	36.8	85.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	61.0	19.5	36.8	85.2
All Waterfowl	**Min**	**302**	**56.7**	**81.1**	**47.5**	**65.8**	**60**	**7.7**	**10.9**	**4.9**	**10.5**	**52**	**67.5**	**103.5**	**38.7**	**96.3**	**-**	**-**	**-**	**-**	**-**	**414**	**50.9**	**80.4**	**43.2**	**58.7**
All Waterfowl	**Max**	**302**	**64.2**	**79.1**	**55.3**	**73.2**	**60**	**13.9**	**13.3**	**10.5**	**17.3**	**52**	**73.9**	**102.2**	**45.5**	**102.4**	**-**	**-**	**-**	**-**	**-**	**414**	**58.2**	**78.9**	**50.5**	**65.8**

[a] This column indicates if a particular row is providing results for the minimum (Min) or maximum (Max) flight height statistic.

[b] Sample size refers to the number of flocks (i.e., not individuals) that were detected in flight within 800 m of the point count station during standardized eagle use (60-minute) surveys. Birds that were heard-only or perched-only were not included in the flight height analysis. All detections are included in flight height analyses, independent of whether the detection occurred above or below 200 m in height.

[c] SD is the standard deviation of Mean Minimum or Maximum Flight Height. N/A indicates that standard deviation could not be calculated as the sample size is one.

[d] This column indicates either the upper or lower bound of the 95% confidence interval. N/A indicates that the confidence interval could not be calculated as the sample size is one.

- North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priority (SCP) are denoted with a superscript I, II, or III following the species name to indicate that it is Level 1, Level 2, or Level 3 SCP, respectively.

Table 9. Eagle-Minutes and Time within Rotor Swept Zone Summaries for Bald Eagles and Golden Eagles

	Spring	Summer	Fall	Winter	Annual Total
Annual Survey Effort (hours)	159	106	212	159	636
	Y2 EAGLE-MINUTES SUMMARY				
BAEA Eagle-Minutes[a]	8	0	49	19	76
BAEA Eagle-Minutes per Survey Hour	0.050	0.000	0.231	0.119	0.119
GOEA Eagle-Minutes	0	0	11	15	26
GOEA Eagle-Minutes per Survey Hour	0.000	0.000	0.052	0.094	0.041
	Y1 and Y2 EAGLE MINUTES COMBINED				
BAEA Eagle-Minutes[a]	50	1	82	24	157
BAEA Eagle-Minutes per Survey Hour	0.157	0.005	0.193	0.075	0.123
GOEA Eagle-Minutes	6	0	23	18	47
GOEA Eagle-Minutes per Survey Hour	0.019	0.000	0.054	0.057	0.037
	Y2 MINUTES WITHIN ROTOR SWEPT ZONE (RSZ) SUMMARY				
BAEA minutes within RSZ[b]	2.4	0	34.5	6	42.9
BAEA minutes within RSZ per Survey Hour	0.015	0.000	0.163	0.038	0.067
GOEA time within RSZ	0	0	5.6	6.2	11.8
GOEA minutes within RSZ per Survey Hour	0.000	0.000	0.026	0.039	0.019
	Y-1 and Y2 MINUTES WITHIN ROTOR SWEPT ZONE (RSZ) COMBINED				
BAEA minutes within RSZ[b]	20.2	0	45	8	73.2
BAEA minutes within RSZ per Survey Hour	0.064	0.000	0.106	0.025	0.058
GOEA time within RSZ	6	0	10.2	6.2	22.4
GOEA minutes within RSZ per Survey Hour	0.019	0.000	0.024	0.019	0.018

[a] Minutes within the standardized 800 m-radius by 200 m-high sample plot as described by the ECPG and final Eagle Rule. Each individual observation is rounded to the next highest integer. For example, and eagle observed for 1.3 minutes in flight within the sample plot is assigned two eagle minutes. Perched eagles and eagles outside of the sample plot are not assigned eagle minutes.

[b] Minutes within the rotor swept zone (RSZ) is used as a metric of flight behavior that could expose a passing bird to collision with operating turbine blades. RSZ represents a predetermined range of above-ground heights within a hypothetical turbine blade sweep of 35 - 150 m within the 800 m-radius sample plot. Measured to the 0.1 minute.

Table 10. Seasonal Raptor Mean Use by Point Count Station

Point Count Station	Spring			Summer			Fall			Winter			Full Year		
	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Standard Deviation	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Standard Deviation	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Standard Deviation	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Standard Deviation	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Standard Deviation
1	3	1.000	1.732	2	1.000	1.414	8	2.000	0.816	1	0.333	0.577	14	1.167	1.193
2	10	3.333	2.517	6	3.000	1.414	19	4.750	4.031	0	-	-	35	2.917	3.059
3	7	2.333	2.517	8	4.000	1.414	3	0.750	0.957	0	-	-	18	1.500	1.931
4	9	3.000	1.732	9	4.500	2.121	16	4.000	3.559	0	-	-	34	2.833	2.758
5	1	0.333	0.577	1	0.500	0.707	6	1.500	1.000	0	-	-	8	0.667	0.888
6	6	2.000	3.464	4	2.000	1.414	17	4.250	3.686	0	-	-	27	2.250	2.989
7	0	-	-	3	1.500	2.121	7	1.750	1.708	0	-	-	10	0.833	1.403
8	6	2.000	1.732	9	4.500	3.536	0	-	-	1	0.333	0.577	16	1.333	2.146
9	4	1.333	2.309	1	0.500	0.707	3	0.750	1.500	0	-	-	8	0.667	1.371
10	7	2.333	2.309	4	2.000	1.414	1	0.250	0.500	0	-	-	12	1.000	1.537
11	10	3.333	0.577	8	4.000	4.243	19	4.750	1.708	0	-	-	37	3.083	2.503
12	5	1.667	2.082	7	3.500	2.121	2	0.500	1.000	1	0.333	0.577	15	1.250	1.712
13	3	0.750	0.957	1	0.500	0.707	8	2.000	2.160	0	-	-	12	0.750	1.342
14[c]	0	-	-	4	2.000	0.000	1	0.250	0.500	N/A	N/A	N/A	5	0.625	0.916
15	2	0.667	0.577	9	4.500	6.364	15	3.750	4.349	1	0.333	0.577	27	2.250	3.519
16	4	1.333	1.528	1	0.500	0.707	6	1.500	1.291	1	0.333	0.577	12	1.000	1.128
17	8	2.667	2.309	2	1.000	0.000	12	3.000	1.414	0	-	-	22	1.833	1.801
18	2	0.667	0.577	4	2.000	2.828	5	1.250	1.500	1	0.333	0.577	12	1.000	1.348
19	5	1.667	1.528	3	1.500	2.121	11	2.750	2.217	0	-	-	19	1.583	1.832
20	2	0.667	1.155	2	1.000	0.000	2	0.500	0.577	2	0.667	1.155	8	0.667	0.778
21	10	3.333	4.163	10	5.000	0.000	9	2.250	1.708	4	1.333	1.155	33	2.750	2.417
22	5	1.667	1.155	3	1.500	2.121	11	2.750	4.193	0	-	-	19	1.583	2.575
23	8	2.667	1.528	5	2.500	2.121	2	0.500	1.000	0	-	-	15	1.250	1.603
24	2	0.667	0.577	4	2.000	1.414	2	0.500	1.000	0	-	-	8	0.667	0.985
25	9	3.000	4.359	7	3.500	4.950	6	1.500	1.291	0	-	-	22	1.833	2.823
26	12	4.000	3.000	10	5.000	5.657	22	5.500	3.109	0	-	-	44	3.667	3.525
29	10	3.333	3.055	8	4.000	0.000	4	1.000	1.155	1	0.333	0.577	23	1.917	2.109
30	8	2.667	0.577	6	3.000	1.414	5	1.250	1.500	0	-	-	19	1.583	1.505
31	5	1.667	2.082	5	2.500	3.536	3	0.750	0.957	0	-	-	13	1.083	1.730
32	4	1.333	1.528	10	5.000	4.243	20	5.000	5.598	0	-	-	34	2.833	3.996
33	4	1.333	0.577	2	1.000	1.414	10	2.500	2.380	2	0.667	1.155	18	1.500	1.624
34	0	-	-	3	1.500	2.121	17	4.250	1.893	1	0.333	0.577	21	1.750	2.261
37	9	3.000	1.000	10	5.000	4.243	14	3.500	2.380	1	0.333	0.577	34	2.833	2.480
38	2	0.667	0.577	2	1.000	1.414	7	1.750	1.258	0	-	-	11	0.917	1.084

Table 10. Seasonal Raptor Mean Use by Point Count Station

Point Count Station	Spring			Summer			Fall			Winter			Full Year		
	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Standard Deviation	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Standard Deviation	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Standard Deviation	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Standard Deviation	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Standard Deviation
39	8	2.667	2.082	11	5.500	7.778	12	3.000	3.559	1	0.333	0.577	32	2.667	3.576
40	6	2.000	0.000	2	1.000	0.000	17	4.250	3.775	0	-	-	25	2.083	2.644
41	6	2.000	2.000	3	1.500	2.121	13	3.250	2.754	0	-	-	22	1.833	2.209
42	9	3.000	2.646	4	2.000	0.000	10	2.500	3.697	0	-	-	23	1.917	2.539
43	1	0.333	0.577	5	2.500	2.121	5	1.250	1.500	0	-	-	11	0.917	1.379
44	4	1.333	2.309	2	1.000	1.414	10	2.500	1.000	3	1.000	1.732	19	1.583	1.564
45	5	1.667	2.082	1	0.500	0.707	3	0.750	1.500	0	-	-	9	0.750	1.357
46	7	2.333	1.528	3	1.500	2.121	14	3.500	2.646	0	-	-	24	2.000	2.174
47	3	1.000	1.732	0	-	-	3	0.750	0.500	1	0.333	0.577	7	0.583	0.900
48	7	2.333	2.082	4	2.000	2.828	23	5.750	7.089	0	-	-	34	2.833	4.549
49	3	1.000	0.000	5	2.500	2.121	7	1.750	3.500	0	-	-	15	1.250	2.137
50	3	1.000	0.000	8	4.000	2.828	20	5.000	8.124	0	-	-	31	2.583	4.870
51	11	3.667	4.726	9	4.500	6.364	11	2.750	3.594	0	-	-	31	2.583	3.753
52	5	1.667	2.082	1	0.500	0.707	22	5.500	7.853	0	-	-	28	2.333	4.849
53	4	1.333	0.577	2	1.000	0.000	12	3.000	4.761	0	-	-	18	1.500	2.780
54	9	3.000	1.732	4	2.000	0.000	9	2.250	2.500	0	-	-	22	1.833	1.899
55	12	4.000	6.083	5	2.500	2.121	8	2.000	1.414	1	0.333	0.577	26	2.167	3.099
56	8	2.667	2.082	8	4.000	4.243	15	3.750	2.363	0	-	-	31	2.583	2.575
57	11	3.667	3.512	6	3.000	1.414	14	3.500	2.517	1	0.333	0.577	32	2.667	2.498

[a] Total Std. Detections is the total number of standardized individuals detected within the 800 m–radius survey cylinder during standardized use surveys

[b] Mean Use is the total standardized detections divided by the total number of 60-minute point count surveys conducted within the season.

[c] Total Std. Detections and Mean Use are not applicable (N/A) at point 14 in the winter as this point was not accessible for surveys.

Table 11. Standardized Avian Use Surveys - Seasonal Mean Use by Species Group

	Spring					Fall				
Species Group	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/10 min. survey/survey plot)[c]**	**SD[d]**	**Occur. Freq.[e]**	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/10 min. survey/survey plot)[c]**	**SD[d]**	**Occur. Freq.[e]**
Large-bodied Corvid	6	0.05%	0.038	0.476	0.006	28	0.17%	0.132	1.720	0.019
Non-passerine (large)	46	0.38%	0.289	1.544	0.069	74	0.46%	0.349	1.742	0.075
Non-passerine (small)	35	0.29%	0.220	0.801	0.107	85	0.53%	0.401	1.108	0.189
Passerine	4725	39.21%	29.717	59.438	0.943	13617	85.02%	64.231	438.807	0.849
Raptor	41	0.34%	0.258	0.565	0.208	110	0.69%	0.519	1.009	0.311
Shorebird	113	0.94%	0.711	1.420	0.352	93	0.58%	0.439	1.467	0.179
Unknown Species Group	12	0.10%	0.075	0.485	0.031	39	0.24%	0.184	1.105	0.080
Upland Gamebird	43	0.36%	0.270	0.744	0.176	20	0.12%	0.094	0.576	0.047
Wader	420	3.49%	2.642	14.194	0.075	106	0.66%	0.500	3.562	0.061
Waterbird	412	3.42%	2.591	10.219	0.226	416	2.60%	1.962	9.091	0.108
Waterfowl	6196	51.42%	38.969	250.351	0.346	1429	8.92%	6.741	32.012	0.118
ALL BIRDS	**12049**	100.00%	**75.780**	**254.263**	**0.969**	**16017**	100.00%	**75.552**	**439.179**	**0.915**

[a] Total Std. Detections is the total number of standardized individuals detected within a 300-m radius (small-bodied species) or 800-m radius (large-bodied species) of the point count station during standardized use surveys. Because small-bodied birds species are the primary focus of diurnal avian use surveys, birds detected at all flight heights were recorded, analyzed, and presented in this table.

[b] % Comp. (i.e., percent composition) is the proportion of all birds that a particular species group comprises during the season using total standardized detections.

[c] Mean Use is the total standardized detections divided by the total number of 10-minute point count surveys conducted within the season.

[d] SD is the standard deviation of Mean Use.

[e] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species group was detected during the season.

APPENDICES

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APPENDIX A

POINT COUNT STATION LOCATIONS

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Appendix A. Point Count Station Locations

Point Count Station[a]	Latitude	Longitude
1	46.380	-99.644
2	46.365	-99.644
3	46.348	-99.645
4	46.354	-99.625
5	46.351	-99.561
6	46.348	-99.519
7	46.333	-99.603
8	46.336	-99.561
9	46.333	-99.519
10	46.319	-99.645
11	46.317	-99.603
12	46.319	-99.561
13	46.319	-99.519
14	46.312	-99.494
15	46.297	-99.653
16	46.297	-99.632
17	46.297	-99.603
18	46.297	-99.561
19	46.298	-99.540
20	46.299	-99.519
21	46.283	-99.498
22	46.283	-99.472
23	46.274	-99.608
24	46.267	-99.650
25	46.260	-99.629
26	46.259	-99.604

Point Count Station[a]	Latitude	Longitude
30	46.230	-99.615
31	46.230	-99.569
32	46.216	-99.711
33	46.221	-99.691
34	46.216	-99.607
37	46.198	-99.690
38	46.201	-99.610
39	46.201	-99.565
40	46.203	-99.545
41	46.187	-99.677
42	46.187	-99.655
43	46.187	-99.631
44	46.187	-99.604
45	46.187	-99.579
46	46.187	-99.542
47	46.168	-99.690
48	46.173	-99.669
49	46.165	-99.628
50	46.162	-99.566
51	46.341	-99.456
52	46.321	-99.456
53	46.305	-99.456
54	46.283	-99.650
55	46.297	-99.582
56	46.370	-99.686
57	46.371	-99.707

[a] Point count stations 27, 28, 35, and 36 were dropped for year 2 avian surveys due to land owner concerns and are therefore excluded from this list. Point count stations 54 and 55 were added as replacements for 27 and 28 during year 1 avian surveys, whereas point count stations 56 and 57 were added as replacements for 35 and 36 prior to the start of year 2 surveys.

APPENDIX B

SEASONAL SPECIES GROUP MEAN USE STATISTICS

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Appendix B-1. Seasonal Large-bodied Corvids, Large-bodied Non-Passerines, and Upland Gamebirds Use Statistics within the Project Area (Diurnal Avian Use Surveys)

	Spring					Fall				
Common Name	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/10 min. survey/survey plot)[c]**	**SD[d]**	**Occur. Freq.[e]**	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/10 min. survey/survey plot)[c]**	**SD[d]**	**Occur. Freq.[e]**
	LARGE-BODIED CORVIDS									
American Crow	6	1.000	0.038	0.476	0.006	27	0.964	0.127	1.719	0.014
Common Raven	0	-	-	-	-	1	0.036	0.005	0.069	0.005
ALL LARGE-BODIED CORVIDS	**6**	**1.000**	**0.038**	**0.476**	**0.006**	**28**	1.000	**0.132**	**1.720**	**0.019**
	LARGE-BODIED NON-PASSERINES									
Eurasian Collared Dove	4	0.087	0.025	0.193	0.019	5	0.068	0.024	0.343	0.005
Rock Pigeon	42	0.913	0.264	1.473	0.057	69	0.932	0.325	1.712	0.071
ALL LARGE-BODIED NON-PASSERINES	**46**	1.000	**0.289**	**1.544**	**0.069**	**74**	1.000	**0.349**	**1.742**	**0.075**
	UPLAND GAMEBIRDS									
Gray Partridge	1	0.023	0.006	0.079	0.006	2	0.100	0.009	0.137	0.005
Ring-necked Pheasant	33	0.767	0.208	0.529	0.164	9	0.450	0.042	0.281	0.028
Sharp-tailed Grouse[II]	9	0.209	0.057	0.467	0.019	9	0.450	0.042	0.490	0.014
ALL UPLAND GAMEBIRDS	**43**	**1.000**	**0.270**	**0.744**	**0.176**	**20**	**1.000**	**0.094**	**0.576**	**0.047**

[a] Total Std. Detections is the total number of standardized individuals detected within a 800-m radius of the point count station during standardized use surveys. Because

[b] % Comp. is the proportion of a particular species group that a particular species comprises during the season using total standardized detections.

[c] Mean Use is the total standardized detections divided by the total number of 10-minute point count surveys conducted within the season.

[d] SD is the standard deviation of Mean Use.

[e] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species was detected during the season.

- North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priortiy (SCP) are denoted with a superscript I or II following the species name to indicate that it is Level I or Level II SCP, respectively.

Appendix B-2. Seasonal Small-Bodied Non-Passerine, and Passerine, and Unknown Species Group Use Statistics within the Project Area (Diurnal Avian Use Surveys)

Common Name	Spring					Fall				
	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]
	SMALL-BODIED NON-PASSERINES									
Downy Woodpecker	2	0.057	0.013	0.112	0.013	1	0.012	0.005	0.069	0.005
Hairy Woodpecker	1	0.029	0.006	0.079	0.006	2	0.024	0.009	0.097	0.009
Mourning Dove	30	0.857	0.189	0.773	0.088	78	0.918	0.368	1.087	0.165
Northern Flicker	2	0.057	0.013	0.159	0.006	3	0.035	0.014	0.118	0.014
Red-headed Woodpecker[I]	0	-	-	-	-	1	0.012	0.005	0.069	0.005
ALL SMALL-BODIED NON-PASSERINES	**35**	**1.000**	**0.220**	**0.801**	**0.107**	**85**	**1.000**	**0.401**	**1.108**	**0.189**
	PASSERINES									
Alder Flycatcher	1	0.000	0.006	0.079	0.006	0	-	-	-	-
American Goldfinch	12	0.003	0.075	0.414	0.044	113	0.008	0.533	1.322	0.231
American Pipit	0	-	-	-	-	17	0.001	0.080	0.714	0.033
American Robin	19	0.004	0.119	0.650	0.063	49	0.004	0.231	1.492	0.052
American Tree Sparrow	7	0.001	0.044	0.482	0.013	3	0.000	0.014	0.153	0.009
Bank Swallow	13	0.003	0.082	0.886	0.013	3	0.000	0.014	0.153	0.009
Barn Swallow	13	0.003	0.082	0.405	0.050	274	0.020	1.292	6.697	0.222
Black-billed Magpie	0	-	-	-	-	1	0.000	0.005	0.069	0.005
Blue Jay	0	-	-	-	-	6	0.000	0.028	0.256	0.014
Bobolink[II]	22	0.005	0.138	0.521	0.075	30	0.002	0.142	0.607	0.075
Brewer's Blackbird	18	0.004	0.113	0.779	0.031	686	0.050	3.236	41.262	0.066
Brown Thrasher	4	0.001	0.025	0.193	0.019	1	0.000	0.005	0.069	0.005
Brown-headed Cowbird	141	0.030	0.887	2.264	0.214	16	0.001	0.075	0.656	0.024
Cedar Waxwing	0	-	-	-	-	2	0.000	0.009	0.097	0.009
Chestnut-collared Longspur[I]	55	0.012	0.346	1.079	0.151	92	0.007	0.434	1.777	0.108
Chipping Sparrow	2	0.000	0.013	0.112	0.013	9	0.001	0.042	0.368	0.024

Appendix B-2. Seasonal Small-Bodied Non-Passerine, and Passerine, and Unknown Species Group Use Statistics within the Project Area (Diurnal Avian Use Surveys)

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]
Clay-colored Sparrow	19	0.004	0.119	0.441	0.094	13	0.001	0.061	0.294	0.047
Cliff Swallow	9	0.002	0.057	0.377	0.031	13	0.001	0.061	0.458	0.028
Common Grackle	317	0.067	1.994	6.963	0.277	3968	0.291	18.717	212.562	0.071
Common Redpoll	25	0.005	0.157	1.315	0.031	9	0.001	0.042	0.263	0.028
Common Yellowthroat	0	-	-	-	-	1	0.000	0.005	0.069	0.005
Dark-eyed Junco	0	-	-	-	-	20	0.001	0.094	1.374	0.005
Eastern Bluebird	0	-	-	-	-	2	0.000	0.009	0.137	0.005
Eastern Kingbird	6	0.001	0.038	0.249	0.025	47	0.003	0.222	0.697	0.118
European Starling	49	0.010	0.308	1.587	0.094	79	0.006	0.373	2.364	0.061
Grasshopper Sparrow[l]	4	0.001	0.025	0.157	0.025	0	-	-	-	-
Harris's Sparrow	0	-	-	-	-	12	0.001	0.057	0.824	0.005
Horned Lark	258	0.055	1.623	2.757	0.579	218	0.016	1.028	2.168	0.335
House Sparrow	69	0.015	0.434	1.632	0.082	133	0.010	0.627	2.137	0.142
House Wren	1	0.000	0.006	0.079	0.006	1	0.000	0.005	0.069	0.005
Lapland Longspur	2294	0.486	14.428	51.960	0.346	1238	0.091	5.840	29.771	0.184
Least Flycatcher	1	0.000	0.006	0.079	0.006	1	0.000	0.005	0.069	0.005
Lincoln's Sparrow	0	-	-	-	-	1	0.000	0.005	0.069	0.005
Marsh Wren	0	-	-	-	-	1	0.000	0.005	0.069	0.005
Orchard Oriole	3	0.001	0.019	0.177	0.013	14	0.001	0.066	0.580	0.028
Palm Warbler	0	-	-	-	-	3	0.000	0.014	0.153	0.009
Pine Siskin	10	0.002	0.063	0.385	0.031	90	0.007	0.425	2.798	0.071
Purple Martin	1	0.000	0.006	0.079	0.006	0	-	-	-	-
Red-breasted Nuthatch	0	-	-	-	-	1	0.000	0.005	0.069	0.005
Red-winged Blackbird	1011	0.214	6.358	27.801	0.384	5906	0.434	27.858	238.760	0.203
Savannah Sparrow	14	0.003	0.088	0.380	0.063	17	0.001	0.080	0.362	0.057

Appendix B-2. Seasonal Small-Bodied Non-Passerine, and Passerine, and Unknown Species Group Use Statistics within the Project Area (Diurnal Avian Use Surveys)

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]
Say's Phoebe	1	0.000	0.006	0.079	0.006	0	-	-	-	-
Sedge Wren	11	0.002	0.069	0.517	0.025	9	0.001	0.042	0.313	0.019
Snow Bunting	0	-	-	-	-	16	0.001	0.075	0.684	0.019
Song Sparrow	10	0.002	0.063	0.268	0.057	22	0.002	0.104	0.400	0.075
Sprague's Pipit[I]	0	-	-	-	-	2	0.000	0.009	0.097	0.009
Tree Swallow	7	0.001	0.044	0.235	0.038	7	0.001	0.033	0.343	0.009
Unknown Blackbird	13	0.003	0.082	0.477	0.044	24	0.002	0.113	0.812	0.038
Unknown Finch	1	0.000	0.006	0.079	0.006	42	0.003	0.198	2.113	0.019
Unknown Passerine	34	0.007	0.214	0.749	0.119	132	0.010	0.623	2.072	0.189
Unknown Sparrow	6	0.001	0.038	0.273	0.025	33	0.002	0.156	0.645	0.080
Unknown Swallow	5	0.001	0.031	0.237	0.019	11	0.001	0.052	0.340	0.028
Unknown Warbler	0	-	-	-	-	3	0.000	0.014	0.153	0.009
Vesper Sparrow	33	0.007	0.208	0.540	0.145	17	0.001	0.080	0.387	0.052
Warbling Vireo	2	0.000	0.013	0.112	0.013	1	0.000	0.005	0.069	0.005
Western Kingbird	10	0.002	0.063	0.368	0.038	27	0.002	0.127	0.531	0.071
Western Meadowlark[II]	171	0.036	1.075	1.394	0.497	114	0.008	0.538	1.282	0.241
White-crowned Sparrow	0	-	-	-	-	1	0.000	0.005	0.069	0.005
White-throated Sparrow	0	-	-	-	-	3	0.000	0.014	0.206	0.005
Yellow Warbler	4	0.001	0.025	0.193	0.019	2	0.000	0.009	0.137	0.005
Yellow-headed Blackbird	19	0.004	0.119	0.741	0.044	39	0.003	0.184	1.614	0.033
Yellow-rumped Warbler	0	-	-	-	-	22	0.002	0.104	0.637	0.033
ALL PASSERINES	**4725**	**1.000**	**29.717**	**59.438**	**0.943**	**13617**	**1.000**	**64.231**	**438.807**	**0.849**
	UNKNOWN SPECIES GROUP									
Unknown Species	6	0.001	0.038	0.354	0.013	6	0.000	0.028	0.216	0.019

Appendix B-2. Seasonal Small-Bodied Non-Passerine, and Passerine, and Unknown Species Group Use Statistics within the Project Area (Diurnal Avian Use Surveys)

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]
ALL UNKNOWN SPECIES GROUP	**6**	**0.001**	**0.038**	**0.354**	**0.013**	**6**	**0.000**	**0.028**	**0.216**	**0.019**

[a] Total Std. Detections is the total number of standardized individuals detected within a 300-m radius of the point count station during standardized use surveys. Because small-bodied birds species are the primary focus of diurnal avian use surveys, birds detected at all flight heights were recorded, analyzed, and presented in this table.

[b] % Comp. (i.e., percent composition) is the proportion of a particular species group that a particular species comprises during the season using total standardized detections.

[c] Mean Use is the total standardized detections divided by the total number of 10-minute point count surveys conducted within the season.

[d] SD is the standard deviation of Mean Use.

[e] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species was detected during the season.

- North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priortiy (SCP) are denoted with a superscript I or II following the species name to indicate that it is Level I or Level II SCP, respectively.

Appendix B-3. Seasonal Raptor Use Statistics within the Project Area (Diurnal Avian Use Surveys)

	Spring					Fall				
Common Name	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/10 min. survey/survey plot)[c]**	**SD[d]**	**Occur. Freq.[e]**	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/10 min. survey/survey plot)[c]**	**SD[d]**	**Occur. Freq.[e]**
American Kestrel[II]	3	0.073	0.019	0.136	0.019	6	0.055	0.028	0.193	0.024
Bald Eagle[II]	4	0.098	0.025	0.157	0.025	3	0.027	0.014	0.118	0.014
Cooper's Hawk	0	-	-	-	-	1	0.009	0.005	0.069	0.005
Ferruginous Hawk[I]	2	0.049	0.013	0.112	0.013	0	-	-	-	-
Great Horned Owl	0	-	-	-	-	4	0.036	0.019	0.194	0.009
Merlin	0	-	-	-	-	1	0.009	0.005	0.069	0.005
Northern Harrier[II]	8	0.195	0.050	0.219	0.050	15	0.136	0.071	0.275	0.066
Red-tailed Hawk	17	0.415	0.107	0.348	0.094	30	0.273	0.142	0.423	0.118
Rough-legged Hawk	0	-	-	-	-	7	0.064	0.033	0.226	0.024
Swainson's Hawk[I]	2	0.049	0.013	0.112	0.013	27	0.245	0.127	0.531	0.075
Turkey Vulture	3	0.073	0.019	0.136	0.019	7	0.064	0.033	0.417	0.009
Unknown Buteo	2	0.049	0.013	0.112	0.013	5	0.045	0.024	0.181	0.019
Unknown Raptor	0	-	-	-	-	4	0.036	0.019	0.136	0.019
ALL RAPTORS	**41**	**1.000**	**0.258**	**0.565**	**0.208**	**110**	**1.000**	**0.519**	**1.009**	**0.311**

[a] Total Std. Detections is the total number of standardized individuals detected within a 800-m radius of the point count station during standardized use surveys. Because small-bodied birds species are the primary focus of diurnal avian use surveys, birds detected at all flight heights were recorded, analyzed, and presented in this table.

[b] % Comp. (i.e., percent composition) is the proportion of a particular species group that a particular species comprises during the season using total standardized detections.

[c] Mean Use is the total standardized detections divided by the total number of 10-minute point count surveys conducted within the season.

[d] SD is the standard deviation of Mean Use.

[e] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species was detected during the season.

- North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priortiy (SCP) are denoted with a superscript I or II following the species name to indicate that it is Level I or Level II SCP, respectively.

Appendix B-4. Seasonal Shorebirds, Waders, and Waterbirds Use Statistics within the Project Area (Diurnal Avian Use Surveys)

Common Name	Spring					Fall				
	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]
	SHOREBIRDS									
American Golden-Plover	0	-	-	-	-	1	0.011	0.005	0.069	0.005
Killdeer	58	0.513	0.365	0.733	0.245	72	0.774	0.340	1.207	0.170
Lesser Yellowlegs	2	0.018	0.013	0.159	0.006	2	0.022	0.009	0.137	0.005
Marbled Godwit[I]	9	0.080	0.057	0.281	0.044	0	-	-	-	-
Solitary Sandpiper	0	-	-	-	-	1	0.011	0.005	0.069	0.005
Spotted Sandpiper	1	0.009	0.006	0.079	0.006	0	-	-	-	-
Upland Sandpiper	20	0.177	0.126	0.682	0.082	14	0.151	0.066	0.538	0.024
Willet[II]	1	0.009	0.006	0.079	0.006	0	-	-	-	-
Wilson's Phalarope[I]	4	0.035	0.025	0.193	0.019	0	-	-	-	-
Wilson's Snipe	18	0.159	0.113	0.421	0.082	0	-	-	-	-
Unknown Shorebird	0	-	-	-	-	3	0.032	0.014	0.153	0.009
ALL SHOREBIRDS	**113**	**1.000**	**0.711**	**1.420**	**0.352**	**93**	**1.000**	**0.439**	**1.467**	**0.179**
	WADERS									
American Bittern[I]	1	0.002	0.006	0.079	0.006	0	-	-	-	-
Great Blue Heron	2	0.005	0.013	0.159	0.006	11	0.104	0.052	0.392	0.028
Great Egret	0	0.000	0.000	0.000	0.000	2	0.019	0.009	0.137	0.005
Sandhill Crane	417	0.993	2.623	14.196	0.063	93	0.877	0.439	3.545	0.028
ALL WADERS	**420**	**1.000**	**2.642**	**14.194**	**0.075**	**106**	**1.000**	**0.500**	**3.562**	**0.061**
	WATERBIRDS									
American Coot	10	0.024	0.063	0.368	0.031	59	0.142	0.278	1.783	0.038
American White Pelican[II]	62	0.150	0.390	4.022	0.019	2	0.005	0.009	0.137	0.005
Black Tern[I]	5	0.012	0.031	0.208	0.025	1	0.002	0.005	0.069	0.005
California Gull	8	0.019	0.050	0.488	0.019	0	-	-	-	-
Double-crested Cormorant	29	0.070	0.182	1.349	0.019	2	0.005	0.009	0.097	0.009

Appendix B-4. Seasonal Shorebirds, Waders, and Waterbirds Use Statistics within the Project Area (Diurnal Avian Use Surveys)

	Spring					Fall				
Common Name	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/10 min. survey/survey plot)[c]**	**SD[d]**	**Occur. Freq.[e]**	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/10 min. survey/survey plot)[c]**	**SD[d]**	**Occur. Freq.[e]**
Franklin's Gull[I]	199	0.483	1.252	8.866	0.063	342	0.822	1.613	8.800	0.071
Pied-billed Grebe	2	0.005	0.013	0.112	0.013	7	0.017	0.033	0.356	0.014
Ring-billed Gull	45	0.109	0.283	1.137	0.113	2	0.005	0.009	0.097	0.009
Unknown Gull	52	0.126	0.327	2.356	0.050	1	0.002	0.005	0.069	0.005
ALL WATERBIRDS	**412**	**1.000**	**2.591**	**10.219**	**0.226**	**416**	**1.000**	**1.962**	**9.091**	**0.108**

[a] Total Std. Detections is the total number of standardized individuals detected within a 800-m radius of the point count station during standardized use surveys. Because small-bodied birds species are the primary focus of diurnal avian use surveys, birds detected at all flight heights were recorded, analyzed, and presented in this table.

[b] % Comp. (i.e., percent composition) is the proportion of a particular species group that a particular species comprises during the season using total standardized detections.

[c] Mean Use is the total standardized detections divided by the total number of 10-minute point count surveys conducted within the season.

[d] SD is the standard deviation of Mean Use.

[e] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species was detected during the season.

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Appendix B-5. Seasonal Waterfowl Use Statistics within the Project Area (Diurnal Avian Use Surveys)

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]
American Wigeon	3	0.000	0.019	0.177	0.013	1	0.001	0.005	0.069	0.005
Blue-winged Teal	29	0.005	0.182	0.980	0.050	16	0.011	0.075	0.500	0.028
Cackling Goose	157	0.025	0.987	8.654	0.019	0	-	-	-	-
Canada Goose	195	0.031	1.226	6.900	0.170	267	0.187	1.259	7.627	0.047
Canvasback[II]	2	0.000	0.013	0.112	0.013	0	-	-	-	-
Common Merganser	8	0.001	0.050	0.501	0.013	0	-	-	-	-
Gadwall	36	0.006	0.226	1.079	0.069	19	0.013	0.090	0.932	0.009
Greater White-fronted Goose	345	0.056	2.170	21.403	0.013	205	0.143	0.967	14.079	0.005
Green-winged Teal	5	0.001	0.031	0.237	0.019	1	0.001	0.005	0.069	0.005
Mallard	57	0.009	0.358	1.711	0.113	223	0.156	1.052	10.200	0.019
Northern Pintail[II]	31	0.005	0.195	0.924	0.082	5	0.003	0.024	0.343	0.005
Northern Shoveler	13	0.002	0.082	0.435	0.044	12	0.008	0.057	0.373	0.024
Redhead	6	0.001	0.038	0.354	0.013	0	-	-	-	-
Ring-necked Duck	2	0.000	0.013	0.159	0.006	0	-	-	-	-
Ross's Goose	5	0.001	0.031	0.237	0.019	9	0.006	0.042	0.553	0.009
Snow Goose	5224	0.843	32.855	243.694	0.057	653	0.457	3.080	25.804	0.019
Tundra Swan	0	-	-	-	-	13	0.009	0.061	0.893	0.005
Unknown Duck	78	0.013	0.491	4.055	0.075	5	0.003	0.024	0.343	0.005
ALL WATERFOWL	**6196**	**1.000**	**38.969**	**250.351**	**0.346**	**1429**	**1.000**	**6.741**	**32.012**	**0.118**

[a] Total Std. Detections is the total number of standardized individuals detected within a 800-m radius of the point count station during standardized use surveys. Because small-bodied birds species are the primary focus of diurnal avian use surveys, birds detected at all flight heights were recorded, analyzed, and presented in this table.

[b] % Comp. (i.e., percent composition) is the proportion of a particular species group that a particular species comprises during the season using total standardized detections.

[c] Mean Use is the total standardized detections divided by the total number of 10-minute point count surveys conducted within the season.

[d] SD is the standard deviation of Mean Use.

Appendix B-5. Seasonal Waterfowl Use Statistics within the Project Area (Diurnal Avian Use Surveys)

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]

[e] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species was detected during the season.

- North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priortiy (SCP) are denoted with a superscript I or II following the species name to indicate that it is Level I or Level II SCP, respectively.

APPENDIX C

SPECIES OBSERVED DURING EAGLE USE AND DIURNAL AVIAN USE SURVEYS

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Appendix C. Species Observed during Eagle Use and Diurnal Avian Use Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Alder Flycatcher	*Empidonax alnorum*	X	N/A	-	N/A	-	-
American Avocet	*Recurvirostra americana*	-	-	X	-	SCP II	-
American Bittern	*Botaurus lentiginosus*	X	Incidental	Incidental	-	SCP I	-
American Coot	*Fulica americana*	X	X	X	-	-	-
American Crow	*Corvus brachyrhynchos*	X	-	X	-	-	-
American Golden-Plover	*Pluvialis dominica*	Incidental	-	X	-	-	-
American Goldfinch	*Spinus tristis*	X	Incidental	X	N/A	-	-
American Kestrel	*Falco sparverius*	X	X	X	-	SCP II	-
American Pipit	*Anthus rubescens*	Incidental	N/A	X	N/A	-	-
American Robin	*Turdus migratorius*	X	Incidental	X	N/A	-	-
American Tree Sparrow	*Spizelloides arborea*	X	N/A	X	N/A	-	-
American White Pelican	*Pelecanus erythrorhynchos*	X	X	X	-	SCP II	-
American Wigeon	*Mareca americana*	X	Incidental	X	-	-	-
Baird's Sandpiper	*Calidris bairdii*	-	Incidental	Incidental	-	-	-
Bald Eagle	*Haliaeetus leucocephalus*	X	X	X	X	SCP II	BGEPA
Baltimore Oriole	*Icterus galbula*	-	N/A	Incidental	N/A	-	-
Bank Swallow	*Riparia riparia*	X	Incidental	X	N/A	-	-
Barn Swallow	*Hirundo rustica*	X	Incidental	X	N/A	-	-
Black Tern	*Chlidonias niger*	X	X	X	-	SCP I	-
Black-billed Magpie	*Pica hudsonia*	Incidental	N/A	X	N/A	-	-
Black-crowned Night-Heron	*Nycticorax nycticorax*	-	-	Incidental	-	-	-
Blue Jay	*Cyanocitta cristata*	X	N/A	X	Incidental	-	-
Blue-winged Teal	*Spatula discors*	X	X	X	-	-	-
Bobolink	*Dolichonyx oryzivorus*	X	Incidental	X	N/A	SCP II	-
Bonaparte's Gull	*Chroicocephalus philadelphia*	X	-	-	-	-	-

Appendix C. Species Observed during Eagle Use and Diurnal Avian Use Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Brewer's Blackbird	*Euphagus cyanocephalus*	X	Incidental	X	N/A	-	-
Brown Thrasher	*Toxostoma rufum*	X	Incidental	X	N/A	-	-
Brown-headed Cowbird	*Molothrus ater*	X	Incidental	X	N/A	-	-
Bufflehead	*Bucephala albeola*	X	-	-	-	-	-
Cackling Goose	*Branta hutchinsii*	X	-	-	-	-	-
California Gull	*Larus californicus*	X	X	-	-	-	-
Canada Goose	*Branta canadensis*	X	X	X	-	-	-
Canvasback	*Aythya valisineria*	X	X	-	-	SCP II	-
Cattle Egret	*Bubulcus ibis*	Incidental	Incidental	-	-	-	-
Cedar Waxwing	*Bombycilla cedrorum*	-	Incidental	X	N/A	-	-
Chestnut-collared Longspur	*Calcarius ornatus*	X	Incidental	X	N/A	SCP I	-
Chipping Sparrow	*Spizella passerina*	X	Incidental	X	N/A	-	-
Clay-colored Sparrow	*Spizella pallida*	X	Incidental	X	N/A	-	-
Cliff Swallow	*Petrochelidon pyrrhonota*	X	Incidental	X	N/A	-	-
Common Goldeneye	*Bucephala clangula*	X	-	-	-	-	-
Common Grackle	*Quiscalus quiscula*	X	N/A	X	N/A	-	-
Common Merganser	*Mergus merganser*	X	-	X	-	-	-
Common Raven	*Corvus corax*	-	-	X	-	-	-
Common Redpoll	*Acanthis flammea*	X	N/A	X	Incidental	-	-
Common Yellowthroat	*Geothlypis trichas*	X	Incidental	X	N/A	-	-
Cooper's Hawk	*Accipiter cooperii*	Incidental	-	X	-	-	-
Dark-eyed Junco	*Junco hyemalis*	Incidental	N/A	X	N/A	-	-
Dickcissel	*Spiza americana*	-	Incidental	Incidental	N/A	SCP II	-
Double-crested Cormorant	*Phalacrocorax auritus*	X	X	X	-	-	-
Downy Woodpecker	*Dryobates pubescens*	X	N/A	X	Incidental	-	-

Appendix C. Species Observed during Eagle Use and Diurnal Avian Use Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Eastern Bluebird	*Sialia sialis*	Incidental	Incidental	X	N/A	-	-
Eastern Kingbird	*Tyrannus tyrannus*	X	Incidental	X	N/A	-	-
Eurasian Collared Dove	*Streptopelia decaocto*	X	Incidental	X	X	-	-
European Starling	*Sturnus vulgaris*	X	N/A	X	Incidental	-	-
Ferruginous Hawk	*Buteo regalis*	X	X	X	-	SCP I	-
Forster's Tern	*Sterna forsteri*	X	-	-	-	-	-
Franklin's Gull	*Leucophaeus pipixcan*	X	X	X	-	SCP I	-
Gadwall	*Mareca strepera*	X	X	X	-	-	-
Golden Eagle	*Aquila chrysaetos*	Incidental	-	X	X	SCP II	BGEPA
Grasshopper Sparrow	*Ammodramus savannarum*	X	Incidental	Incidental	N/A	SCP I	-
Gray Partridge	*Perdix perdix*	X	X	X	-	-	-
Great Blue Heron	*Ardea herodias*	X	Incidental	X	-	-	-
Great Egret	*Ardea alba*	X	-	X	-	-	-
Great Horned Owl	*Bubo virginianus*	X	X	X	X	-	-
Greater White-fronted Goose	*Anser albifrons*	X	-	X	-	-	-
Greater Yellowlegs	*Tringa melanoleuca*	X	X	Incidental	-	-	-
Green-winged Teal	*Anas crecca*	X	X	X	-	-	-
Hairy Woodpecker	*Dryobates villosus*	X	N/A	X	Incidental	-	-
Harris's Sparrow	*Zonotrichia querula*	Incidental	N/A	X	N/A	-	-
Hooded Merganser	*Lophodytes cucullatus*	X	-	-	-	-	-
Horned Grebe	*Podiceps auritus*	Incidental	Incidental	-	-	SCP I	-
Horned Lark	*Eremophila alpestris*	X	Incidental	X	N/A	-	-
House Sparrow	*Passer domesticus*	X	Incidental	X	N/A	-	-
House Wren	*Troglodytes aedon*	X	Incidental	X	N/A	-	-
Killdeer	*Charadrius vociferus*	X	X	X	-	-	-

Appendix C. Species Observed during Eagle Use and Diurnal Avian Use Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Lapland Longspur	*Calcarius lapponicus*	X	N/A	X	Incidental	-	-
Lark Sparrow	*Chondestes grammacus*	Incidental	N/A	-	N/A	-	-
LeConte's Sparrow	*Ammospiza leconteii*	-	Incidental	Incidental	N/A	SCP II	-
Least Flycatcher	*Empidonax minimus*	X	Incidental	X	N/A	-	-
Least Sandpiper	*Calidris minutilla*	-	X	X	-	-	-
Lesser Scaup	*Aythya affinis*	X	X	-	-	SCP II	-
Lesser Yellowlegs	*Tringa flavipes*	X	X	X	-	-	-
Lincoln's Sparrow	*Melospiza lincolnii*	Incidental	N/A	X	N/A	-	-
Loggerhead Shrike	*Lanius ludovicianus*	Incidental	Incidental	-	N/A	SCP II	-
Long-billed Dowitcher	*Limnodromus scolopaceus*	-	Incidental	-	-	-	-
Mallard	*Anas platyrhynchos*	X	X	X	Incidental	-	-
Marbled Godwit	*Limosa fedoa*	X	X	-	-	SCP I	-
Marsh Wren	*Cistothorus palustris*	-	N/A	X	N/A	-	-
Merlin	*Falco columbarius*	X	-	X	X	-	-
Mourning Dove	*Zenaida macroura*	X	Incidental	X	N/A	-	-
Nelson's Sparrow	*Ammospiza nelsoni*	-	Incidental	-	N/A	SCP I	-
Northern Flicker	*Colaptes auratus*	X	Incidental	X	N/A	-	-
Northern Harrier	*Circus hudsonius*	X	X	X	-	SCP II	-
Northern Pintail	*Anas acuta*	X	X	X	-	SCP II	-
Northern Shoveler	*Spatula clypeata*	X	X	X	-	-	-
Orange-crowned Warbler	*Oreothlypis celata*	Incidental	N/A	-	N/A	-	-
Orchard Oriole	*Icterus spurius*	X	Incidental	X	N/A	-	-
Osprey	*Pandion haliaetus*	-	-	Incidental	-	-	-
Palm Warbler	*Setophaga palmarum*	Incidental	N/A	X	N/A	-	-
Pectoral Sandpiper	*Calidris melanotos*	-	X	X	-	-	-

Appendix C. Species Observed during Eagle Use and Diurnal Avian Use Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Peregrine Falcon	*Falco peregrinus*	X	-	-	-	SCP III	-
Pied-billed Grebe	*Podilymbus podiceps*	X	X	X	-	-	-
Pine Siskin	*Setophaga palmarum*	X	N/A	X	N/A	-	-
Prairie Falcon	*Falco mexicanus*	-	X	X	X	SCP II	-
Purple Martin	*Falco peregrinus*	X	Incidental	-	N/A	-	-
Red-breasted Nuthatch	*Sitta canadensis*	-	N/A	X	N/A	-	-
Redhead	*Aythya americana*	X	X	-	-	-	-
Red-headed Woodpecker	*Melanerpes erythrocephalus*	-	Incidental	X	N/A	SCP I	-
Red-tailed Hawk	*Buteo jamaicensis*	X	X	X	-	-	-
Red-winged Blackbird	*Agelaius phoeniceus*	X	Incidental	X	N/A	-	-
Ring-billed Gull	*Larus delawarensis*	X	X	X	-	-	-
Ring-necked Duck	*Aythya collaris*	X	-	-	-	-	-
Ring-necked Pheasant	*Phasianus colchicus*	X	X	X	X	-	-
Rock Pigeon	*Columba livia*	X	X	X	X	-	-
Ross's Goose	*Anser rossii*	X	-	X	-	-	-
Rough-legged Hawk	*Buteo lagopus*	X	-	X	X	-	-
Ruddy Duck	*Oxyura jamaicensis*	Incidental	X	-	-	-	-
Sandhill Crane	*Antigone canadensis*	X	-	X	-	-	-
Savannah Sparrow	*Passerculus sandwichensis*	X	Incidental	X	N/A	-	-
Say's Phoebe	*Sayornis saya*	X	N/A	Incidental	N/A	-	-
Sedge Wren	*Cistothorus platensis*	X	Incidental	X	N/A	-	-
Semipalmated Plover	*Charadrius semipalmatus*	-	-	X	-	-	-
Semipalmated Sandpiper	*Calidris pusilla*	-	-	Incidental	-	-	-
Sharp-shinned Hawk	*Accipiter striatus*	X	-	X	-	-	-
Sharp-tailed Grouse	*Tympanuchus phasianellus*	X	X	X	X	SCP II	-

Appendix C. Species Observed during Eagle Use and Diurnal Avian Use Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Smith's Longspur	*Calcarius pictus*	Incidental	N/A	Incidental	N/A	-	-
Snow Bunting	*Plectrophenax nivalis*	-	N/A	X	Incidental	-	-
Snow Goose	*Anser caerulescens*	X	-	X	-	-	-
Snowy Owl	*Bubo scandiacus*	-	-	-	X	-	-
Solitary Sandpiper	*Tringa solitaria*	-	X	X	-	-	-
Song Sparrow	*Melospiza melodia*	X	Incidental	X	N/A	-	-
Sora	*Porzana carolina*	X	X	X	-	-	-
Spotted Sandpiper	*Actitis macularius*	X	X	X	-	-	-
Sprague's Pipit	*Anthus spragueii*	-	Incidental	X	N/A	SCP I	-
Swainson's Hawk	*Buteo swainsoni*	X	X	X	-	SCP I	-
Swainson's Thrush	*Catharus ustulatus*	Incidental	N/A	-	N/A	-	-
Swamp Sparrow	*Melospiza georgiana*	Incidental	N/A	-	N/A	-	-
Tree Swallow	*Tachycineta bicolor*	X	Incidental	X	N/A	-	-
Tundra Swan	*Cygnus columbianus*	-	-	X	-	-	-
Turkey Vulture	*Cathartes aura*	X	X	X	-	-	-
Upland Sandpiper	*Bartramia longicauda*	X	X	X	-	SCP II	-
Vesper Sparrow	*Pooecetes gramineus*	X	Incidental	X	N/A	-	-
Warbling Vireo	*Vireo gilvus*	X	Incidental	X	N/A	-	-
Western Kingbird	*Tyrannus verticalis*	X	Incidental	X	N/A	-	-
Western Meadowlark	*Sturnella neglecta*	X	Incidental	X	N/A	SCP II	-
White-crowned Sparrow	*Zonotrichia leucophrys*	Incidental	N/A	X	N/A	-	-
White-faced Ibis	*Plegadis chihi*	Incidental	X	X	-	-	-
White-throated Sparrow	*Zonotrichia albicollis*	-	N/A	X	N/A	-	-
Willet	*Tringa semipalmata*	X	X	Incidental	-	SCP II	-
Willow Flycatcher	*Empidonax traillii*	-	Incidental	-	N/A	-	-

Appendix C. Species Observed during Eagle Use and Diurnal Avian Use Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Wilson's Phalarope	*Phalaropus tricolor*	X	X	-	-	SCP I	-
Wilson's Snipe	*Gallinago delicata*	X	X	X	-	-	-
Wood Duck	*Aix sponsa*	Incidental	-	Incidental	-	-	-
Yellow Warbler	*Setophaga petechia*	X	N/A	X	N/A	-	-
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	X	Incidental	X	N/A	-	-
Yellow-rumped Warbler	*Setophaga coronata*	Incidental	N/A	X	N/A	-	-

[a] An "X" within a particular seasonal column indicates that species has been detected at least once within the project area over the course of standardized field studies (i.e., eagle use or diurnal avian use surveys). While diurnal avian use survey data were truncated at a distance of 300 m and 800 m for small and large bird analysis, respectively, all birds were recorded as standardized during these surveys and are therefore given an "X" if detected at any distance during spring or fall. As a result, some species may receive an "X" in the table above and be excluded from tables in Appendix B since the species was only detected beyond the 300 m or 800 m cut-offs. Small-bodied bird species generally receive an "N/A" in summer and winter as standardized surveys were only conducted for large-bodied birds during these seasons. However, species marked with "Incidental" indicate that the species was observed incidentally within the project area during the season.

[b] State conservation listing status indicates North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priority (SCP) Level I, II, or III.

[c] Federal Status Codes: BGEPA = Bald and Golden Eagle Protection Act; No federally threatened or endangered species were detected within the project area over the course of Year 2 avian studies.

TECHNICAL MEMORANDUM

Date: January 17, 2024

To: Andrew Krieger and Christopher Farmer; Badger Wind, LLC

From: Western EcoSystems Technology, Inc.

Subject: Badger Wind Project – 2024 Bald Eagle Nest Verification Survey

INTRODUCTION

Badger Wind, LLC (Badger Wind) is proposing the development of the Badger Wind Project (Project) in Logan and McIntosh counties, North Dakota (Figure 1). Badger Wind contracted Western EcoSystems Technology, Inc. (WEST) to complete a ground-based nest verification survey to determine if two previous bald eagle nests **(**nest IDs BAEA 19-01 and BAEA 21-01; Figure 1) located within two miles (mi; 3.2 kilometers [km]) of proposed turbine locations were present. Nest ID BAEA 19-01 was previously discovered in spring 2019 and was occupied, active in 2019 and 2020; however, in the spring of 2021, the nest was classified as missing. Nest ID BAEA 21-01 was discovered in March 2021 and was occupied, active for the breeding season.

METHODS

The ground-based nest verification survey did not follow US Fish and Wildlife (USFWS) Region 6 Guidance (USFWS 2021). An experienced WEST biologist completed the ground-based nest verification from accessible public roads within a maximum distance of 0.8 mi (1.3 km) from each nest location allowing for a thorough visual inspection of the habitat. The biologist spent a maximum of 30 minutes at each nest location scanning the area with binoculars and a high-powered scope. The ground survey was conducted between 0800 and 1200 hours.

RESULTS

One ground-based nest verification survey was conducted at both nest locations on January 5, 2024. BAEA 21-01 was identified in 2024 and is located in a deciduous tree (Figure 2). The nest was classified as being in good condition and inactive during the survey. No new nesting material was observed in the nest and no adult eagle was observed at the nest during the brief survey. BAEA 19-01 was missing during 2024 surveys and no other large stick nests were recorded in the vicinity of this location.

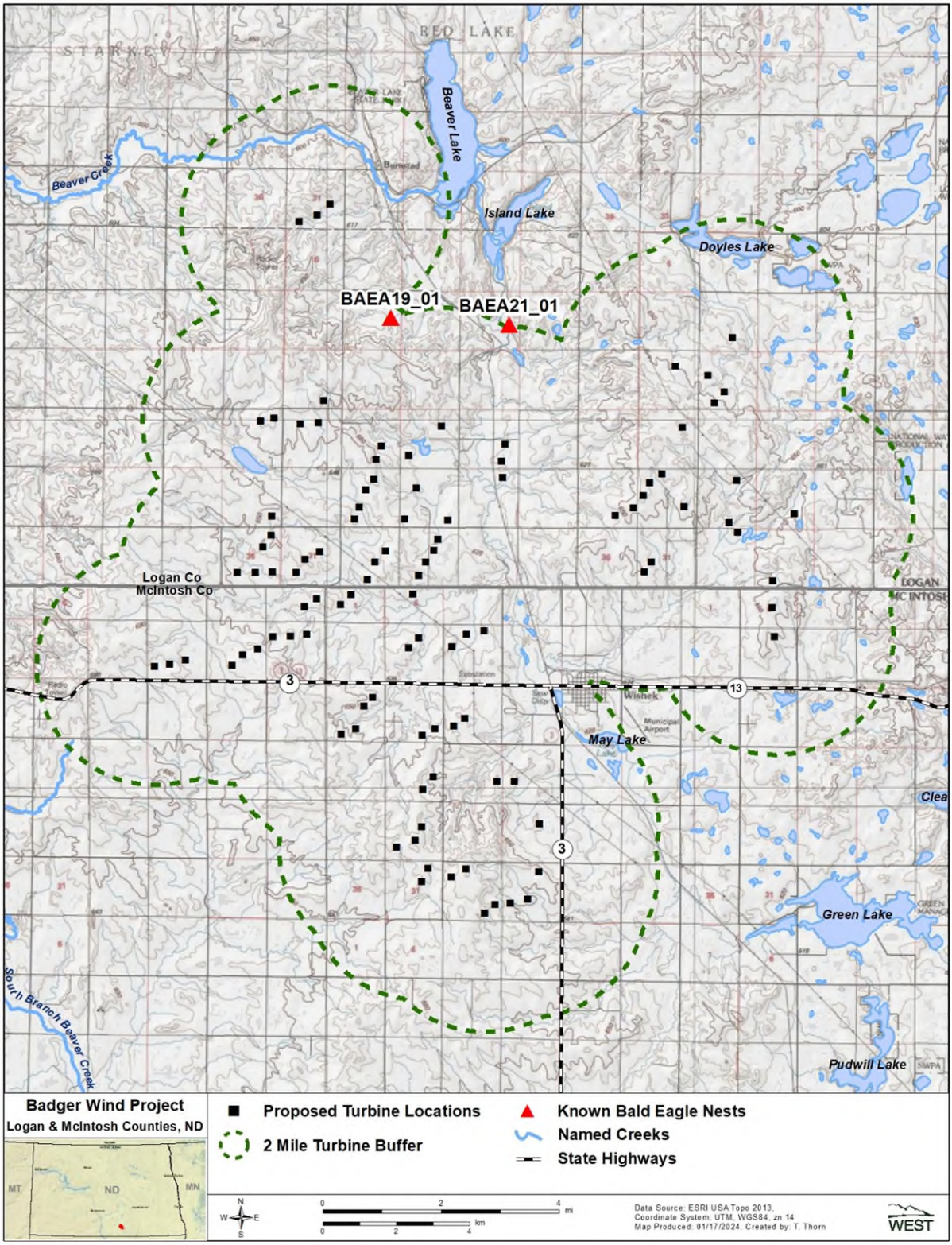

Figure 1. Bald eagle nest locations at the Badger Wind Energy Project in Logan and McIntosh counties, North Dakota.



Figure 2. Photos of BAEA21-01 nest identified at the Badger Wind Energy Project in Logan and McIntosh counties, North Dakota, January 5, 2024.

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YEAR 1 MIGRATION ACOUSTIC MONITORING

BADGER WIND PROJECT

Prepared for

Ørsted Onshore North America
401 N. Michigan Ave
Suite 501
Chicago, IL 60611

Atwell Project No. 19000785

DRAFT

Submitted by Atwell, LLC

April 18, 2020

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APPENDICES

Appendix A **Figure 1. Land cover in the project area (NLCD 2016)**
Figure 2. Acoustic monitoring locations
Figure 3. Nightly mean use
Figure 4. Hourly mean use
Figure 5. Species by detector
Figure 6. Call files by species and station
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Appendix B **Table 1. Nightly mean bat use per detector location**
Table 2. Hourly mean bat use per detector location
Table 3. Frequency of recorded bat calls at each detector (noise excluded).
Table 4. Frequency of all recordings at each detector (noise included).

Appendix C **Photo log**

1 INTRODUCTION

Ørsted Onshore North America (Ørsted) retained Atwell, LLC (Atwell) to conduct migration acoustic monitoring in accordance with the North Dakota Native Wildlife Resources: Guidelines for Reducing Impacts from Wind Energy Development for the Badger Wind Project (the project), an approximate 121,695-acre potential wind energy development site located in Logan and McIntosh counties, North Dakota (the project area) (Figure 1). The purpose of this monitoring is to conduct preconstruction surveys to evaluate bat activity at meteorological (MET) tower locations and ground stations representative of turbine locations.

1.1 STUDY AREA

Ørsted is currently in the early stages of developing a wind energy project in rural south-central North Dakota. The approximate center of the project area is near 46.239702N, -99.626697E. The project area, situated in Logan and McIntosh counties, is approximately 36 miles east of the Missouri River, 55 miles southeast of Bismarck, 54 miles southwest of Jamestown, and 11 miles north of the South Dakota border (Figure 1).

Approximately 60% (73,380 acres) of the 121,695-acre project area is in McIntosh County and approximately 40% (48,315 acres) is in Logan County. A network of paved and unpaved roads provides access throughout the project area. Farmsteads and associated buildings are scattered throughout the project area.

Based on topographic maps, satellite imagery, and review of the land-cover data, the project area consists predominantly of agricultural land and herbaceous land cover. Overall, the project area is dominated by agricultural land use and supports a mix of cultivated cropland, hayfields, pasturelands, and grasslands. A network of streams with herbaceous riparian buffers and scattered freshwater ponds, emergent wetlands, and livestock ponds are present. Emergent wetlands in this area are primarily classified as prairie potholes and are associated with a formerly glaciated landscape; however, the prairie pothole region primarily occurs to the north and east of the project area. Forested habitat is limited and highly fragmented, consisting primarily of planted shelterbelts. The general topography of the region and the project area can be described as undulating, with approximate elevations between 1,970 and 2,200 ft above mean sea level (amsl) within the project area.

1.2 NORTH DAKOTA STATE WILDLIFE ACTION PLAN

North Dakota Game and Fish Department (NDGFD) does not maintain a list of state-level threatened and endangered species (TES), but rather defaults to those species listed federally as those it recognizes with a threatened or endangered status (NDGFD 2015). The USFWS has primary oversight of TES in North Dakota.

The North Dakota State Wildlife Action Plan (SWAP) is the principle guiding document for safeguarding rare and declining species of fish and wildlife within the state. The plan places an emphasis on the protection of diverse native habitats to maximize the preservation of native wildlife diversity. The SWAP includes a list of 115 species of greatest conservation priority, and each has been given a priority designation based on conservation need (SCP Levels I, II, and III). SCP Level I are species that have declining populations in North Dakota or across their range, or are species that are at risk, range-wide, and have a high rate of occurrence in North Dakota constituting the core of the species breeding range. SCP Level I receives the most funding from the state wildlife grant. SCP Level II are species of moderate conservation priority, or species with a high level of conservation priority that receive a substantial level of monetary support from non-state wildlife grant funding. SCP Level III are species of moderate conservation priority but are peripheral or non-breeding in North Dakota (NDGFD 2016d). The SWAP has no regulatory authority over industrial development on private land (NDGFD 2016 pers. comm.). Should project development impact state-listed species of conservation concern on public lands, the SWAP could assist in providing steps to reduce or minimize these impacts.

1.3 BATS OF NORTH DAKOTA

Twelve species of bats are known to occur in North Dakota: Townsend's big-eared bat (*Corynorhinus townsendii*), big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*), eastern red bat (*Lasiurus borealis*), western red bat (*Lasiurus blossevillii*), hoary bat (*Aeorestes cinereus*), western small-footed bat (*Myotis ciliolabrum*), long-eared myotis (*Myotis evotis*), little brown bat (*Myotis lucifugus*), fringed myotis (*Myotis thysanodes*), long-legged myotis (*Myotis volans*), and northern long-eared bat (*Myotis septentronalis;* MYSE) (Nelson, Barnhart, and Gillam 2015). The MYSE is the only listed species and is federally threatened. NDGFD has classified Townsend's big-eared bat, big brown bat, little brown bat, and MYSE as SCP Level I, and western small-footed bat, long-eared myotis, and long-legged myotis as SCP Level III (Dyke, Johnson, and Isakson 2015).

According to Bat Conservation International species profiles, the ranges of Townsend's big-eared bat, western small-footed bat, long-eared myotis, and long-legged myotis include small portions of western North Dakota (BCI 2019). These four SCP are unlikely to occur within the project area and will not be discussed further.

Species that may occur, with varying likelihood, within the project area include (NDGFD 2016a; 2016b; 2016c; BCI 2019):

- eastern red bat (LABO)
- hoary bat (AECI)
- silver-haired bat (LANO)
- big brown bat (EPFU; SCP Level I)
- little brown bat (MYLU; SCP Level I)
- northern long-eared bat (MYSE; SCP Level I; Federally Threatened)

Additional information regarding these species and habitat within the project area can be found within the *Bat Habitat Assessment* dated January 23, 2020.

2 METHODS

2.1 Bat Migration Acoustic Monitoring

Acoustic surveys were completed during the summer (May 23 – July 14), and fall (July 15 – October 16) seasons in 2019. Five (5) Song Meter full spectrum ultrasonic detectors (SM3 or SM4; Wildlife Acoustics, Inc; www.wildlifeacoustics.com) were deployed at representative turbine locations utilizing available MET tower locations and ground locations within the project area.

2.2 Station Installment

Four ground-based stations (BMg1, BMg2, BMg3, BMg4) and one raised MET tower station (BMr2) were deployed using SM3 or SM4 detectors for the study (Figure 2). Detectors were positioned to record bat activity at approximately ground level and record activity within the rotary sweep zone (RSZ), in accordance with the North Dakota Native Wildlife Resources: Guidelines for Reducing Impacts from Wind Energy Development.

Each ground-based detector was secured to poly-vinyl chloride (PVC) tube encasing the microphone cable. Atop the PVC tubing was a 90-degree PVC elbow to secure the SMM-U1 external ultrasonic microphone. Allowing the microphone to sit parallel to the ground recording at an approximate height of 3m.

At BMr2, the microphone and microphone cable were raised using a K-bat pulley system installed on the MET tower. The SMM-U1 external ultrasonic microphone recorded at an approximate height of 50m, representative of the RSZ.

A photo log of all stations can be found in **Appendix C**.

2.3 Detector Deployment

All ground-based units were deployed on May 23, 2019 (BMg1, BMg2, BMg3, BMg4). The raised MET tower unit was deployed on July 30, 2019 (BMr2). Two MET towers were originally intended to be utilized at locations BM1 and BM2; however, damaged components prevented a raised deployment at BM1 and delayed deployment at BMr2 until MET tower repairs were made. BMg1 and BMr2 were initially deployed with SM3 units and switched to SM4 units on June 12, 2019, and September 4, 2019 respectively. All stations except BMg4 recorded activity through October 16, 2019. BMg4 had technical issues and recorded through October 9, 2019. Detectors monitored from approximately 30 minutes before sunset to 30 minutes after sunrise each night. Detectors were visited routinely to ensure units worked properly, to collect data, and to change data cards and batteries.

2.4 Call Analysis

Bat calls were identified using USFWS- approved Kaleidoscope Pro software (Wildlife Acoustics, Inc. v. 4.2.0) automated ID software. The following parameters were applied to the software (approved for use by USFWS):

- Classifier: NA 4.1.0
- "0" Sensitivity
- Approved for both Indiana bat and northern long-eared bat calls
- Analysis was set to include all species with ranges overlapping with project area

All bat calls underwent qualitative analysis by a biologist with sufficient bat acoustic call vetting experience through visual comparison of echolocation call metrics (i.e., call sequence activity and call duration, call slope, minimum frequency, and individual call characteristics representative of individual species). Species categories for analysis consisted of AECI (hoary bat), EPFU/LANO (big brown bat and silver-haired bat), LABO (eastern-red bat), little brown bat (MYLU), high frequency call (HF), and low frequency call (LF). Big brown bats and silver-haired bats were paired due to similar call characteristics. High frequency calls were distinguished as bat calls that exhibited call characteristics above 30khz (i.e., LABO, MYLU, MYSE, but either had degraded call sequence quality, limited amount of quality call pulses, or did not provide a quality search phase call to accurately apply a species identification. Similarly, the low frequency category included calls under 30khz that couldn't be classified to species. Recorded calls that did not exhibit any bat call pulses were categorized as "noise" and censored from species specific analysis.

2.5 Data Analysis

Data were organized and analyzed with Microsoft Excel, Program R, and Program RStudio (R Core Team 2018), RStudio TEAM 2018). The following statistics/data appearing in this report include:

- Detector Recording Effectiveness

- Site species richness
- High frequency and low frequency mean use
    - Nightly mean use
    - Hourly mean use
- Species Proportions
- Location Distribution of Species

Acoustic call data were standardized across time. Mean use statistics were calculated for each call frequency group (e.g., high frequency, low frequency, and all bats) per detector station per deployment period (e.g., detector nights or detector hours).

A detector night is equivalent to one detector properly operating for one entire night. Detector hours are defined as the number of hours a detector was properly operating for each detector night. It is important to note that mean use does not reflect absolute density of a particular call frequency group, and the number of a individuals present cannot be determined by number of calls identified. Standard errors (SE) are reported alongside of total bat calls per station mean use values. A bat pass was defined as a sequence of at least two echolocation calls (pulses) produced by an individual bat with no pause between calls.

Frequency of bat calls is the percentage that a particular species was recorded on completed detector nights per site and for completed detector nights per project area.

3 RESULTS

3.1 Survey Effectiveness

SM3 and SM4 units collected data for 602 detector nights, an overall 90.25% effectiveness for the study period. Survey effectiveness per detector unit ranged from 76.9% (BMg4) to 100% (BMg2). Stations BMr2, BMg3, and BMg1 accounted for 94.9%, 94.6%, and 87.1% effectiveness, respectfully. BMg4 detector malfunctioned late in the season, which hindered the detector's overall survey effectiveness.

3.2 Mean Use

Mean use by site and detector nights are displayed in Table 1 and Figure 3. Ground stations had a mean of 3.18 ± 0.31 SE bat passes per detector night and the MET tower station had a mean of 4.65 ± 1.60 SE bat passes per detector night.

All detectors were operational for 8,428 hours for the 602 detector nights. Ground stations and the MET station operated for 7,378 hours and 1,050 hours respectively. Mean use by hour and detector site are displayed in Table 2 and Figure 4. Ground stations had a mean of 0.21 ± 0.01 SE bat passes per hour and the MET tower station had a mean use of 0.31 ± 0.08 SE bat passes per hour.

Overall, bat mean use by night and by hour for each site is relatively low.

3.3 Species Percentages and Spatial Distribution

Throughout the survey period, 26,850 total files were recorded. Of these, 24,824 files (92.45%) were categorized as "Noise" and filtered out during automated and manual call analysis, leaving 2,026 total bat calls (Table 4).

Approximately 89% of all recorded bat activity came from low frequency species (AECI, EPFU, LANO, LF calls; Table 3). The remaining 11% of calls included LABO, MYLU, and HF calls. No federally threatened or endangered bat species were identified in analysis through either Kaleidoscope software or manual vetting of calls.

AECI had the highest frequency of calls across all stations (937 calls; 3.49% of call files; 46.3% of bat calls) followed by EPFU/LANO (757 calls; 2.82% of call files; 37.3% of bat calls), LABO (202 calls; 0.75% of call files; 9.97%), and MYLU (4 calls; .01% of call files; 0.20% of bat calls) (Table 3). HF and LF categorized bat calls made up 5.13% and 1.09% of bat calls, respectfully.

BMg4 (39.09%), BMg2 (18.36%), and BMr2 (17.23) had the highest percentage of bat calls across the project area. It is important to note that BMr2 was not deployed until late July, so there were fewer detector nights than any other station despite having a high percentage of overall bat call recordings.

AECI and EPFU/LANO had the highest percentage of bat calls per station (46.25% and 47.36%, respectfully). However, AECI made up a relatively low amount of total bat recordings at the raised (BMr2) station. EPFU/LANO had the highest percent of bat calls at BMg1, BMg2, BMr2. AECI had the highest percent of bat calls at BMg3 and BMg4 (Table 3; Figure 5). Additionally, a majority of all bat calls identified at location BMr2 were EPFU/LANO (7.90%) and LABO (6.81%). Approximately 68% of all LABO calls were collected at BMr2.

Only four *Myotis spp.* (all identified as MYLU; 0.2% of bat recordings) were recorded during the study. MYLU calls were dispersed across ground stations and were not concentrated at any detector location.

3.4 Temporal Species Distribution

All call files identified as bat calls are displayed by species categories and detector site across date and time in Figure 6. AECI exhibited peaks in activity in the evening, shortly after sunset, and also again just prior to sunrise throughout the season. EPFU/LANO activity was more distributed throughout the night, but had more concentrated activity in June, September and October. Activity was substantially lower for these species in July and August months. LABO species had distributions of activity throughout the survey period but were most notable in September. In addition, this peak in LABO activity occurred mostly at the raised station, BMr2 (Table 3).

Seasonal distribution of species is grouped by week in Figure 4. Overall bat passes recorded across the project area peaked in late-May and also again in late August/early September (Figure 7). Recorded bat passes across all species rapidly declined by late September.

Throughout most of the survey season, AECI was the dominant species detected across all stations and accounted for 46.25% of all bat recordings (Table 3). AECI exhibited the greatest frequency of bat passes during completed nights in the summer season (May 23 – July 14) while EPFU/LANO species had peak activity in the fall season (July 15 – October 16) (Figure 4). EPFU/LANO species accounted for 37.36% of all bat recordings and accounted for the second most recorded category. LABO accounted for the third highest percentage of all recorded bat calls (9.97%) and had the greatest total bat passes the week of September 2nd. Total bat calls were driven by AECI in May and June with EPFU/LANO species dominating most of the bat species activity in mid-August and September. No temporal distribution was evident of MYLU due to low total recorded calls.

4 DISCUSSION AND CONCLUSIONS

No federally threatened or endangered bat species were detected throughout the acoustic migration monitoring study.

Overall bat activity for throughout the project was low. Bat activity between ground-based stations and the MET tower station were similar (3.18 bat passes per detector nights, and 4.65 respectively). However, the MET tower station, BMr2, had significantly fewer detector nights and a shorter survey period than the ground-based units, making the sample size smaller and incurring a higher standard error (SE) than the ground-based bat passes per night (0.31 SE and 1.60 SE respectively). Thus, evaluating operational mortality risk during normal operations based on the MET tower station with year one data may not adequately depict comparable bat data between the RSZ and ground units within the project area.

The MET tower station recorded more HF bats compared to the ground-based stations, primarily due to increased LABO activity in the fall season. BMg4 had the highest bat activity compared to all stations, and this margin was largely driven by AECI (91 .9% of bat calls). BMg4 has very limited suitable habitat and/or shelterbelts within the vicinity of the station. However, the station is located on the northeast side of the project adjacent to the prairie pothole region described in the *Study Area* section of this report. AECI are large bats and accustomed to foraging in open areas, which may have yielded the increase in activity by this species. BMg3 had the lowest bat activity compared to all stations, with only 0.69% of all recording files were categorized as bat calls at BMg3. BMg3 is in a very open area of the project area and, comparative to other station locations, has the least amount of attractive bat habitat features within the surrounding area.

The majority of bat passes over the monitoring period were made by LF bats and a seasonal bimodal distribution was largely driven by LF bats in mid-May through mid-June (AECI activity dominating) and mid-August through mid-September (dominated by EPFU/LANO) (Figure 7). AECI also exhibited a nightly bimodal distribution (eavening and morning peaks), particulalry in June and July months, but AECI bat activity becomes less concentrated and more distributed across the night in the fall season (Figure 6).

EPFU and LANO species can exhibit similar call characteristics and can be difficult to adequately distinguish between. However, it is likely that EPFU/LANO peaks were driven by LANO migration, with May influxes being triggered by by the end of migration, and this migration may be more indicative of activity being more evenly distributed throughout the night rather than exhibiting a bimodal distribution. In September and October, this distribution is very likely driven by LANO migrations as well. Migratory tree bat species (AECI, LABO, LANO) are commonly recorded bat fatalities at wind facilities and are expected to be the most common fatalities at the project (AWWI 2018; Arnett et al. 2013). EPFU are common bat species and are also likely to occur within the project area as well.

Unlike low frequency species, high frequency species, such as MYLU and LABO, did not reflect these strong bimodal distributions in nightly activity. LABO did exhibit increased activity in late the fall season. Due to the relative absence of activity earlier in the study, it is likely that these influxes were more related to seasonal migration. MYLU call data is limitted (only four total calls), and no distinctive trends in activity are evident. Additionally, no MYSE (federally threatened) calls were detected. Suitable habitat within the project is limited for each of these species. MYSE is dependent on forest habitat for foraging and roosting during the summer season. There is minimal suitable habitat for MYSE within the project area as discussed in the *Bat Habitat Assessment Memorandum* submitted by Atwell. Migration monitoring is not intended to replace summer presence/absence studies for federally threatened and endangered species. Protocols for addressing threatened and endangered bat species presence/absence surveys at the project should be discussed with USFWS.

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APPENDIX A

FIGURES

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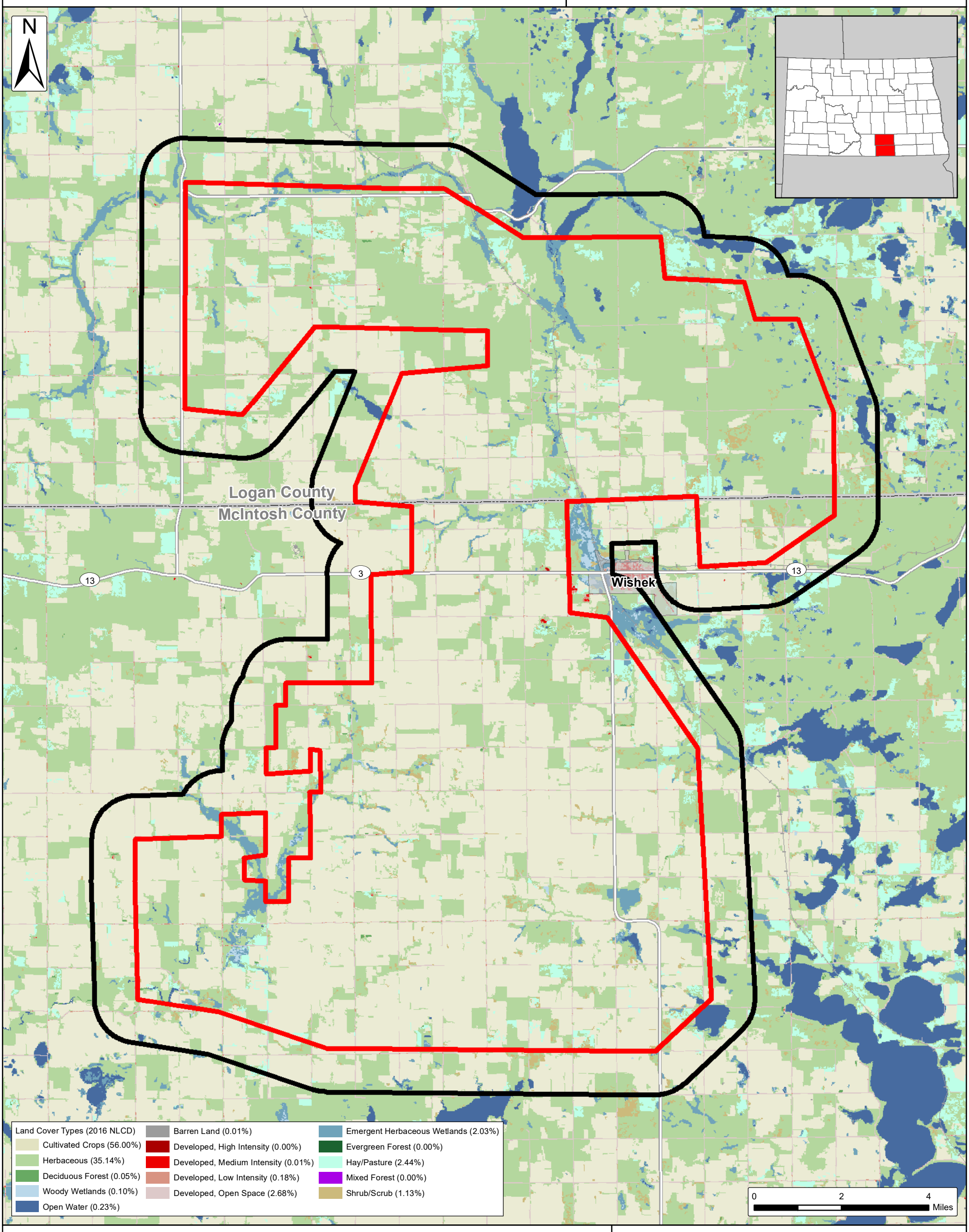
Figure 1.

Land Cover in the Project Area (NLCD 2016) Logan County & McIntosh County, North Dakota

Client:
Ørsted Onshore North America

Issue Date:
5/22/2019

Atwell, LLC Project:
19000785



Project Area
04/15/2019 (±121,695 Ac.)

1 Mile Buffer

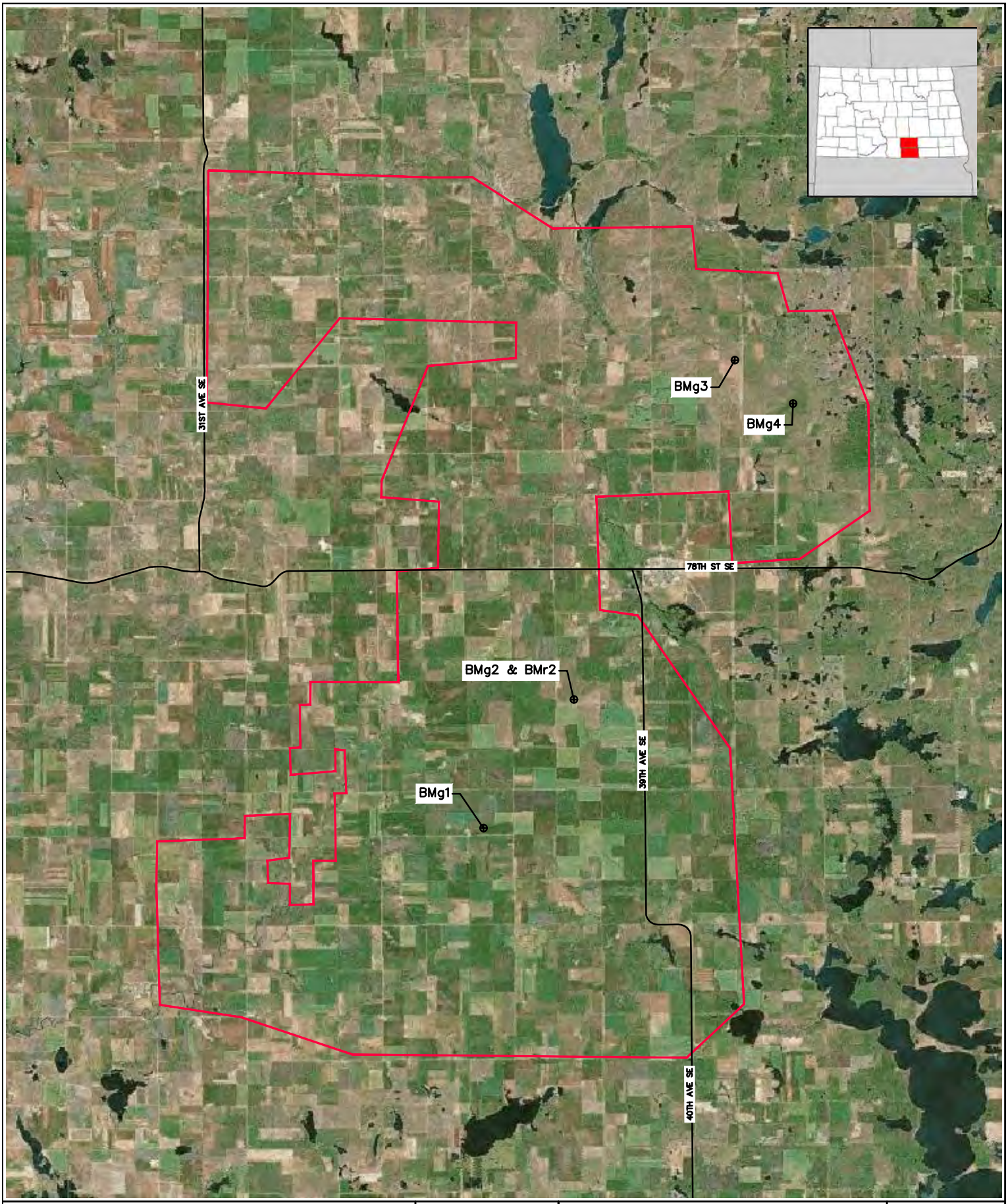
City/Village

Counties

SOURCE: NATIONAL LAND COVER DATABASE 2016 (USGS)

ATWELL

The information contained on this map is proprietary and confidential. The use or disclosure of this information by you to third parties is prohibited by law and may give rise to civil or criminal liability.



BADGER WIND PROJECT

Figure 2:

Acoustic Monitoring Locations

DRAWN BY: BS

DATE: 12-30-2019

0 7500 15000

SCALE: 1"=15000'

ATWELL

866.850.4200 www.atwell-group.com

CAD FILE: S:\19000785\DWG\ECOLOGICAL\ACOUSTIC REPORT DWG\19000785ACOUSTICS

Figure 3: Nightly Mean Use

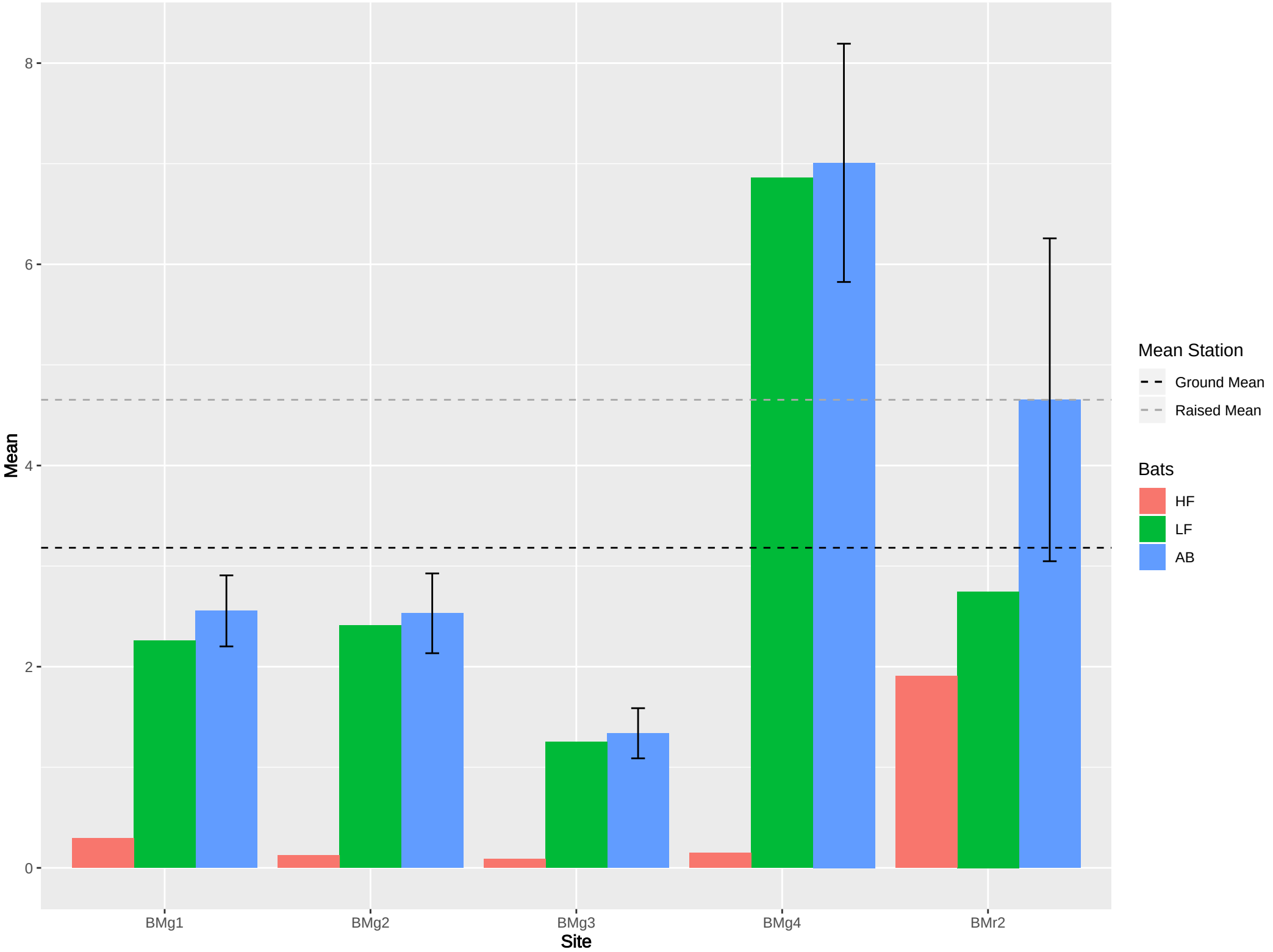


Figure 4: Hourly Mean Use

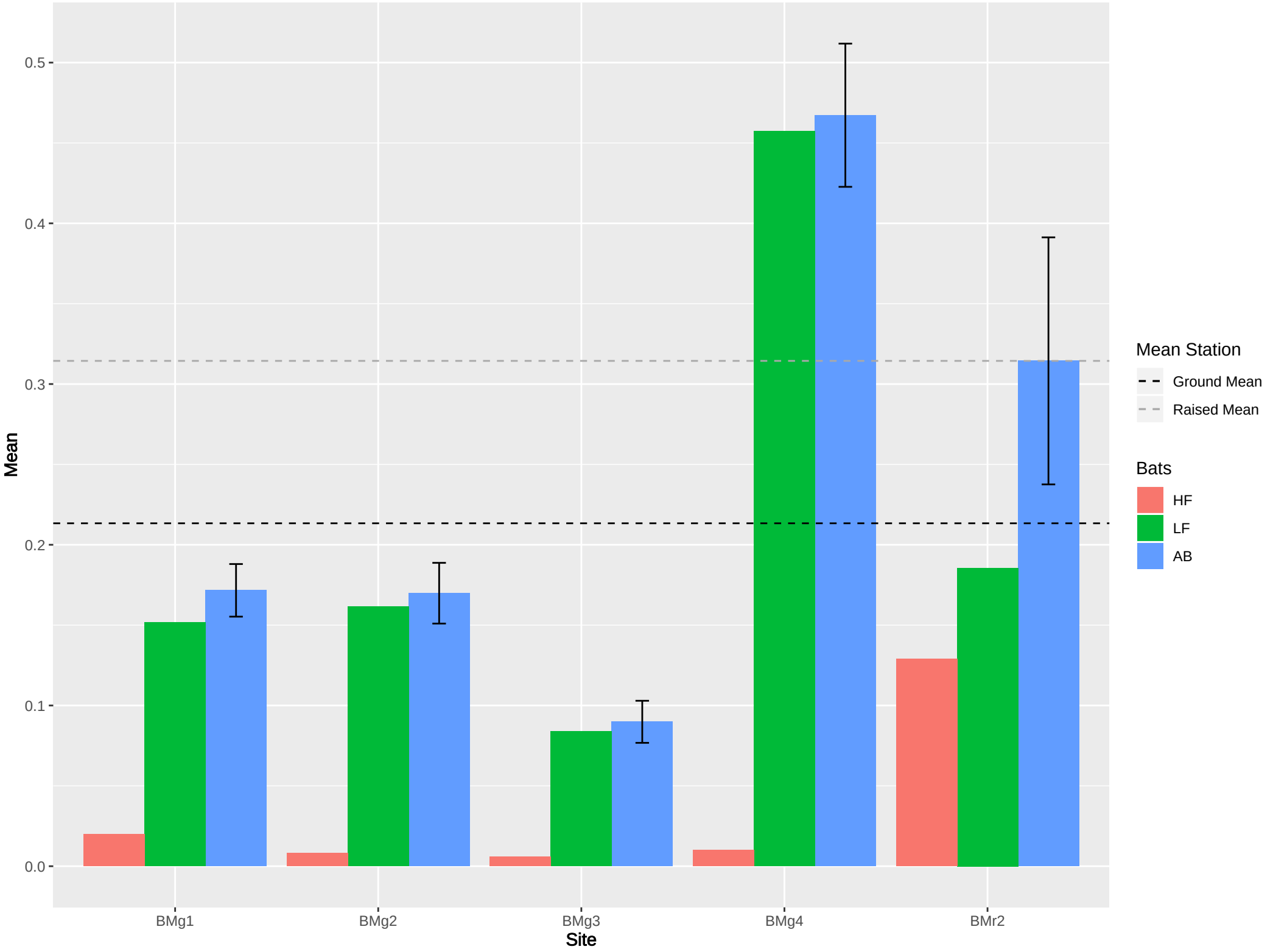


Figure 5: Species by Detector

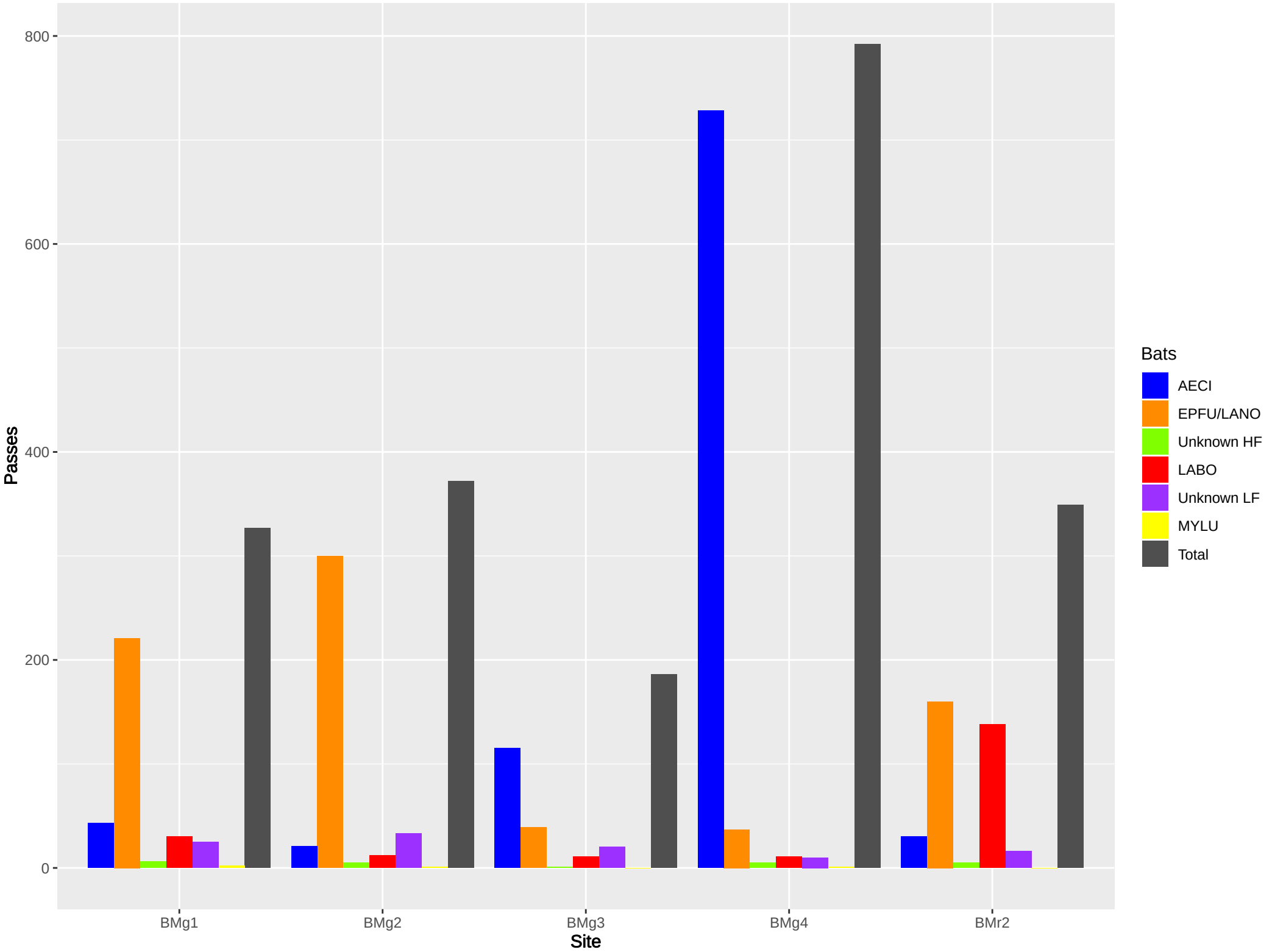


Figure 6: Call Files by Species and Site

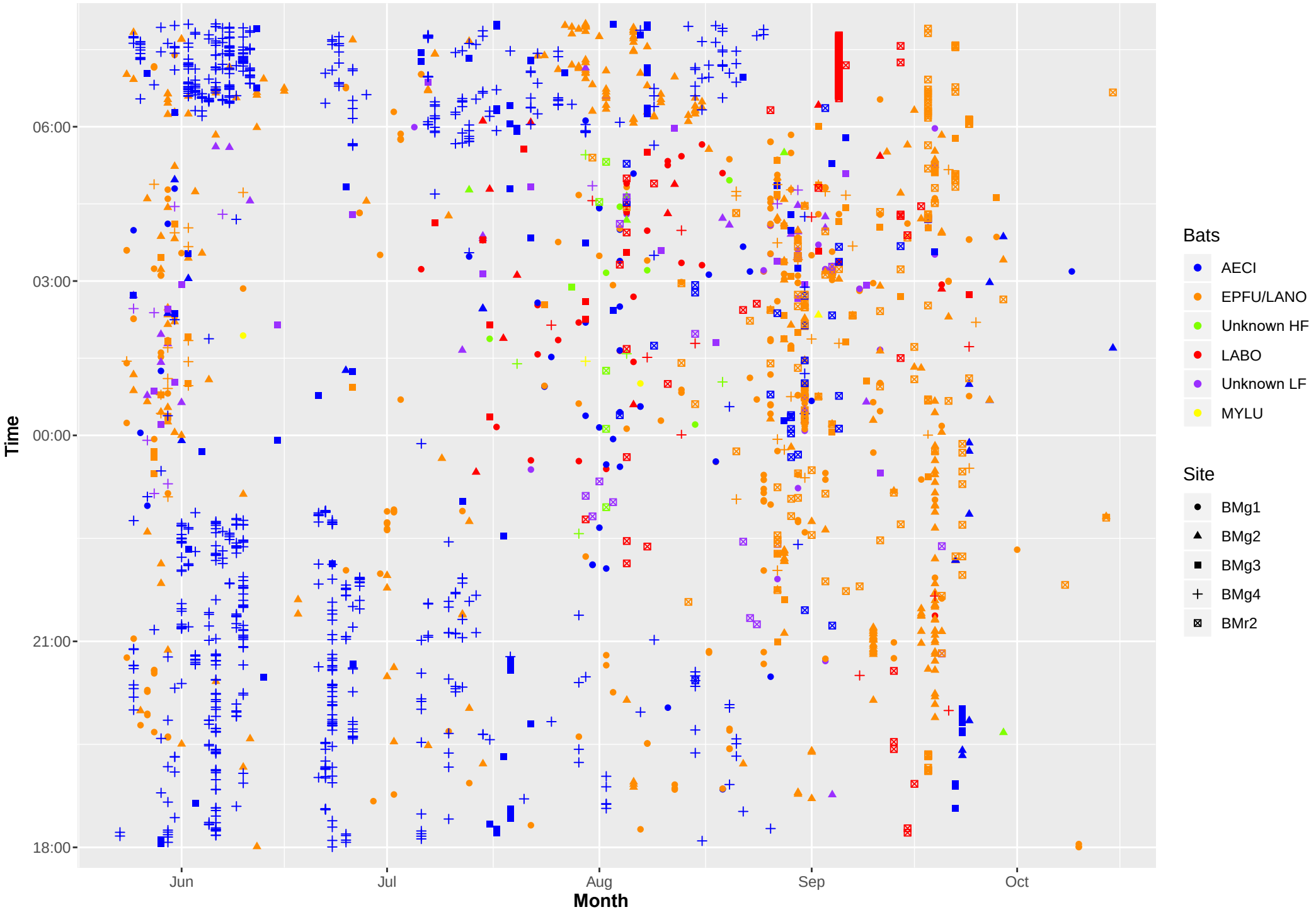
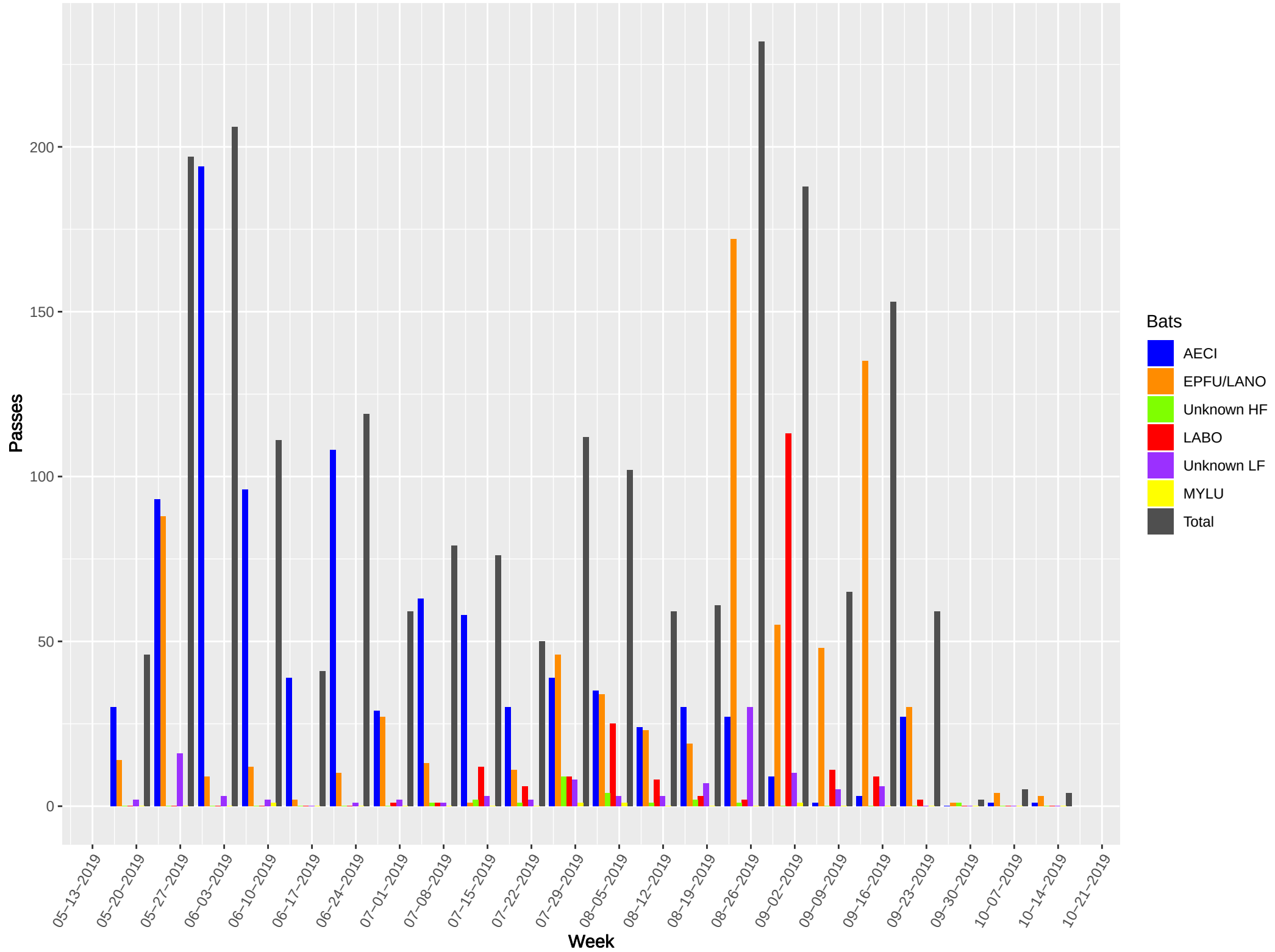


Figure 7: Species by Week



APPENDIX B

TABLES

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Table 1. Nightly mean bat use per detector location.

Station	Type	Bat Calls			Detector Nights	Mean Nightly Bat Passes (± SE)
		High Frequency	Low Frequency	Total		
BMg1	Ground	38	289	327	128	2.55 ± 0.35
BMg2	Ground	18	354	372	147	2.53 ± 0.40
BMg3	Ground	12	174	186	139	1.34 ± 0.25
BMg4	Ground	17	775	792	113	7.01 ± 1.18
BMr2	Raised	143	206	349	75	4.65 ± 1.60
Total Ground	Ground	85	1592	1677	527	3.18 ± 0.31
Total Raised	Raised	143	206	349	75	4.65 ± 1.60
Total	--	228	1798	2026	602	--

Table 2: Hourly mean bat use per detector location.

Station	Type	Bat Calls			Detector Hours	Mean Hourly Bat Passes (± SE)
		High Frequency	Low Frequency	Total		
BMg1	Ground	38	289	327	1792	0.17 ± 0.02
BMg2	Ground	18	354	372	2058	0.17 ± 0.02
BMg3	Ground	12	174	186	1946	0.09 ± 0.01
BMg4	Ground	17	775	792	1582	0.47 ± 0.04
BMr2	Raised	143	206	349	1050	0.31 ± 0.08
Total Ground	Ground	85	1592	1677	7378	0.21 ± 0.01
Total Raised	Raised	143	206	349	1050	0.31 ± 0.08
Total	--	228	1798	2026	8428	--

Table 3: Frequency of recorded bat calls at each detector (noise excluded).

Site	Call Analysis ID	Passes	Site Percentage	Project Percentage
BMg1	AECI	43	13.15%	2.12%
	EPFU/LANO	221	67.58%	10.91%
	HF	6	1.83%	0.30%
	LABO	30	9.17%	1.48%
	LF	25	7.65%	1.23%
	MYLU	2	0.61%	0.10%
	Station Total	*327*	-	*16.14%*
BMg2	AECI	21	5.65%	1.04%
	EPFU/LANO	300	80.65%	14.81%
	HF	5	1.34%	0.25%
	LABO	12	3.23%	0.59%
	LF	33	8.87%	1.63%
	MYLU	1	0.27%	0.05%
	Station Total	*372*	-	*18.36%*
BMg3	AECI	115	61.83%	5.68%
	EPFU/LANO	39	20.97%	1.92%
	HF	1	0.54%	0.05%
	LABO	11	5.91%	0.54%
	LF	20	10.75%	0.99%
	Station Total	*186*	-	*9.18%*
BMg4	AECI	728	91.92%	35.93%
	EPFU/LANO	37	4.67%	1.83%
	HF	5	0.63%	0.25%
	LABO	11	1.39%	0.54%
	LF	10	1.26%	0.49%
	MYLU	1	0.13%	0.05%
	Station Total	*792*	-	*39.09%*
BMr2	AECI	30	8.60%	1.48%
	EPFU/LANO	160	45.85%	7.90%
	HF	5	1.43%	0.25%
	LABO	138	39.54%	6.81%
	LF	16	4.58%	0.79%
	Station Total	*349*	-	*17.23%*
Totals	AECI	937	-	46.25%
	EPFU/LANO	757	-	37.36%
	HF	22	-	1.09%
	LABO	202	-	9.97%
	LF	104	-	5.13%
	MYLU	4	-	0.20%
Total Bat Calls		*2026*		100.00%

Table 4. Frequency of all recordings at each detector (includes noise).

Site	Call Analysis ID	Passes	Site Percentage	Project Percentage
BMg1	AECI	43	0.99%	0.16%
	EPFU/LANO	221	5.07%	0.82%
	HF	6	0.14%	0.02%
	LABO	30	0.69%	0.11%
	LF	25	0.57%	0.09%
	MYLU	2	0.05%	0.01%
	Noise	4028	92.49%	15.00%
BMg2	AECI	21	0.19%	0.08%
	EPFU/LANO	300	2.69%	1.12%
	HF	5	0.04%	0.02%
	LABO	12	0.11%	0.04%
	LF	33	0.30%	0.12%
	MYLU	1	0.01%	0.00%
	Noise	10762	96.66%	40.08%
BMg3	AECI	115	3.45%	0.43%
	EPFU/LANO	39	1.17%	0.15%
	HF	1	0.03%	0.00%
	LABO	11	0.33%	0.04%
	LF	20	0.60%	0.07%
	Noise	3147	94.42%	11.72%
BMg4	AECI	728	32.59%	2.71%
	EPFU/LANO	37	1.66%	0.14%
	HF	5	0.22%	0.02%
	LABO	11	0.49%	0.04%
	LF	10	0.45%	0.04%
	MYLU	1	0.04%	0.00%
	Noise	1442	64.55%	5.37%
BMr2	AECI	30	0.52%	0.11%
	EPFU/LANO	160	2.76%	0.60%
	HF	5	0.09%	0.02%
	LABO	138	2.38%	0.51%
	LF	16	0.28%	0.06%
	Noise	5445	93.98%	20.28%
Totals	AECI	937	--	3.49%
	EPFU/LANO	757	--	2.82%
	HF	22	--	0.08%
	LABO	202	--	0.75%
	LF	104	--	0.39%
	MYLU	4	--	0.01%
	Noise	24824		92.45%
Total Recordings		*26850*	24824	--

APPENDIX C

PHOTO LOG

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PHOTO LOG

Badger Wind Project

Logan and McIntosh Counties, North Dakota, May 23-October 16, 2019



Photo 1. A view of pastureland on site. Agricultural and grazing are common practices throughout the site.



Photo 2. Initial deployment of BMg1, with an SM3 unit, at ground level.



Photo 3. Initial deployment of BMg2, with an SM4 unit, at ground level.



Photo 4. Initial deployment of BMg3, with an SM4, at ground level.



Photo 5. Initial deployment of BMg4, with an SM4, at ground level.



Photo 6. Installing the microphone at BMr2. Initially deployed with an SM3. In background you can see BMg2.

YEAR 2 ACOUSTIC BAT MONITORING

BADGER WIND PROJECT

Prepared for

Badger Wind, LLC
401 N. Michigan Ave
Suite 501
Chicago, IL 60611

Atwell Project No. 19000785

Submitted by Atwell, LLC

March 5, 2021

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Appendix B Table 1. Nightly Mean Use per Station
Table 2. Hourly Mean Use per Station
Table 3. Frequency of Recorded Bat Passes (noise excluded).
Table 4. Frequency of All Files Recorded (noise included).

Appendix C Photo log

ACRONYMS AND ABBREVIATIONS

AECI	*Aeorestes cinereus* (hoary bat)
amsl	above mean sea level
BCI	Bat Conservation International
EPFU	*Eptesicus fuscus* (big brown bat)
ESA	Endangered Species Act
ft	feet
HF	High Frequency
kHz	kilohertz
LABO	*Lasiurus borealis* (eastern red bat)
LANO	*Lasionycteris noctivagans* (silver-haired bat)
LF	Low Frequency
MET	Meteorological Evaluation Tower
MRLC	Multi-Resolution Land Characteristics
MYLU	*Myotis lucifugus* (little brown bat)
MYSE	*Myotis septentrionalis* (northern long-eared bat)
MYSP	*Myotis* species
NDWWC	North Dakota Wind and Wildlife Collaboration
NLCD	National Land Cover Database
NDGFD	North Dakota Game and Fish Department
noID	No identification to species
PVC	Poly-vinyl Chloride
RSZ	Rotor Sweep Zone
SCP	Species of Conservation Priority
SE	Standard Error
SWAP	State Wildlife Action Plan
TES	Threatened and Endangered Species
USFWS	United States Fish and Wildlife Service

1 INTRODUCTION

Badger Wind, LLC (Badger Wind) a wholly owned subsidiary of Ørsted Onshore North America retained Atwell, LLC (Atwell) to conduct migration acoustic monitoring for the Badger Wind Project (the project), an approximately 121,695-acre potential wind energy development site located in Logan and McIntosh counties, North Dakota (the project area; Figure 1). Acoustic monitoring was conducted in accordance with North Dakota Native Wildlife Resources: Guidelines for Reducing Impacts from Wind Energy Development (NDWWC 2018). The purpose of this monitoring is to conduct pre-construction surveys to document bat activity at meteorological evaluation tower (MET) stations and ground stations at locations representative of turbine locations within the study area.

1.1 STUDY AREA

Badger Wind is currently in the early stages of developing a wind energy project in rural south-central North Dakota. The approximate centroid of the project area is near 46.239702°N, 99.626697°W. The project area, situated in Logan and McIntosh counties, is approximately 36 miles east of the Missouri River, 55 miles southeast of Bismarck, North Dakota, 54 miles southwest of Jamestown, North Dakota, and 11 miles north of the South Dakota border. Approximately 60% (73,380 acres) of the 121,695-acre project area is in McIntosh County and approximately 40% (48,315 acres) is in Logan County (Figure 1).

The project area is located within a largely rural landscape containing agricultural fields, herbaceous lands including pastures, and some dispersed single-family rural residences. A network of paved and unpaved roads provides access throughout the project area. According to the 2016 National Land Cover Database (NLCD), the major land use types within the project area include: cultivated crops (approximately 56% of the project area), and herbaceous land (approximately 35% of the project area; MRLC 2016). Overall, the project area is dominated by agricultural land use and supports a mix of cultivated cropland, hayfields, pasturelands, and grasslands. A network of streams with herbaceous riparian buffers and scattered freshwater ponds, emergent wetlands, and livestock ponds are present. Forested habitat is limited and highly fragmented, consisting primarily of planted shelterbelts. The general topography of the region and the project area can be described as undulating, with approximate elevations between 1,970 and 2,200 feet (ft) above mean sea level (amsl) within the project area.

1.2 NORTH DAKOTA STATE WILDLIFE ACTION PLAN

North Dakota Game and Fish Department (NDGFD) does not maintain a list of state-level threatened and endangered species (TES), but rather defaults to those species federally protected under the Endangered Species Act (ESA) as those it recognizes with a threatened or

endangered status (NDGFD 2015). The U.S. Fish and Wildlife Service (USFWS) has primary oversight of TES in North Dakota.

The North Dakota State Wildlife Action Plan (SWAP) is the principle guiding document for safeguarding rare and declining species of fish and wildlife within the state. The plan places an emphasis on the protection of diverse native habitats to maximize the preservation of native wildlife diversity. The SWAP includes a list of 115 species of greatest conservation priority, and each has been given a priority designation based on conservation need (Species of Conservation Priority [SCP] Levels I, II, and III). SCP Level I are species that have declining populations in North Dakota or across their range, or are species that are at risk, range-wide, and have a high rate of occurrence in North Dakota constituting the core of the species' breeding range. SCP Level I receive the most funding from the state wildlife grant. SCP Level II are species of moderate conservation priority, or species with a high level of conservation priority that receive a substantial level of monetary support from non-state wildlife grant funding. SCP Level III are species of moderate conservation priority but are peripheral or non-breeding in North Dakota (NDGFD 2016d). The SWAP has no regulatory authority over industrial development on private land (NDGFD 2016 pers. comm.). Should a project development impact state-listed species of conservation concern on public lands, the NDGFD and SWAP can assist in providing steps to reduce or minimize these impacts.

1.3 BATS OF NORTH DAKOTA

Eleven species of bats are known to occur in North Dakota: Townsend's big-eared bat (*Corynorhinus townsendii*), big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*), eastern red bat (*Lasiurus borealis*), , hoary bat (*Aeorestes cinereus*), western small-footed bat (*Myotis ciliolabrum*), long-eared myotis (*Myotis evotis*), little brown bat (*Myotis lucifugus*), fringed myotis (*Myotis thysanodes*), long-legged myotis (*Myotis volans*), and northern long-eared bat (*Myotis septentronalis;* MYSE) (Nelson, Barnhart, and Gillam 2015). The MYSE is the only listed species and is federally threatened. NDGFD has classified Townsend's big-eared bat, big brown bat, little brown bat, and MYSE as SCP Level I and western small-footed bat, long-eared myotis, and long-legged myotis as SCP Level III (Dyke, Johnson, and Isakson 2015).

According to Bat Conservation International (BCI) species profiles and previous studies in North Dakota, the ranges of Townsend's big-eared bat, western small-footed bat, long-eared myotis, fringed myotis, and long-legged myotis include small portions of western North Dakota (BCI 2019; Nelson, Barnhart, and Gillam 2015). These five SCP were only documented in the Badlands (Nelson, Barnhart, and Gillam 2015); thus, they are unlikely to occur within the project area and will not be discussed further.

Species that may occur, with varying likelihood, within the project area include (NDGFD 2016a; 2016b; 2016c; BCI 2019):

- eastern red bat (LABO)
- hoary bat (AECI)
- silver-haired bat (LANO)
- big brown bat (EPFU; SCP Level I)
- little brown bat (MYLU; SCP Level I)
- northern long-eared bat (MYSE; SCP Level I; federally threatened)

Additional information regarding these species and habitat within the project area can be found within the Bat Habitat Assessment dated January 23, 2020 (Atwell 2020).

2 METHODS

2.1 Bat Acoustic Monitoring

Acoustic surveys were completed during the spring (April 14 – May 15), summer (May 15 – August 15), and fall (August 16 – October 15) seasons in 2020. Six (6) Song Meter full spectrum ultrasonic detectors (SM3 or SM4; Wildlife Acoustics, Inc; www.wildlifeacoustics.com) were deployed at representative turbine locations utilizing available MET stations and ground stations within the project area. Refer to Figure 2 for monitoring station locations.

2.2 Station Installment

Four ground-based stations (BMg1, BMg2, BMg3, BMg4) and two raised MET stations (BMr1, BMr2) were deployed using SM3 or SM4 detectors for the study (Figure 2). Detectors installed on MET towers were positioned to record bat activity at approximately ground level and to record bat activity within the rotor sweep zone (RSZ), in accordance with the North Dakota Native Wildlife Resources: Guidelines for Reducing Impacts from Wind Energy Development (NDWWC 2018).

Each ground-based station included one detector that was secured to a poly-vinyl chloride (PVC) tube encasing the microphone cable. Atop the PVC tubing was a 90-degree PVC elbow to secure the SMM-U1 external ultrasonic microphone. Allowing the microphone to sit parallel to the ground recording at an approximate height of 3 meters (m).

MET stations (BMr1 and BMr2) were paired with a ground-based station (BMg1 and BMg2, respectively). Each MET station included one detector that was secured to fencing around the MET. Each microphone and microphone cable were raised using a K-bat pulley system installed on the MET. The SMM-U1 external ultrasonic microphones recorded acoustic data at an approximate height of 50 m, representative of the RSZ.

A photo log of all stations is included in Appendix C.

2.3 Detector Deployment

All ground-based detectors were deployed on April 15, 2020 (BMg1, BMg2, BMg3, BMg4). The raised MET detectors were deployed on April 14, 2020 (BMr1, BMr2). BMg2 was deployed with an SM3 detector, while all other stations were deployed with SM4 detectors. Detectors recorded from approximately 30 minutes before sunset to 30 minutes after sunrise each night during the monitoring period. Detectors were visited routinely to ensure units worked properly, to collect data, and to change data cards and batteries.

A detector night was equivalent to one detector properly operating for one entire night (30 minutes before sunset to 30 minutes after sunrise). Detector hours were defined as the number of hours a detector was properly operating for each detector night.

2.4 Acoustic Files Analysis

Acoustic files (files) were assessed using USFWS-approved Kaleidoscope Pro automated ID software (Wildlife Acoustics, Inc. v. 4.2.0) sand were identified to species when appropriate and where feasible. The following parameters were applied to the software (approved for use by USFWS; USFWS 2020):

- Classifier: NA 4.1.0
- "0" Sensitivity
- Approved for both Indiana bat and northern long-eared bat calls
- Analysis was set to include all species with ranges overlapping with project area

A bat pass was defined as a sequence of at least two echolocation calls (pulses) produced by an individual bat. Bat passes classified by the software as MYLU (little brown bat), MYSE (northern long-eared bat), or noID (indicating that a bat pass was identified but could not be categorized to species) underwent qualitative analysis by a biologist with sufficient bat acoustic call vetting experience through visual comparison of echolocation call metrics (i.e., call sequence activity and call duration, call slope, minimum frequency, and individual call characteristics representative of individual species). These files were manually vetted using the viewer in SonoBat acoustic software (v4.2.2 North America). Files were initially differentiated into two classes: high frequency calls (those with a low frequency above 30 kilohertz, kHz) and low frequency calls (those with a low frequency below 30 kHz). From here, files were identified to species/species group when possible or remained in the coarse high frequency call (HF) or low frequency call (LF) classification. Species categories evaluated for as part of the analysis consisted of AECI (hoary bat), EPFU/LANO (big brown bat and silver-haired bat), LABO (eastern-red bat), MYLU (little brown bat), MYSE (northern long-eared bat), and MYSP (unidentified myotis species). Additionally, any file that did not include obvious bat calls were classified as "noise" and removed from further analysis.

Low frequency bats included EPFU, LANO, and AECI. EPFU and LANO were paired due to similar call characteristics. The passes for EPFU and LANO were differentiated from AECI based on the low frequency of the calls in the sequence. EPFU and LANO calls are consistently above 25 kHz, while AECI calls are consistently below 25 kHz, with some calls below 20 kHz. If a mix of calls was found in the sequence or the recording was determined to be a bat but possessed too few calls for conclusive identification, they were classified as LF.

High frequency bats included LABO, MYLU, MYSE, and MYSP. Of the high frequency bats, LABO were differentiated from *Myotis* species by having long, sweeping calls with variable frequencies. *Myotis* calls possessed an obvious "tail" at the end of the call that is indicative of the genus in the state. Some calls of LABO, most notably feeding buzzes (a short duration call used when approaching prey items), can be confused as *Myotis* species. If enough of the LABO call sequence is recorded, the calls leading to the feeding buzz possess the typical characteristics of LABO and thus can be classified as such. MYSE and MYLU were differentiated by the shape and duration of the call as MYSE has a steeper, shorter duration call than MYLU (Humboldt State University Bat Lab 2011). Files were only classified as MYSE if all calls in the sequence possessed the steeper, shorter duration indicative of the species. If calls indicative of both MYSE and MYLU were present in the sequence, the pass was classified as MYSP. For files classified as MYSP, identification to the species level is inaccurate and inconclusive based on the bat passes recorded; therefore, the course identification to the *Myotis* genus is utilized for file classification. Similar to LF files, files classified as HF were inconclusive and could not be classified beyond the coarse identification.

2.5 Data Analysis

Data were organized and analyzed with Microsoft Excel, Program R, and Program RStudio (R Core Team 2019; R StudioTeam 2018). Statistics/data analysis in this report includes:

- Detector recording effectiveness
- Site species richness
- High frequency and low frequency mean use
    - Nightly mean use
    - Hourly mean use
- Species Proportions
- Location distribution of species

Acoustic data were standardized across time. Mean use statistics were calculated for each call frequency group (e.g., high frequency [HF], low frequency [LF], and all bats [Total]) per station per deployment period (e.g., detector nights or detector hours). It is important to note that mean use does not reflect absolute density of a particular call frequency group, and the number of individuals present cannot be determined by number of passes identified.

Standard errors (SE) are reported alongside total bat passes per station mean use values. To calculate the SE, bat passes were theoretically resampled 1,000 times using bootstrapping.

Frequency of bat passes is the percentage that a particular species was recorded on completed detector nights per station and for completed detector nights per project area.

3 RESULTS

3.1 Survey Effectiveness

SM3 and SM4 detectors collected data for 1,097 detector nights, an overall 99.73% effectiveness for the study period. Survey effectiveness per detector unit ranged from 98.36% (BMg2) to 100% (BMg1, BMg3, BMg4, BMr1, BMr2).

3.2 Mean Use

All detectors were operational for 15,358 hours over 1,097 detector nights. Mean use by station and detector nights are displayed in Table 1 and Figure 3. Across all six stations, the average number of bat passes per night was 1.03 ± 0.07 and an hourly mean of 0.07 ± 0.00. Ground stations had a mean of 1.01 ± 0.09 SE bat passes per detector night and the MET stations had a mean of 1.06 ± 0.11 SE bat passes per detector night. Ground stations and MET stations operated for 10,206 hours and 5,152 hours, respectively. Mean use by station and detector hours are displayed in Table 2 and Figure 4. Ground stations had a mean of 0.07 ± 0.00 SE bat passes per hour and MET stations had a mean use of 0.07 ± 0.00 SE bat passes per hour.

Overall, bat mean use by night and by hour for all detector locations was relatively low. BMg1 saw the highest mean use by night and by hour, 2.01 ± 0.30 SE and 0.13 ± 0.01 SE, respectively.

3.3 Species Percentages and Spatial Distribution

Throughout the survey period, 63,417 total files were recorded. Of these, 62,283 files (98.21%) were categorized as “Noise” and were consequently filtered out during automated identification and manual vetting, leaving 1,134 total bat passes for analysis (Table 4).

Approximately 81.66% of all recorded bat activity came from LF species (AECI, EPFU/LANO, LF passes). The remaining 18.34% of passes included HF species (LABO, MYLU, MYSP and HF passes). Following analysis using the automated Kaleidoscope software, nine files were classified as MYSE; however, following manual vetting, all nine files were debunked as noise files that were misidentified by the automated software. Of the remaining files analyzed, only two were manually classified as *Myotis* species as there were calls characteristic of MYSE and MYLU (one was classified by the automated software as noID and the other was classified as MYLU). It should be noted that MYSP is a course identification for *Myotis* spp. and identification to the species level was therefore not obtained. However, with only two files classified, MYSP only made up approximately 0.18% of all recorded bat passes. For a breakdown of recorded bat passes refer to Table 3.

EPFU/LANO had the highest frequency of passes across all stations (485 passes; 42.77% of bat passes) followed by AECI (418 passes; 36.86% of bat passes), LABO (202 passes; 17.81% of bat passes), MYLU (3 passes; 0.26% of bat passes), and MYSP (2 passes, 0.18% of bat passes; Table 3). HF and LF categorized bat passes made up 0.09% and 2.03% of bat passes, respectfully.

BMg1 possessed the highest number of bat passes among the six detector locations (370 passes; 32.63% of the bat passes) followed by BMr1 (204 passes; 17.99%), BMr2 (190 passes; 16.75%), BMg3 (161 passes; 14.20%), and BMg4 (102 passes; 8.99%). In comparisons of the MET locations with two simultaneously recording detectors, BM1 had more activity (574 passes) than BM2 (298 passes). Ground based units also recorded more activity (478 passes) than raised units (394 passes), but the sample size for these two comparisons was too small to test for statistical significance.

EPFU/LANO and AECI had the highest percentage of bat passes per station (42.77% and 36.86%, respectfully). However, AECI activity represented a minimal percentage of total bat passes at BMr2 (3.79%). EPFU/LANO had the highest percent of bat passes at BMg2, BMg3, BMg4, and BMr2. AECI had the highest percent of bat passes at BMg1 and BMr1 (Table 3; Figure 5). At MET locations where both detectors were recording, EPFU/LANO and AECI were more commonly detected at ground locations (180 and 234, respectively) than at raised locations (166 and 135, respectively). LABO was highest at BMg2 and BMr1 (24.26% and 22.77%, respectively). LABO was the only species more commonly detected at raised sites (91 passes) compared to ground sites (56 passes) at MET locations where two detectors were recording. Only five *Myotis* spp. files (three passes identified as MYLU; 0.26% of recorded bat activity, and two passes identified as MYSP, 0.18% of recorded bat activity) were recorded during the study, all of which occurred on ground-based detector locations.

3.4 Temporal Species Distribution

All files identified as bat passes are displayed by their identification through Kaleidoscope software and/or manual vetting (i.e., species and/or call frequency group) and station across date and time in Figure 6. AECI exhibited activity distributed throughout the night, including shortly after sunset and prior to sunrise, throughout the entire monitoring season. EPFU/LANO activity was also distributed throughout the night, but had more concentrated activity in May, June, September and October. Activity was substantially lower for these species from mid-June to mid-July. LABO had distributions of activity throughout the survey period but were most notable in August. In addition, this peak in LABO activity occurred mostly at the raised stations, BMr1 and BMr2 (Table 3).

Seasonal distribution of species is grouped by week in Figure 7. Overall bat passes recorded across the project area had a slight peak in late-April and early-May and had a large peak in

mid- and late-August (Figure 7). Recorded bat passes across all species rapidly declined by late-September.

Throughout most of the survey season, EPFU/LANO was the dominant species detected across all stations and accounted for 42.77% of all bat passes (Table 3). EPFU/LANO species had peak activity in the spring (April 14 – May 18) and fall (August 24 – September 28) seasons (Figure 7). AECI exhibited the greatest frequency of bat passes during nights in the summer season (May 18 – July 13) AECI accounted for 36.86% of all bat passes and accounted for the second most recorded identification category. LABO accounted for the third highest percentage of all recorded bat passes (17.81%) and had the greatest total bat passes in the late summer, early fall (July 27 – Aug 3), and at the end of the survey period in October. Total bat passes were driven by AECI in May, June, and July with EPFU/LANO species dominating most of the bat species activity in spring and fall. Four *Myotis* spp. (MYLU and MYSP) passes were detected in late July and a MYLU bat pass was also detected at the end of August.

4 DISCUSSION AND CONCLUSIONS

Overall bat activity throughout the project was low with an average of one bat pass per night. Due to the lack of suitable bat habitat in the project area (i.e., waterways and forested areas), this observation was expected as bats would have to commute longer distances from roost locations to forage in these areas. A preconstruction survey in similar habitat in South Dakota (approximately 200 km SE) yielded fewer than two passes per night (Pickle, Bishop-Boros, and Solick 2017). Bat activity between ground-based stations and MET stations were similar (1.01 ± 0.09 SE bat passes per detector night, and 1.06 ± 0.11 SE bat passes per detector night, respectively). However, MET stations had fewer detector nights than the ground-based stations, making the sample size smaller and incurring a slightly higher standard error (SE) than the ground-based mean.

BMg1 had the highest bat activity compared to all stations, and this higher activity was largely driven by AECI (58.92% of bat passes at BMg1). However, BMg1 has very limited suitable habitat and/or shelterbelts within the vicinity of the station. There is a livestock pond approximately 0.34 miles east of the station. AECI are large bats and accustomed to foraging in open areas, which may have contributed to the activity observed for this species (Norberg and Rayner 1987).

BMg4 had the lowest bat activity compared to all stations, with only 0.16% of all files throughout the project area categorized as bat passes. BMg4 is in a very open area of the project, with limited suitable habitat in the immediate vicinity. In contrast with 2020 results, BMg4 saw the highest level of bat activity during the Year 1 Migration Bat Activity Monitoring in 2019.

Over two years of monitoring, the relatively highest level of bat activity was observed in association with ground-based acoustic stations located in the northeastern portion of the project area and during fall migration. Much of this activity can be attributed to activity peaks related to AECI migration. A peak in AECI activity was observed at BMg4 in the spring of 2019 and a peak in AECI activity was observed at BMg1 in the fall of 2020. It therefore appears that there are short periods of AECI activity that occur seasonally during spring and fall migration. However, large peaks in AECI activity was not observed across all migration seasons.

Additionally, during acoustic file analysis it was noted that BMr1 possessed a disproportionately high number of passes classified to species compared to the other five stations. Upon manual review, these files contained pulsing noises that were being classified to species. In many cases, the low frequency noises resembled those of low frequency bats (AECI, EPFU, LANO) and would have normally been classified as such. However, the manual vetting process found little to no evidence of bat activity throughout the night and the consistency with which these noise files were found indicated that they were misidentified noise files by the software program. As a result, the manual vetting of files classified by the automated software as noID or as any bat species recorded on BMr1 allowed for the proper identification and removal of false positives.

The majority of bat passes over the monitoring period were made by LF bats and a seasonal bimodal distribution was largely driven by LF bats in spring, mid-April through mid-May (dominated by EPFU/LANO) and fall, mid-August through mid-September (dominated by AECI and/or EPFU/LANO) (Figure 7). AECI also exhibited a nightly bimodal distribution (evening and morning peaks), particularly in June and July, but AECI activity becomes less concentrated and more evenly distributed across the night in the early spring and fall seasons (Figure 6). These observed trends in activity can be attributed to migratory behaviors in AECI and LANO which travel north to breeding grounds in the spring before traveling south in the fall to overwinter (Cryan 2003). These species are likely not year-round residents in the project area. Occurrences of EPFU/LANO through the summer stems from the grouping of these species as the two possess similar call characteristics and can be diffficult to distinguish. EPFU are year-round residents in North Dakota; thus, the recordings through the summer are most likely this species and not LANO.

Unlike low frequency species, high frequency species, such as MYLU, MYSP, and LABO, did not reflect these strong bimodal distributions in nightly activity. LABO did exhibit increased activity in the fall season. Due to the relative absence of activity earlier in the study, it is likely that these influxes were more related to seasonal migration. MYLU call data is limited (only three total calls), and no distinctive trends in activity can be discerned from this small sample size.

Despite the identification of the federally threatened MYSE in the Kaleidoscope automated analysis, evaluation of these nine files through manual vetting concluded that these were noise

files. While no MYSE passes were confirmed during the 2020 survey, two files were classified as MYSP indicating that the calls in the sequence possessed characteristics of MYLU and MYSE, but a conclusive identification could not be made. MYSE not being identified in the acoustic analysis could be attributed to a lack of suitable habitat within the project area, as discussed in the Bat Habitat Assessment Memorandum submitted by Atwell (Atwell 2020). MYSE are typically associated with forested habitat for foraging and roosting and do not normally venture into open agricultural landscapes in the midwest (White, Freeman, and Lemen 2017). Additionally, although previous bat survey work in North Dakota is limited, the eastern-most confirmed locations for MYSE in the state occur along the Missouri River, approximately 36 miles west of the study area (Nelson et al. 2015; Shank et al. 2015). Due to the lack of suitable habitat, the distance to the nearest known documentation of the species in the state, and the results of the acoustic monitoring study in 2020, we can conclude that MYSE are rare in the project area if they do occur, and are unlikely to be encountered. Note that migration monitoring is not intended to replace summer presence/absence studies for federally threatened and endangered species.

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APPENDIX A

FIGURES

Badger Wind

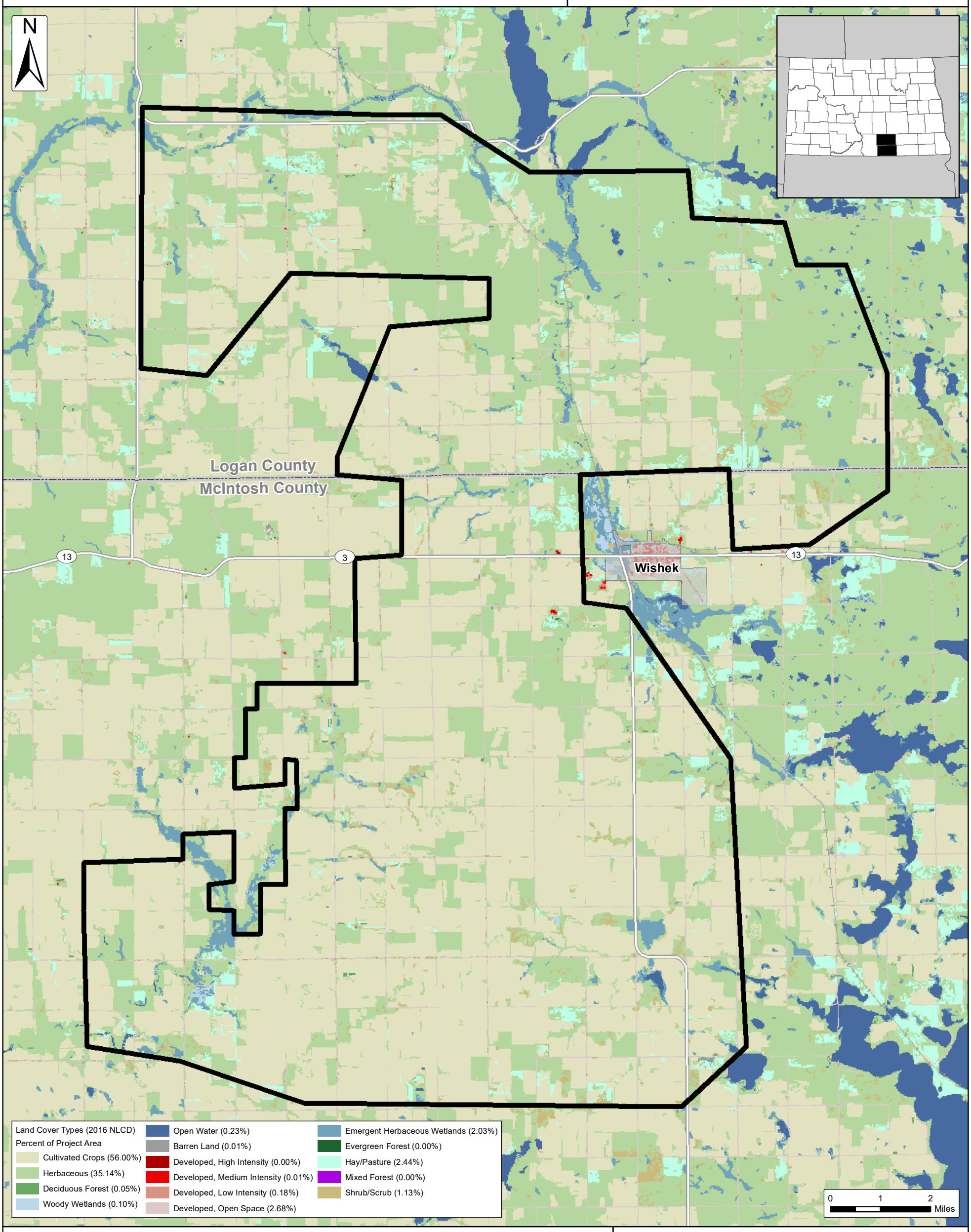
Figure 1. Land Cover

Logan County & McIntosh County, North Dakota

Client:
Badger Wind, LLC

Issue Date:
12/15/2020

Atwell, LLC Project:
19000785



Project Area
04/15/2019 (±121,695 Ac.)

City/Village

Counties

SOURCE: NATIONAL LAND COVER DATABASE 2016 (USGS)

ATWELL

The information contained on this map is proprietary and confidential. The use or disclosure of this information by you to third parties is prohibited by law and may give rise to civil or criminal liability.

Badger Wind

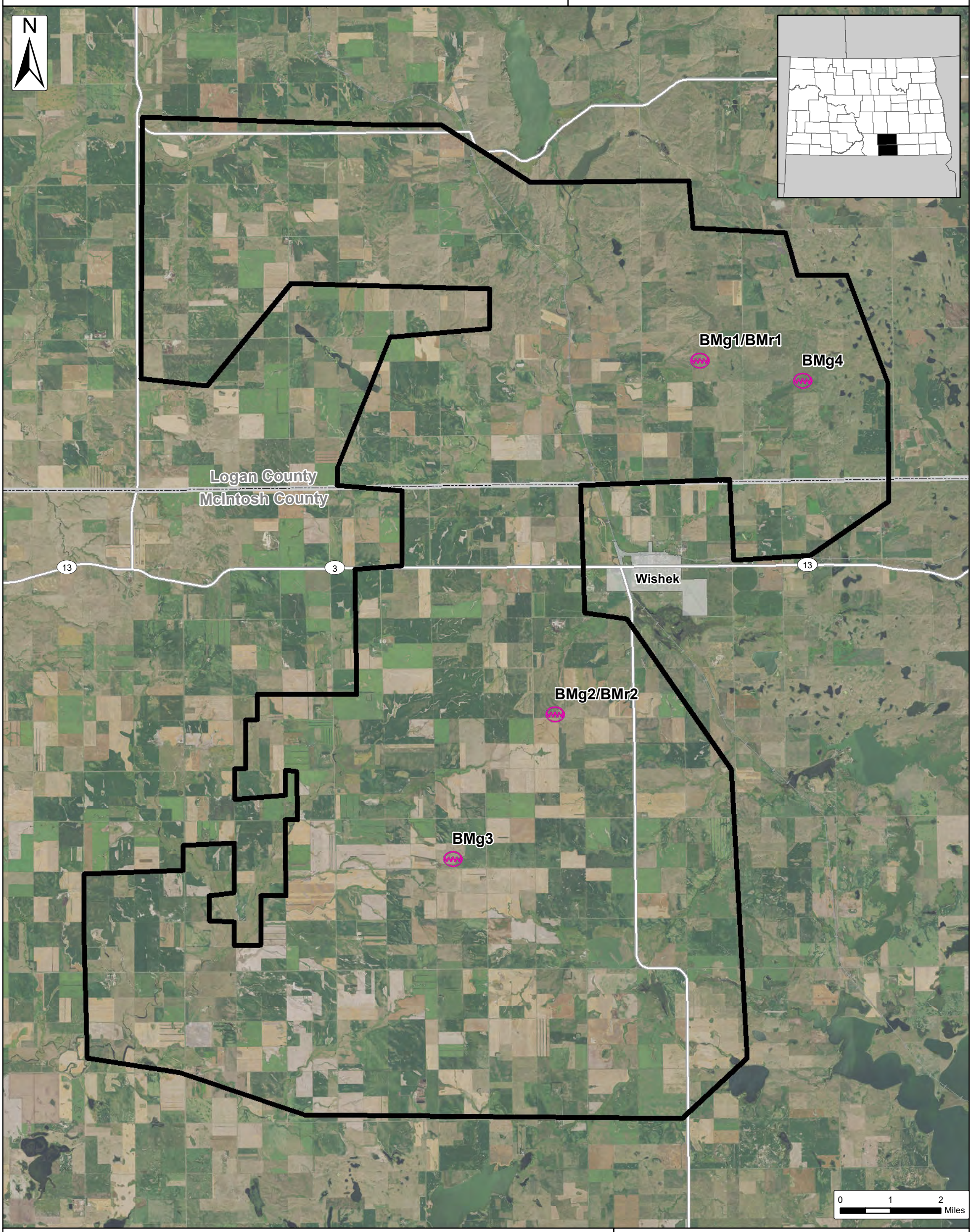
Figure 2. Bat Acoustic Monitoring

Logan County & McIntosh County, North Dakota

Client: Badger Wind, LLC

Issue Date: 2/4/2021

Atwell, LLC Project: 19000785



Acoustic Monitoring Site

Project Area
04/15/2019 (±121,695 Ac.)

City/Village

Counties

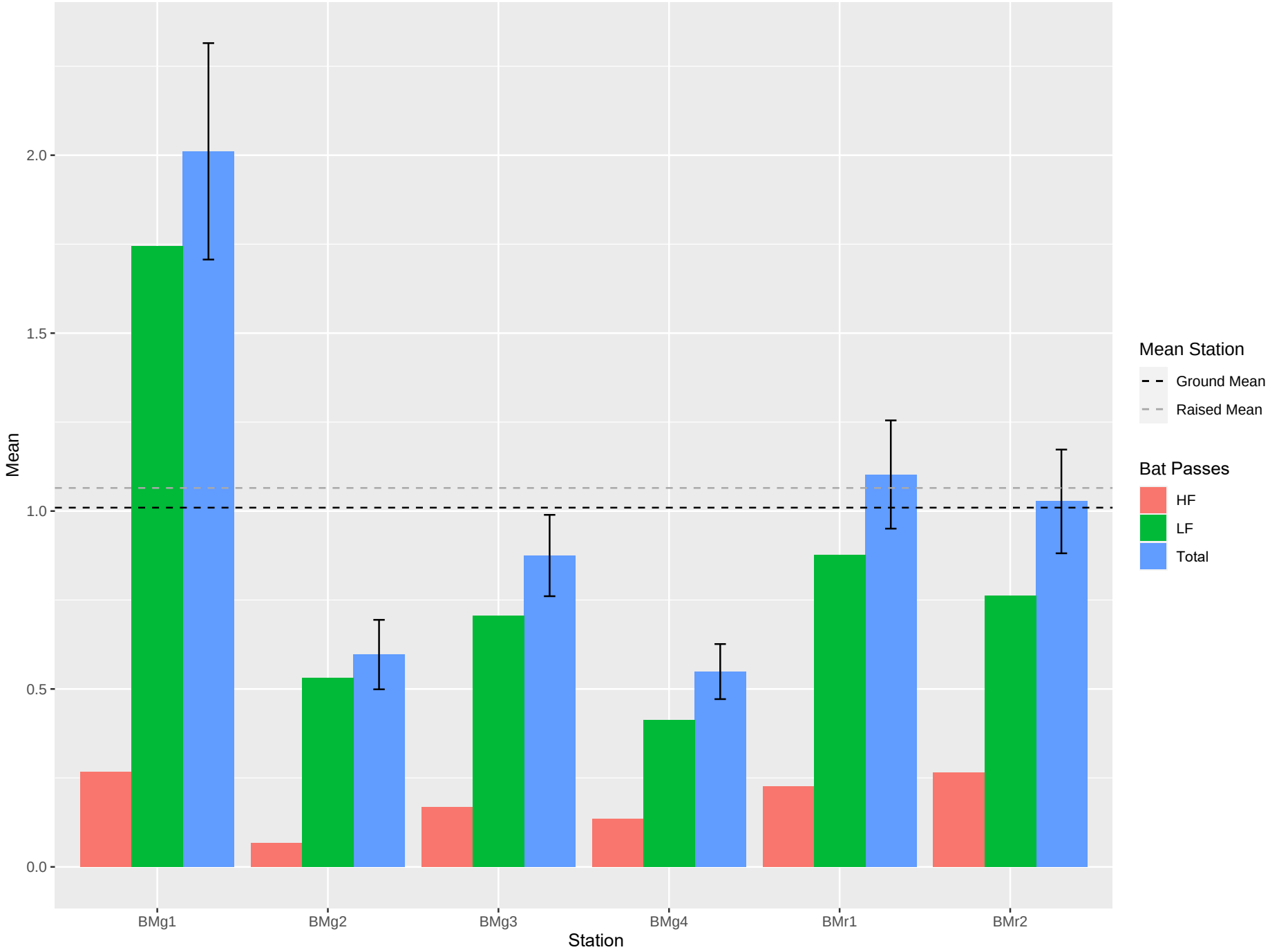
SOURCE: NATIONAL LAND COVER DATABASE 2016 (USGS)

ATWELL

The information contained on this map is proprietary and confidential. The use or disclosure of this information by you to third parties is prohibited by law and may give rise to civil or criminal liability.

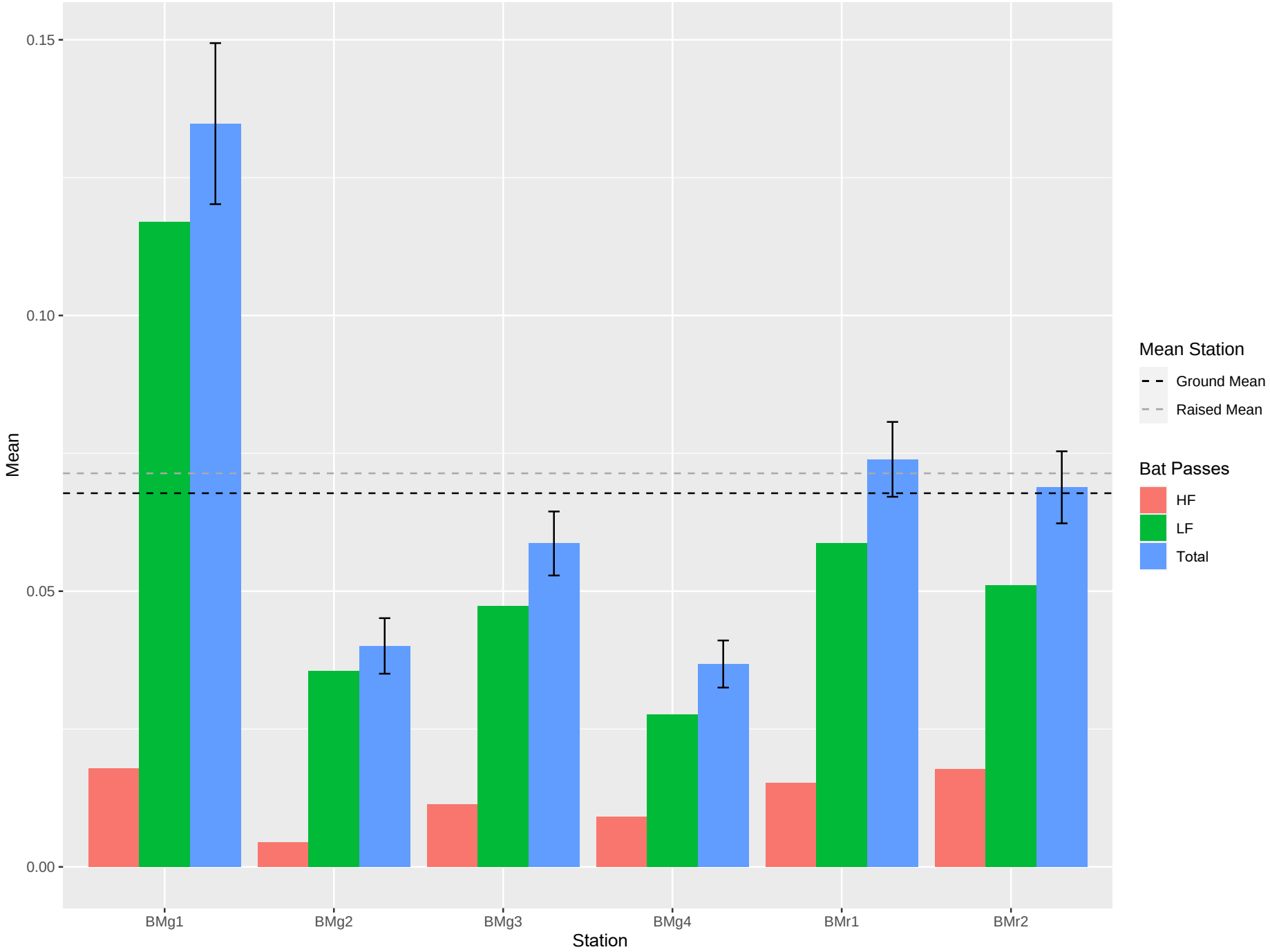
BW Exhibit 28

Figure 3: Nightly Mean Use



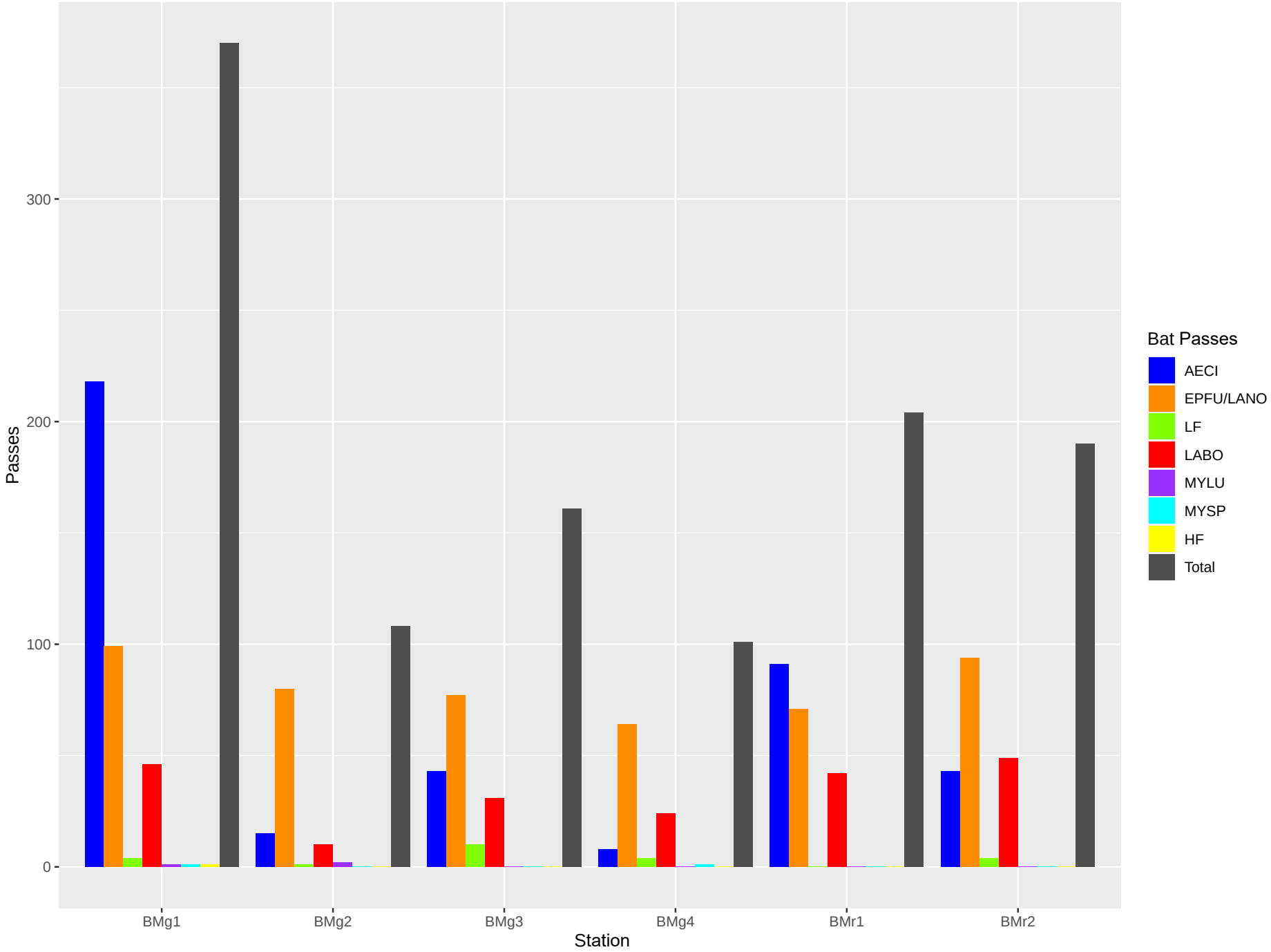
BW Exhibit 28

Fgiure 4: Hourly Mean Use



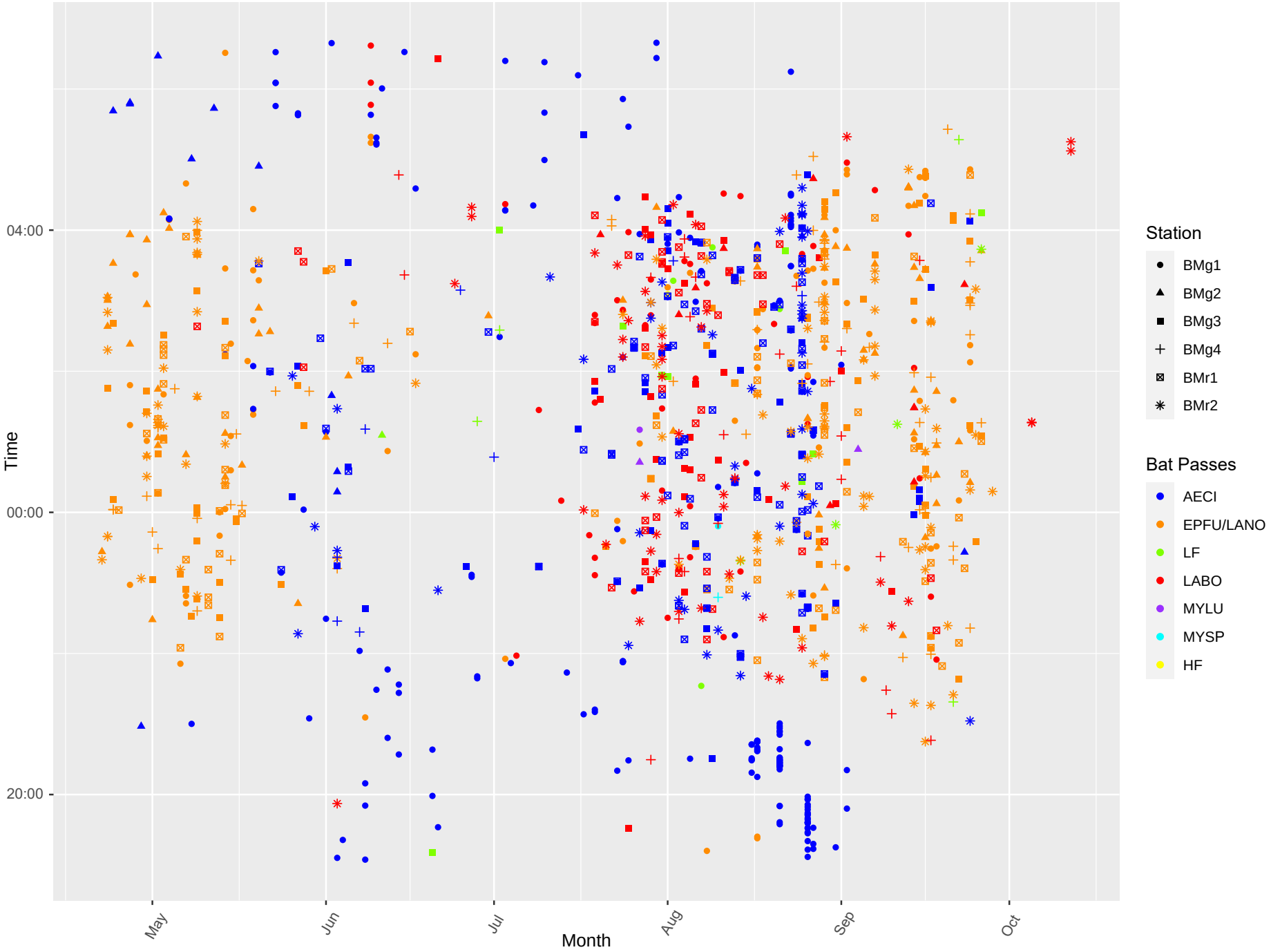
BW Exhibit 28

Figure 5: Species by Station



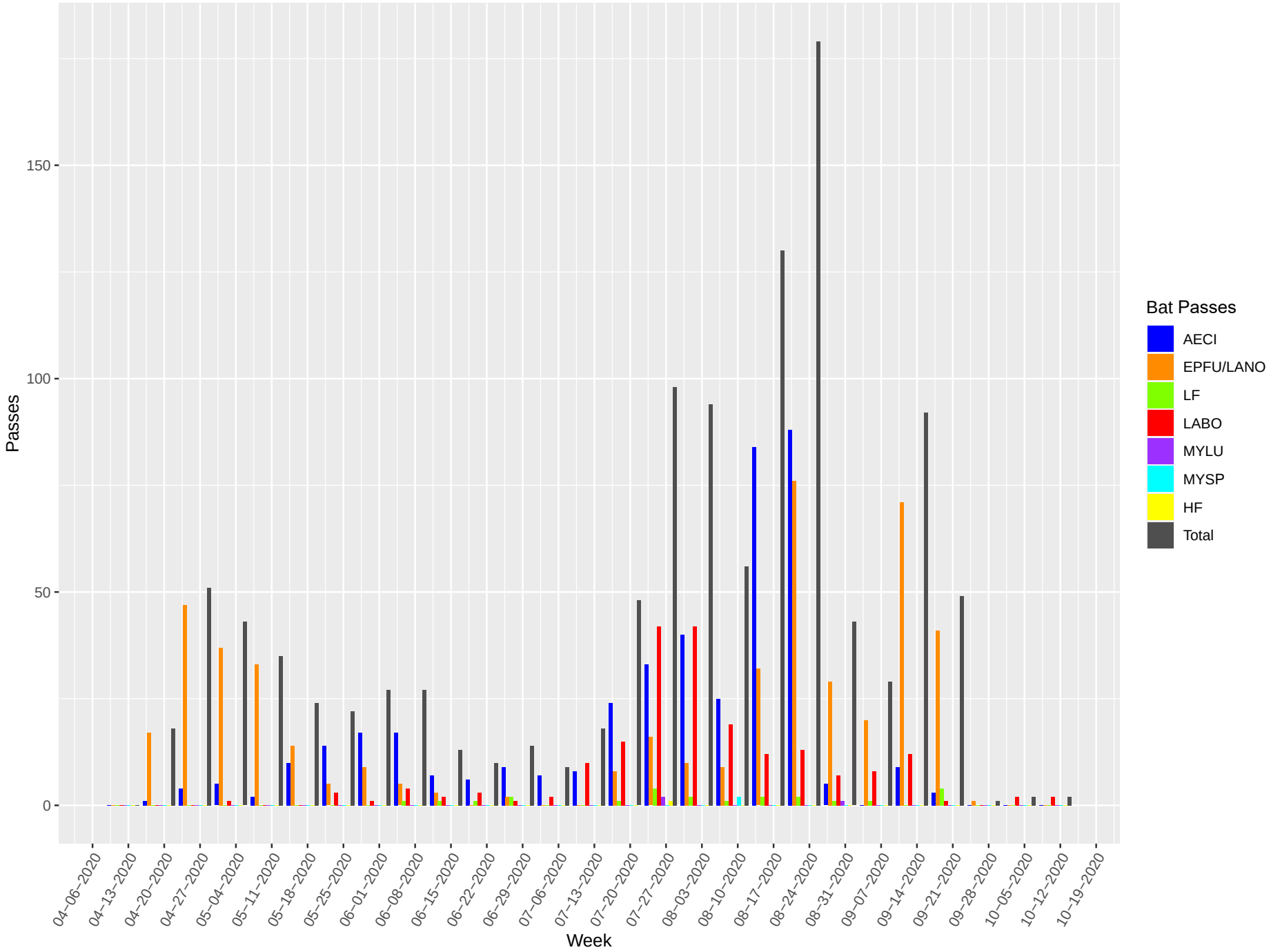
BW Exhibit 28

Figure 6: Call Files by Species and Station



BW Exhibit 28

Figure 7: Species by Week



APPENDIX B

TABLES

Table 1. Nightly Mean Bat Use per Station

Station	Type	Bat Passes			Detector Nights	Mean Nightly Bat Passes (± SE)[c]
		High Frequency[a]	Low Frequency[b]	Total		
BMg1	Ground	49	321	370	183	2.01 ± 0.30
BMg2	Ground	12	96	108	180	0.60 ± 0.10
BMg3	Ground	31	130	161	183	0.88 ± 0.11
BMg4	Ground	25	76	101	183	0.55 ± 0.08
BMr1	Raised	42	162	204	184	1.10 ± 0.15
BMr2	Raised	49	141	190	184	1.03 ± 0.15
Total Ground	Ground	117	623	740	729	1.01 ± 0.09
Total Raised	Raised	91	303	394	368	1.06 ± 0.11
Total	--	208	926	1134	1097	--

[a] High Frequency includes: LABO, MYLU, MYSP, and HF
[b] Low Frequency includes AECI, EPFU/LANO, and LF
[c] Rounding has occurred

Table 2: Hourly Mean Bat Use per Station

Station	Type	Bat Passes			Detector Hours	Mean Hourly Bat Passes (± SE)[c]
		High Frequency[a]	Low Frequency[b]	Total		
BMg1	Ground	49	321	370	2562	0.13 ± 0.01
BMg2	Ground	12	96	108	2520	0.04 ± 0.01
BMg3	Ground	31	130	161	2562	0.06 ± 0.01
BMg4	Ground	25	76	101	2562	0.04 ± 0.00
BMr1	Raised	42	162	204	2576	0.07 ± 0.01
BMr2	Raised	49	141	190	2576	0.07 ± 0.01
Total Ground	Ground	117	623	740	10206	0.07 ± 0.00
Total Raised	Raised	91	303	394	5152	0.07 ± 0.00
Total	--	208	926	1134	15358	--

[a] High Frequency includes: LABO, MYLU, MYSP, and HF
[b] Low Frequency includes AECI, EPFU/LANO, and LF
[c] Rounding has occurred

Table 3: Frequency of Recorded Bat Passes (noise excluded)

Station	Call Analysis ID	Passes	Site Percentage[a]	Project Percentage[a]
BMg1	AECI	218	58.92%	19.22%
	EPFU/LANO	99	26.76%	8.73%
	LF	4	1.08%	0.35%
	LABO	46	12.43%	4.06%
	MYLU	1	0.27%	0.09%
	MYSP	1	0.27%	0.09%
	HF	1	0.27%	0.09%
	Station Total	370	100.00%	32.63%
BMg2	AECI	15	13.89%	1.32%
	EPFU/LANO	80	74.07%	7.05%
	LF	1	0.93%	0.09%
	LABO	10	9.26%	0.88%
	MYLU	2	1.85%	0.18%
	MYSP	--	--	--
	HF	--	--	--
	Station Total	108	100.00%	9.52%
BMg3	AECI	43	26.71%	3.79%
	EPFU/LANO	77	47.83%	6.79%
	LF	10	6.21%	0.88%
	LABO	31	19.25%	2.73%
	MYLU	--	--	--
	MYSP	--	--	--
	HF	--	--	--
	Station Total	161	100.00%	14.20%
BMg4	AECI	8	7.92%	0.71%
	EPFU/LANO	64	63.37%	5.64%
	LF	4	3.96%	0.35%
	LABO	24	23.76%	2.12%
	MYLU	--	--	--
	MYSP	1	0.99%	0.09%
	HF	--	--	--
	Station Total	101	100.00%	8.91%
BMr1	AECI	91	44.61%	8.02%
	EPFU/LANO	71	34.80%	6.26%
	LF	--	--	--

Station	Call Analysis ID	Passes	Site Percentage[a]	Project Percentage[a]
BMr1	LABO	42	20.59%	3.70%
	MYLU	--	--	--
	MYSP	--	--	--
	HF	--	--	--
	Station Total	204	100.00%	17.99%
BMr2	AECI	43	22.63%	3.79%
	EPFU/LANO	94	49.47%	8.29%
	LF	4	2.11%	0.35%
	LABO	49	25.79%	4.32%
	MYLU	--	--	--
	MYSP	--	--	--
	HF	--	--	--
	Station Total	190	100.00%	16.75%
Totals	AECI	418	--	36.86%
	EPFU/LANO	485	--	42.77%
	LF	23	--	2.03%
	LABO	202	--	17.81%
	MYLU	3	--	0.26%
	MYSP	2	--	0.18%
	HF	1	--	0.09%
Total Bat Passes		1134	--	100.00%

[a] Rounding has occurred

Table 4. Frequency of All Files Recorded (includes noise)

Station	Call Analysis ID	Passes	Site Percentage[a]	Project Percentage[a]
BMg1	AECI	218	9.78%	0.34%
	EPFU/LANO	99	4.44%	0.16%
	LF	4	0.18%	0.01%
	LABO	46	2.06%	0.07%
	MYLU	1	0.04%	0.00%
	MYSP	1	0.04%	0.00%
	HF	1	0.04%	0.00%
	Noise	1858	83.39%	2.93%
	Station Total	2228	100.00%	3.51%
BMg2	AECI	15	0.22%	0.02%
	EPFU/LANO	80	1.17%	0.13%
	LF	1	0.01%	0.00%
	LABO	10	0.15%	0.02%
	MYLU	2	0.03%	0.00%
	MYSP	--	--	--
	HF	--	--	--
	Noise	6702	98.41%	10.57%
	Station Total	6810	100.00%	10.74%
BMg3	AECI	43	0.86%	0.07%
	EPFU/LANO	77	1.53%	0.12%
	LF	10	0.20%	0.02%
	LABO	31	0.62%	0.05%
	MYLU	--	--	--
	MYSP	--	--	--
	HF	--	--	--
	Noise	4860	96.79%	7.66%
	Station Total	5021	100.00%	7.92%
BMg4	AECI	8	0.45%	0.01%
	EPFU/LANO	64	3.60%	0.10%
	LF	4	0.22%	0.01%
	LABO	24	1.35%	0.04%
	MYLU	--	--	--
	MYSP	1	0.06%	0.00%
	HF	--	--	--
	Noise	1679	94.33%	2.65%
	Station Total	1780	100.00%	2.81%
BMr1	AECI	91	0.23%	0.14%
	EPFU/LANO	71	0.18%	0.11%
	LF	--	--	--
	LABO	42	0.11%	0.07%

Station	Call Analysis ID	Passes	Site Percentage[a]	Project Percentage[a]
BMr1	MYLU	--	--	--
	MYSP	--	--	--
	HF	--	--	--
	Noise	38994	99.48%	61.49%
	Station Total	39198	100.00%	61.81%
BMr2	AECI	43	0.51%	0.07%
	EPFU/LANO	94	1.12%	0.15%
	LF	4	0.05%	0.01%
	LABO	49	0.58%	0.08%
	MYLU	--	--	--
	MYSP	--	--	--
	HF	--	--	--
	Noise	8190	97.73%	12.91%
	Station Total	8380	100.00%	13.21%
Totals	AECI	418	--	0.66%
	EPFU/LANO	485	--	0.76%
	LF	23	--	0.04%
	LABO	202	--	0.32%
	MYLU	3	--	0.00%
	MYSP	2	--	0.00%
	HF	1	--	0.00%
	Noise	62283	--	98.21%
Total Recordings		63417	--	100.00%

[a] Rounding has occurred

APPENDIX C

PHOTO LOG

PHOTO LOG

Badger Wind Project

Logan and McIntosh Counties, North Dakota, April 14-October 15, 2020



Photo 1. A view of pastureland within the project area. Agricultural and grazing are common practices throughout the project area.



Photo 2. Initial deployment of BMg1, with an SM4 unit, at ground level.



Photo 3. Initial deployment of BMg2, with an SM3 unit, at ground level.

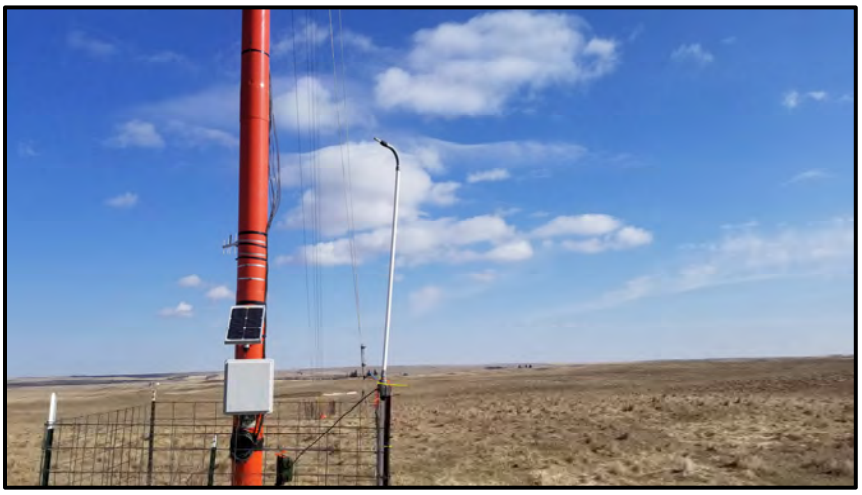


Photo 4. Initial deployment of BMg3, with an SM4, at ground level.

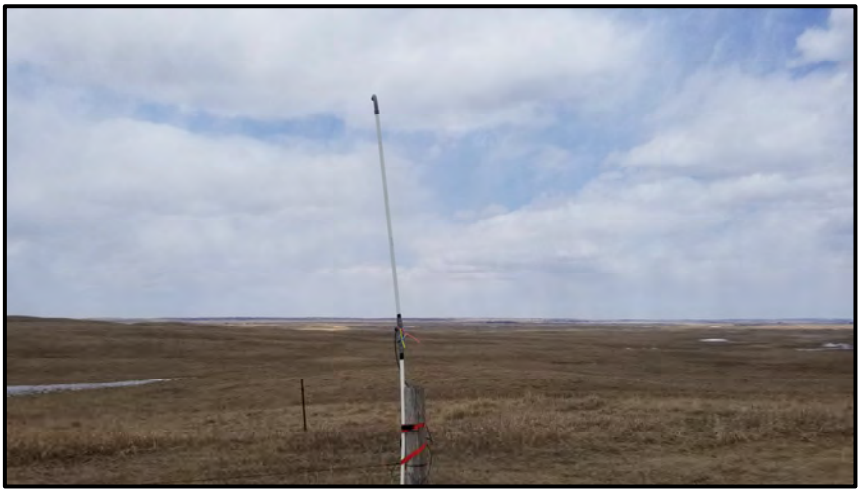


Photo 5. Initial deployment of BMg4, with an SM4, at ground level.



Photo 6. A west facing view of BMr1. This is a representative view of the landscape surrounding the MET tower where BMr1 is located.



Photo 7. A west facing view of BMr2. This is a representative view of the landscape surrounding the MET tower where BMr2 is located.

BAT HABITAT ASSESSMENT MEMORANDUM

BADGER WIND PROJECT

Prepared for

Ørsted Onshore North America
401 N. Michigan Ave
Suite 501
Chicago, IL 60611

Atwell Project No. 19000785

DRAFT

Submitted by Atwell, LLC

January 21, 2020

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Appendix A Figure 1. Land Cover in the Project Area (NLCD 2016)
Figure 2. Potential Bat Habitat in the Project Area
Figure 3. Known NLEB Presence in North Dakota

1 INTRODUCTION

Ørsted Onshore North America (Ørsted) is proposing to develop the Badger Wind Project (the project) in Logan and McIntosh counties, North Dakota. Atwell, LLC (Atwell) conducted a desktop bat habitat assessment for the federally threatened northern long-eared bat (NLEB; *Myotis septentrionalis*) within the project area in accordance with the United States Fish and Wildlife Service (USFWS) Range-Wide Indiana Bat Survey Guidelines (the USFWS Guidelines; (USFWS 2019a). These guidelines are used to identify suitable habitat for the NLEB as well as the federally listed Indiana bat (*Myotis sodalist)*; however, the range of the latter does not extend into North Dakota and is not discussed further in this assessment.

The objectives of the bat habitat assessment were to identify potential summer habitat for NLEB and to assess the habitat quality of forested areas within the project area.

1.1 STUDY AREA

The project area consists of approximately 121,695 acres in northwestern McIntosh County and southwestern Logan County, North Dakota. The town of Wishek, North Dakota is approximately 1 mile from the project boundary.

According to the 2016 National Land Cover Database (NLCD), a large proportion of the project area is dedicated to agriculture. Figure 1 summarizes land cover data for the project area. Approximately 56% of the land is classified as cultivated crops (approximately 68,149 acres) and 35% of the land is classified as herbaceous, including pastures (approximately 42,593 acres).

According to the Environmental Protection Agency (EPA) Ecoregion mapping data, the project is located mostly within the Missouri Coteau Slope (U.S. EPA 2013). A few eastern sections of the project area are located in the Missouri Coteau Level IV Ecoregions. The Level IV Ecoregions are located within the Northwestern Glaciated Plains Level III Ecoregion. Soils in the ecoregion consist of mollisols and some entisols. The region was once dominated by prairie grasses (spear, grama, and wheat grasses) and shrubs. Forested area consisting of scrubby aspen, box elder, cottonwood, and willow is limited to shaded slopes in the valleys and river terraces. The ecoregion mainly consists of rangeland used for cattle grazing, and some cropland.

1.2 BATS OF NORTH DAKOTA

Twelve species of bats are known to occur in North Dakota: Townsend's big-eared bat (*Corynorhinus townsendii*), big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*), eastern red bat (*Lasiurus borealis*), western red bat (*Lasiurus blossevillii*), hoary bat (*Aeorestes cinereus*), western small-footed bat (*Myotis ciliolabrum*), long-eared myotis (*Myotis evotis*), little brown bat (*Myotis lucifugus*), fringed myotis (*Myotis thysanodes*), long-legged myotis

(*Myotis volans*), and NLEB (Nelson et al. 2015). The NLEB is the only listed species and is federally threatened.

North Dakota does not maintain a state endangered or threatened species list (NDGFD 2015). However, the North Dakota Game and Fish Department (NDGFD) tracks species of conservation priority (SCP). Species of conservation priority are categorized into three levels. SCP Level I are species that have declining populations in North Dakota or across their range, or are species that are at risk, range-wide, and have a high rate of occurrence in North Dakota constituting the core of the species breeding range. SCP Level I receives the most funding from the state wildlife grant. SCP Level II are species of moderate conservation priority, or species with a high level of conservation priority that receive a substantial level of monetary support from non-state wildlife grant funding. SCP Level III are species of moderate conservation priority but are peripheral or non-breeding in North Dakota. NDGFD has classified Townsend's big-eared bat, big brown bat, little brown bat, and NLEB as SCP Level I, and western small-footed bat, long-eared myotis, and long-legged myotis as SCP Level III (Dyke et al. 2015).

According to Bat Conservation International species profiles, the ranges of Townsend's big-eared bat, western small-footed bat, long-eared myotis, and long-legged myotis include small portions of western North Dakota (BCI 2019). These four SCP are unlikely to occur within the project area and will not be discussed further in this assessment.

Species that may occur, with varying likelihood, within the project area include (NDGFD 2016a; NDGFD 2016b; BCI 2019):

- eastern red bat
- hoary bat
- silver-haired bat
- big brown bat (SCP Level I)
- little brown bat (SCP Level I)
- NLEB (SCP Level I; Federally Threatened)

The little brown bat is known for forming maternity colonies in man-made structures and foraging over water (BCI 2019). The little brown bat was heavily impacted by white-nose syndrome (WNS) in the eastern part of its range and is currently under review for being listed (USFWS 2019c). WNS is a disease that results from the fungus, *Pseudogymnoascus destructans,* which affects hibernating bats (White-Nose Syndrome.org 2018). The big brown bat is a generalist species showing no preference for foraging habitat (BCI 2019). The NLEB is the only federally listed bat species (threatened) within North Dakota and occurrence of NLEB is unlikely within the project area.

The project area is within the NLEB WNS zone per the USFWS WNS Zone Final 4(d) Rule (05/31/2019). The final ruling prohibits all incidental take within a known hibernaculum or incidental take caused by tree removal if (a) tree removal occurs within 0.25 miles of a known hibernaculum at any time of year, and (b) tree removal cuts or destroys a known occupied

maternity roost tree or any other trees within a 150 ft radius of the maternity roost tree during the pup season (June 1 through July 31). There are no known maternity roost trees or hibernacula in North Dakota (USFWS 2019b). However, correspondence with the USFWS (North Dakota Ecological Services Field Office [NDESFO], Bismarck, ND) and NDGFD is recommended for additional confirmation that no known NLEB roosts or hibernacula are within the project area.

Under the USFWS 4(d) rule, incidental take that results from operating wind turbines or from permanent conversion of forested lands to other uses (i.e., rights-of-way creation or expansion, urban development) may be allowed within the project area. However, surveys for northern long-eared bat maternity roosts are recommended by NDGFD, e.g., *North Dakota Native Wildlife Resources: Guidelines for Reducing Impacts from Wind Energy Development (DRAFT)* (NDWWC 2018) if tree removal is necessary for the construction of the wind farm.

1.3 NORTHERN LONG-EARED BAT ECOLOGY

Suitable summer habitat for NLEB consists of a wide variety of forested/wooded habitats for foraging, roosting, and commuting routes as well as interspersed non-forested habitats (i.e., emergent wetlands, shelterbelts adjacent to agriculture fields, and pastures). Foster and Kurta found that NLEB prefer mature forest as foraging habitat but can also use younger riparian forests, open forest corridors, wooded ponds, emergent wetlands, adjacent agriculture fields, and wooded shelterbelts (Foster and Kurta 1999). Linear features, such as fencerows, riparian forests, and other wooded corridors can serve as suitable habitat for NLEB.

NLEB are roost generalists and utilize a broad array of roost characteristics, including roost types (e.g., cavities, crevices, exfoliating bark) and tree species (Carter and Feldhamer 2005; Timpone et al. 2010). NLEB roost species can vary by geographic location and site characteristics (Whalen and Krusac 2014).

The USFWS Guidelines define suitable NLEB habitat as forests and woodlots containing potential roost trees; however, buildings, barns, bridges, and bat houses may also be considered potential summer habitat for NLEB. Trees with a diameter at breast height greater than or equal to 3.0 inches (7.6 centimeters [cm]) and which have exfoliating bark and/or cavities are defined as potential roosts. NLEB roost trees may include individual trees when they exhibit characteristics of a potential roost and are within 1,000 feet (ft; 305 meters [m]) of other forested/wooded habitat (USFWS 2019a).

Documented information on bat ecology in North Dakota is limited. Nelson et al. conducted the first detailed survey of occurrence and distribution of bats in North Dakota, and captured NLEB at sites in McKenzie County, and Oliver County, North Dakota (Nelson et al. 2015). NLEB maternity roost trees or hibernacula have not been reported in North Dakota (USFWS 2019b). However,

correspondence with UWFWS NDESFO (Bismarck, ND) and NDGFD is recommended for additional confirmation that no known NLEB roosts or hibernacula are within the project area.

2 METHODS

Atwell conducted a desktop bat habitat assessment using available satellite imagery and Geographic Information System (GIS) data. NLCD data were reviewed to identify potential bat habitat within the project area. Forested areas and associated wooded shelterbelts or tree lines were delineated manually using satellite imagery. A site visit was conducted by a technician from Atwell, from June 12 – June 13, 2019 to identify dominant tree species within the project area.

Potential habitat was categorized using the following criteria:

- Size of forested areas and associated shelterbelts
- Preferred roost tree species presence
- Preferred roost characteristics.

In addition to the desktop Habitat Assessment, Atwell conducted a literature review of North Dakota bats to determine any known NLEB presence in the vicinity of the project. Publicly available information on locations of confirmed NLEB presence were compiled and digitized in order to establish the distance(s) of documented NLEB presence to the project area.

3 RESULTS

3.1 DESKTOP HABITAT ASSESSMENT

There is a high degree of habitat fragmentation within the project area, which consists predominantly of cropland and herbaceous land (91% of total acreage) (MRLC 2016). Delineation of forested parcels and wooded shelterbelts resulted in 426.93 acres (approximately 0.35% of the project area) of potential suitable habitat from 248 forested areas and wooded shelterbelts. The median forested area of potential suitable habitat was 1.41 acres. The size of woodlots range from 0.09 to 8.65 acres. Figure 2 (Appendix A) shows potential suitable habitat within the project area.

Data collected during the site visit identified green ash (*Fraxinus pennsylvanica*) and Siberian elm (*Ulmus pumila*) as the dominant tree species within the project area. Additional tree species include American elm (*Ulmus americana*) and Russian olive (*Elaeagnus angustifolia*).

Other tree species potentially present within the project area include Tatarian honeysuckle (*Lonicera tatarica*), common lilac (*Syringa vulgaris*), American plum (*Prunus americana*), chokecherry (*Prunus virginiana*), rocky mountain juniper (*Juniperus scopulorum*), eastern red cedar (*Juniperus virginiana*), ponderosa pine (*Pinus ponderosa*), black hills white spruce (*Picea*

glauca var. densata), Colorado spruce (*Picea pungens*), and willow species (*Salix spp.*) These tree species were recommended for planting shelterbelts in North Dakota, and could provide characteristics suitable (as defined by the Indiana Bat Range-Wide Survey Guidelines) for NLEB roosting (Herman and Chaput 2003).

3.2 LITERATURE REVIEW

In 2010, NLEB were not listed as occurring within the vicinity of the project (Bicknell and Gillam 2013). However, the NLEB range was more recently updated by USFWS to include all of North Dakota (Nelson et al. 2015).

There is confirmed NLEB presence in North Dakota within the Missouri River Valley, the Badlands of North Dakota, and the Moreau Prairie (Nelson et al. 2015; Christopher Shank et al. 2015 Fall). The distances of known NLEB locations ranged from 53.5 miles to 187.3 miles from the project area. Figure 3 shows documented NLEB presence in North Dakota and the project boundary.

A brief summary of NLEB presence from publicly available documents on North Dakota bats is provided below.

- Twenty-three NLEB were captured via mist net in McKenzie and Oliver Counties, North Dakota, ranging from 80-190 miles northwest of the project area (Nelson et al. 2015).
- NLEB were documented during acoustic surveys at Standing Rock Indian Reservation in the Moreau Prairie in Sioux County, North Dakota, approximately 50 miles west of the project area (Christopher Shank et al. 2015 Fall).

4 DISCUSSION

The project area has a minimal amount of potential suitable summer roosting habitat based on a review of satellite imagery, NLCD data, and on-site reconnaissance. None of the forested area or wooded shelterbelts exceed 8.65 acres. The fragmented forested areas and wooded shelterbelts within the project area offer limited connectivity to more suitable roosting and foraging habitat. NLEB are roost generalists, and roost tree species exhibiting preferential roost characteristics do occur within the project area.

Known NLEB presence in North Dakota was documented in two publicly available papers. The closest known NLEB presence was approximately 50 miles away and was confirmed during acoustic surveys. According to Whalen and Krusac, the home range of suitable habitat for NLEB is typically within three miles of a capture or positive acoustic identification, or within 1.5 miles of a roost tree (Rhea Whalen and Dennis Krusac 2014). None of the documented NLEB were within this distance of the project area.

The terrain and habitat characteristics in areas of known NLEB presence within North Dakota differ significantly from the landscape characteristics within the project area. The Badlands of North Dakota has rugged terrain with exposed rock and stands of Juniper (*Juiperus scopulorum*). The Missouri River Valley has riparian vegetation including cottonwood forests and grasslands (Nelson et al. 2015). The Moreau Prairie terrain includes buttes, badlands, grasslands, and saltpans (Christopher Shank et al. 2015 Fall). None of the known sites of NLEB presence include the high percentage of croplands and herbaceous lands present within the project area.

5 CONCLUSION

Information confirming NLEB presence in North Dakota is limited. Based on literature review, known NLEB presence is confirmed west of the Missouri River, in landscapes that differ from the project area. There are no known maternity roost trees nor hibernacula in North Dakota (USFWS 2019b). However, correspondence with the USFWS (North Dakota Ecological Services Field Office [NDESFO], Bismarck, ND) and NDGFD is recommended for additional confirmation that no known NLEB roosts or hibernacula are within the project vicinity.

Based on NLCD data, satellite imagery review, and site reconnaissance, potential suitable habitat for NLEB within the project area is limited. Forested areas along the southern and eastern boundaries of the project area have better potential to support NLEB, based on their proximity to open water, but even these are small woodlots with limited resources. There is high forest fragmentation and low connectivity of wooded shelterbelts throughout the agriculturally dominated landscape. Most riparian areas throughout the project area do not have adjacent forested areas.

Despite these findings, as with many operational wind facilities in the region, the project may represent a risk to bats during the spring/fall migration. Migratory tree-roosting bats, such as the hoary bat, eastern red bat, and the silver-haired bat, are at a greater risk to operational wind facilities. Summer foraging/roosting activities for bats, particularly NLEB, are expected to be limited due to low amounts of suitable habitat. Overall, risk to NLEB from an operational wind facility within the project area is expected to be low

Bat activity acoustic monitoring was conducted (based on *North Dakota Native Wildlife Resources: Guidelines for Reducing Impacts from Wind Energy Development (DRAFT)*) in 2019 and is expected to continue in 2020. Survey results will be available in a separate report. Correspondence with USFWS and NDGFD is recommended to determine if additional bat surveys are needed.

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APPENDIX A

FIGURES

DRAFT

Figure 1.

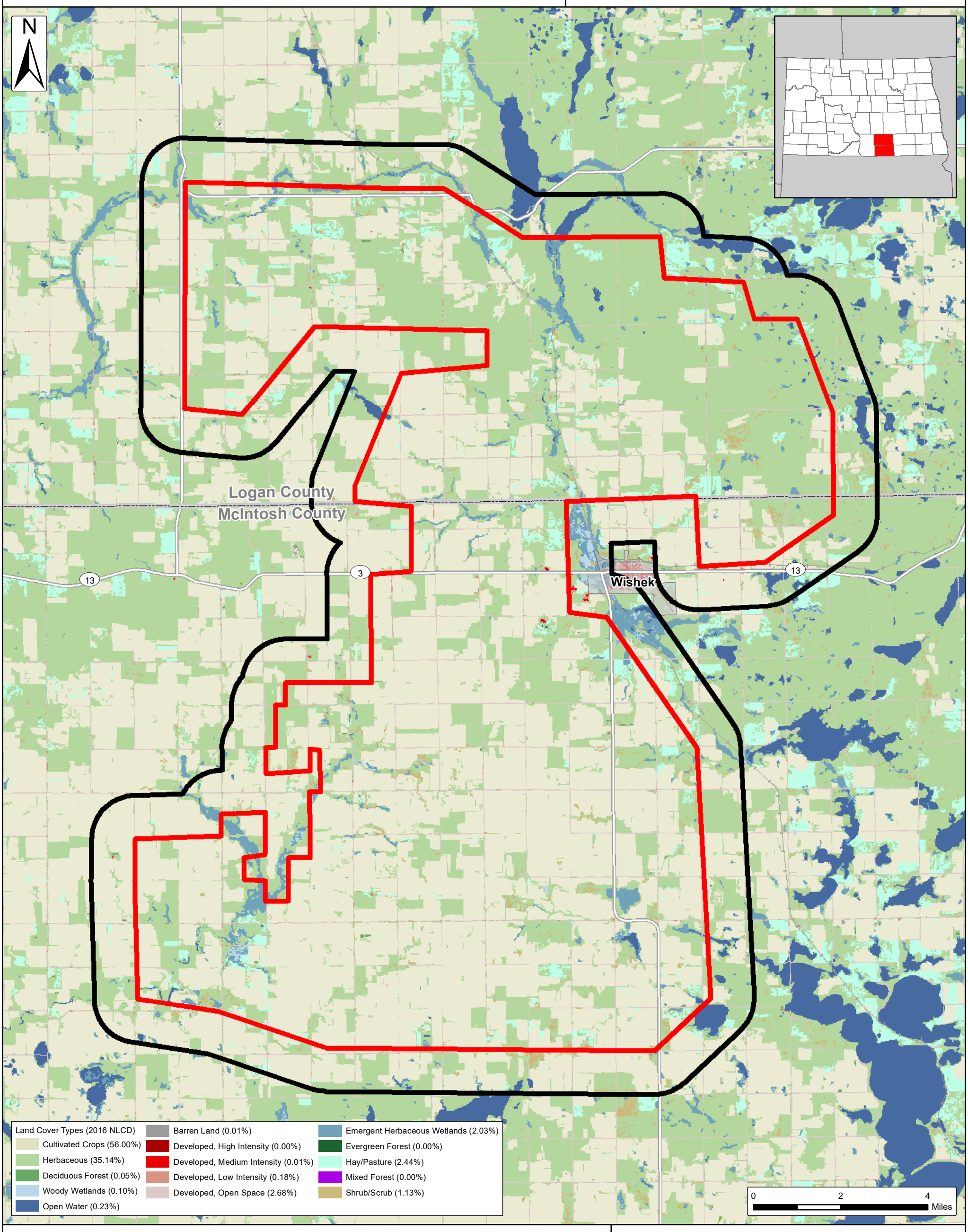
Land Cover in the Project Area (NLCD 2016)

Logan County & McIntosh County, North Dakota

Client:
Ørsted Onshore North America

Issue Date:
5/22/2019

Atwell, LLC Project:
19000785



Project Area
04/15/2019 (±121,695 Ac.)

1 Mile Buffer

City/Village

Counties

SOURCE: NATIONAL LAND COVER DATABASE 2016 (USGS)

ATWELL

The information contained on this map is proprietary and confidential. The use or disclosure of this information by you to third parties is prohibited by law and may give rise to civil or criminal liability.

Figure 2.

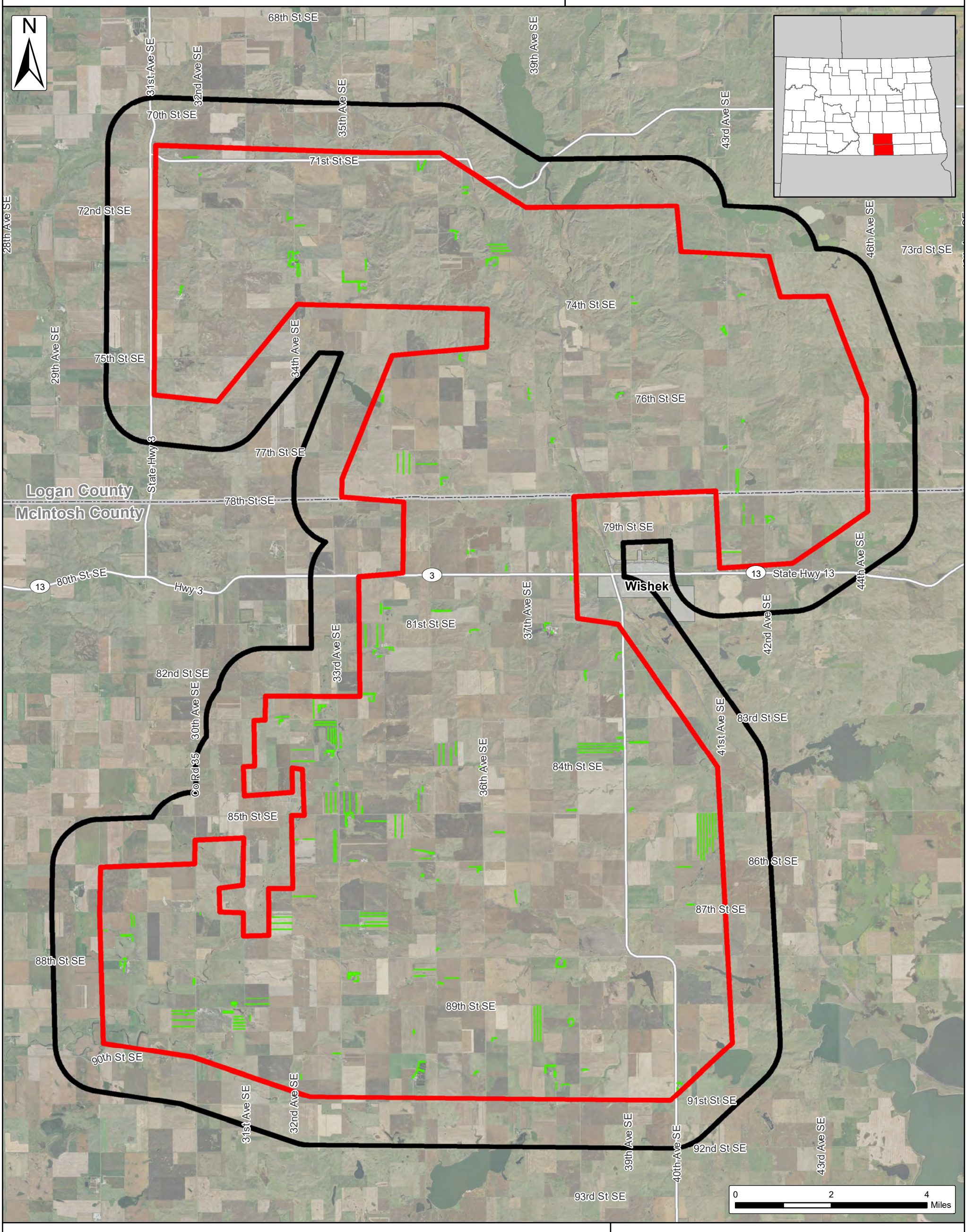
Potential Bat Habitat in the Project Area

Logan County & McIntosh County, North Dakota

Client:
Ørsted Onshore North America

Issue Date:
6/18/2019

Atwell, LLC Project:
19000785



Woodlots with Potential Suitable Bat Habitat (Atwell Aerial Interpretation)

Project Area
04/15/2019 (±121,695 Ac.)

1 Mile Buffer

City/Village

Counties

SOURCE: USDA NAIP 2018 IMAGERY

ATWELL

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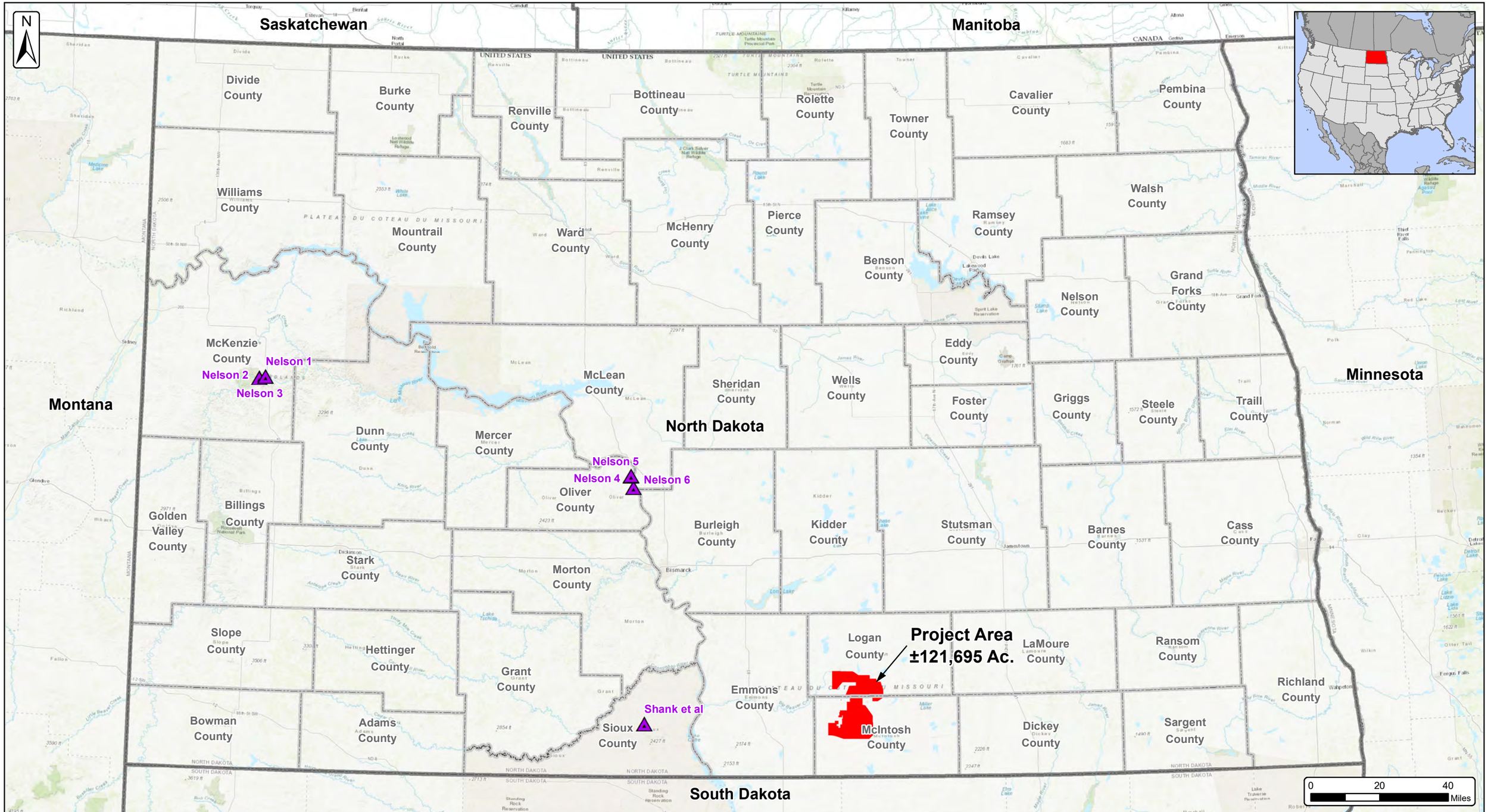

Figure 3.
Known NLEB Presence in North Dakota
North Dakota
Date: 6/18/2019

Client:
Ørsted Onshore North America

Atwell, LLC Project: 19000785

Northern Long-Eared Bat Presence (Nelson et al., Shank et al.)
Project Area 04/15/2019 (±121,695 Ac.)
County Boundaries
State Boundaries

SOURCE: ESRI WORLD TOPOGRAPHIC BASEMAP

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WHOOPING CRANE STOPOVER HABITAT ASSESSMENT

BADGER WIND PROJECT
LOGAN AND MCINTOSH COUNTIES, NORTH DAKOTA
REVISED

Prepared for

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Atwell Project No. 19000785

Submitted by Atwell, LLC

September 2021

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ACRONYMS AND ABBREVIATIONS

Atwell	Atwell, LLC
AWP	Aransas-Wood Buffalo Whooping Crane Subpopulation
amsl	above mean sea levelBadger Wind Badger Wind, LLC
GIS	geographic information system
HAPET	Habitat and Population Evaluation Team
km	kilometer(s)
m	meter(s)
NDGF	North Dakota Game and Fish Department
NLCD	National Land Cover Database
NWI	National Wetland Inventory
Ørsted	Ørsted Onshore North America, LLC
PUDL	Potential Undisturbed Layer
QA/QC	Quality Assurance / Quality Control
TWI	The Watershed Institute
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

1 INTRODUCTION

Atwell, LLC (Atwell) was retained by Badger Wind, LLC (Badger Wind), a wholly-owned subsidiary of Ørsted Onshore North America, LLC (Ørsted), to conduct a desktop assessment evaluating the potential for Whooping Crane (*Grus americana*) to use the Badger Wind Project Area (the project area) as stopover habitat during seasonal spring and fall migrations. The project area is located in Logan and McIntosh counties, North Dakota (Figure 1).

Whooping Cranes use a variety of stopover habitats during migration. Stopover roost habitats include palustrine, lacustrine, and riverine wetlands. Stopover foraging habitats include grasslands and croplands, and foraging sites are often within 1.6 kilometers (km, or approximately one mile) of roost habitat (The Watershed Institute; TWI 2013; Austin and Richert 2005). The objectives of the assessment are to determine whether potentially suitable Whooping Crane stopover habitat is present within the project area and to compare this habitat to four reference areas adjacent to the project area.

The Whooping Crane is listed federally as an endangered species (U.S. Fish and Wildlife Service [USFWS] 2016). The Aransas/Wood Buffalo subpopulation (AWP) is the only self-sustaining population in existence (Urbanek and Lewis 2015) and was estimated at 505 individuals in 2017 (Devokaitis 2018). Whooping Cranes that constitute the AWP winter at locations in the Texas Gulf Coast, including the Aransas National Wildlife Refuge. In the spring, the subpopulation migrates northward to its nesting grounds at Wood Buffalo National Park in Alberta and the Northwest Territories of Canada, passing through North Dakota en route. Cranes return to Texas in the fall, following approximately the same pathway on both their northern and southern migrations. Whooping Cranes occur in North Dakota in the spring from April into May and in the fall from October into November.

Researchers have defined Whooping Crane migration corridors using accrued sightings reported by the public from 1942 to the present, including locations from telemetered birds between 2010 to 2016. The migration corridor has been delineated with 50%, 75%, and 95% core areas. The 95% core area (i.e., the area containing 95% of all recorded observations) averages 294 km (183 miles) in width (Pearse et al. 2018). The project area is located within the 75% migration corridor (Figure 1).

2 PROJECT AREA

The current project area boundary (December 2020) is depicted in Figure 1. The project area is approximately 57,097 acres, with approximately 46% of the area (26,000 acres) in McIntosh County and approximately 54% (31,098 acres) in Logan County. The general topography is undulating and rises from the west to the east, with elevations between 1,940 and 2,180 feet above mean sea level (amsl). The project area is predominately within the Missouri Coteau Slope Level IV Ecoregion, with portions of the eastern boundary extending upward into the Missouri Coteau Level IV Ecoregion (Bryce et al. 1996). The Missouri Coteau is an escarpment of glacial till containing numerous hills, small lakes, and poorly drained depressions that are referred to as "potholes" that receive most of their water from snow melt and precipitation (Bryce et al. 1996). The Missouri Coteau Slope descends westward toward the Missouri River from the Coteau and is characterized by a thinner glacial till layer and integrated drainages that flow toward the Missouri River (Clayton 1962).

According to the 2016 U.S. Geological Survey National Land Cover Database (National Land Cover Database [NLCD]; Yang et al. 2018), the project area is composed primarily of cultivated crops (46.2%) and herbaceous/grassland (44.9%) (Figure 2). Wetlands and open water cover 2.5% of the project area. Other land cover types found within the project area include developed areas (3.1% of the project area), pasture/hay (2.2%), shrub/scrub (1.2%), woodland forest (less than 0.1%), and barren land (less than 0.1%). It is noted that percentage totals exceed 100% due to rounding.

2.1 Reference Areas

As discussed in more detail in the Methods section (Section 3), , four reference areas of equal shape and dimension as the project area were established in each of the four cardinal directions, at equal distances from the project's centroid (referred to as the North, East, South, and West reference areas and as depicted on Figure 1). The reference areas were spaced to be adjacent to, but without overlapping, the project area. Due to the project boundary configuration and to avoid overlap, the West and East reference areas are slightly farther from the project boundary than the North and South reference areas (Figure 1). All of the reference areas are within the Missouri Coteau Slope and Missouri Coteau Level IV Ecoregions described above. Elevations and topography of the reference areas are similar to elevations and topography of the project area described above. Notable differences include a relatively greater amount of topographic relief in the West reference area due to the intrusion of dissected river break physiography associated with the Missouri River and a relatively lower amount of topographic relief due to the lower elevation outwash plain present in the East reference area. The East reference area is also within the Collapsed Glacial Outwash Level IV Ecoregion. The Collapsed Glacial Outwash Ecoregion is characterized by large, shallow, alkaline lakes. The West reference area is also within the River Breaks Level IV Ecoregion. The River Breaks ecoregion is characterized by broken terraces and

uplands surrounding the floodplains of the Missouri River and its major tributaries (Bryce et al. 1996).

3 METHODS

The Whooping Crane stopover habitat assessment was conducted using data sources and publicly available reports recommended by the USFWS and North Dakota Game and Fish Department (NDGF) during a January 28, 2020 agency meeting. The assessment follows a reference area-analysis approach and is consistent with the methodology used in other publicly available reports produced for wind energy facilities in North Dakota (Derby and Thorn 2018; WEST 2018; Chodachek 2019). The stopover habitat assessment was conducted in four steps:

1) Habitat Mapping - habitat mapping was completed to compare land cover between the project area and each of the four reference areas;

2) Potential Stopover Roosting Site Assessment - stopover wetland habitat was scored to compare availability of stopover habitat between the project area and each reference area using previously published wetland assessment methodology developed by TWI (TWI 2013);

3) Stopover Use Intensity - stopover site use intensity analysis was conducted using modeling outputs (Pearse et al. 2015) produced by the U.S Geological Survey (USGS) to compare stopover use intensity between the project area and each reference area; and

4) Probability of Habitat Use - probability of stopover habitat use in North and South Dakota modeled by the USFWS Habitat and Population Evaluation Team (HAPET) was used to compare each reference area using modeling outputs produced by Niemuth et al. (2018). The USFWS also furnished Atwell an unpublished, annually updated data set of opportunistically collected Whooping Crane sightings dating back to 1942. USFWS sightings data are not intended for public distribution but can be used to provide additional context for regional habitat and Whooping Crane use patterns.

3.1 HABITAT MAPPING

Desktop analysis was used to assess terrestrial and wetland habitat parameters within the project boundary and within surrounding reference areas using ArcMap 10.8.1 (ESRI 2020); land cover information from the NLCD (Yang et al. 2018) (Figure 2); wetland data from the USFWS National Wetland Inventory (USFWS 2019) (Figure 3); agricultural aerial imagery provided by the National Agriculture Imagery Program (U.S Department of Agriculture [USDA] 2018); and cropland coverage data from the potentially undisturbed lands (PUDL) assessment recently completed by the Prairie Pothole Joint Venture (Fields and Barnes 2019).

A site visit was not conducted to ground-truth the desktop analysis. However, Atwell has conducted ground-based avian use surveys at 53 fixed point count stations throughout the project area since May 2019, as well as aerial nesting raptor and grouse lek surveys throughout

the project area and surrounding biological survey buffer areas extending to ten miles (as part of surveys conducted between May 2019 through April 2020). Through these efforts, Atwell confirmed that desktop habitats are generally consistent with on-the-ground conditions observed as part of field studies.

3.2 POTENTIAL STOPOVER ROOSTING SITE ASSESSMENT

The stopover roosting wetland assessment methodology used for this report was developed by TWI (TWI 2013) and consists of: 1) elimination of unsuitable wetlands (wetlands considered not suitable as Whooping Crane stopover habitat) from consideration after screening all wetlands for conditions including size, proximity to human disturbance, and proximity to visual obstructions; 2) a score-based assessment of screened suitable wetlands that considers water regime, distance to food, wetland size, whether the wetland is natural or manmade, and wetland density (TWI 2013); and, 3) comparison of stopover wetland density, acreage, and favorability as Whooping Crane stopover roosting sites between the project area and reference areas.

3.3 STOPOVER USE INTENSITY

To map stopover use intensity, Pearse et al. (2015) used five years of migration stopover data provided by radio-tagged Whooping Cranes to categorize 20 km^2 (7.72 $miles^2$) grid cells throughout the migration pathway by number of stopover sites and duration of time spent at stopover locations.

Grid cells were classified from low to high stopover intensity as unoccupied, low intensity, core intensity, and extended-use core intensity (Pearse et al. 2015). Unoccupied grid cells have no evidence of Whooping Crane use. Low intensity grid cells have at least one stopover site, with low duration of time spent at the site(s). Core intensity cells have a density of stopover sites below calculated stopover volume, which is a measure of duration of use. Core intensity cells also have a lower density of crane days, an additional metric of stopover intensity, than extended-use core intensity cells. Extended-use core intensity cells have density of stopover sites below calculated stopover volume and have the highest volume of crane days.

The project area and reference areas were overlaid atop grid classifications. Coverage values were calculated for each stopover use intensity class for the project area and for each reference area.

3.4 PROBABILITY OF HABITAT USE

Niemuth et al. (2018) created a predictive model and map showing relative probability of Whooping Crane habitat use during migration through North and South Dakota. In this model, Whooping Crane stopover habitat selection is influenced by land cover and by wetland

characteristics including water regime, size, water depth, and proximity to food resources and other wetland habitats nearby (TWI 2013; Niemuth et al. 2018).

The predictive model was generated using historic Whooping Crane stopover data for the Whooping Crane migration corridor and was combined with high resolution landscape data. Model outputs were used to produce a relative probability of habitat use map for North and South Dakota. Researchers then divided this map into deciles of ten equal-area bins, or classes, to rank probability of use across the two states. Areas with decile values of 1 have the lowest probability of use while areas with decile values of 10 have the highest probability of Whooping Crane use. The project area and reference areas were overlaid atop decile values and coverage values were calculated for each decile class for the project area and for the four reference areas.

4 RESULTS

4.1 HABITAT MAPPING

The project area contains more cultivated cropland and less grassland/herbaceous cover than surrounding reference areas (Table 1). Cover values for other terrestrial land cover classifications were similar between the project area and the reference areas.

Cultivated Cropland

The project area has a comparable amount of cultivated cropland (26,362.1 acres, or 46.2% of the project area) to each of the four reference areas. Cultivated cropland within reference areas ranged from 16,573.2, or 33.9% for the North reference area to 35,070.5 acres, or 52.1% for the South reference area.

Grassland/Herbaceous

The project area has a comparable amount of grassland and herbaceous cover (25,622.6 acres, or 44.9% of the project area) to each of the four reference areas. Grassland and herbaceous cover within reference areas ranged from 15,194.5 acres or 38.0% for the South reference area to 31,292.7 acres or 49% for the North reference area.

Wetlands/Waters

The project area had less wetlands/waters compared to the four reference areas, with less than 2.36% or 2,872.7 acres within the project area comprised of wetlands/waters. Wetlands/waters within the reference areas ranged from 3,006.7 acres or 2.47% for the West reference area to 18,283.2 acres or 15.0% for the East reference area. The East and North reference areas had the highest wetlands / waters habitat.

4.2 POTENTIAL STOPOVER ROOSTING SITE ASSESSMENT

Wetland density within the project area increases moving from west to east and from the south to north in Logan and McIntosh counties as the topography rises from the Missouri Coteau Slope eastward into the Missouri Coteau (Figure 3). The project area and West reference area are located predominately within the Missouri Coteau Slope, and they have similar low percentages of wetland coverage. The North, East, and South reference areas extend further into the Missouri Coteau and the wetland compositions of these three reference areas are higher than that of the project area. The project area and the West reference area have less wetland acreage (2,297.9 acres and 1,943.6 acres respectively) than the North (7,324.0 acres), East (7,724.5 acres) and South (3,831.7 acres) reference areas, respectively (Table 2).

Riverine wetlands associated with the integrated drainages of the Missouri Coteau Slope were more numerous within the project area and West reference area (394.3 acres and 377.1 acres respectively) than in the North, East, and South reference areas (83.81 – 95.7 acres, Table 2), indicting that wetlands in these areas are more commonly associated with linear water features (such as streams). Conversely, freshwater emergent wetlands covered more acreage in the North, East, and South reference areas (3,652.5 – 6,398.0 acres) than in the project area (1,824.2 acres) and West reference area (1,477.6 acres, Table 2), indicating that wetlands in these areas are more commonly associated with other topographic features, including pothole areas.

Potential Roosting Habitat Scoring Assessment

The project area includes 370 wetland basins that passed initial wetland screening to be subsequently processed using the TWI score-based assessment to evaluate their potential as stopover roosting habitat. Wetlands that passed the wetland screening are hereafter referred to as "screened wetlands". These screened wetlands cover approximately 955.0 acres of the project area (Table 3a). The project holds fewer screened wetland basins with less acreage than each of the reference areas. The total number of screened wetlands in reference areas ranged from 460 in the West reference area to 1,603 in the East reference area (Table 3a). Screened wetland habitat acreage in the reference areas ranged from 1,406.1 acres in the West reference area to 5,587.2 acres in the East reference area. Mean screened wetland size in the project area was 2.6 acres. This is also smaller than mean screened wetland sizes for the four reference areas (which had mean scored wetland sizes ranging from 3.0 acres in the North reference area to 3.5 acres in the East reference area).

As noted earlier, the wetland scoring system developed by TWI scores potential roosting habitat based on criteria such as water regime, distance to food, wetland size, whether the wetland is natural or manmade, and wetland density (TWI 2013). Mean wetland assessment scores for the project area and surrounding reference areas for screened wetlands ranged from 10.7 – 12.8 out of a total possible score of 20 (Table 3a). Mean assessment scores were highest in the East and North reference areas, which extend into the Missouri Coteau. Screened wetlands within the project area held a mean score of 10.7.

Stopover roosting habitat scores derived from this methodology have been truthed with roosting Whooping Crane observations at Quivira National Wildlife Refuge in Kansas. TWI researchers used stopover roosting data gathered from Whooping Cranes sightings to determine that wetlands with cumulative scores of at least 12 qualified as potentially suitable stopover roosting habitat (TWI 2013). Project area and reference area wetlands with cumulative assessment scores of at least 12 are summarized in Table 3b.

The project area holds 114 wetlands that are potential stopover roosting habitat with assessment scores of at least 12. The project area has a lower number of potential roosting habitat wetlands

than each of the four reference areas (Table 3b). Surrounding reference areas contain a range of 177 potential roosting habitat wetlands within the West reference area to 1,240 potential roosting habitat wetlands within the East reference area. Potential roosting habitat wetlands also cover a smaller portion of the project area (744.3 acres) than each of the reference areas (1,116.3 in the West reference area to 5,306.7 acres in the East reference area).

4.3 STOPOVER USE INTENSITY

Whooping Crane stopover use intensity generally increases moving westward from the project area toward the migration corridor's centerline (Figure 4). In the case of the project area, even though relatively higher quality stopover habitat exists to the north and east of the project area, these reference areas are also to the east of the portion of the Whooping Crane migration corridor that encompasses a higher density of recorded historic stopovers.

The project area and reference areas do not contain any lands classified as extended use core intensity, which is the classification representing highest use (Figure 4). The project area and surrounding reference areas are located in an area generally classified as low intensity use (Tables 4a and 4b). The low intensity classification is described in Pearse et al. (2015) as a classification containing grid cells with Whooping Crane stopovers, but whose ratio of total Whooping Crane observation days to total stopovers was not as high as ratios found in core intensity cells.

4.4 PROBABILITY OF HABITAT USE

The USFWS HAPET found that the best supported model indicated that Whooping Crane occurrence was positively associated with wetland area, wetland variety, cropland area, and road density (reflecting the opportunistic nature of Whooping Crane sightings). Whooping Crane occurrence was negatively associated with distance to the migration corridor's centerline, number of wetlands, and terrain roughness. Areas included with the highest decile rankings best fit these parameters and have the highest probability of use.

As with stopover use intensity (Section 4.3), probability of Whooping Crane habitat use modeled by the USFWS HAPET (Niemuth et al. 2018) also increases moving westward from the project area toward the migration corridor's centerline (Figure 5). On an east to west axis, the decile ranking with highest probability of use (depicted in red in Figure 5) covers approximately 3.5% of the East reference area, increases to cover 4.4% of the project area, then further increases to cover 13.5% of the West reference area (Tables 5a and 5b).

5 DISCUSSION

This desktop analysis assesses the likelihood that Whooping Cranes will use the project area for stopover habitat by using methodologies that consider both stopover roosting and foraging

requirements of Whooping Cranes. The results of this analysis generally confirm that on a regional basis, and in comparison to four reference areas adjacent to the project area, the project area has been sited in an area that has relatively lower quality and quantity Whooping Crane stopover habitat. The Project Area is primarily comprised of croplands, has the relatively lowest portion of wetland and water habitat, and is located in the 75th percentile of the Whooping Crane migration corridor. Areas to the west (which is located in the 50th percentile migration corridor) and to the north and east (which have a relatively higher percentage of wetlands and waters) have relatively more potentially suitable Whooping Crane stopover habitat.

Considering land cover alone, the project area has equal or more cropland than the surrounding reference areas. Cropland habitat is present throughout the project area but is found in highest density in the project area and to the south and west, on the Missouri Coteau Slope. The project area has a similar amount of herbaceous grassland cover as the reference areas. Grassland cover is more prevalent north of the project area and less prevalent south of the project area. Wetlands are present throughout the project area but are found in highest densities on the Missouri Coteau to the east, north, and south of the project area.

USFWS HAPET analyzed probability of habitat use and found that Whooping Crane occurrence was positively associated with wetland area, wetland variety, cropland area, and road density. Whooping Crane occurrence was negatively associated with distance to the migration corridor centerline, wetland density, distance to areas of increased survey effort, and terrain roughness (Niemuth et al. 2018). Importantly, the best-supported habitat use model also was positively influenced by interactions of wetland area and wetland density; and by interactions of wetland area, cropland area, and distance to the centerline of the migration corridor. Red-shaded areas in Figure 5 encompass the highest modeled probability of Whooping Crane habitat use that best captures relationships between the parameters that are listed above.

The project area appears to have a greater probability of use than much of the East reference area, which lies farther from the migration corridor's center line but within the 95% migration corridor band. The project area is modeled to generally have a lower probability of use than the South and West reference areas. The project area also includes a lower number of potentially suitable stopover roosting sites with an assessment score of at least 12 out of 20 (Table 3b) than each of the four reference areas, and that the North and East reference areas on the Missouri Coteau hold notably more wetlands with assessment scores of at least 12 than the project area. Stopover wetland habitat scoring suggests that the project area has a lower potential to host roosting Whooping Cranes during stopovers than the surrounding reference areas because it holds a smaller number of high-scoring wetland basins as well as less acreage of high-scoring wetland basins than the surrounding reference areas.

The project area and reference areas tended to contain low intensity use areas or areas left unclassified by this system due to a lack of evidence of use, and only the South reference area contained any areas that were classified as core use (Pearse et al. 2015). The South reference area had the highest modeled stopover use intensity, the North and West reference areas were comparable in stopover use intensity to the project area, and the East reference area had the lowest modeled stopover use intensity. The closest areas with the highest stopover use intensity classification were approximately 30 miles (48 km) to the northwest of the project area, near the Missouri River and Lake Oahe. The closest core use cell (the second highest use intensity classification), was approximately 22 miles (35 km) south of the project area, near the town of Ventura (Figure 4).

Whooping Crane Observations

An unpublished Whooping Crane sighting data set curated by the USFWS contains only one record for the study area (specifically within the West reference area).

On April 15, 2020, an Atwell biologist incidentally observed three adult Whooping Cranes within the project area. This observation is the first known occurrence of Whooping Cranes within the project area. The Whooping Cranes were observed foraging in agricultural areas (corn fields) throughout the day, approximately four miles northwest of Wishek, North Dakota. Of note, due to poor harvesting conditions during the fall of 2019, the Whooping Cranes were foraging in unharvested stands of corn. The Atwell biologist noted at the time of observation that there are many other areas of unharvested corn within the project area, perhaps dispersing Whooping Crane stopover use farther from the migration corridor's centerline than expected.

Their stopover roosting location was not obtained on April 15. The Whooping Cranes were again present on April 16 and 17, and they were observed heading to roost near dusk approximately 0.7 miles (1,120 meters [m]) from their foraging location on the April 16 and 17. The roosting location is at the confluence of two riverine wetlands with seasonally flooded water regime classifications within the project area. The location is depicted by the yellow icon on Figure 5. Wetland density is not high at this location, with two NWI-delineated wetlands present within the one-mile section block. The roost is within a low stopover use intensity grid cell. It is within the second-highest probability of habitat use decile. The Whooping Cranes may have been attracted to the area of unharvested corn where they foraged and then to a roost site near this foraging area. During future operations, Whooping Cranes would be expected to generally avoid wind turbines. However, a potential consideration would be to limit areas within the project area with unharvested crops to avoid attracting Whooping Cranes into the project area to forage.

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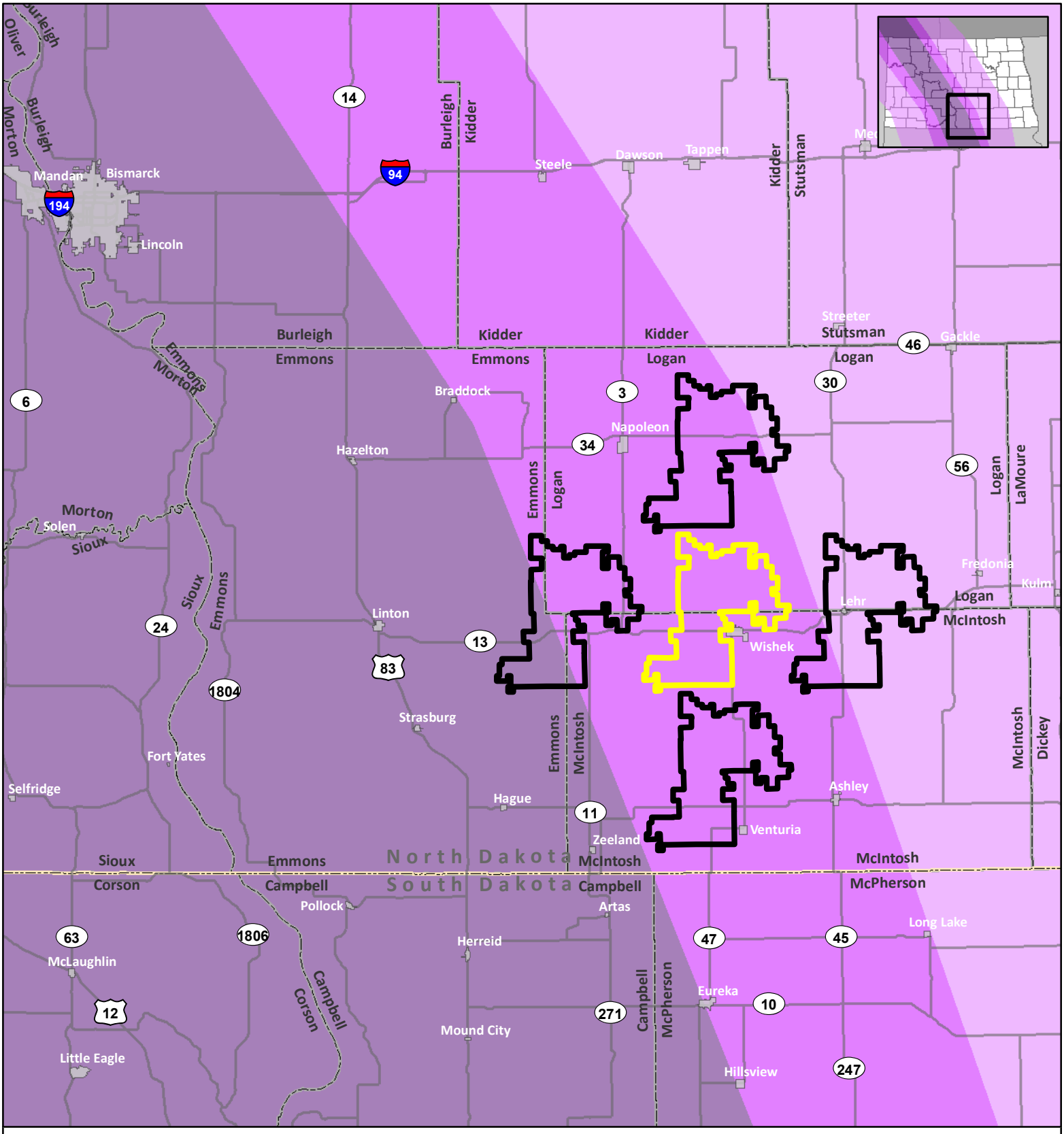
FIGURES



Whooping Crane Migration Corridor (USFWS)
- 50%
- 75%
- 95%

Project Area (12/4/2020, ~57,097 acres)
Reference Areas

Road
Town/Village
County
State

0 10
Miles

ATWELL

Whooping Crane Habitat Assessment
Badger Wind
19000785
March 09, 2021

Figure 1
Project Area and Reference Areas
North Dakota

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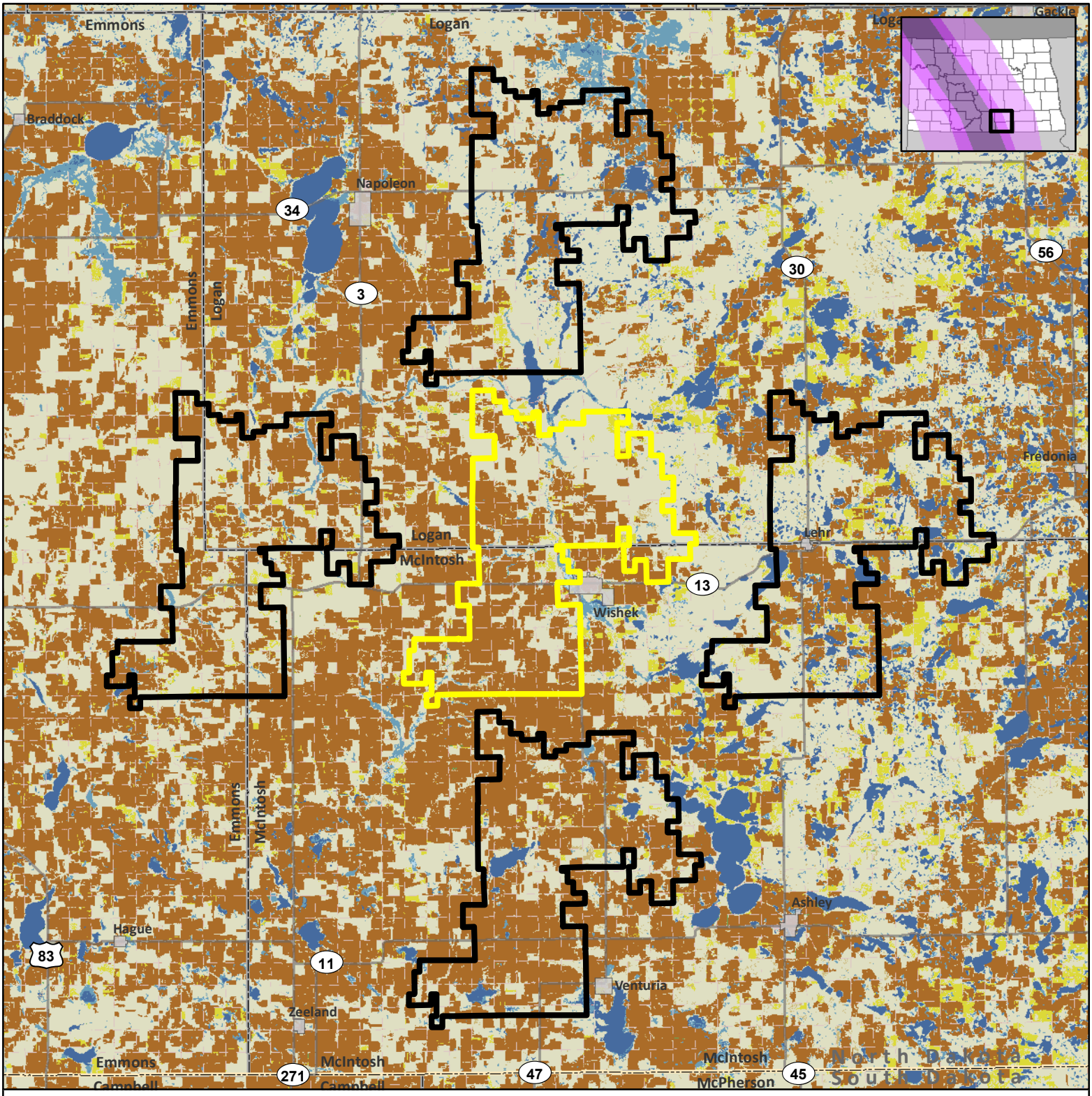

Open Water
Developed, Open Space
Developed
Barren Land
Deciduous Forest
Evergreen Forest
Mixed Forest
Shrub/Scrub
Herbaceous
Hay/Pasture
Cultivated Crops
Woody Wetlands
Emergent Herbaceous Wetlands
Project Area (12/4/2020, ~57,097 acres)
Reference Areas
Whooping Crane Migration Corridor (USFWS)
50%
75%
95%
Road
County
State

0 6
Miles

ATWELL

Whooping Crane Habitat Assessment
Badger Wind
19000785
March 09, 2021

Figure 2
NLCD Land Cover Classification
North Dakota

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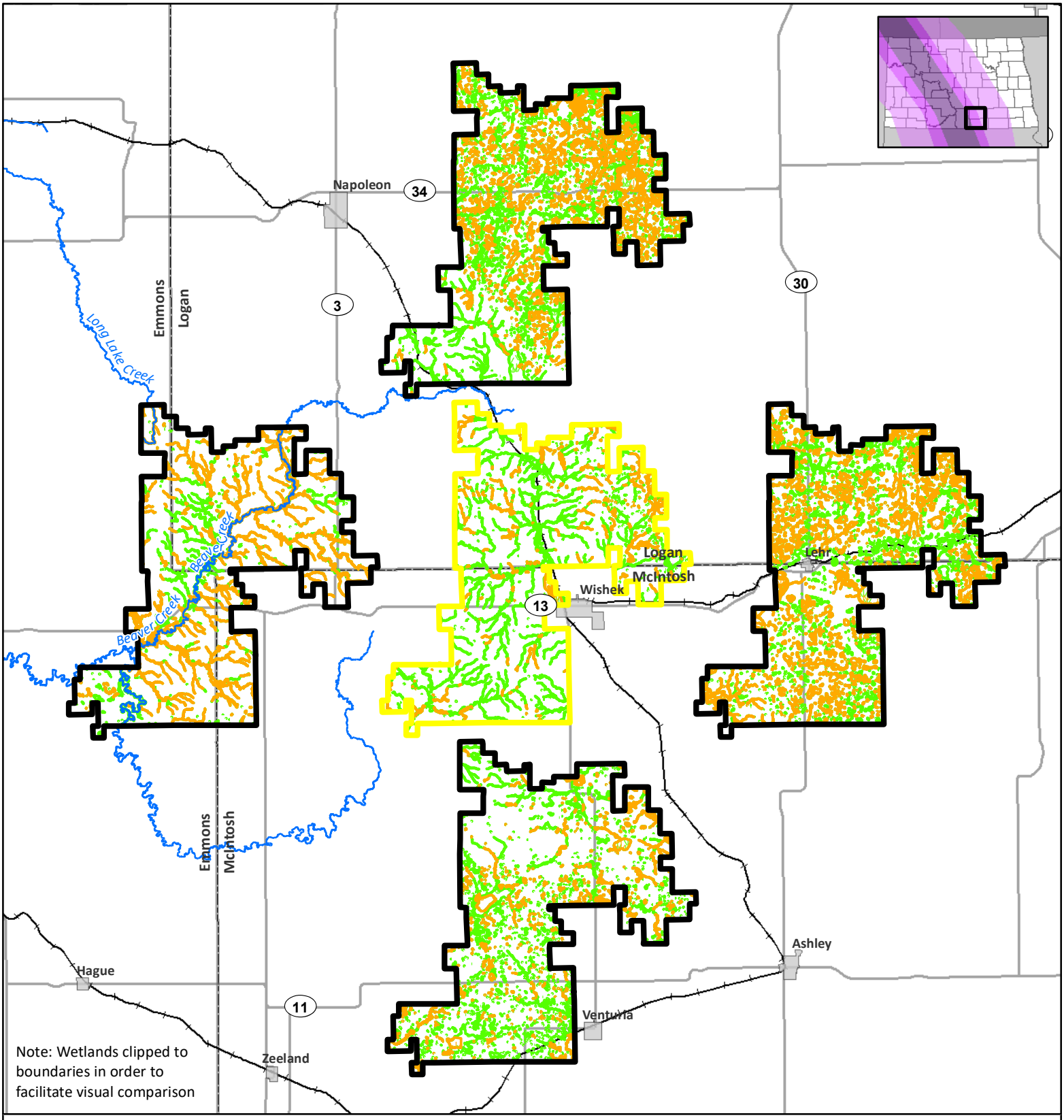

Major Watercourse (NHD)
Wetland (Screened)
Wetland (NWI)

Whooping Crane Migration Corridor (USFWS)
50%
75%
95%

Project Area (12/4/2020, ~57,097 acres)
Reference Areas

Road
Railroad
County

0 6
Miles

ATWELL

Whooping Crane Habitat Assessment
Badger Wind
19000785
March 10, 2021

Figure 3
NWI Wetlands
North Dakota

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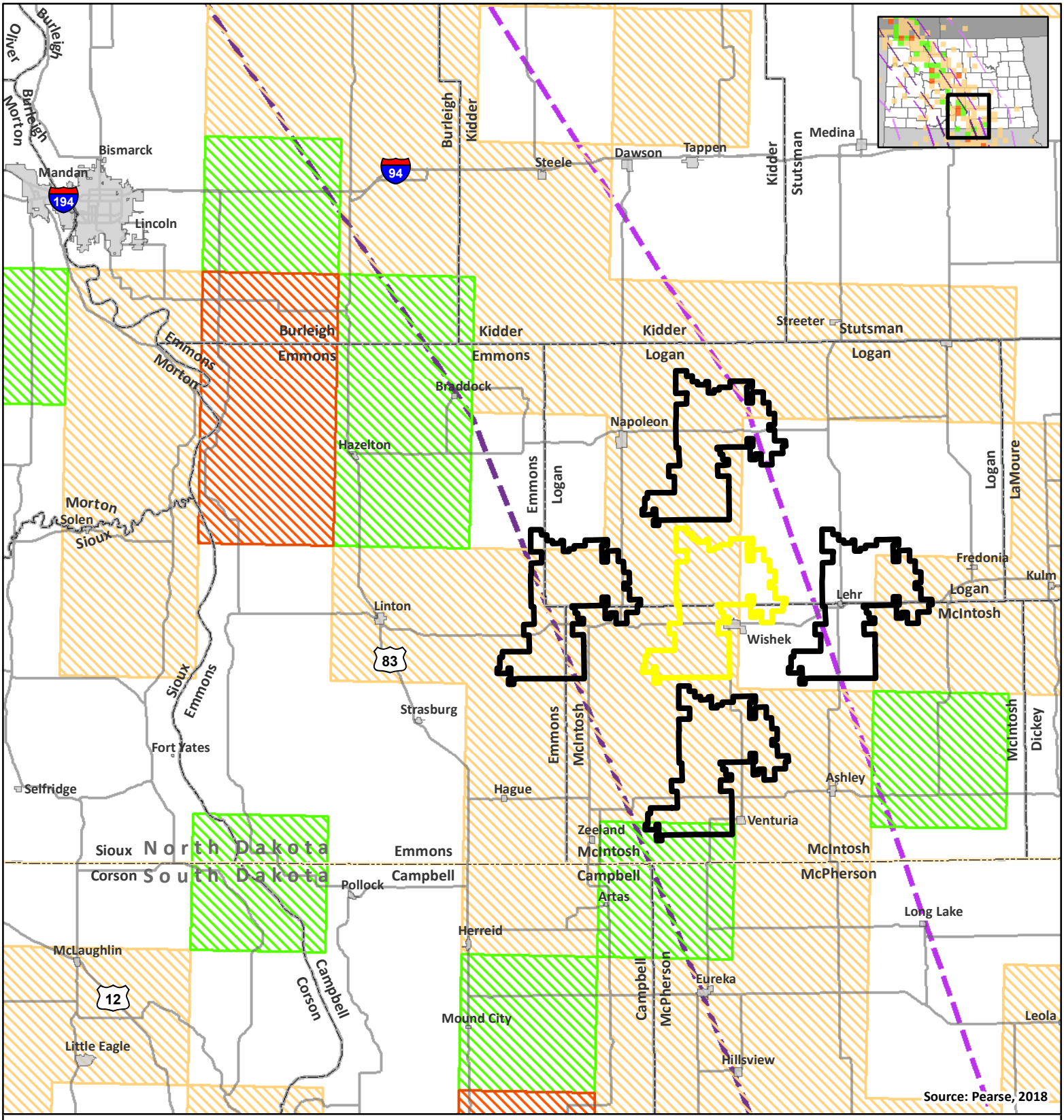

Whooping Crane Stop Over Intensity
- Extended Use Core
- Core
- Low
- Unoccupied

Whooping Crane Migration Corridor (USFWS)
- 50%
- 75%
- 95%

- Project Area (12/4/2020, ~57,097 acres)
- Reference Areas

- Road
- Town/Village
- County
- State

0 10
Miles

ATWELL

Whooping Crane Habitat Assessment
Badger Wind
19000785
March 09, 2021

Figure 4
Whooping Crane Stopover Use Intensity
North Dakota

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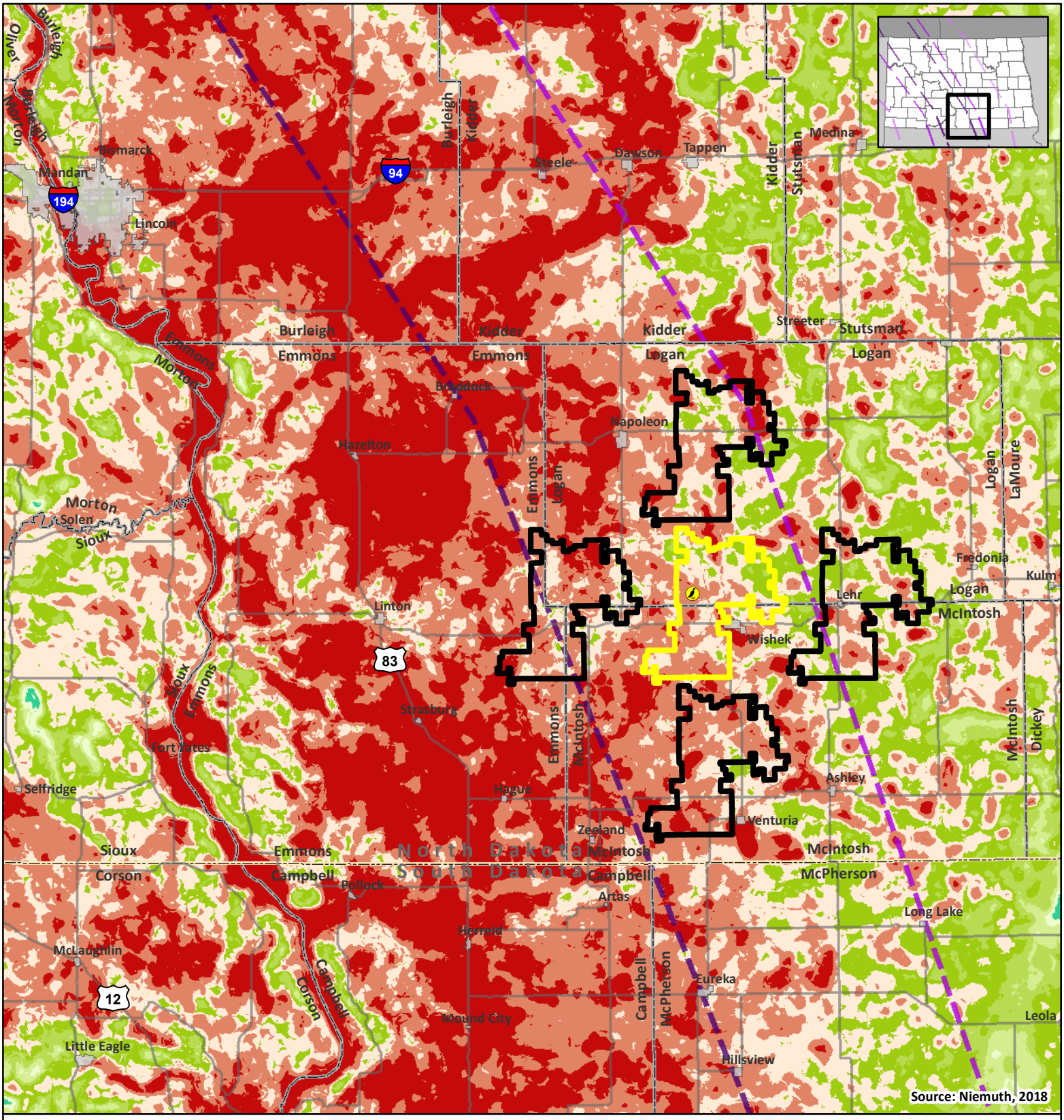

Whooping Crane Probability of Use
- High (10)
- High (9)
- High (8)
- Medium (7)
- Medium (6)
- Medium (5)
- Medium (4)
- Low (3)
- Low (2)

Whooping Crane Migration Corridor (USFWS)
- 50%
- 75%
- 95%

Whooping Crane Sighting (April 2020)

Project Area (12/4/2020, ~57,097 acres)

Reference Areas

Road

Town/Village

County

State

0 10
Miles

ATWELL

Whooping Crane Habitat Assessment
Badger Wind
19000785
March 09, 2021

Figure 5
Whooping Crane Probability of Landscape-level Habitat Use
North Dakota

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TABLES

Table 1. NLCD Land Cover Classification

	Project		East		North		South		West	
Land Use/Cover	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**
Cultivated Crops	26362.1	46.17%	16988.0	29.75%	16573.2	29.03%	35070.5	61.42%	26633.1	46.65%
Wetlands/Water	1402.8	2.46%	8279.7	14.50%	6774.6	11.87%	3097.0	5.42%	1105.6	1.94%
Grassland/Herbaceous	25622.6	44.88%	25098.9	43.96%	31292.7	54.81%	15194.5	26.61%	25451.2	44.58%
Pasture/Hay	1260.5	2.21%	4273.5	7.48%	976.7	1.71%	816.0	1.43%	2042.0	3.58%
Developed	1756.8	3.08%	1823.3	3.19%	1369.4	2.40%	1905.6	3.34%	1827.4	3.20%
Woodland/Forest	24.0	0.04%	13.6	0.02%	22.2	0.04%	11.3	0.02%	10.2	0.02%
Shrub/Scrub	664.7	1.16%	573.6	1.00%	70.5	0.12%	983.5	1.72%	22.9	0.04%
Barren Land	3.6	0.01%	46.5	0.08%	17.6	0.03%	18.5	0.03%	4.4	0.01%

National Land Cover Database (NLCD) classification values provided for the Badger Wind project area and four surrounding references areas in North Dakota. Project area and each reference area is approximately 57,097.0 acres in area.

Source: Yang et al. 2018

Table 2. NWI Wetland Assessment

	Project		East		North		South		West	
Land Use/Cover	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**
Freshwater Emergent Wetland	1824.2	79.4%	6398.0	82.8%	5724.9	78.2%	3652.5	95.3%	1477.6	76.0%
Freshwater Forested/Shrub Wetland	1.9	0.1%	1.3	0.0%	4.9	0.1%	2.9	0.1%	0.0	0.0%
Freshwater Pond	57.0	2.5%	166.4	2.2%	127.4	1.7%	42.8	1.1%	89.0	4.6%
Lake	20.4	0.9%	1075.0	13.9%	1371.2	18.7%	39.3	1.0%	0.0	0.0%
Riverine	394.3	17.2%	83.8	1.1%	95.7	1.3%	94.2	2.5%	377.1	19.4%
Total	**2297.9**	**100.0%**	**7724.5**	**100.0%**	**7324.0**	**100.0%**	**3831.7**	**100.0%**	**1943.6**	**100.0%**

National Wetlands Inventory (NWI) classification values provided for the Badger Wind project area and four surrounding references areas in North Dakota. Project area and each reference area is approximately 57,097.0 acres in area.

Source: USFWS 2019

Table 3a. Wetland Scoring Assessment: All Scored Wetlands

Area	Number of Basins	Total Wetland Acres	Mean Basin Size in Acres	Basin Size Range in Acres	Mean Score	Score Range
Project	370	955.0	2.6	0.3 - 292.3	10.7	7 - 18
East	1603	5587.2	3.5	0.3 - 305.2	12.7	7 - 19
North	1393	4215.9	3.0	0.3 - 381.3	12.8	6 - 19
South	634	1945.5	3.1	0.3 - 206.4	11.0	7 - 17
West	460	1406.1	3.1	0.3 - 80.8	11.0	7 - 17

Number of wetland basins that passed wetland assessment screening, total acreage, mean acreage, acreage range, mean score, and score range of screened basins. Basin summary data are provided for the Badger Wind project area and four surrounding reference areas in North Dakota. Project area and each reference area is appoximately 57,097.0 acres. Screening and scoring methodology from The Watershed Institute (2013).

Table 3b. Wetland Scoring Assessment: Potential Roosting Habitat Wetlands

Area	Number of Basins	Total Wetland Acres	Mean Basin Size in Acres	Basin Size Range in Acres	Mean Score	Score Range
Project	114	744.3	6.5	0.3 - 146.4	13.2	12 - 18
East	1240	5306.7	4.3	0.3 - 192.4	13.5	12 - 19
North	1116	4021.0	3.6	0.3 - 108.6	13.4	12 - 18
South	273	1628.2	6.0	0.3 - 206.4	13.0	12 - 17
West	177	1116.3	6.3	0.3 - 353.0	13.5	12 - 18

Screened wetlands with assessment scores ≥ 12, signifying status as potential Whooping Crane stopover roosting habitat (Watershed Institute, Inc. 2013).
Number of potential stopover roosting habitat basins, total acreage, mean acreage, acreage range, mean score, and score range are provided for the Badger Wind project area and four surrounding reference areas in North Dakota. Project area and each reference area is approximately 57,097.0 acres.

Table 4a. Whooping Crane Stopover Use Intensity Acreage

Area	Extended Use Core Intensity	Core Intensity	Low Intensity	Unclassified
Project	0	0	45,374	11,723
East	0	0	13,901	43,196
North	0	0	49,997	7,100
South	0	5,367	51,731	0
West	0	0	53,806	3,291
Grand Total	**0**	**5,367**	**214,809**	**65,310**

Source: Pearse, A.T., M. Rabbe, L.M. Juliusson, M.T. Bidwell, L. Craig-Moore, D.A. Brandt, and W. Harrell. 2018.

Table 4b. Whooping Crane Stopover Use Intensity Percent Coverage

Area	Extended Use Core Intensity	Core Intensity	Low Intensity	Unclassified
Project	0.0%	0.0%	79.5%	20.5%
East	0.0%	0.0%	24.3%	75.7%
North	0.0%	0.0%	87.6%	12.4%
South	0.0%	9.4%	90.6%	0.0%
West	0.0%	0.0%	94.2%	5.8%
Average	**0.0%**	**1.9%**	**75.2%**	**22.9%**

Source: Pearse, A.T., M. Rabbe, L.M. Juliusson, M.T. Bidwell, L. Craig-Moore, D.A. Brandt, and W. Harrell. 2018.

Table 5a. Whooping Crane Probability of Habitat Use: Decile Acreage

Habitat Quality	Value	Project Area	East	North	South	West
High	**10**	2,518	2,001	7,081	7,330	7,692
	9	21,993	14,349	22,536	34,315	30,209
	8	23,741	22,780	18,684	14,785	17,653
High Total		**48,252**	**39,130**	**48,301**	**56,430**	**55,554**
Medium	**7**	8,253	16,062	8,116	667	1,543
	6	591	1,901	650	0	0
	5	0	3	30	0	0
Medium Total		**8,844**	**17,966**	**8,796**	**667**	**1,543**

Source: Niemuth, N. D., A. J. Ryba, A. T. Pearse, S. M. Kvas, D. A. Brandt, B. Wangler, J. E. Austin, and M. J. Carlisle. 2018

Table 5b. Whooping Crane Probability of Habitat Use: Percent Coverage

Habitat Quality	Decile	Project Area	East	North	South	West
High	**10**	4.4%	3.5%	12.4%	12.8%	13.5%
	9	38.5%	25.1%	39.5%	60.1%	52.9%
	8	41.6%	39.9%	32.7%	25.9%	30.9%
High Total		**84.5%**	**68.5%**	**84.6%**	**98.8%**	**97.3%**
Medium	**7**	14.5%	28.1%	14.2%	1.2%	2.7%
	6	1.0%	3.3%	1.1%	0.0%	0.0%
	5	0.0%	0.0%	0.1%	0.0%	0.0%
Medium Total		**15.5%**	**31.4%**	**15.4%**	**1.2%**	**2.7%**

Source: Niemuth, N. D., A. J. Ryba, A. T. Pearse, S. M. Kvas, D. A. Brandt, B. Wangler, J. E. Austin, and M. J. Carlisle. 2018

Grassland Habitat Assessment

Badger Wind Project

Logan and McIntosh Counties, North Dakota



Prepared for:

Badger Wind, LLC

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January 19, 2024

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REPORT REFERENCE

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Appendix B. Results of the desktop review and field assessment of potential grassland habitat within the Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021 and August 17 – 18, 2023.

INTRODUCTION

Badger Wind, LLC (Badger Wind) is proposing the Badger Wind Project (Project) in Logan and McIntosh counties, North Dakota. Badger Wind contracted Western EcoSystems Technology, Inc. (WEST) to complete a grassland habitat assessment, including characterization of grassland sod types as broken/unbroken, to inform development of the Project. Unbroken grasslands, defined in the North Dakota Game and Fish Department's (NDGFD) *Wind Energy Development in North Dakota, Best Management Practices* (NDGFD 2021) as "grasslands that have not been tilled or otherwise broken," are considered key habitat for the "health and long-term survival of many of North Dakota's native wildlife."

The objective of this study was to identify grassland parcels within the Project and categorize the sod type of each parcel as either broken or unbroken grasslands. This report presents the combined results of grassland assessments conducted for the Project during 2021 (Arellano and Piorkowski 2021) and during 2023 to cover changes/updates to the Project since2021, which include the expanded project boundary and design modifications. Results from this assessment can help inform siting of facilities and guide decisions regarding future survey needs within the area.

PROJECT AND SURVEY AREAS

The Project Area encompasses approximately 34,867 acres (ac; 14,110 hectares [ha]) in Logan and McIntosh counties, North Dakota (Figure 1). The primary land cover within the Project is predominantly herbaceous (47.4%) and cultivated crops (42.4%; National Land Cover Database [NLCD] 2019). The Project Area lies within the Northwestern Glaciated Plains Level III Ecoregion, an ecoregion dominated by mixed-grass prairie (US Environmental Protection Agency 2013). Topography within the Project Area ranges from relatively flat to rolling hills and elevations range from 1,963 to 2,200 feet (598 to 610 meters).

The 2021 Grassland Survey Area was not buffered and encompassed 52,305 ac (21,657 ha) within Logan and McIntosh counties, North Dakota (Figure 1). The 2023 Grassland Survey Area included recently leased lands buffered by one mile (1.6 kilometers) that were located outside of the 2021 Grassland Survey Area (Figure 1). The 2023 Survey Area encompassed 7704.5ac (3,117.9 ha).

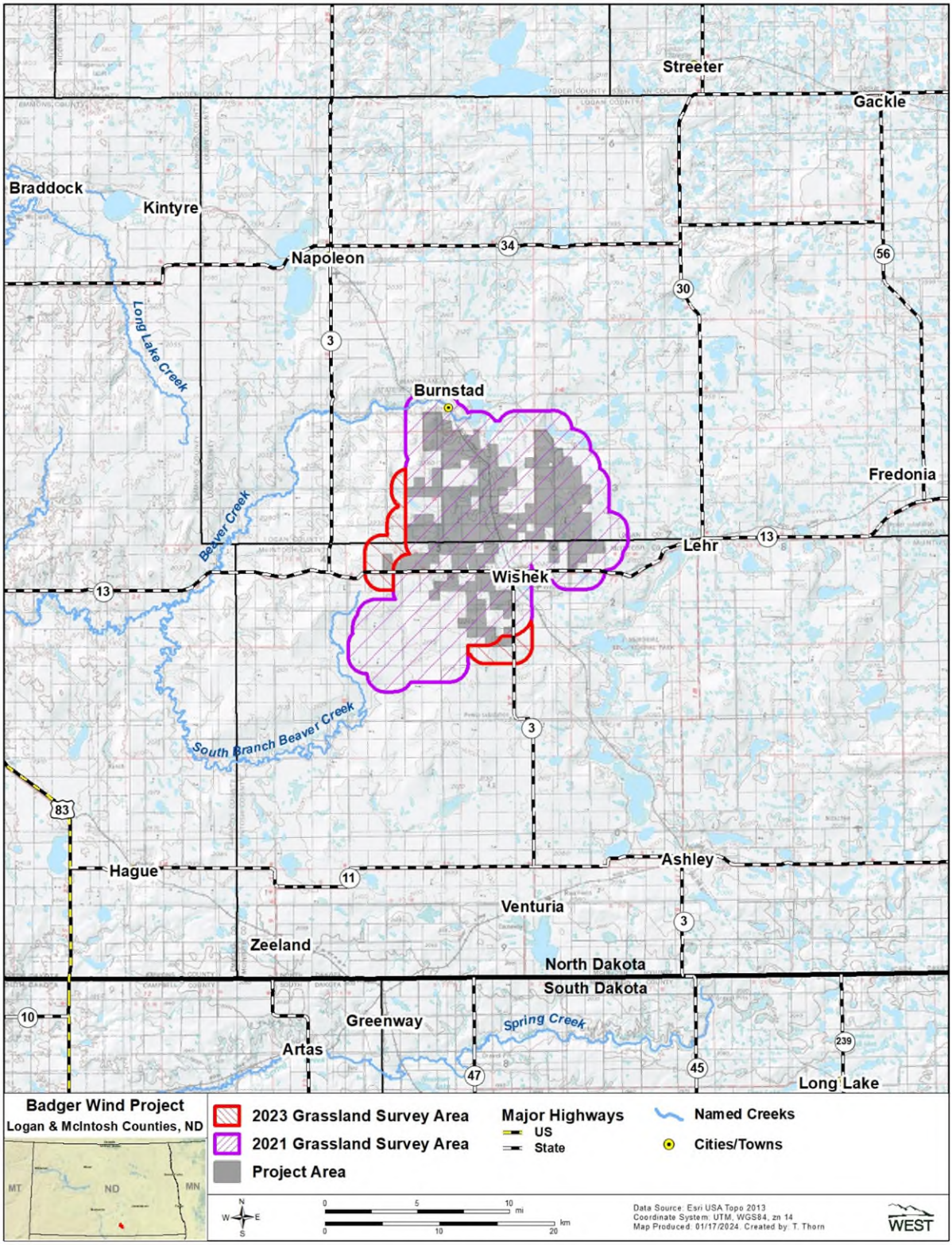

Figure 1. Location of the 2021 and 2023 Grassland Survey Areas and the Badger Wind Project in Logan and McIntosh counties, North Dakota.

METHODS

Desktop Review

Prior to field surveys, WEST completed a desktop review of existing land cover features within the 2021 and 2023 Survey Areas using current aerial photography (US Department of Agriculture [USDA] National Agriculture Imagery Program [NAIP] 2019, 2020, 2021, and 2022), ESRI imagery (larger scale/higher resolution; ESRI 2021), existing land cover (NLCD 2016 and 2019), 2021 Project grasslands data layer (Arellano and Piorkowski 2021), and the NDGFD Native Habitat layer (NDGFD 2014). This review, conducted using Esri software (ArcGIS 10.8.1), resulted in a digital data layer of polygons delineating grassland cover.

Delineated grassland polygons were further examined using a series of historical USDA NAIP aerial photography and USDA North Dakota statewide historical imagery from 1957–1962 (USDA 2017) to establish a preliminary classification of grassland type (broken or unbroken). Broken grassland was identified based on features such as rock piles indicating extensive mechanized rock clearing; presence and number of trees and shrubs; field edge changes; absence of scattered rocks; straight line features indicating plowing, discing, harvesting, or planting; or any other features indicating human disturbance. Unbroken grassland was identified based on the lack of these disturbance features.

The desktop analysis resulted in creation of a digital data layer of polygons classified as "grassland" or "other" (i.e., non-grass areas such as cultivated cropland, roads, barren areas, development, wetlands, forests, and shrub/scrub). Each grassland polygon was defined by visual changes in the landscape (e.g., grassland to cropland or forest edges) and was further categorized as broken or unbroken and given a unique identifier (Grassland ID) used on maps and datasheets. The geographical information system specialist provided maps showing all grassland polygons, Grassland ID, roads, cities, and land access information for the field survey effort.

In November 2023, WEST received a revised NDGFD Native Habitat layer (NDGFD 2022). All areas classified as grasslands in this spatial file were previously reviewed during the desktop review and evaluated during field surveys. This layer is included in the results for reference.

Field Survey

Field surveys were completed from September 29 – October 2, 2021 and August 17 – 18, 2023 to verify the results of the desktop review. A qualified WEST biologist experienced with grassland plant identification and habitat assessments completed both pedestrian surveys and ocular surveys from publicly accessible roadsides for these efforts. Grassland polygons created from the desktop review were confirmed as broken or unbroken, and dominant grass and forb species were recorded as indicators of quality. Photographs were taken to document the condition of the grassland polygons (Appendix A).

Data Management

WEST implemented quality assurance and quality control (QA/QC) measures at all stages of the grassland habitat assessment, including during the desktop review, in the field, during data entry, and during report writing. Data were reviewed by the WEST field biologist before the field data were submitted for data entry; WEST data entry staff were trained on proper data entry procedures, which included an independent review of the field data. If any errors, omissions, or problems were identified, follow-up QA/QC measures were implemented including discussions and review of field data with field staff and/or Project Manager. Upon completion of field surveys, the digital data layer created during the desktop review was updated, as needed.

RESULTS

The combined desktop and field survey resulted in 3,188.7 ac (1,290.4 ha) of grasslands classified as broken and 18,463.0 ac (7,471.7 ha) of unbroken grasslands within the 2021 Grassland Survey Area (Table 1; Figure 2; Appendix B1). The 2023 Grassland Survey Area resulted in 2,265.8 ac (916.92 ha) of grasslands classified as broken and 5,804.6 ac (2,349.05 ha) classified as unbroken within the 2023 Grassland Survey Area (Table 1; Figure 2; Appendix B2).

Table 1. Results of the grassland habitat survey conducted within the 2021 and 2023 Grassland Survey Areas of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021 and August 17 – 18, 2023.

	2021 Grassland Survey Area		2023 Grassland Survey Area	
Grassland Sod Type	**Acres**	**Percentage of Total**	**Acres**	**Percentage of Total**
Broken	3,188.7	14.7	2,265.8	28.1
Unbroken	18,463.0	85.3	5,804.6	71.9
Total	**21,651.7**	**100**	**8,070.4**	**100**

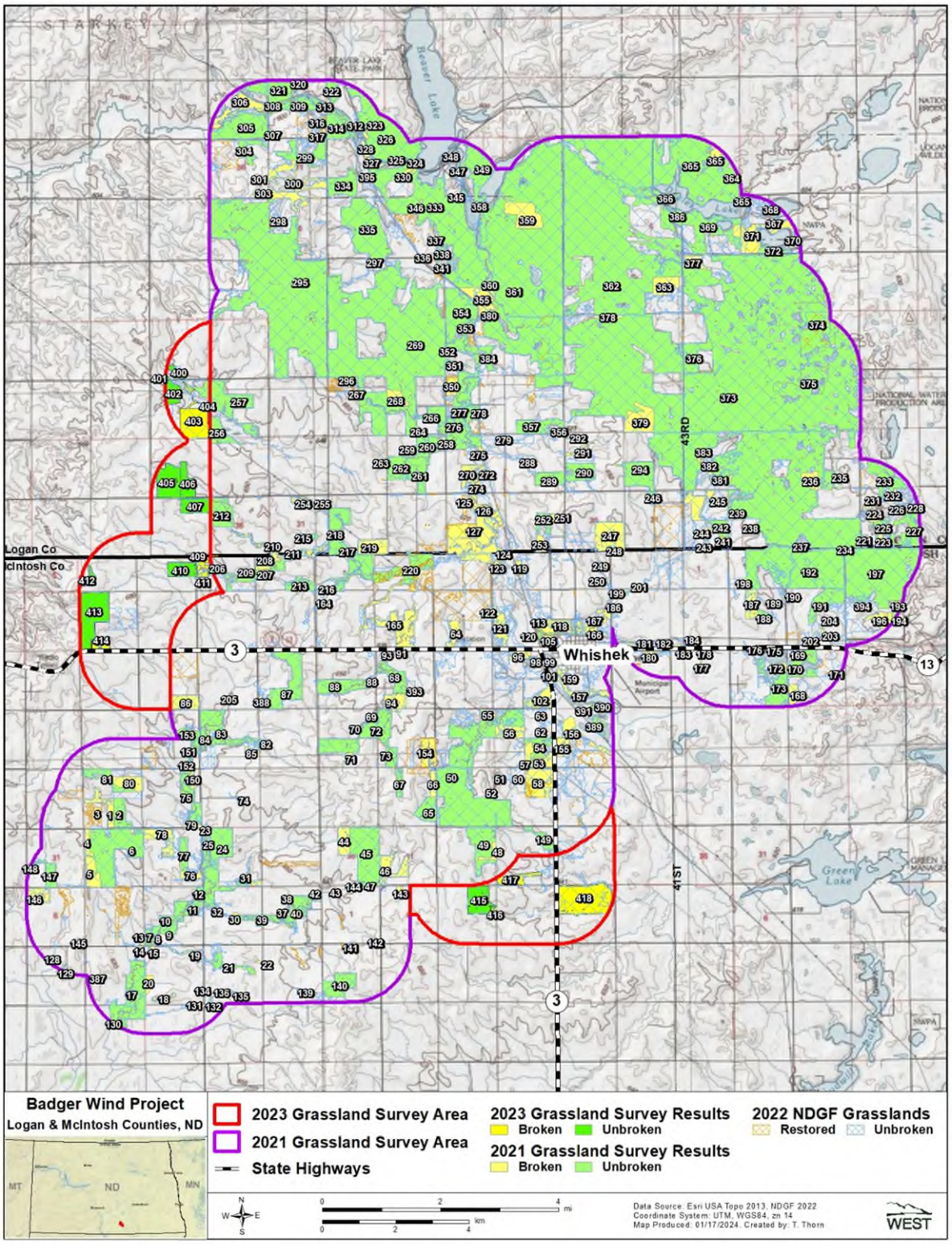

Figure 2. Results of the desktop review and field assessment of potential grassland habitat within the 2021 and 2023 Grassland Survey Areas of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021 and August 17 – 18, 2023.

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Appendix A. Representative Photographs of Grassland Habitats within the 2021 and 2023 Grassland Survey Areas of the Badger Wind Project in Logan and McIntosh Counties, North Dakota, from September 29 – October 2, 2021 and August 17 – 18, 2023.



Appendix A1. Representative photo of broken grasslands within the 2021 Grassland Survey Area of the Badger Wind Farm, Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021.



Appendix A2. Representative photo of broken grasslands within the 2021 Grassland Survey Area of the Badger Wind Farm, Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021.



Appendix A3. Representative photo of unbroken grasslands within the 2021 Grassland Survey Area of the Badger Wind Farm, Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021.



Appendix A4. Representative photo of unbroken grasslands within the 2021 Grassland Survey Area of the Badger Wind Farm, Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021.



Appendix A5. Representative photo of broken grassland within the 2023 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from August 17 – 18, 2023.



Appendix A6. Representative photo of broken grasslands within the 2023 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from August 17 – 18, 2023.



Appendix A7. Representative photo of unbroken grassland within the 2023 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from August 17 – 18, 2023.



Appendix A8. Representative photo of unbroken grassland within the 2023 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from August 17 – 18, 2023.

Appendix B. Results of the desktop review and field assessment of potential grassland habitat within the Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021 and August 17 – 18, 2023.

Appendix B1. Results of the desktop review and field assessment of potential grassland habitat within the 2021 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021.

Grassland ID	Classification
1	Broken
2	Unbroken
3	Broken
4	Broken
5	Broken
6	Unbroken
7	Unbroken
8	Broken
9	Unbroken
10	Unbroken
11	Unbroken
12	Unbroken
13	Broken
14	Broken
15	Broken
16	Broken
17	Unbroken
18	Broken
19	Broken
20	Broken
21	Unbroken
22	Broken
23	Unbroken
24	Unbroken
25	Unbroken
26	Unbroken
27	Unbroken
28	Unbroken
29	Unbroken
30	Unbroken
31	Broken
32	Broken
33	Broken
34	Unbroken
35	Unbroken
36	Unbroken
37	Broken
38	Broken
39	Unbroken
40	Unbroken
41	Broken
42	Broken
43	Broken
44	Broken
45	Unbroken
46	Broken
47	Unbroken
48	Broken
49	Unbroken

Appendix B1. Results of the desktop review and field assessment of potential grassland habitat within the 2021 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021.

Grassland ID	Classification
50	Unbroken
51	Unbroken
52	Unbroken
53	Broken
54	Unbroken
55	Broken
56	Broken
57	Broken
58	Broken
59	Unbroken
60	Unbroken
61	Unbroken
62	Unbroken
63	Unbroken
64	Broken
65	Unbroken
66	Broken
67	Unbroken
68	Unbroken
69	Broken
70	Broken
71	Broken
72	Unbroken
73	Broken
74	Broken
75	Unbroken
76	Broken
77	Unbroken
78	Broken
79	Broken
80	Broken
81	Unbroken
82	Broken
83	Unbroken
84	Unbroken
85	Broken
86	Broken
87	Unbroken
88	Unbroken
88	Broken
89	Broken
90	Broken
91	Broken
92	Broken
93	Broken
94	Broken
96	Broken
97	Broken
98	Broken
99	Broken

Appendix B1. Results of the desktop review and field assessment of potential grassland habitat within the 2021 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021.

Grassland ID	Classification
100	Broken
101	Broken
102	Broken
104	Broken
105	Broken
106	Broken
107	Broken
108	Unbroken
109	Broken
110	Broken
111	Unbroken
112	Unbroken
113	Unbroken
114	Unbroken
115	Unbroken
116	Unbroken
118	Broken
119	Broken
120	Unbroken
121	Broken
122	Broken
123	Broken
124	Broken
125	Broken
126	Broken
127	Broken
128	Broken
129	Broken
130	Unbroken
131	Broken
132	Broken
133	Broken
134	Broken
135	Broken
136	Broken
137	Broken
138	Broken
139	Unbroken
140	Unbroken
141	Broken
142	Broken
143	Broken
144	Broken
145	Broken
146	Broken
147	Unbroken
148	Broken
149	Unbroken
150	Broken
151	Unbroken

Appendix B1. Results of the desktop review and field assessment of potential grassland habitat within the 2021 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021.

Grassland ID	Classification
152	Unbroken
153	Unbroken
154	Broken
155	Broken
156	Broken
157	Broken
158	Broken
159	Broken
164	Broken
165	Broken
166	Broken
167	Broken
168	Broken
169	Broken
170	Unbroken
171	Broken
172	Broken
173	Unbroken
174	Broken
175	Broken
176	Broken
177	Broken
178	Broken
179	Broken
180	Broken
181	Broken
182	Broken
183	Broken
184	Broken
185	Broken
186	Broken
187	Broken
188	Unbroken
189	Unbroken
190	Broken
191	Broken
192	Unbroken
193	Broken
194	Broken
195	Unbroken
196	Broken
197	Unbroken
198	Broken
199	Broken
200	Broken
201	Broken
202	Broken
203	Broken
204	Unbroken
205	Broken

Appendix B1. Results of the desktop review and field assessment of potential grassland habitat within the 2021 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021.

Grassland ID	Classification
206	Unbroken
207	Unbroken
208	Broken
209	Unbroken
210	Broken
211	Broken
212	Unbroken
213	Unbroken
214	Unbroken
215	Broken
216	Broken
217	Unbroken
218	Broken
219	Broken
220	Unbroken
221	Broken
222	Unbroken
223	Broken
224	Broken
225	Unbroken
226	Broken
227	Unbroken
228	Broken
229	Broken
230	Unbroken
231	Broken
232	Unbroken
233	Unbroken
234	Broken
235	Broken
236	Broken
237	Unbroken
238	Broken
239	Broken
240	Broken
241	Broken
242	Unbroken
243	Broken
244	Broken
245	Broken
246	Unbroken
247	Broken
248	Broken
249	Broken
250	Broken
251	Broken
252	Unbroken
253	Broken
254	Broken
255	Broken

Appendix B1. Results of the desktop review and field assessment of potential grassland habitat within the 2021 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021.

Grassland ID	Classification
256	Unbroken
257	Unbroken
258	Broken
259	Broken
260	Unbroken
261	Unbroken
262	Unbroken
263	Broken
264	Broken
265	Broken
266	Unbroken
267	Broken
268	Broken
269	Unbroken
270	Broken
272	Broken
273	Broken
274	Broken
275	Broken
276	Broken
277	Unbroken
278	Unbroken
279	Broken
280	Broken
288	Broken
289	Unbroken
290	Unbroken
291	Broken
292	Broken
293	Broken
294	Unbroken
295	Unbroken
296	Broken
297	Broken
298	Unbroken
299	Unbroken
300	Broken
301	Unbroken
302	Unbroken
303	Unbroken
304	Unbroken
305	Unbroken
306	Broken
307	Unbroken
308	Unbroken
309	Unbroken
310	Unbroken
311	Unbroken
312	Unbroken
313	Unbroken

Appendix B1. Results of the desktop review and field assessment of potential grassland habitat within the 2021 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021.

Grassland ID	Classification
314	Unbroken
315	Broken
316	Broken
317	Broken
318	Unbroken
319	Unbroken
320	Broken
321	Unbroken
322	Unbroken
323	Broken
324	Broken
325	Broken
326	Unbroken
327	Broken
328	Broken
329	Broken
330	Broken
331	Unbroken
332	Unbroken
333	Unbroken
334	Unbroken
335	Unbroken
335	Broken
336	Unbroken
337	Unbroken
338	Unbroken
339	Unbroken
340	Unbroken
341	Unbroken
342	Unbroken
343	Unbroken
345	Unbroken
346	Broken
347	Unbroken
348	Broken
349	Unbroken
350	Broken
351	Unbroken
352	Broken
353	Unbroken
354	Unbroken
355	Broken
356	Broken
357	Unbroken
358	Unbroken
359	Broken
360	Broken
361	Unbroken
362	Unbroken
363	Broken

Appendix B1. Results of the desktop review and field assessment of potential grassland habitat within the 2021 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021.

Grassland ID	Classification
364	Broken
365	Unbroken
365	Broken
365	Broken
366	Unbroken
367	Unbroken
368	Unbroken
369	Unbroken
370	Unbroken
371	Broken
372	Unbroken
373	Unbroken
374	Unbroken
375	Unbroken
376	Unbroken
377	Broken
378	Broken
379	Broken
380	Unbroken
381	Broken
382	Broken
383	Broken
384	Unbroken
384	Broken
385	Unbroken
386	Unbroken
387	Broken
388	Broken
389	Unbroken
390	Unbroken
391	Unbroken
392	Unbroken
393	Unbroken
394	Broken
395	Broken

Appendix B2. Results of the desktop review and field assessment of potential grassland habitat within the 2023 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from August 17 – 18, 2023.

Grassland ID	Classification	Vegetation	Comments
400	Unbroken	*Bouteloua gracilis, Bromus inermis, Poa pratensis, Grindelia squarrosa, Artemisia ludoviciana, Artemisia absinthium,* and *Rumex spp.*	
401	Unbroken	*Bouteloua gracilis, Bromus inermis, Poa pratensis, Grindelia squarrosa, Artemisia ludoviciana, Artemisia absinthium,* and *Rumex spp.*	
402	Unbroken	*Bouteloua gracilis, Bromus inermis,* and *Poa pratensis*	Heavy grazing
403	Broken	*Bouteloua gracilis, Bromus inermis, Poa pratensis,* and *Artemisia ludoviciana*	
404	Broken	*Bouteloua gracilis, Bromus inermis, Poa pratensis,* and *Artemisia ludoviciana*	
405	Unbroken	*Bouteloua gracilis, Bromus inermis, Grindelia squarrosa, Liatris ligulistylis, Taraxacum officinale, artemisia ludoviciana, Rumex spp.,* and *Symphoricaros occidentalis*	
406	Unbroken	*Bromus inermis, Poa pratensis, Grindelia squarrosa, Artemisia ludoviciana, Symphoricarpos occident,* and *Melilotus officinalis*	
407	Unbroken	*Bromus inermis, Poa pratensis, Grindelia squarrosa, Artemisia ludoviciana, Symphoricarpos occident,* and *Melilotus officinalis*	
409	Broken	*Bromus inermis, Poa pratensis, Medicago sativa, Artemisia ludoviciana,* and *Melilotus officinalis*	Planted, straight line features
410	Broken	*Bouteloua gracilis, Spartina pectinate, Bromus inermis, Poa pratensis, Taraxacum officinale,* and *Symphoricarpos occident*	Cattle grazing
411	Broken	*Bromus inermis, Poa pratensis, Medicago sativa, Artemisia ludoviciana,* and *Melilotus officinalis*	Planted, straight line features
412	Unbroken	*Bromus inermis, Grindelia squarrosa, Artemisia ludoviciana, Sonchus spp., Pediomelum argophyllum,* and *Symphoricarpos occident*	Cattle grazing
413	Unbroken	*Bromus inermis, Grindelia squarrosa, Artemisia ludoviciana, Sonchus spp., Pediomelum argophyllum,* and *Symphoricarpos occident*	Cattle grazing
414	Broken	*Bromus inermis, Poa pratensis, Grindelia squarrosa, Artemisia ludoviciana, Sonchus spp., Taraxacum*	Extensive rock clearing, straight line features, farm equipment

Appendix B2. Results of the desktop review and field assessment of potential grassland habitat within the 2023 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from August 17 – 18, 2023.

Grassland ID	Classification	Vegetation	Comments
		officinale, and *Symphoricarpos occident*	
415	Unbroken	*Bouteloua gracilis, Bromus inermis, Poa pratensis, Agropyron cristatum, Grindelia squarrosa, Solidago spp., Artemisia absinthium,* and *Symphoricarpos occident*	Cattle grazing
416	Broken	*Bromus inermis, Agropyron cristatum, Rosa spp., Echninacea, Medicago sativa, Grindelia squarrosa,* and *Fraxinus*	Extensive rock clearing, Abandoned farmyard
417	Broken	*Bromus inermis, Poa pratensis, Liatris ligulistylis, Artemisia absinthium, Bassia scoparia,* and *Melilotus officinalis*	Extensive rock clearing
418	Broken	*Artemisia absinthium, Sonchus spp.,* and *Symphoricarpos occident*	Extensive rock clearing

AQUATIC RESOURCES DELINEATION REPORT

BADGER WIND
LOGAN AND MCINTOSH COUNTIES, NORTH DAKOTA

Prepared for

Badger Wind, LLC
401 N. Michigan Avenue
Suite 501
Chicago, IL 60611

Atwell Project No. 19000785

Submitted by Atwell, LLC

June 7, 2022

EXECUTIVE SUMMARY

Atwell, LLC (Atwell) was retained by Badger Wind, LLC (Badger Wind) to delineate aquatic resources, including wetlands, watercourses, and waterbodies, for portions of the Badger Wind Project (Project) in North Dakota. In 2020 and 2021, Atwell conducted delineations for the portion of the Project in Logan County, North Dakota, with Western EcoSystems Technology, Inc. (WEST) conducting delineations for the portion of the Project in McIntosh County, North Dakota in 2021. In 2022, Atwell completed additional delineations for areas of Project adjustment in both Logan and McIntosh Counties.

The purpose of this report is to identify, describe, and document aquatic resource boundary determinations for review by regulatory authorities, including potential Waters of the U.S. (WOTUS). Aquatic resources that exhibit a hydrological connection to, or are adjacent to, navigable waters are regulated by the U.S. Army Corps of Engineers (USACE). The Badger Wind Project Area is located in Logan and McIntosh Counties, North Dakota, and comprises approximately 31,514 acres (49 square miles) centered at 46.287179, - 99.600842 (**Figure 1**).

The aquatic resources delineations were performed in accordance with the 1987 USACE Wetland Delineation Manual (USACE 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region (USACE 2010). Delineations were performed with a focus on proposed Badger Wind development areas. Atwell and WEST were provided the following assessment areas: a 250-foot (ft) radius around proposed turbines; a 100-ft-wide corridor around proposed collection lines; a 300-ft-wide corridor around access roads; a 200-ft-wide corridor for crane walks; a 200-ft-wide disturbance area around the proposed Project transmission line, and the areas comprising a proposed electric substation, Operations and Maintenance (O&M) facility, meteorological towers (MET) towers, the Aircraft Detection Lighting System (ADLS) tower, laydown yard, batch plant, marshaling yard (approximately 38.5 acres total), and turning radii locations. Collectively, Atwell and WEST assessed a 6,056-acre survey area.

Field aquatic resources delineations were conducted by Atwell within the defined survey area in 2020. In early 2021, Badger Wind shifted the Project to the south, which resulted in additional survey areas. WEST was retained by Badger Wind to conduct the aquatic resources delineation surveys for the remaining McIntosh County portion of the survey area, while Atwell continued to perform aquatic resources delineation surveys for the Logan County portion of the survey area. This was done with the understanding that two aquatic resources delineation reports would be produced to summarize 2021 delineation results.

Adjustments to the proposed project layout resulted in the need for additional aquatic resources delineation surveys in 2022. These surveys were conducted in full by Atwell. This report details

the results of all aquatic resources delineation field efforts led by Atwell. Several wetland boundaries that were originally delineated by WEST were updated or extended during the 2022 aquatic resources delineation effort due to changes in survey area boundaries and/or variations in seasonal climatic conditions on-site. These updated features are provided in this report following the original WEST nomenclature.

Atwell conducted aquatic resources delineations within the survey area during the months of September 2020, October 2020, September 2021, October 2021, and May 2022. Atwell ecologists delineated 158 wetland features comprising a cumulative total of 272.62 acres of wetlands within the survey area. Three waterbodies were identified within the survey area for a total of 0.84 acres. Six watercourses were identified within the survey area for a total of 6.44 acres and 7,468 linear feet.

Project activities that impact WOTUS must be authorized by the USACE prior to those activities taking place.

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A NRCS SSURGO Soil Map Unit Table
B Results of Antecedent Precipitation Tool
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D Wetland Determination Forms
E Aquatic Resources Tables

ACRONYMS

ADLS	Aircraft Detection Lighting System
APT	Antecedent Precipitation Tool
Atwell	Atwell, LLC
Badger Wind	Badger Wind, LLC
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
HUC	Hydrologic Unit Code
MET	Meteorological Towers
NDGF	North Dakota Game and Fish
NHD	National Hydrography Dataset
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
OHWM	Ordinary High-Water Mark
O&M	Operations and Maintenance
PEM	Palustrine Emergent
SSURGO	Soil Survey Geographic Database
TNW	Traditional Navigable Waters
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WOTUS	Waters of the United States, including wetlands

1 INTRODUCTION

Atwell, LLC (Atwell) was retained by Badger Wind, LLC (Badger Wind) to delineate aquatic resources for the Badger Wind Project (Project) in North Dakota. These include wetlands, watercourses, and waterbodies, including potential waters of the United Stated, including wetlands (WOTUS). In 2020 and 2021, Atwell conducted delineations for the portion of the Project in Logan County, North Dakota, with Western EcoSystems Technology, Inc. (WEST) conducting delineations for the portion of the Project in McIntosh County, North Dakota in 2021. In 2022, Atwell completed additional delineations for areas of Project adjustment in both Logan and McIntosh Counties.

The purpose of this report is to identify, describe, and document aquatic resource boundary determinations for review by regulatory authorities, including potential Waters of the U.S. (WOTUS). Aquatic resources that exhibit a hydrological connection to, or are adjacent to, navigable waters are regulated by the U.S. Army Corps of Engineers (USACE). The Badger Wind Project Area is located in Logan and McIntosh Counties, North Dakota, and comprises approximately 31,514 acres (49 square miles) centered at 46.287179, - 99.600842 (**Figure 1**).

The proposed Project will have a nameplate capacity of up to 251.6 megawatts and consist of an array of wind turbines, each with an associated transformer. Proposed Project facilities include the following components:

- Up to 74 wind turbines;
- All-weather access roads to each turbine site;
- One collection substation (approximately 2 acres);
- Underground electrical collection lines and fiber optic cables from each turbine to the collection substation;
- An operations and maintenance (O&M) facility (approximately 2 acres);
- A temporary concrete batch plant location (up to 3 acres);
- A temporary marshaling yard (up to 10 acres);
- A temporary laydown yard (up to 15 acres);
- Temporary turning radii;
- An Aircraft Detection Lighting System (ADLS) tower;
- Up to 3 permanent meteorological towers (MET); and

- One generation transmission line that would not exceed 0.75 miles in length.

The Project will have one point of interconnection at Montana-Dakota Utilities' (MDU) 230 kV Wishek substation.

A Study Area of approximately 121,695 acres (190 square miles) was studied, analyzed, and refined to create a 55,745-acre Project Area that would avoid or minimize impacts to natural and human resources. Further refinement in 2022 resulted in a smaller Project Area footprint, which is approximately 31,514 acres (49 square miles). This Project Area was submitted as part of the *Application for a Certificate of Site Compatibility* submitted to the North Dakota Public Service Commission in February 2022.

The aquatic resources delineation conducted within the Project Area is limited to the sections of the Project where the proposed development is associated with the facilities detailed above. Atwell and WEST were provided the following assessment areas: a 250-foot (ft) radius around proposed turbines; a 100-ft-wide corridor around proposed collection lines; a 300-ft-wide corridor around access roads; a 200-ft-wide corridor for crane walks; a 200-ft-wide disturbance area around the proposed Project transmission line, and the areas comprising a proposed electric substation, Operations and Maintenance (O&M) facility, meteorological towers (MET) towers, the Aircraft Detection Lighting System (ADLS) tower, laydown yard, batch plant, marshaling yard (approximately 38.5 acres total), and turning radii locations.

The proposed Project layout was analyzed and revised several times over the course of field surveys, resulting in Atwell analyzing a cumulative survey area of approximately 6,056 acres within the Project Area.

Field delineations were conducted by Atwell within the defined survey area in 2020. In early 2021, Badger Wind shifted the Project to the south, which resulted in additional survey areas. Western EcoSystems Technology, Inc. (WEST) was retained by Badger Wind to conduct the delineation surveys for the remaining McIntosh County portion of the survey area, while Atwell continued to perform delineation surveys for the Logan County portion of the survey area. This was done with the understanding that two aquatic resources delineation reports would be produced to summarize 2021 delineation results. Adjustments to the proposed project layout resulted in the need for additional delineation surveys in 2022. These surveys were conducted in full by Atwell.

This report details the results of all aquatic resources delineation field efforts within the survey area conducted by Atwell. The results of WEST's aquatic resources delineation efforts in McIntosh County in 2021 are provided under separate cover. Several aquatic resources boundaries that were originally delineated by WEST were updated or extended during the 2022 aquatic resources delineation effort due to changes in survey area boundaries and/or variations in

seasonal climatic conditions on-site. These updated features are provided in this report following the original WEST nomenclature.

2 LOCATION

The Project Area is located in Logan and McIntosh Counties, North Dakota, and consists of approximately 31,514 acres (49 square miles) centered at 46.287179, - 99.600842 (**Figure 1**). The approximately 6,056-acre aquatic resources delineation survey area contains all portions of the site where permanent or temporary disturbances might occur as a result of Project construction. The survey area is located within the Beaver (Hydrologic Unit Code [HUC] 10130104) watershed.

The Project is located directly adjacent to the City of Wishek, North Dakota in the following townships, ranges, and sections:

Red Lake

134N 71W 31-32

Unorganized Territory
132N 70W 5-7
132N 71W 1, 4-8, 12, 17-21, 28-30
132N 72W 1-2, 12-14, 23
133N 70W 6-8, 16-21, 28-33
133N 71W 3-6, 8-10, 12, 14-15, 18-23, 25-29, 31-36
133N 72W 36

North Dakota Highway 13 intersects the Project Area just west of Wishek in McIntosh County. A number of roads traverse the Project Area in a grid-like arrangement. The northernmost road is 71st St SE, the southernmost is 83rd St SE, the westernmost is 37th Avenue SE, and the easternmost is 44th Avenue SE.

3 METHODS

Atwell completed a preliminary desktop review of existing background information for the Project prior to field surveys. The review considered current and historical background documentation, including aerial photographs, and publicly-available data as detailed in Section 3.1, including U.S. Geological Survey (USGS) Topographic Maps (ESRI 2019), National Wetland Inventory (NWI) Maps (USFWS 2019), USGS National Hydrography Dataset (NHD) (USGS 2018), County Soil Survey Maps (USDA 2019), and Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) (FEMA 2017). This information was previously utilized during desktop review to direct micro-siting efforts within the Project Area to avoid and/or minimize impacts to aquatic resources and other natural features. The survey area for this report was developed, in part, as a result of these efforts.

Due to the continuous refinement of the Project Area, and therefore the aquatic resources survey area, some portions of the survey area may appear outside of the current Project Area as shown on **Figures 1-3**. At the time of field surveys, a larger Project Area was in effect and preliminary desktop analyses were performed on that larger area as described below.

After this preliminary desktop data review, Atwell conducted field surveys within the entire survey area in late August and early September 2020; in September and October 2021 for the Logan County portions of the survey area; and again, in May 2022 for the entire survey area. WEST conducted field surveys for portions of the survey area in McIntosh County in 2021. Atwell analyzed precipitation data prior to field mobilizations to determine the status of climatic conditions. Section 7 includes definitions of common terms us throughout this report.

3.1 PRELIMINARY DESKTOP ANALYSIS

The following information was reviewed as part of the preliminary desktop evaluation:

1.1.1 Aerial Imagery

Atwell utilized National Agriculture Imagery Program aerial imagery and Google Earth historical imagery ranging from 1992 to 2018 to guide field efforts and outline land cover characteristics within the Project Area (USDA 2018).

1.1.2 USGS Topographic Map

The USGS 7.5-minute series topographic quadrangles for Wishek, Wishek SW, Lehr SW, May Lake, May Lake NW, and Burnstad (1982) were reviewed for overall topography, natural features, and additional characteristics of the Project Area.

1.1.3 Soil Survey of Logan and McIntosh Counties

The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) soil survey geographic database (SSURGO) for Logan and McIntosh counties were reviewed to obtain the soil types likely to be observed within the Project Area (USDA 2019).

1.1.4 National Wetlands Inventory Map

A review of the NWI maps for Logan and McIntosh counties was conducted to determine the likely presence, location, size, and type of wetlands that may be located within the Project Area (USFWS 2018). The United States Fish and Wildlife Service (USFWS) produces NWI maps through aerial photographic interpretation.

1.1.5 National Hydrography Dataset Map

A review of the NHD (USGS 2018) for the Project was conducted to identify NHD watercourses and waterbodies within the Project Area.

1.1.6 FEMA National Flood Hazard Layer Map

FEMA FIRMs are maps that show floodplain and floodway areas along watercourses and their tributaries. The maps provide the following data, when available for any given area: 100-year floodplains (one percent chance of annual flooding) and 500-year floodplains (< one percent annual chance of flooding), the regulatory floodway (the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height), the base flood elevation, and the risk to premium areas developed across a floodplain (FEMA 2018). There is no available FEMA mapping for Logan and McIntosh Counties. Therefore, a review of the existence, location, and zone of any 100-year floodplain that may be located within the Project Area could not be conducted.

1.1.7 Precipitation Data

Precipitation data provided by the U.S. Army Corps of Engineers (USACE) Antecedent Precipitation Tool (APT) were reviewed for sections within the Project Area for the three months prior to each of the survey efforts to determine whether climatic conditions were below average, normal, or above average when compared to monthly historical data.

3.2 AQUATIC RESOURCES DELINEATION METHODS

All on-site aquatic resources delineations were performed in accordance with the 1987 USACE Wetland Delineation Manual (USACE 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region (USACE 2010). The determination of a wetland depends on three basic parameters: (1) presence of hydrophytic vegetation, (2) presence of hydric soils, and (3) presence of wetland hydrology.

Atwell identified likely-jurisdictional waters (watercourses) by utilizing existing mapping of known watercourses, including the NHD, NWI databases, and blue line streams on 7.5-minute USGS topographic quads, in combination with field observations of watercourse channel characteristics, such as indicators of an Ordinary High-Water Mark (OHWM).

Plant species were identified using several regional references and following the nomenclature of the National Wetlands Plant List (USACE 2018). The boundaries of all identified features were recorded using a submeter-capable handheld GPS unit, and representative photographs were taken of each feature.

4 EXISTING CONDITIONS

4.1 LANDSCAPE SETTING (DESKTOP ANALYSIS RESULTS)

The Project Area is located in both the Missouri Coteau Slope and the Missouri Coteau Level IV Ecoregions within the Northwestern Great Plains Level III Ecoregion of North Dakota (Bryce et al. 1996). The Missouri Coteau is characterized by rolling hummocks that contain numerous wetland potholes. The Missouri Coteau Slope ecoregion is characterized by rolling to hilly plains with more watercourses and fewer prairie potholes. Pre-human development, mixed-grass prairie was the most common grassland in these regions, with very little upland deciduous forest or woodlands. Land use in these regions is a mixture of agriculture and cattle grazing, which has resulted in conversion of much of the mixed-grass prairie. The transition between these ecoregions across the Project Area is highly visible in the expression of surface hydrology, as noted during the delineation field effort, discussed further in the **Section 4.2** of this report.

The primary source of surface hydrology in both regions is precipitation, including snowmelt (Eisenlohr Jr. and Sloan 1968). Water drains to the southwest and to the north into South Branch Beaver Creek and Beaver Creek, respectively. These streams are tributaries to the Missouri River. A seasonal surficial connection between delineated wetlands may exist in these regions despite the lack of a defined watercourse channel or presence of connecting wetland features surveyed in the field.

4.1.1.1 Aerial Imagery Results

The Project Area does not intersect large urban areas. A review of present and historic aerial photographs indicate agricultural fields, pasture/rangeland, grasslands, residential areas, a railroad, streams, rivers, wetlands, and waterbodies (ponds, lakes, or reservoirs) within the Project Area. In general, the western and southern portions of the Project Area appeared flat and dominated by cultivated crops whereas the northeastern portion of the Project Area appeared to support more pastures and disturbed grasslands, comparatively. Preliminary identification of potential aquatic resource signatures and locations, as assessed through the aerial imagery desktop review, was provided to Badger Wind to aid in initial micro-siting efforts intended to avoid and minimize potential impacts to aquatic resources and other ecologically sensitive areas. As a result, the survey area only contained a subset of aquatic resources identified by aerial imagery within the entire Project Area.

4.1.1.2 USGS Topographic Map Results

The USGS 7.5-minute topographic quadrangles indicated that elevations within the Project Area range between approximately 1,963 and 2,264 feet above sea level (ASL). The overall topography of the Project Area was mapped as flat to undulating with the presence of knolls, ridges,

drainages, wetlands, and roads throughout. While very few wetlands were mapped on the USGS 7.5-minute topographic quadrangles, numerous unnamed watercourses were mapped within the Project Area. Beaver Creek was the only named watercourse within the Project Area and flows along the northern boundary.

4.1.1.3 Soils Survey of Logan and McIntosh County Results

NRCS soil survey data indicated that 96 soil types underlie the Project Area, 11 of which are considered to be hydric or partially hydric (USDA 2019). Hydric soils comprise approximately 1,693 acres or five percent of the Project Area. A detailed list of each soil map unit, its hydric status, and total area within the Project Area is provided in **Appendix A**. The locations of soil map units within the survey area are provided in **Figure 2**.

4.1.1.4 NWI Map Results

NWI mapping was provided to Badger Wind to aid in initial micro-siting efforts intended to avoid and minimize potential impacts to aquatic resources and other ecologically sensitive areas. As a result, only a small subset of NWI-mapped features were contained within the survey area. These features appeared to be mostly drainages or depressional. Refer to **Figure 2** to see the location of NWI-mapped features within the survey area.

4.1.1.5 NHD Map Results

NHD mapping was also provided to Badger Wind to aid in initial micro-siting efforts. **Figure 2** provides the locations of NHD-mapped features within the survey area. Watercourses and freshwater ponds are mapped within the survey area.

4.1.1.6 Precipitation Data Results

Atwell reviewed the results of the USACE APT for the days on which aquatic resources field delineations occurred using the centroid of the Project Area. The results of the APT indicated that field delineations were performed during the dry season and under normal conditions during the 2020 and 2021 field mobilization efforts. Field delineations performed in May 2022 were performed under wetter than normal conditions.

4.2 AQUATIC RESOURCES RESULTS

4.2.1 Overview

Atwell conducted aquatic resources delineations within the survey area during the months of September 2020, October 2020, September 2021, October 2021, and May 2022. Photographs

depicting features and conditions during the site reconnaissance are provided in the Photographic Log within **Appendix C**.

Atwell ecologists delineated 158 wetland features within the survey area, comprising 272.62 acres. Wetland determination forms for these delineated features and adjacent uplands are provided in **Appendix D**. Three waterbodies were identified within the survey area for a total of 0.84 acres. Six watercourses were identified within the survey area for a total of 6.44 acres and 7,468 linear feet. Summary tables for all features identified during Atwell's aquatic resources delineation field efforts are provided in **Appendix E**. **Figure 3** depicts the locations of all delineated features within the survey area.

4.2.2 On-Site Conditions

Atwell ecologists noted that the survey area was dominated by cultivated cropland, pasture, and fallow fields. Homesteads, wetland systems, drainage swales, grasslands, shelterbelts, and road systems were also present within the survey area to a lesser degree. Other structures within the survey area included existing transmission lines, railroads, and distribution lines. No interstate or foreign commerce associated with aquatic resources were observed on-site.

4.2.3 Aquatic Resource Features

Atwell ecologists delineated 158 aquatic resource features within the survey area, comprising 272.62 acres. Many of the delineated features existed as naturally depressional, vegetated swales that were seasonally saturated or flooded and support emergent vegetative communities. Additional common wetland systems observed included emergent fringe wetland systems associated with watercourses, depressional wetland pockets that appeared isolated from surficial hydrological connection, atypical heavily disturbed wetland drainage swales, and smaller temporarily saturated headwater drainage swales that contributed hydrology to larger drainage systems.

Some atypical wetland systems were observed as heavily disturbed depressional areas associated with agricultural farming activities. Farmers apparently cleared emergent wetland vegetation via mechanical mowing or tilling for planting crops. In some locations, cattle grazing within pastures prevented identification of some vegetation types. The wetland boundaries of these areas were delineated using a combination of topographical changes, wetland hydrology indicators, and the presence of hydric soils.

While the majority of wetlands did not appear to have a direct connection to navigable waters, a combination of field data and desktop analysis anticipated that during spring snowmelt, a

seasonal surficial connection between delineated wetlands may exist despite the lack of a defined watercourse channel or presence of connecting wetland features surveyed in the field.

Of the 158 delineated aquatic features identified within the survey area, 38 appeared to be hydrologically isolated. These wetland areas lacked an apparent drainage outlet, as noted during the field assessment, and no clear overland flow paths were observed during the desktop analysis. These isolated wetland areas existed almost solely within the northeastern portion of the survey area, where the landscape comprises depressional areas geologically formed by the collapse of superglacial sediment. In these areas, water became trapped for extended periods of time after snowmelt and other precipitation events. The results of Atwell's field and desktop connectivity analyses are summarized in **Appendix E**.

4.2.3.1 Vegetation

All wetlands within the survey area were classified as palustrine emergent (PEM). Common dominant herbaceous species within delineated PEM wetlands included reed canary grass (*Phalaris arundinacea,* FACW), cattail (*Typha latifolia, T. angustifolia, or T.* x *glauca,* OBL), freshwater cordgrass (*Spartina pectinata,* FACW), rice cutgrass (*Leersia oryzoides,* OBL), curly dock (*Rumex crispus*, FAC), and water smartweed (*Persicaria amphibia,* OBL). Other common but less prevalent species included common spikerush (*Eleocharis palustris*, OBL), large barnyard grass (*Echinochloa crus-galli,* FAC), foxtail barley (*Hordeum jubatum,* FACW), and upright sedge (*Carex stricta*, OBL).

Uplands were generally comprised of cropland or pastureland. Croplands were dominated by species such as corn (*Zea mays*, NI) and soybean (*Glycine max,* NI). Pastures were dominated by grasses such as smooth brome (*Bromus inermis,* UPL), foxtail barley, and little bluestem (*Schizachyrium scoparium,* FACU). Forbs such as clovers (*Trifolium repens* and *T. pratense,* FACU), goldenrods (*Solidago* spp.), common yarrow (*Achillea millefolium,* FACU), Canadian horseweed (*Erigeron canadensis*, FACU), and alfalfa (*Medicago sativa,* UPL) were intermixed throughout.

Two species found on North Dakota Department of Agriculture's Noxious Weeds List, absinth wormwood (*Artemisia absinthium*, NI) and Canada thistle (*Cirsium arvense,* FACU), were locally uncommon in both wetlands and uplands throughout the survey area.

4.2.3.2 Soils

Soil samples within wetlands were generally noted to display dark, silt loam horizons on top of darker, silt loam to clay loam horizons that exhibited redoximorphic features. Wetland depressions that tended to hold water for longer periods of time sometimes exhibited a gleyed matrix underneath a dark, loam horizon. The majority of delineated wetland features contained soils that met the redox dark surface hydric soil indicator. Less frequent hydric soil indicators

included loamy gleyed matrix, hydrogen sulfide, depleted matrix, and redox depressions. Soils within the uplands generally displayed dark horizons, but they included slightly brighter values and chroma colors compared to soils within the wetlands. Upland soils did not contain any visually-notable redoximorphic features.

4.2.3.3 Hydrology

Delineated wetlands exhibited both primary and secondary hydrology indicators, including saturation, geomorphic position, and the FAC-Neutral test. Delineated wetland drainage features also contained drift deposits and drainage patterns, while depressional features typically exhibited surface water and a high water table.

As discussed above in **Section 4.2.3**, the majority of wetlands appeared to possess a seasonal surficial connection to navigable water. USGS 7.5-minute topographic quads (**Figure 1**) and the NHD dataset (**Figure 2**) indicated that these wetlands generally aligned with mapped, blue-line streams. Some depressional features that appeared hydrologically isolated were present in the northeastern portion of the survey area. These wetlands were noted to lack an apparent drainage outlet, and no clear overland flow paths could be observed during the desktop analysis. These features did not align with blue-line streams as shown in **Figure 2**. Uplands on-site typically did not contain any primary or secondary wetland hydrology indicators.

4.2.4 Waterbodies

Three waterbodies were observed within the survey area, totaling 0.84 acres.

Waterbody B1

Waterbody B1 comprises 0.35 acres and is associated with Wetlands B3 and C1. The OHWM was characterized by an absence of vegetation as well as a sudden a break in elevation (i.e. scouring). Water levels were low at the time of delineation and the unconsolidated mud substrate was apparent in the transition area between the OHWM and the open water. Water depths reached two feet in the deepest portions of the waterbody.

Waterbody F1

Waterbody F1 comprised 0.29 acres and is associated with Wetland F10. Waterbody F1 was noted as a farm pond with signs of trampling from cattle in the shallow portions of the pond. The OHWM was characterized by an absence of vegetation as well as a sudden a break in elevation (i.e. scouring). Water levels were low at the time of delineation and the unconsolidated mud substrate was apparent in the transition area between the OHWM and the open water. Water depths reached two feet in the deepest portions of the waterbody.

Waterbody G1

Waterbody G1 comprises 0.20 acres and appeared to be a completely enclosed basin isolated from other surface water features. The OHWM was characterized by the absence of vegetation as well as a sudden a break in elevation (i.e. scouring). Water levels were low at the time of delineation and the unconsolidated mud substrate was apparent in the transition area between the OHWM and the open water. Water depths reached three inches in the deepest portions of the waterbody.

4.2.5 Watercourses

Six watercourses were identified within the survey area for a total of 7,468 linear feet and 6.44 acres.

Watercourse D1 (2020)

Watercourse D1 (2020) was identified as a perennial stream that meandered through Wetland D5 (2020) within a pasture. Stream width was highly variable; at the survey area crossing, the OHWM width was 17 feet. OHWM was characterized primarily by an abrupt transition between vegetated wetlands and unvegetated stream channel. Water was visibly murky and approximately one foot deep. The stream bed substrate was comprised of primarily muck with a small amount of gravel intermixed, and no aquatic life was observed. Watercourse D1 (2020) flowed north to Beaver Lake.

Watercourse E1 (2020)

Watercourse E1 (2020) was identified as a perennial stream that flowed south through an agriculture field. The OHWM width was 30 feet, which was characterized by an abrupt transition between vegetated uplands and unvegetated stream channel. Water was clear and approximately five to seven feet deep. The stream bed substrate was primarily silt and, no aquatic life was observed.

Watercourse H1 (2020)

Watercourse H1 (2020) was identified as an intermittent stream crossing through pasture. The stream was culverted underneath an existing road and flowed eastward, ultimately to Beaver Lake. The OHWM was 25 feet at the time of survey. The OHWM was characterized by scouring and the absence of vegetation. Water was tannic and approximately one foot deep, and the stream bed substrate was silty. No aquatic life was observed.

Watercourse H2 (2020)

Watercourse H2 (2020) was identified as a perennial stream crossing through pasture within Wetland H8 (2020). This stream was part of the same tributary as Watercourse D1 (2020) and exhibited similar characteristics. The OHWM width was 25 feet within the survey area, and the OHWM was characterized by an abrupt transition between vegetated wetlands and unvegetated stream channel. The water was clear and approximately three feet deep. The stream bed substrate contained a mixture of silt, sand, and gravel, and no aquatic life was observed. Watercourse H2 (2020) flows north to Beaver Lake.

Watercourse D1

Watercourse D1 was noted as a meandering, perennial stream flowing through pastureland, within Wetland D6. Watercourse D1 was part of the same tributary as Watercourses H2 (2020). Watercourse D1 was located upstream of Watercourse H2 (2020). The OHWM was characterized by an abrupt transition between vegetated wetlands and unvegetated stream channel. The OHWM width was 80 feet. The stream bed substrate was mucky, and no aquatic life was observed. Watercourse D1 flowed north to Beaver Lake.

Watercourse G1

Watercourse G1 was noted as a perennial stream that flowed through cropland, within Wetland G13. Watercourse G1 was located upstream of Watercourses D1 (2020) and H2 (2020), and these all were part of the same tributary. The OHWM was characterized by an abrupt transition between vegetated wetlands and unvegetated stream channel. The OHWM width was 25 feet. The stream bed substrate was mucky, and no aquatic life was observed. Watercourse G1 flows north to Beaver Lake.

5 CONCLUSIONS & RECOMMENDATIONS

Atwell ecologists delineated a total of 158 aquatic resource features comprising a cumulative total of 272.62 acres within the survey area. There were six watercourses comprising a cumulative total of 7,468 linear feet and 6.44 acres, and three waterbodies comprising a cumulative total of 0.84 acres were delineated within the survey area. Project activities that impact WOTUS must be authorized by the USACE prior to those activities taking place.

In late August 2021, the EPA and USACE received a court order vacating and remanding the Navigable Waters Protection Rule. At present, the EPA and USACE are interpreting WOTUS consistent with the pre-2015 regulatory regime until further notice. While Atwell believes that some wetland features on-site are hydrologically isolated and, therefore, may not be subject to

federal regulation, the USACE and the EPA ultimately determine the final jurisdictional status of all wetlands and aquatic resources presented within this report.

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7 COMMON AQUATIC RESOURCE DEFINITIONS

Emergent Wetland: Vegetative classification of a wetland system based on the dominant vegetation consisting of rooted herbaceous plant species that have parts extending above a water surface.

Aquatic Resources: Wetland waters (i.e. vegetated swales, freshwater marshes, vernal pools, other seasonal wetlands, etc.) and nonwetland waters (i.e. ponds, lakes, streams, rivers, drainages, ditches, etc.) - Definition of aquatic resources as used by the USACE and EPA for regulatory purposes.

Hydric Soil: Soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part (1991 National Technical Committee on Hydric Soils definition).

Hydrophytic Vegetation: Plant species that grow in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content; plants typically found in wet habitats.

Typical Situation: That which normally, usually, or commonly occurs.

Wetland: "…areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." - Definition of wetlands as used by the USACE and EPA for regulatory purposes.

Wetland Hydrology: Hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface at some time during the growing season.

Wetland Indicator Status:

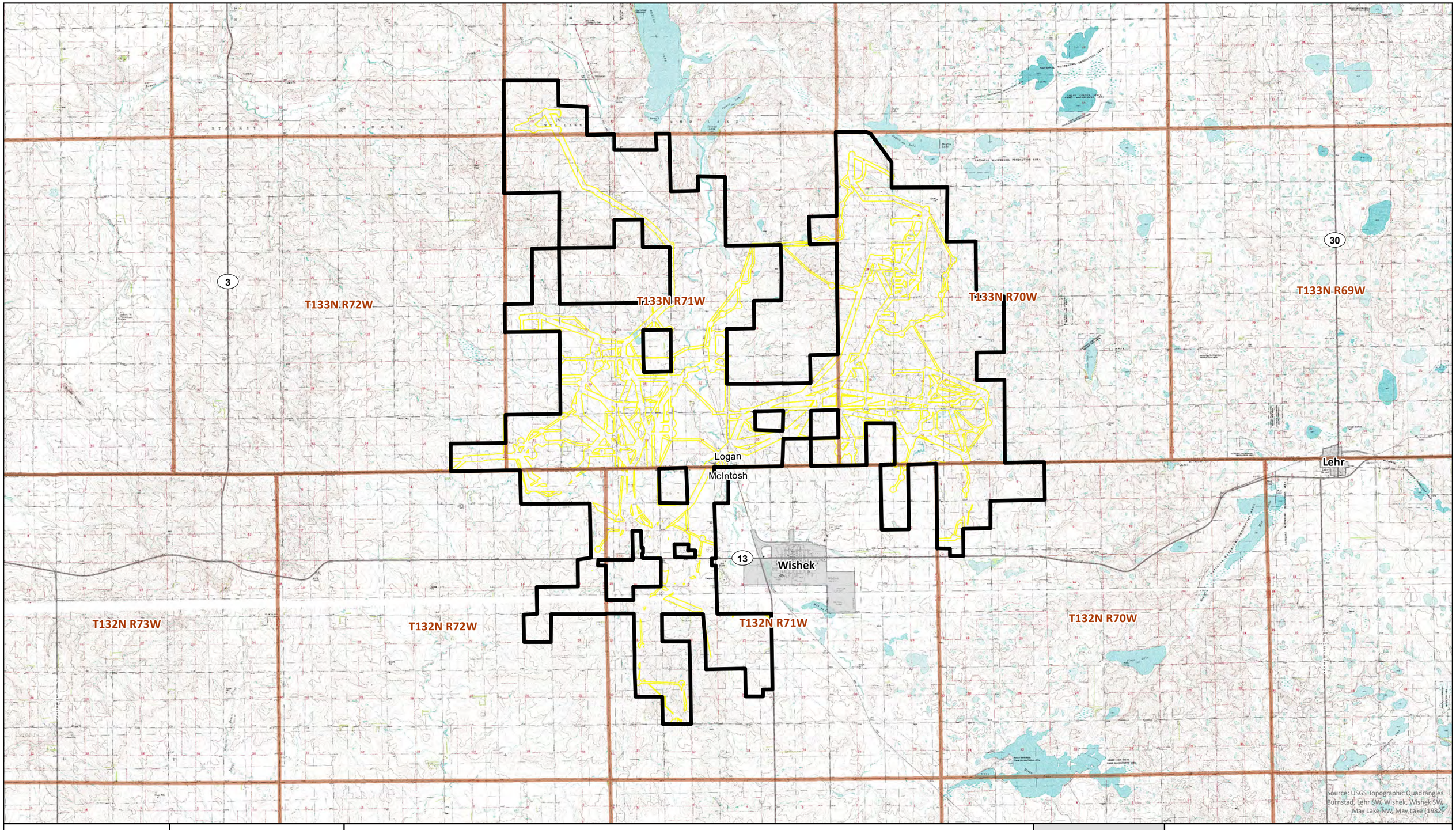
OBL: Obligate wetland plant that occurs almost always, 99% of the time, in wetlands under natural conditions, but which rarely occur in non-wetlands.

FACW: Facultative wetland plant that occurs usually, 67% to 99% of the time, in wetlands, but also occurs 1% to 33% of the time in non-wetlands.

FAC: Facultative plant that occurs in both wetlands and non-wetlands 33% to 67% of the time.

FACU: Plant that occurs sometimes, 1% to 33% of the time, in wetlands but occurs more often, 67% to 99% of the time, in non-wetlands.

FIGURES



ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 1 2
Miles

Survey Area (~6,056 acres)
Project Area (~31,514 acres)
Town/Village
Township (PLSS)
County

Figure 1
Wind Farm Site Location
Logan and McIntosh Counties, North Dakota

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ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 1 2
Miles

Map Index
Survey Area (~6,056 acres)
Project Area (~31,514 acres)
Road
County

Figure 2
Index Map
Wind Farm Desktop Review Mapbook
Logan and McIntosh Counties, North Dakota

Source: National Agriculture Imagery Program (2020)

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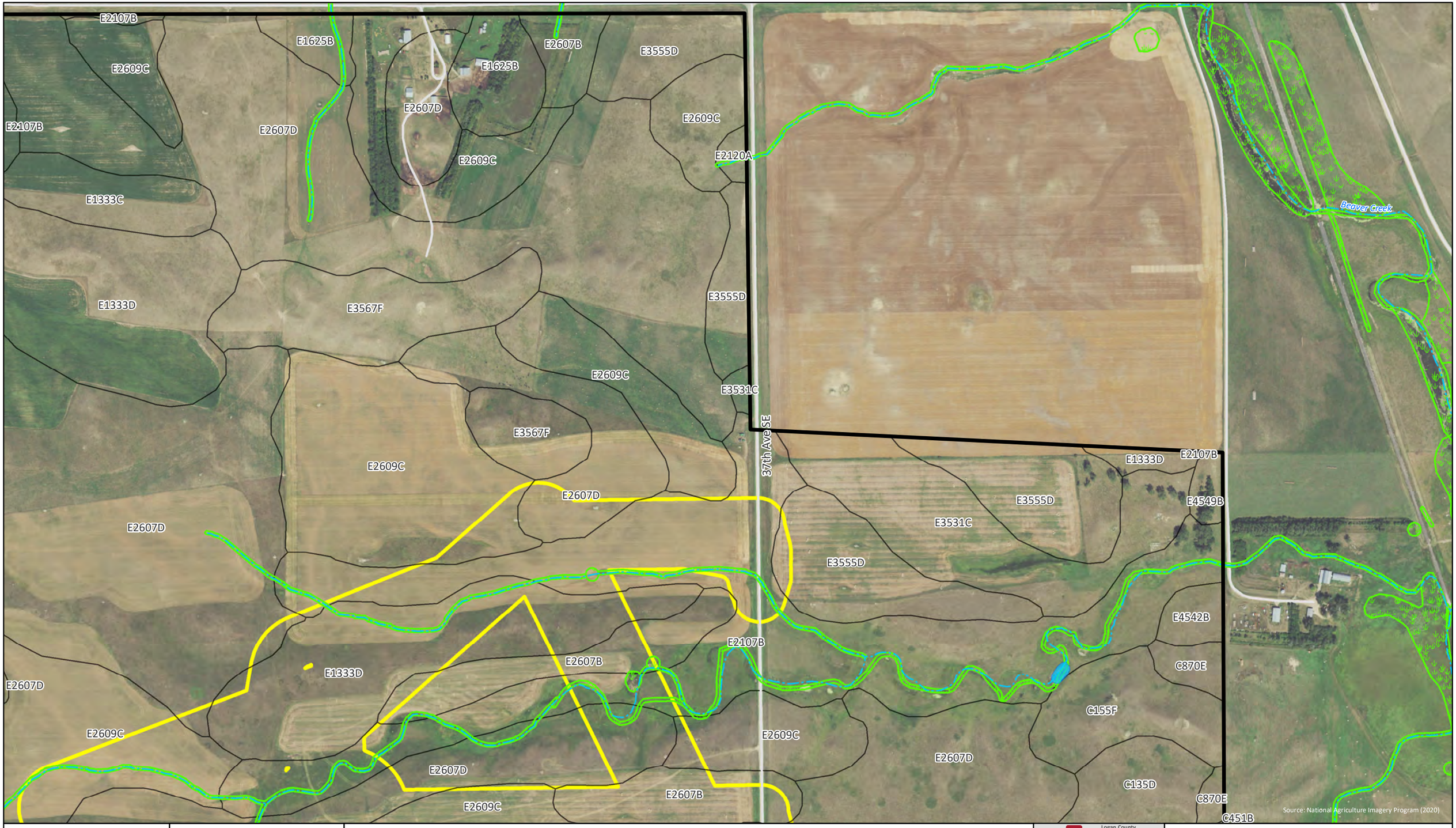

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

Watercourse (NHD)
Waterbody (NHD)
Wetland (NWI)
Hydric Soils (gSSURGO)
Survey Area (~6,056 acres)
Project Area (~31,514 acres)
Road
County

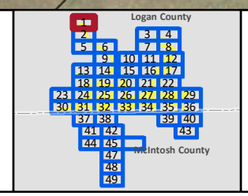

Figure 2
Map 1 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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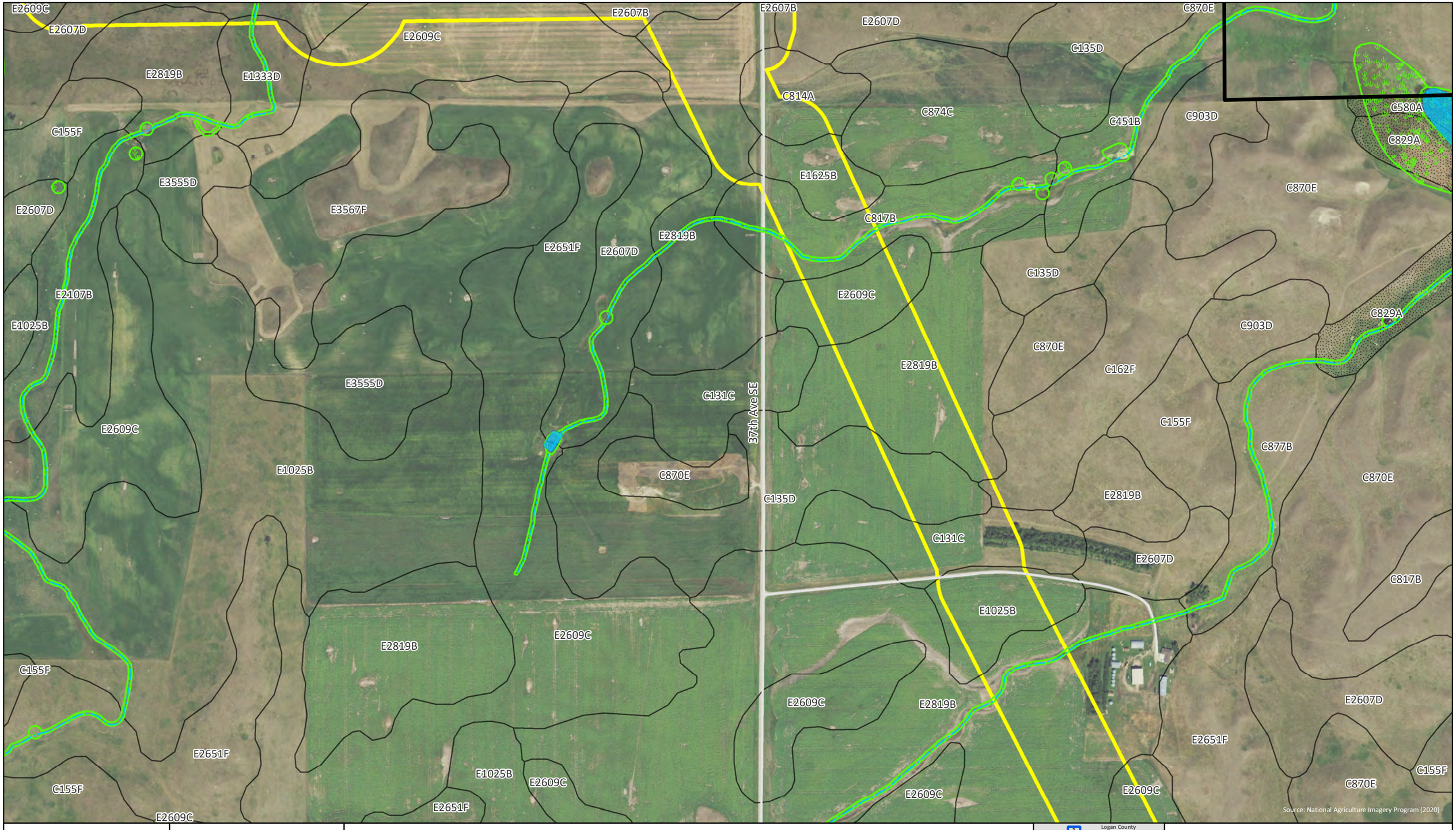

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

Watercourse (NHD)
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County

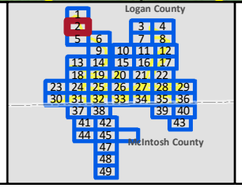

Figure 2
Map 2 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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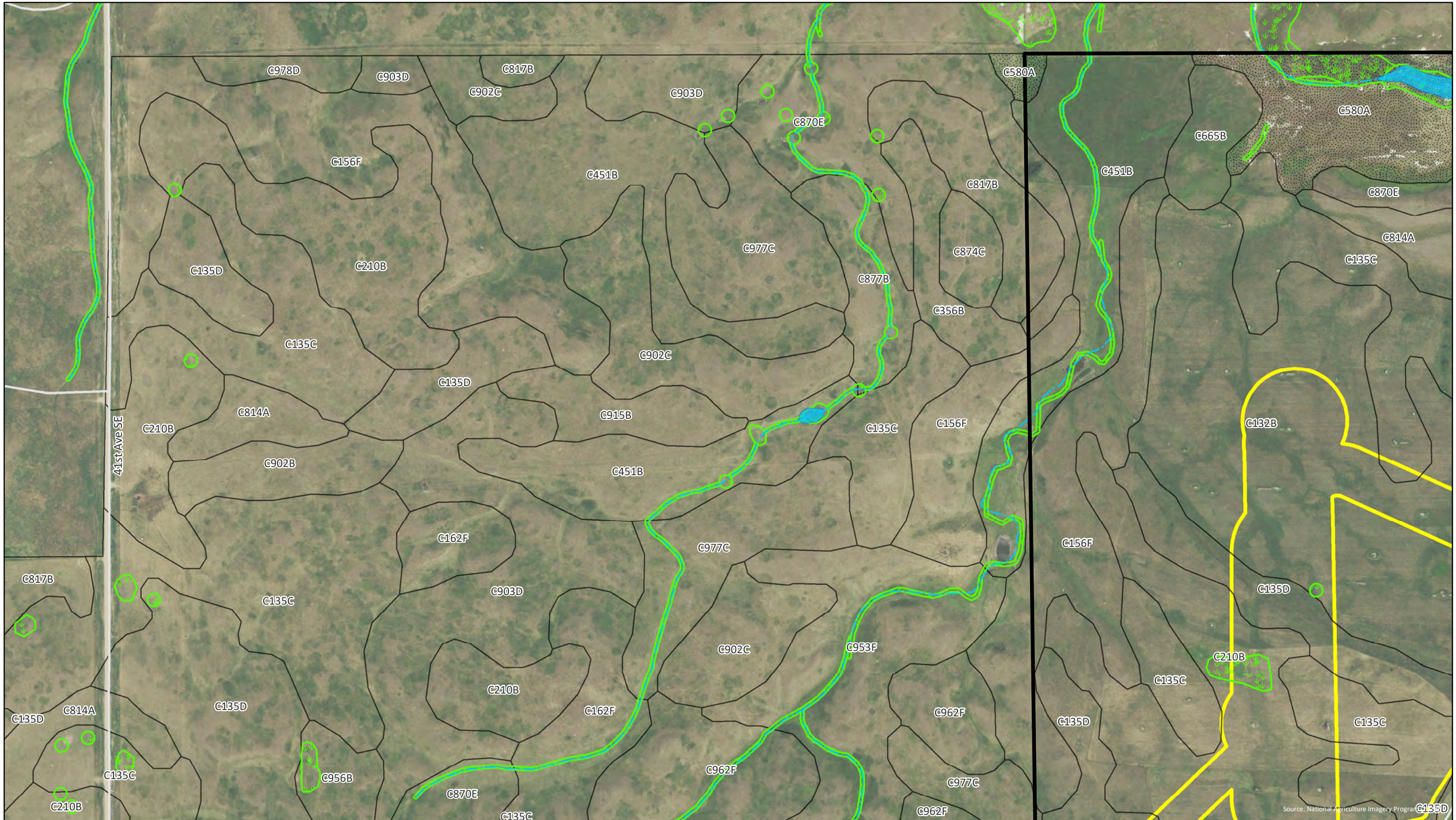

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

Watercourse (NHD)
Waterbody (NHD)
Wetland (NWI)
Hydric Soils (gSSURGO)
Survey Area (~6,056 acres)
Project Area (~31,514 acres)
Road
County

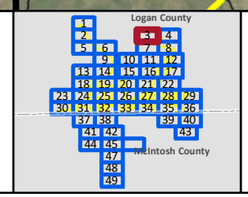

Figure 2
Map 3 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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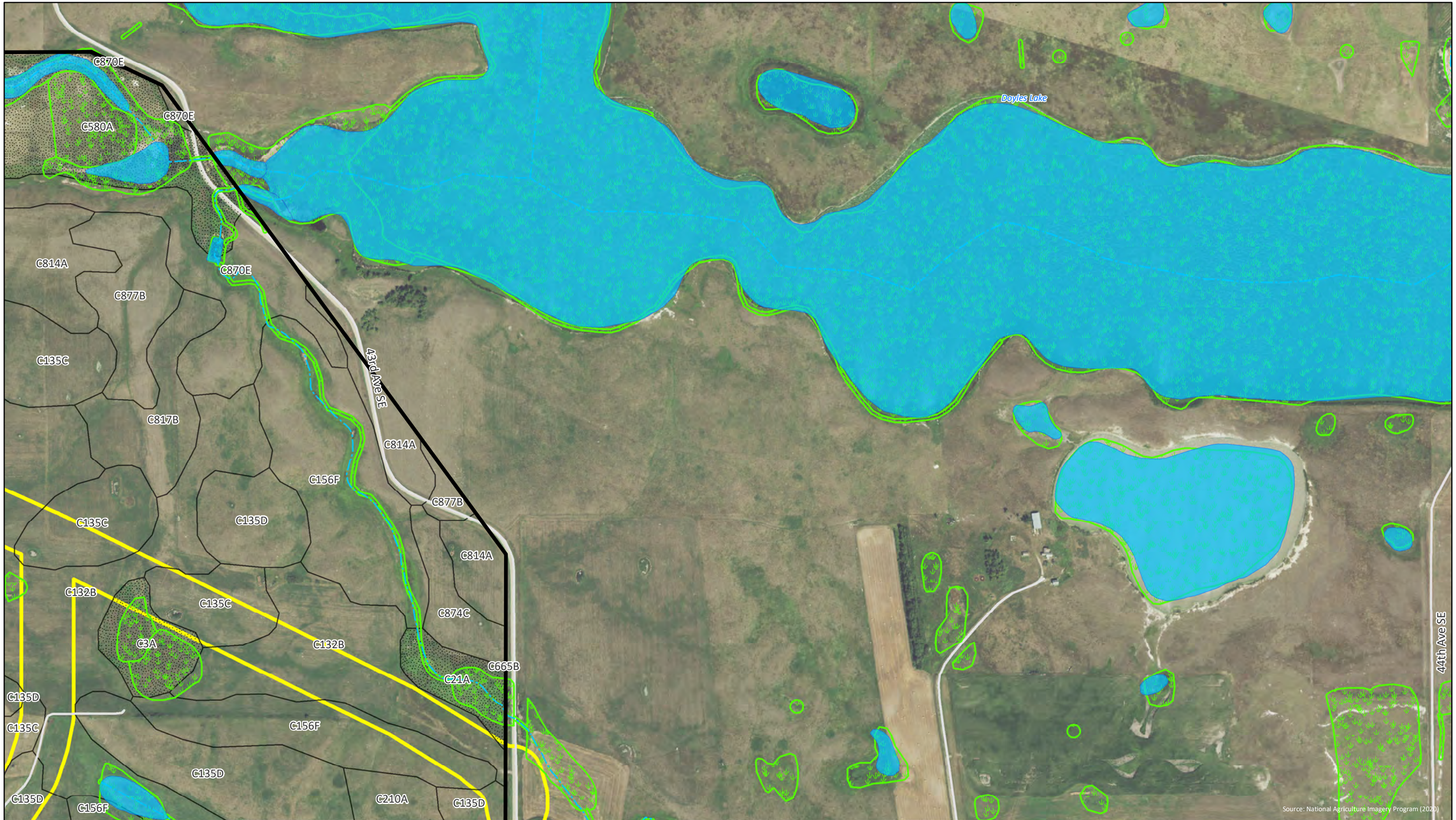

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

Watercourse (NHD)
Waterbody (NHD)
Wetland (NWI)
Hydric Soils (gSSURGO)
Survey Area (~6,056 acres)
Project Area (~31,514 acres)
Road
County

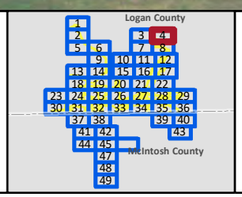

Figure 2
Map 4 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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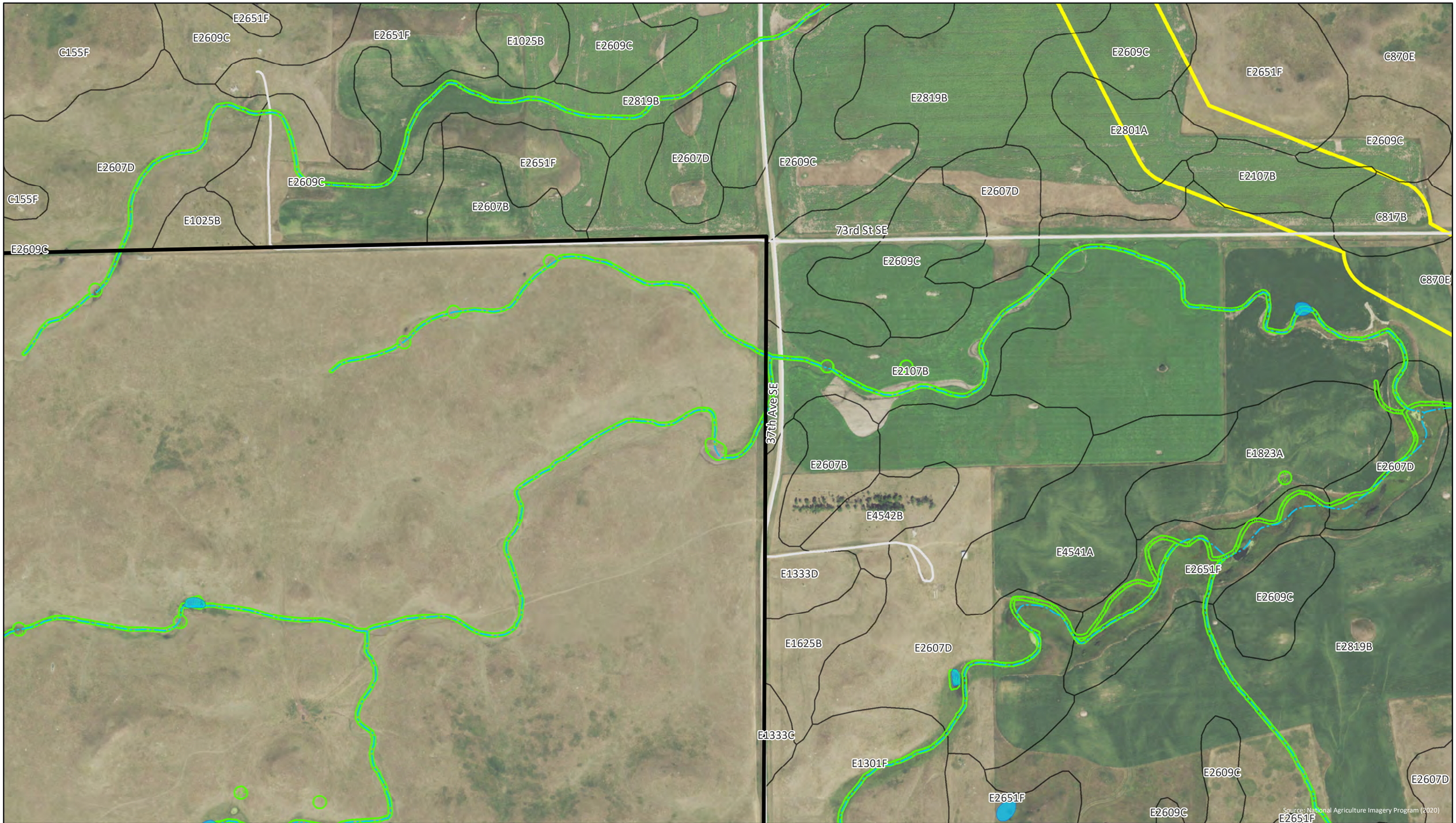

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

Watercourse (NHD)
Waterbody (NHD)
Wetland (NWI)
Hydric Soils (gSSURGO)
Survey Area (~6,056 acres)
Project Area (~31,514 acres)
Road
County

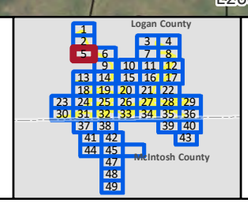

Figure 2
Map 5 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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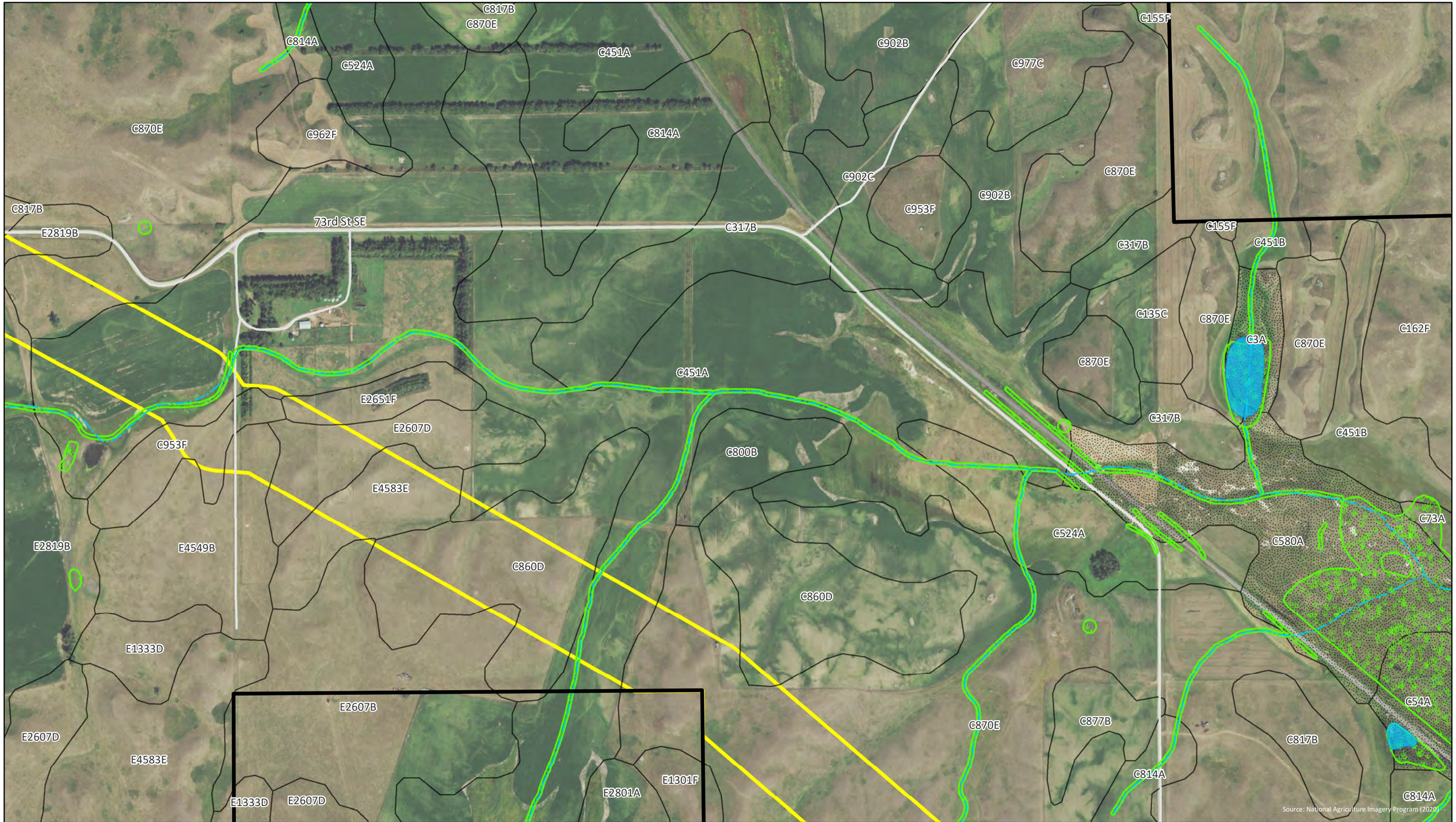

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

Watercourse (NHD)
Waterbody (NHD)
Wetland (NWI)
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Survey Area (~6,056 acres)
Project Area (~31,514 acres)
Road
County

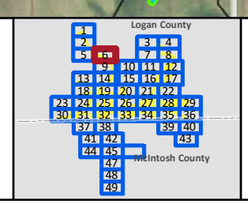

Figure 2
Map 6 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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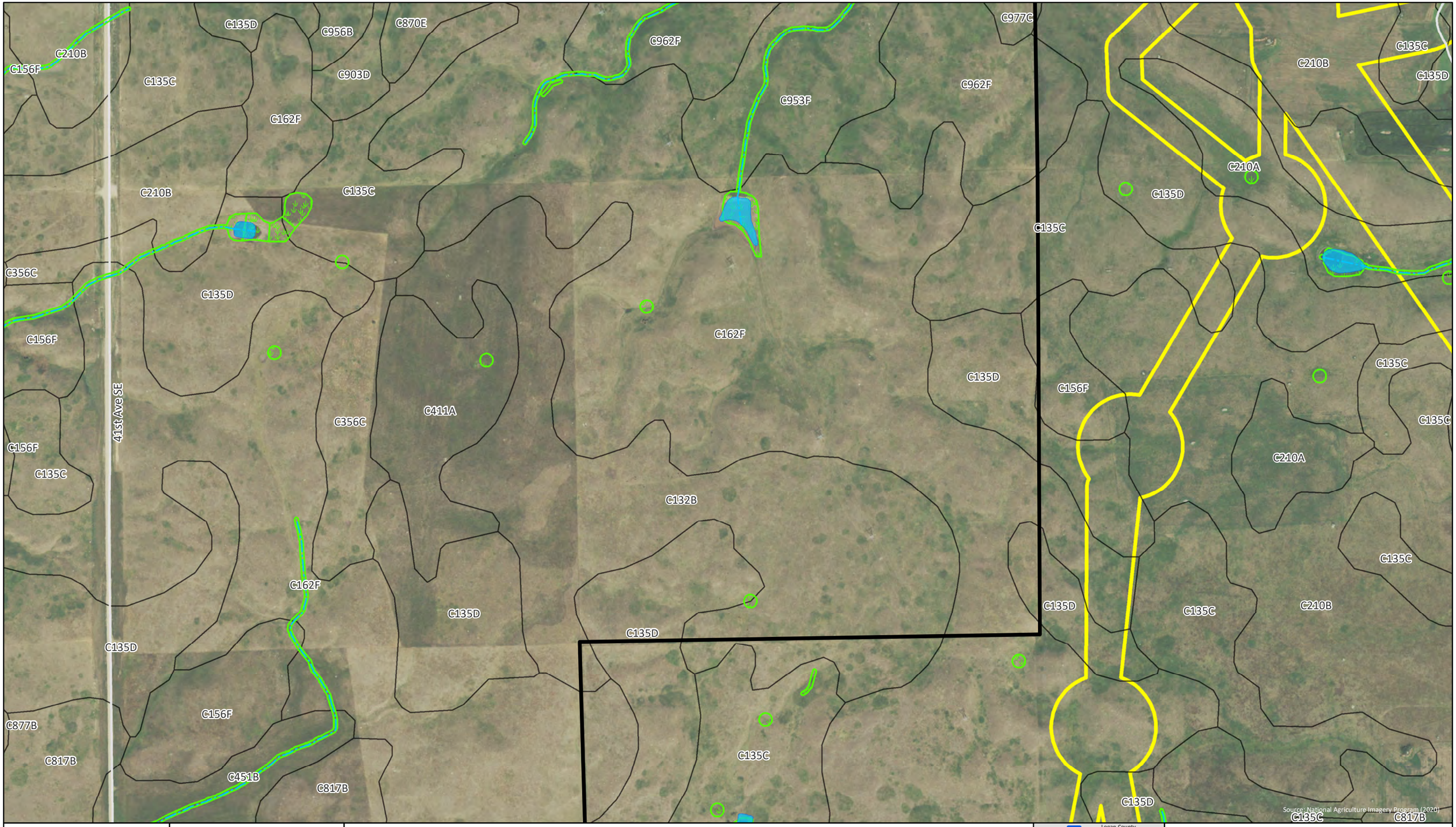

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

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- Waterbody (NHD)
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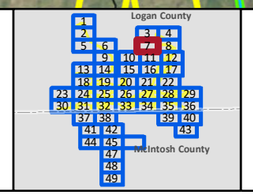

Figure 2
Map 7 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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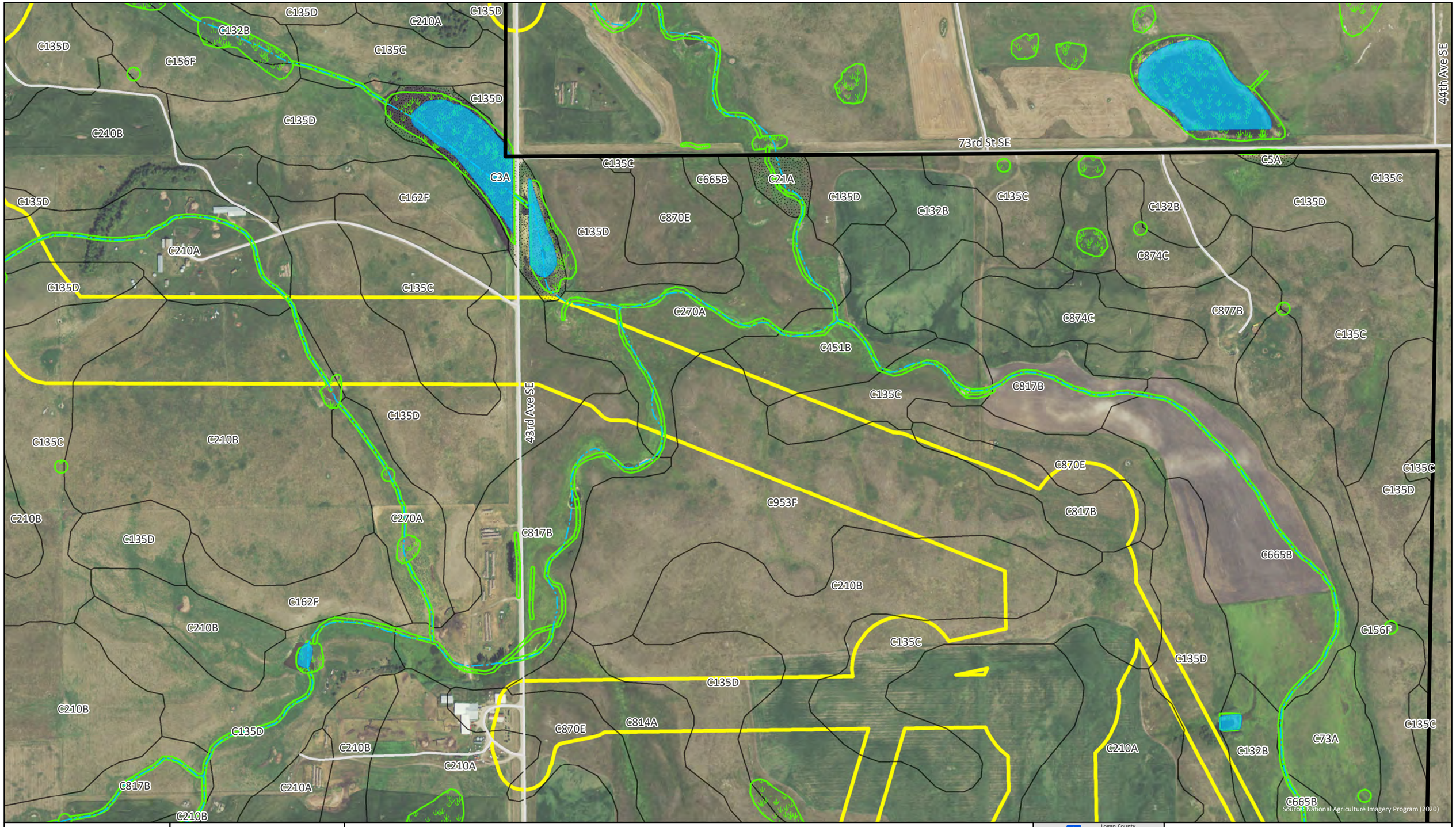

Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

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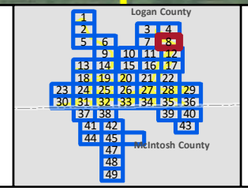

Figure 2
Map 8 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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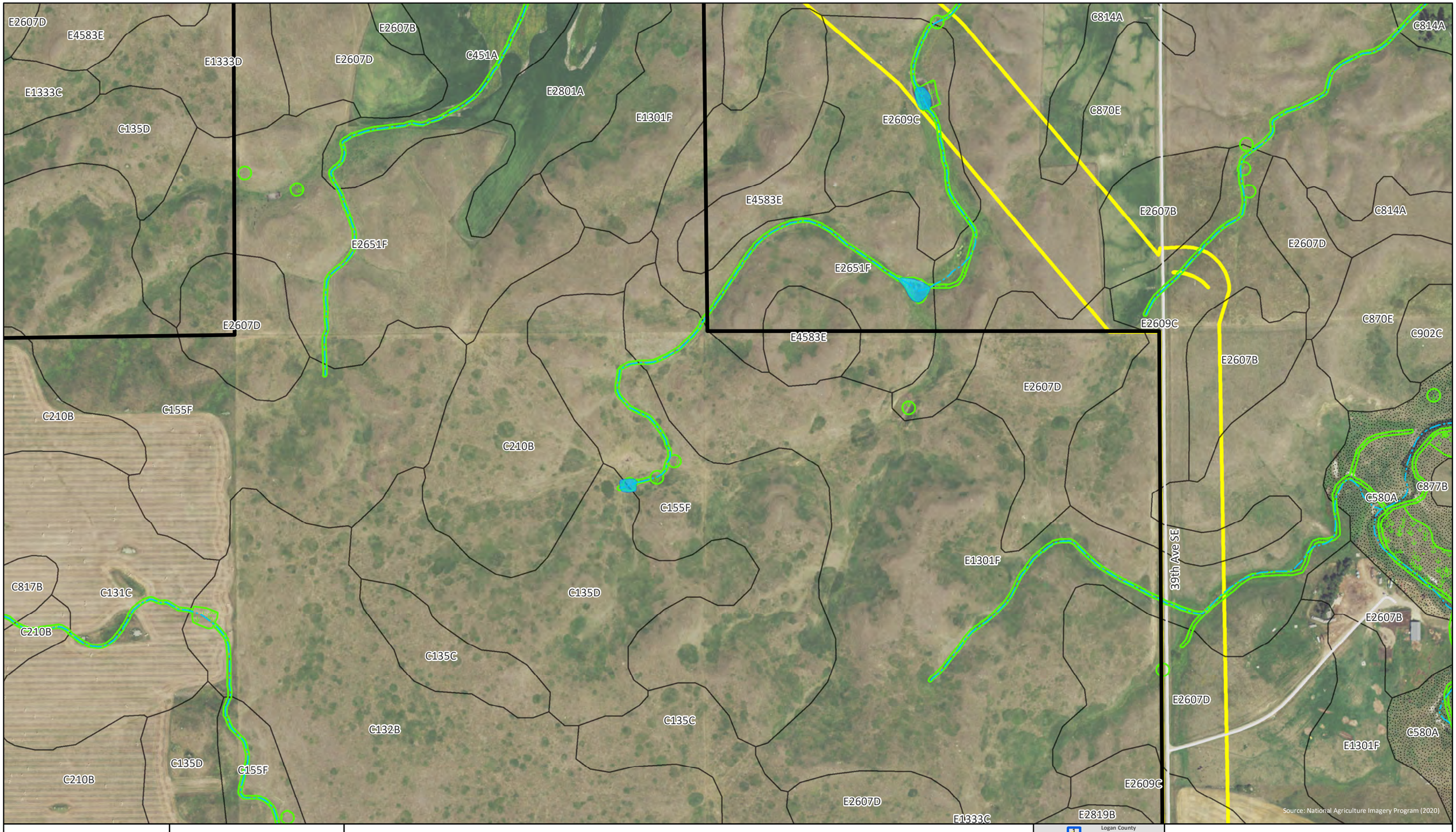

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

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Feet

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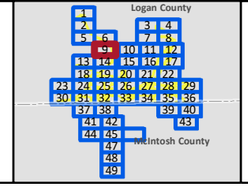

Figure 2
Map 9 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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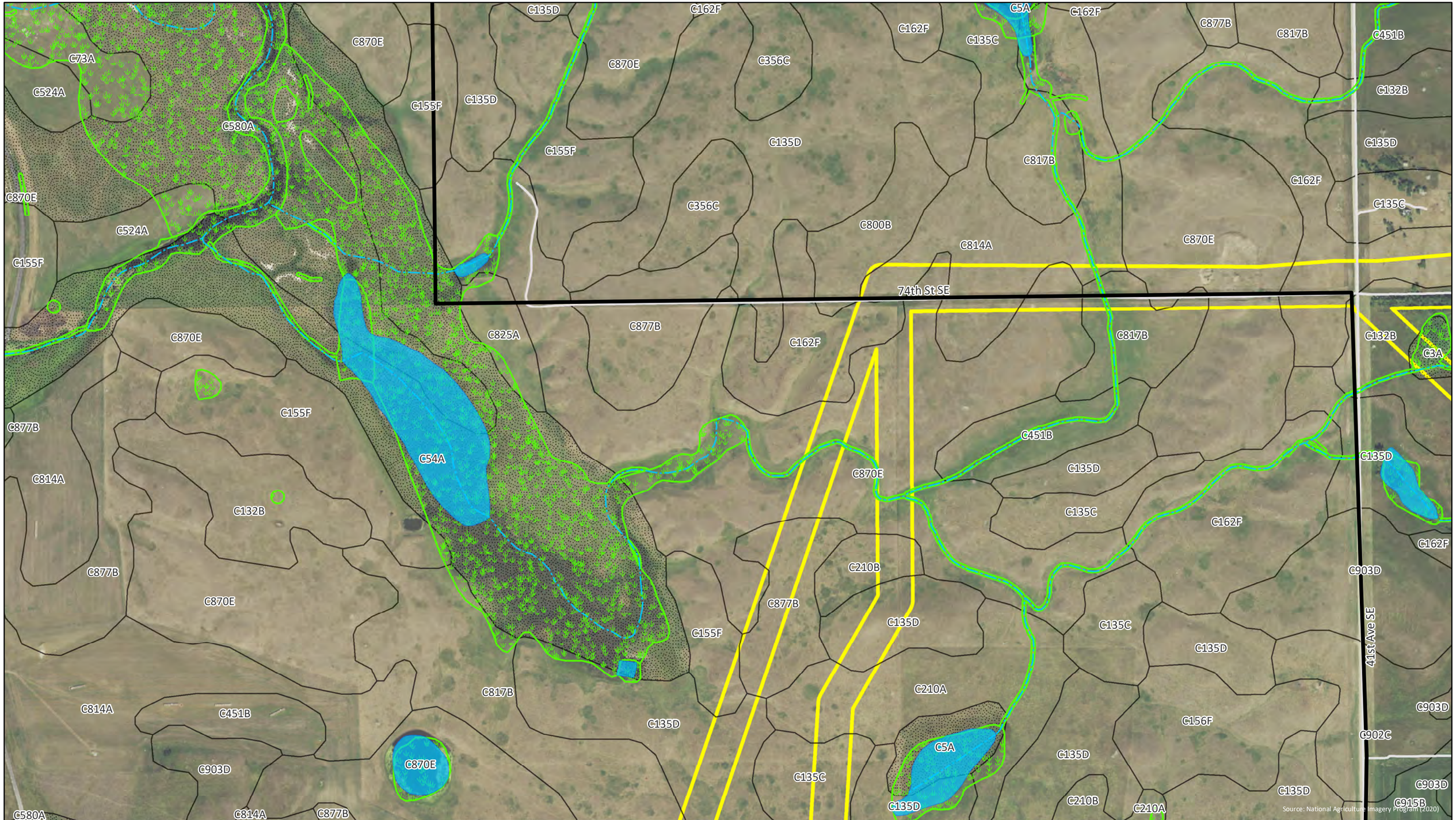

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

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Feet

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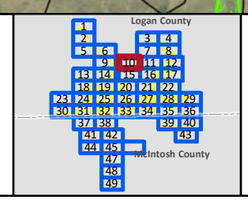

Figure 2
Map 10 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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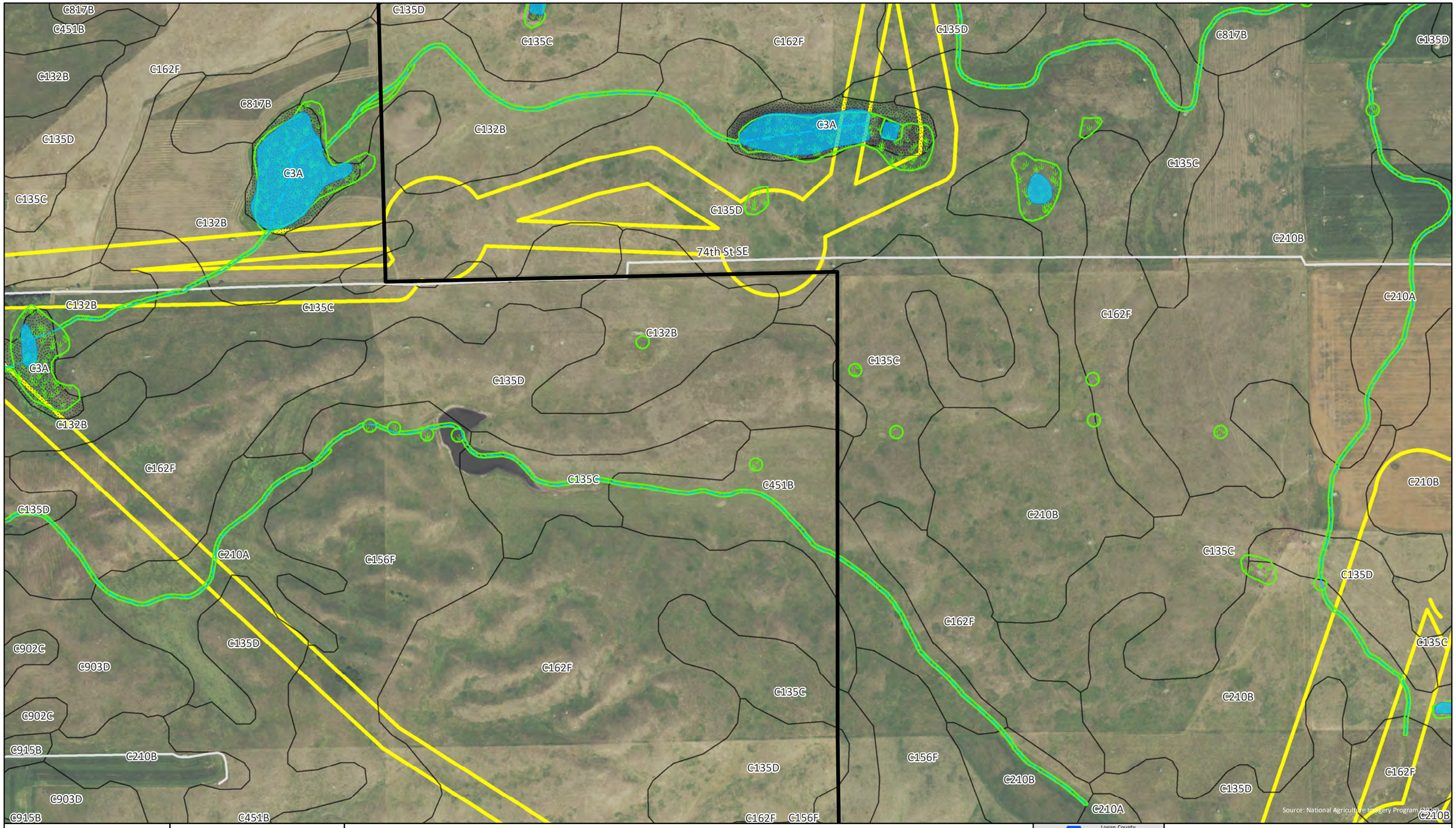

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

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County

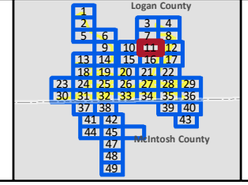

Figure 2
Map 11 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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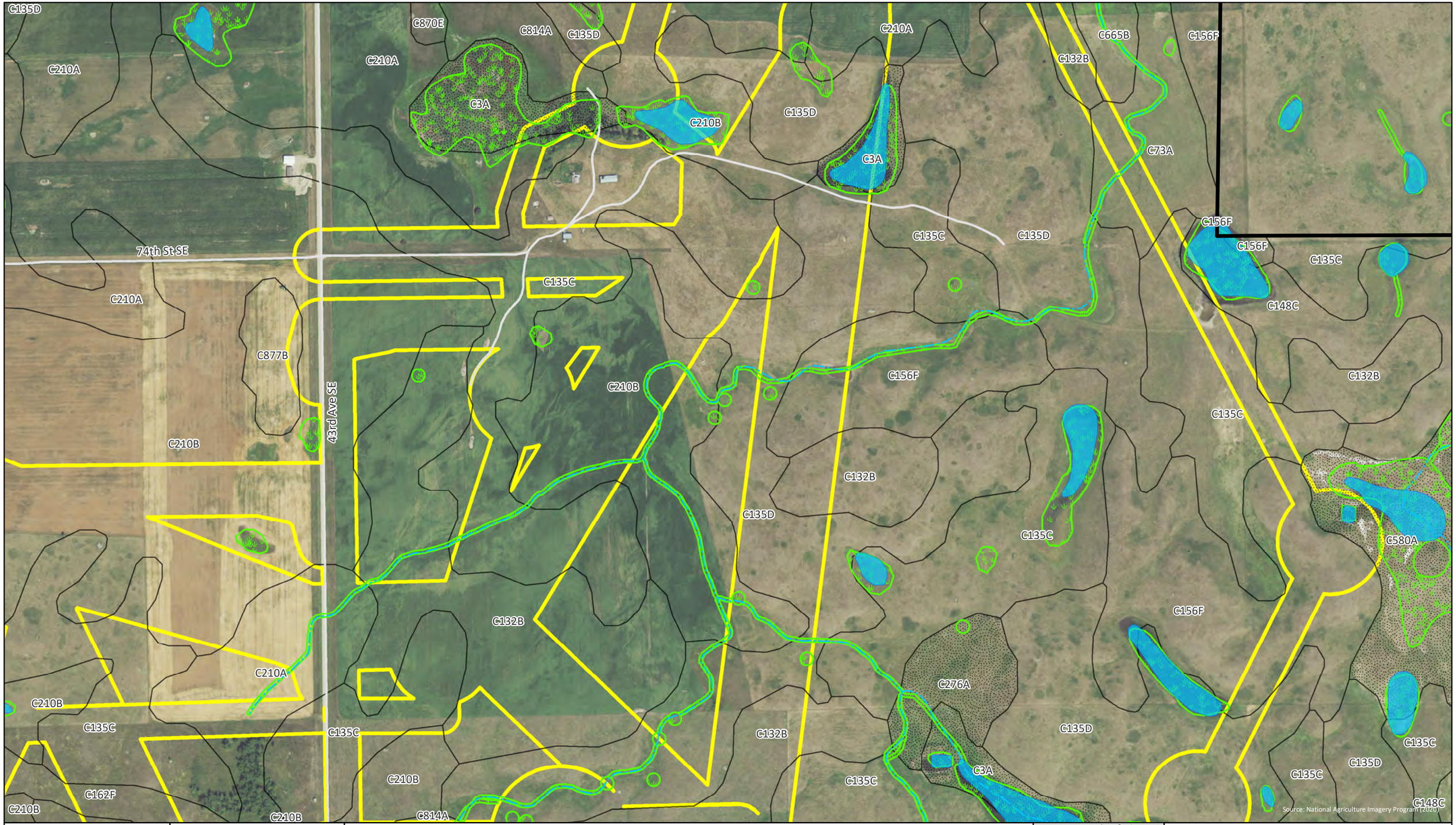

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

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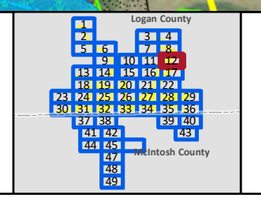

Figure 2
Map 12 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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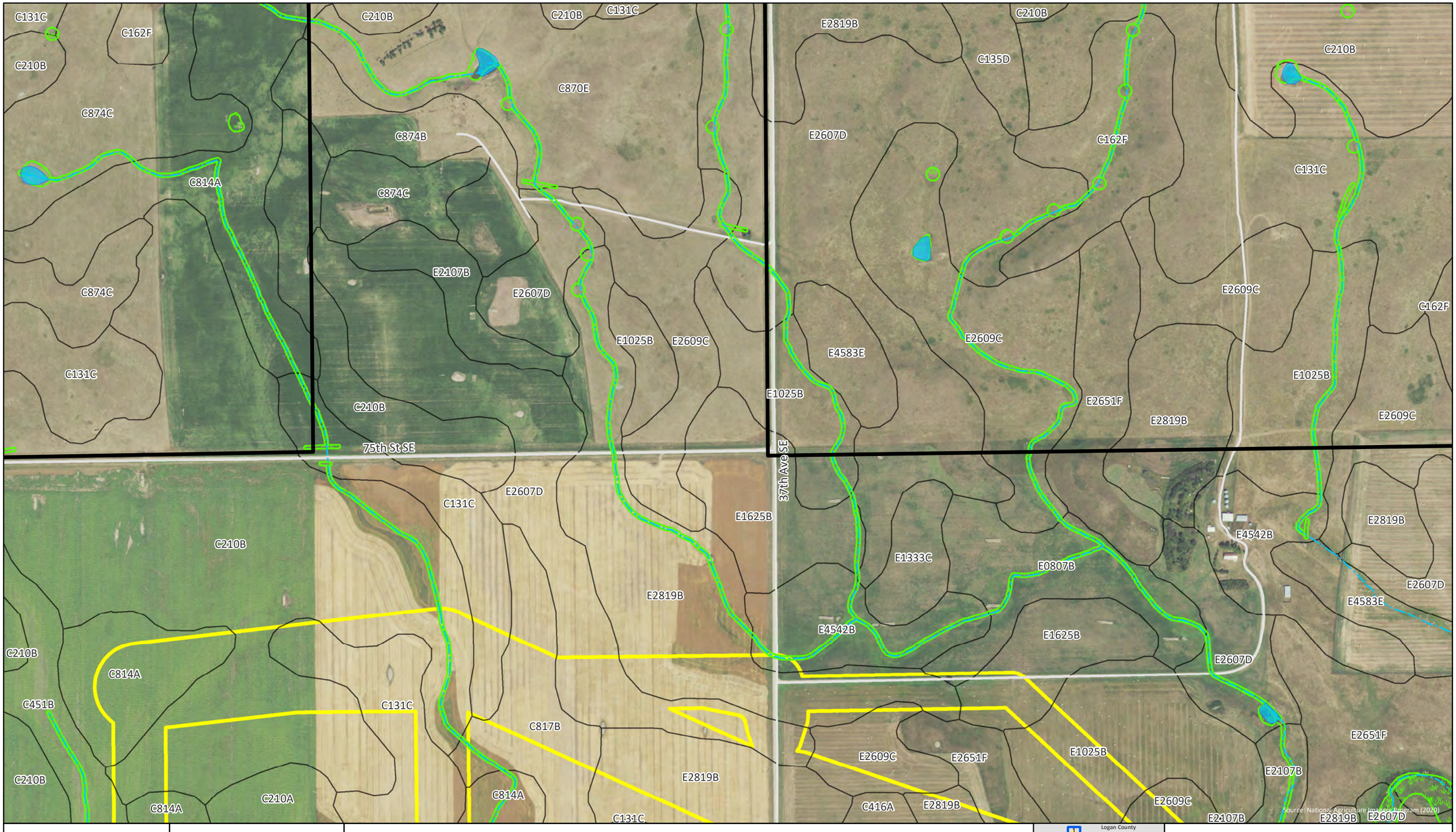

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

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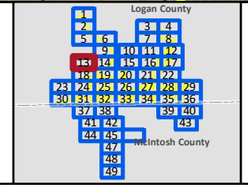

Figure 2
Map 13 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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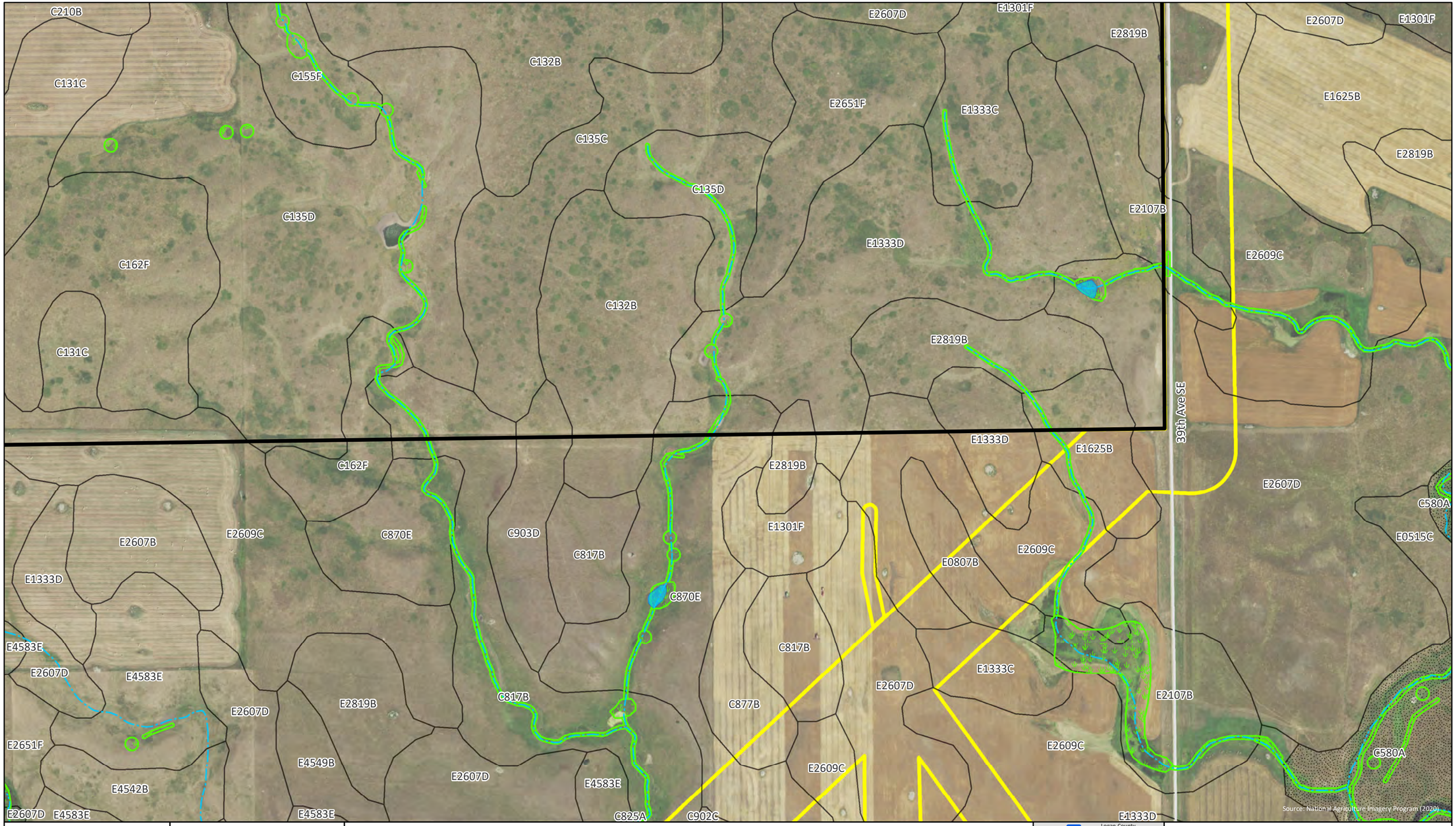

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

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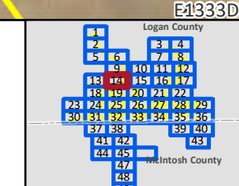

Figure 2
Map 14 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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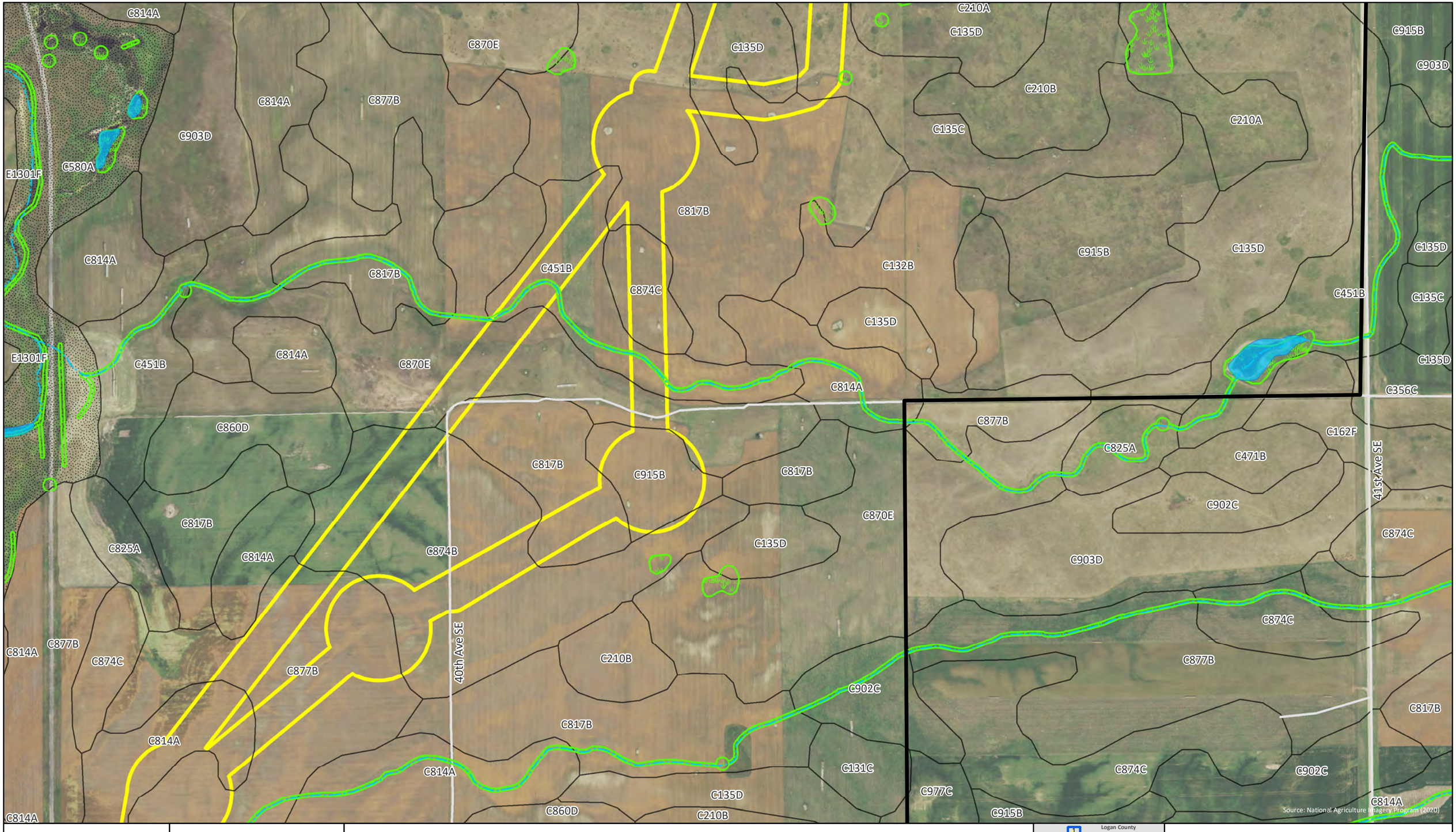

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
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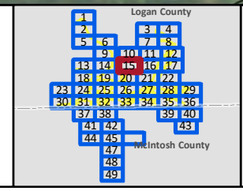

Figure 2
Map 15 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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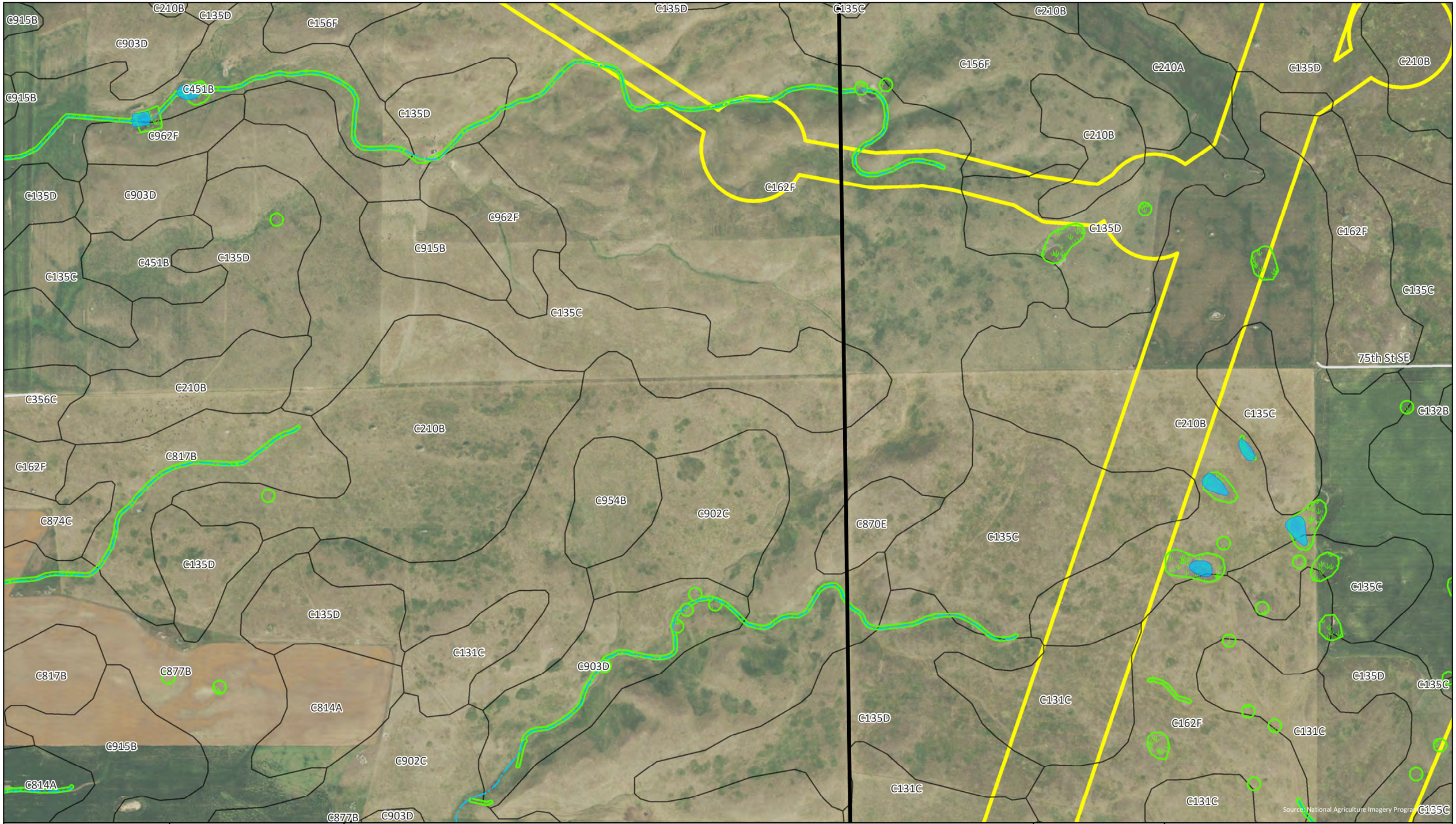

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

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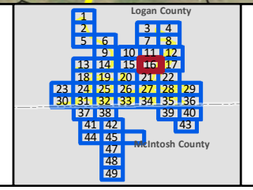

Figure 2
Map 16 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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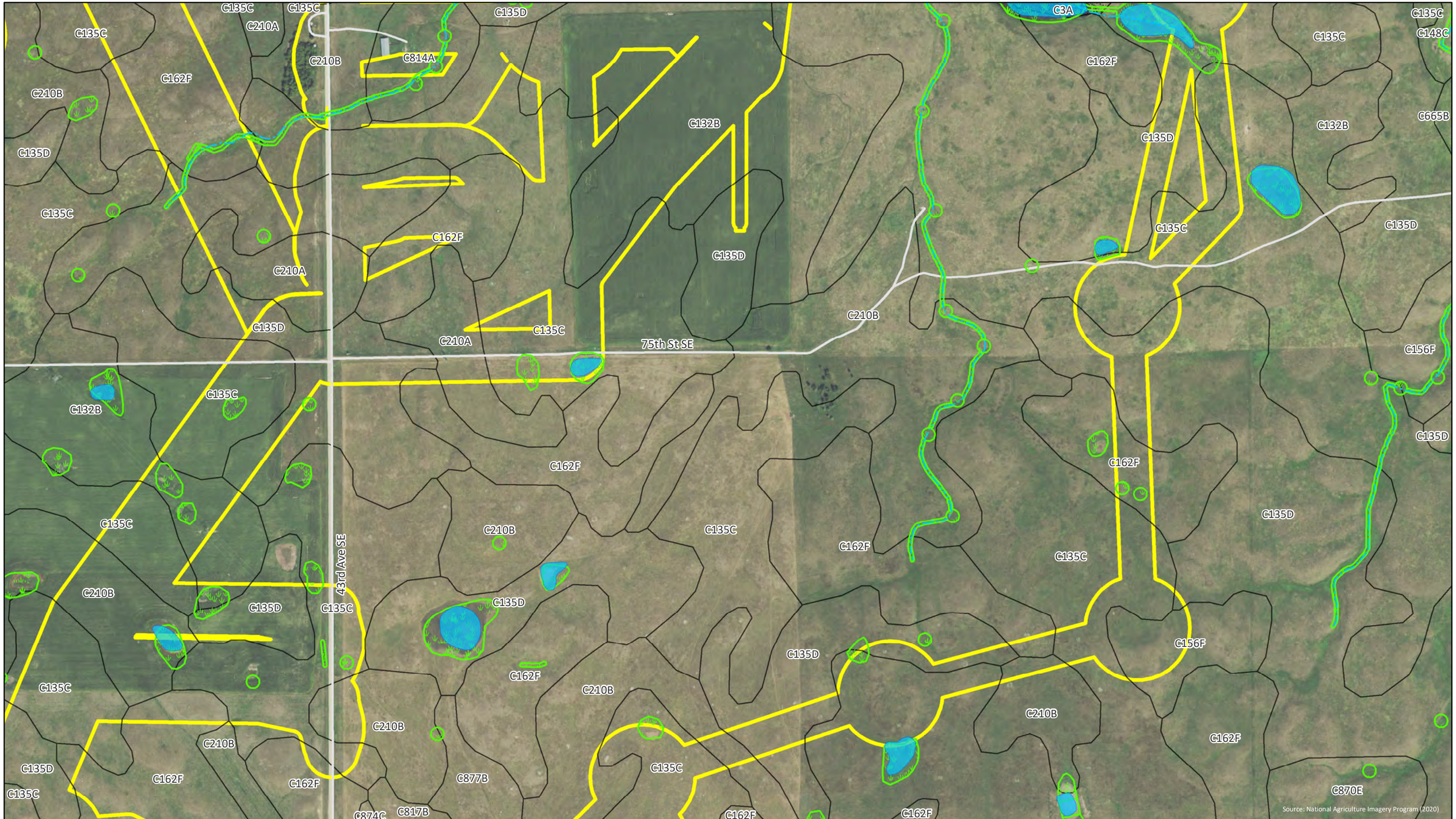

Aquatic Resource Delineation Report
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19000785
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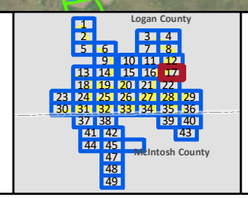

Figure 2
Map 17 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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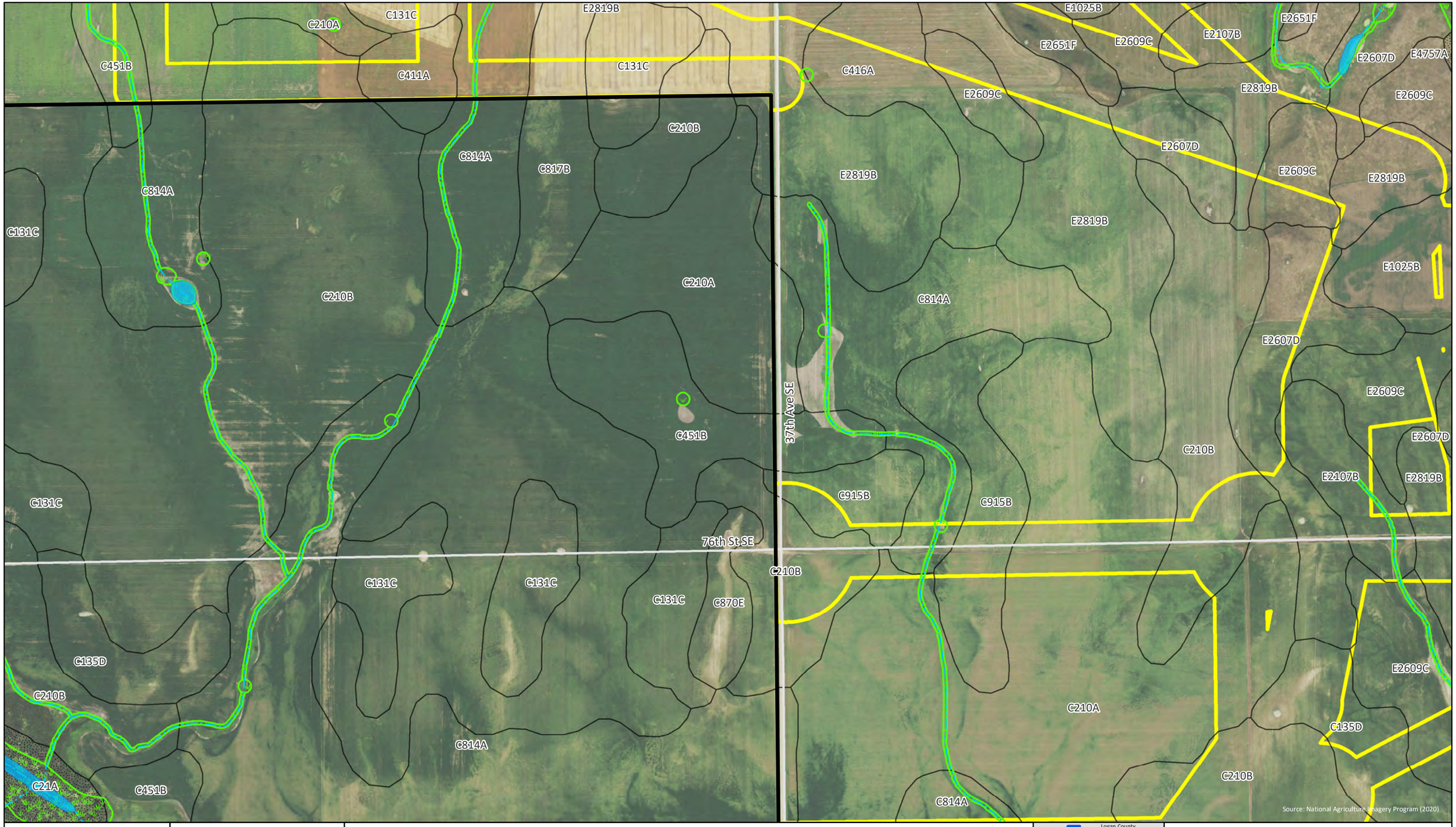

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
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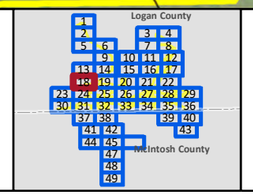

Figure 2
Map 18 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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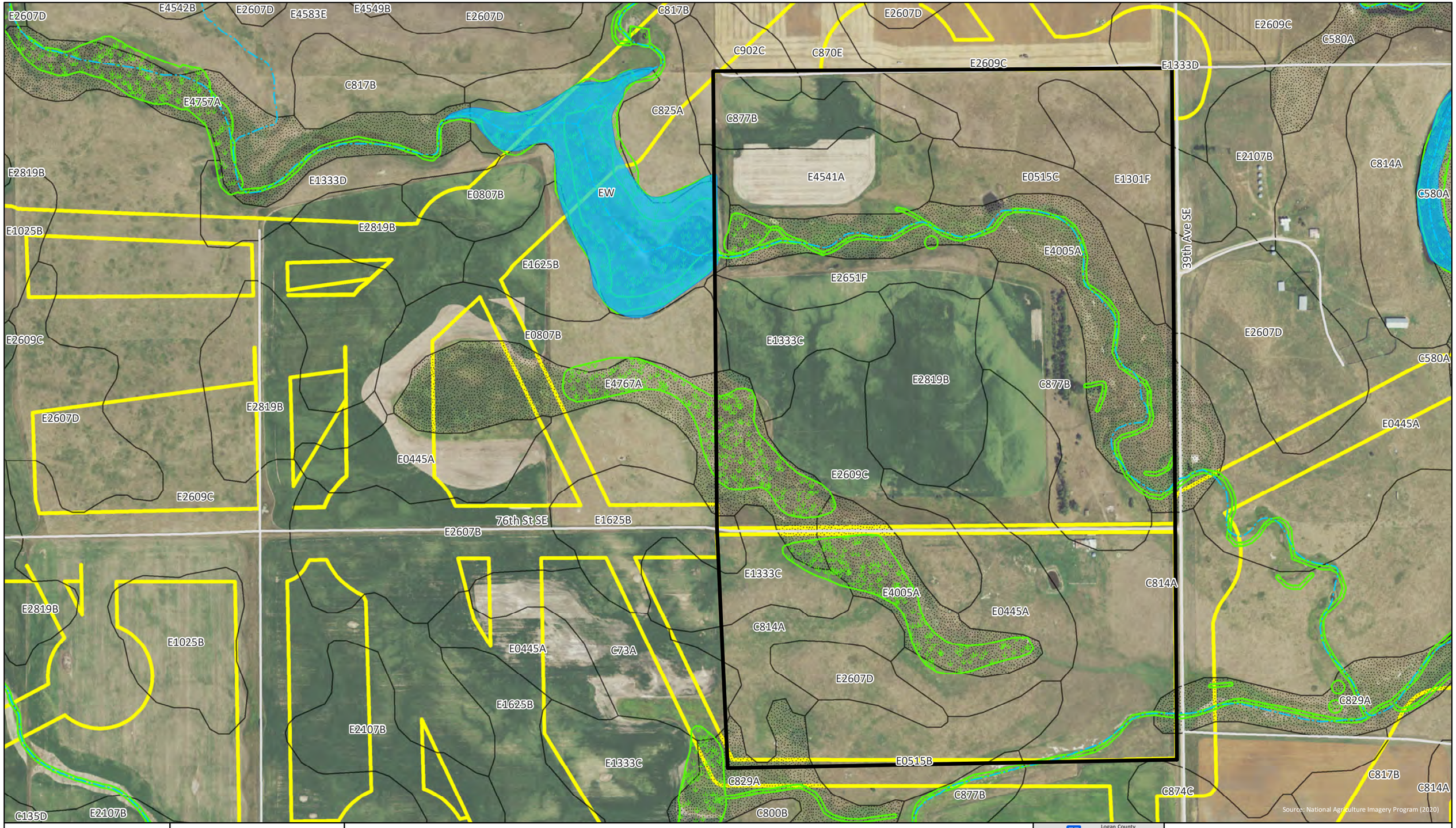

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
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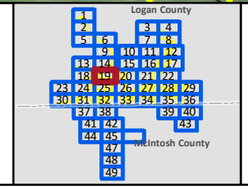

Figure 2
Map 19 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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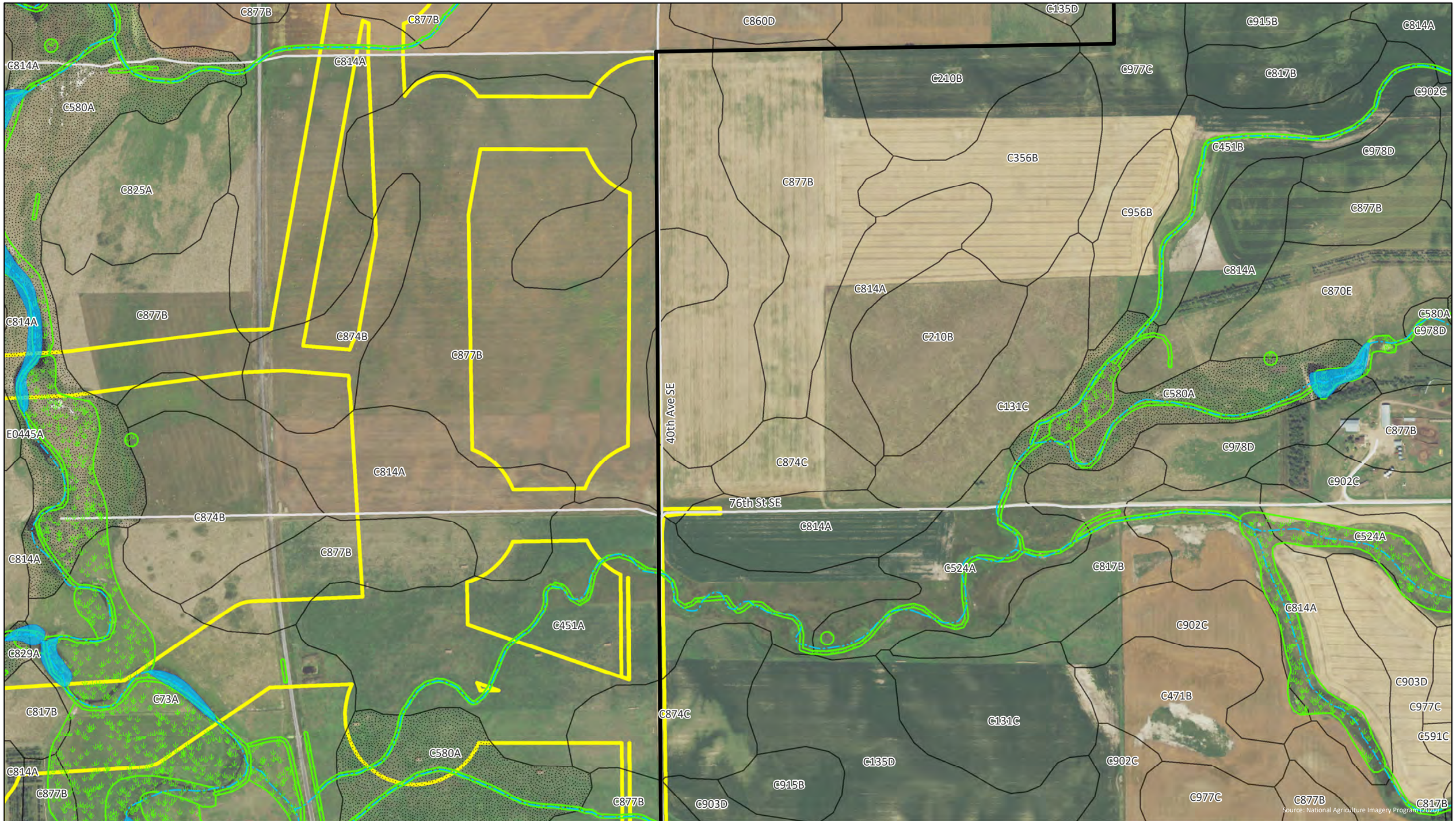

ATWELL

Aquatic Resource Delineation Report
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19000785
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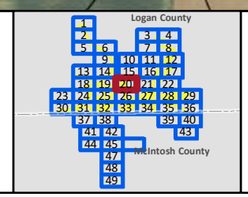

Figure 2
Map 20 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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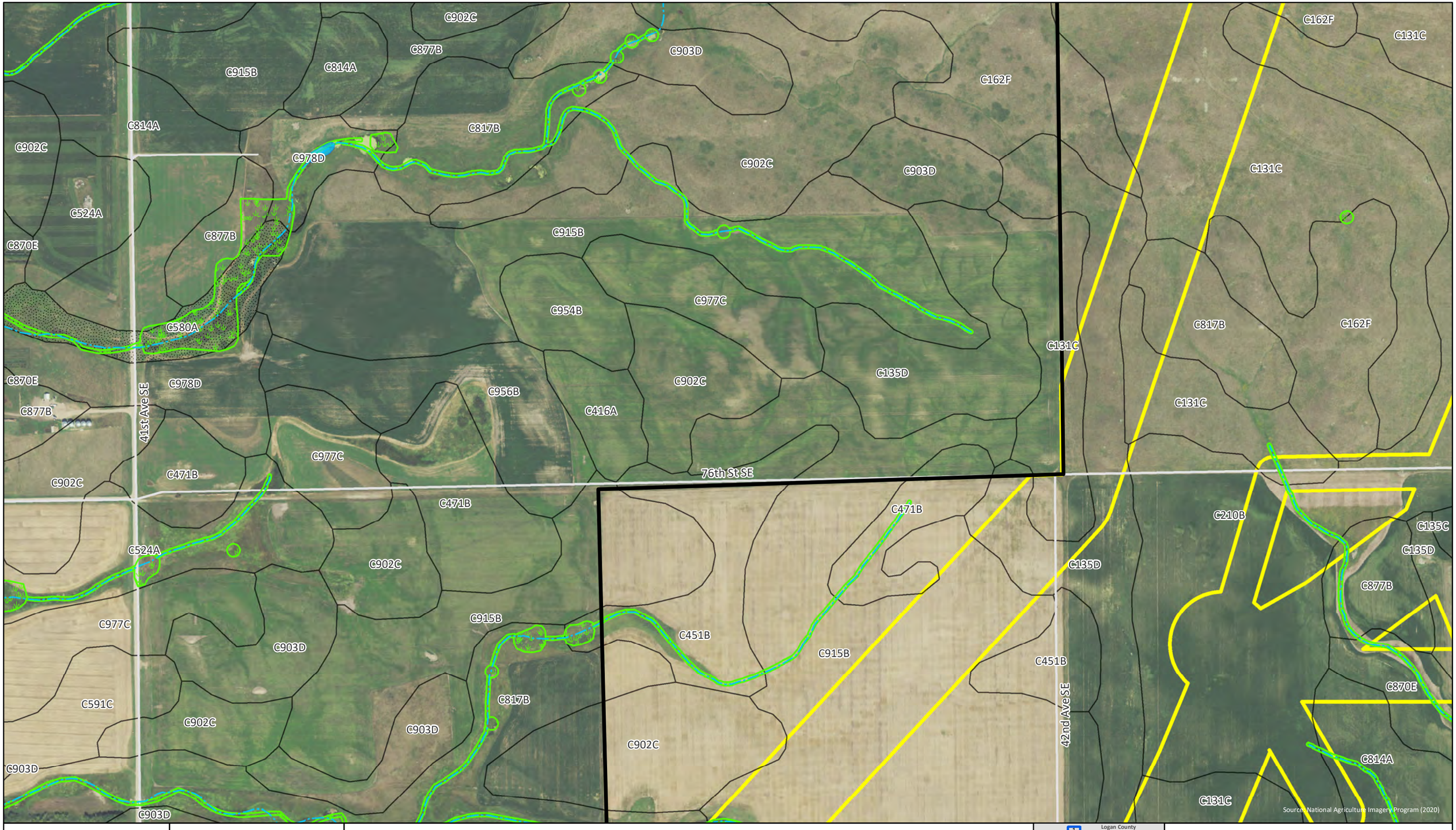

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Aquatic Resource Delineation Report
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0 500
Feet

Watercourse (NHD)
Waterbody (NHD)
Wetland (NWI)
Hydric Soils (gSSURGO)
Survey Area (~6,056 acres)
Project Area (~31,514 acres)
Road
County

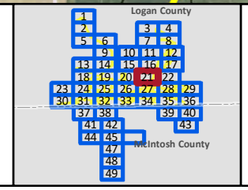

Figure 2
Map 21 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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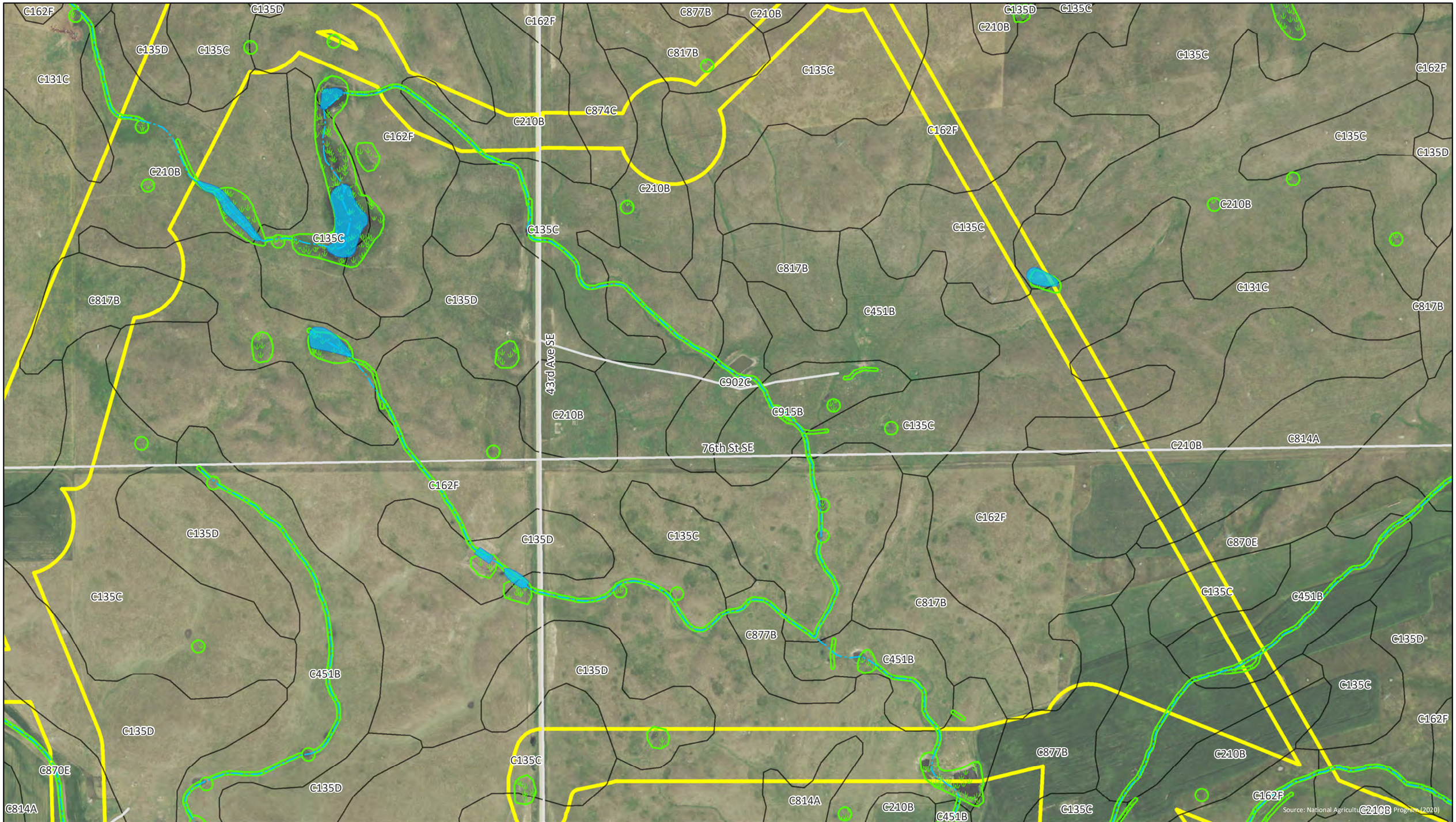

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

Watercourse (NHD)
Waterbody (NHD)
Wetland (NWI)
Hydric Soils (gSSURGO)
Survey Area (~6,056 acres)
Project Area (~31,514 acres)
Road
County

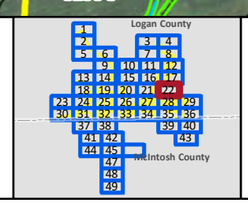

Figure 2
Map 22 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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C21A
C131C
C915B
C451B
C954B
36th Ave SE
C902C
77th St SE
C915B
C451B
C954B
C915B
C954B
C902C
Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

Watercourse (NHD)
Waterbody (NHD)
Wetland (NWI)
Hydric Soils (gSSURGO)
Survey Area (~6,056 acres)
Project Area (~31,514 acres)
Road
County

Logan County
McIntosh County

Figure 2
Map 23 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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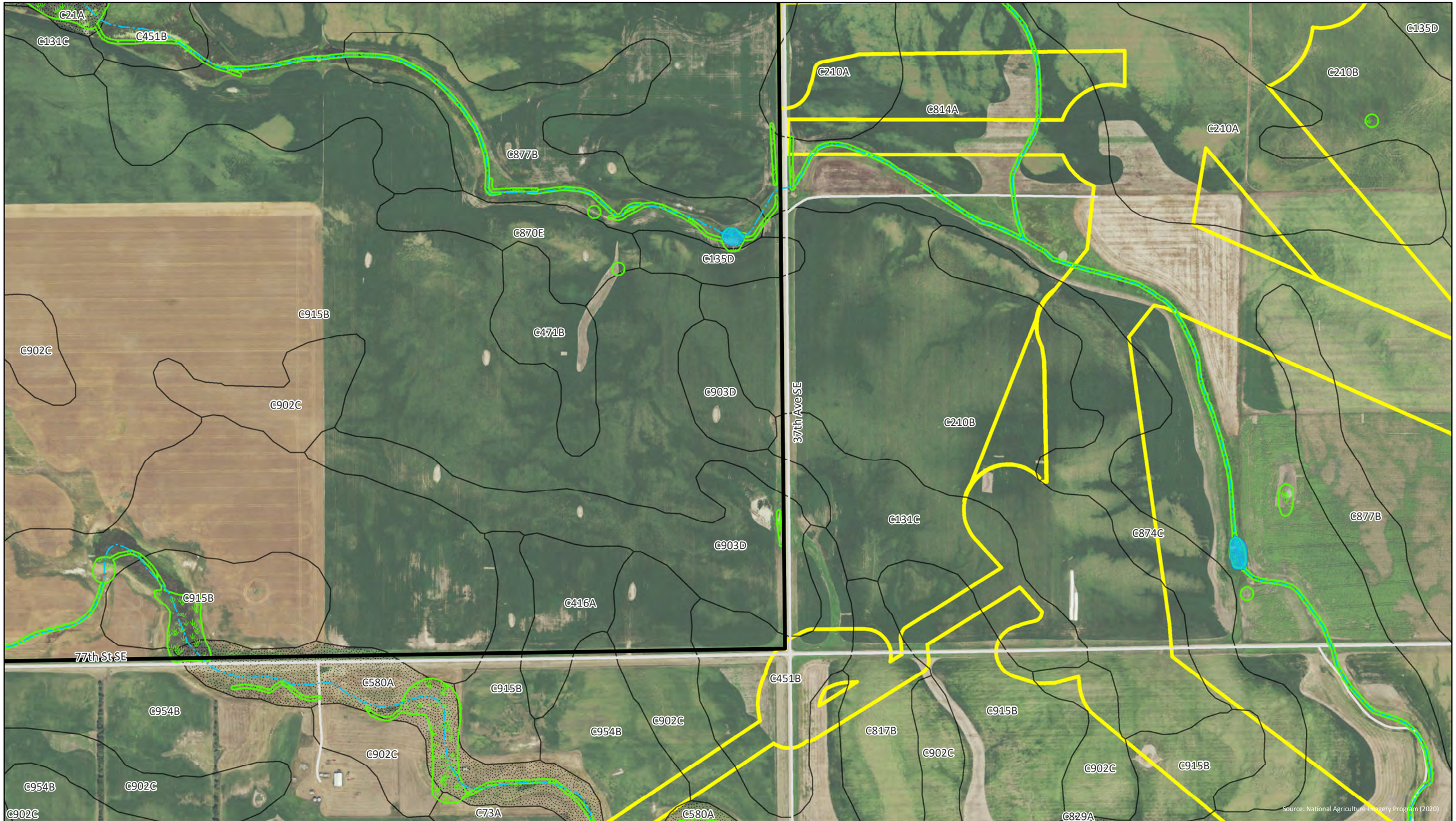

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

- Watercourse (NHD)
- Waterbody (NHD)
- Wetland (NWI)
- Hydric Soils (gSSURGO)
- Survey Area (~6,056 acres)
- Project Area (~31,514 acres)
- Road
- County

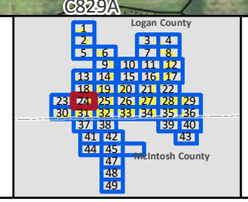

Figure 2
Map 24 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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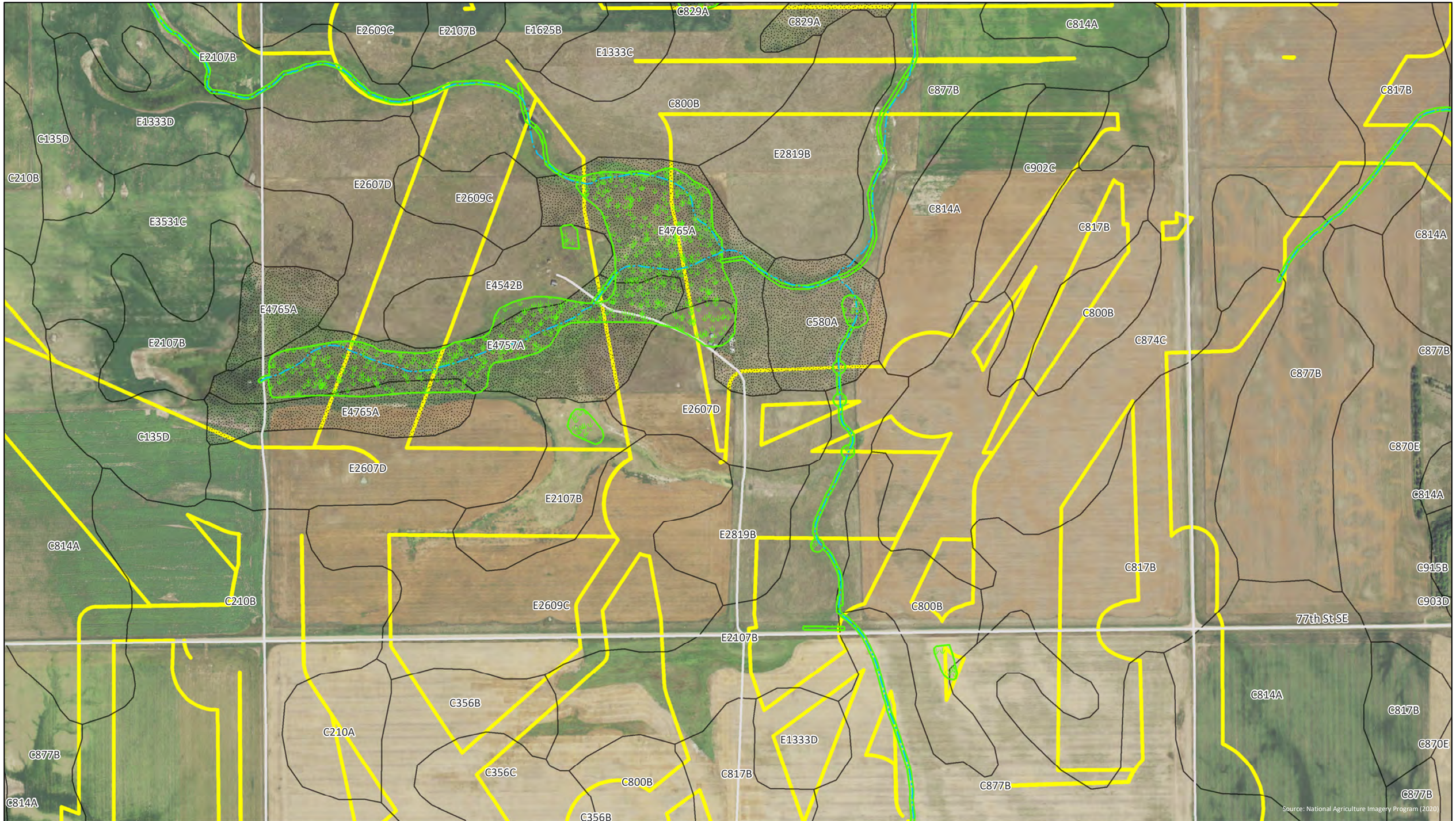

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

- Watercourse (NHD)
- Waterbody (NHD)
- Wetland (NWI)
- Hydric Soils (gSSURGO)
- Survey Area (~6,056 acres)
- Project Area (~31,514 acres)
- Road
- County

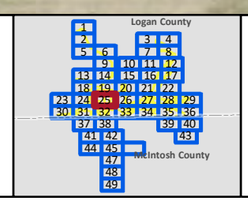

Figure 2
Map 25 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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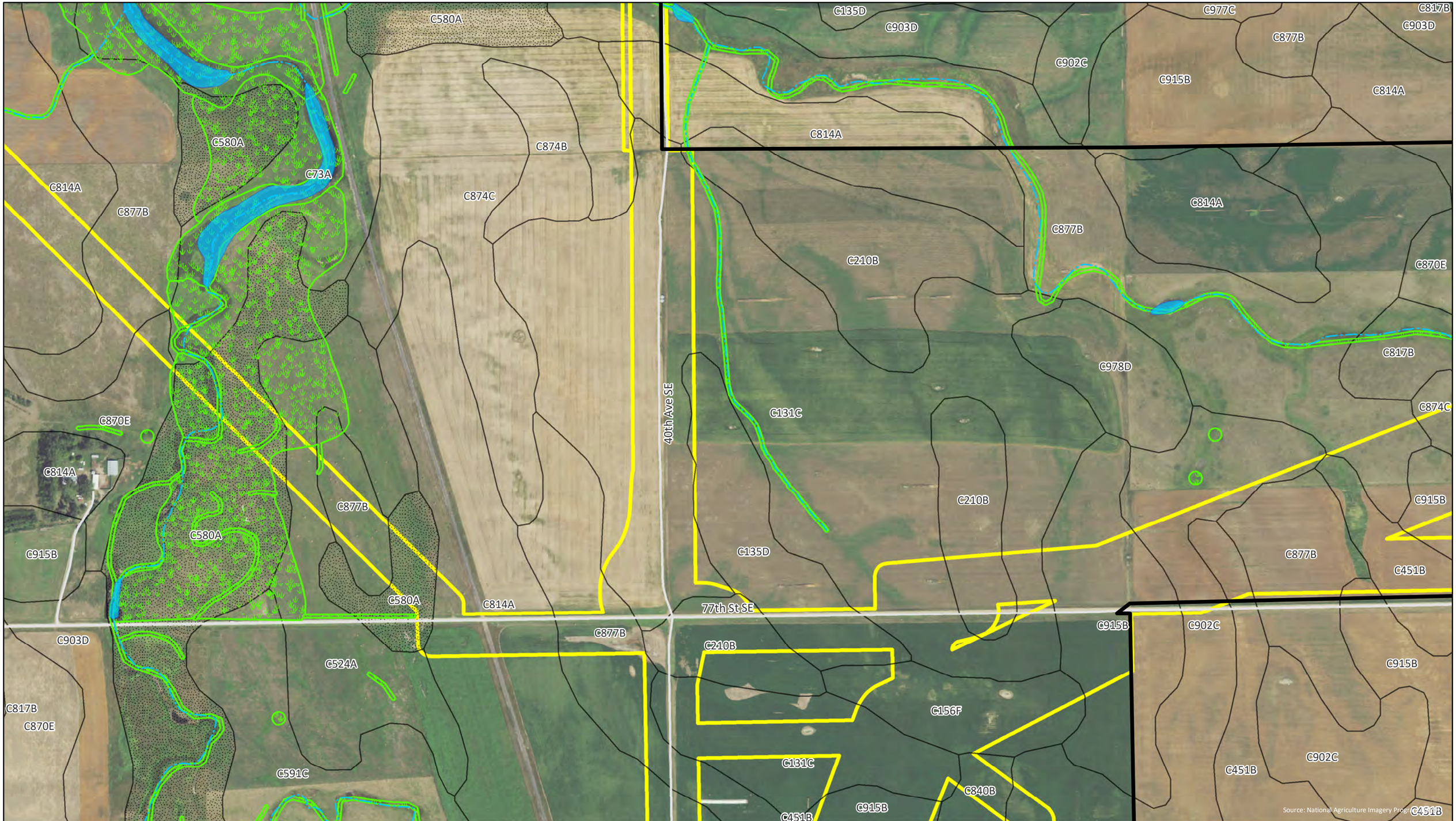

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

Watercourse (NHD)
Waterbody (NHD)
Wetland (NWI)
Hydric Soils (gSSURGO)
Survey Area (~6,056 acres)
Project Area (~31,514 acres)
Road
County

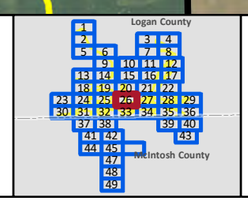

Figure 2
Map 26 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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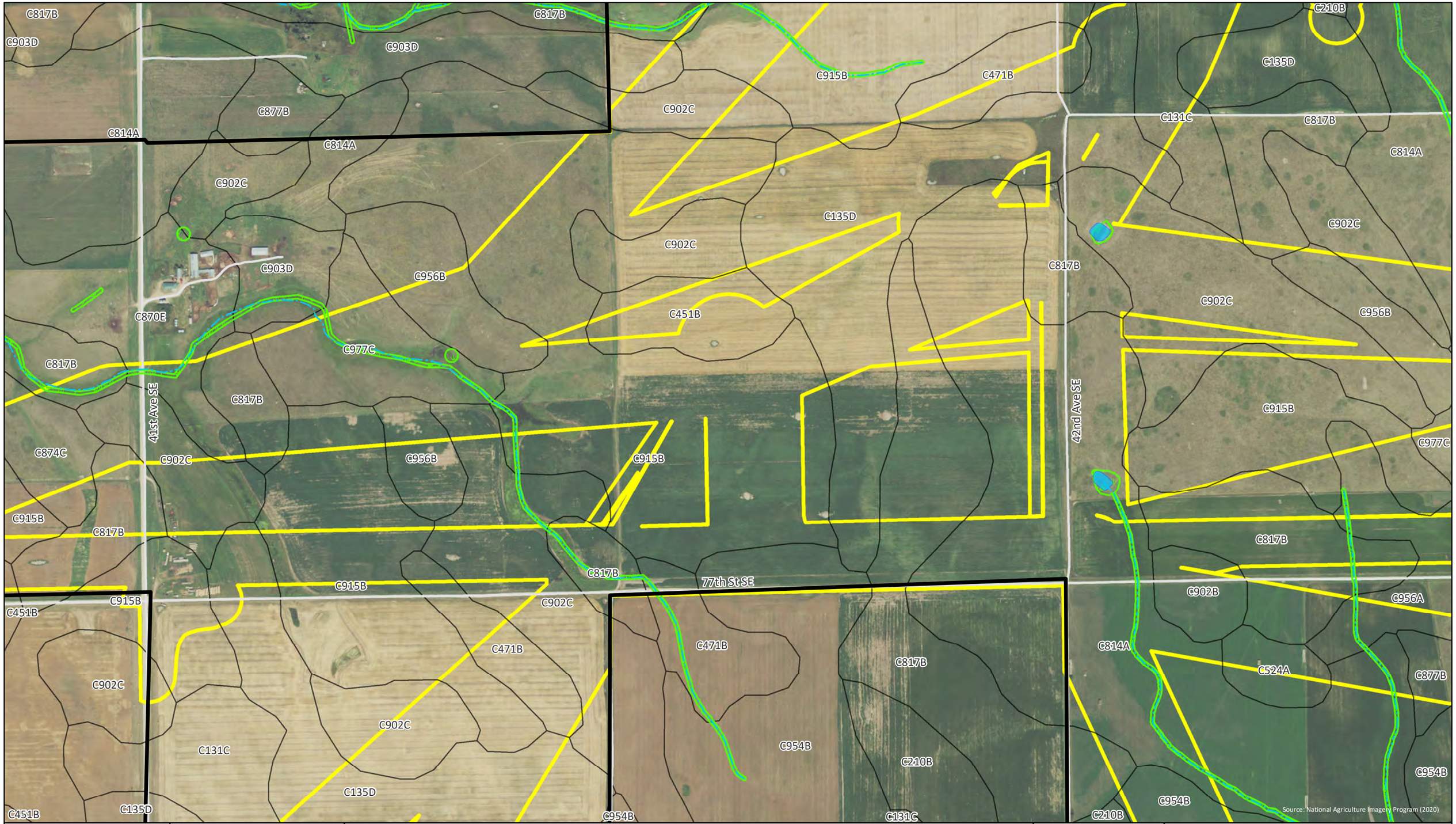

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

- Watercourse (NHD)
- Waterbody (NHD)
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- Survey Area (~6,056 acres)
- Project Area (~31,514 acres)
- Road
- County

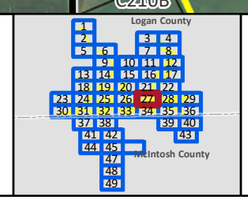

Figure 2
Map 27 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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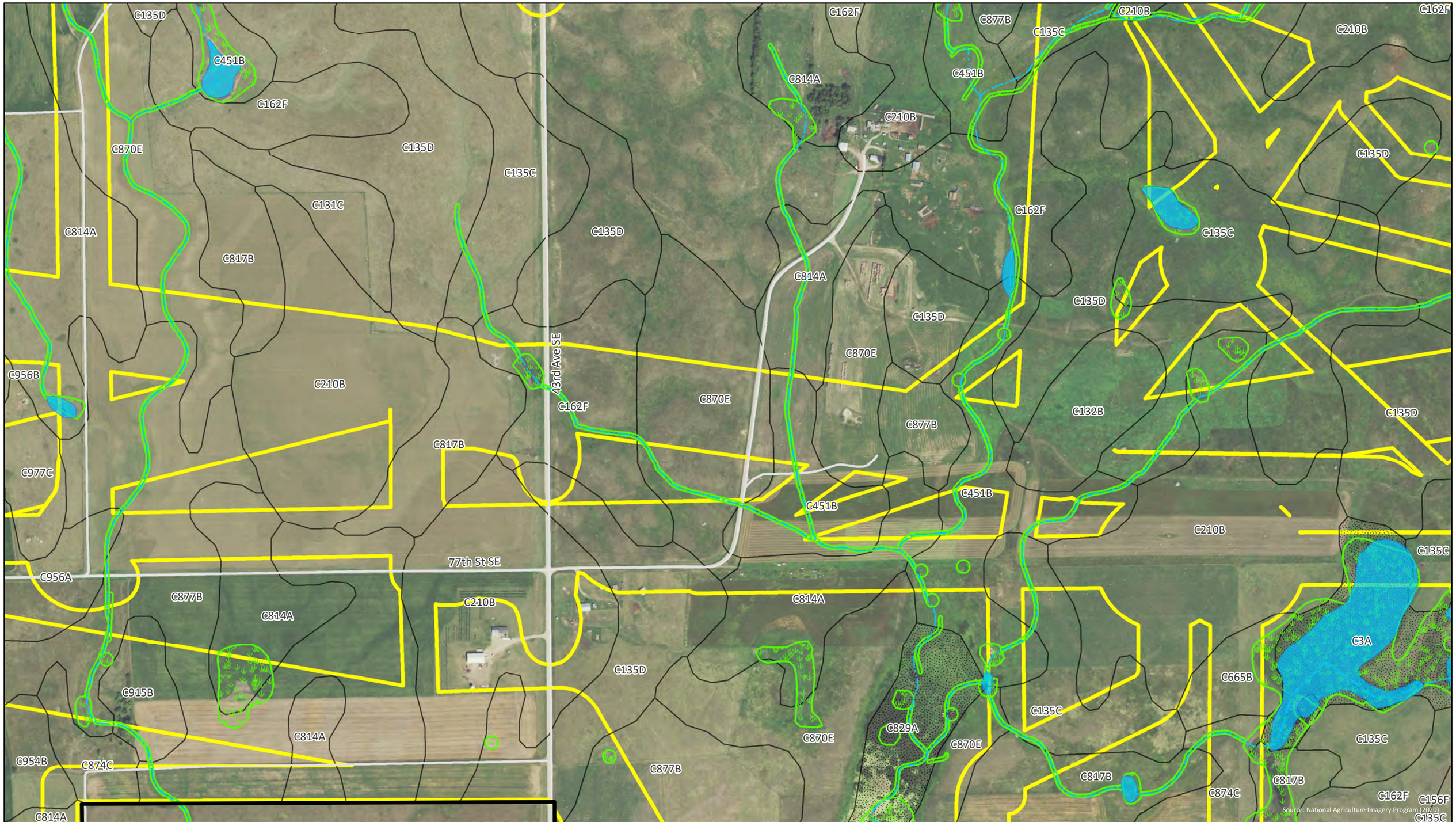

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

Watercourse (NHD)
Waterbody (NHD)
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Survey Area (~6,056 acres)
Project Area (~31,514 acres)
Road
County

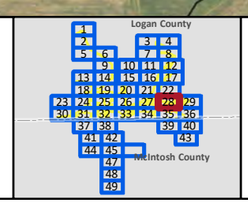

Figure 2
Map 28 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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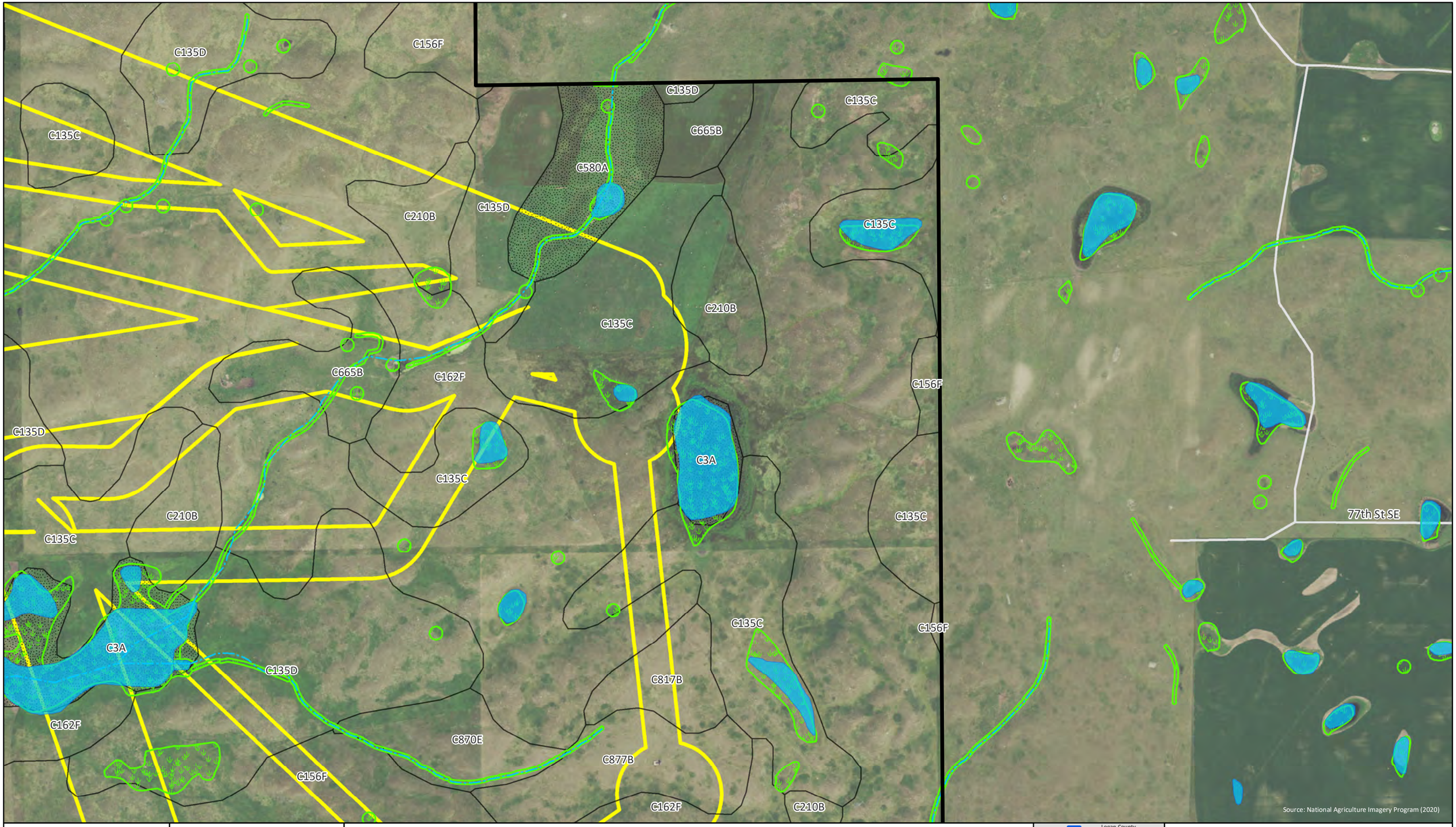

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

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- Waterbody (NHD)
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- Road
- County

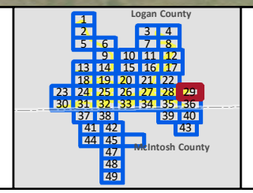

Figure 2
Map 29 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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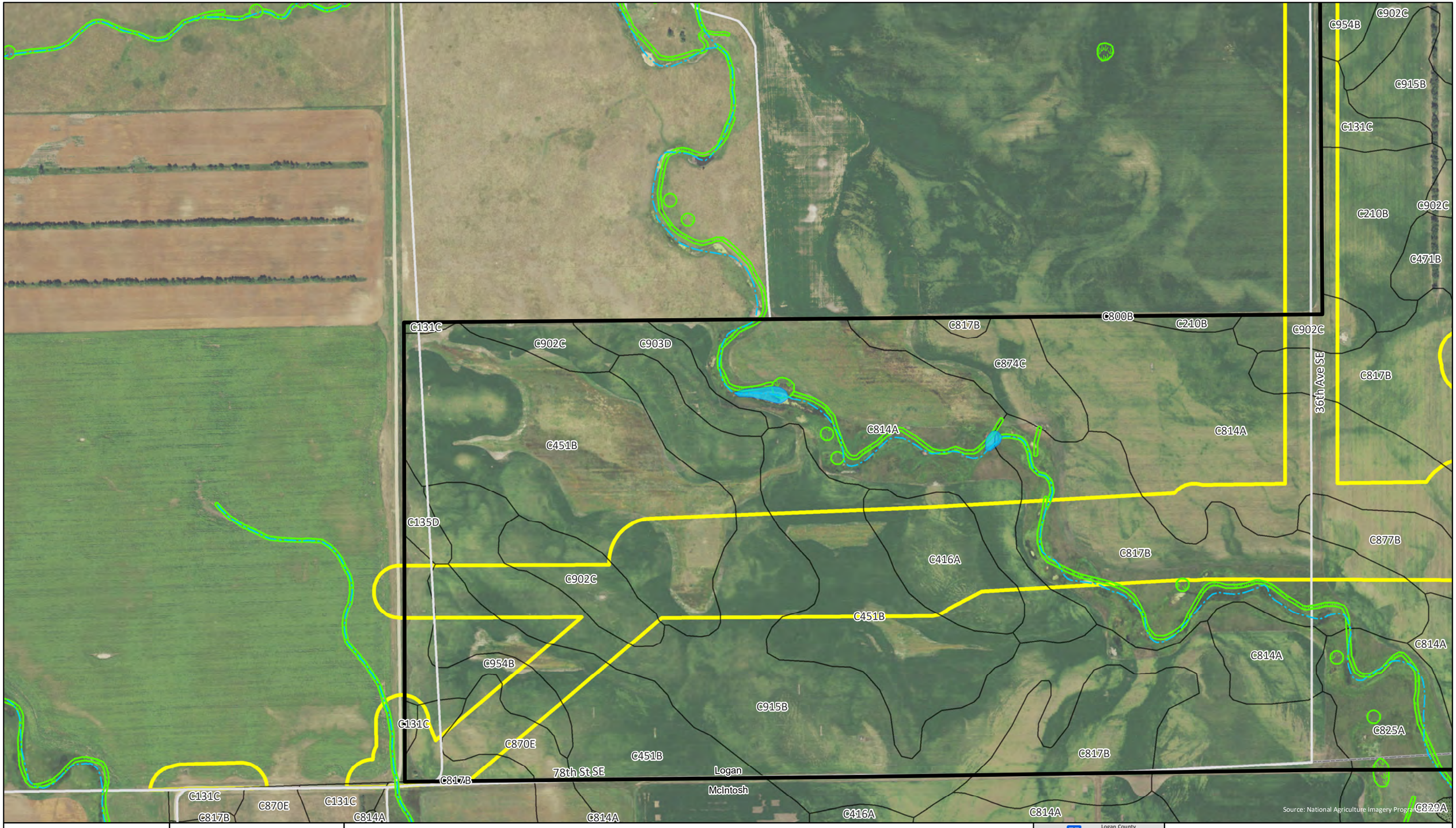

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

Watercourse (NHD)
Waterbody (NHD)
Wetland (NWI)
Hydric Soils (gSSURGO)
Survey Area (~6,056 acres)
Project Area (~31,514 acres)
Road
County

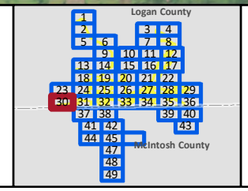

Figure 2
Map 30 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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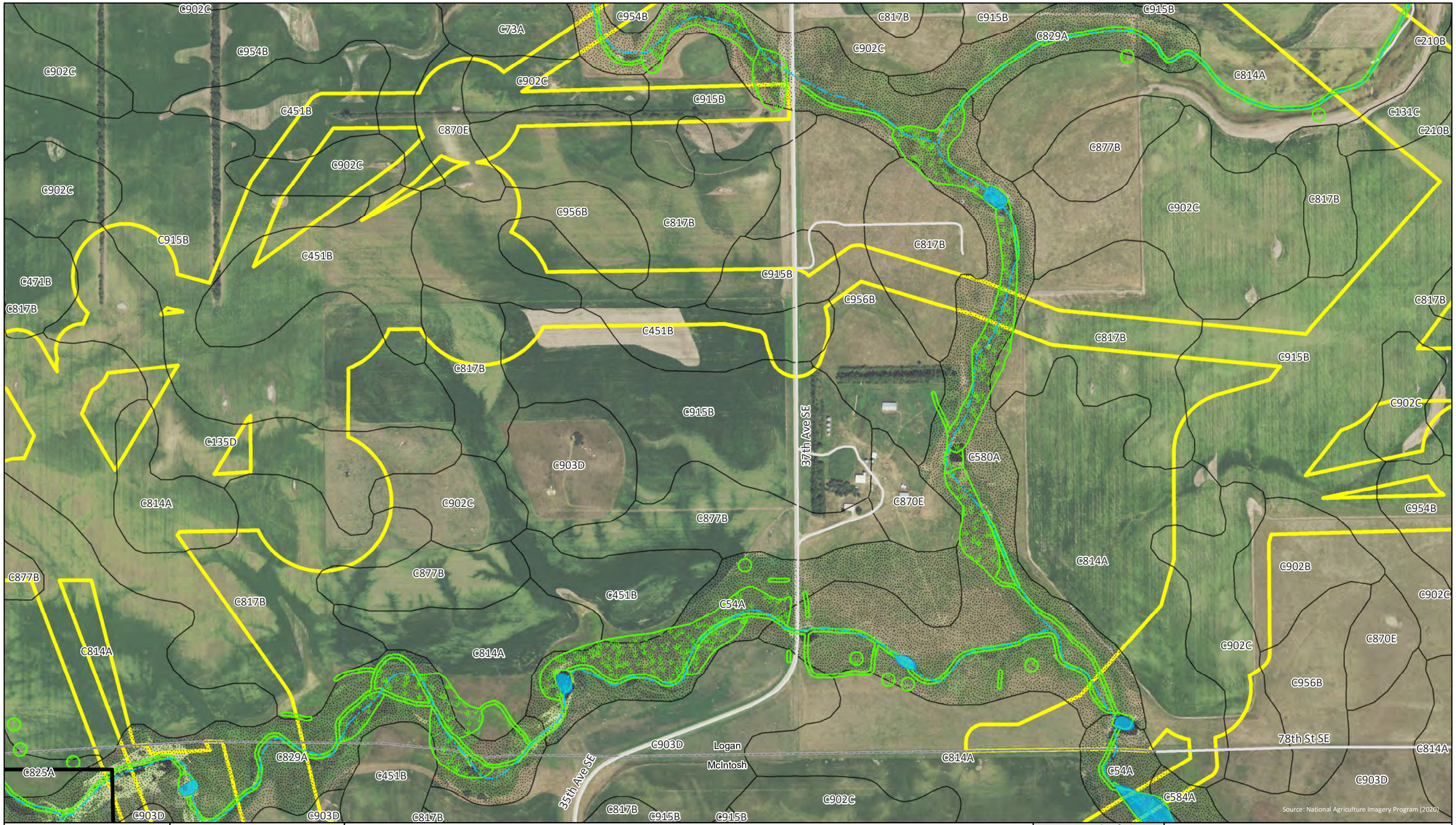

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

- Watercourse (NHD)
- Waterbody (NHD)
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- County

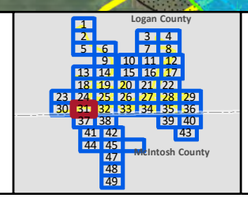

Figure 2
Map 31 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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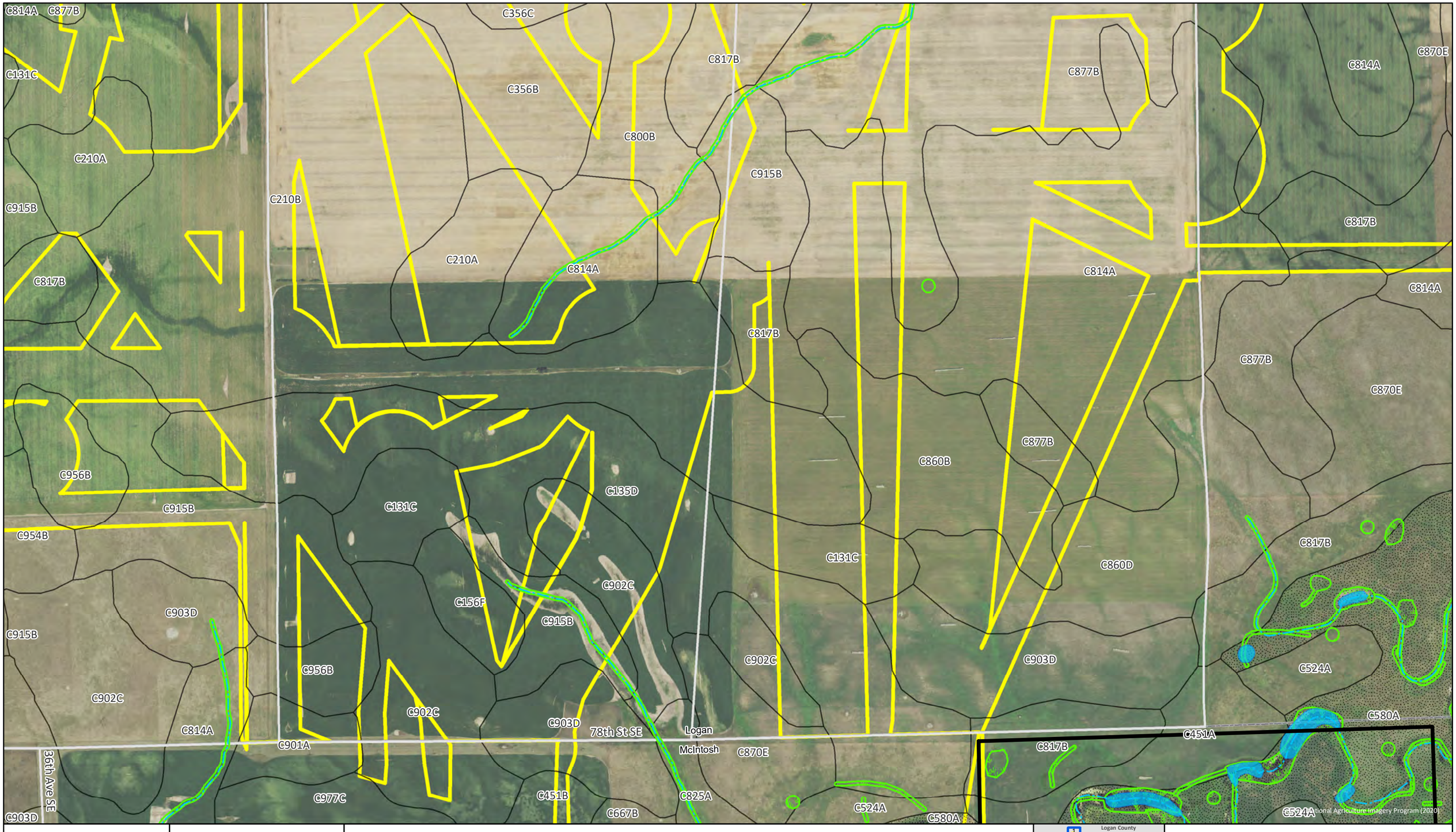

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

- Watercourse (NHD)
- Waterbody (NHD)
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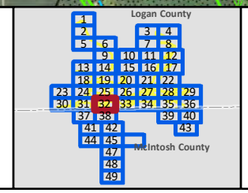

Figure 2
Map 32 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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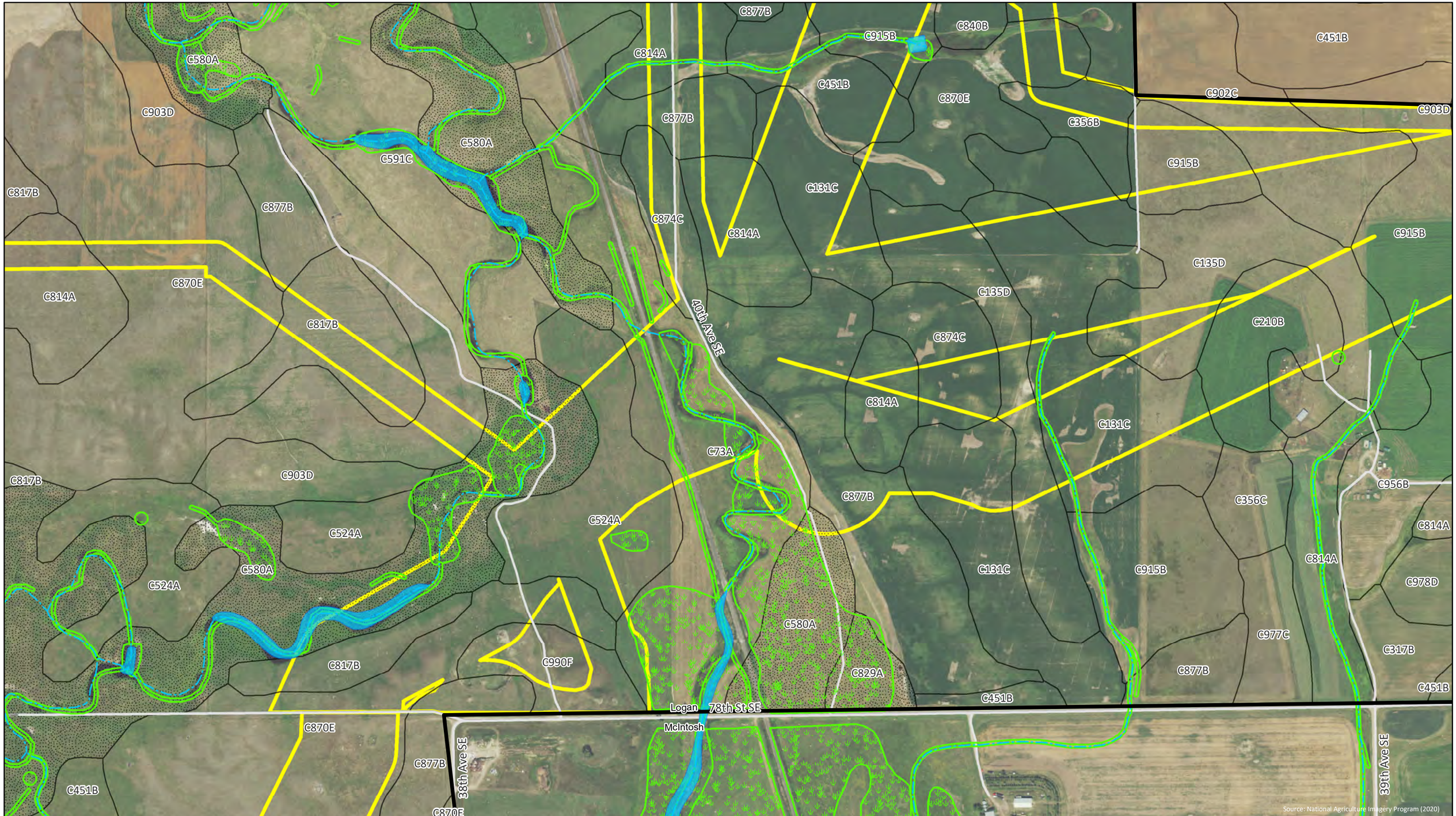

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

Watercourse (NHD)
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County

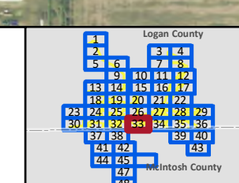

Figure 2
Map 33 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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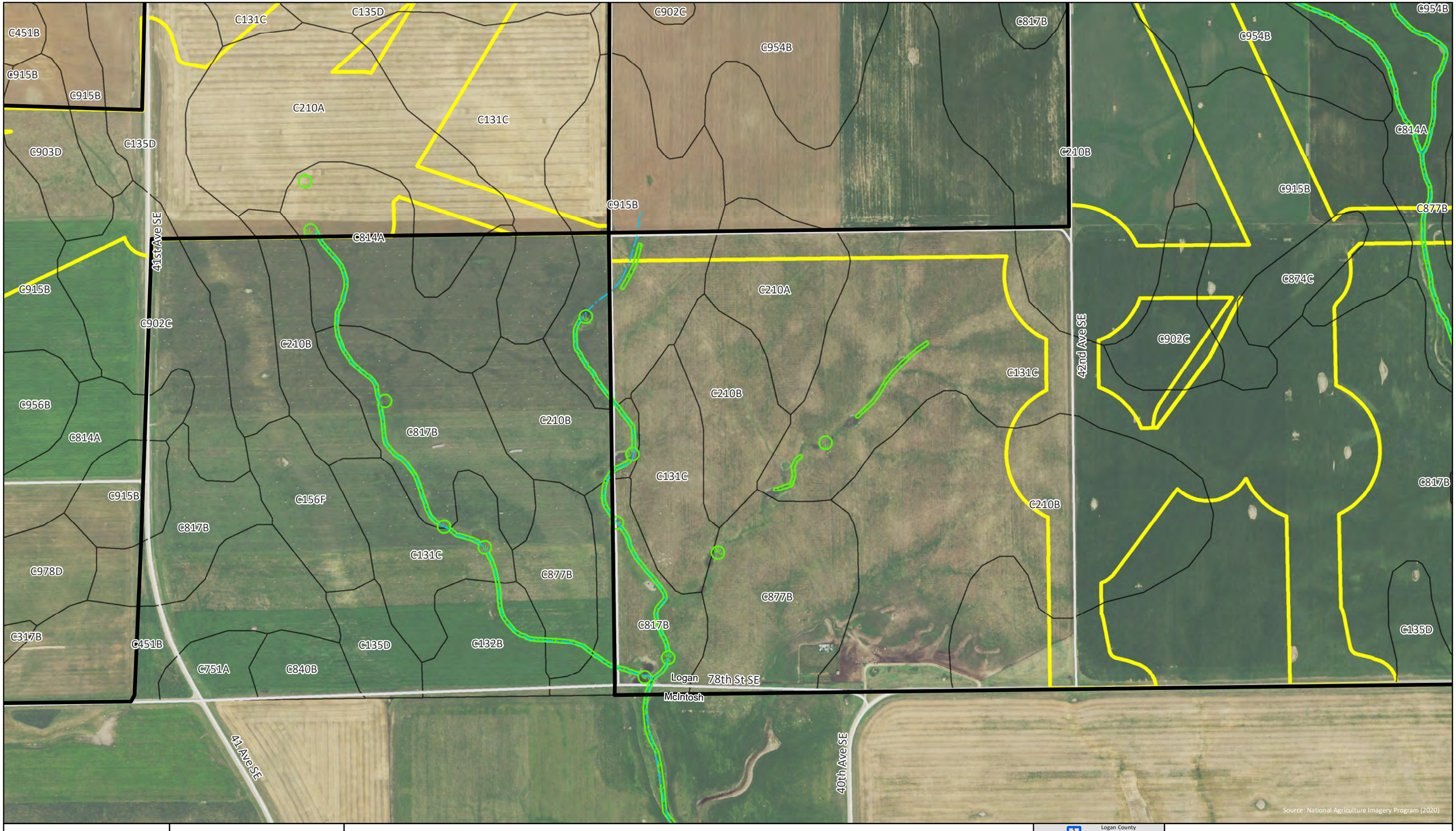

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

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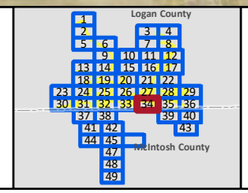
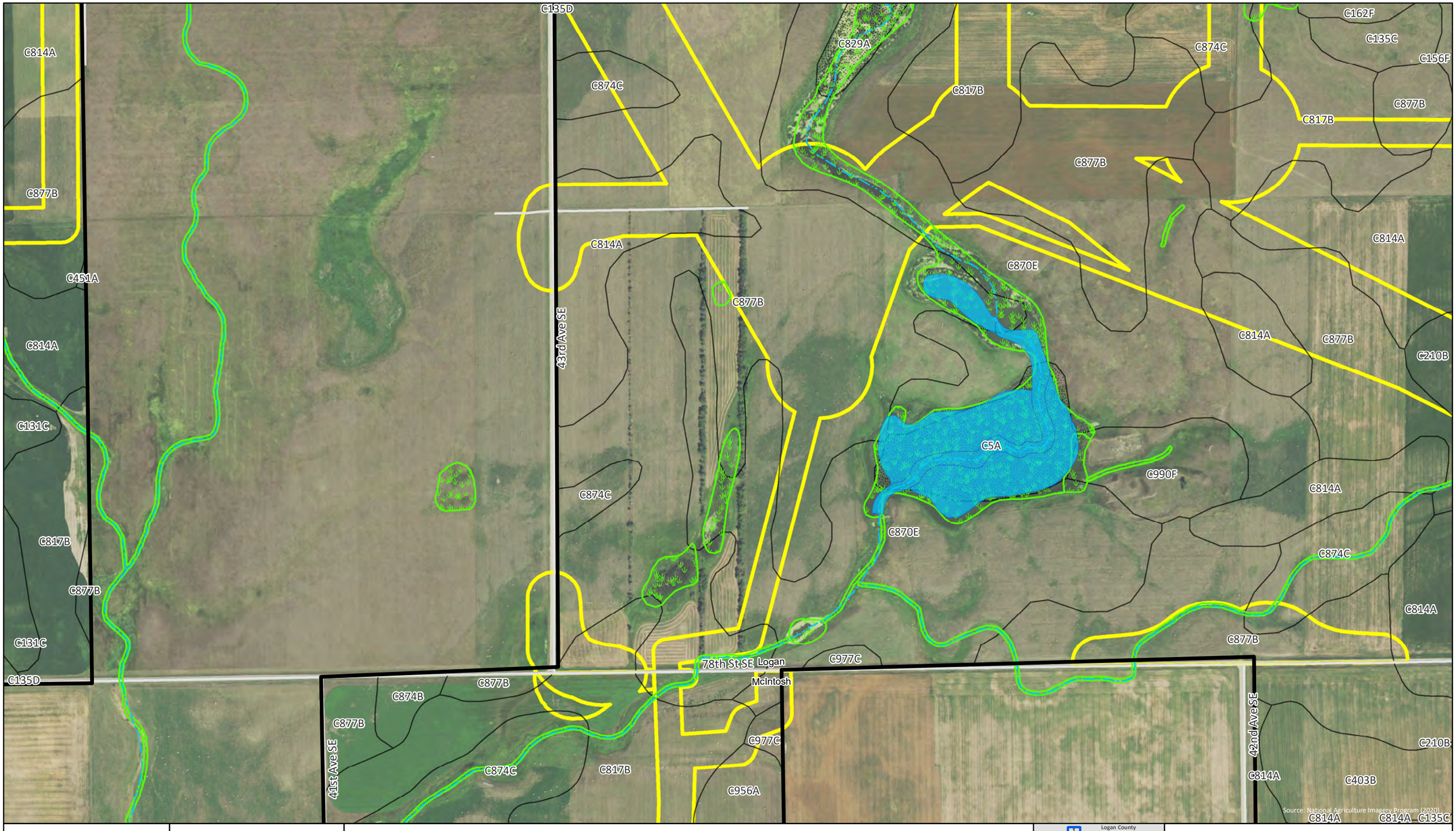


Figure 2
Map 34 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota



ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

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County

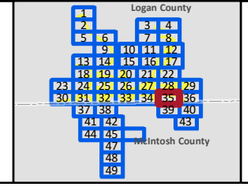

Figure 2
Map 35 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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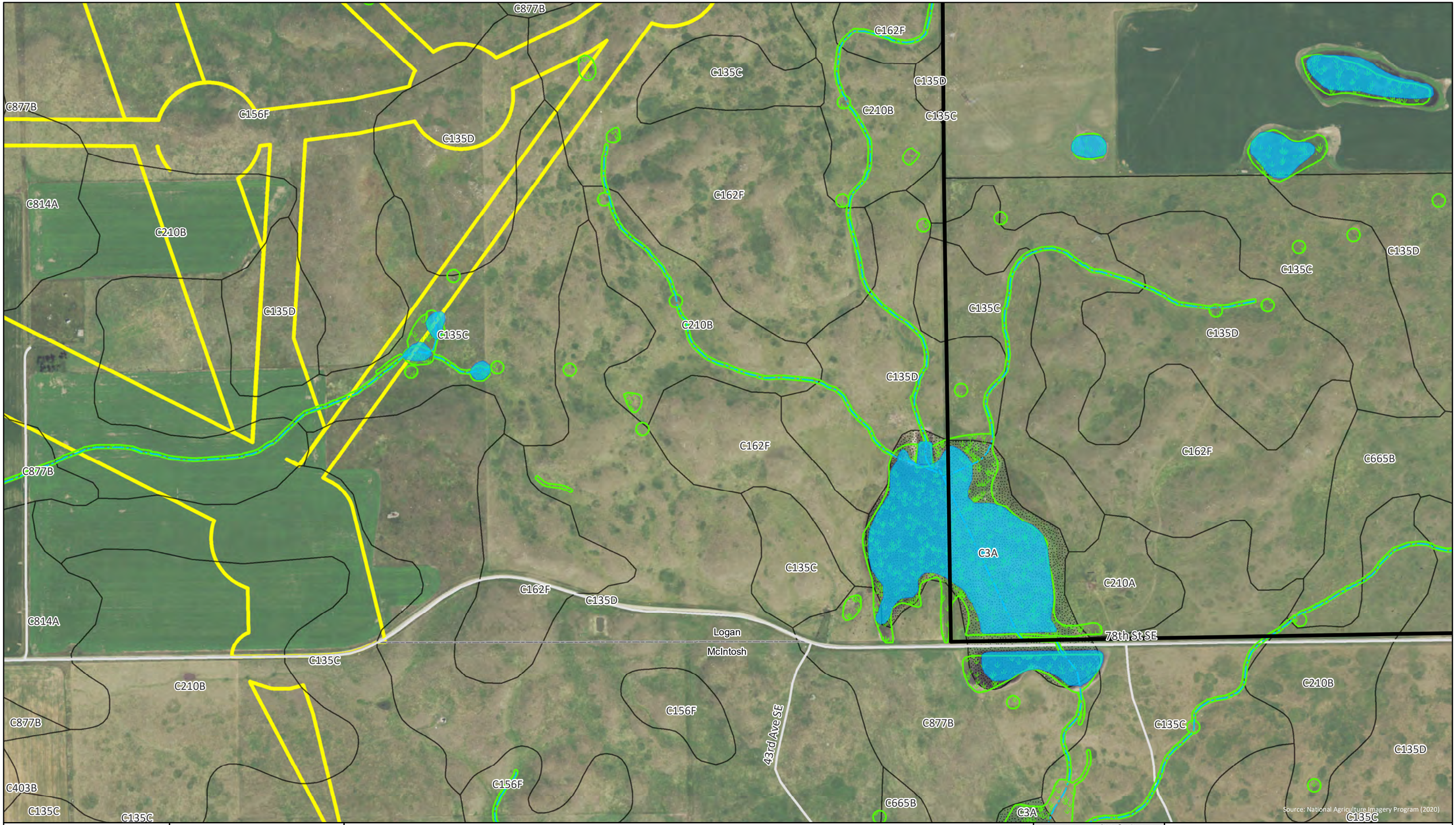

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

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County

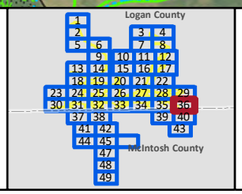

Figure 2
Map 36 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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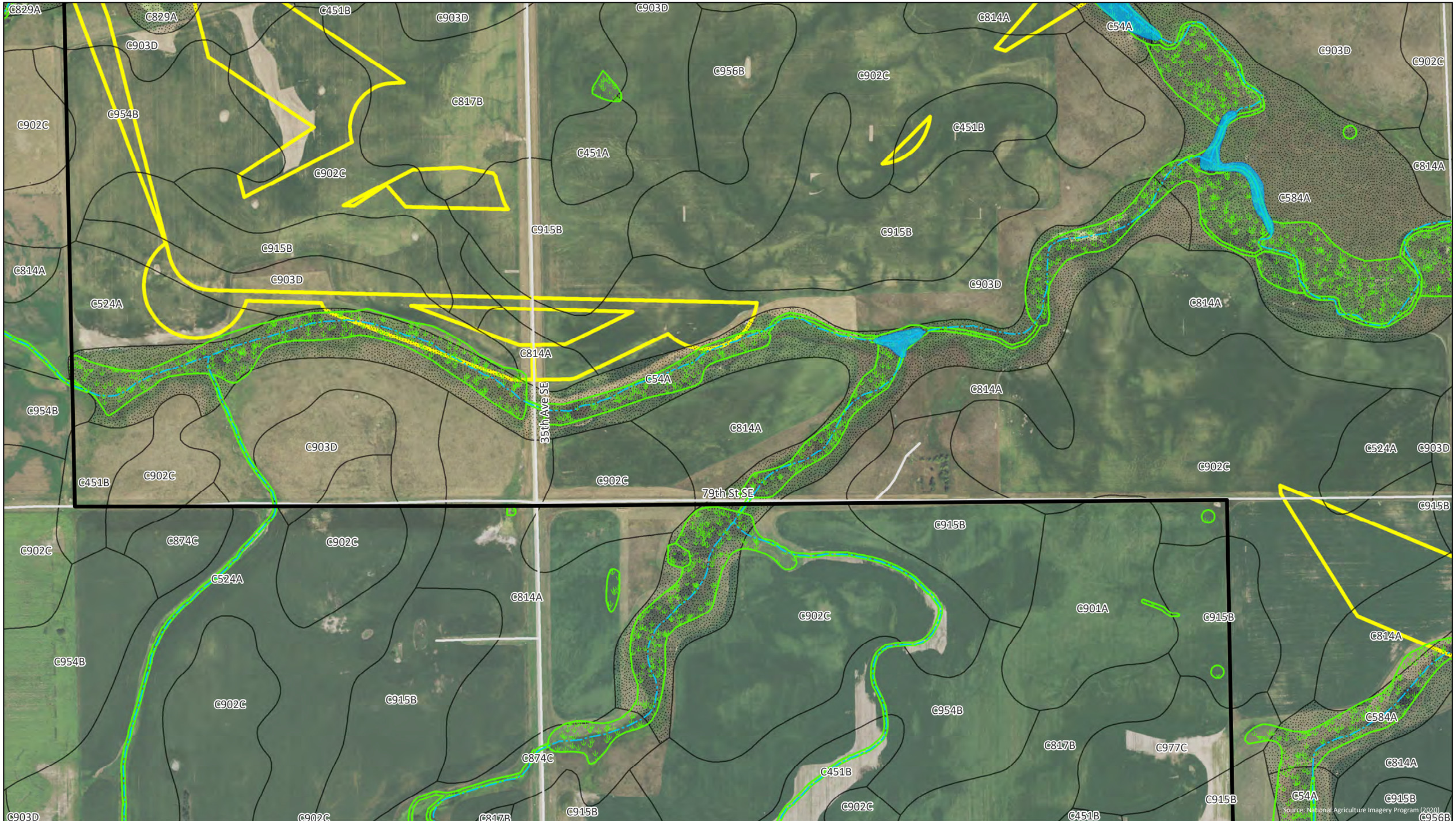

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

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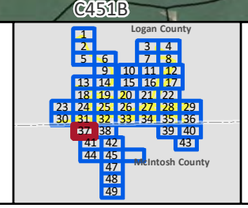

Figure 2
Map 37 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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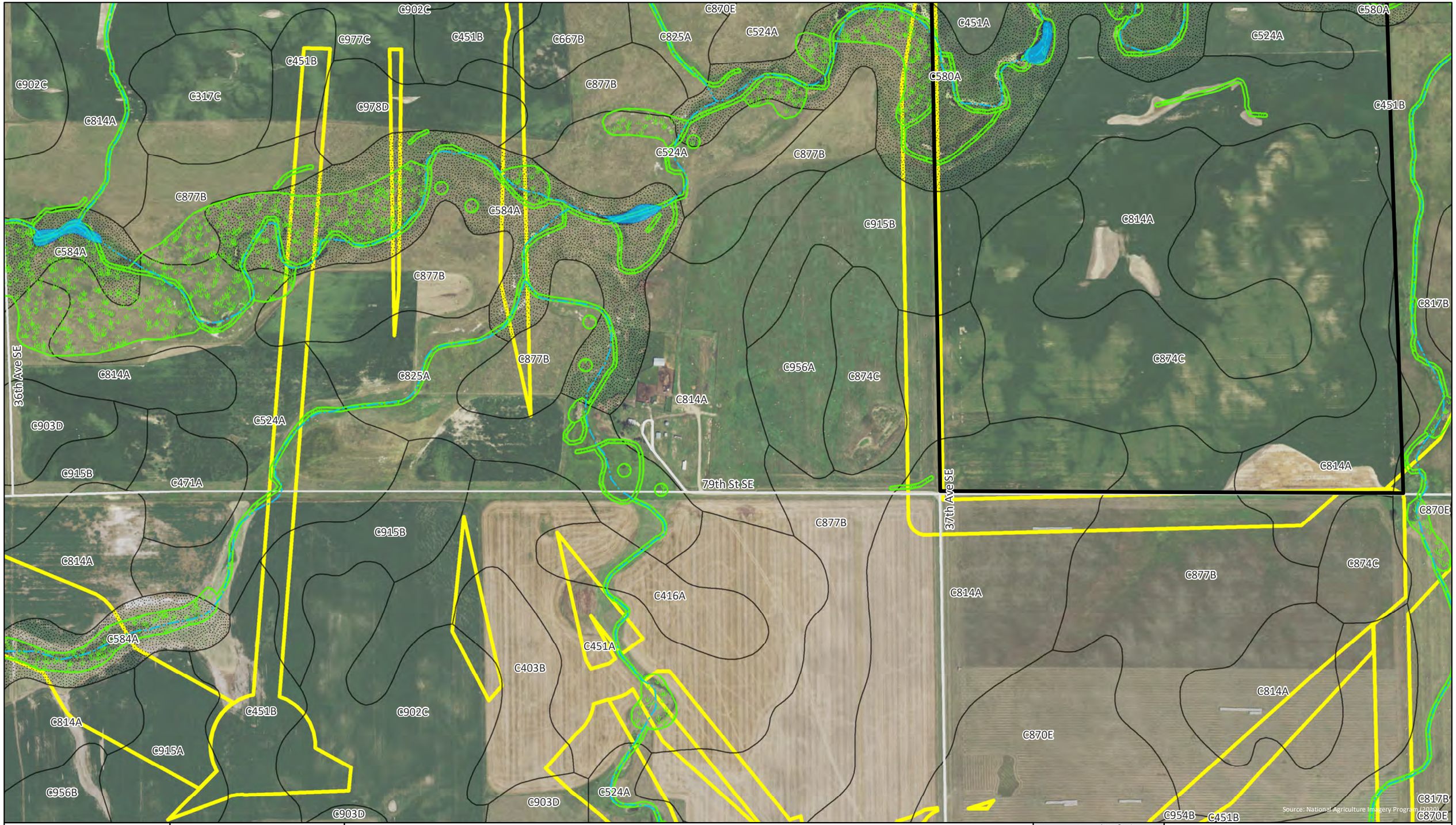

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

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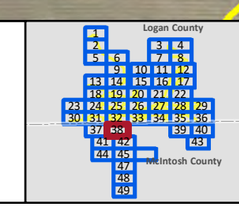

Figure 2
Map 38 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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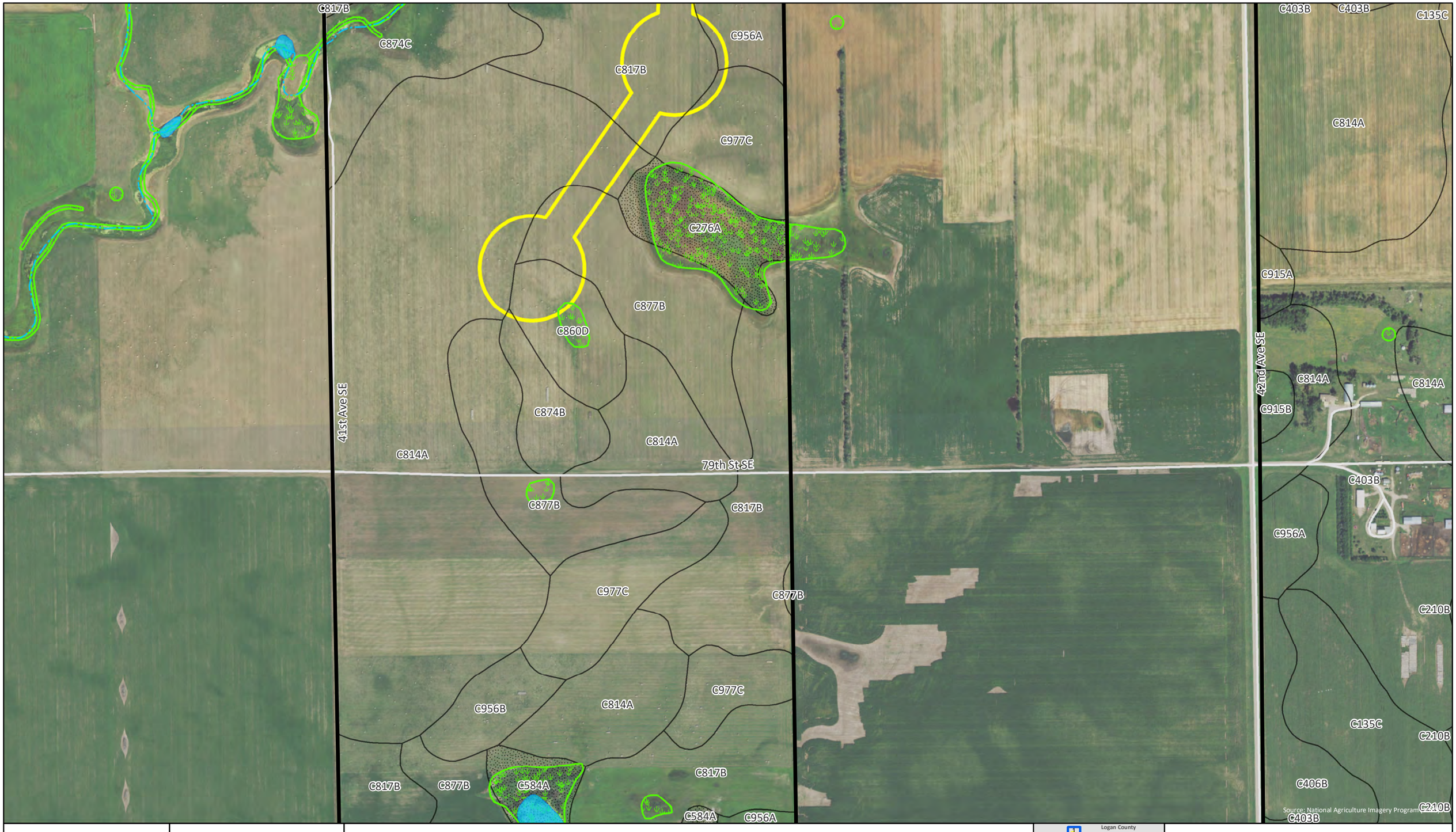

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

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Road
County

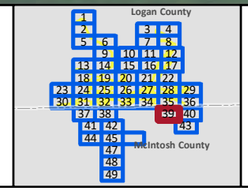


Figure 2
Map 39 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig2_WetlandsDesktopMapbook.mxd 5/16/2022

C210B
C156F
C3A
C135D
C135C
C210B
C665B
C877B
C403B
43rd Ave SE
C135D
C877B
C870E
C135D
C135C
C210B
C210A
C135C
C814A
C210A
C135C
C210B
C270A
79th St SE
C403B
C135C
C210B
C814A
C403B
C210B
C276A
C877B
C135C
C874B
C135C
Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

Watercourse (NHD)
Waterbody (NHD)
Wetland (NWI)
Hydric Soils (gSSURGO)
Survey Area (~6,056 acres)
Project Area (~31,514 acres)
Road
County

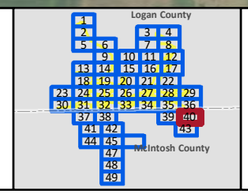
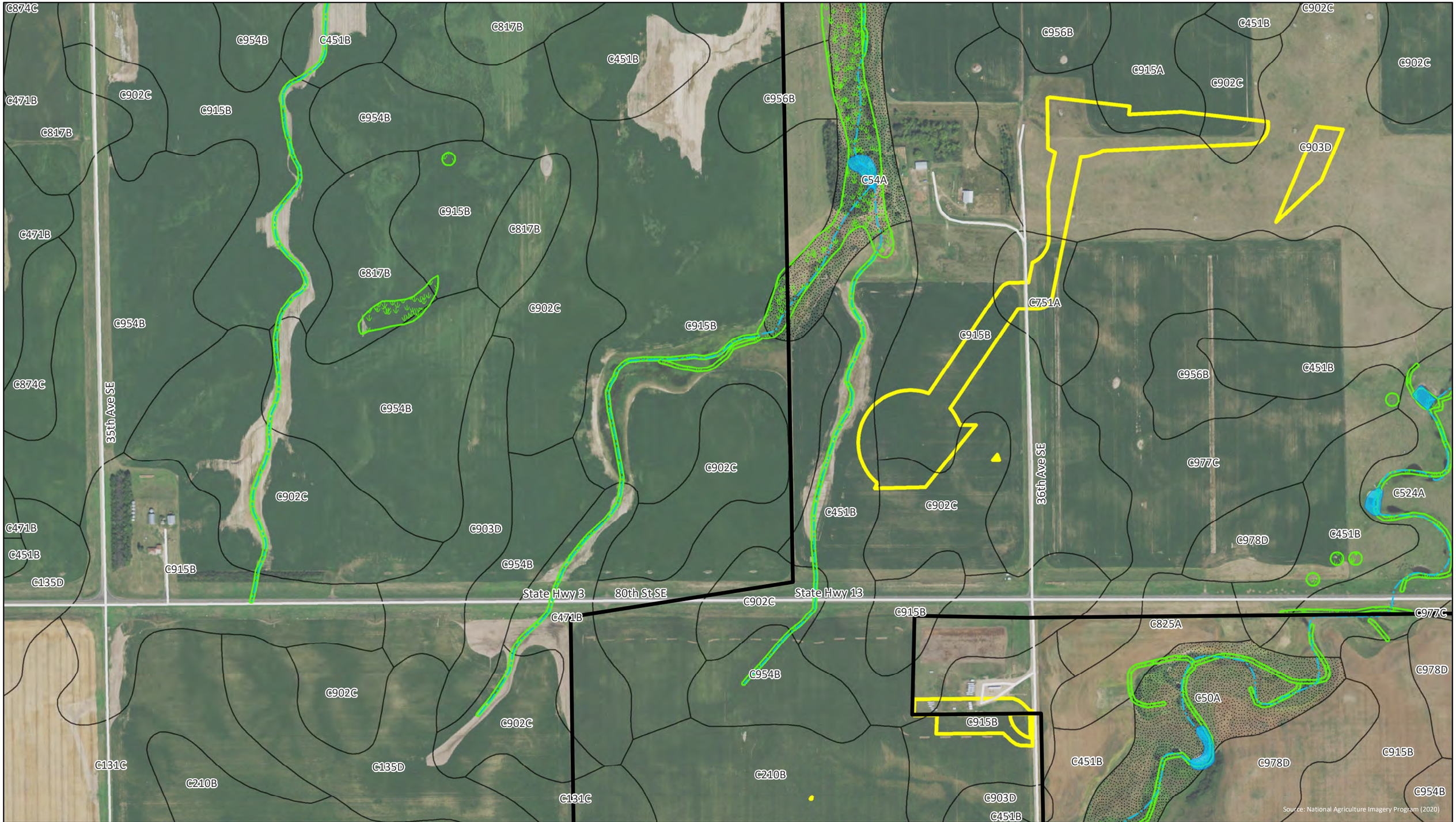


Figure 2
Map 40 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig2_WetlandsDesktopMapbook.mxd 5/16/2022



ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

Watercourse (NHD)
Waterbody (NHD)
Wetland (NWI)
Hydric Soils (gSSURGO)
Survey Area (~6,056 acres)
Project Area (~31,514 acres)
Road
County

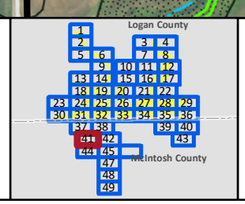


Figure 2
Map 41 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig2_WetlandsDesktopMapbook.mxd 5/16/2022

C902C
C877B
C814A
C877B
C870E
C817B
C903D
C954B
C451B
C877B
C870E
C874C
C870E
C451B
C524A
C978D
C915B
C954B
C451B
C977C
C814A
37th Ave SE
C814A
38th Ave SE
C915B
C915A
C977C
C956B
C751A
State Hwy 3
80th St SE
State Hwy 13
C584A
C915B
C471B
C817B
C915B
C956B
C978D
C902C
C977C
C73A
C471A
C814A
C915A
C451B
C915B
C954B
C915B
C915B
C901A
C915B
C901A
C902B
Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

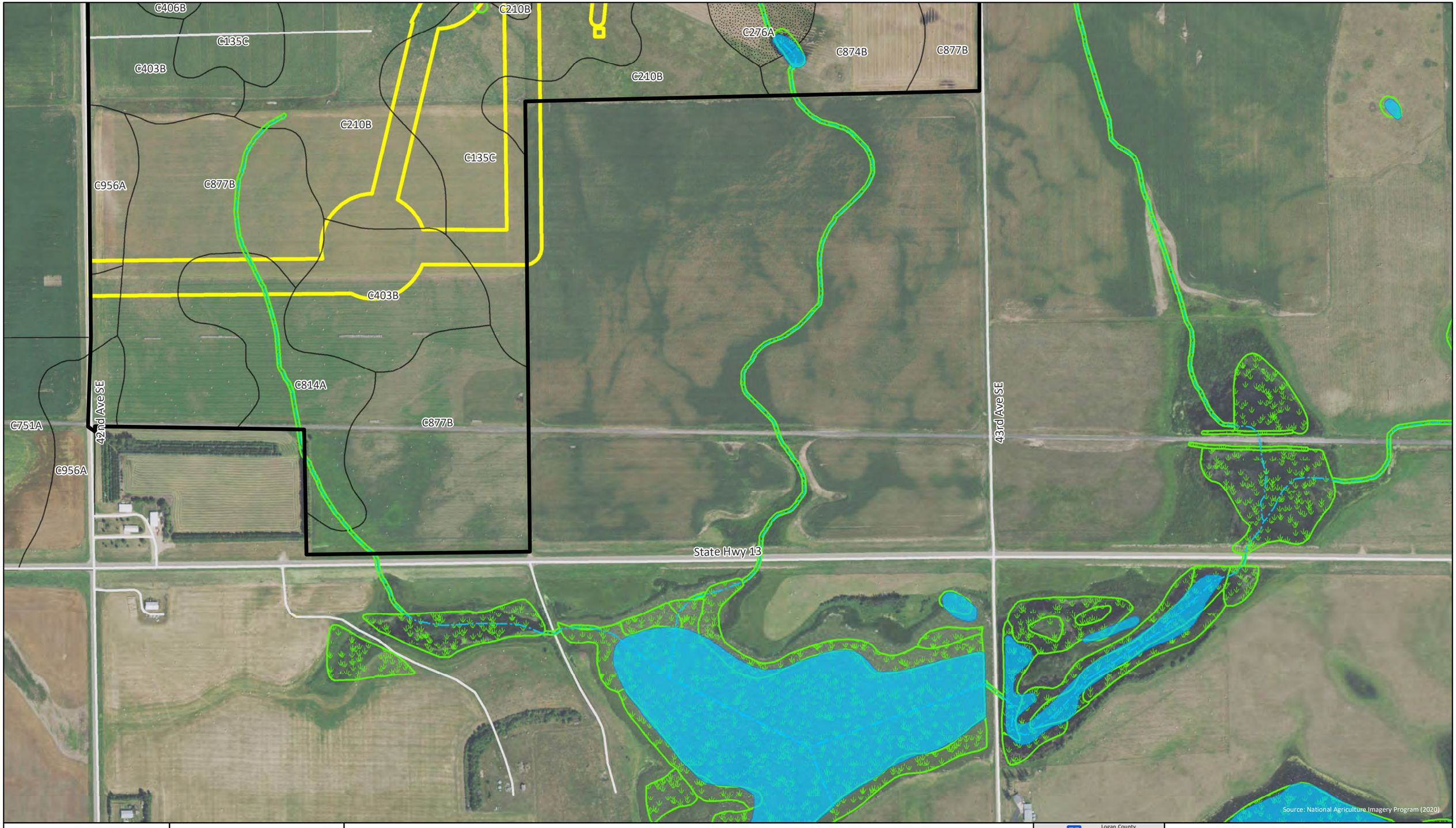
0 500
Feet

Watercourse (NHD)
Waterbody (NHD)
Wetland (NWI)
Hydric Soils (gSSURGO)
Survey Area (~6,056 acres)
Project Area (~31,514 acres)
Road
County

Logan County
McIntosh County

Figure 2
Map 42 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig2_WetlandsDesktopMapbook.mxd 5/16/2022



ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

Watercourse (NHD)
Waterbody (NHD)
Wetland (NWI)
Hydric Soils (gSSURGO)
Survey Area (~6,056 acres)
Project Area (~31,514 acres)
Road
County

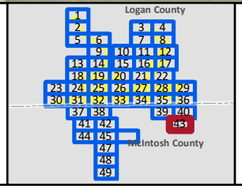


Figure 2
Map 43 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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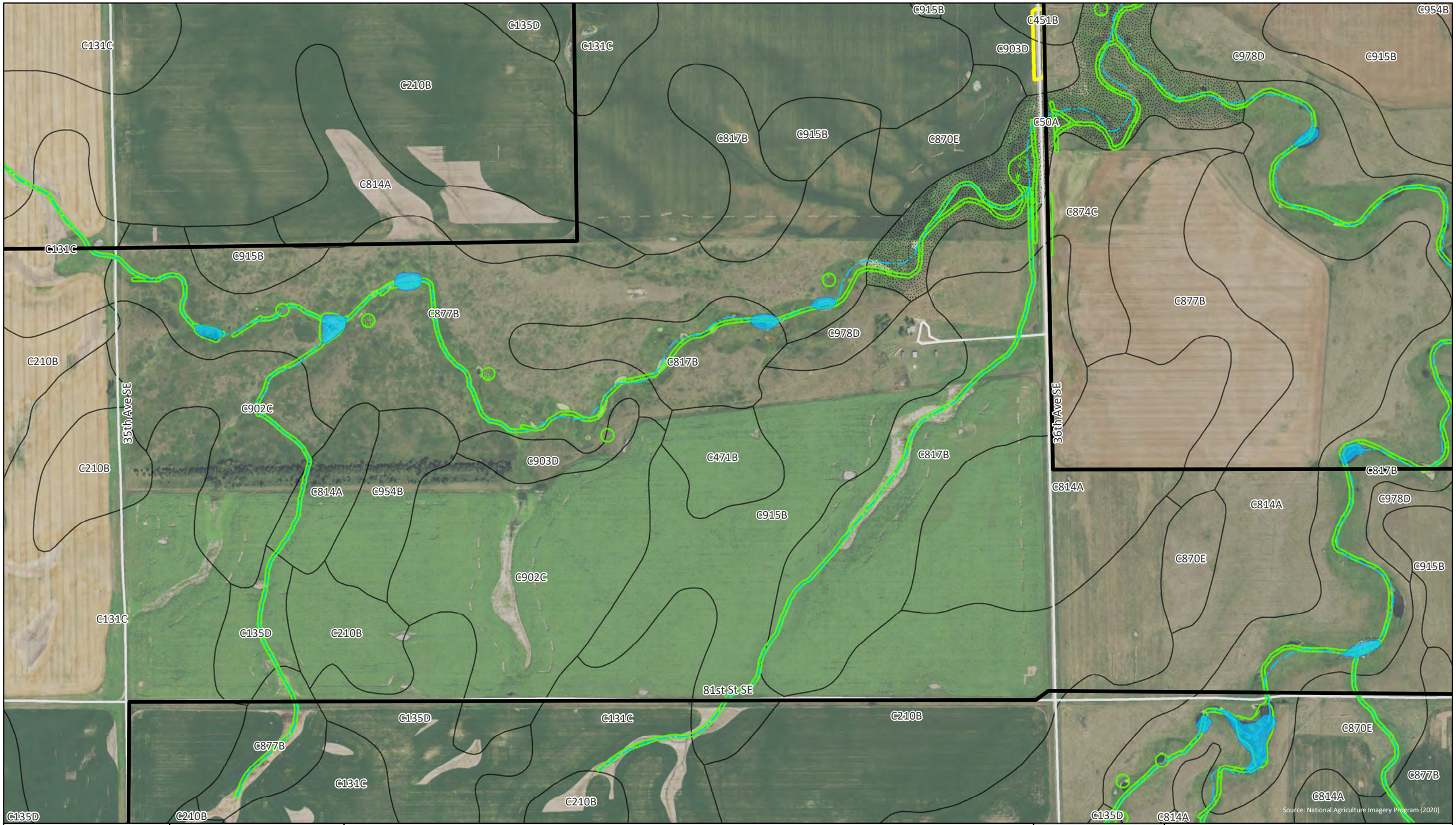

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

- Watercourse (NHD)
- Waterbody (NHD)
- Wetland (NWI)
- Hydric Soils (gSSURGO)
- Survey Area (~6,056 acres)
- Project Area (~31,514 acres)
- Road
- County

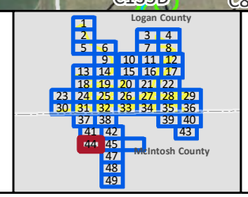

Figure 2
Map 44 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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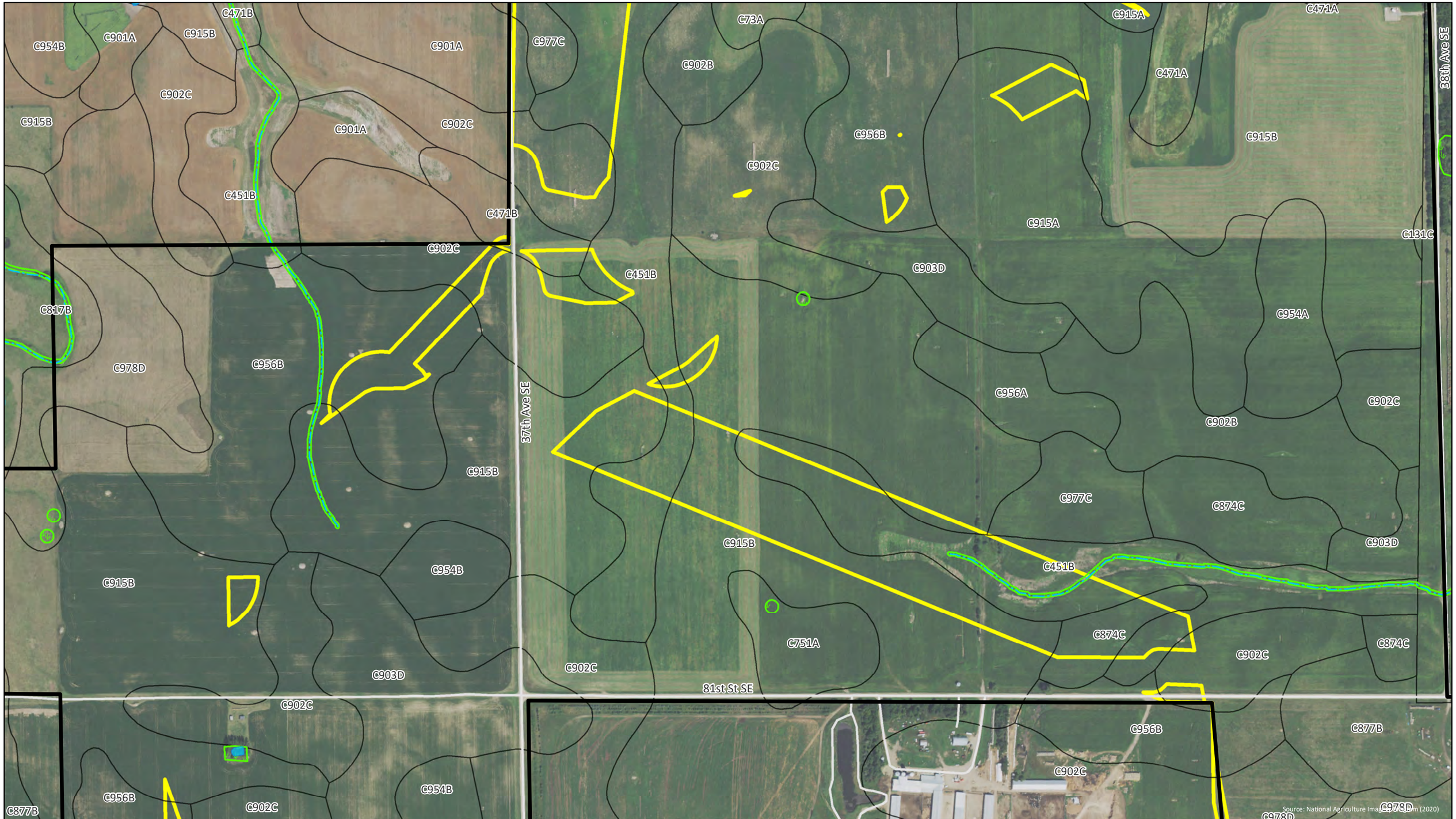


Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

Watercourse (NHD)
Waterbody (NHD)
Wetland (NWI)
Hydric Soils (gSSURGO)
Survey Area (~6,056 acres)
Project Area (~31,514 acres)
Road
County

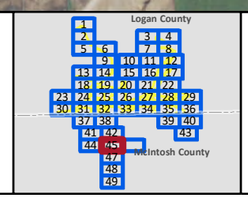


Figure 2
Map 45 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig2_WetlandsDesktopMapbook.mxd 5/16/2022

4th Ave S
5th St S
6th St S
7th St S
5th Ave S
Centennial St S
4th St S
89th Ave SE
8th Ave S
State Hwy 3
May Lake
81st St SE
C902C
C451B
C584A
C877B
C978D
C584A
C524A
C915A
C915B
C870E
C584A
C978D
C915B
C814A
C54A
C956B
Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

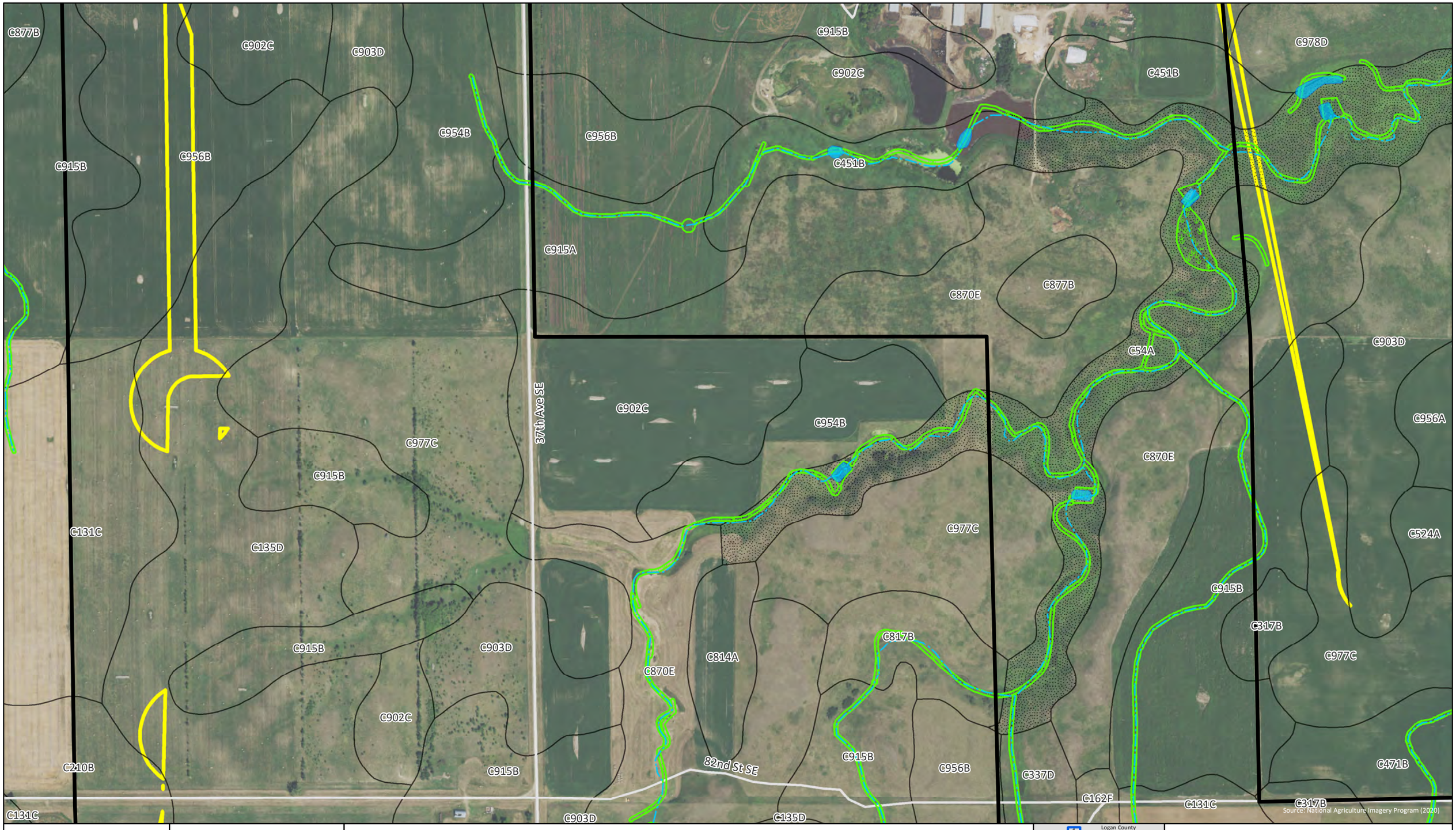
0 500
Feet

Watercourse (NHD)
Waterbody (NHD)
Wetland (NWI)
Hydric Soils (gSSURGO)
Survey Area (~6,056 acres)
Project Area (~31,514 acres)
Road
County

Logan County
McIntosh County

Figure 2
Map 46 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig2_WetlandsDesktopMapbook.mxd 5/16/2022



ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

Watercourse (NHD)
Waterbody (NHD)
Wetland (NWI)
Hydric Soils (gSSURGO)
Survey Area (~6,056 acres)
Project Area (~31,514 acres)
Road
County

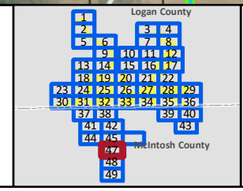


Figure 2
Map 47 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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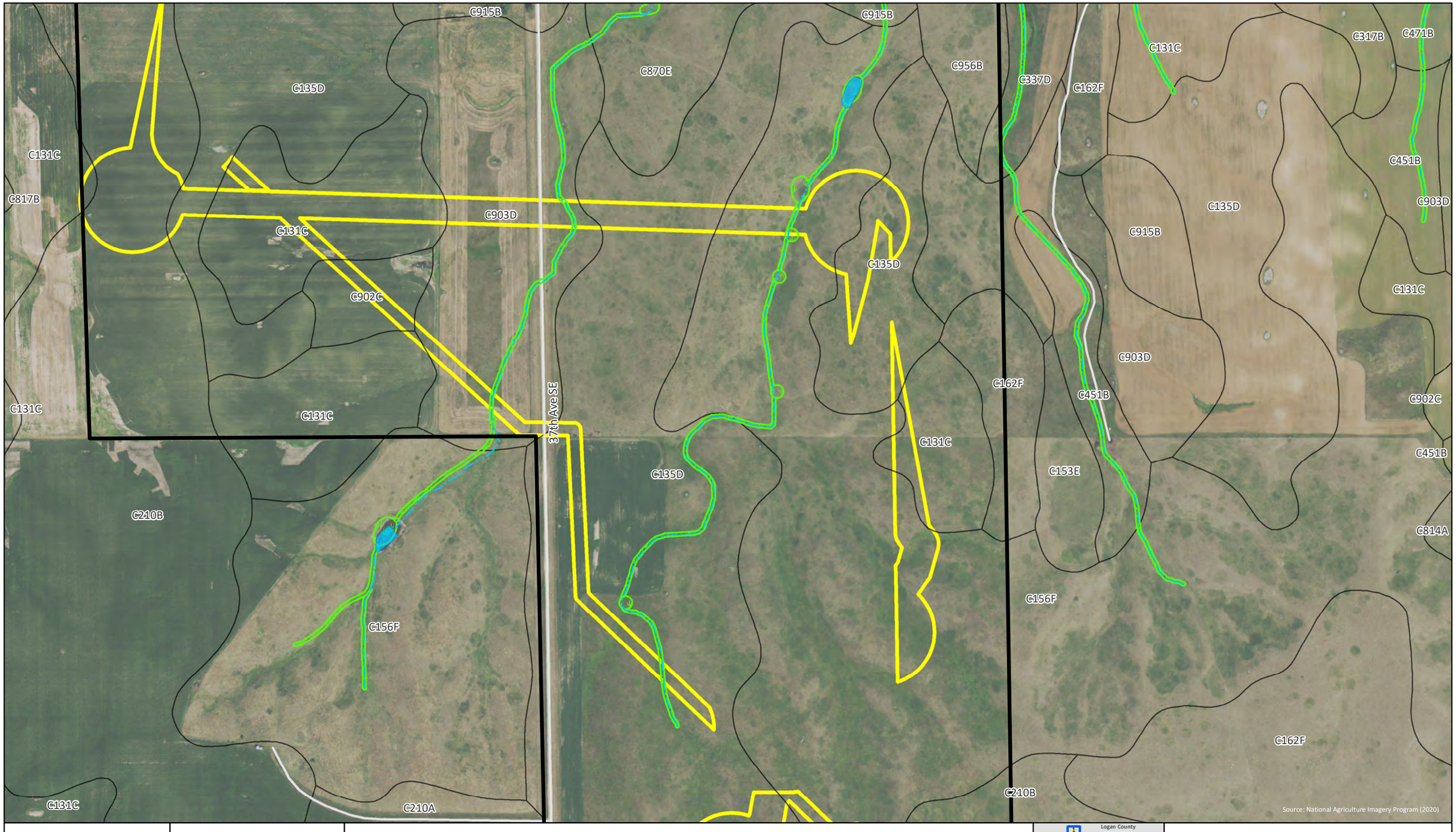

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

- Watercourse (NHD)
- Waterbody (NHD)
- Wetland (NWI)
- Hydric Soils (gSSURGO)
- Survey Area (~6,056 acres)
- Project Area (~31,514 acres)
- Road
- County

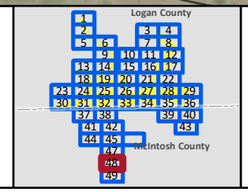

Figure 2
Map 48 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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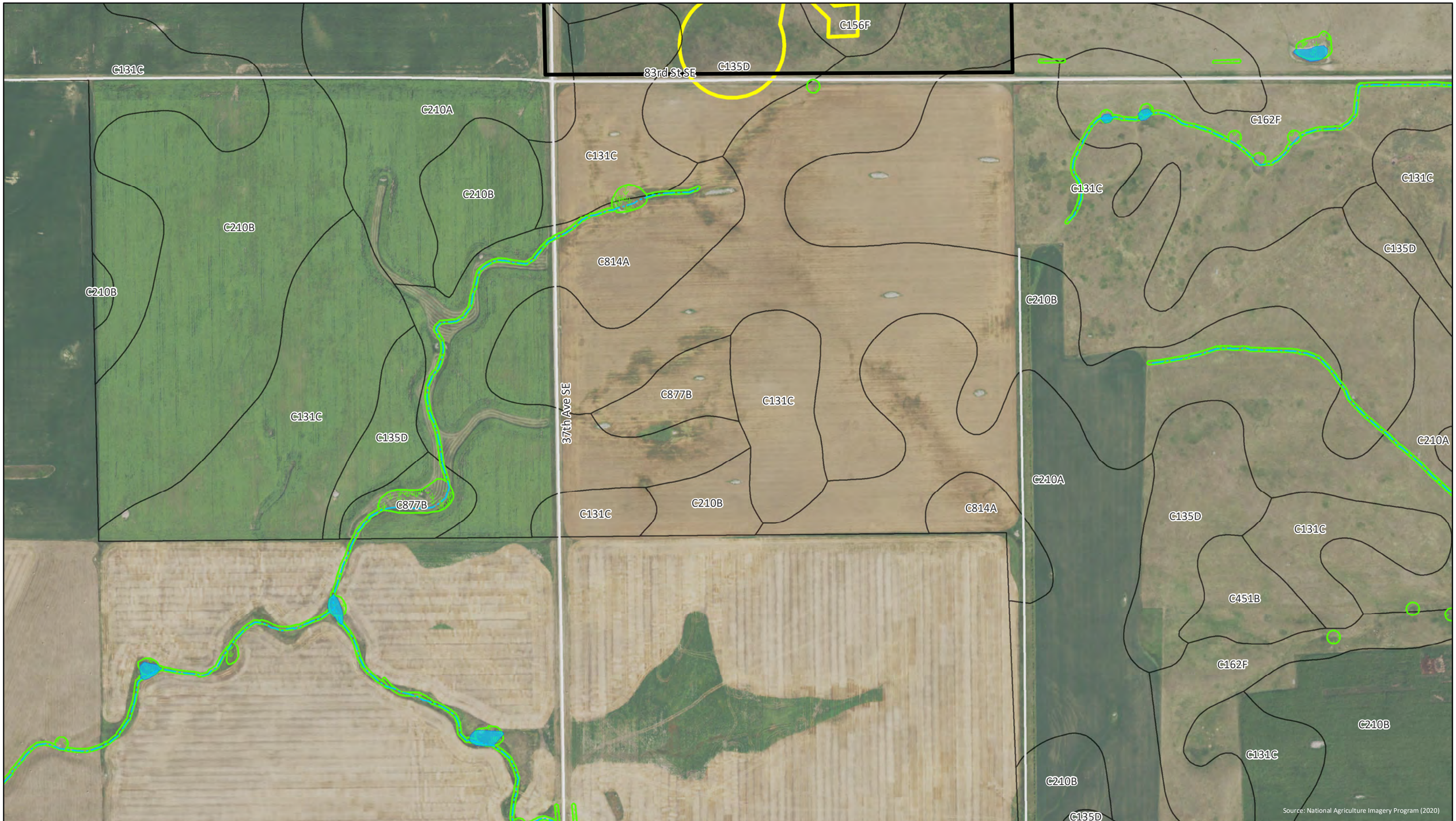

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 500
Feet

Watercourse (NHD)
Waterbody (NHD)
Wetland (NWI)
Hydric Soils (gSSURGO)
Survey Area (~6,056 acres)
Project Area (~31,514 acres)
Road
County

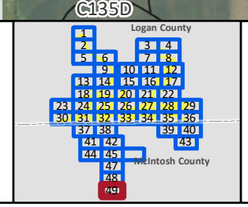

Figure 2
Map 49 of 49
Wind Farm Desktop Review Mapbook
Logan County, North Dakota

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ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 16, 2022

0 1 2 Miles

Map Index
Survey Area (~6,056 acres)
Project Area (~31,514 acres)
Road
County



Figure 3
Index Map
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

Source: National Agriculture Imagery Program (2020)

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsIndex.mxd 5/16/2022

37th Ave SE

Wetland B5

Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

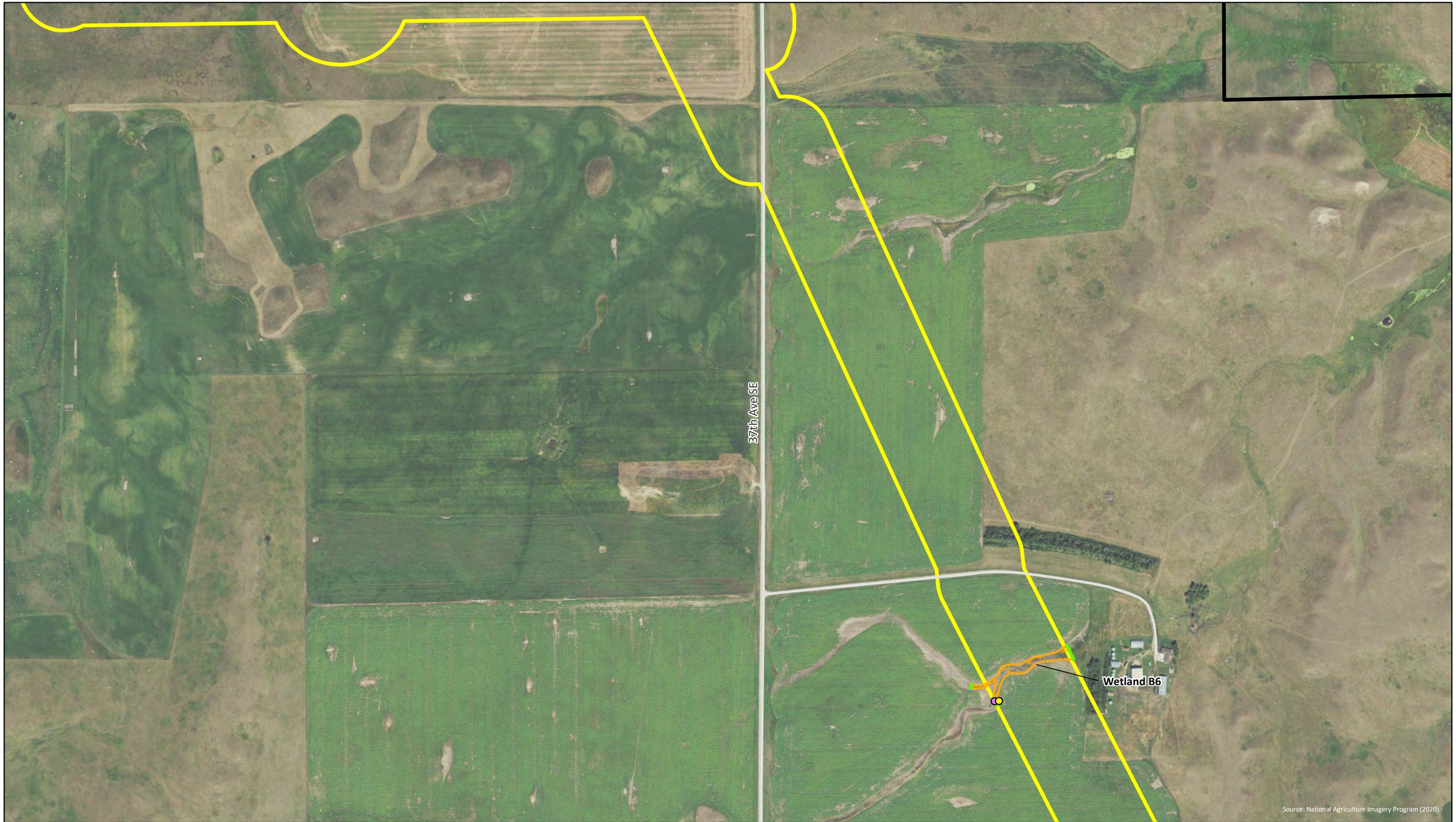
0 500
Feet

- Wetland Data Point
- Upland Data Point
- Watercourse (Field Identified)
- Waterbody (Field Identified)
- Wetland (Field Identified)
- Continues Outside Survey Area
- Survey Area (~6,056 acres)
- Project Area (~55,745 acres)
- Road
- County

Logan County
McIntosh County

Figure 3
Map 1 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022



ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

Wetland Data Point
Upland Data Point
Watercourse (Field Identified)
Waterbody (Field Identified)
Wetland (Field Identified)
Continues Outside Survey Area
Survey Area (~6,056 acres)
Project Area (~55,745 acres)
Road
County

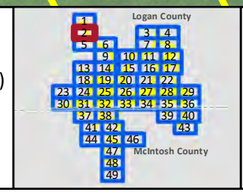


Figure 3
Map 2 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022

41st Ave SE

Wetland H1 (2020)

Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

- Wetland Data Point
- Upland Data Point
- Watercourse (Field Identified)
- Waterbody (Field Identified)
- Wetland (Field Identified)
- Continues Outside Survey Area
- Survey Area (~6,056 acres)
- Project Area (~55,745 acres)
- Road
- County

Logan County

McIntosh County

Figure 3
Map 3 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022



ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

- Wetland Data Point
- Upland Data Point
- Watercourse (Field Identified)
- Waterbody (Field Identified)
- Wetland (Field Identified)
- Continues Outside Survey Area
- Survey Area (~6,056 acres)
- Project Area (~55,745 acres)
- Road
- County

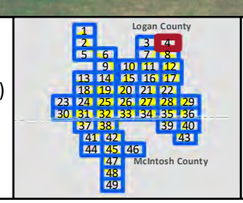


Figure 3
Map 4 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022



ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

Wetland Data Point
Upland Data Point
Watercourse (Field Identified)
Waterbody (Field Identified)
Wetland (Field Identified)
Continues Outside Survey Area
Survey Area (~6,056 acres)
Project Area (~55,745 acres)
Road
County

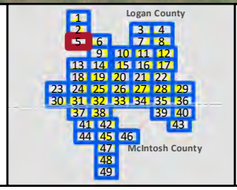


Figure 3
Map 5 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022

73rd St SE

Wetland B4

Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

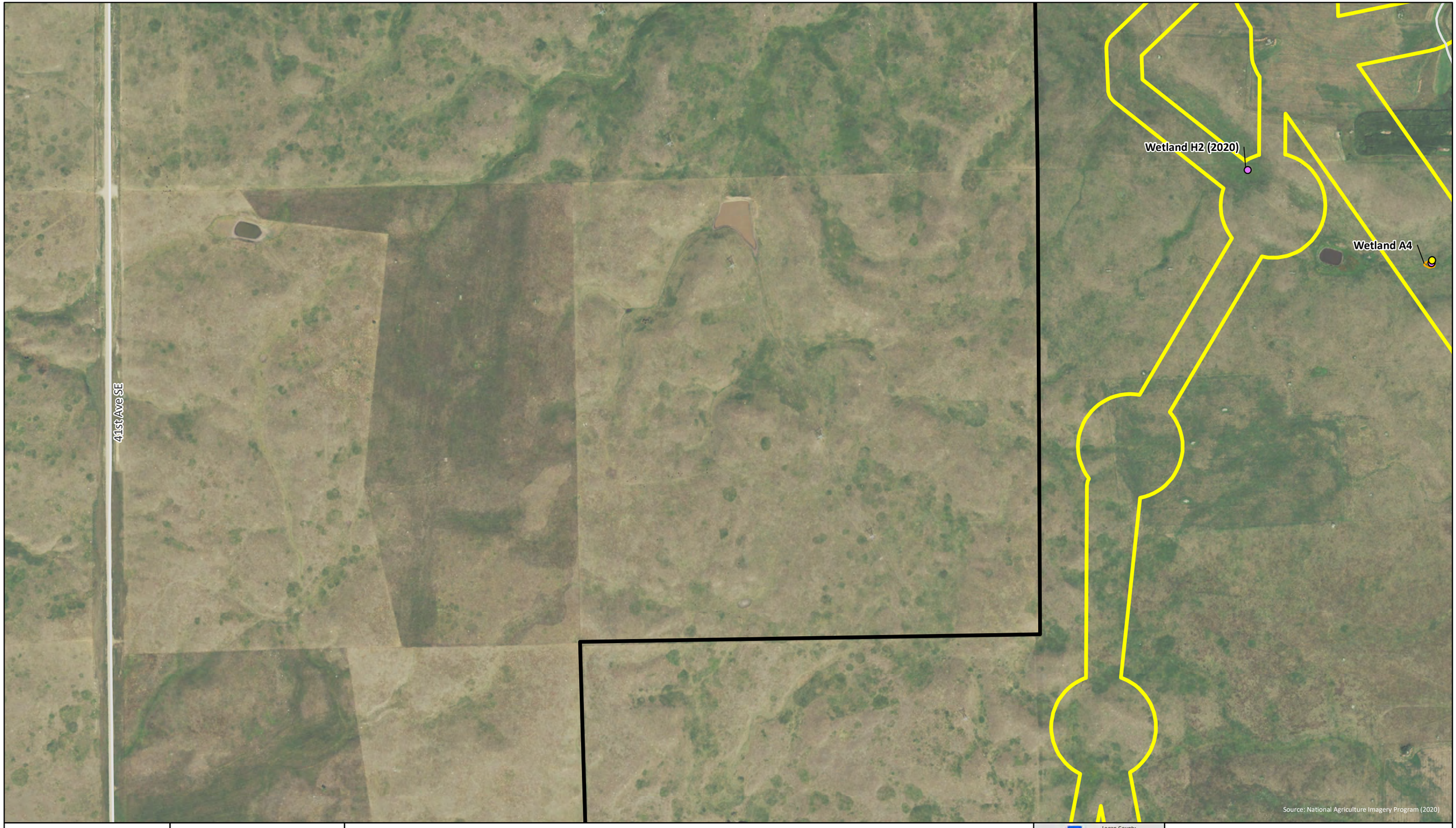
0 500
Feet

Wetland Data Point
Upland Data Point
Watercourse (Field Identified)
Waterbody (Field Identified)
Wetland (Field Identified)
Continues Outside Survey Area
Survey Area (~6,056 acres)
Project Area (~55,745 acres)
Road
County

Logan County
McIntosh County

Figure 3
Map 6 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022



ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

Wetland Data Point
Upland Data Point
Watercourse (Field Identified)
Waterbody (Field Identified)
Wetland (Field Identified)
Continues Outside Survey Area
Survey Area (~6,056 acres)
Project Area (~55,745 acres)
Road
County

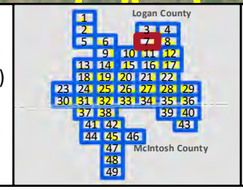
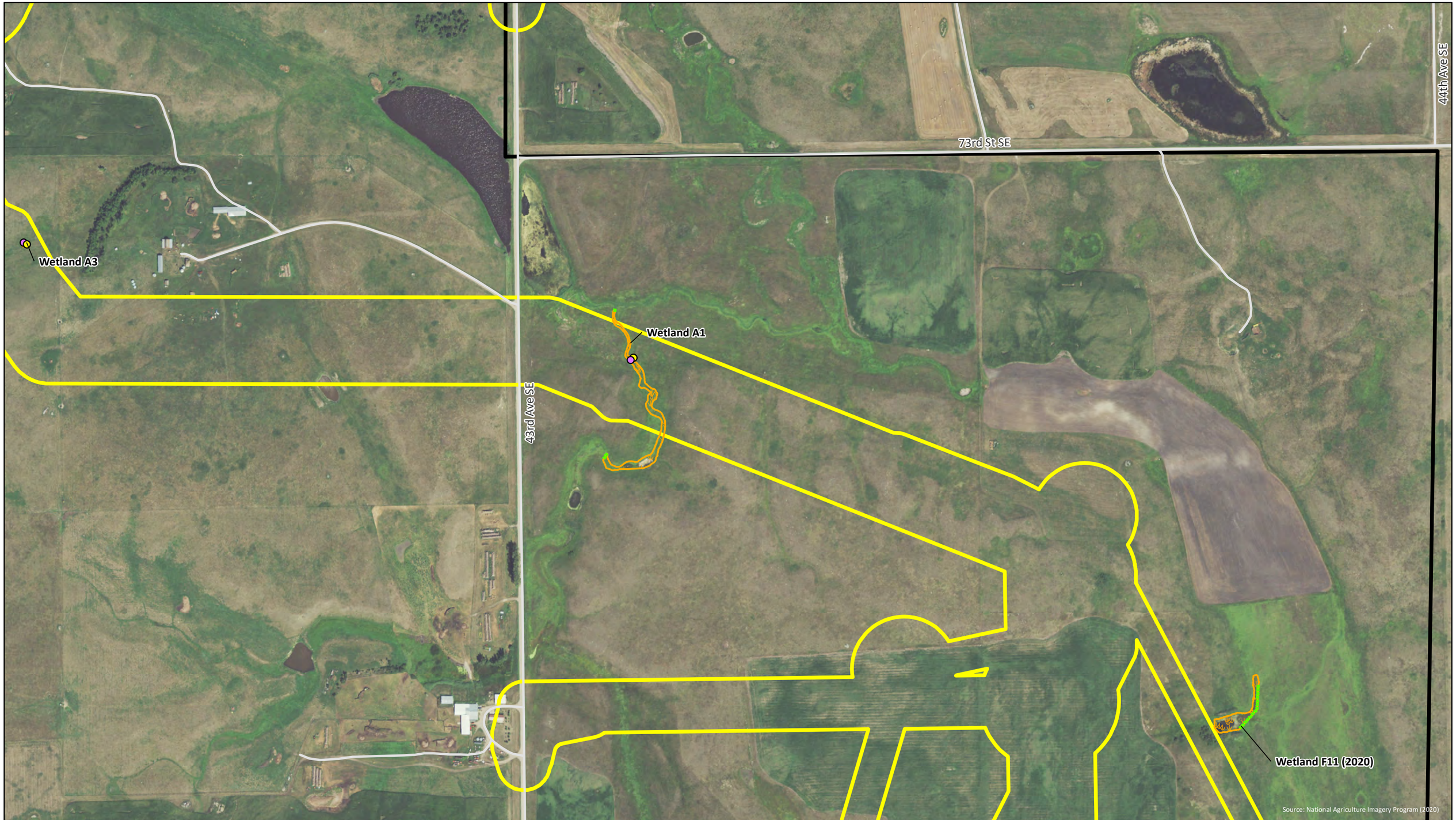


Figure 3
Map 7 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022



ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

Wetland Data Point
Upland Data Point
Watercourse (Field Identified)
Waterbody (Field Identified)
Wetland (Field Identified)
Continues Outside Survey Area
Survey Area (~6,056 acres)
Project Area (~55,745 acres)
Road
County

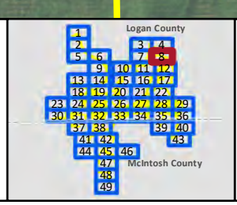


Figure 3
Map 8 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

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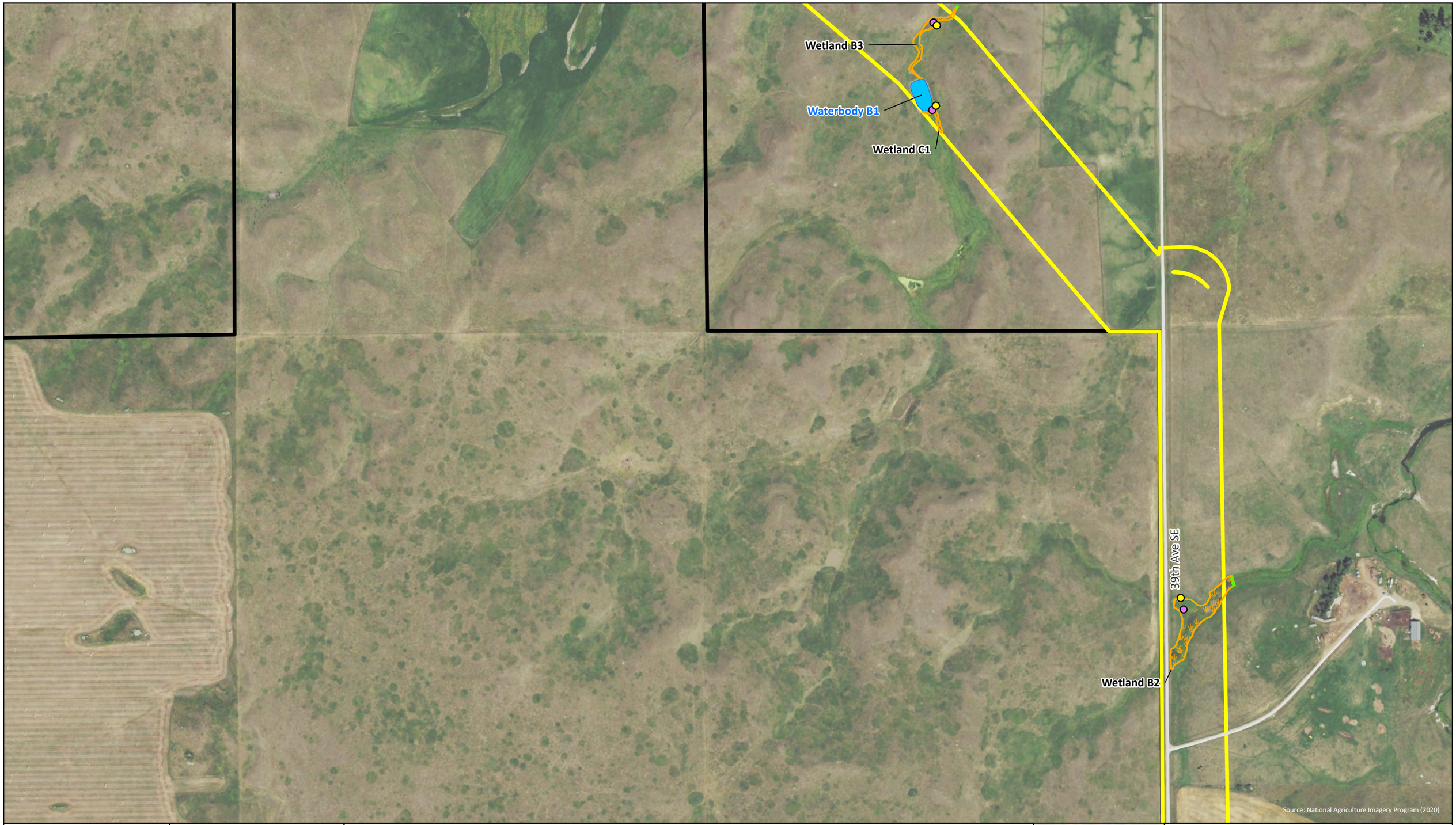


ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

- Wetland Data Point
- Upland Data Point
- Watercourse (Field Identified)
- Waterbody (Field Identified)
- Wetland (Field Identified)
- Continues Outside Survey Area
- Survey Area (~6,056 acres)
- Project Area (~55,745 acres)
- Road
- County

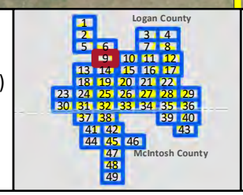


Figure 3
Map 9 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022

74th St SE

Wetland G17 (2020)

Wetland I1 (2020)

Wetland I2 (2020)

41st Ave SE

Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

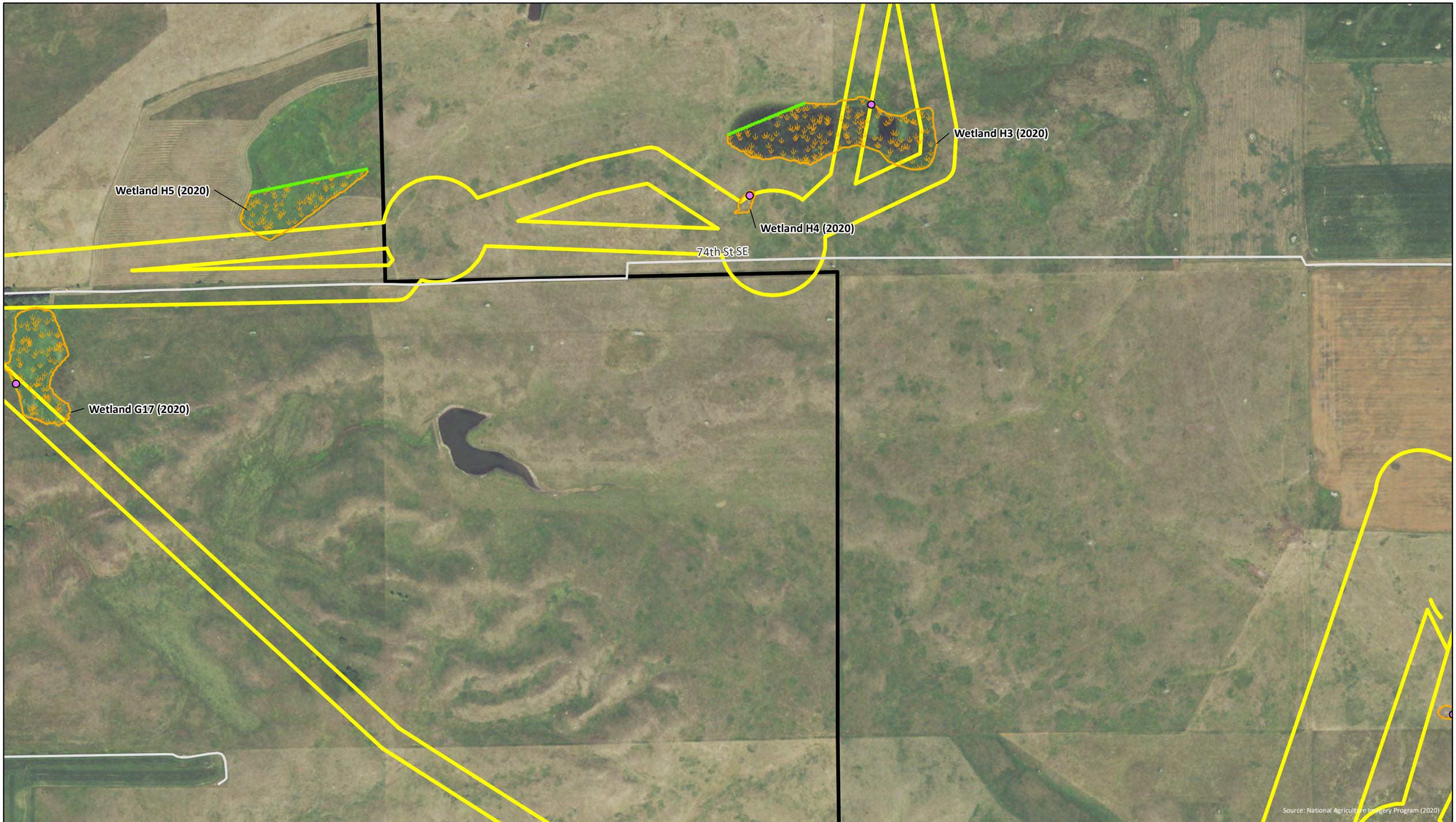
- Wetland Data Point
- Upland Data Point
- Watercourse (Field Identified)
- Waterbody (Field Identified)
- Wetland (Field Identified)
- Continues Outside Survey Area
- Survey Area (~6,056 acres)
- Project Area (~55,745 acres)
- Road
- County

Logan County

McIntosh County

Figure 3
Map 10 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022



ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

Wetland Data Point
Upland Data Point
Watercourse (Field Identified)
Waterbody (Field Identified)
Wetland (Field Identified)
Continues Outside Survey Area
Survey Area (~6,056 acres)
Project Area (~55,745 acres)
Road
County

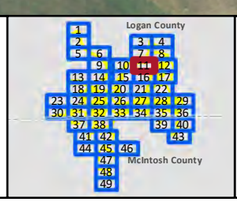


Figure 3
Map 11 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022

Wetland F4
Wetland K1
Wetland F10 (2020)
Wetland F9 (2020)
74th St SE
Wetland G13 (2020)
Wetland F8 (2020)
Wetland F3
Wetland G12 (2020)
43rd Ave SE
Wetland K3
Wetland K2
Wetland G11 (2020)
Wetland G10 (2020)
Wetland K4
Wetland K5
Wetland G9 (2020)
Wetland G14 (2020)
Wetland K6
Wetland K7
Wetland F2
Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

Wetland Data Point
Upland Data Point
Watercourse (Field Identified)
Waterbody (Field Identified)
Wetland (Field Identified)
Continues Outside Survey Area
Survey Area (~6,056 acres)
Project Area (~55,745 acres)
Road
County

Logan County
McIntosh County

Figure 3
Map 12 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022

75th St SE

37th Ave SE

Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

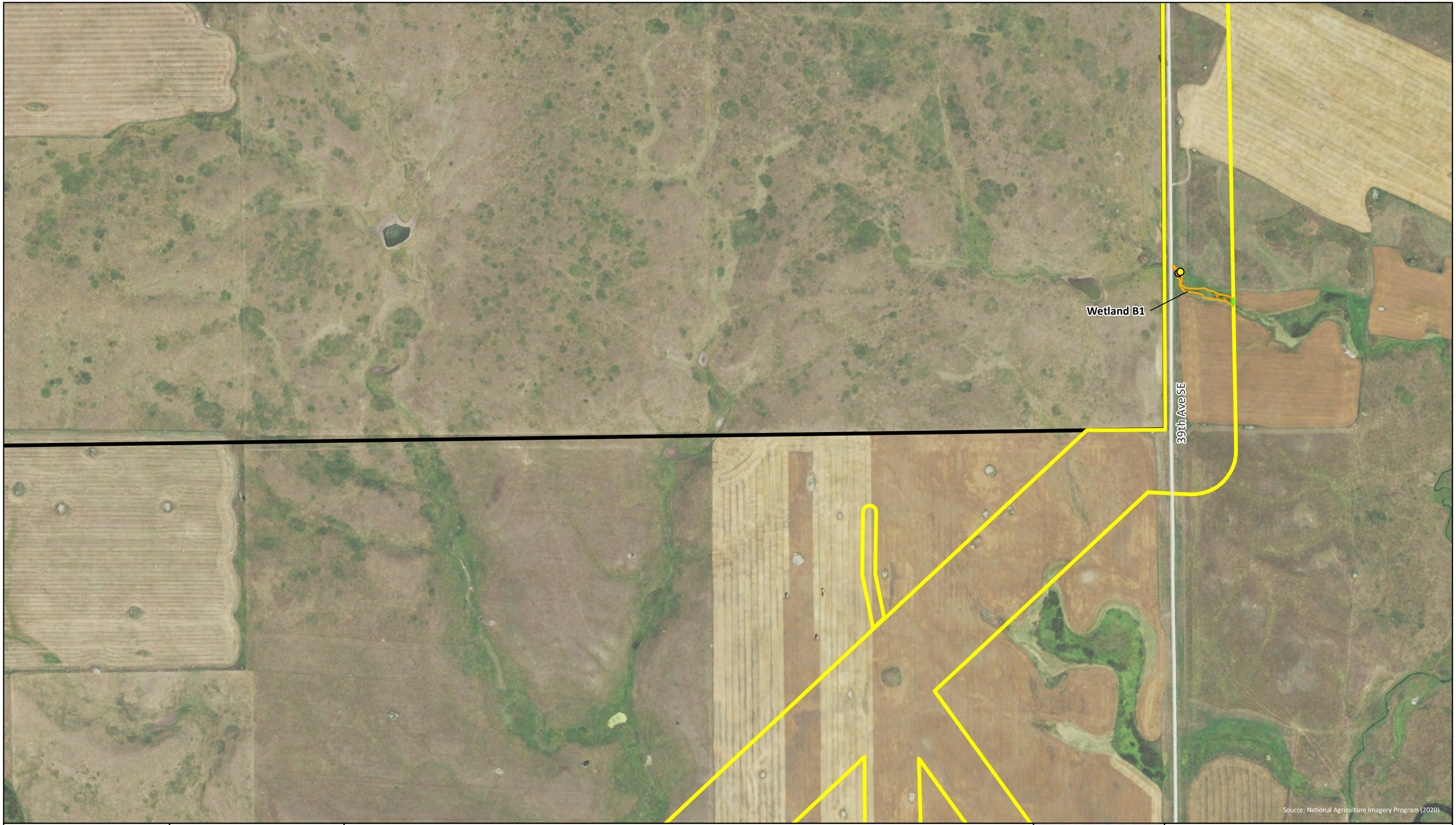
- Wetland Data Point
- Upland Data Point
- Watercourse (Field Identified)
- Waterbody (Field Identified)
- Wetland (Field Identified)
- Continues Outside Survey Area
- Survey Area (~6,056 acres)
- Project Area (~55,745 acres)
- Road
- County

Logan County

McIntosh County

Figure 3
Map 13 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022



ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

Wetland Data Point
Upland Data Point
Watercourse (Field Identified)
Waterbody (Field Identified)
Wetland (Field Identified)
Continues Outside Survey Area
Survey Area (~6,056 acres)
Project Area (~55,745 acres)
Road
County

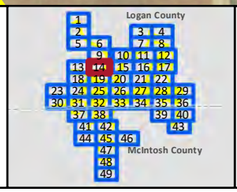
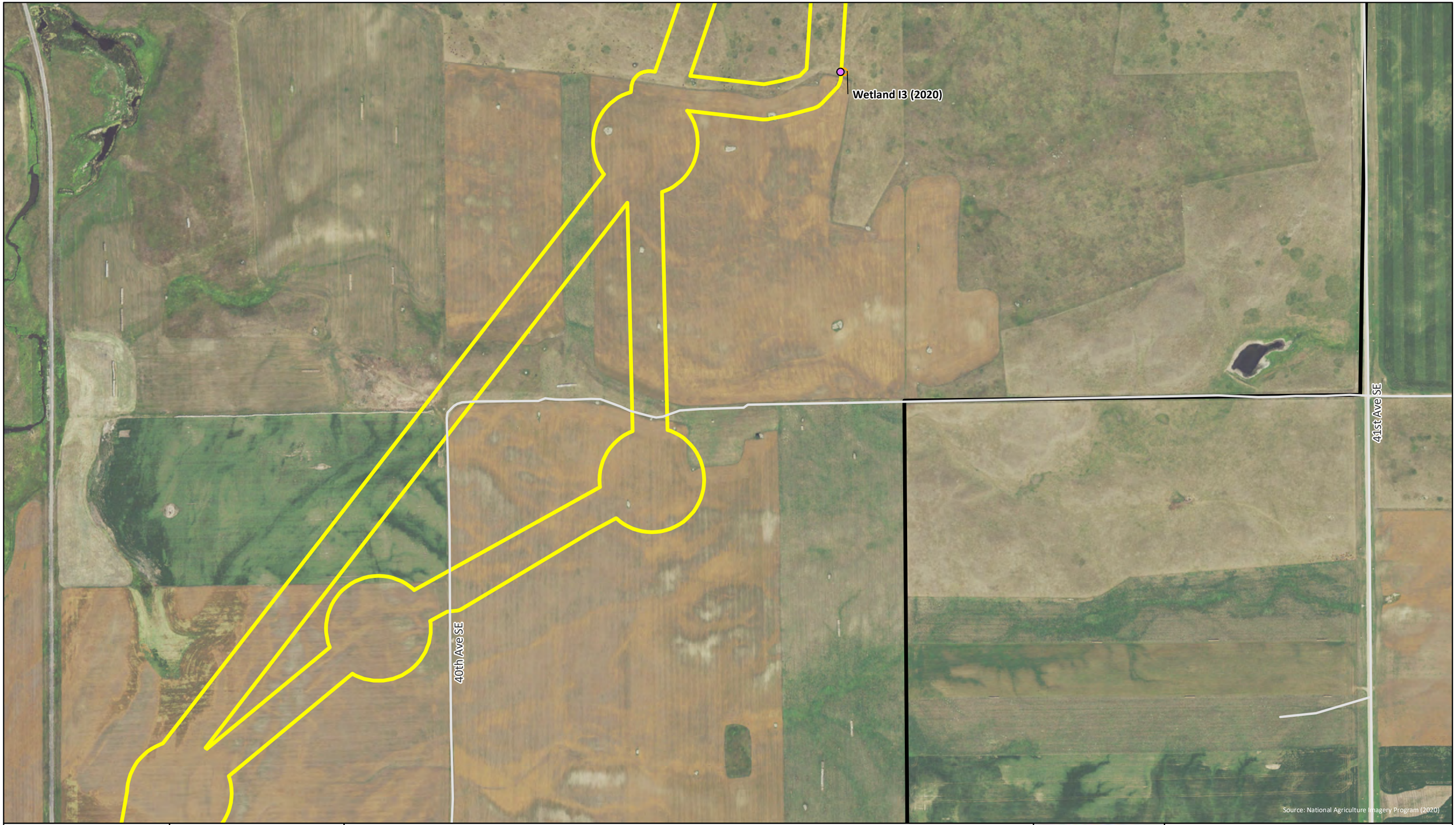


Figure 3
Map 14 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022



ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

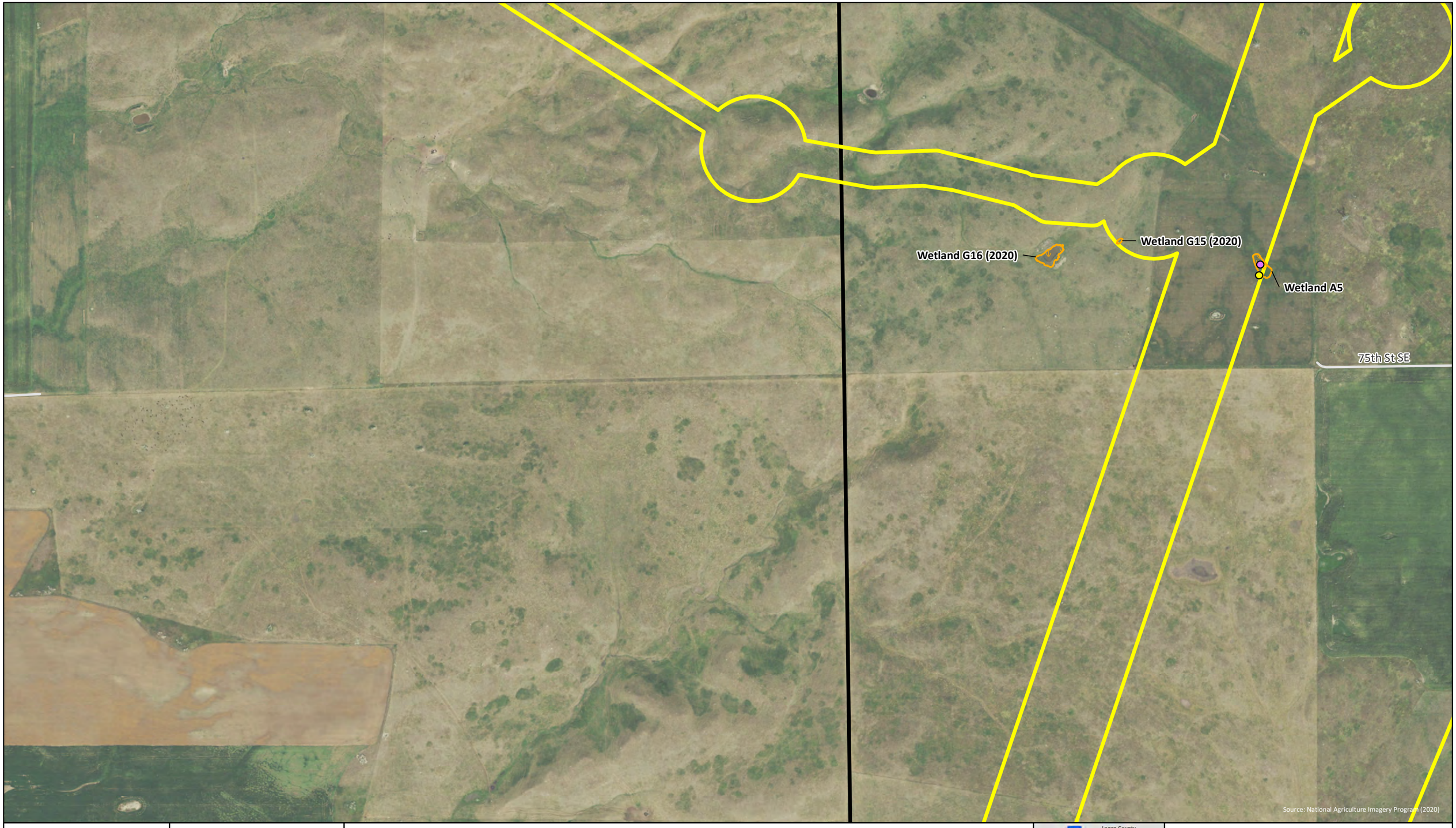
0 500
Feet

Wetland Data Point
Upland Data Point
Watercourse (Field Identified)
Waterbody (Field Identified)
Wetland (Field Identified)
Continues Outside Survey Area
Survey Area (~6,056 acres)
Project Area (~55,745 acres)
Road
County

Logan County
McIntosh County

Figure 3
Map 15 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022



ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

Wetland Data Point
Upland Data Point
Watercourse (Field Identified)
Waterbody (Field Identified)
Wetland (Field Identified)
Continues Outside Survey Area
Survey Area (~6,056 acres)
Project Area (~55,745 acres)
Road
County

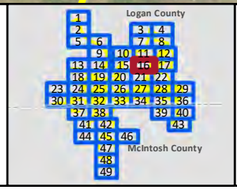
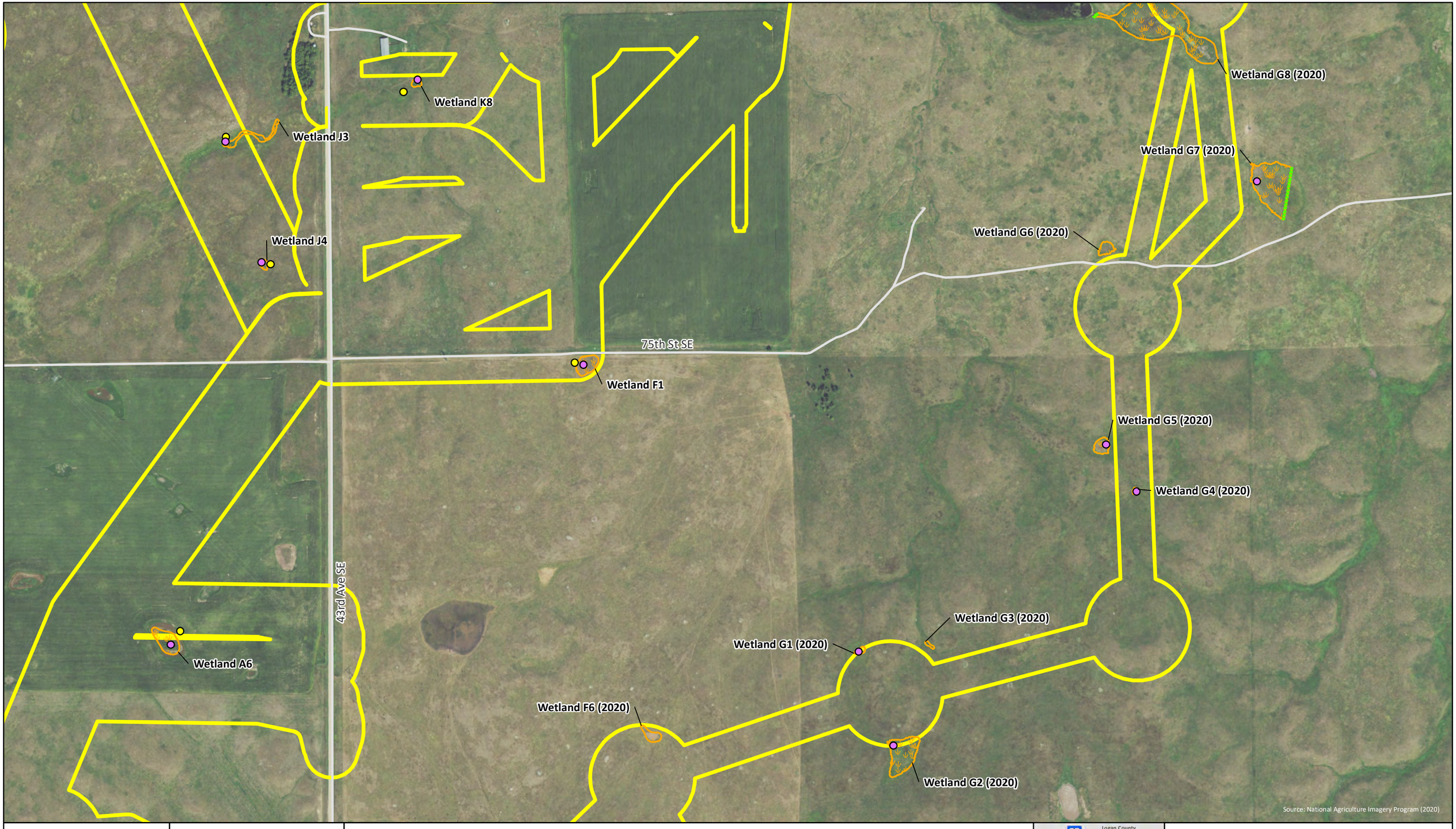


Figure 3
Map 16 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022



ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

- Wetland Data Point
- Upland Data Point
- Watercourse (Field Identified)
- Waterbody (Field Identified)
- Wetland (Field Identified)
- Continues Outside Survey Area
- Survey Area (~6,056 acres)
- Project Area (~55,745 acres)
- Road
- County

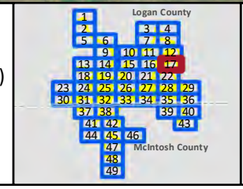


Figure 3
Map 17 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

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ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

Wetland Data Point
Upland Data Point
Watercourse (Field Identified)
Waterbody (Field Identified)
Wetland (Field Identified)
Continues Outside Survey Area
Survey Area (~6,056 acres)
Project Area (~55,745 acres)
Road
County

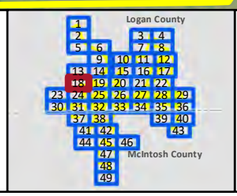

Figure 3
Map 18 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

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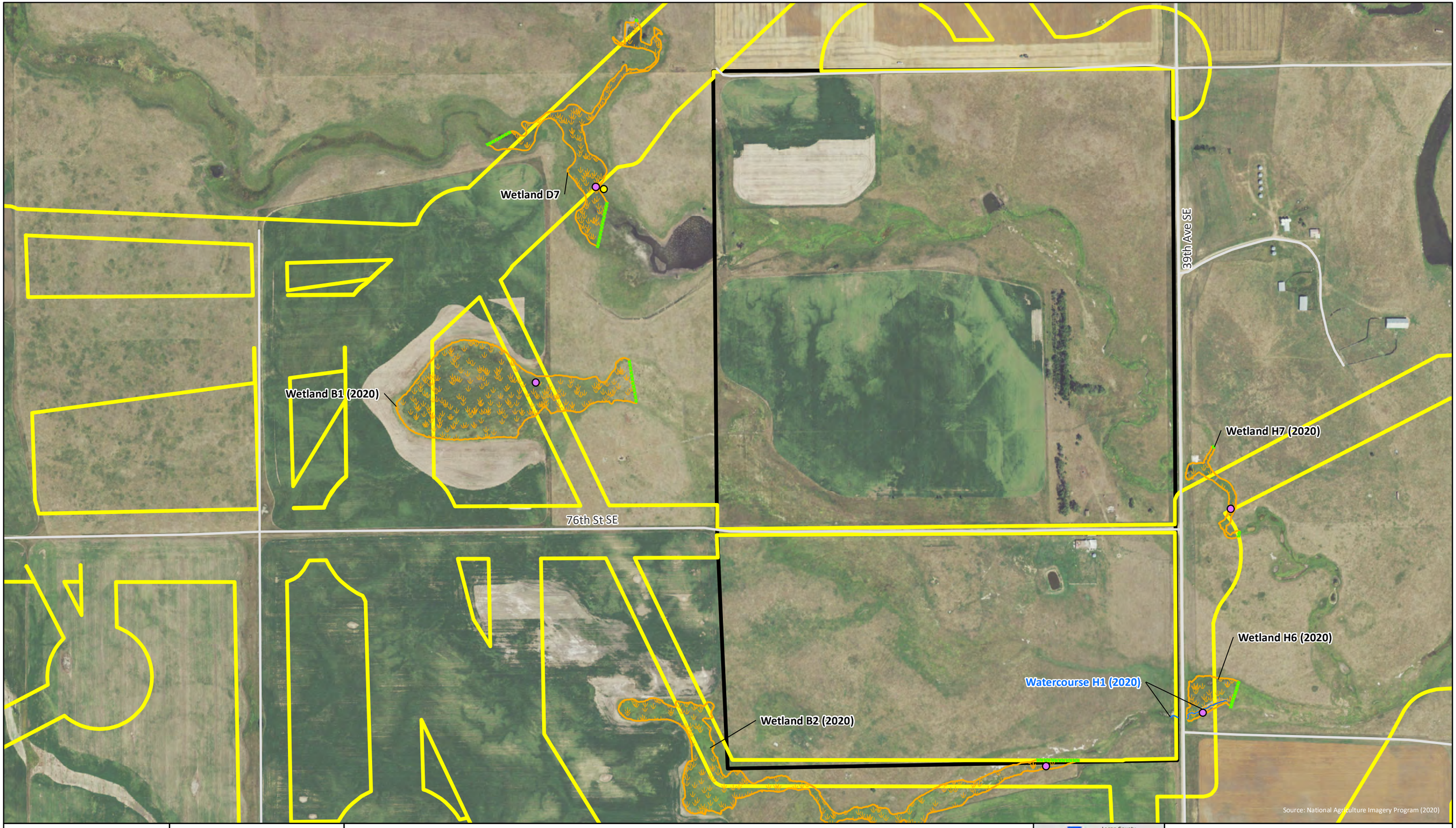

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

- Wetland Data Point
- Upland Data Point
- Watercourse (Field Identified)
- Waterbody (Field Identified)
- Wetland (Field Identified)
- Continues Outside Survey Area
- Survey Area (~6,056 acres)
- Project Area (~55,745 acres)
- Road
- County

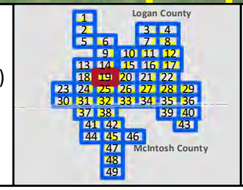

Figure 3
Map 19 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022

Watercourse H2 (2020)
Wetland H8 (2020)
Watercourse D1
Wetland G8
Wetland D6
Wetland G7
Wetland G6
40th Ave SE
76th St SE

Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

- Wetland Data Point
- Upland Data Point
- Watercourse (Field Identified)
- Waterbody (Field Identified)
- Wetland (Field Identified)
- Continues Outside Survey Area
- Survey Area (~6,056 acres)
- Project Area (~55,745 acres)
- Road
- County

Logan County
McIntosh County

Figure 3
Map 20 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022

41st Ave SE

76th St SE

42nd Ave SE

Wetland G3

Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

- Wetland Data Point
- Upland Data Point
- Watercourse (Field Identified)
- Waterbody (Field Identified)
- Wetland (Field Identified)
- Continues Outside Survey Area
- Survey Area (~6,056 acres)
- Project Area (~55,745 acres)
- Road
- County

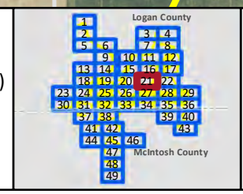

Figure 3
Map 21 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022

Wetland D12 (2020)
Wetland D11 (2020)
Wetland D13 (2020)
Wetland D10 (2020)
Wetland D9 (2020)
Wetland F7 (2020)
Wetland F5 (2020)
43rd Ave SE
76th St SE
Wetland F10
Waterbody F1
Wetland F8
Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

- Wetland Data Point
- Upland Data Point
- Watercourse (Field Identified)
- Waterbody (Field Identified)
- Wetland (Field Identified)
- Continues Outside Survey Area
- Survey Area (~6,056 acres)
- Project Area (~55,745 acres)
- Road
- County

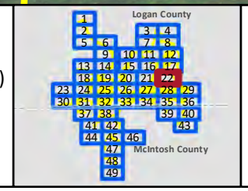

Figure 3
Map 22 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

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ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

Wetland Data Point
Upland Data Point
Watercourse (Field Identified)
Waterbody (Field Identified)
Wetland (Field Identified)
Continues Outside Survey Area
Survey Area (~6,056 acres)
Project Area (~55,745 acres)
Road
County

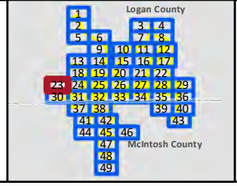


Figure 3
Map 23 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022

Wetland A4 (2020)

37th Ave SE

77th St SE

Wetland A1 (2020)

Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

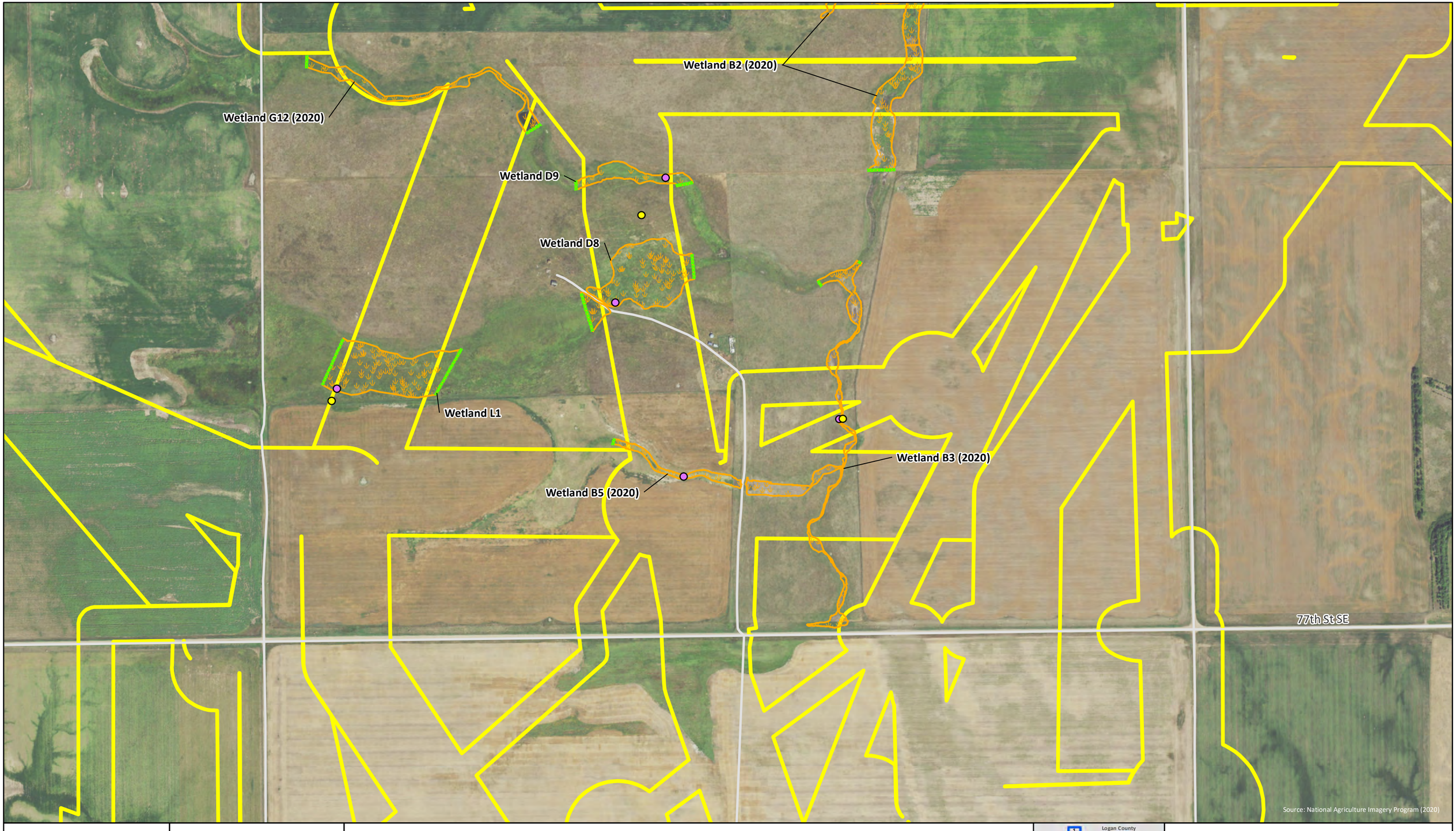
0 500
Feet

Wetland Data Point
Upland Data Point
Watercourse (Field Identified)
Waterbody (Field Identified)
Wetland (Field Identified)
Continues Outside Survey Area
Survey Area (~6,056 acres)
Project Area (~55,745 acres)
Road
County

Logan County
McIntosh County

Figure 3
Map 24 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022



ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

Wetland Data Point
Upland Data Point
Watercourse (Field Identified)
Waterbody (Field Identified)
Wetland (Field Identified)
Continues Outside Survey Area
Survey Area (~6,056 acres)
Project Area (~55,745 acres)
Road
County

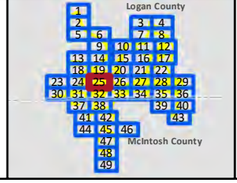


Figure 3
Map 25 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

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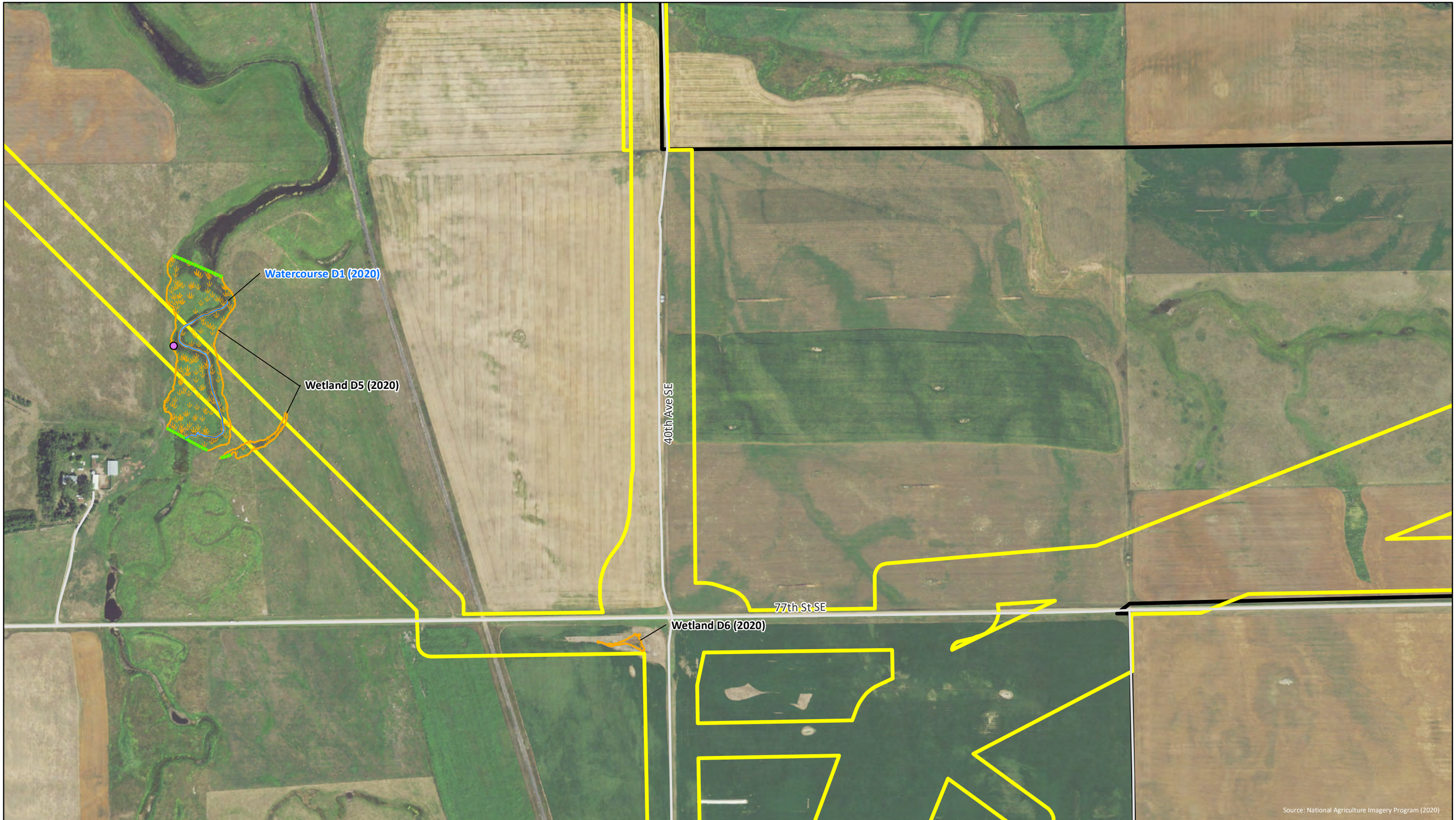

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

Wetland Data Point
Upland Data Point
Watercourse (Field Identified)
Waterbody (Field Identified)
Wetland (Field Identified)
Continues Outside Survey Area
Survey Area (~6,056 acres)
Project Area (~55,745 acres)
Road
County

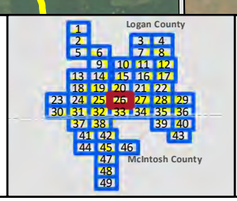

Figure 3
Map 26 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

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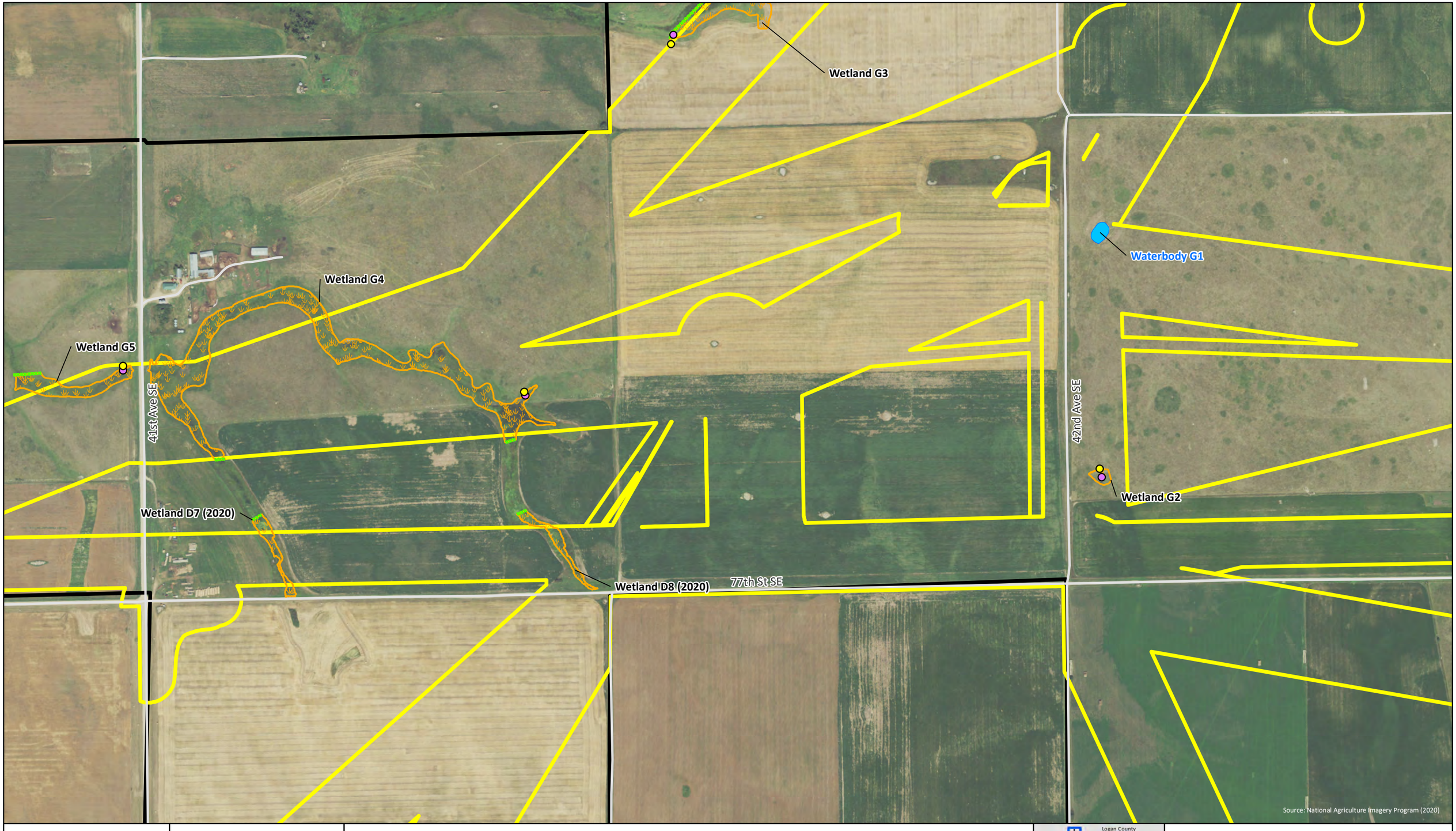


ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

- Wetland Data Point
- Upland Data Point
- Watercourse (Field Identified)
- Waterbody (Field Identified)
- Wetland (Field Identified)
- Continues Outside Survey Area
- Survey Area (~6,056 acres)
- Project Area (~55,745 acres)
- Road
- County

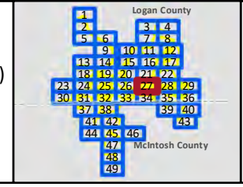


Figure 3
Map 27 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

Wetland F9
Wetland E22 (2020)
Wetland E21 (2020)
Wetland E2 (2020)
Wetland J2
Wetland E1 (2020)
Wetland F14
Wetland G1
43rd Ave SE
77th St SE
Wetland E9 (2020)
Wetland E3 (2020)
Wetland E4 (2020)
Wetland E5 (2020)
Wetland F11
Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

Wetland Data Point
Upland Data Point
Watercourse (Field Identified)
Waterbody (Field Identified)
Wetland (Field Identified)
Continues Outside Survey Area
Survey Area (~6,056 acres)
Project Area (~55,745 acres)
Road
County

Logan County
McIntosh County

Figure 3
Map 28 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022

Wetland E19 (2020)
Wetland E18 (2020)
Wetland E20 (2020)
Wetland E17 (2020)
Wetland E16 (2020)
Wetland E11 (2020)
Wetland E10 (2020)
Wetland E13 (2020)
Wetland E12 (2020)
Wetland F6
Wetland E15 (2020)
Wetland F5
Wetland F7
Wetland E14 (2020)
Wetland E9 (2020)
Wetland J1
Wetland E8 (2020)
77th St SE

Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

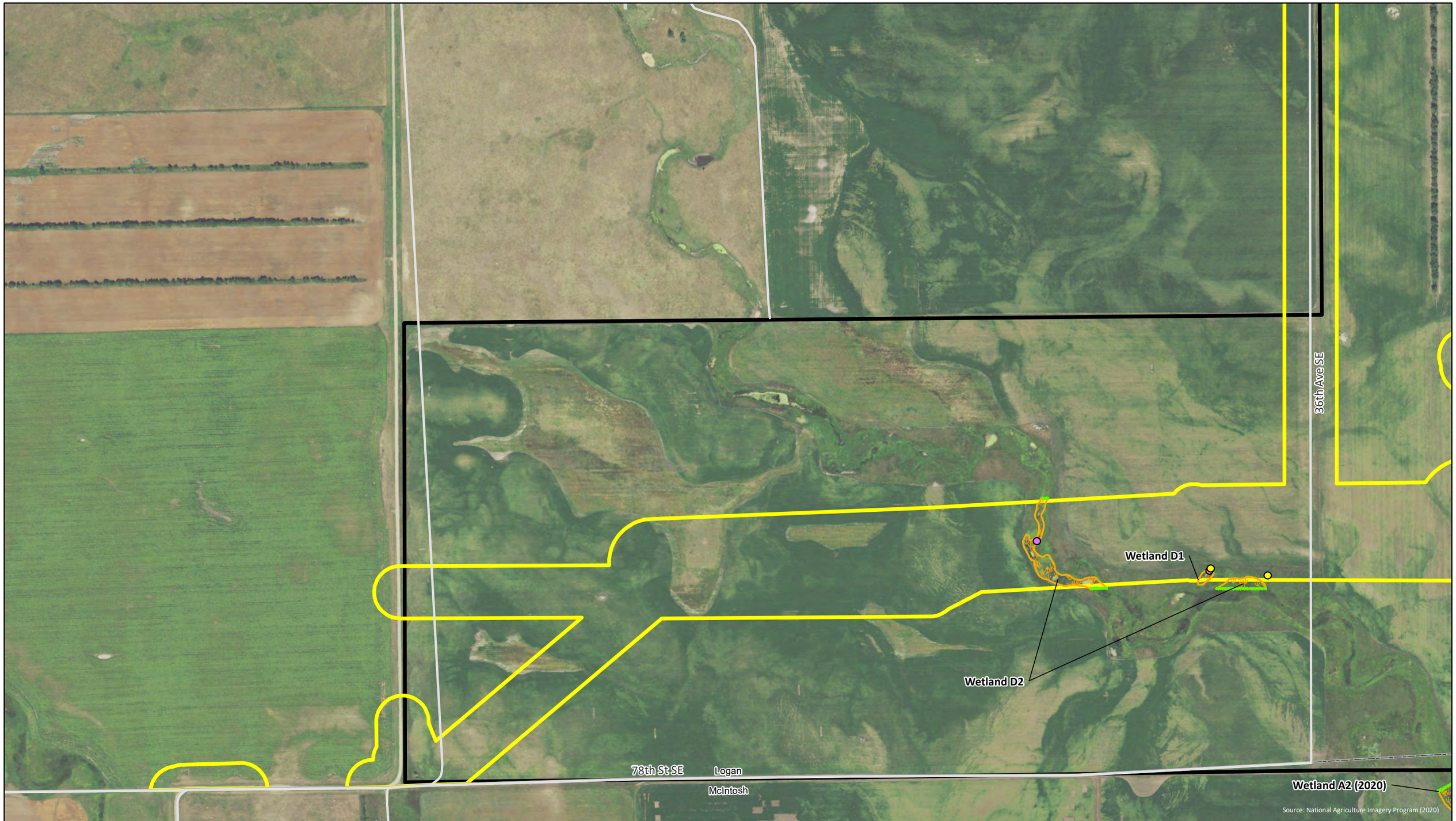
0 500
Feet

Wetland Data Point
Upland Data Point
Watercourse (Field Identified)
Waterbody (Field Identified)
Wetland (Field Identified)
Continues Outside Survey Area
Survey Area (~6,056 acres)
Project Area (~55,745 acres)
Road
County

Logan County
McIntosh County

Figure 3
Map 29 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022



ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

- Wetland Data Point
- Upland Data Point
- Watercourse (Field Identified)
- Waterbody (Field Identified)
- Wetland (Field Identified)
- Continues Outside Survey Area
- Survey Area (~6,056 acres)
- Project Area (~55,745 acres)
- Road
- County

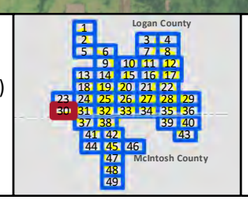


Figure 3
Map 30 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

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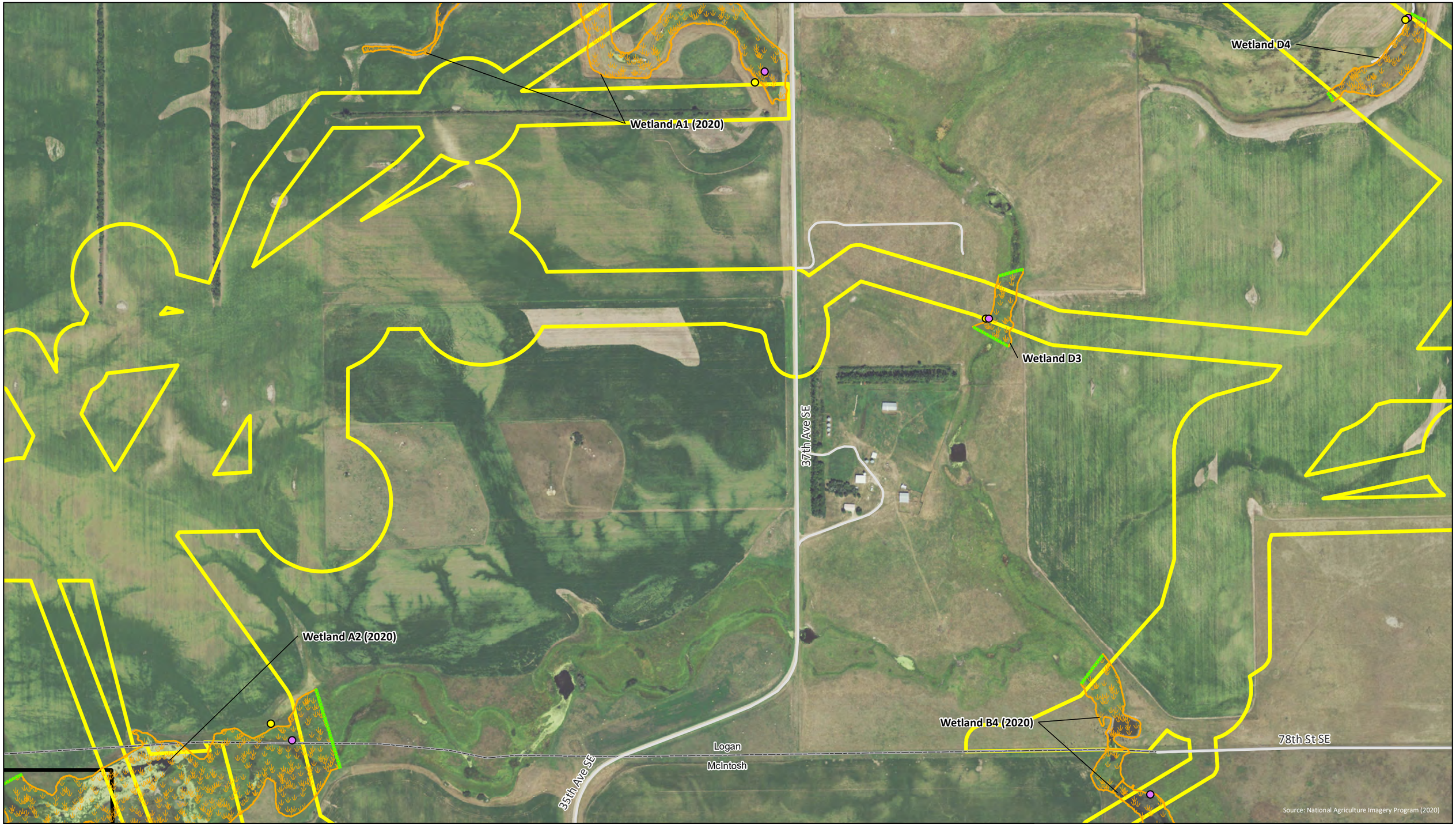

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

Wetland Data Point
Upland Data Point
Watercourse (Field Identified)
Waterbody (Field Identified)
Wetland (Field Identified)
Continues Outside Survey Area
Survey Area (~6,056 acres)
Project Area (~55,745 acres)
Road
County

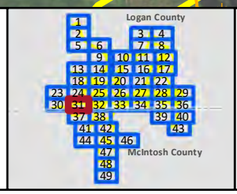

Figure 3
Map 31 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

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Wetland D5

78th St SE

36th Ave SE

Logan

McIntosh

Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

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- Continues Outside Survey Area
- Survey Area (~6,056 acres)
- Project Area (~55,745 acres)
- Road
- County

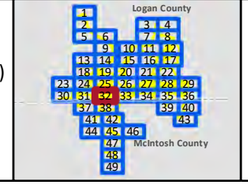

Figure 3
Map 32 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022

Wetland G9
Wetland G12
Wetland G10
40th Ave SE
Wetland G11
Wetland G13
Watercourse G1
Logan
McIntosh
78th St SE
38th Ave SE
39th Ave SE
Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

- Wetland Data Point
- Upland Data Point
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- Survey Area (~6,056 acres)
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- Road
- County

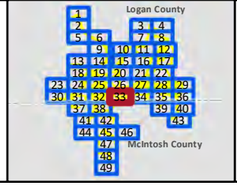

Figure 3
Map 33 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022

Wetland F13

Wetland F12

41st Ave SE

42nd Ave SE

78th St SE

Logan

McIntosh

41 Ave SE

40th Ave SE

Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

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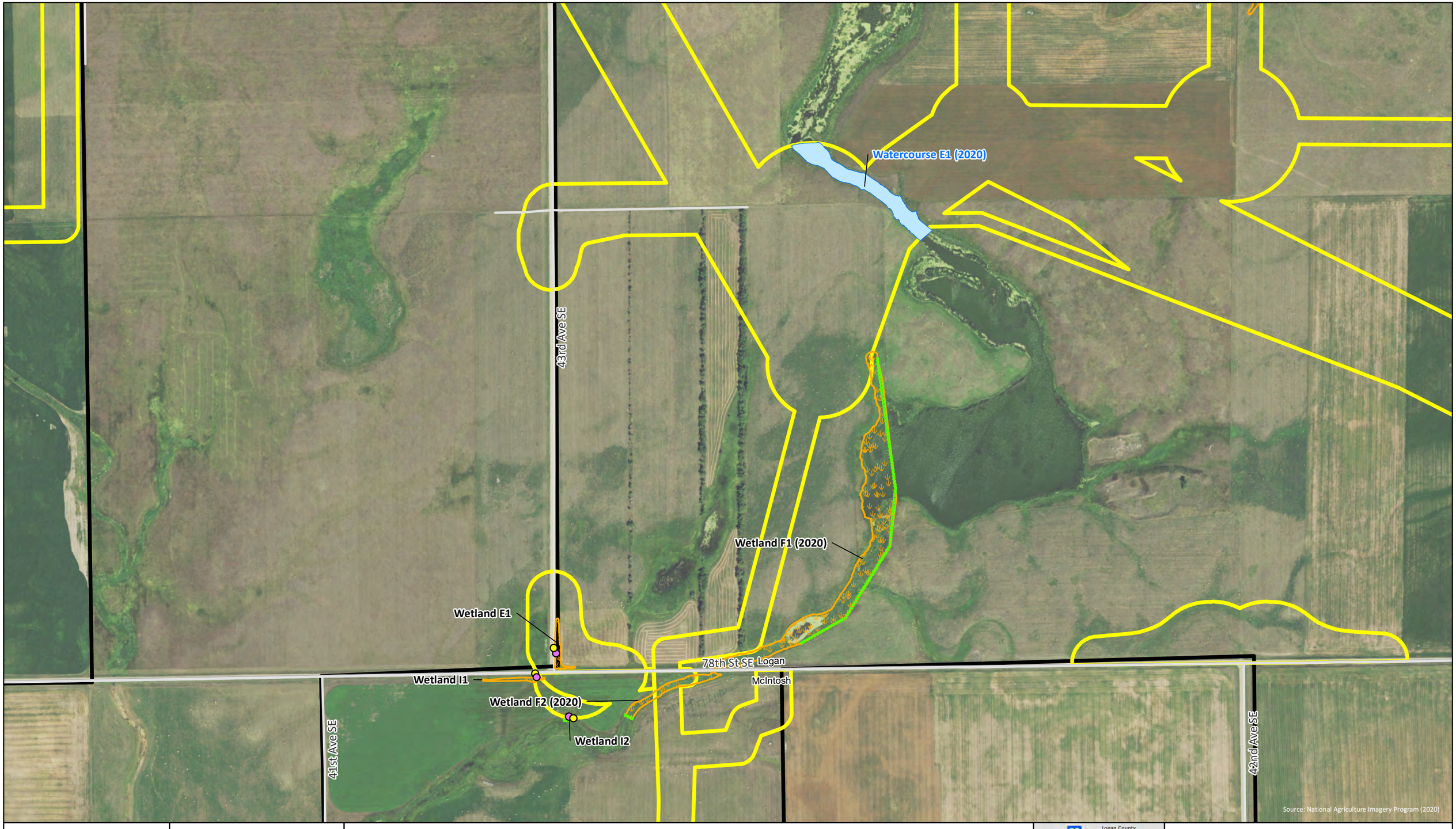
- Project Area (~55,745 acres)
- Road
- County

Logan County

McIntosh County

Figure 3
Map 34 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022



ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

- Wetland Data Point
- Upland Data Point
- Watercourse (Field Identified)
- Waterbody (Field Identified)
- Wetland (Field Identified)
- Continues Outside Survey Area
- Survey Area (~6,056 acres)
- Project Area (~55,745 acres)
- Road
- County

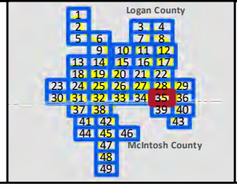


Figure 3
Map 35 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022

Wetland E7 (2020)

Logan

McIntosh

78th St SE

43rd Ave SE

Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

- Wetland Data Point
- Upland Data Point
- Watercourse (Field Identified)
- Waterbody (Field Identified)
- Wetland (Field Identified)
- Continues Outside Survey Area
- Survey Area (~6,056 acres)
- Project Area (~55,745 acres)
- Road
- County

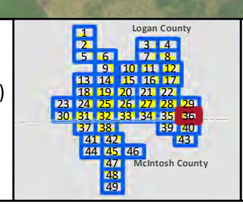


Figure 3
Map 36 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022

Wetland A2 (2020)

Wetland B4 (2020)

Wetland A3 (2020)

35th Ave SE

Wetland C1 (2020)

79th St SE

Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

- Wetland Data Point
- Upland Data Point
- Watercourse (Field Identified)
- Waterbody (Field Identified)
- Wetland (Field Identified)
- Continues Outside Survey Area
- Survey Area (~6,056 acres)
- Project Area (~55,745 acres)
- Road
- County

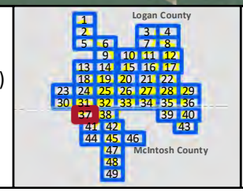


Figure 3
Map 37 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022

Wetland D2 (2020)

Wetland D1 (2020)

36th Ave SE

Wetland C2 (2020)

79th St SE

37th Ave SE

Wetland H2

Wetland C3 (2020)

Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

Wetland Data Point
Upland Data Point
Watercourse (Field Identified)
Waterbody (Field Identified)
Wetland (Field Identified)
Continues Outside Survey Area
Survey Area (~6,056 acres)
Project Area (~55,745 acres)
Road
County

Logan County
McIntosh County

Figure 3
Map 38 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022



ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

Wetland Data Point
Upland Data Point
Watercourse (Field Identified)
Waterbody (Field Identified)
Wetland (Field Identified)
Continues Outside Survey Area
Survey Area (~6,056 acres)
Project Area (~55,745 acres)
Road
County

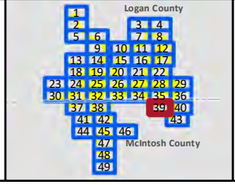


Figure 3
Map 39 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

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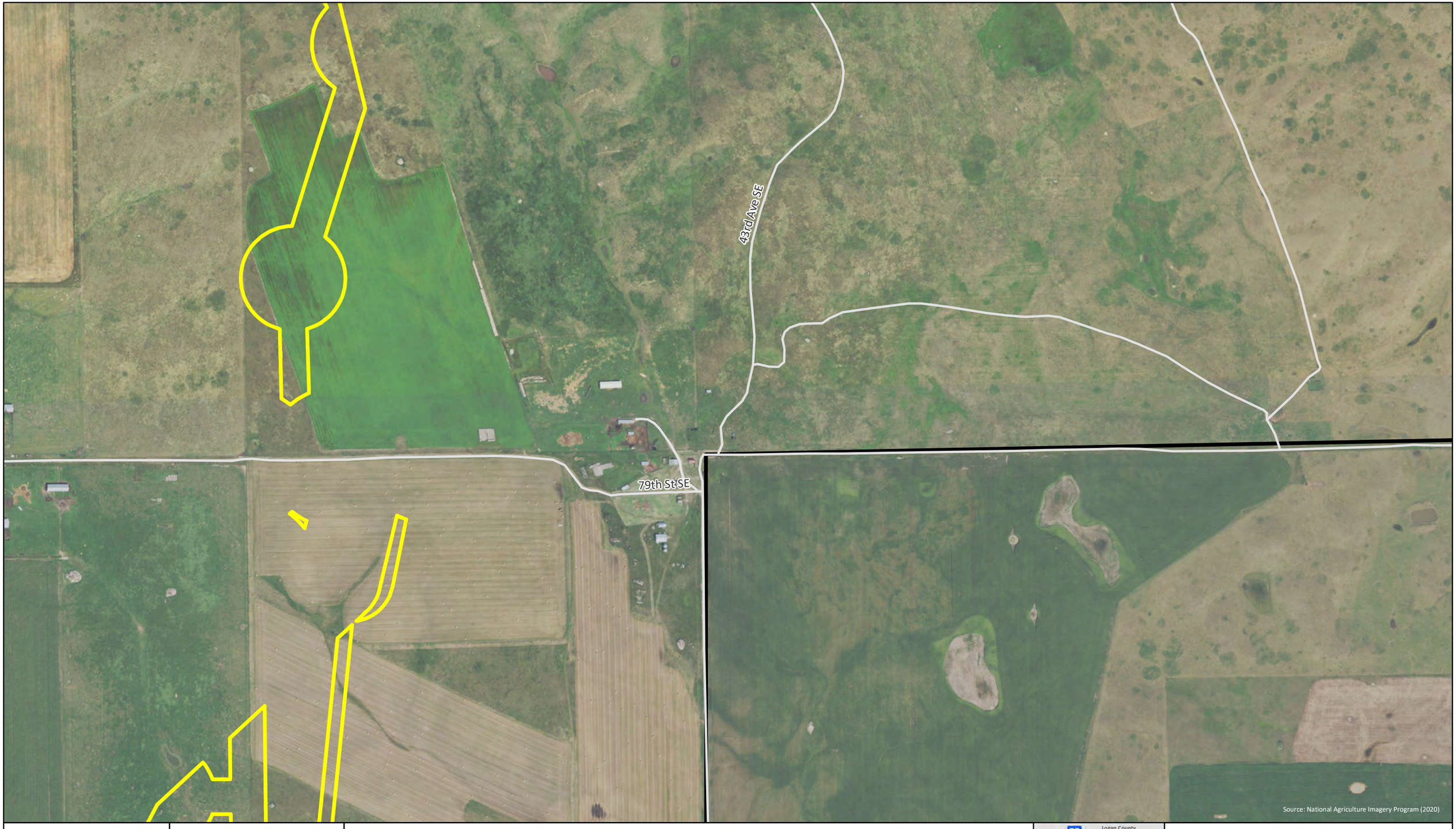

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

Wetland Data Point
Upland Data Point
Watercourse (Field Identified)
Waterbody (Field Identified)
Wetland (Field Identified)
Continues Outside Survey Area
Survey Area (~6,056 acres)
Project Area (~55,745 acres)
Road
County

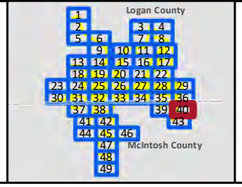

Figure 3
Map 40 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

35th Ave SE

36th Ave SE

State Hwy 13 80th St SE State Hwy 3

Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

- Wetland Data Point
- Upland Data Point
- Watercourse (Field Identified)
- Waterbody (Field Identified)
- Wetland (Field Identified)
- Continues Outside Survey Area
- Survey Area (~6,056 acres)
- Project Area (~55,745 acres)
- Road
- County

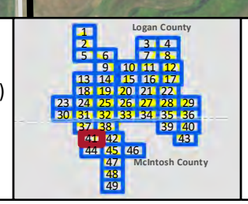

Figure 3
Map 41 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022

Wetland C3 (2020)
w-kf-024a (WEST, 2021)
Wetland C4 (2020)
Wetland D4 (2020)
Wetland D3 (2020)
Wetland H9 (2020)
37th Ave SE
38th Ave SE
State Hwy 13
80th St SE
State Hwy 3
Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

Wetland Data Point
Upland Data Point
Watercourse (Field Identified)
Waterbody (Field Identified)
Wetland (Field Identified)
Continues Outside Survey Area
Survey Area (~6,056 acres)
Project Area (~55,745 acres)
Road
County

Logan County
McIntosh County

Figure 3
Map 42 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022

Wetland F3 (2020)

42nd Ave SE

43rd Ave SE

State Hwy 13

Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

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- Waterbody (Field Identified)
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- Continues Outside Survey Area
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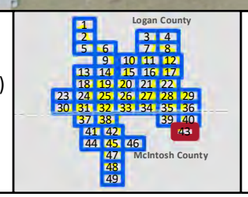

Figure 3
Map 43 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

G:\Jobs\19000785_BadgerWind_McIntoshCo_ND\Projects\Wetlands\T19000785_WDR_Fig3_WetlandsMapbook.mxd 5/18/2022

35th Ave SE

36th Ave SE

81st St SE

Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

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- Continues Outside Survey Area
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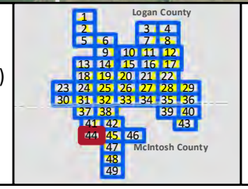

Figure 3
Map 44 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

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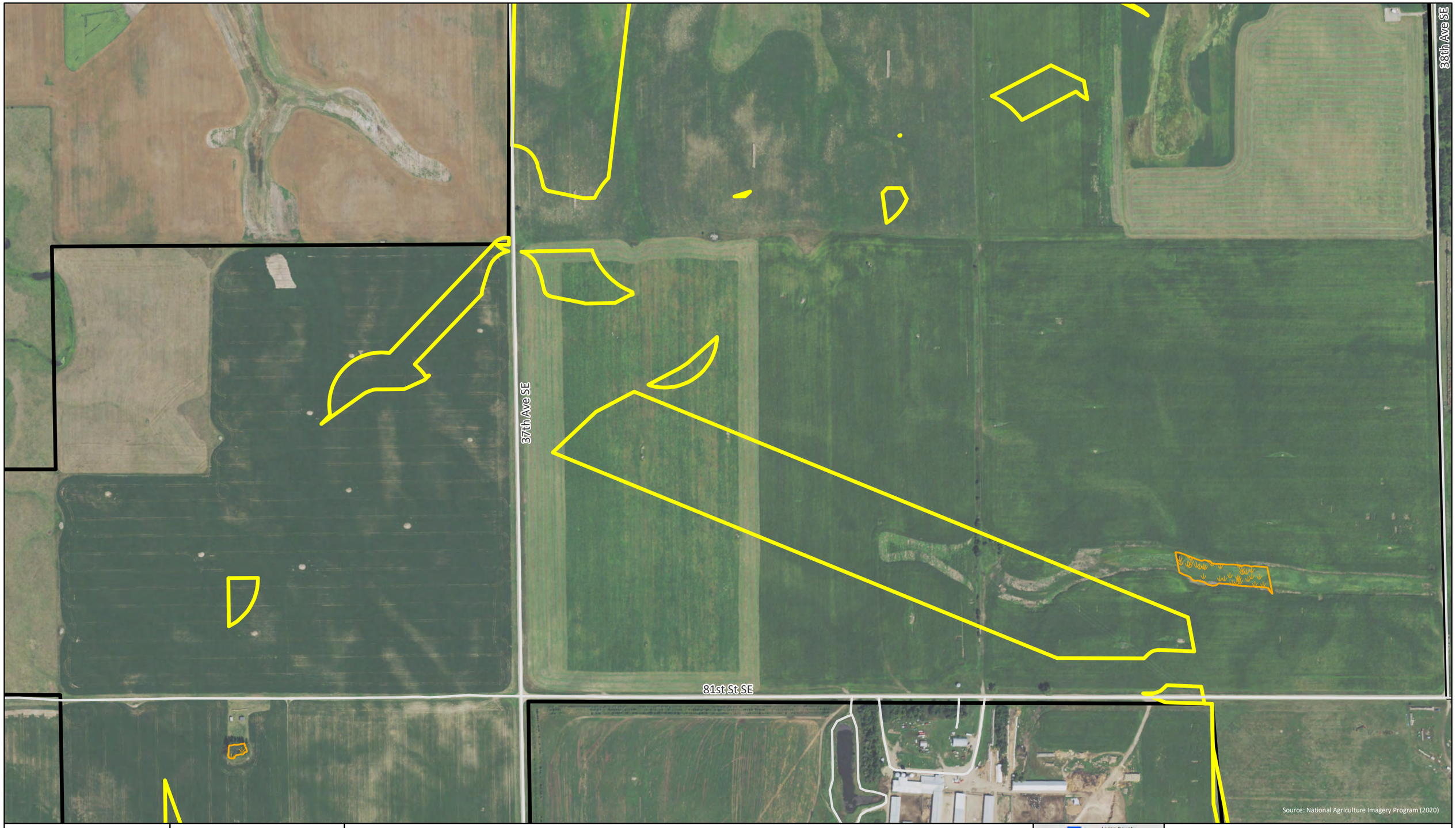

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

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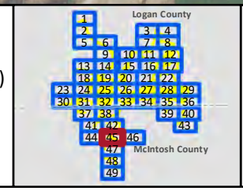

Figure 3
Map 45 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

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ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

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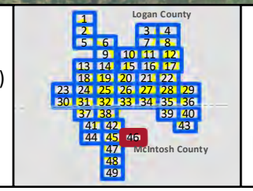

Figure 3
Map 46 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

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w-ab-015a

Wetland H1

37th Ave SE

82nd St SE

Source: National Agriculture Imagery Program (2020)

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

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- Upland Data Point
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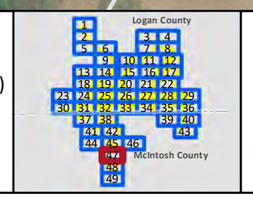

Figure 3
Map 47 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

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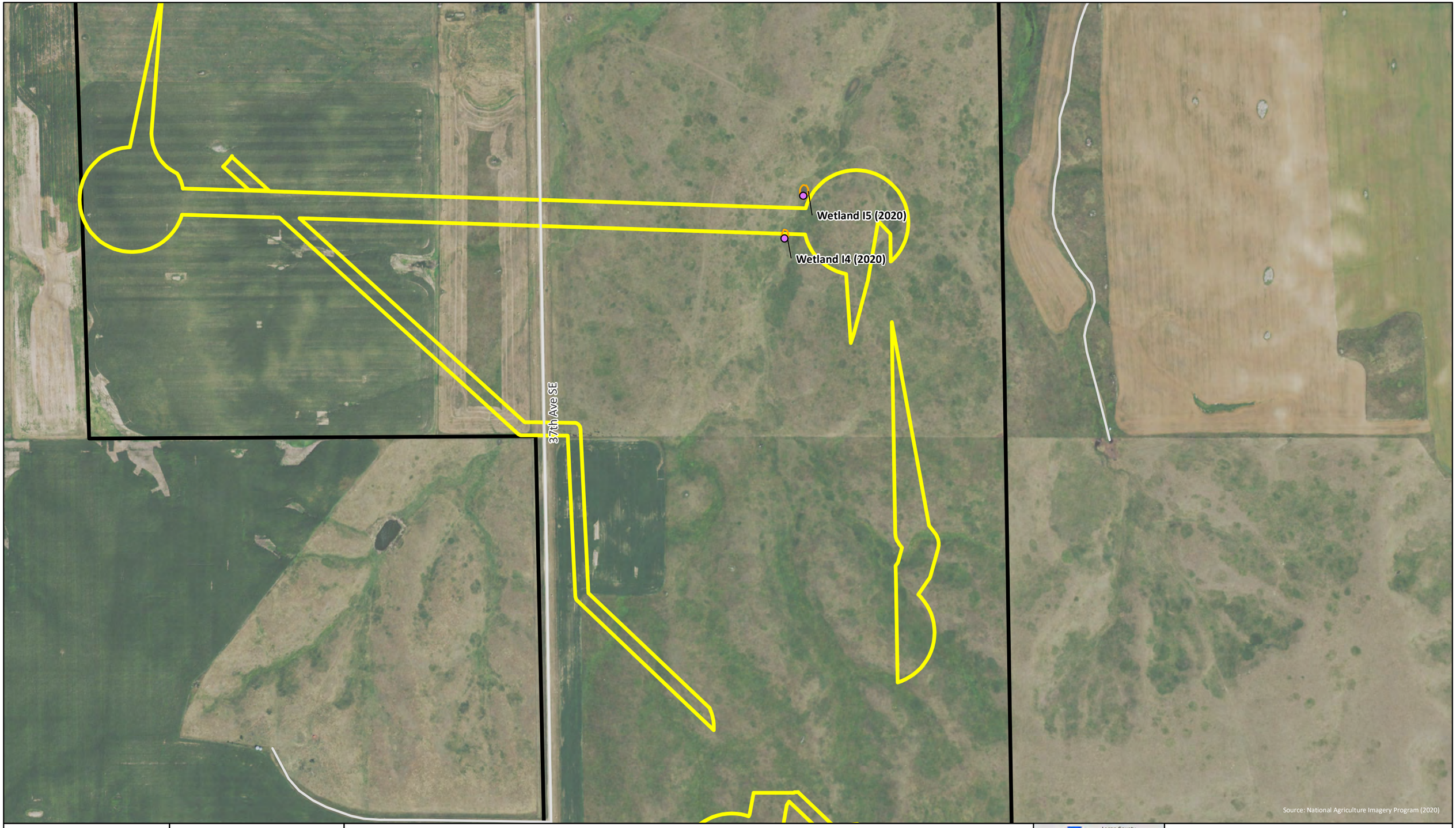

ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

- Wetland Data Point
- Upland Data Point
- Watercourse (Field Identified)
- Waterbody (Field Identified)
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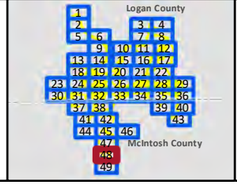

Figure 3
Map 48 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

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ATWELL

Aquatic Resource Delineation Report
Badger Wind, LLC
19000785
May 18, 2022

0 500
Feet

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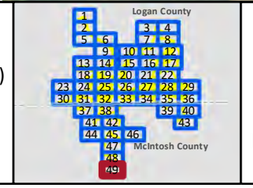

Figure 3
Map 49 of 49
Wind Farm Delineated Features Mapbook
Logan and McIntosh Counties, North Dakota

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APPENDICES

APPENDIX A

NRCS SSURGO SOIL MAP UNIT TABLE

Table 1. NRCS SSURGO Soil Map Units present within the Project Area

MUSYM	Soil Map Unit Name	Hydric Soil?	Acreage	% of Project Area
C210B	Williams-Bowbells loams, 3 to 6 percent slopes	No	2,520.3	8.0%
C135D	Zahl-Williams loams, 9 to 15 percent slopes	No	2,124.7	6.7%
C135C	Zahl-Williams-Zahill complex, 6 to 9 percent slopes	No	1,574.6	5.0%
C814A	Bowdle-Lehr loams, 0 to 2 percent slopes	No	1,564.6	5.0%
C870E	Wabek-Lehr-Appam complex, 9 to 25 percent slopes	No	1,383.6	4.4%
C162F	Max-Zahl-Arnegard complex, 9 to 35 percent slopes, very stony	No	1,377.7	4.4%
C817B	Lehr-Bowdle loams, 2 to 6 percent slopes	No	1,287.8	4.1%
C877B	Wabek-Lehr complex, 2 to 6 percent slopes	No	1,068.8	3.4%
C131C	Williams loam, 6 to 9 percent slopes	No	866.8	2.8%
E2607D	Amor-Werner loams, 9 to 15 percent slopes	No	837.5	2.7%
C580A	Harriet-Regan-Stirum complex, 0 to 2 percent slopes, occasionally flooded	Yes	826.4	2.6%
E2609C	Amor-Werner-Farnuf loams, 6 to 9 percent slopes	No	793.6	2.5%
C915B	Reeder-Arnegard loams, 3 to 6 percent slopes	No	750.4	2.4%
C915B	Reeder-Arnegard loams, 3 to 6 percent slopes	No	716.6	2.3%
E2819B	Reeder-Farnuf loams, 3 to 6 percent slopes	No	600.8	1.9%
C814A	Bowdle-Lehr loams, 0 to 2 percent slopes	No	548.4	1.7%
C877B	Wabek-Lehr complex, 2 to 6 percent slopes	No	506.8	1.6%
C451B	Arnegard loam, 2 to 6 percent slopes	No	489.4	1.6%
C902C	Amor-Cabba loams, 6 to 9 percent slopes	No	464.9	1.5%
C135D	Zahl-Williams loams, 9 to 15 percent slopes	No	464.6	1.5%
C132B	Williams-Zahl loams, 3 to 6 percent slopes	No	461.7	1.5%
C210A	Williams-Bowbells loams, 0 to 3 percent slopes	No	455.8	1.4%
C902C	Amor-Cabba loams, 6 to 9 percent slopes	No	425.6	1.4%
C156F	Zahl-Max-Bowbells loams, 6 to 35 percent slopes	No	395.4	1.3%
C870E	Wabek-Lehr-Appam complex, 9 to 25 percent slopes	No	392.2	1.2%
C903D	Amor-Werner loams, 9 to 15 percent slopes	No	343.9	1.1%
C451B	Arnegard loam, 2 to 6 percent slopes	No	331.1	1.1%
C135C	Zahl-Williams-Zahill complex, 6 to 9 percent slopes	No	316.4	1.0%
E2107B	Arnegard loam, 2 to 6 percent slopes	No	290.2	0.9%

MUSYM	Soil Map Unit Name	Hydric Soil?	Acreage	% of Project Area
C874C	Wabek-Appam complex, 6 to 9 percent slopes	No	289.5	0.9%
C956B	Vebar fine sandy loam, 3 to 6 percent slopes	No	273.2	0.9%
C451A	Arnegard loam, 0 to 2 percent slopes	No	268.7	0.9%
C73A	Hamerly-Vallers loams, moderately saline, 0 to 3 percent slopes	No	265.4	0.8%
C524A	Daglum-Belfield complex, 0 to 2 percent slopes	No	262.0	0.8%
C977C	Vebar-Cohagen fine sandy loams, 6 to 9 percent slopes	No	256.9	0.8%
E2651F	Werner-Amor-Arnegard loams, 9 to 50 percent slopes	No	236.5	0.8%
C155F	Zahl-Max-Arnegard loams, 15 to 60 percent slopes	No	236.2	0.7%
C584A	Harriet loam, 0 to 2 percent slopes	Yes	226.8	0.7%
C903D	Amor-Werner loams, 9 to 15 percent slopes	No	216.6	0.7%
C978D	Vebar-Flasher complex, 9 to 15 percent slopes	No	208.6	0.7%
E1025B	Regent-Savage silty clay loams, 3 to 6 percent slopes	No	207.3	0.7%
C915A	Reeder-Arnegard loams, 0 to 3 percent slopes	No	175.2	0.6%
C829A	Marysland loam, 0 to 1 percent slopes	Yes	158.4	0.5%
C156F	Zahl-Max-Bowbells loams, 6 to 35 percent slopes	No	143.3	0.5%
C54A	Lowe loam, 0 to 2 percent slopes, occasionally flooded	Yes	137.7	0.4%
E1333D	Vebar-Cohagen fine sandy loams, 9 to 15 percent slopes	No	135.0	0.4%
C665B	Noonan-Niobell-Williams loams, 0 to 6 percent slopes	No	130.5	0.4%
E1301F	Cohagen-Vebar-Parshall fine sandy loams, 9 to 35 percent slopes	No	125.7	0.4%
C954B	Regent-Savage silty clay loams, 3 to 6 percent slopes	No	125.5	0.4%
C524A	Daglum-Belfield complex, 0 to 2 percent slopes	No	123.8	0.4%
E2607B	Amor-Werner loams, 3 to 6 percent slopes	No	121.2	0.4%
C874C	Wabek-Appam complex, 6 to 9 percent slopes	No	117.0	0.4%
C954B	Regent-Savage silty clay loams, 3 to 6 percent slopes	No	114.0	0.4%
C902B	Amor-Cabba loams, 3 to 6 percent slopes	No	112.8	0.4%
C403B	Tansem-Makoti complex, 2 to 6 percent slopes	No	110.1	0.3%
E1625B	Vebar-Parshall fine sandy loams, 3 to 6 percent slopes	No	109.8	0.3%
C860D	Schaller loamy sand, 6 to 15 percent slopes	No	107.3	0.3%
C3A	Parnell silty clay loam, 0 to 1 percent slopes	Yes	106.8	0.3%
C54A	Lowe loam, 0 to 2 percent slopes, occasionally flooded	Yes	106.1	0.3%

MUSYM	Soil Map Unit Name	Hydric Soil?	Acreage	% of Project Area
C956B	Vebar fine sandy loam, 3 to 6 percent slopes	No	99.4	0.3%
C874B	Wabek-Appam complex, 2 to 6 percent slopes	No	95.4	0.3%
E4583E	Wabek-Appam sandy loams, 6 to 25 percent slopes	No	92.8	0.3%
C800B	Appam sandy loam, 2 to 6 percent slopes	No	89.6	0.3%
C956A	Vebar fine sandy loam, 0 to 3 percent slopes	No	88.9	0.3%
C148C	Williams-Zahl-Parnell complex, 0 to 9 percent slopes	No	83.5	0.3%
C471B	Grail silty clay loam, 2 to 6 percent slopes	No	77.3	0.2%
C953F	Flasher-Vebar-Parshall complex, 15 to 50 percent slopes	No	68.3	0.2%
E0445A	Daglum-Belfield loams, 0 to 2 percent slopes	No	67.2	0.2%
E1333C	Vebar-Cohagen fine sandy loams, 6 to 9 percent slopes	No	61.2	0.2%
C591C	Rhoades-Daglum complex, 2 to 9 percent slopes	No	60.4	0.2%
C825A	Divide loam, 0 to 2 percent slopes	No	59.3	0.2%
E3555D	Zahl-Williams loams, 9 to 15 percent slopes	No	57.2	0.2%
E4542B	Lehr-Bowdle loams, 2 to 6 percent slopes	No	53.4	0.2%
C825A	Divide loam, 0 to 2 percent slopes	No	52.9	0.2%
C451A	Arnegard loam, 0 to 2 percent slopes	No	51.8	0.2%
C977C	Vebar-Cohagen fine sandy loams, 6 to 9 percent slopes	No	50.1	0.2%
E3567F	Zahl-Max loams, dissected, 15 to 45 percent slopes	No	48.6	0.2%
E3531C	Williams loam, 6 to 9 percent slopes	No	47.2	0.1%
E0807B	Grail silty clay loam, till, 2 to 6 percent slopes	No	45.1	0.1%
E4757A	Regan silt loam, 0 to 2 percent slopes, occasionally flooded	Yes	41.9	0.1%
C317B	Lihen-Telfer loamy fine sands, 0 to 6 percent slopes	No	38.4	0.1%
C356B	Flaxton-Williams complex, 0 to 6 percent slopes	No	35.1	0.1%
C270A	Hamerly loam, 0 to 3 percent slopes	No	34.9	0.1%
E4765A	Tonka-Hamerly complex, 0 to 3 percent slopes	No	33.1	0.1%
C471A	Grail silty clay loam, 0 to 2 percent slopes	No	30.8	0.1%
C751A	Parshall fine sandy loam, 0 to 2 percent slopes	No	30.1	0.1%
C416A	Farnuf loam, 0 to 2 percent slopes	No	29.0	0.1%
C276A	Hamerly-Tonka-Parnell complex, 0 to 3 percent slopes	No	27.0	0.1%
C874B	Wabek-Appam complex, 2 to 6 percent slopes	No	26.2	0.1%

MUSYM	Soil Map Unit Name	Hydric Soil?	Acreage	% of Project Area
E4549B	Wabek-Lehr complex, 2 to 6 percent slopes	No	26.1	0.1%
C356C	Flaxton-Williams complex, 6 to 9 percent slopes	No	24.9	0.1%
C580A	Harriet-Regan-Stirum complex, 0 to 2 percent slopes, occasionally flooded	Yes	24.6	0.1%
C860B	Schaller loamy sand, 0 to 6 percent slopes	No	22.4	0.1%
C210A	Williams-Bowbells loams, 0 to 3 percent slopes	No	22.0	0.1%
C978D	Vebar-Flasher complex, 9 to 15 percent slopes	No	21.5	0.1%
EW	Water	No	19.9	0.1%
C5A	Southam silty clay loam, 0 to 1 percent slopes	Yes	19.5	0.1%
E4541A	Bowdle-Lehr loams, 0 to 2 percent slopes	No	18.5	0.1%
C990F	Pits, gravel and sand, 0 to 60 percent slopes	No	18.5	0.1%
E1823A	Parshall fine sandy loam, 0 to 2 percent slopes	No	16.5	0.1%
C954A	Regent-Savage silty clay loams, 0 to 3 percent slopes	No	16.3	0.1%
C416A	Farnuf loam, 0 to 2 percent slopes	No	16.0	0.1%
E4767A	Regan silt loam, saline, 0 to 2 percent slopes, occasionally flooded	Yes	15.6	<0.1%
C800B	Appam sandy loam, 2 to 6 percent slopes	No	13.1	<0.1%
C317C	Lihen-Telfer loamy fine sands, 6 to 9 percent slopes	No	11.9	<0.1%
C50A	Lowe-Fluvaquents channeled, complex, 0 to 2 percent slopes, flooded	Yes	10.5	<0.1%
C162F	Max-Zahl-Arnegard complex, 9 to 35 percent slopes, very stony	No	10.1	<0.1%
E3527B	Williams-Bowbells loams, 3 to 6 percent slopes	No	9.8	<0.1%
C996	Water	-	9.6	<0.1%
C962F	Werner-Amor-Arnegard loams, 9 to 50 percent slopes	No	9.0	<0.1%
C406B	Makoti-Sakakawea complex, 2 to 6 percent slopes	No	9.0	<0.1%
C276A	Hamerly-Tonka-Parnell complex, 0 to 3 percent slopes	No	9.0	<0.1%
C860D	Schaller loamy sand, 6 to 15 percent slopes	No	8.6	<0.1%
E2801A	Amor-Arnegard loams, 0 to 3 percent slopes	No	8.1	<0.1%
C3A	Parnell silty clay loam, 0 to 1 percent slopes	Yes	7.9	<0.1%
C21A	Vallers loam, 0 to 1 percent slopes	Yes	6.9	<0.1%
C667B	Williams-Niobell loams, 3 to 6 percent slopes	No	6.4	<0.1%
E0515C	Rhoades-Daglum complex, 6 to 9 percent slopes	No	5.6	<0.1%
C840B	Manning fine sandy loam, 0 to 6 percent slopes	No	5.3	<0.1%

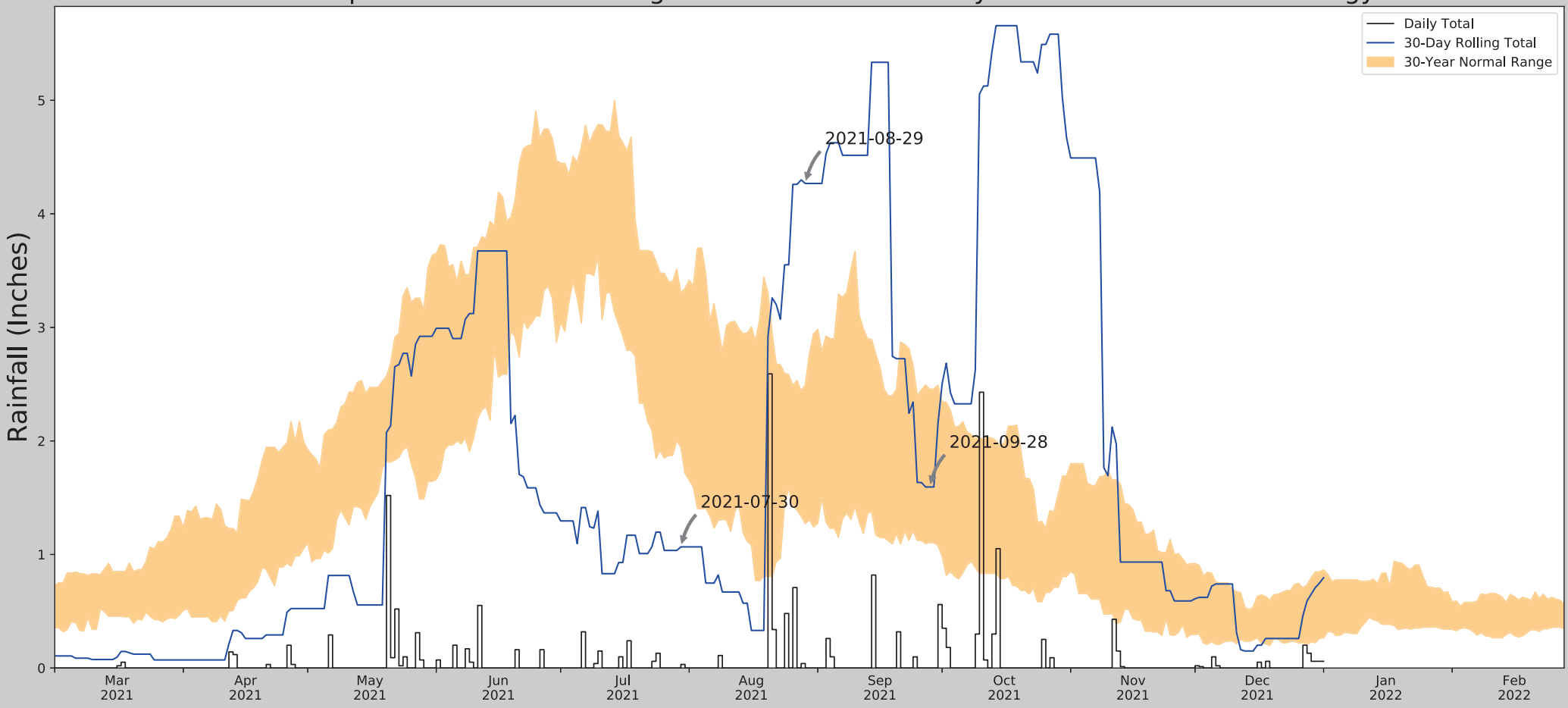
MUSYM	Soil Map Unit Name	Hydric Soil?	Acreage	% of Project Area
C901A	Amor-Arnegard loams, 0 to 3 percent slopes	No	5.2	<0.1%
C411A	Makoti silty clay loam, 0 to 2 percent slopes	No	4.9	<0.1%
C317B	Lihen-Telfer loamy fine sands, 0 to 6 percent slopes	No	4.5	<0.1%
E4005A	Harriet loam, 0 to 2 percent slopes, occasionally flooded	Yes	4.0	<0.1%
E0515B	Rhoades-Daglum complex, 0 to 6 percent slopes	No	3.5	<0.1%
	Total		31,585.61	100.00

Source: NRCS SSURGO

APPENDIX B

RESULTS OF ANTECEDENT PRECIPITATION TOOL

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	46.287179, -99.600842
Observation Date	2021-09-28
Elevation (ft)	2030.69
Drought Index (PDSI)	Normal
WebWIMP H_2O Balance	Dry Season

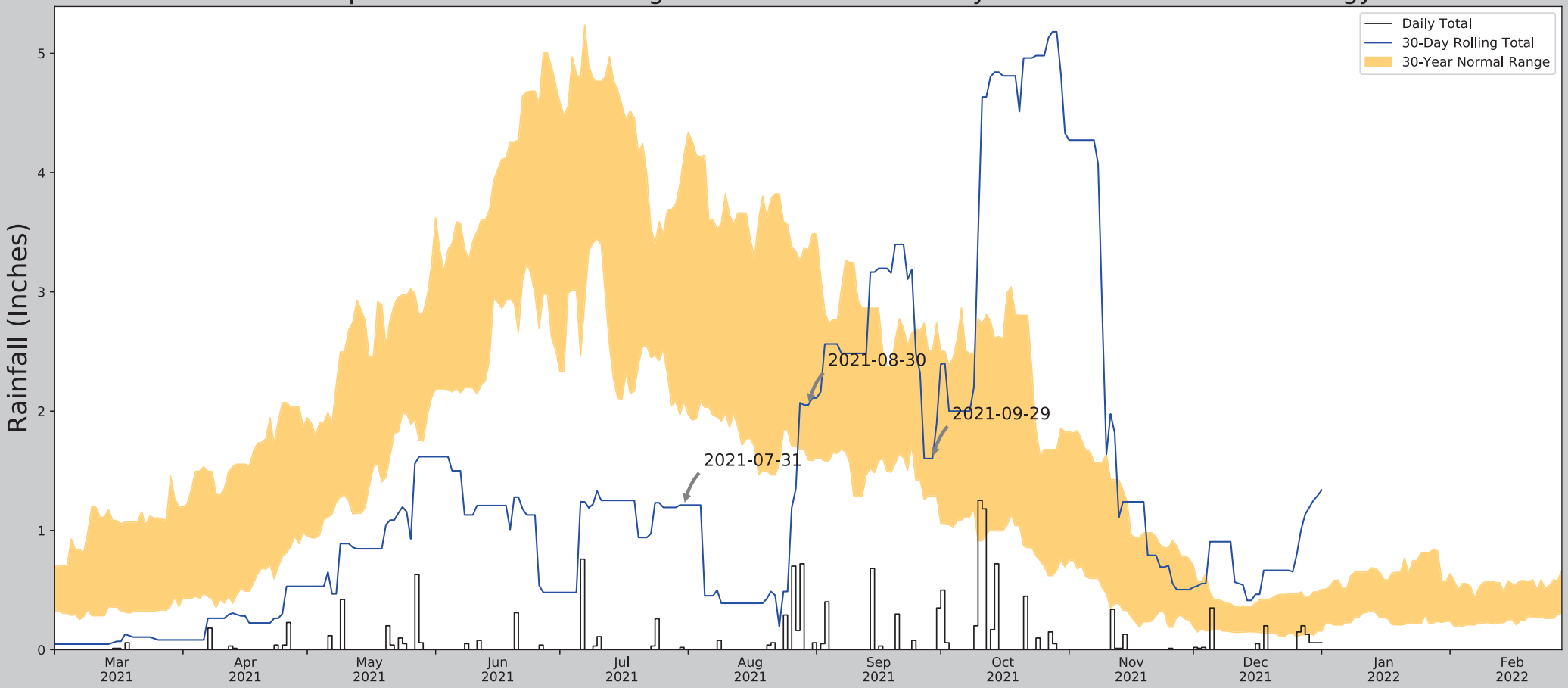
30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2021-09-28	1.104724	2.455906	1.594488	Normal	2	3	6
2021-08-29	1.272047	2.495669	4.267717	Wet	3	2	6
2021-07-30	1.943307	3.30315	1.066929	Dry	1	1	1
Result							Normal Conditions - 13

Figure and tables made by the
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
NAPOLEON	46.5067, -99.7692	1979.987	17.158	50.703	8.591	11283	90
WISHEK	46.2608, -99.56	2037.074	19.7	57.087	9.99	26	0
ASHLEY	46.0406, -99.3742	2014.108	37.323	34.121	18.069	44	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	46.287179, -99.600842
Observation Date	2021-09-29
Elevation (ft)	2030.69
Drought Index (PDSI)	Normal
WebWIMP H_2O Balance	Dry Season

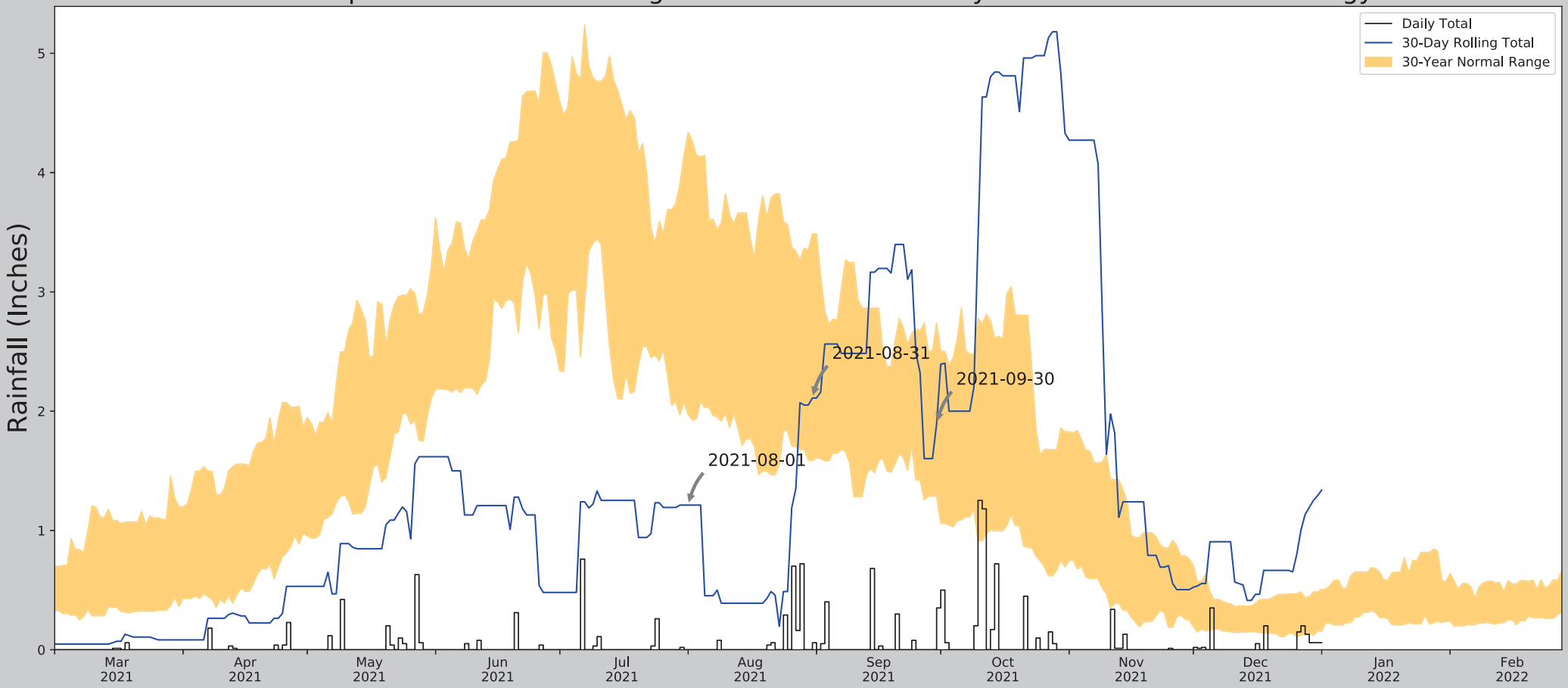
30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2021-09-29	1.287402	2.50315	1.602362	Normal	2	3	6
2021-08-30	1.590551	3.350394	2.051181	Normal	2	2	4
2021-07-31	2.079921	4.144095	1.212598	Dry	1	1	1
Result							Normal Conditions - 11

Figure and tables made by the **Antecedent Precipitation Tool** Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
ASHLEY 9.0 ENE	46.0651, -99.1913	2030.84	24.887	0.15	11.203	246	0
EUREKA 13.6 NNE	45.9385, -99.4787	2076.116	24.792	45.426	12.283	202	55
WISHEK	46.2608, -99.56	2037.074	2.67	6.384	1.219	6793	0
ASHLEY	46.0406, -99.3742	2014.108	20.196	16.582	9.423	4026	35
HAGUE	46.025, -99.9911	1897.966	26.019	132.724	15.162	49	0
NAPOLEON	46.5067, -99.7692	1979.987	17.158	50.703	8.591	37	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	46.287179, -99.600842
Observation Date	2021-09-30
Elevation (ft)	2030.69
Drought Index (PDSI)	Normal
WebWIMP H_2O Balance	Dry Season

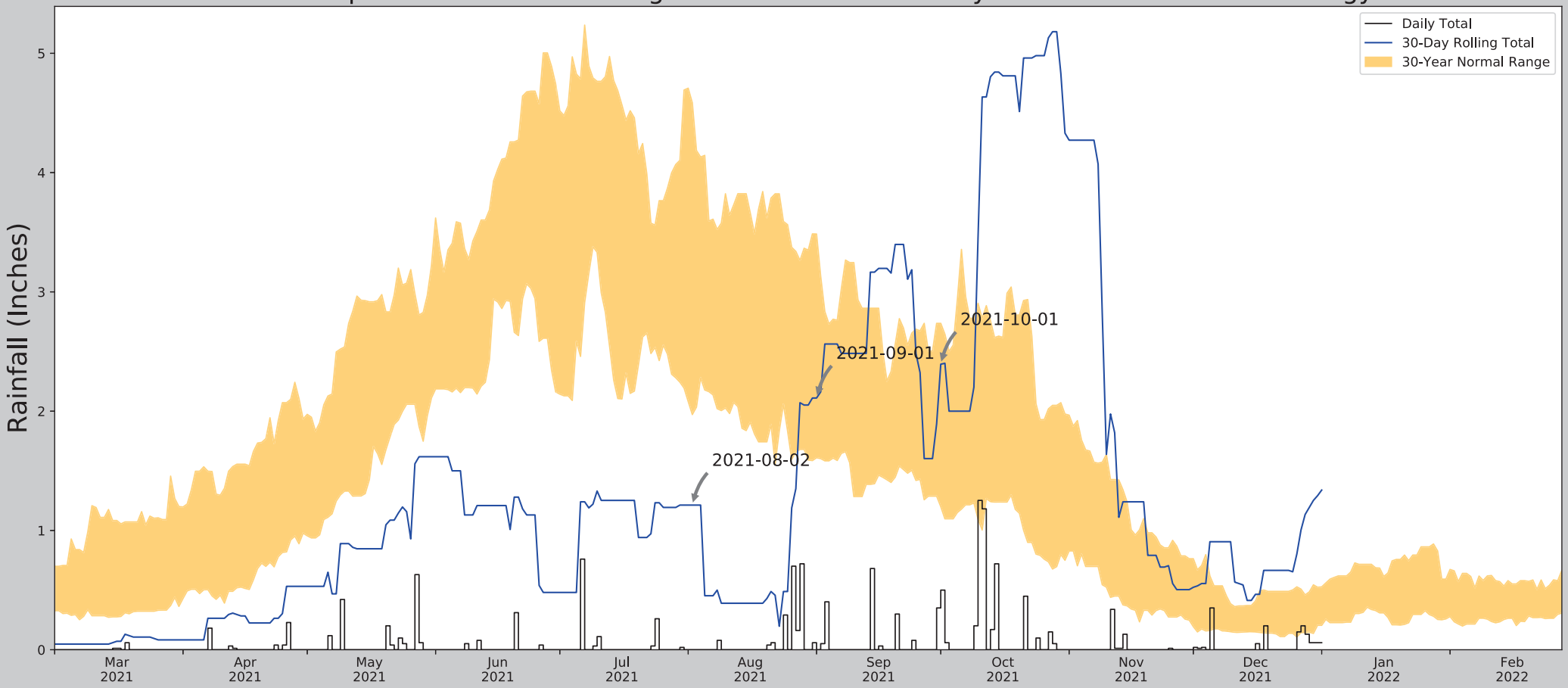
30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2021-09-30	1.287402	2.736221	1.893701	Normal	2	3	6
2021-08-31	1.585827	3.486221	2.110236	Normal	2	2	4
2021-08-01	1.971654	4.337008	1.212598	Dry	1	1	1
Result							Normal Conditions - 11

Figure and tables made by the **Antecedent Precipitation Tool** Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
ASHLEY 9.0 ENE	46.0651, -99.1913	2030.84	24.887	0.15	11.203	246	0
EUREKA 13.6 NNE	45.9385, -99.4787	2076.116	24.792	45.426	12.283	202	55
WISHEK	46.2608, -99.56	2037.074	2.67	6.384	1.219	6793	0
ASHLEY	46.0406, -99.3742	2014.108	20.196	16.582	9.423	4026	35
HAGUE	46.025, -99.9911	1897.966	26.019	132.724	15.162	49	0
NAPOLEON	46.5067, -99.7692	1979.987	17.158	50.703	8.591	37	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	46.287179, -99.600842
Observation Date	2021-10-01
Elevation (ft)	2030.69
Drought Index (PDSI)	Moderate wetness
WebWIMP H_2O Balance	Dry Season

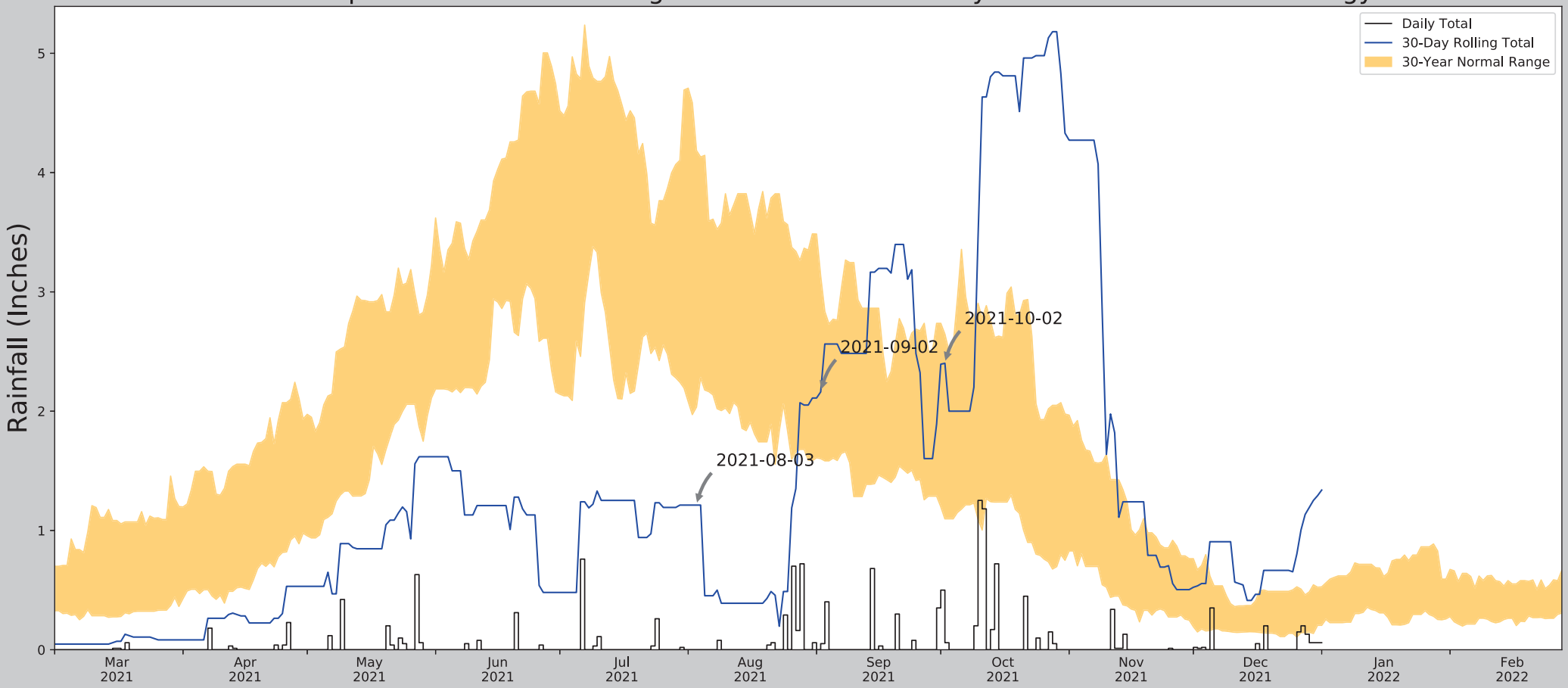
30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2021-10-01	1.199606	2.736221	2.393701	Normal	2	3	6
2021-09-01	1.609449	3.485039	2.110236	Normal	2	2	4
2021-08-02	1.971654	4.58504	1.212598	Dry	1	1	1
Result							Normal Conditions - 11

Figure and tables made by the **Antecedent Precipitation Tool** Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
ASHLEY 9.0 ENE	46.0651, -99.1913	2030.84	24.887	0.15	11.203	246	0
EUREKA 13.6 NNE	45.9385, -99.4787	2076.116	24.792	45.426	12.283	293	55
WISHEK	46.2608, -99.56	2037.074	2.67	6.384	1.219	6430	0
ASHLEY	46.0406, -99.3742	2014.108	20.196	16.582	9.423	4298	35
HAGUE	46.025, -99.9911	1897.966	26.019	132.724	15.162	49	0
NAPOLEON	46.5067, -99.7692	1979.987	17.158	50.703	8.591	37	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	46.287179, -99.600842
Observation Date	2021-10-02
Elevation (ft)	2030.69
Drought Index (PDSI)	Moderate wetness
WebWIMP H_2O Balance	Dry Season

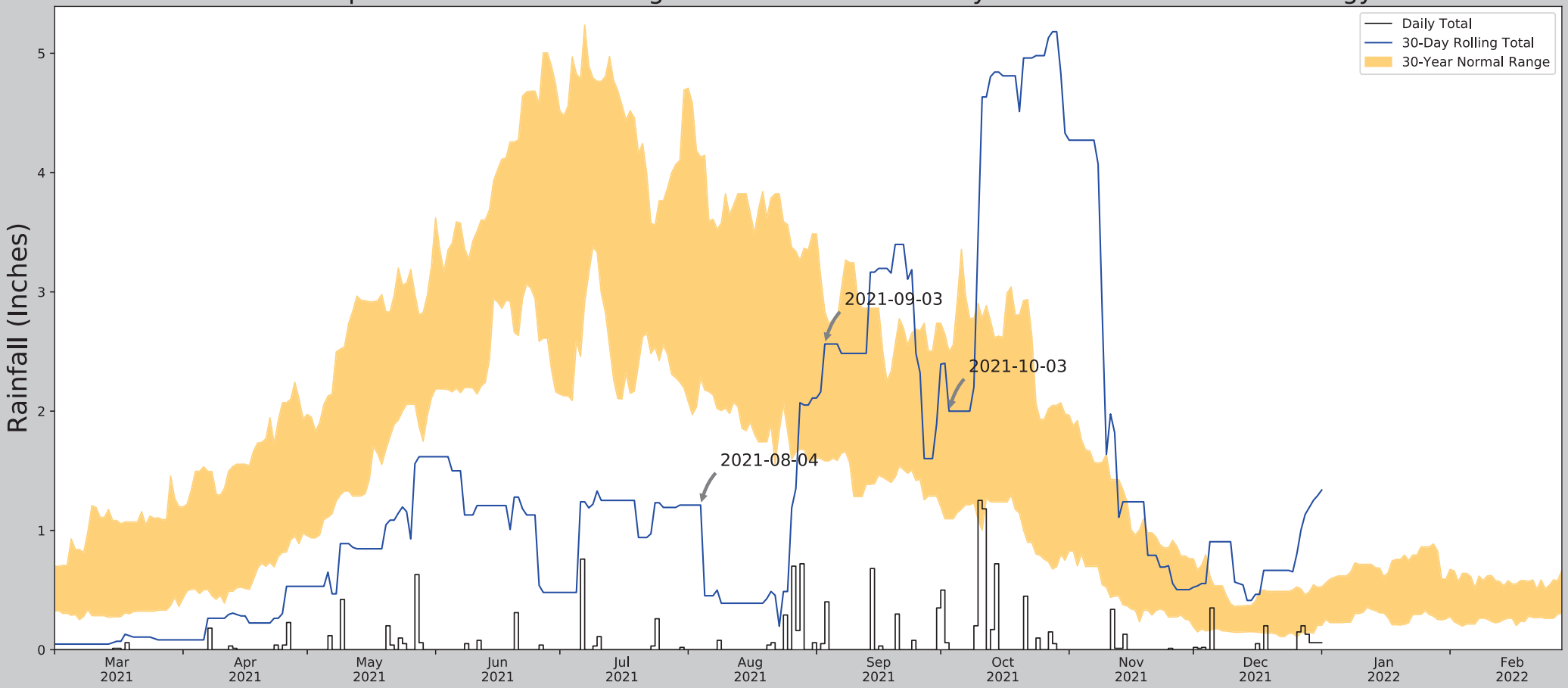
30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2021-10-02	1.097638	2.645276	2.401575	Normal	2	3	6
2021-09-02	1.602362	3.131102	2.161417	Normal	2	2	4
2021-08-03	2.034252	4.18504	1.212598	Dry	1	1	1
Result							Normal Conditions - 11

Figure and tables made by the **Antecedent Precipitation Tool** Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
ASHLEY 9.0 ENE	46.0651, -99.1913	2030.84	24.887	0.15	11.203	246	0
EUREKA 13.6 NNE	45.9385, -99.4787	2076.116	24.792	45.426	12.283	293	55
WISHEK	46.2608, -99.56	2037.074	2.67	6.384	1.219	6430	0
ASHLEY	46.0406, -99.3742	2014.108	20.196	16.582	9.423	4298	35
HAGUE	46.025, -99.9911	1897.966	26.019	132.724	15.162	49	0
NAPOLEON	46.5067, -99.7692	1979.987	17.158	50.703	8.591	37	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	46.287179, -99.600842
Observation Date	2021-10-03
Elevation (ft)	2030.69
Drought Index (PDSI)	Moderate wetness
WebWIMP H_2O Balance	Dry Season

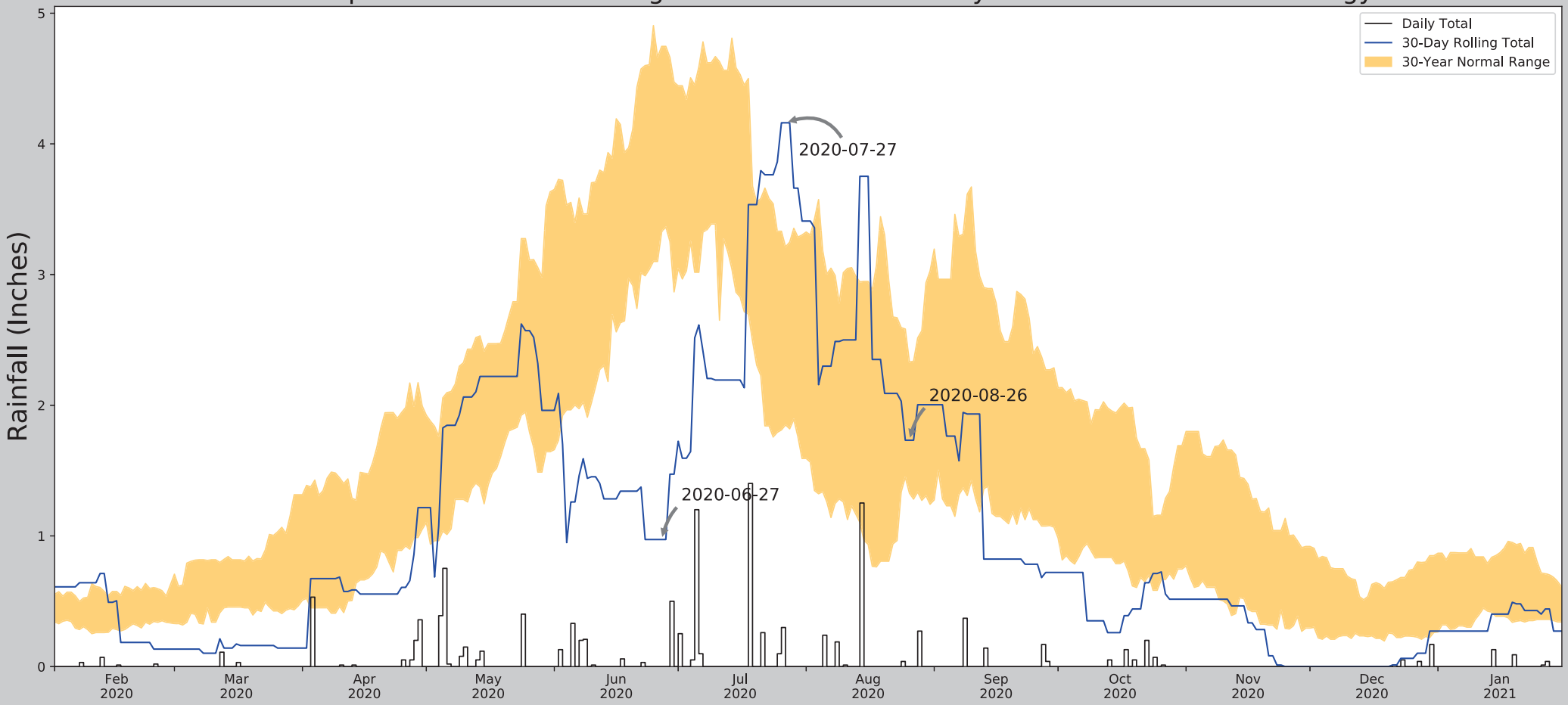
30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2021-10-03	1.097638	2.500394	2.0	Normal	2	3	6
2021-09-03	1.583465	2.835039	2.562992	Normal	2	2	4
2021-08-04	2.279134	4.130709	1.212598	Dry	1	1	1
Result							Normal Conditions - 11

Figure and tables made by the **Antecedent Precipitation Tool** Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
ASHLEY 9.0 ENE	46.0651, -99.1913	2030.84	24.887	0.15	11.203	246	0
EUREKA 13.6 NNE	45.9385, -99.4787	2076.116	24.792	45.426	12.283	293	55
WISHEK	46.2608, -99.56	2037.074	2.67	6.384	1.219	6430	0
ASHLEY	46.0406, -99.3742	2014.108	20.196	16.582	9.423	4298	35
HAGUE	46.025, -99.9911	1897.966	26.019	132.724	15.162	49	0
NAPOLEON	46.5067, -99.7692	1979.987	17.158	50.703	8.591	37	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	46.287179, -99.600842
Observation Date	2020-08-26
Elevation (ft)	2030.69
Drought Index (PDSI)	Extreme wetness
WebWIMP H_2O Balance	Dry Season

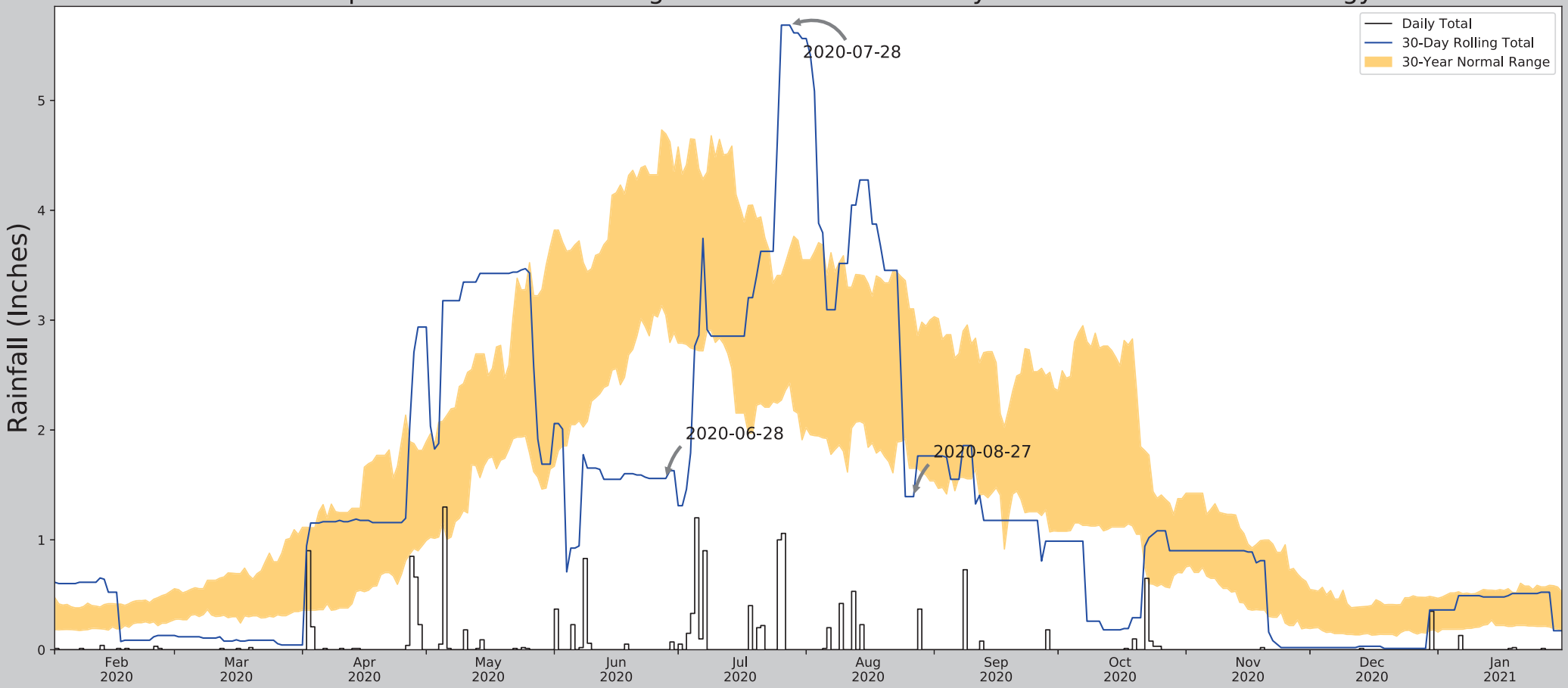
30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2020-08-26	1.326772	2.330709	1.732284	Normal	2	3	6
2020-07-27	1.849213	3.212205	4.161417	Wet	3	2	6
2020-06-27	3.327953	4.746457	0.972441	Dry	1	1	1
Result							Normal Conditions - 13

Figure and tables made by the
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
NAPOLEON	46.5067, -99.7692	1979.987	17.158	50.703	8.591	11281	86
WISHEK	46.2608, -99.56	2037.074	19.7	57.087	9.99	35	0
ASHLEY	46.0406, -99.3742	2014.108	37.323	34.121	18.069	36	4

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	46.287179, -99.600842
Observation Date	2020-08-27
Elevation (ft)	2030.69
Drought Index (PDSI)	Extreme wetness
WebWIMP H_2O Balance	Dry Season

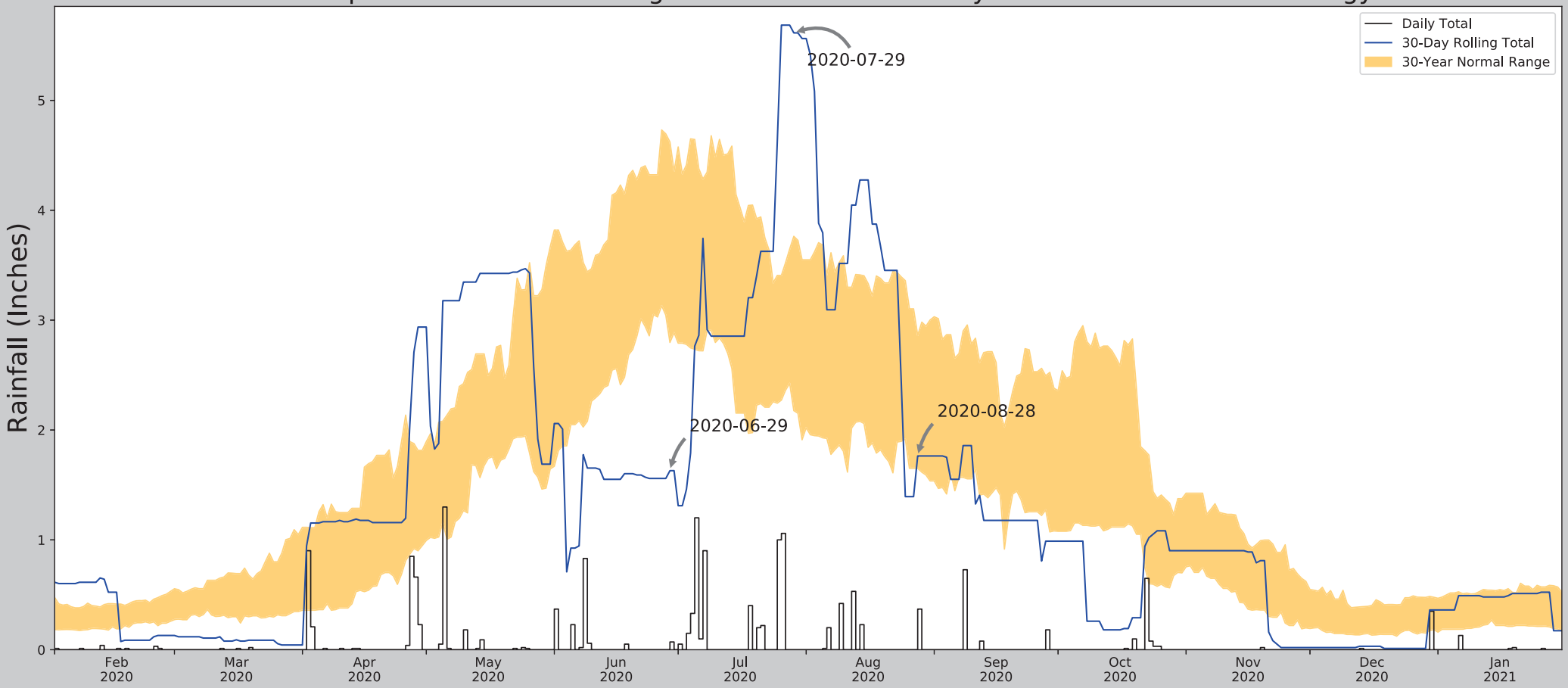
30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2020-08-27	1.651575	3.102756	1.393701	Dry	1	3	3
2020-07-28	2.424016	3.646851	5.68504	Wet	3	2	6
2020-06-28	3.045669	4.694882	1.559055	Dry	1	1	1
Result							Normal Conditions - 10

Figure and tables made by the
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
EUREKA 13.6 NNE	45.9385, -99.4787	2076.116	24.792	45.426	12.283	128	44
ASHLEY 9.0 ENE	46.0651, -99.1913	2030.84	24.887	0.15	11.203	240	0
ASHLEY	46.0406, -99.3742	2014.108	20.196	16.582	9.423	10874	46
WISHEK	46.2608, -99.56	2037.074	2.67	6.384	1.219	29	0
HAGUE	46.025, -99.9911	1897.966	26.019	132.724	15.162	49	0
NAPOLEON	46.5067, -99.7692	1979.987	17.158	50.703	8.591	32	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	46.287179, -99.600842
Observation Date	2020-08-28
Elevation (ft)	2030.69
Drought Index (PDSI)	Extreme wetness
WebWIMP H_2O Balance	Dry Season

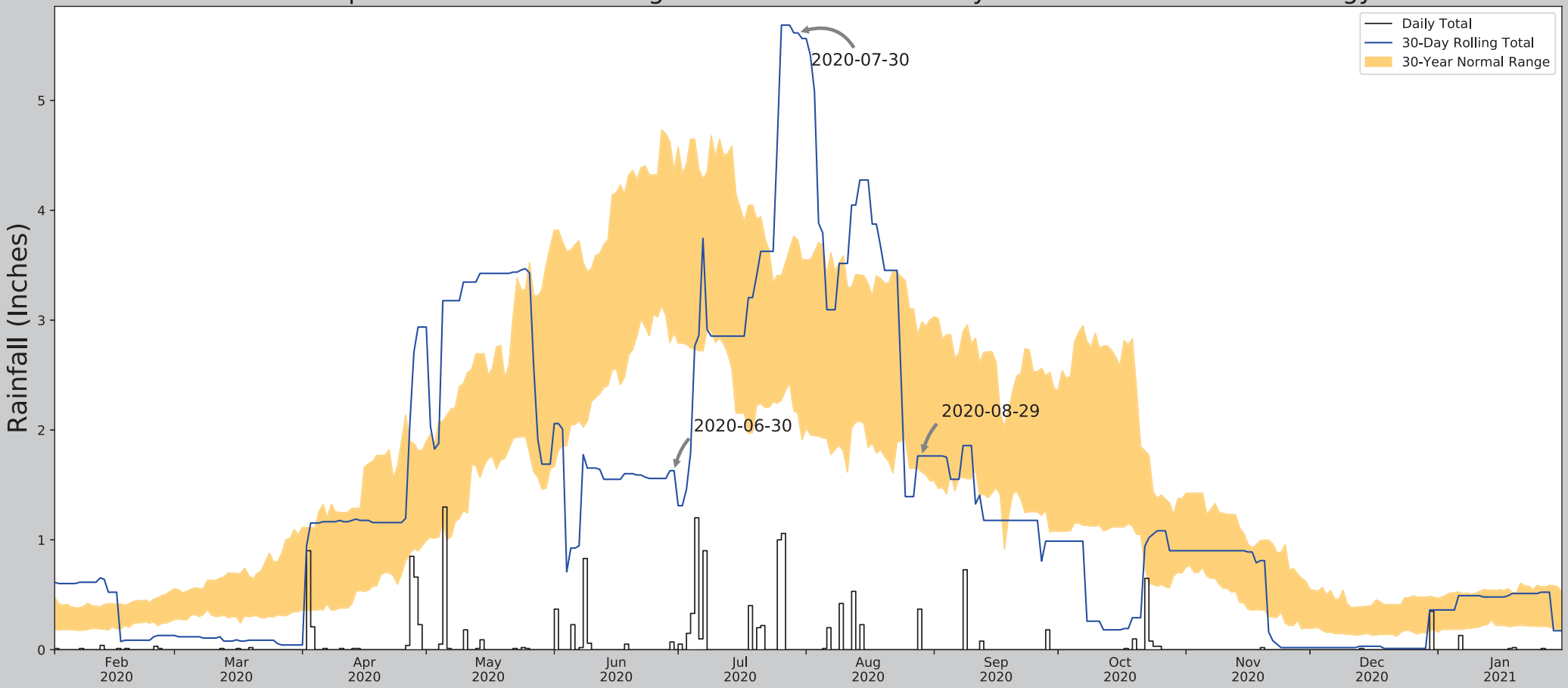
30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2020-08-28	1.651575	2.861024	1.76378	Normal	2	3	6
2020-07-29	2.176378	3.762599	5.614173	Wet	3	2	6
2020-06-29	2.797244	4.622047	1.629921	Dry	1	1	1
Result							Normal Conditions - 13

Figure and tables made by the **Antecedent Precipitation Tool** Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
EUREKA 13.6 NNE	45.9385, -99.4787	2076.116	24.792	45.426	12.283	128	45
ASHLEY 9.0 ENE	46.0651, -99.1913	2030.84	24.887	0.15	11.203	240	0
ASHLEY	46.0406, -99.3742	2014.108	20.196	16.582	9.423	10874	45
WISHEK	46.2608, -99.56	2037.074	2.67	6.384	1.219	29	0
HAGUE	46.025, -99.9911	1897.966	26.019	132.724	15.162	49	0
NAPOLEON	46.5067, -99.7692	1979.987	17.158	50.703	8.591	32	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	46.287179, -99.600842
Observation Date	2020-08-29
Elevation (ft)	2030.69
Drought Index (PDSI)	Extreme wetness
WebWIMP H_2O Balance	Dry Season

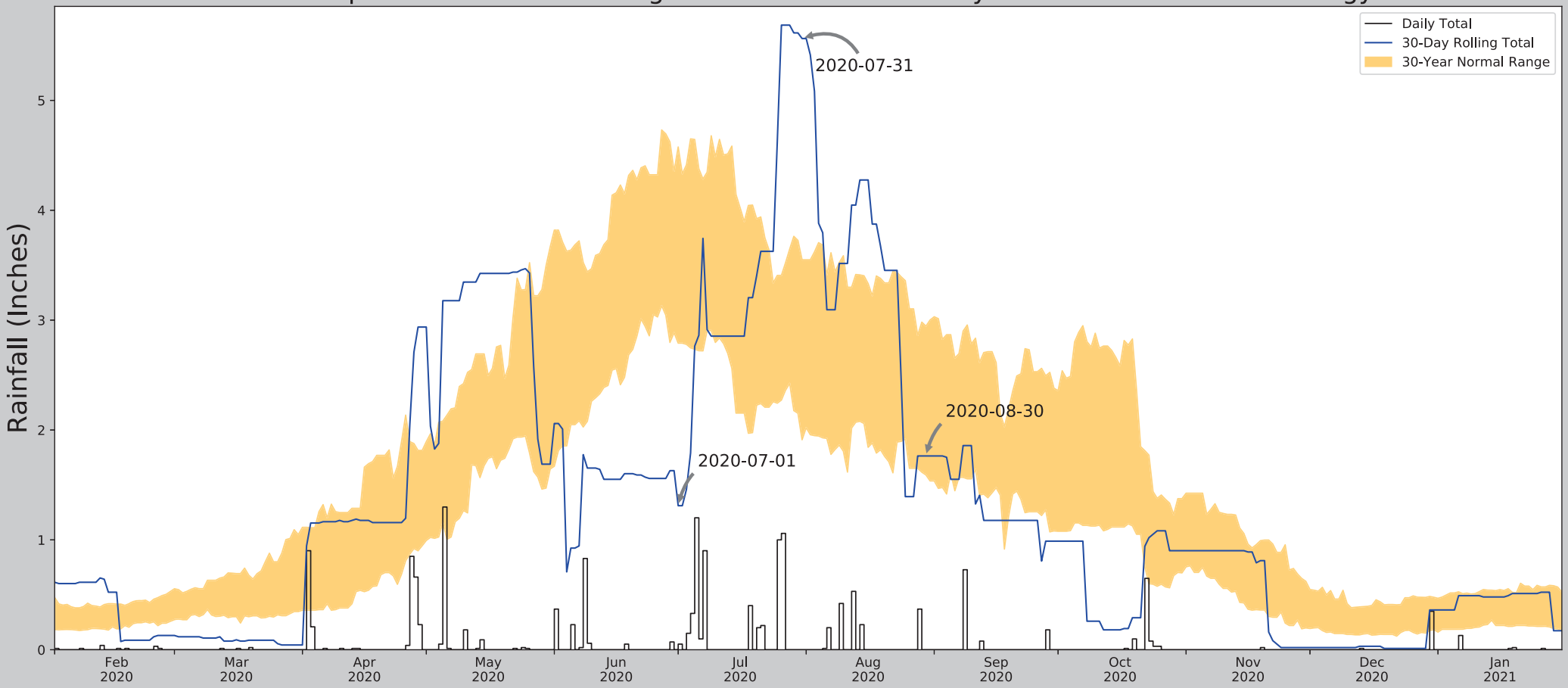
30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2020-08-29	1.616142	2.981496	1.76378	Normal	2	3	6
2020-07-30	2.152362	3.725591	5.614173	Wet	3	2	6
2020-06-30	2.885827	4.355512	1.629921	Dry	1	1	1
Result							Normal Conditions - 13

Figure and tables made by the
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
EUREKA 13.6 NNE	45.9385, -99.4787	2076.116	24.792	45.426	12.283	128	45
ASHLEY 9.0 ENE	46.0651, -99.1913	2030.84	24.887	0.15	11.203	240	0
ASHLEY	46.0406, -99.3742	2014.108	20.196	16.582	9.423	10874	45
WISHEK	46.2608, -99.56	2037.074	2.67	6.384	1.219	29	0
HAGUE	46.025, -99.9911	1897.966	26.019	132.724	15.162	49	0
NAPOLEON	46.5067, -99.7692	1979.987	17.158	50.703	8.591	32	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	46.287179, -99.600842
Observation Date	2020-08-30
Elevation (ft)	2030.69
Drought Index (PDSI)	Extreme wetness
WebWIMP H_2O Balance	Dry Season

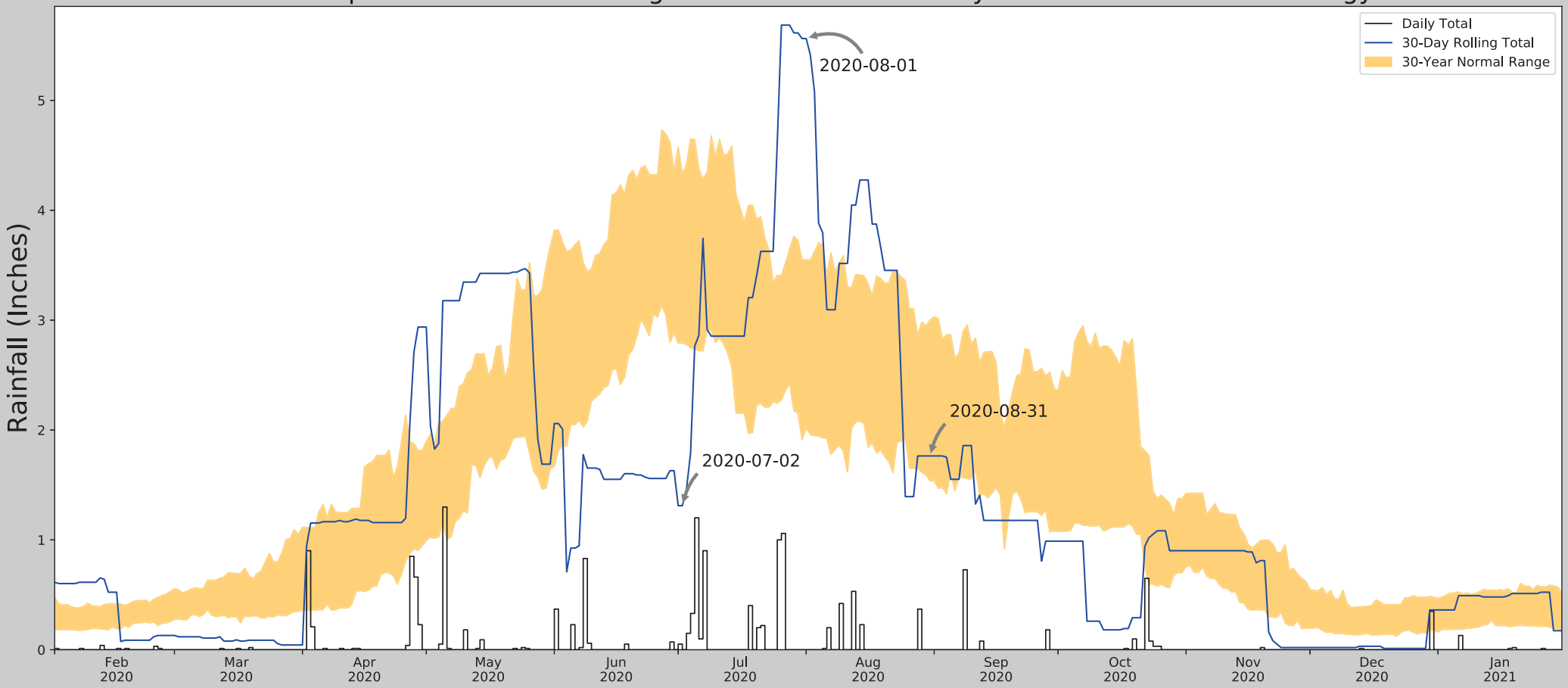
30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2020-08-30	1.590551	2.945276	1.76378	Normal	2	3	6
2020-07-31	1.911417	3.549213	5.562992	Wet	3	2	6
2020-07-01	2.790551	4.575984	1.311024	Dry	1	1	1
Result							Normal Conditions - 13

Figure and tables made by the **Antecedent Precipitation Tool** Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
EUREKA 13.6 NNE	45.9385, -99.4787	2076.116	24.792	45.426	12.283	128	44
ASHLEY 9.0 ENE	46.0651, -99.1913	2030.84	24.887	0.15	11.203	240	0
ASHLEY	46.0406, -99.3742	2014.108	20.196	16.582	9.423	10874	46
WISHEK	46.2608, -99.56	2037.074	2.67	6.384	1.219	29	0
HAGUE	46.025, -99.9911	1897.966	26.019	132.724	15.162	49	0
NAPOLEON	46.5067, -99.7692	1979.987	17.158	50.703	8.591	32	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	46.287179, -99.600842
Observation Date	2020-08-31
Elevation (ft)	2030.69
Drought Index (PDSI)	Extreme wetness
WebWIMP H_2O Balance	Dry Season

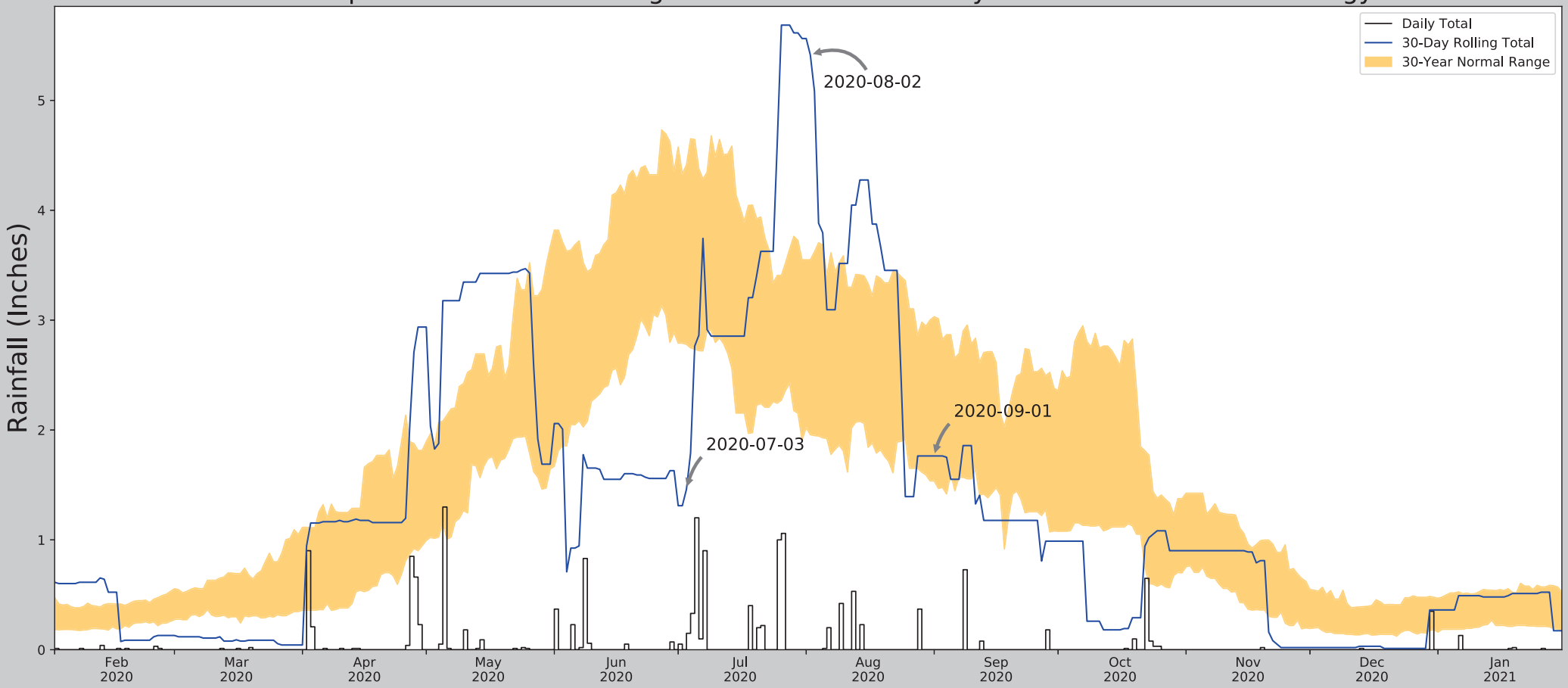
30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2020-08-31	1.536614	3.001181	1.76378	Normal	2	3	6
2020-08-01	2.020473	3.549213	5.562992	Wet	3	2	6
2020-07-02	2.790551	4.332284	1.311024	Dry	1	1	1
Result							Normal Conditions - 13

Figure and tables made by the **Antecedent Precipitation Tool** Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
EUREKA 13.6 NNE	45.9385, -99.4787	2076.116	24.792	45.426	12.283	128	44
ASHLEY 9.0 ENE	46.0651, -99.1913	2030.84	24.887	0.15	11.203	240	0
ASHLEY	46.0406, -99.3742	2014.108	20.196	16.582	9.423	10874	46
WISHEK	46.2608, -99.56	2037.074	2.67	6.384	1.219	29	0
HAGUE	46.025, -99.9911	1897.966	26.019	132.724	15.162	49	0
NAPOLEON	46.5067, -99.7692	1979.987	17.158	50.703	8.591	32	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	46.287179, -99.600842
Observation Date	2020-09-01
Elevation (ft)	2030.69
Drought Index (PDSI)	Normal
WebWIMP H_2O Balance	Dry Season

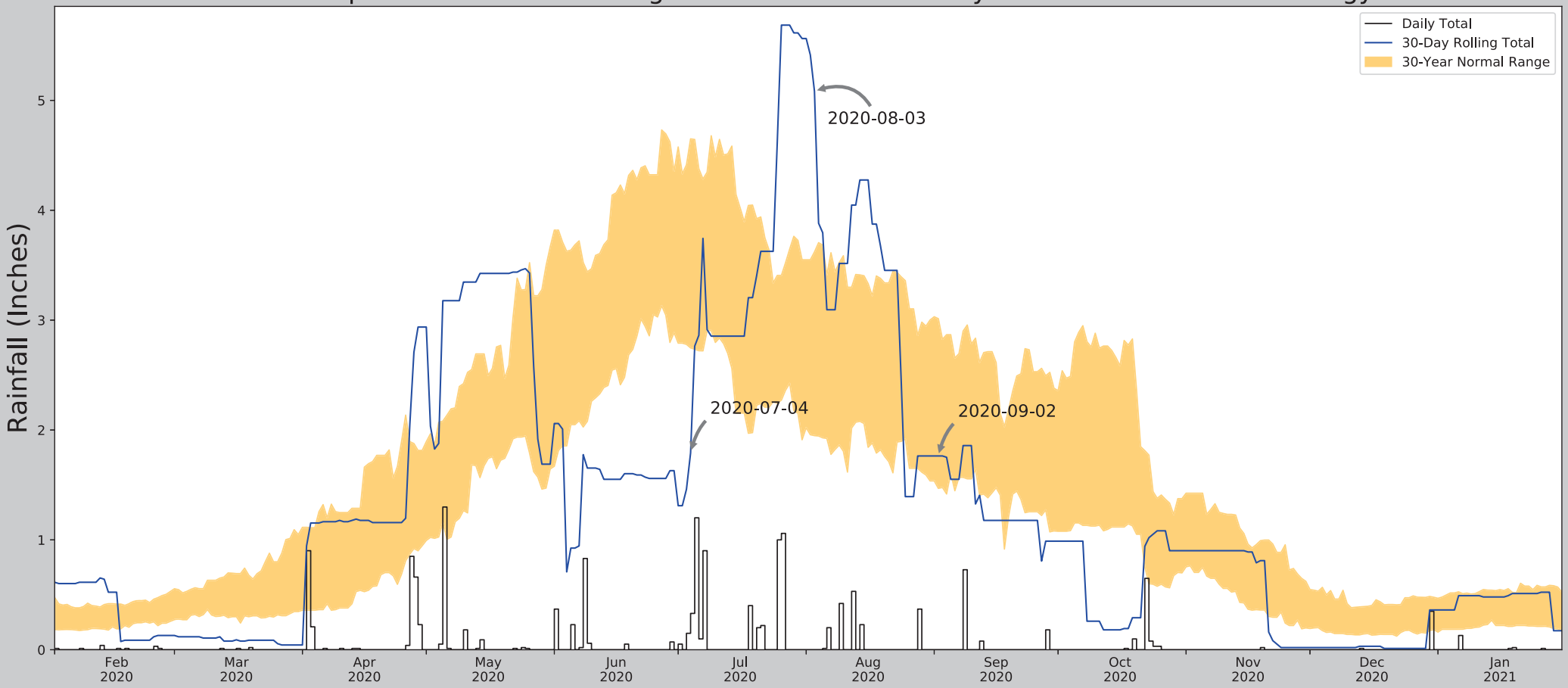
30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2020-09-01	1.536614	3.030709	1.76378	Normal	2	3	6
2020-08-02	1.957087	3.549213	5.413386	Wet	3	2	6
2020-07-03	2.779528	4.412992	1.46063	Dry	1	1	1
Result							Normal Conditions - 13

Figure and tables made by the **Antecedent Precipitation Tool** Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
EUREKA 13.6 NNE	45.9385, -99.4787	2076.116	24.792	45.426	12.283	128	44
ASHLEY 9.0 ENE	46.0651, -99.1913	2030.84	24.887	0.15	11.203	240	0
ASHLEY	46.0406, -99.3742	2014.108	20.196	16.582	9.423	10874	46
WISHEK	46.2608, -99.56	2037.074	2.67	6.384	1.219	29	0
HAGUE	46.025, -99.9911	1897.966	26.019	132.724	15.162	49	0
NAPOLEON	46.5067, -99.7692	1979.987	17.158	50.703	8.591	32	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	46.287179, -99.600842
Observation Date	2020-09-02
Elevation (ft)	2030.69
Drought Index (PDSI)	Normal
WebWIMP H_2O Balance	Dry Season

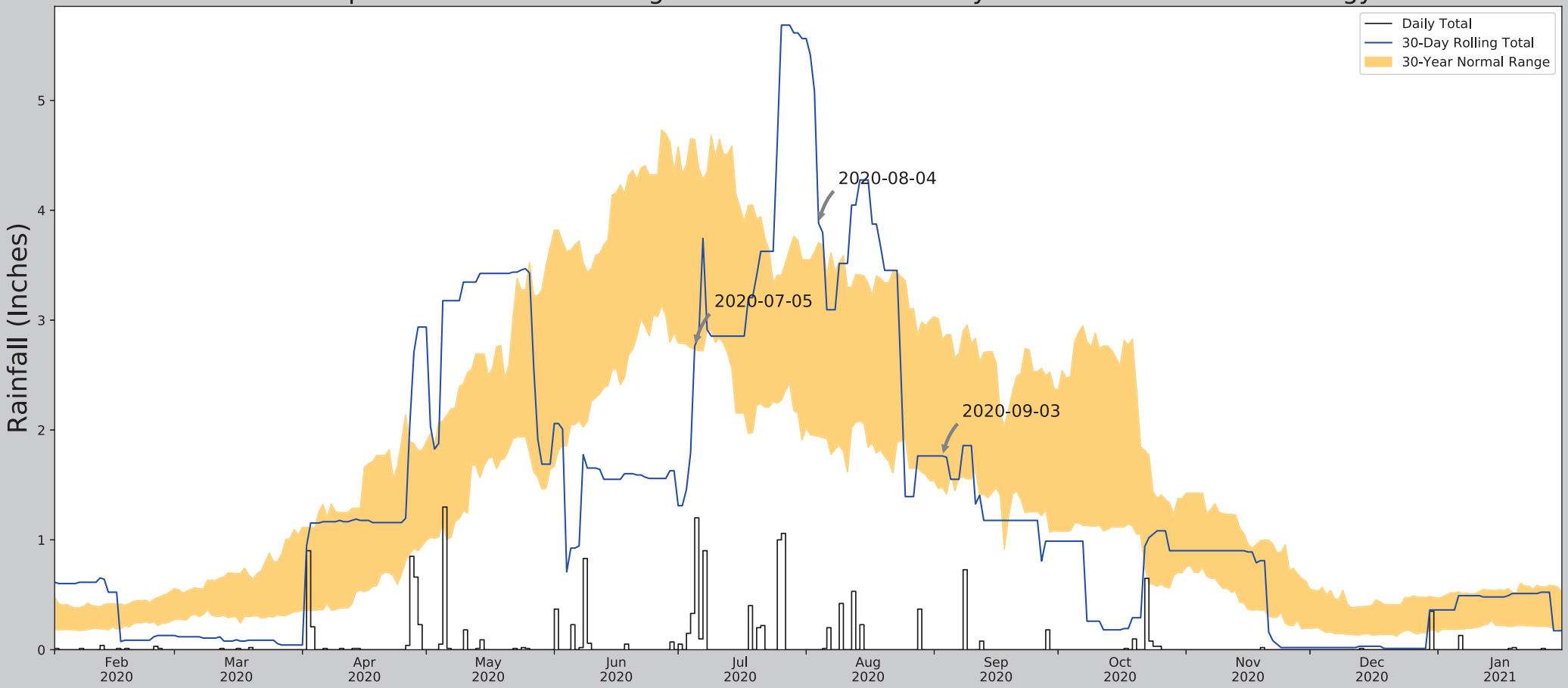
30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2020-09-02	1.468898	3.013386	1.76378	Normal	2	3	6
2020-08-03	1.948819	3.620473	5.082677	Wet	3	2	6
2020-07-04	2.747244	4.65	1.791339	Dry	1	1	1
Result							Normal Conditions - 13

Figure and tables made by the **Antecedent Precipitation Tool** Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
EUREKA 13.6 NNE	45.9385, -99.4787	2076.116	24.792	45.426	12.283	128	43
ASHLEY 9.0 ENE	46.0651, -99.1913	2030.84	24.887	0.15	11.203	240	0
ASHLEY	46.0406, -99.3742	2014.108	20.196	16.582	9.423	10874	47
WISHEK	46.2608, -99.56	2037.074	2.67	6.384	1.219	29	0
HAGUE	46.025, -99.9911	1897.966	26.019	132.724	15.162	49	0
NAPOLEON	46.5067, -99.7692	1979.987	17.158	50.703	8.591	32	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	46.287179, -99.600842
Observation Date	2020-09-03
Elevation (ft)	2030.69
Drought Index (PDSI)	Normal
WebWIMP H_2O Balance	Dry Season

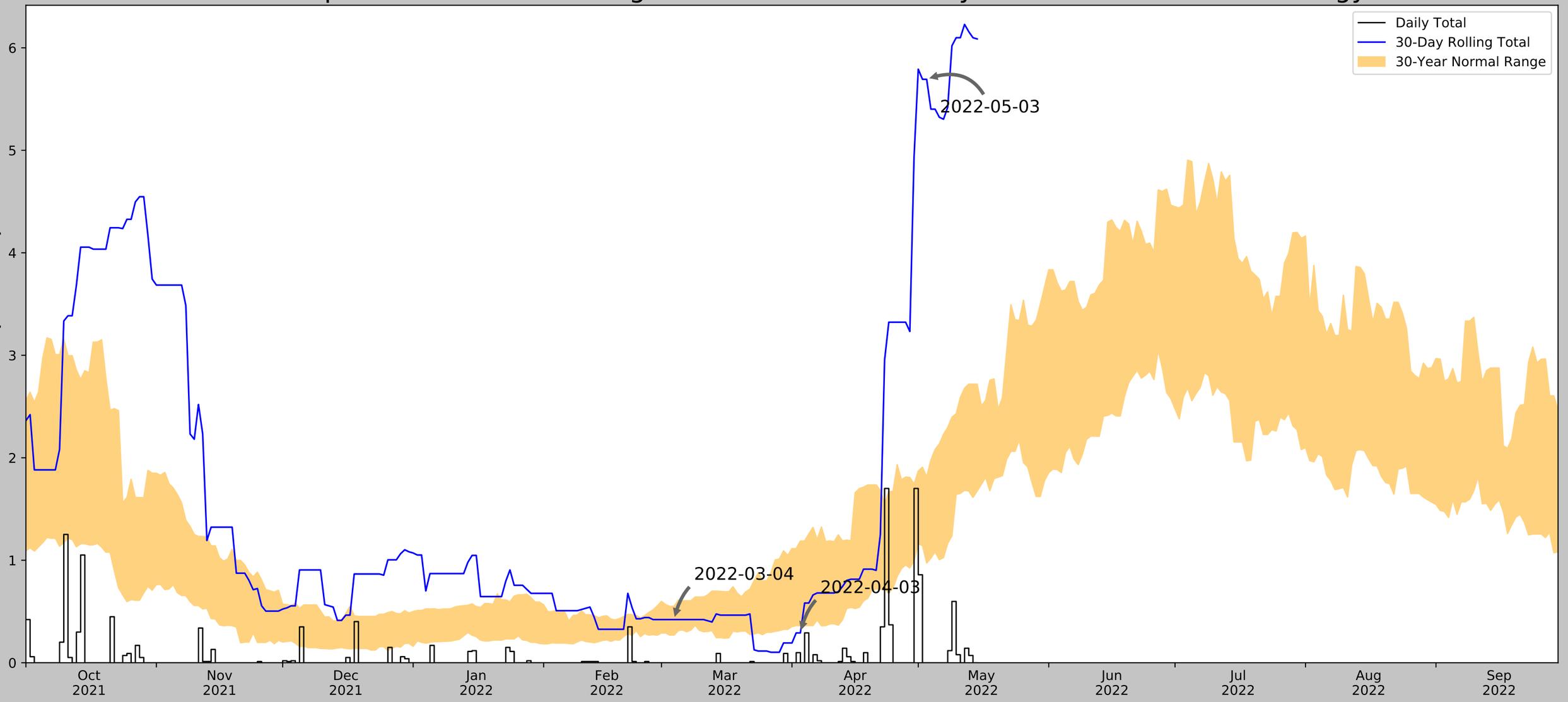
30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2020-09-03	1.476772	2.825984	1.76378	Normal	2	3	6
2020-08-04	1.945276	3.705118	3.88189	Wet	3	2	6
2020-07-05	2.735039	4.644095	2.76378	Normal	2	1	2
Result							Normal Conditions - 14

Figure and tables made by the **Antecedent Precipitation Tool** Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
EUREKA 13.6 NNE	45.9385, -99.4787	2076.116	24.792	45.426	12.283	128	43
ASHLEY 9.0 ENE	46.0651, -99.1913	2030.84	24.887	0.15	11.203	240	0
ASHLEY	46.0406, -99.3742	2014.108	20.196	16.582	9.423	10874	47
WISHEK	46.2608, -99.56	2037.074	2.67	6.384	1.219	29	0
HAGUE	46.025, -99.9911	1897.966	26.019	132.724	15.162	49	0
NAPOLEON	46.5067, -99.7692	1979.987	17.158	50.703	8.591	32	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	46.287179, -99.600842
Observation Date	2022-05-03
Elevation (ft)	2030.69
Drought Index (PDSI)	Extreme wetness (2022-04)
WebWIMP H_2O Balance	Dry Season

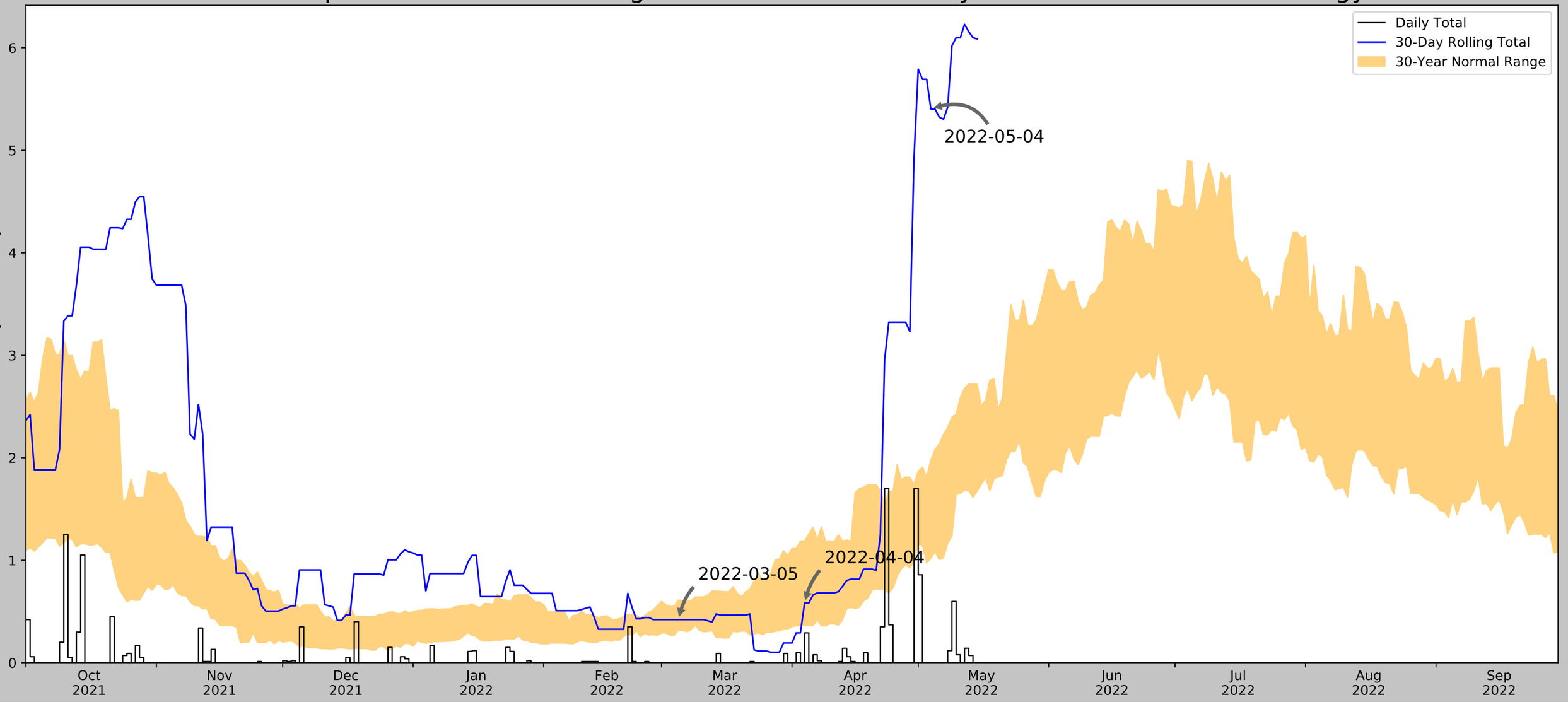
30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2022-05-03	0.972835	1.81378	5.692914	Wet	3	3	9
2022-04-03	0.362205	1.187795	0.291339	Dry	1	2	2
2022-03-04	0.269685	0.550394	0.42126	Normal	2	1	2
Result							Normal Conditions - 13

Figure and tables made by the
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
ASHLEY	46.0406, -99.3742	2014.108	20.196	16.582	9.423	11221	90
ASHLEY 9.0 ENE	46.0651, -99.1913	2030.84	8.932	16.732	4.169	17	0
WISHEK	46.2608, -99.56	2037.074	17.623	22.966	8.335	29	0
ARTAS 1S	45.8811, -99.7983	1814.961	23.16	199.147	15.034	77	0
HAGUE	46.025, -99.9911	1897.966	29.611	116.142	16.764	9	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	46.287179, -99.600842
Observation Date	2022-05-04
Elevation (ft)	2030.69
Drought Index (PDSI)	Extreme wetness (2022-04)
WebWIMP H_2O Balance	Dry Season

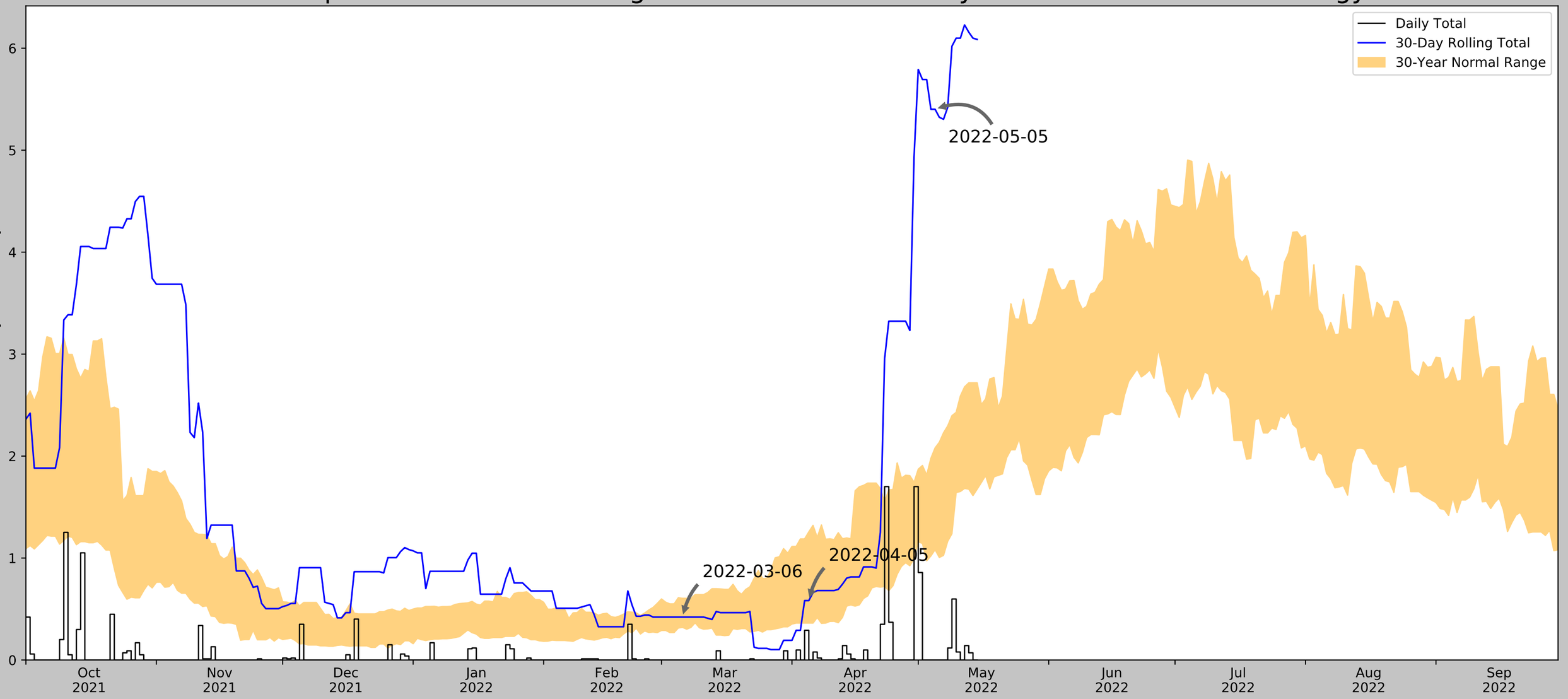
30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2022-05-04	1.020472	1.978347	5.401575	Wet	3	3	9
2022-04-04	0.362205	1.187795	0.582677	Normal	2	2	4
2022-03-05	0.314173	0.611024	0.42126	Normal	2	1	2
Result							Wetter than Normal - 15

Figure and tables made by the
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
ASHLEY	46.0406, -99.3742	2014.108	20.196	16.582	9.423	11221	90
ASHLEY 9.0 ENE	46.0651, -99.1913	2030.84	8.932	16.732	4.169	17	0
WISHEK	46.2608, -99.56	2037.074	17.623	22.966	8.335	29	0
ARTAS 1S	45.8811, -99.7983	1814.961	23.16	199.147	15.034	77	0
HAGUE	46.025, -99.9911	1897.966	29.611	116.142	16.764	9	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	46.287179, -99.600842
Observation Date	2022-05-05
Elevation (ft)	2030.69
Drought Index (PDSI)	Extreme wetness (2022-04)
WebWIMP H_2O Balance	Dry Season

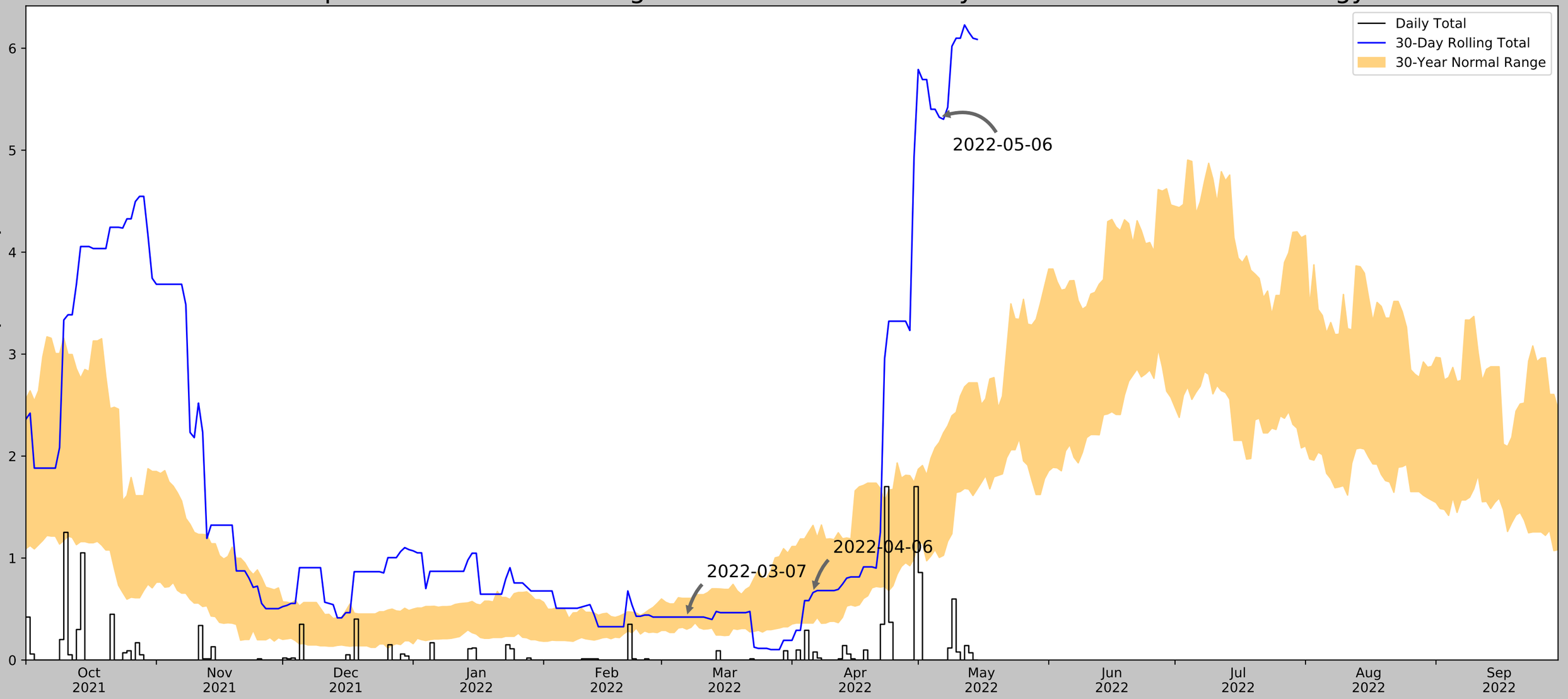
30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2022-05-05	1.082283	2.080709	5.401575	Wet	3	3	9
2022-04-05	0.362205	1.256693	0.582677	Normal	2	2	4
2022-03-06	0.320472	0.605118	0.42126	Normal	2	1	2
Result							Wetter than Normal - 15

Figure and tables made by the
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
ASHLEY	46.0406, -99.3742	2014.108	20.196	16.582	9.423	11221	89
ASHLEY 9.0 ENE	46.0651, -99.1913	2030.84	8.932	16.732	4.169	17	0
WISHEK	46.2608, -99.56	2037.074	17.623	22.966	8.335	29	0
ARTAS 1S	45.8811, -99.7983	1814.961	23.16	199.147	15.034	77	0
HAGUE	46.025, -99.9911	1897.966	29.611	116.142	16.764	9	0
Linear Interpolation	N/A	N/A	N/A	N/A	N/A	0	1

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	46.287179, -99.600842
Observation Date	2022-05-06
Elevation (ft)	2030.69
Drought Index (PDSI)	Extreme wetness (2022-04)
WebWIMP H_2O Balance	Dry Season

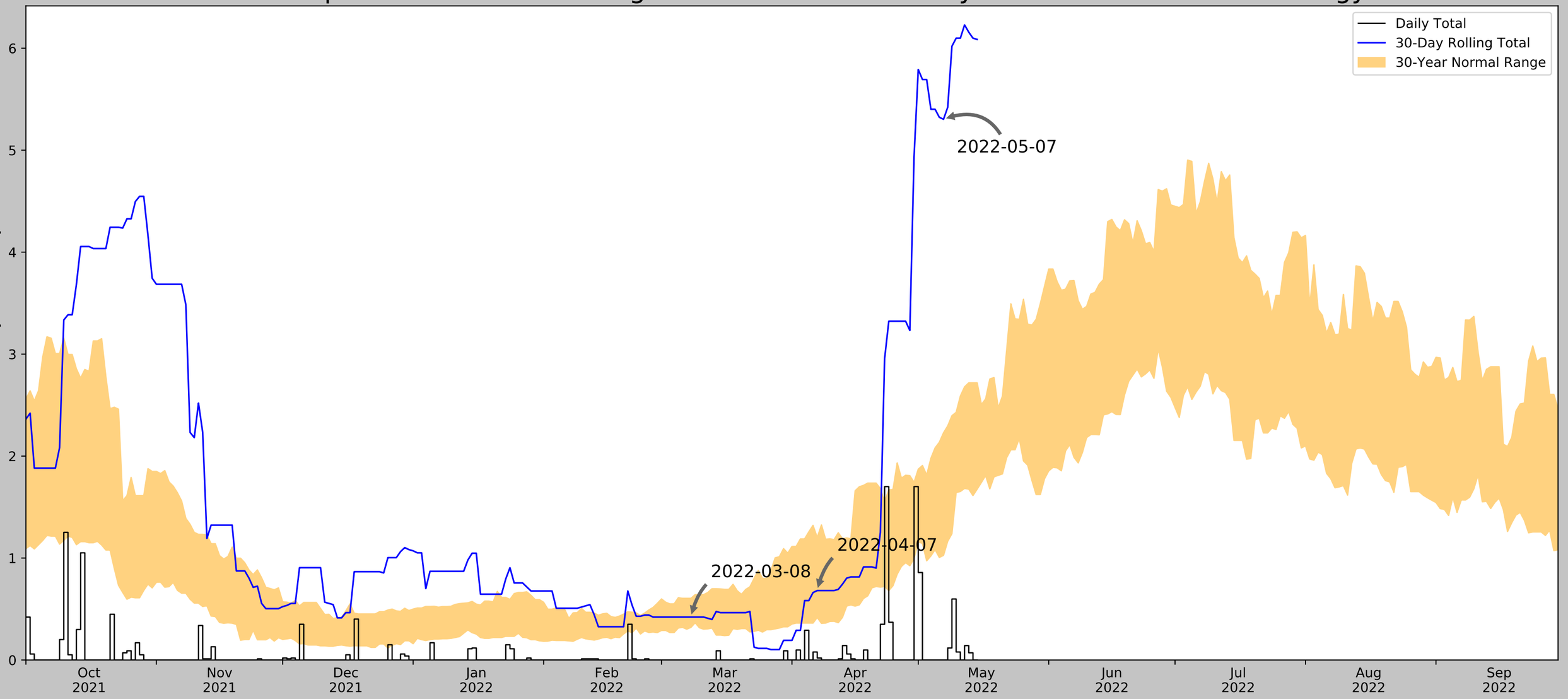
30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2022-05-06	1.005906	2.135039	5.322835	Wet	3	3	9
2022-04-06	0.362205	1.320866	0.661417	Normal	2	2	4
2022-03-07	0.302362	0.605118	0.42126	Normal	2	1	2
Result							Wetter than Normal - 15

Figure and tables made by the
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
ASHLEY	46.0406, -99.3742	2014.108	20.196	16.582	9.423	11221	89
ASHLEY 9.0 ENE	46.0651, -99.1913	2030.84	8.932	16.732	4.169	17	0
WISHEK	46.2608, -99.56	2037.074	17.623	22.966	8.335	29	0
ARTAS 1S	45.8811, -99.7983	1814.961	23.16	199.147	15.034	77	0
HAGUE	46.025, -99.9911	1897.966	29.611	116.142	16.764	9	0
Linear Interpolation	N/A	N/A	N/A	N/A	N/A	0	1

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	46.287179, -99.600842
Observation Date	2022-05-07
Elevation (ft)	2030.69
Drought Index (PDSI)	Extreme wetness (2022-04)
WebWIMP H_2O Balance	Dry Season

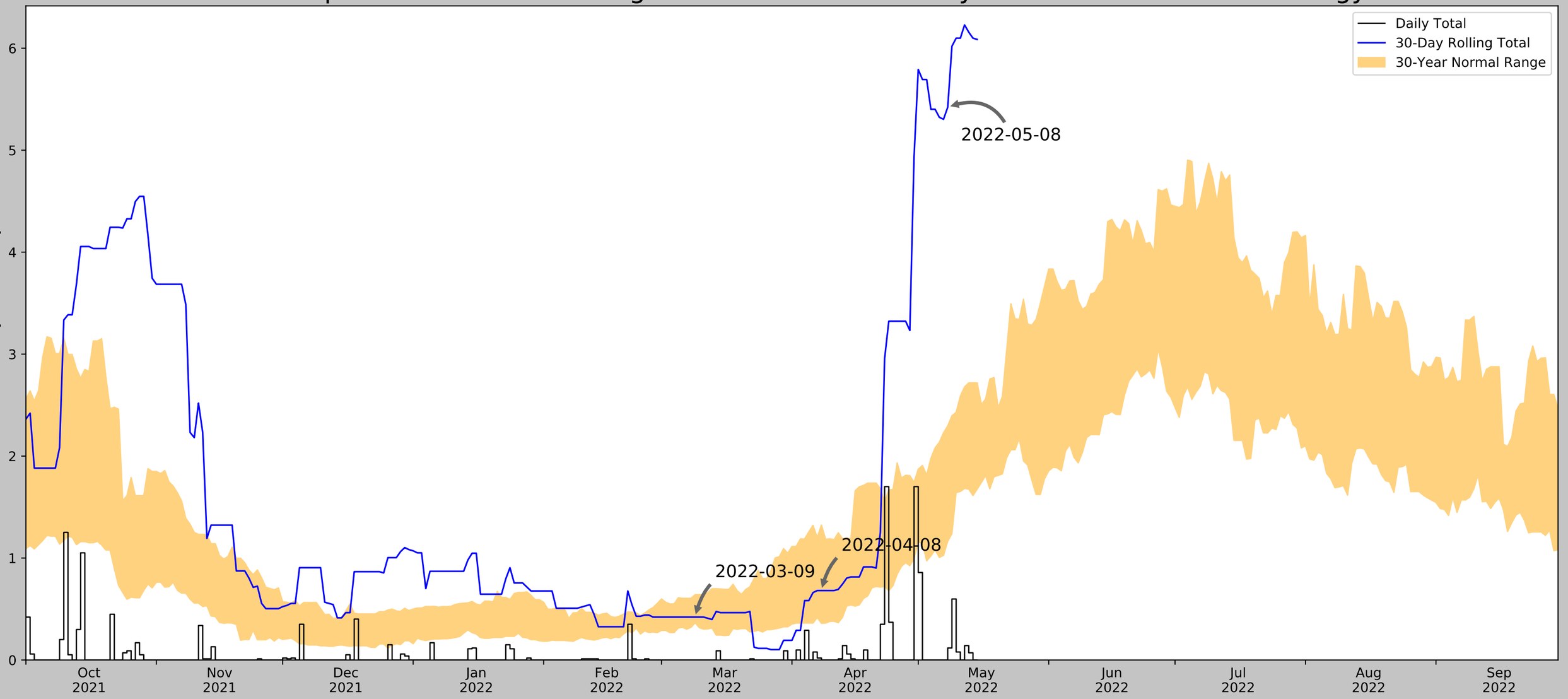
30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2022-05-07	1.026378	2.228347	5.30315	Wet	3	3	9
2022-04-07	0.417323	1.201575	0.681102	Normal	2	2	4
2022-03-08	0.320079	0.605118	0.42126	Normal	2	1	2
Result							Wetter than Normal - 15

Figure and tables made by the
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
ASHLEY	46.0406, -99.3742	2014.108	20.196	16.582	9.423	11221	89
ASHLEY 9.0 ENE	46.0651, -99.1913	2030.84	8.932	16.732	4.169	17	0
WISHEK	46.2608, -99.56	2037.074	17.623	22.966	8.335	29	0
ARTAS 1S	45.8811, -99.7983	1814.961	23.16	199.147	15.034	77	0
HAGUE	46.025, -99.9911	1897.966	29.611	116.142	16.764	9	0
Linear Interpolation	N/A	N/A	N/A	N/A	N/A	0	1

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	46.287179, -99.600842
Observation Date	2022-05-08
Elevation (ft)	2030.69
Drought Index (PDSI)	Extreme wetness (2022-04)
WebWIMP H_2O Balance	Dry Season

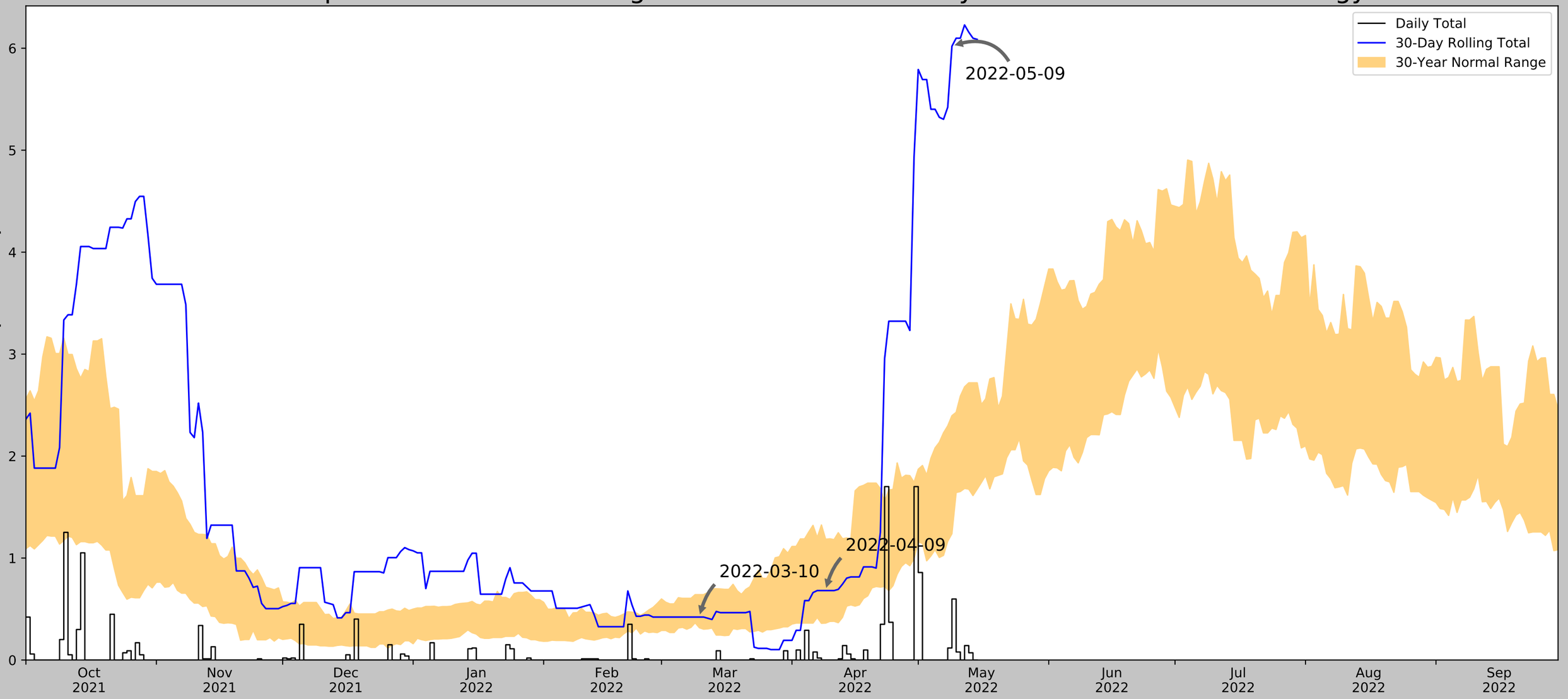
30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2022-05-08	1.164961	2.296063	5.42126	Wet	3	3	9
2022-04-08	0.359843	1.324803	0.681102	Normal	2	2	4
2022-03-09	0.365354	0.641339	0.42126	Normal	2	1	2
Result							Wetter than Normal - 15

Figure and tables made by the
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
ASHLEY	46.0406, -99.3742	2014.108	20.196	16.582	9.423	11221	89
ASHLEY 9.0 ENE	46.0651, -99.1913	2030.84	8.932	16.732	4.169	17	0
WISHEK	46.2608, -99.56	2037.074	17.623	22.966	8.335	29	0
ARTAS 1S	45.8811, -99.7983	1814.961	23.16	199.147	15.034	77	0
HAGUE	46.025, -99.9911	1897.966	29.611	116.142	16.764	9	0
Linear Interpolation		N/A	N/A	N/A	N/A	0	1

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	46.287179, -99.600842
Observation Date	2022-05-09
Elevation (ft)	2030.69
Drought Index (PDSI)	Extreme wetness (2022-04)
WebWIMP H_2O Balance	Dry Season

30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2022-05-09	1.238583	2.396063	6.019685	Wet	3	3	9
2022-04-09	0.362205	1.184252	0.681102	Normal	2	2	4
2022-03-10	0.316535	0.641339	0.42126	Normal	2	1	2
Result							Wetter than Normal - 15

Figure and tables made by the
Antecedent Precipitation Tool
Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
ASHLEY	46.0406, -99.3742	2014.108	20.196	16.582	9.423	11221	89
ASHLEY 9.0 ENE	46.0651, -99.1913	2030.84	8.932	16.732	4.169	17	0
WISHEK	46.2608, -99.56	2037.074	17.623	22.966	8.335	29	0
ARTAS 1S	45.8811, -99.7983	1814.961	23.16	199.147	15.034	77	0
HAGUE	46.025, -99.9911	1897.966	29.611	116.142	16.764	9	0
Linear Interpolation		N/A	N/A	N/A	N/A	0	1

APPENDIX C

PHOTOGRAPHIC LOG

PHOTOGRAPHIC LOG

Photo #: 1 Date: 09/28/2021

Direction: North

General view of upland landscape in agricultural setting (soybean field).

46.306183, -99.529285

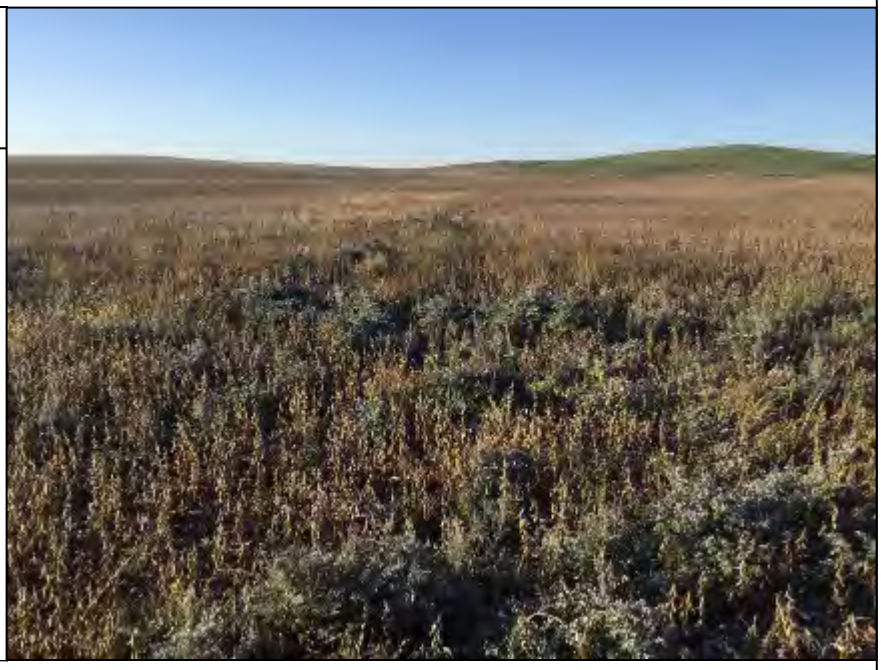


Photo #: 2 Date: 09/28/2021

Direction: North

General view of upland landscape within the Survey Area.

46.306183, -99.529285



PHOTOGRAPHIC LOG

Photo #: 3 Date: 08/26/2020



Photo of site conditions where flat topography was observed within the Project Area.

Photo #: 4 Date: 08/26/2020



Photo of site conditions in areas with gently rolling hills and agricultural fields within the Project Area.

PHOTOGRAPHIC LOG

Photo #: 5 Date: 08/26/2020



Photo of site conditions showing disturbed agricultural fields within the Project Area.

Photo #: 6 Date: 08/26/2020



Photo of site conditions showing general planted crop fields.

PHOTOGRAPHIC LOG

Photo #: 7 Date: 09/28/2021

Direction: West

Drainage feature dominated by upland grass species.

46.306915, -99.581883

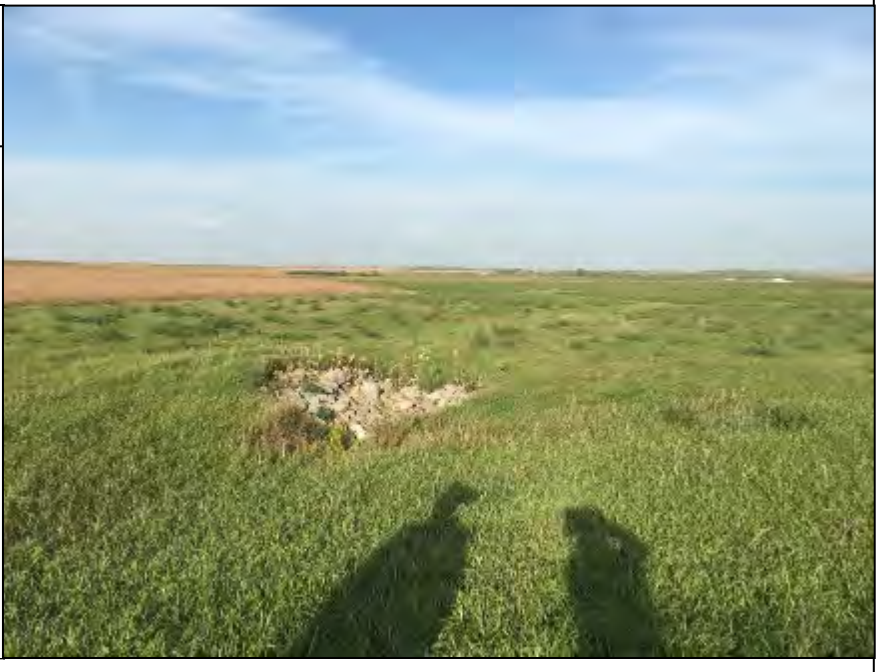


Photo #: 8 Date: 09/28/2021

Direction: Northwest

Upland swale in soybean field. No evidence of crop being stunted or stressed.

46.308651, -99.531390



PHOTOGRAPHIC LOG

Photo #: 9 Date: 09/28/2021

Direction: West

Upland swale; no watercourse present.

46.308457, -99.587015



Photo #: 10 Date: 09/28/2021

Direction: North

Dry farm pond.

46.352073, -99.522866



PHOTOGRAPHIC LOG

Photo #: 11 Date: 09/28/2021

Direction: North

Wetland A1 - PEM

46.352497, -99.515981



Photo #: 12 Date: 09/28/2021

Direction: North

Wetland A2 - PEM

46.359245, -99.518401



PHOTOGRAPHIC LOG

Photo #: 13 Date: 09/28/2021

Direction: West

Wetland A3 - PEM

46.354463, -99.529694



Photo #: 14 Date: 09/28/2021

Direction: West

Wetland A4 - PEM

46.354212, -99.530589



PHOTOGRAPHIC LOG

Photo #: 15 Date: 09/28/2021

Direction: East

Wetland A5 - PEM

46.328292, -99.530411



Photo #: 16 Date: 09/28/2021

Direction: North

Wetland A6 - PEM

46.322162, -99.522126



PHOTOGRAPHIC LOG

Photo #: 17 Date: 09/29/2021

Direction: East

Wetland B1 - PEM

46.328882, -99.602712



Photo #: 18 Date: 09/29/2021

Direction: East

Wetland B2 - PEM

46.336653, -99.602699



PHOTOGRAPHIC LOG

Photo #: 19 Date: 09/29/2021

Direction: Southeast

Wetland B3 - PEM

46.345664, -99.607884



Photo #: 20 Date: 09/29/2021

Direction: Southwest

Wetland B4 - PEM

46.353137, -99.623630



PHOTOGRAPHIC LOG

Photo #: 21 Date: 09/29/2021

Direction: West

Wetland B5 - PEM

46.374519, -99.647077



Photo #: 22 Date: 09/29/2021

Direction: Northeast

Wetland B6 - PEM

46.360928, -99.639066



PHOTOGRAPHIC LOG

Photo #: 23 Date: 09/29/2021

Direction: Southeast

Wetland C1 - PEM

46.344362, -99.607900



Photo #: 24 Date: 09/30/2021

Direction: East

Wetland D1 - PEM

46.309054, -99.594868



PHOTOGRAPHIC LOG

Photo #: 25 Date: 09/30/2021

Direction: South

Wetland D2 - PEM

46.294374, -99.630842



Photo #: 26 Date: 09/30/2021

Direction: Southwest

Wetland D3 - PEM

46.294374, -99.630842



PHOTOGRAPHIC LOG

Photo #: 27 Date: 09/30/2021

Direction: North

Wetland D7 - PEM

46.316423, -99.615988



Photo #: 28 Date: 09/30/2021

Direction: East

Wetland D8 - PEM

46.303393, -99.615542



PHOTOGRAPHIC LOG

Photo #: 29 Date: 09/30/2021

Direction: West

Wetland D9 - PEM

46.304598, -99.614361



Photo #: 30 Date: 10/01/2021

Direction: Northeast

Wetland E1 - PEM

46.283329, -99.519041



PHOTOGRAPHIC LOG

Photo #: 31 Date: 10/02/2021

Direction: South

Wetland F1 - PEM

46.326781, -99.512773



Photo #: 32 Date: 10/02/2021

Direction: Northwest

Wetland F2 - PEM

46.332902, -99.512234



PHOTOGRAPHIC LOG

Photo #: 33 Date: 10/02/2021

Direction: Northwest

Wetland F3 - PEM

46.339372, -99.510247

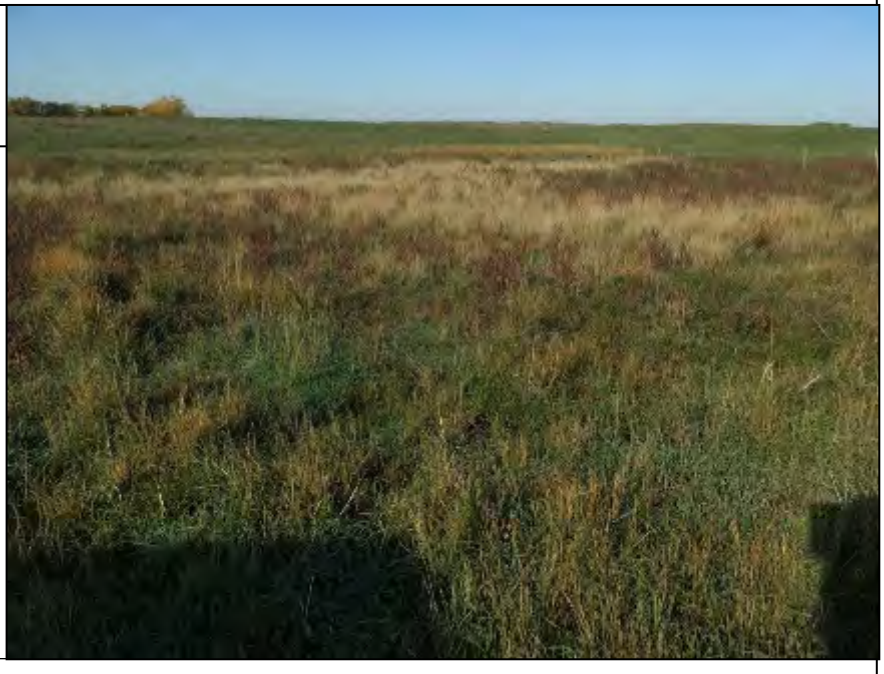


Photo #: 34 Date: 10/02/2021

Direction: West

Wetland F4 - PEM

46.344052, -99.507033



PHOTOGRAPHIC LOG

Photo #: 35 Date: 10/02/2021

Direction: Southeast

Wetland F5 - PEM

46.300280, -99.490455



Photo #: 36 Date: 10/02/2021

Direction: Northwest

Wetland F6 - PEM

46.300287, -99.490418



PHOTOGRAPHIC LOG

Photo #: 37 Date: 10/02/2021

Direction: Southeast

Wetland F7 - PEM

46.299415, -99.487635



Photo #: 38 Date: 10/02/2021

Direction: Southeast

Wetland F8 - PEM

46.306895, -99.502179



PHOTOGRAPHIC LOG

Photo #: 39 Date: 10/02/2021

Direction: Southwest

Wetland F9 - PEM

46.306059, -99.507123



Photo #: 40 Date: 10/02/2021

Direction: Northwest

Wetland F10 - PEM

46.307384, -99.509902



PHOTOGRAPHIC LOG

Photo #: 41 Date: 10/02/2021

Direction: South

Wetland F11 - PEM

46.297944, -99.500655



Photo #: 42 Date: 10/02/2021

Direction: South

Wetland F12 - PEM

46.290200, -99.532004



PHOTOGRAPHIC LOG

Photo #: 43 Date: 10/02/2021

Direction: North

Wetland F13 - PEM

46.289891, -99.550012



Photo #: 44 Date: 10/02/2021

Direction: North

Wetland F14 - PEM

46.300427, -99.519202



PHOTOGRAPHIC LOG

Photo #: 45 Date: 10/03/2021

Direction: South

Wetland G2 - PEM

46.299426, -99.539114



Photo #: 46 Date: 10/03/2021

Direction: Northeast

Wetland G3 - PEM

46.306253, -99.548801



PHOTOGRAPHIC LOG

Photo #: 47 Date: 10/03/2021

Direction: Southwest

Wetland G4 - PEM

46.300702, -99.552192



Photo #: 48 Date: 10/03/2021

Direction: Southwest

Wetland G7 - PEM

46.310028, -99.585185



PHOTOGRAPHIC LOG

Photo #: 49 Date: 10/03/2021

Direction: North

Wetland G8 - PEM

46.309467, -99.590383



Photo #: 50 Date: 10/03/2021

Direction: East

Wetland G9 - PEM

46.293163, -99.581179



PHOTOGRAPHIC LOG

Photo #: 51 Date: 10/03/2021

Direction: South

Wetland G10 - PEM

46.289575, -99.581686



Photo #: 52 Date: 10/03/2021

Direction: North

Wetland G11 - PEM

46.286152, -99.579393



PHOTOGRAPHIC LOG

Photo #: 53 Date: 5/09/2022

Direction: East

Wetland G12 - PEM

46.306584, -99.622834



Photo #: 54 Date: 5/03/2022

Direction: East

Wetland H1 - PEM

46.239383, -99.590778



PHOTOGRAPHIC LOG

Photo #: 55 Date: 5/03/2022

Direction: South

Wetland H2 - PEM

46.273783, -99.596996



Photo #: 56 Date: 5/04/2022

Direction: West

Wetland I1 - PEM

46.283102, -99.519404



PHOTOGRAPHIC LOG

Photo #: 57 Date: 5/04/2022

Direction: West

Wetland I2 - PEM

46.282481, -99.51868



Photo #: 58 Date:5/05/2022

Direction: West

Wetland J1 - PEM

46.29421, -99.495453



PHOTOGRAPHIC LOG

Photo #: 59 Date: 5/05/2022

Direction: North

Wetland J2 - PEM

46.300436, -99.504055



Photo #: 60 Date: 5/05/2022

Direction: East

Wetland J3 - PEM

46.330186, -99.520921



PHOTOGRAPHIC LOG

Photo #: 61 Date: 5/05/2022

Direction: South

Wetland J4 - PEM

46.328283, -99.520137



Photo #: 62 Date: 5/07/2022

Direction: East

Wetland K1 - PEM

46.283329, -99.519041



PHOTOGRAPHIC LOG

Photo #: 63 Date: 5/07/2022

Direction: South

Wetland K2 - PEM

46.339497, -99.507337

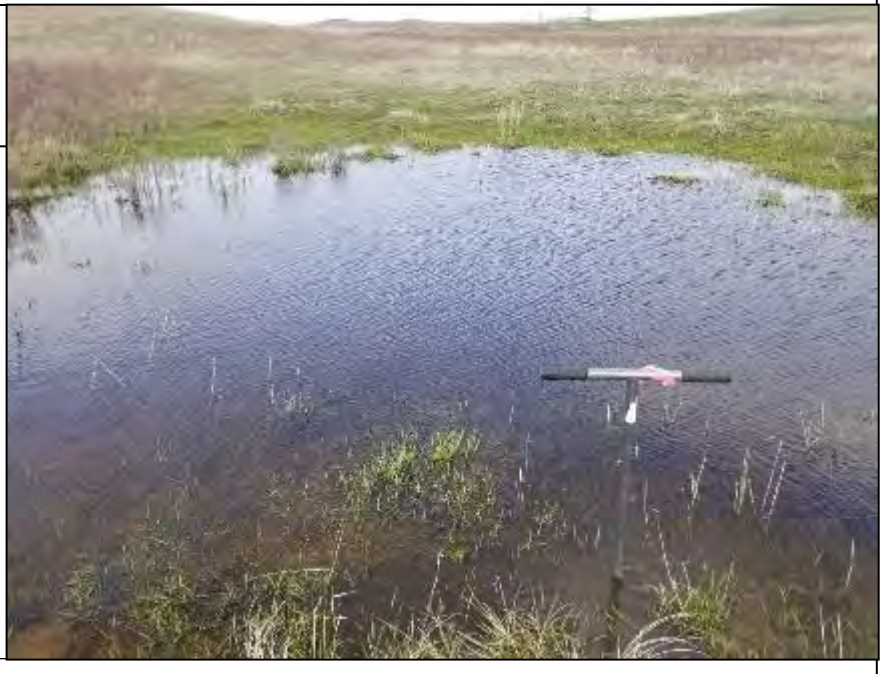


Photo #: 64 Date: 5/07/2022

Direction: East

Wetland K3 - PEM

46.339113, -99.508413



PHOTOGRAPHIC LOG

Photo #: 65 Date: 5/07/2022

Direction: South

Wetland K4 - PEM

46.335851, -99.509219



Photo #: 66 Date: 5/07/2022

Direction: West

Wetland K5 - PEM

46.334858, -99.507955



PHOTOGRAPHIC LOG

Photo #: 67 Date: 5/07/2022

Direction: North

Wetland K6 - PEM

46.333604, -99.511127



Photo #: 68 Date: 5/07/2022

Direction: West

Wetland K7 - PEM

46.333015, -99.511221



PHOTOGRAPHIC LOG

Photo #: 69 Date: 5/07/2022

Direction: South

Wetland K8 - PEM

46.331122, -99.516545



Photo #: 70 Date: 5/09/2022

Direction: Northeast

Wetland L1 - PEM

46.301373, -99.622128



PHOTOGRAPHIC LOG

Photo #: 71 Date: 08/26/2020



Wetland A1 (2020) - PEM

Photo #: 72 Date: 08/26/2020



Wetland A2 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 73 Date: 08/26/2020



Wetland A3 (2020) - PEM

Photo #: 74 Date: 08/26/2020



Wetland A4 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 75 Date: 08/27/2020



Wetland B1 (2020) - PEM

Photo #: 76 Date: 08/27/2020



Wetland B2 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 77 Date: 08/27/2020



Wetland B3 (2020)- PEM

Photo #: 78 Date: 08/27/2020



Wetland B4 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 79 Date: 08/27/2020



Wetland B5 (2020) - PEM

Photo #: 80 Date: 08/28/2020



Wetland C1 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 81 Date: 08/29/2020



Wetland C2 (2020) - PEM

Photo #: 82 Date: 08/29/2020



Wetland C3 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 83 Date: 08/29/2020



Wetland C4 (2020) - PEM

Photo #: 84 Date: 08/29/2020



Wetland D1 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 85 Date: 08/29/2020



Wetland D2 (2020) - PEM

Photo #: 86 Date: 08/29/2020



Wetland D3 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 87 Date: 08/29/2020



Wetland D4 (2020) - PEM

Photo #: 88 Date: 08/29/2020



Wetland D5 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 89 Date: 08/29/2020



Wetland D6 (2020) - PEM

Photo #: 90 Date: 08/29/2020



Wetland D7 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 91 Date: 08/29/2020



Wetland D8 (2020) - PEM

Photo #: 92 Date: 08/29/2020



Wetland D9 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 93 Date: 08/29/2020



Wetland D10 (2020) - PEM

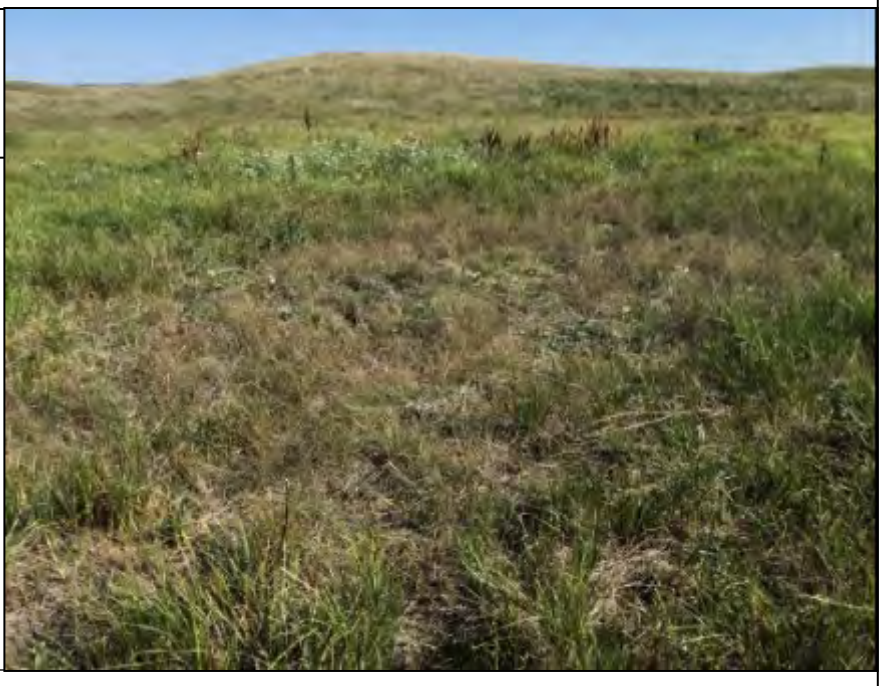
Photo #: 94 Date: 08/29/2020



Wetland D11 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 95 Date: 08/29/2020



Wetland D12 (2020) - PEM

Photo #: 96 Date: 08/29/2020



Wetland D13 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 97 Date: 08/30/2020



Wetland E1 (2020) - PEM

Photo #: 98 Date: 08/30/2020



Wetland E2 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 99 Date: 08/30/2020



Wetland E3 (2020) - PEM

Photo #: 100 Date: 08/30/2020



Wetland E4 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 101 Date: 08/30/2020



Wetland E5 (2020) - PEM

Photo #: 102 Date: 08/30/2020



Wetland E7 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 103 Date: 08/30/2020



Wetland E8 (2020) - PEM

Photo #: 104 Date: 08/30/2020



Wetland E9 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 105 Date: 08/30/2020



Wetland E10 (2020) – PEM – Dyked/impounded inundated wetland

Photo #: 106 Date: 08/30/2020



Wetland E11 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 107 Date: 08/30/2020



Wetland E12 (2020) - PEM

Photo #: 108 Date: 08/30/2020



Wetland E13 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 109 Date: 08/30/2020



Wetland E14 (2020) - PEM

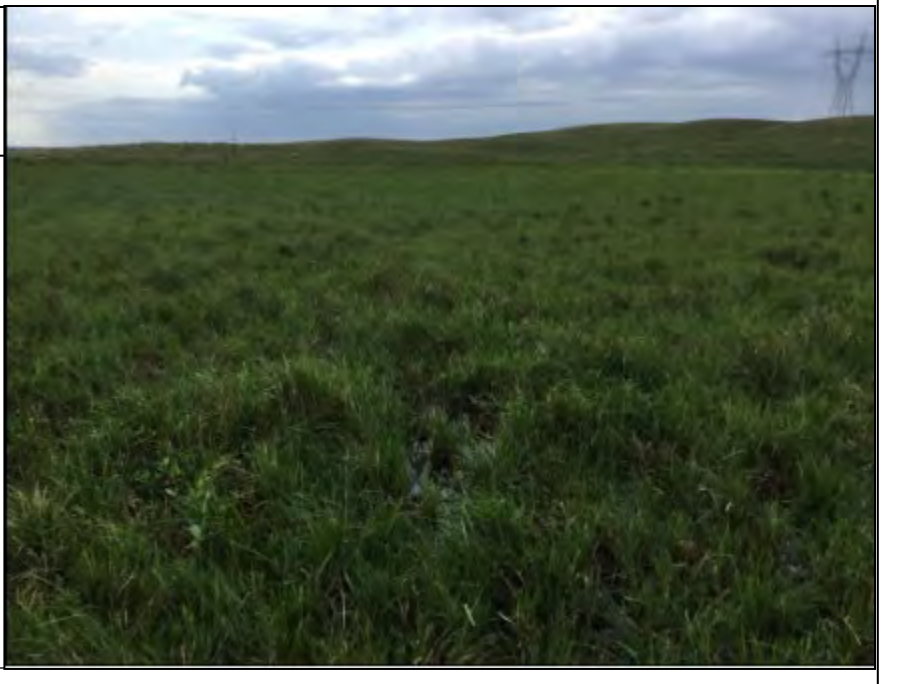
Photo #: 110 Date: 08/30/2020



Wetland E15(2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 111 Date: 08/30/2020



Wetland E16 (2020) - PEM

Photo #: 112 Date: 08/30/2020



Wetland E17 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 113 Date: 08/30/2020



Wetland E18 (2020) - PEM

Photo #: 114 Date: 08/30/2020



Wetland E19 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 115 Date: 08/30/2020



Wetland E20 (2020) - PEM

Photo #: 116 Date: 08/30/2020



Wetland E21(2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 117 Date: 08/30/2020



Wetland E22 (2020) - PEM

Photo #: 118 Date: 08/31/2020



Wetland F1 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 119 Date: 08/31/2020



Wetland F2 (2020) - PEM

Photo #: 120 Date: 08/31/2020



Wetland F3 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 121 Date: 08/31/2020



Wetland F5 (2020) - PEM

Photo #: 122 Date: 08/31/2020



Wetland F6 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 123 Date: 08/31/2020



Wetland F7 (2020) - PEM

Photo #: 124 Date: 08/31/2020



Wetland F8 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 125 Date: 08/31/2020



Wetland F9 (2020) - PEM

Photo #: 126 Date: 08/31/2020



Wetland F10 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 127 Date: 08/31/2020



Wetland F11 (2020) - PEM

Photo #: 128 Date: 09/01/2020



Wetland G1 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 129 Date: 09/01/2020



Wetland G2 (2020) - PEM

Photo #: 130 Date: 09/01/2020



Wetland G3 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 131 Date: 09/01/2020



Wetland G4 (2020) - PEM

Photo #: 132 Date: 09/01/2020



Wetland G5 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 133 Date: 09/01/2020



Wetland G6 (2020) - PEM

Photo #: 134 Date: 09/01/2020



Wetland G7 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 135 Date: 09/01/2020



Wetland G8 (2020) - PEM

Photo #: 136 Date: 09/01/2020



Wetland G9 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 137 Date: 09/01/2020



Wetland G10 (2020) - PEM

Photo #: 138 Date: 09/01/2020



Wetland G11 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 139 Date: 09/01/2020



Wetland G12 (2020) - PEM

Photo #: 140 Date: 09/01/2020



Wetland G13 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 141 Date: 09/01/2020



Wetland G14 (2020) - PEM

Photo #: 142 Date: 09/01/2020



Wetland G15 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 143 Date: 09/01/2020



Wetland G16 (2020) - PEM

Photo #: 144 Date: 09/01/2020



Wetland G17 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 145 Date: 09/01/2020



Wetland G16 (2020) - PEM

Photo #: 146 Date: 09/01/2020



Wetland G17 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 147 Date: 09/02/2020



Wetland H1 (2020) - PEM

Photo #: 148 Date: 09/02/2020



Wetland H2 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 149 Date: 09/02/2020



Wetland H3 (2020) - PEM

Photo #: 150 Date: 09/02/2020



Wetland H4 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 151 Date: 09/02/2020



Wetland H5 2020) - PEM

Photo #: 152 Date: 09/02/2020



Wetland H6 2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 153 Date: 09/02/2020



Wetland H7 (2020) - PEM

Photo #: 154 Date: 09/02/2020



Wetland H8 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 155 Date: 09/02/2020



Wetland H9 (2020) - PEM

Photo #: 156 Date: 09/03/2020



Wetland I1 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 157 Date: 09/03/2020



Wetland I2 (2020) - PEM

Photo #: 158 Date: 09/03/2020



Wetland I3 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 159 Date: 09/03/2020



Wetland I4 (2020) - PEM

Photo #: 160 Date: 09/03/2020



Wetland I5 (2020) - PEM

PHOTOGRAPHIC LOG

Photo #: 161 Date: 08/29/2020



Watercourse D1 (2020)

Photo #: 162 Date: 08/30/2020



Watercourse E1 (2020)

PHOTOGRAPHIC LOG

Photo #: 163 Date: 09/30/2021

Direction: East

Watercourse D1

46.309054, -99.594868



Photo #: 164 Date: 10/01/2021

Direction: Southwest

Watercourse E1

46.290758, -99.511861



PHOTOGRAPHIC LOG

Photo #: 165 Date: 10/02/2021

Direction: South

Waterbody F1

46.307470, -99.509272



Photo #: 166 Date: 10/03/2021

Direction: Southwest

Waterbody G1

46.303352, -99.538949



PHOTOGRAPHIC LOG

Photo #: 167 Date: 09/02/2020



Watercourse H1 (2020)

Photo #: 168 Date: 09/02/2020



Watercourse H2 (2020)

PHOTOGRAPHIC LOG

Photo #: 169 Date: 10/03/2021

Direction: East

Watercourse G1

46.283920, -99.590681



Photo #: 170 Date: 09/29/2021

Direction: South

Waterbody B1

46.344988, -99.607603



APPENDIX D

WETLAND DETERMINATION FORMS

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-28

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL A1

Investigator(s): David Nigro - Atwell, LLC Section, Township, Range: 8, 133N, 70W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR): F 53B Lat: 46.3525051 Long: -99.5160204 Datum: WGS 84

Soil Map Unit Name: Hamerly loam, 0 to 3 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

Palustrine emergent (PEM) wetland located along a drainage swale. Northern portion of wetland is mowed and hayed by landowner. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft r)			
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Rumex crispus	30	✓	FAC
2. Leersia oryzoides	25	✓	OBL
3. Phalaris arundinacea	20	✓	FACW
4. Echinochloa muricata	15		FACW
5. Bromus inermis	5		UPL
6. Typha angustifolia	5		OBL
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	30	x 1 =	30
FACW species	35	x 2 =	70
FAC species	30	x 3 =	90
FACU species	0	x 4 =	0
UPL species	5	x 5 =	25
Column Totals:	100 (A)		215 (B)

Prevalence Index = B/A = 2.15

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL A1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 8	10YR 2/1	100					Sandy Loam	
8 - 14	10YR 2/1	50	10YR 3/2	50	C	M	Sandy Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ✓ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 0

Wetland Hydrology Present? **Yes** ✓ **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-28

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL A1 Upland

Investigator(s): David Nigro - Atwell, LLC Section, Township, Range: 8, 133N, 70W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR): F 53B Lat: 46.3525402 Long: -99.5159619 Datum: WGS 84

Soil Map Unit Name: Hamerly loam, 0 to 3 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Area is representative of uplands adjacent to wetland A1. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	100	✓	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	100	x 5 =	500
Column Totals:	100 (A)		500 (B)

Prevalence Index = B/A = 5.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: WL A1 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/2	100					Sandy Loam	
-								
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? **Yes** _____ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-28

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL A2

Investigator(s): David Nigro - Atwell, LLC Section, Township, Range: 5, 133N, 70W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR): F 53B Lat: 46.3592621 Long: -99.5184071 Datum: WGS 84

Soil Map Unit Name: Vallers loam, 0 to 1 percent slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1. Salix interior	15	✓	FACW
2. Salix bebbiana	10	✓	FACW
3.			
4.			
5.			
	25% = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Typha sp.	70	✓	FACW
2. Urtica dioica	10		FAC
3. Solidago gigantea	5		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	85% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	95	x 2 =	190
FAC species	15	x 3 =	45
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	110 (A)		235 (B)

Prevalence Index = B/A = 2.14

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Dominance Test and Prevalence Index calculated for reference purposes only.

SOIL

Sampling Point: WL A2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 3	10YR 3/2	100					Silt Loam	
3 - 7	10YR 3/1	60	2.5Y 7/1	38	RM	M	Silty Clay Loam	
-			7.5YR 5/8	2	C	M	Silty Clay Loam	
7 - 12	2.5Y 7/1	70	7.5YR 5/8	30	C	M	Silty Clay Loam	
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ✓ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 3

Wetland Hydrology Present? **Yes** ✓ **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-28

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL A2 Upland

Investigator(s): David Nigro - Atwell, LLC Section, Township, Range: 5, 133N, 70W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR): F 53B Lat: 46.3591924 Long: -99.5184036 Datum: WGS 84

Soil Map Unit Name: Vallers loam, 0 to 1 percent slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Area is representative of uplands adjacent to wetland A2. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	15	✓	UPL
2. Solidago nemoralis	15	✓	
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	30% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	15	x 5 =	75
Column Totals:	15 (A)		75 (B)

Prevalence Index = B/A = 5.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

70% bare ground.

SOIL

Sampling Point: WL A2 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 8	10YR 3/2	100					Loamy Sand	
8 - 12	10YR 5/6	100					Sand	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? **Yes** _____ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-28

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL A3

Investigator(s): David Nigro - Atwell, LLC Section, Township, Range: 6, 133N, 70W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR): F 53B Lat: 46.3544546 Long: -99.5297362 Datum: WGS 84

Soil Map Unit Name: Williams-Bowbells loams, 0 to 3 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

Area is classified as a palustrine emergent (PEM) wetland. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			FAC
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Rumex crispus	50	✓	FAC
2. Leersia oryzoides	35	✓	OBL
3. Amaranthus viridis	10		FAC
4. Artemisia absinthium	5		
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	35	x 1 =	35
FACW species	0	x 2 =	0
FAC species	60	x 3 =	180
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	95 (A)		215 (B)

Prevalence Index = B/A = 2.26

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL A3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 3	10YR 3/2	100					Silt Loam	
3 - 12	10YR 3/2	60	10YR 3/1	38	C	M	Silt Loam	
-			10YR 4/6	2	C	M	Silt Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ✓ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ✓ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-28

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL A3 Upland

Investigator(s): David Nigro - Atwell, LC Section, Township, Range: 6, 133N, 70W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR): F 53B Lat: 46.3544422 Long: -99.529694 Datum: WGS 84

Soil Map Unit Name: Williams-Bowbells loams, 0 to 3 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Area is representative of uplands adjacent to wetland A3. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	80	✓	UPL
2. Amaranthus viridis	8		FAC
3. Glycyrrhiza lepidota	5		FACU
4. Rumex crispus	5		FAC
5. Artemisia absinthium	2		
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	13	x 3 =	39
FACU species	5	x 4 =	20
UPL species	80	x 5 =	400
Column Totals:	98 (A)		459 (B)

Prevalence Index = B/A = 4.68

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: WL A3 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 4/3	100					Sandy Loam	
-								
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-28

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL A4

Investigator(s): David Nigro - Atwell, LLC Section, Township, Range: 6, 133N, 70W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR): F 53B Lat: 46.3541562 Long: -99.5306893 Datum: WGS 84

Soil Map Unit Name: Williams-Bowbells loams, 0 to 3 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

Area is classified as a palustrine emergent (PEM) wetland. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5ft r)			
1. Rumex crispus	50	✓	FAC
2. Leersia oryzoides	35	✓	OBL
3. Amaranthus viridis	10		FAC
4. Artemisia absinthium	5		
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	35	x 1 =	35
FACW species	0	x 2 =	0
FAC species	60	x 3 =	180
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	95 (A)		215 (B)

Prevalence Index = B/A = 2.26

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL A4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 3	10YR 3/2	100					Silt Loam	
3 - 12	10YR 3/2	60	10YR 3/1	38	C	M	Silt Loam	
-			10YR 4/6	2	C	M	Silt Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-18

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL A4 Upland

Investigator(s): David Nigro - Atwell, LC Section, Township, Range: 6, 133N, 70W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR): F 53B Lat: 46.3544422 Long: -99.529694 Datum: WGS 84

Soil Map Unit Name: Williams-Bowbells loams, 0 to 3 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Area is representative of uplands adjacent to wetland A3. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	80	✓	UPL
2. Amaranthus viridis	8		FAC
3. Glycyrrhiza lepidota	5		FACU
4. Rumex crispus	5		FAC
5. Artemisia absinthium	2		
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	13	x 3 =	39
FACU species	5	x 4 =	20
UPL species	80	x 5 =	400
Column Totals:	98 (A)		459 (B)

Prevalence Index = B/A = 4.68

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: WL A4 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 4/3	100					Sandy Loam	
-								
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-28

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL A5

Investigator(s): David Nigro - Atwell, LLC Section, Township, Range: 18, 133N, 70W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR): F 53B Lat: 46.328334 Long: -99.5303426 Datum: WGS 84

Soil Map Unit Name: Williams-Bowbells loams, 3 to 6 percent slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

Area is classified as a palustrine emergent (PEM) wetland. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft r)			
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Phalaris arundinacea	85	✓	FACW
2. Rumex crispus	15		FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	85	x 2 =	170
FAC species	15	x 3 =	45
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		215 (B)

Prevalence Index = B/A = 2.15

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL A5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/1	85	10YR 5/8	15	C	M	Sandy Loam	
-								
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? **Yes** ✓ **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-28

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL A5 Upland

Investigator(s): David Nigro - Atwell, LLC Section, Township, Range: 18, 133N, 70W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR): F 53B Lat: 46.3281660 Long: -99.5303770 Datum: WGS 84

Soil Map Unit Name: Williams-Bowbells loams, 3 to 6 percent slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Area is representative of uplands adjacent to wetland A5. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	80	✓	UPL
2. Amaranthus viridis	8		FAC
3. Glycyrrhiza lepidota	5		FACU
4. Rumex crispus	5		FAC
5. Artemisia absinthium	2		
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	13	x 3 =	39
FACU species	5	x 4 =	20
UPL species	80	x 5 =	400
Column Totals:	98 (A)		459 (B)

Prevalence Index = B/A = 4.68

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: WL A5 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 4/3	100					Sandy Loam	
-								
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-28

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL A6

Investigator(s): David Nigro - Atwell, LLC. Section, Township, Range: 19, 133N, 70W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR): F 53B Lat: 46.3222910 Long: -99.5223064 Datum: WGS 84

Soil Map Unit Name: Williams-Bowbells loams, 3 to 6 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

Area is classified as a palustrine emergent (PEM) wetland. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Rumex crispus	40	✓	FAC
2. Echinochloa muricata	20	✓	FACW
3. Poa pratensis	10		FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	70% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	20	x 2 =	40
FAC species	40	x 3 =	120
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column Totals:	70 (A)		200 (B)

Prevalence Index = B/A = 2.86

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

30% bare ground. Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL A6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 2/1	90	10YR 4/4	10	C	M	Sandy Loam	
12 - 18	10YR 2/1	90	10YR 4/6	10	C	M	Sandy Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 0

Wetland Hydrology Present? **Yes** ✓ **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-28

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL A6 Upland

Investigator(s): David Nigro - Atwell, LLC Section, Township, Range: 19, 133N, 70W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave Slope (%): 2

Subregion (LRR): F 53B Lat: 46.3222546 Long: -99.5220845 Datum: WGS 84

Soil Map Unit Name: Williams-Bowbells loams, 3 to 6 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Area is representative of uplands adjacent to wetland A6. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Artemisia absinthium	85	✓	
2. Sporobolus heterolepis	15		UPL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: NaN (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	15	x 5 =	75
Column Totals:	15 (A)		75 (B)

Prevalence Index = B/A = 5.0

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: WL A6 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 4/2	100					Sand	
-								
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? **Yes** _____ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-29

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL B1

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 15, 133N, 71W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave

Slope (%): 2-5 Lat: 46.3288101 Long: -99.6025956 Datum: WGS 84

Soil Map Unit Name: Arnegard loam, 2 to 6 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Leersia oryzoides	75	✓	OBL
2. Erigeron glabellus	10		FACW
3. Bromus inermis	5		FACU
4. Scirpus cyperinus	5		OBL
5. Rumex crispus	3		FAC
6. Sonchus oleraceus	2		FACU
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	80	x 1 =	80
FACW species	10	x 2 =	20
FAC species	3	x 3 =	9
FACU species	7	x 4 =	28
UPL species	0	x 5 =	0
Column Totals:	100 (A)		137 (B)

Prevalence Index = B/A = 1.37

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Dominance Test and Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL B1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 6	10YR 2/2	95	10YR 4/6	5	C	M	Clay Loam	
6 - 12	10YR 2/1	85	10YR 4/6	10	C	M	Clay Loam	
-			10YR 3/3	5	C	M	Clay Loam	
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-29

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL B1 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz - Atwell, LLC Section, Township, Range: 15, 133N, 71W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 2 Lat: 46.3288359 Long: -99.6025520 Datum: WGS 84

Soil Map Unit Name: Arnegard loam, 2 to 6 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	
Hydric Soil Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data point is representative of uplands adjacent to wetland B1. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	90	✓	FACU
2. Sonchus oleraceus	5		FACU
3. Artemisia absinthium	2		
4. Poa pratensis	2		FAC
5. Asclepias syriaca	1		FACU
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	2	x 3 =	6
FACU species	96	x 4 =	384
UPL species	0	x 5 =	0
Column Totals:	98 (A)		390 (B)

Prevalence Index = B/A = 3.98

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL B1 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/2	100					Sandy Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-29

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL B2

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 15, 133N, 71W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave

Slope (%): 2-5 Lat: 46.3364194 Long: -99.6023541 Datum: WGS 84

Soil Map Unit Name: Cohagen-Vebar-Parshall fine sandy loams, 9 to 35 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMC) wetland. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Leersia oryzoides	45	✓	OBL
2. Typha angustifolia	45	✓	OBL
3. Scirpus atrovirens	4		OBL
4. Erigeron glabellus	3		FACW
5. Scirpus cyperinus	3		OBL
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	97	x 1 =	97
FACW species	3	x 2 =	6
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		103 (B)

Prevalence Index = B/A = 1.03

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Dominance Test and Prevalence Index calculated for reference purposes only.

SOIL

Sampling Point: WL B2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 2	10YR 3/2	100					Muck	
2 - 6	10YR 2/1	100					Muck	
6 - 8	5GY 4/	100					Muck	
8 - 18	10YR 2/2	80	5GY 4/	20	C	M	Muck	
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ✓ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 0

Water Table Present? Yes ✓ No _____ Depth (inches): 8

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-29

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL B2 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz - Atwell, LLC Section, Township, Range: 15, 133N, 71W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 2 Lat: 46.3366010 Long: -99.6024125 Datum: WGS 84

Soil Map Unit Name: Cohagen-Vebar-Parshall fine sandy loams, 9 to 35 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data point is representative of uplands adjacent to wetland B2. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Poa pratensis	40	✓	FAC
2. Bromus inermis	20	✓	FACU
3. Solidago nemoralis	10		
4. Trifolium repens	10		FACU
5. Dalea purpurea	5		
6. Erigeron canadensis	5		FACU
7. Melilotus officinalis	5		FACU
8. Taraxacum officinale	5		FACU
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	40	x 3 =	120
FACU species	45	x 4 =	180
UPL species	0	x 5 =	0
Column Totals:	85 (A)		300 (B)

Prevalence Index = B/A = 3.53

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL B2 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/2	100					Sandy Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-29

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL B3

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 9, 133N, 71W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave

Slope (%): 2 Lat: 46.3456875 Long: -99.6078719 Datum: WGS 84

Soil Map Unit Name: Wabek-Lehr-Appam complex, 9 to 25 percent slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMC) wetland. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Eleocharis acicularis	30	✓	OBL
2. Leersia oryzoides	25	✓	OBL
3. Rumex crispus	5		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	60% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	55	x 1 =	55
FACW species	0	x 2 =	0
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	60 (A)		70 (B)

Prevalence Index = B/A = 1.17

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

40% bare soils. Dominance Test and Prevalence Index calculated for reference purposes only.

SOIL

Sampling Point: WL B3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 3	10YR 3/1	100					Silty Clay Loam	
3 - 8	10YR 3/1	95	7.5YR 4/4	5	C	M	Silty Clay Loam	
8 - 12	10YR 3/1	90	7.5YR 4/4	10	C	M	Silty Clay Loam	
12 - 16	10YR 3/2	80	7.5YR 4/4	20	C	M	Silty Clay Loam	
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-29

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL B3 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz - Atwell, LLC Section, Township, Range: 9, 133N, 71W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 2 Lat: 46.3456399 Long: -99.6078039 Datum: WGS 84

Soil Map Unit Name: Amor-Werner-Farnuf loams, 6 to 9 percent slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data point is representative of uplands adjacent to wetland B3. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	60	✓	FACU
2. Erigeron canadensis	20	✓	FACU
3. Trifolium repens	20	✓	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	100	x 4 =	400
UPL species	0	x 5 =	0
Column Totals:	100 (A)		400 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL B3 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/3	100					Sandy Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-29

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL B4

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 9, 133N, 71W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave

Slope (%): 2 Lat: 46.3533134 Long: -99.6237434 Datum: WGS 84

Soil Map Unit Name: Arnegard loam, 0 to 2 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMC) wetland. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Leersia oryzoides	75	✓	OBL
2. Calamagrostis canadensis	5		OBL
3. Rumex crispus	2		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	82% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	80	x 1 =	80
FACW species	0	x 2 =	0
FAC species	2	x 3 =	6
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	82 (A)		86 (B)

Prevalence Index = B/A = 1.05

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

18% bare ground present. Dominance Test and Prevalence Index calculated for reference purposes only.

SOIL

Sampling Point: WL B4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 4	10YR 2/2	98	10YR 4/6	2	C	M	Sandy Clay Loam	
4 - 12	10YR 2/2	90	10YR 4/6	10	C	M	Sandy Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ✓ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ✓ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ✓ Inundation Visible on Aerial Imagery (B7)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ✓ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-29

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL B4 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 9, 133N, 71W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave

Slope (%): 2 Lat: 46.3532778 Long: -99.6236300 Datum: WGS 84

Soil Map Unit Name: Arnegard loam, 2 to 6 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data Point is representative of uplands adjacent to wetland B4. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Schizachyrium scoparium	70	✓	FACU
2. Bromus inermis	20	✓	FACU
3. Artemisia absinthium	5		
4. Asclepias syriaca	5		FACU
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	95	x 4 =	380
UPL species	0	x 5 =	0
Column Totals:	95 (A)		380 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL B4 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/3	100					Silt Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-29

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL B5

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 31, 134N, 71W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave

Slope (%): 0-2 Lat: 46.3740524 Long: -99.6470362 Datum: WGS 84

Soil Map Unit Name: Arnegard loam, 2 to 6 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Typha angustifolia	65	✓	OBL
2. Leersia oryzoides	20	✓	OBL
3. Eleocharis palustris	8		OBL
4. Asclepias incarnata	4		OBL
5. Rumex crispus	3		FAC
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	97	x 1 =	97
FACW species	0	x 2 =	0
FAC species	3	x 3 =	9
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		106 (B)

Prevalence Index = B/A = 1.06

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

40% bare soils. Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL B5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 6	10YR 3/1	100					Silty Clay Loam	
6 - 8	10YR 2/1	90	10YR 4/4	10	C	M	Sandy Clay Loam	
8 - 12	10G 2/1	60	10YR 4/4	10	C	M	Silty Clay Loam	
-			N 2.5/	30	D	M	Sandy Clay Loam	
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ✓ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-29

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL B5 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 31 134N 71W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave

Slope (%): 2 Lat: 46.3740847 Long: -99.6470217 Datum: WGS 84

Soil Map Unit Name: Amor-Werner loams, 3 to 6 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No ✓ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No ✓

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	
Hydric Soil Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data Point is representative of uplands adjacent to wetland B5. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	85	✓	FACU
2. Melilotus officinalis	3		FACU
3. Trifolium repens	3		FACU
4. Ambrosia artemisiifolia	2		FACU
5. Asclepias syriaca	2		FACU
6. Medicago sativa	2		FACU
7. Sonchus oleraceus	2		FACU
8. Erigeron lonchophyllus	1		FACW
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	1	x 2 =	2
FAC species	0	x 3 =	0
FACU species	99	x 4 =	396
UPL species	0	x 5 =	0
Column Totals:	100 (A)		398 (B)

Prevalence Index = B/A = 3.98

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL B5 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0 - 12	10YR 4/1	100					Sandy Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-29

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL B6

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 5 133N 71W

Landform (hillslope, terrace, etc.): Ditch Local relief (concave, convex, none): Concave

Slope (%): 2 Lat: 46.3102813 Long: -99.63910423 Datum: WGS 84

Soil Map Unit Name: Reeder-Farnuf loams, 3 to 6 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Setaria pumila	60	✓	FAC
2. Persicaria maculosa	30	✓	FACW
3. Hordeum jubatum	5		FAC
4. Typha angustifolia	5		OBL
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5	x 1 =	5
FACW species	30	x 2 =	60
FAC species	65	x 3 =	195
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		260 (B)

Prevalence Index = B/A = 2.60

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL B6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 3	10YR 2/1	100					Sandy Clay Loam	
3 - 8	10YR 2/1	90	10YR 4/6	10	C	M	Sandy Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ✓ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ✓ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ✓ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-29

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL B6 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 5 133N 71W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 2 Lat: 46.3103239 Long: -99.63900799 Datum: WGS 84

Soil Map Unit Name: Reeder-Farnuf loams, 3 to 6 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No ✓ (If no, explain in Remarks.)

Are Vegetation ✓, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No ✓

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data Point is representative of uplands adjacent to wetland B6. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Zea mays	80	✓	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	80% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	80	x 5 =	400
Column Totals:	80 (A)		400 (B)

Prevalence Index = B/A = 5.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

Data point is located in agricultural field. 20% bare soils present.

SOIL

Sampling Point: WL B6 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0 - 10	10YR 3/2	100					Sandy Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-29

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL C1

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 9 133N 71W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave

Slope (%): 2-5 Lat: 46.34431673 Long: -99.60792091 Datum: WGS 84

Soil Map Unit Name: Amor-Werner-Farnuf loams, 6 to 9 percent slopes NWI classification: PABFx

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Eleocharis acicularis	30	✓	OBL
2. Leersia oryzoides	25	✓	OBL
3. Rumex crispus	5		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	60% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	55	x 1 =	55
FACW species	0	x 2 =	0
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	60 (A)		70 (B)

Prevalence Index = B/A = 1.17

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

40% bare soils present. Dominance Test and Prevalence Index calculated for reference purposes only.

SOIL

Sampling Point: WL C1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 3	10YR 3/1	100					Silty Clay Loam	
3 - 8	10YR 3/1	95	7.5YR 4/4	5	C	M	Silty Clay Loam	
8 - 12	10YR 3/1	90	7.5YR 4/4	10	C	M	Silty Clay Loam	
12 - 16	10YR 3/2	80	7.5YR 4/4	20	C	M	Silty Clay Loam	
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-29

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL C1 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz - Atwell, LLC Section, Township, Range: 9 133N 71W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 2 Lat: 46.3443791 Long: -99.6078427 Datum: WGS 84

Soil Map Unit Name: Amor-Werner-Farnuf loas, 6 to 9 percent slopes NWI classification: PABFx

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data Point is representative of uplands adjacent to wetland C1. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	60	✓	FACU
2. Erigeron canadensis	20	✓	FACU
3. Trifolium repens	20	✓	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	100	x 4 =	400
UPL species	0	x 5 =	0
Column Totals:	100 (A)		400 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL C1 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0 - 12	10YR 3/3	100					Sandy Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-30

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL D1

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 36, 133N, 72W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave

Slope (%): 2 Lat: 46.2859898 Long: -99.6682404 Datum: WGS 84

Soil Map Unit Name: Lehr-Bowdle loams, 2 to 6 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

Area is classified as a palustrine emergent (PEMC) wetland. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Typha angustifolia	15	✓	OBL
2. Elymus virginicus	10	✓	FACW
3. Leersia oryzoides	3		OBL
4. Equisetum arvense	1		FAC
5. Rumex crispus	1		FAC
6.			
7.			
8.			
9.			
10.			
	30% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	18	x 1 =	18
FACW species	10	x 2 =	20
FAC species	2	x 3 =	6
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	30 (A)		44 (B)

Prevalence Index = B/A = 1.47

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

70% open water. Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL D1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 5	10YR 2/1	85	10YR 4/4	15	C	PL / M	Silt Loam	
5 - 12	10YR 2/2	100					Silt Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ✓ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 6

Water Table Present? Yes ✓ No _____ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-30

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL D1 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 36 133N 72W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave

Slope (%): 0 Lat: 46.2860110 Long: -99.6682262 Datum: WGS 84

Soil Map Unit Name: Lehr-Bowdle loams, 2 to 6 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	
Hydric Soil Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data Point is representative of uplands adjacent to wetland D1. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	70	✓	FACU
2. Elymus virginicus	15		FACW
3. Trifolium repens	10		FACU
4. Taraxacum officinale	5		FACU
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	15	x 2 =	30
FAC species	0	x 3 =	0
FACU species	85	x 4 =	340
UPL species	0	x 5 =	0
Column Totals:	100 (A)		370 (B)

Prevalence Index = B/A = 3.70

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL D1 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10R 3/2	100					Silt Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-30

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL D2

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 36 133N 72W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave

Slope (%): 2 Lat: 46.2864706 Long: -99.6721581 Datum: WGS 84

Soil Map Unit Name: Lehr-Bowdle loams, 2 to 6 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMC) wetland. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Typha angustifolia	65	✓	OBL
2. Leersia oryzoides	15		OBL
3. Eleocharis palustris	10		OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	90% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	90	x 1 =	90
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	90 (A)		90 (B)

Prevalence Index = B/A = 1.00

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

10% open water present. Dominance Test and Prevalence Index calculated for reference purposes only.

SOIL

Sampling Point: WL D2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 5	10YR 2/1	85	10YR 4/4	15	C	PL / M	Silt Loam	
5 - 12	10YR 2/2	100					Silt Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 3

Water Table Present? Yes ✓ No _____ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-30

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL D2 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 36 133N 72W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave

Slope (%): 2 Lat: 46.2858913 Long: -99.6669364 Datum: WGS 84

Soil Map Unit Name: Lehr-Bowdle loams, 2 to 6 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	
Hydric Soil Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data Point is representative of uplands adjacent to wetland D2. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	70	✓	FACU
2. Elymus virginicus	15		FACW
3. Trifolium repens	10		FACU
4. Taraxacum officinale	5		FACU
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	15	x 2 =	30
FAC species	0	x 3 =	0
FACU species	85	x 4 =	340
UPL species	0	x 5 =	0
Column Totals:	100 (A)		370 (B)

Prevalence Index = B/A = 3.70

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL D2 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10R 3/2	100					Silt Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-30

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL D3

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 32, 133N, 71W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave

Slope (%): 3 Lat: 46.2897253 Long: -99.6403711 Datum: WGS 84

Soil Map Unit Name: Harriet-Regan-Stirum complex, 0 to 2 percent slopes, occasionally flooded NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Leersia oryzoides	80	✓	OBL
2. Eleocharis palustris	10		OBL
3. Rumex crispus	5		FAC
4. Typha angustifolia	3		OBL
5. Erigeron glabellus	2		FACW
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	93	x 1 =	93
FACW species	2	x 2 =	4
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		112 (B)

Prevalence Index = B/A = 1.12

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Dominance Test and Prevalence Index calculated for reference purposes only.

SOIL

Sampling Point: WL D3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 3	10YR 3/2	100					Silt Loam	
3 - 9	10YR 2/2	100					Silt Loam	
9 - 16	5GY 4/	75	10YR 5/6	25			Silt Loam	
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ✓ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ✓ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 6

Water Table Present? Yes ✓ No _____ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-30

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL D3 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 32, 133N, 71W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave

Slope (%): 2 Lat: 46.2897269 Long: -99.6404393 Datum: WGS 84

Soil Map Unit Name: Harriet-Regan-Stirum complex, 0 to 2 percent slopes, occasionally flooded NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data Point is representative of uplands adjacent to wetland D3. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	100	✓	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	100	x 4 =	400
UPL species	0	x 5 =	0
Column Totals:	100 (A)		400 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL D3 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/2	100					Silt Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-30

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL D4

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 32, 133N, 71W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave

Slope (%): 2 Lat: 46.2943715 Long: -99.6307909 Datum: WGS 84

Soil Map Unit Name: Bowdle-Lehr loams, 0 to 2 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEM) wetland. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Schoenoplectus tabernaemontani	50	✓	OBL
2. Scirpus cyperinus	15	✓	OBL
3. Carex vulpinoidea	10		FACW
4. Hordeum jubatum	10		FAC
5. Agrostis stolonifera	5		FACW
6. Leonurus cardiaca	5		
7. Rumex crispus	3		FAC
8. Typha angustifolia	2		OBL
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	67	x 1 =	67
FACW species	15	x 2 =	30
FAC species	13	x 3 =	39
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	95 (A)		136 (B)

Prevalence Index = B/A = 1.43

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Dominance Test and Prevalence Index calculated for reference purposes only.

SOIL

Sampling Point: WL D4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 8	10YR 2/1	98	5G 4/	2	C	M	Silt Loam	
8 - 12	10YR 2/1	90	10YR 6/4	10	C	PL / M	Silt Loam	
12 - 16	10YR 4/3	100					Silt Loam	
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 6

Water Table Present? Yes ✓ No _____ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-30

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL D4 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 32 133N 71W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave

Slope (%): 2 Lat: 46.2943455 Long: -99.6308571 Datum: WGS 84

Soil Map Unit Name: Bowdle-Lehr loams, 2 to 6 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data Point is representative of uplands adjacent to wetland D4. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Hordeum jubatum	85	✓	FAC
2. Leonurus cardiaca	10		
3. Setaria pumila	3		FAC
4. Erigeron canadensis	2		FACU
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	88	x 3 =	264
FACU species	2	x 4 =	8
UPL species	0	x 5 =	0
Column Totals:	90 (A)		272 (B)

Prevalence Index = B/A = 3.02

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL D4 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/2	100					Sandy Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project | City/County: Logan | Sampling Date: 2021-09-30

Applicant/Owner: Badger Wind, LLC | State: North Dakota | Sampling Point: WL D5

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC | Section, Township, Range: 33, 133N, 71W

Landform (hillslope, terrace, etc.): Basin | Local relief (concave, convex, none): Concave

Slope (%): 2 | Lat: 46.2841399 | Long: -99.6163922 | Datum: WGS 84

Soil Map Unit Name: Reeder-Arnegard loams, 3 to 6 percent slopes | NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Typha angustifolia	60	✓	OBL
2. Cannabis sativa	15		
3. Cirsium arvense	5		FACU
4. Hieracium caespitosum	5		
5. Rumex crispus	5		FAC
6.			
7.			
8.			
9.			
10.			
	90% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	60	x 1 =	60
FACW species	0	x 2 =	0
FAC species	5	x 3 =	15
FACU species	5	x 4 =	20
UPL species	0	x 5 =	0
Column Totals:	70 (A)		95 (B)

Prevalence Index = B/A = 1.36

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL D5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 4	10YR 2/2	90	10YR 4/4	10	C	M	Sandy Clay Loam	
4 - 12	10YR 2/2	100					Sandy Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ✓ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No ✓ Depth (inches): _____

Water Table Present? Yes ✓ No ____ Depth (inches): 7

Saturation Present? (includes capillary fringe) Yes ✓ No ____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-30

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL D5 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 33, 133N, 71W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave

Slope (%): 2 Lat: 46.2841408 Long: -99.6164683 Datum: WGS 84

Soil Map Unit Name: Reeder-Arnegard loams, 3 to 6 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No ✓ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No ✓

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	
Hydric Soil Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data Point is representative of uplands (agricultural fields) adjacent to wetland D5. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Zea mays	80	✓	
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	80% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: NaN (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = NaN

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

20% bare ground present.

SOIL

Sampling Point: WL D5 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0 - 12	10YR 3/2	100					Sandy Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-30

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL D6

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 27, 133N, 71W

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave

Slope (%): 1 Lat: 46.3088860 Long: -99.5952098 Datum: WGS 84

Soil Map Unit Name: Hamerly-Vallers loams, moderately saline, 0 to 3 percent slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Typha angustifolia	25	✓	OBL
2. Eleocharis palustris	20	✓	OBL
3. Leersia oryzoides	20	✓	OBL
4. Agrostis stolonifera	15		FACW
5. Hordeum jubatum	10		FAC
6. Trifolium repens	5		FACU
7.			
8.			
9.			
10.			
	95% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	65	x 1 =	65
FACW species	15	x 2 =	30
FAC species	10	x 3 =	30
FACU species	5	x 4 =	20
UPL species	0	x 5 =	0
Column Totals:	95 (A)		145 (B)

Prevalence Index = B/A = 1.53

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

5% bare ground present. Dominance Test and Prevalence Index calculated for reference purposes only.

SOIL

Sampling Point: WL D6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 3	10YR 3/1	100					Sandy Clay Loam	
3 - 8	10YR 3/1	90	10YR 4/4	10	C	PL / M	Sandy Clay Loam	
8 - 16	10YR 3/2	100						
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes ✓ No _____ Depth (inches): 3

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-30

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL D6 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 27, 133N, 71W

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave

Slope (%): 3 Lat: 46.3088860 Long: -99.5952098 Datum: WGS 84

Soil Map Unit Name: Hamerly-Vallers loams, moderately saline, 0 to 3 percent slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	
Hydric Soil Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data Point is representative of uplands adjacent to wetland D6. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	40	✓	FACU
2. Schizachyrium scoparium	25	✓	FACU
3. Trifolium repens	10		FACU
4. Agrostis stolonifera	5		FACW
5. Elymus virginicus	5		FACW
6. Taraxacum officinale	3		FACU
7. Eleocharis palustris	2		OBL
8.			
9.			
10.			
	90% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	2	x 1 =	2
FACW species	10	x 2 =	20
FAC species	0	x 3 =	0
FACU species	78	x 4 =	312
UPL species	0	x 5 =	0
Column Totals:	90 (A)		334 (B)

Prevalence Index = B/A = 3.71

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

10% bare ground present.

SOIL

Sampling Point: WL D6 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0 - 3	10YR 3/2	100					Silty Clay Loam	
3 - 12	10YR 5/2	100					Sandy Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-30

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL D7

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 21, 133N, 71W

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave

Slope (%): 1 Lat: 46.3173874 Long: -99.6159993 Datum: WGS 84

Soil Map Unit Name: Water NWI classification: PABFh

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Agrostis stolonifera	20	✓	FACW
2. Elymus virginicus	20	✓	FACW
3. Schoenoplectus tabernaemontani	20	✓	OBL
4. Calamagrostis canadensis	15		OBL
5. Hordeum jubatum	15		FAC
6. Carex spp.	5		OBL
7. Lycopus americanus	5		OBL
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	45	x 1 =	45
FACW species	40	x 2 =	80
FAC species	15	x 3 =	45
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		170 (B)

Prevalence Index = B/A = 1.70

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL D7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 5	10YR 2/2	100					Sandy Clay Loam	
5 - 10	10YR 2/2	90	7.5YR 4/4	10	C	M	Sandy Clay Loam	
10 - 16	10YR 4/1	70	10YR 4/3	30	C	M	Sandy Clay Loam	
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 0

Water Table Present? Yes ✓ No _____ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-30

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL D7 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 21, 133N, 71W

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave

Slope (%): 3 Lat: 46.3173466 Long: -99.6158134 Datum: WGS 84

Soil Map Unit Name: Water NWI classification: PABFh

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data Point is representative of uplands adjacent to wetland D7. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	70	✓	FACU
2. Elymus trachycaulus	20	✓	FACU
3. Solidago nemoralis	10		
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	90	x 4 =	360
UPL species	0	x 5 =	0
Column Totals:	90 (A)		360 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL D7 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/1	100					Silty Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-30

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL D8

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 28 133N 71W

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave

Slope (%): 2 Lat: 46.30267715 Long: -99.61579536 Datum: WGS 84

Soil Map Unit Name: Regan silt loam, 0 to 2 percent slopes, occasionally flooded NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No _____	
Hydric Soil Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Wetland Hydrology Present?	Yes _____	No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Leersia oryzoides	85	✓	OBL
2. Typha angustifolia	15		OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

	Total % Cover of:		Multiply by:
OBL species	100	x 1 =	100
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		100 (B)

Prevalence Index = B/A = 1.00

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL D8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 8	10YR 2/2	100					Sandy Clay Loam	
8 - 16	10YR 2/2	90	10YR 4/4	10	C	M	Sandy Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 1

Water Table Present? Yes ✓ No _____ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes _____ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-30

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL D8/D9 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz - Atwell, LLC Section, Township, Range: 28 133N 71W

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave

Slope (%): 2 Lat: 46.30404094 Long: -99.61517845 Datum: WGS 84

Soil Map Unit Name: Tonka-Hamerly complex, 0 to 3 percent slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes _____ No ✓	
Wetland Hydrology Present?	Yes _____ No ✓	

Remarks:

Data Point is representative of uplands adjacent to wetlands D8 and D9. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	50	✓	FACU
2. Poa pratensis	30	✓	FAC
3. Artemisia absinthium	20	✓	
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	30	x 3 =	90
FACU species	50	x 4 =	200
UPL species	0	x 5 =	0
Column Totals:	80 (A)		290 (B)

Prevalence Index = B/A = 3.63

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL D8/D9 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 2/2	100					Silt Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-09-30

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL D9

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 28 133N 71W

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave

Slope (%): 1 Lat: 46.3046301 Long: -99.6146222 Datum: WGS 84

Soil Map Unit Name: Tonka-Hamerly complex, 0 to 3 percent slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland. The Palmer Drought Severity Index indicates the area is in severe drought, but the Antecedent Precipitation Tool indicates that conditions are normal for this location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Leersia oryzoides	85	✓	OBL
2. Typha angustifolia	15		OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	100	x 1 =	100
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		100 (B)

Prevalence Index = B/A = 1.00

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL D9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 8	10YR 2/2	100					Sandy Clay Loam	
8 - 16	10YR 2/2	90	10YR 4/4	10			Sandy Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 1

Water Table Present? Yes ✓ No _____ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-01

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL E1

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 32, 133N, 71W

Landform (hillslope, terrace, etc.): Ditch Local relief (concave, convex, none): Concave

Slope (%): 3 Lat: 46.2834760 Long: -99.5189577 Datum: WGS 84

Soil Map Unit Name: Wabek-Lehr complex, 2 to 6 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Phalaris arundinacea	45	✓	FACW
2. Typha angustifolia	40	✓	OBL
3. Rumex crispus	15		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	40	x 1 =	40
FACW species	45	x 2 =	90
FAC species	15	x 3 =	45
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		175 (B)

Prevalence Index = B/A = 1.75

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL E1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 6	10YR 3/1	100					Sandy Clay Loam	
6 - 12	10YR 3/1	95	10YR 5/6	5	C	M	Sandy Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-01

Applicant/Owner: Badger WInd, LLC State: North Dakota Sampling Point: WL E1 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 32, 133N, 70W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.2835588 Long: -99.5190040 Datum: WGS 84

Soil Map Unit Name: Wabek-Lehr complex, 2 to 6 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	
Hydric Soil Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data Point is representative of uplands adjacent to wetland E1.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	50	✓	FACU
2. Poa pratensis	50	✓	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	50	x 3 =	150
FACU species	50	x 4 =	200
UPL species	0	x 5 =	0
Column Totals:	100 (A)		350 (B)

Prevalence Index = B/A = 3.50

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL E1 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 4/1	100					Silty Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-01

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL E2

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 1, 13N, 71W

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave

Slope (%): 2-5 Lat: 46.2830959 Long: -99.5188977 Datum: WGS 84

Soil Map Unit Name: Lehr-Bowdle loams, 2 to 6 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Phalaris arundinacea	90	✓	FACW
2. Rumex crispus	10		FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	90	x 2 =	180
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		210 (B)

Prevalence Index = B/A = 2.10

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL E2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 6	10YR 3/1	100					Sandy Clay Loam	
6 - 12	10YR 3/1	95	10YR 5/6	5	C	M	Sandy Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-01

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL E2 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 1, 132N, 71W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.2831259 Long: -99.5189322 Datum: WGS 84

Soil Map Unit Name: Lehr-Bowdle loams, 2 to 6 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data Point is representative of uplands adjacent to wetland E2.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	50	✓	FACU
2. Poa pratensis	50	✓	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	50	x 3 =	150
FACU species	50	x 4 =	200
UPL species	0	x 5 =	0
Column Totals:	100 (A)		350 (B)

Prevalence Index = B/A = 3.50

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL E2 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 4/1	100					Silty Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-02

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL F1

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 20, 133N, 70W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave

Slope (%): 4 Lat: 46.3266130 Long: -99.5128672 Datum: WGS 84

Soil Map Unit Name: Zahl-Williams-Zahill complex, 6 to 9 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Eleocharis palustris	55	✓	OBL
2. Rumex crispus	15		FAC
3. Artemisia biennis	10		FACW
4. Persicaria maculosa	10		FACW
5. Phalaris arundinacea	5		FACW
6. Amaranthus cruentus	3		
7. Taraxacum officinale	2		FACU
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	55	x 1 =	55
FACW species	25	x 2 =	50
FAC species	15	x 3 =	45
FACU species	2	x 4 =	8
UPL species	0	x 5 =	0
Column Totals:	97 (A)		158 (B)

Prevalence Index = B/A = 1.63

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Dominance Test and Prevalence Index are calculate for reference purposes only.

SOIL

Sampling Point: WL F1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 6	10YR 2/2	98	10YR 4/6	2	C	PL / M	Sandy Clay Loam	
6 - 12	10YR 3/1	95	10YR 5/6	5	C	PL / M	Sandy Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-02

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL F1 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 20, 133N, 70W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.3266444 Long: -99.5130613 Datum: WGS 84

Soil Map Unit Name: Zahl-Williams-Zahill complex, 6 to 9 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data Point is representative of uplands adjacent to wetland F1.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	100	✓	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	100	x 4 =	400
UPL species	0	x 5 =	0
Column Totals:	100 (A)		400 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL F1 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0 - 12	10YR 3/3	100					Silty Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-02

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL F2

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 17 133N 70W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave

Slope (%): 2-5 Lat: 46.3329604 Long: -99.5123002 Datum: WGS 84

Soil Map Unit Name: Zahl-Williams loams, 9 to 15 percent slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Echinochloa crus-galli	65	✓	FACW
2. Bromus inermis	10		FACU
3. Eleocharis palustris	8		OBL
4. Amaranthus cruentus	5		
5. Leersia oryzoides	5		OBL
6. Rumex crispus	5		FAC
7. Artemisia vulgaris	2		UPL
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	13	x 1 =	13
FACW species	65	x 2 =	130
FAC species	5	x 3 =	15
FACU species	10	x 4 =	40
UPL species	2	x 5 =	10
Column Totals:	95 (A)		208 (B)

Prevalence Index = B/A = 2.19

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL F2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 2	10YR 3/2	100					Sandy Clay Loam	
2 - 8	10YR 3/2	98	7.5YR 4/4	2	C	M	Sandy Clay Loam	
8 - 12	10YR 3/2	90	7.5YR 4/4	10	C	M	Sandy Clay Loam	
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-02

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL F2 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 17 133N 70W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.3329135 Long: -99.5122186 Datum: WGS 84

Soil Map Unit Name: Zahl-Williams loams, 9 to 15 percent slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	
Hydric Soil Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data Point is representative of uplands adjacent to wetland F2.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	100	✓	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	100	x 4 =	400
UPL species	0	x 5 =	0
Column Totals:	100 (A)		400 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL F2 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0 - 8	10YR 3/3	100					Silty Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-02

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL F3

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 17 133N 70W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave

Slope (%): 2-5 Lat: 46.3394206 Long: -99.5102716 Datum: WGS 84

Soil Map Unit Name: Williams-Bowbells loams, 3 to 6 percent NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Elymus trachycaulus	40	✓	FACU
2. Hordeum jubatum	20	✓	FAC
3. Leersia oryzoides	20	✓	OBL
4. Bromus inermis	10		FACU
5. Rumex crispus	5		FAC
6. Eleocharis palustris	3		OBL
7. Echinochloa crus-galli	2		FACW
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66.7 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	23	x 1 =	23
FACW species	2	x 2 =	4
FAC species	25	x 3 =	75
FACU species	50	x 4 =	200
UPL species	0	x 5 =	0
Column Totals:	100 (A)		302 (B)

Prevalence Index = B/A = 3.02

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL F3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 3	10YR 3/2	100					Sandy Clay Loam	
3 - 12	10YR 3/1	85	10YR 4/4	5	C	M	Sandy Clay Loam	
-			10YR 4/2	10	C	M	Sandy Clay Loam	
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 3

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-02

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL F3 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 17 133N 70W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.3393984 Long: -99.5103246 Datum: WGS 84

Soil Map Unit Name: Williams-Bowbells loams, 3 to 6 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data Point is representative of uplands adjacent to wetland F3.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	95	✓	FACU
2. Cirsium arvense	4		FACU
3. Taraxacum officinale	1		FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	100	x 4 =	400
UPL species	0	x 5 =	0
Column Totals:	100 (A)		400 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL F3 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 8	10YR 3/3	100					Silty Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-02

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL F4

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 8 133N 70W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave

Slope (%): 2-5 Lat: 46.3440064 Long: -99.5072209 Datum: WGS 84

Soil Map Unit Name: Williams-Bowbells loams, 0 to 3 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Hordeum jubatum	60	✓	FAC
2. Carex stricta	15		OBL
3. Rumex crispus	15		FAC
4. Amaranthus cruentus	5		
5. Persicaria posumbu	5		
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	15	x 1 =	15
FACW species	0	x 2 =	0
FAC species	75	x 3 =	225
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	90 (A)		240 (B)

Prevalence Index = B/A = 2.67

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL F4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 3	10YR 3/2	100					Sandy Clay Loam	
3 - 8	10YR 3/1	95	10YR 4/6	5	C	M	Sandy Clay Loam	
8 - 16	10YR 3/2	60	10YR 4/6	15	C	M	Sandy Clay Loam	
-			10YR 4/2	25	C	M	Sandy Clay Loam	
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 3

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-02

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL F4 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 8 133N 70W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.3439947 Long: -99.5070393 Datum: WGS 84

Soil Map Unit Name: Williams-Bowbells loams, 0 to 3 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	
Hydric Soil Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Area is representative of uplands adjacent to wetland F4.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	80	✓	FACU
2. Poa pratensis	15		FAC
3. Artemisia vulgaris	3		UPL
4. Carex stricta	2		OBL
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	2	x 1 =	2
FACW species	0	x 2 =	0
FAC species	15	x 3 =	45
FACU species	80	x 4 =	320
UPL species	3	x 5 =	15
Column Totals:	100 (A)		382 (B)

Prevalence Index = B/A = 3.82

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL F4 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/2	100					Silty Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-02

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL F5

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 28 133N 70W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave

Slope (%): 2-5 Lat: 46.3002438 Long: -99.4902786 Datum: WGS 84

Soil Map Unit Name: Noonan-Niobell-Williams loams, 0 to 6 percent slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as palustrine emergent (PEMB) wetlands.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Hordeum jubatum	80	✓	FAC
2. Carex stricta	5		OBL
3. Polygonum aviculare	5		FAC
4. Rumex crispus	3		FAC
5. Chenopodium album	2		FACU
6.			
7.			
8.			
9.			
10.			
	95% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5	x 1 =	5
FACW species	0	x 2 =	0
FAC species	88	x 3 =	264
FACU species	2	x 4 =	8
UPL species	0	x 5 =	0
Column Totals:	95 (A)		277 (B)

Prevalence Index = B/A = 2.92

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

5% bare soils present. Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL F5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 8	10YR 2/1	100					Sandy Clay Loam	
8 - 16	10YR 2/1	98	10YR 4/6	2	C	M	Sandy Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 3

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-02

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL F5 & F6 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 28 133N 70W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.3002717 Long: -99.4903619 Datum: WGS 84

Soil Map Unit Name: Noonan-Niobell-Williams loams, 0 to 6 percent slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data Point is representative of uplands adjacent to wetlands F5 and F6.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	50	✓	FACU
2. Poa pratensis	50	✓	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	50	x 3 =	150
FACU species	50	x 4 =	200
UPL species	0	x 5 =	0
Column Totals:	100 (A)		350 (B)

Prevalence Index = B/A = 3.50

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL F5 & F6 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/1	100					Silty Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-02

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL F6

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 28 133N 70W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave

Slope (%): 2-5 Lat: 46.3003079 Long: -99.4904582 Datum: WGS 84

Soil Map Unit Name: Noonan-Niobell-Williams loams, 0 to 6 percent slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Hordeum jubatum	80	✓	FAC
2. Carex stricta	5		OBL
3. Polygonum aviculare	5		FAC
4. Rumex crispus	3		FAC
5. Chenopodium album	2		FACU
6.			
7.			
8.			
9.			
10.			
	95% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5	x 1 =	5
FACW species	0	x 2 =	0
FAC species	88	x 3 =	264
FACU species	2	x 4 =	8
UPL species	0	x 5 =	0
Column Totals:	95 (A)		277 (B)

Prevalence Index = B/A = 2.92

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

5% bare soils present. Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL F6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 8	10YR 2/1	100					Sandy Clay Loam	
8 - 16	10YR 2/1	98	10YR 4/6	2	C	M	Sandy Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 3

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-02

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL F7

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 31 133N 70W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave

Slope (%): 2-5 Lat: 46.3003079 Long: -99.4904582 Datum: WGS 84

Soil Map Unit Name: Noonan-Niobell-Williams loams, 0 to 6 percent slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is representative of a palustrine emergent (PEMB) wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Hordeum jubatum	25	✓	FAC
2. Rumex crispus	25	✓	FAC
3. Carex stricta	20	✓	OBL
4. Eleocharis palustris	20	✓	OBL
5. Aster sp.	5		
6. Typha angustifolia	5		OBL
7.			FAC
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	45	x 1 =	45
FACW species	0	x 2 =	0
FAC species	50	x 3 =	150
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	95 (A)		195 (B)

Prevalence Index = B/A = 2.05

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL F7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 6	10YR 2/1	80	10YR 4/6	20	C	PL / M	Silty Clay Loam	
6 - 12	10YR 2/1	80	10YR 4/6	20	C	PL / M	Sandy Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 3

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-02

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL F7 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 31 133N 70W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.2993674 Long: -9.4876917 Datum: WGS 84

Soil Map Unit Name: Zahl-Williams-Zahill complex, 6 to 9 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	
Hydric Soil Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data Point is representative of uplands adjacent to wetland F7.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	50	✓	FACU
2. Poa pratensis	50	✓	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	50	x 3 =	150
FACU species	50	x 4 =	200
UPL species	0	x 5 =	0
Column Totals:	100 (A)		350 (B)

Prevalence Index = B/A = 3.50

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL F7 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/1	100					Silty Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-02

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL F8

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 29 133N 70W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave

Slope (%): 2-5 Lat: 46.3069657 Long: -99.5020687 Datum: WGS 84

Soil Map Unit Name: Max-Zahl-Arnegard complex, 9 to 25 percent slopes, very stony NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Amaranthus cruentus	35	✓	
2. Carex stricta	20	✓	OBL
3. Xanthium strumarium	20	✓	FAC
4. Echinochloa crus-galli	15		FACW
5. Medicago lupulina	5		FACU
6. Cannabis sativa	3		
7. Rumex crispus	2		FAC
8.			OBL
9.			
10.			FAC
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	20	x 1 =	20
FACW species	15	x 2 =	30
FAC species	22	x 3 =	66
FACU species	5	x 4 =	20
UPL species	0	x 5 =	0
Column Totals:	62 (A)		136 (B)

Prevalence Index = B/A = 2.19

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ✓ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL F8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 8	10YR 2/2	99	10YR 4/6	1	C	M	Sandy Clay Loam	
8 - 12	10YR 2/2	95	10YR 4/6	5	C	M	Sandy Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 3

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-02

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL F8 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 29 133N 70W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.3069126 Long: -99.5022153 Datum: WGS 84

Soil Map Unit Name: Max-Zahl-Arnegard complex, 9 to 25 percent slopes, very stony NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data point is representative of uplands adjacent to wetland F8.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	98	✓	FACU
2. Asclepias syriaca	2		FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	100	x 4 =	400
UPL species	0	x 5 =	0
Column Totals:	100 (A)		400 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL F8 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/2	100					Silty Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-02

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL F9

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 29 133N 70W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave

Slope (%): 2-5 Lat: 46.3059980 Long: -99.5070852 Datum: WGS 84

Soil Map Unit Name: Zahl-Williams-Zahill complex, 6 to 9 percent slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Carex stricta	40	✓	OBL
2. Rumex crispus	40	✓	FAC
3. Helianthus sp.	13		
4. Agrostis stolonifera	5		FACW
5. Symphyotrichum lanceolatum	2		FAC
6.			FAC
7.			FAC
8.			
9.			
10.			OBL
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	40	x 1 =	40
FACW species	5	x 2 =	10
FAC species	42	x 3 =	126
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	87 (A)		176 (B)

Prevalence Index = B/A = 2.02

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL F9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 4	10YR 2/2	100					Sandy Clay Loam	
4 - 10	10YR 2/2	85	7.5YR 4/4	15	C	M	Silty Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 3

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-02

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL F9 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 29 133N 70W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.3059730 Long: -99.5071713 Datum: WGS 84

Soil Map Unit Name: Zahl-Williams-Zahill complex, 6 to 9 percent slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	
Hydric Soil Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data Point is representative of uplands adjacent to wetland F9.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	50	✓	FACU
2. Poa pratensis	50	✓	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	50	x 3 =	150
FACU species	50	x 4 =	200
UPL species	0	x 5 =	0
Column Totals:	100 (A)		350 (B)

Prevalence Index = B/A = 3.50

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL F9 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/1	100					Sandy Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-02

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL F10

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 29 133N 70W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave

Slope (%): 2-5 Lat: 46.3073972 Long: -99.5101931 Datum: WGS 84

Soil Map Unit Name: Max-Zahl-Arnegard complex, 9 to 35 percent slopes, very stony NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Eleocharis palustris	15	✓	OBL
2. Rumex crispus	15	✓	FAC
3. Symphyotrichum lanceolatum	10	✓	FAC
4. Echinochloa crus-galli	5		FACW
5.			
6.			FAC
7.			
8.			
9.			
10.			
	45% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	15	x 1 =	15
FACW species	5	x 2 =	10
FAC species	25	x 3 =	75
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	45 (A)		100 (B)

Prevalence Index = B/A = 2.22

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

55% bare ground present. Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL F10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 6	10YR 3/2	100					Silty Clay Loam	
6 - 12	10YR 3/2	95	10YR 4/4	5	C	M	Silty Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-02

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL F10 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 29 133N 70W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.3073980 Long: -99.5099796 Datum: WGS 84

Soil Map Unit Name: Max-Zahl-Arnegard complex, 9 to 35 percent slopes, very stony NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	
Hydric Soil Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data point is representative of uplands adjacent to wetland F10.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Poa pratensis	50	✓	FAC
2. Bromus inermis	45	✓	FACU
3. Erigeron canadensis	4		FACU
4. Melilotus officinalis	1		FACU
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	50	x 3 =	150
FACU species	50	x 4 =	200
UPL species	0	x 5 =	0
Column Totals:	100 (A)		350 (B)

Prevalence Index = B/A = 3.50

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL F10 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/3	100					Sandy Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-02

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL F11

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 32 133N 70W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave

Slope (%): 2-5 Lat: 46.2937239 Long: -99.5024553 Datum: WGS 84

Soil Map Unit Name: Lehr-Bowdle loams, 2 to 6 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Rumex crispus	50	✓	FAC
2. Agrostis stolonifera	10		FACW
3. Eleocharis palustris	10		OBL
4. Hordeum jubatum	10		FAC
5. Artemisia vulgaris	5		UPL
6. Echinochloa crus-galli	5		FACW
7.			
8.			
9.			
10.			
	90% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	10	x 1 =	10
FACW species	15	x 2 =	30
FAC species	60	x 3 =	180
FACU species	0	x 4 =	0
UPL species	5	x 5 =	25
Column Totals:	90 (A)		245 (B)

Prevalence Index = B/A = 2.72

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

10% bare soils present. Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL F11

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 4	10YR 2/2	100					Silty Clay Loam	
4 - 10	10YR 2/2	80	5YR 4/6	20	C	M	Sandy Clay Loam	
10 - 16	7.5YR 3/2	50	5YR 4/6	50			Sandy Clay Loam	Mixed Matrix
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-02

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL F11 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 32 133N 70W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.2969581 Long: -99.4990089 Datum: WGS 84

Soil Map Unit Name: Zahl-Williams-Zahill complex, 6 to 9 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	
Hydric Soil Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data Point is representative of uplands adjacent to wetland F11.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	50	✓	FACU
2. Poa pratensis	50	✓	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	50	x 3 =	150
FACU species	50	x 4 =	200
UPL species	0	x 5 =	0
Column Totals:	100 (A)		350 (B)

Prevalence Index = B/A = 3.50

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL F11 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0 - 12	10YR 3/1	100					Sandy Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-02

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL F12

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 31 133N 70W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave

Slope (%): 2-5 Lat: 46.2901932 Long: -99.5320623 Datum: WGS 84

Soil Map Unit Name: Bowdle-Lehr loams, 0 to 2 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Elymus trachycaulus	30	✓	FACU
2. Rumex crispus	25	✓	FAC
3. Hordeum jubatum	15		FAC
4. Setaria pumila	15		FAC
5. Typha angustifolia	10		OBL
6. Agrostis stolonifera	5		FACW
7.			
8.			FAC
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	10	x 1 =	10
FACW species	5	x 2 =	10
FAC species	55	x 3 =	165
FACU species	30	x 4 =	120
UPL species	0	x 5 =	0
Column Totals:	100 (A)		305 (B)

Prevalence Index = B/A = 3.05

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL F12

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 8	10YR 2/2	95	10YR 4/6	5	C	M	Sandy Clay Loam	
8 - 14	10YR 2/2	85	5YR 4/6	15	C	M	Sandy Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-02

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL F12 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range:

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.2902090 Long: -99.5319590 Datum: WGS 84

Soil Map Unit Name: Bowdle-Lehr loams, 0 to 2 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data point is representative of uplands adjacent to wetland F12.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Zea mays	80	✓	
2. Taraxacum officinale	20	✓	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	20	x 4 =	80
UPL species	0	x 5 =	0
Column Totals:	20 (A)		80 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL F12 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/2	100					Sandy Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-02

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL F13

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 36 133N 71W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave

Slope (%): 2-5 Lat: 46.2898774 Long: -99.5500131 Datum: WGS 84

Soil Map Unit Name: Reeder-Arnegard loams, 3 to 6 percent slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Polygonum aviculare	65	✓	FAC
2. Malva neglecta	20	✓	
3. Echinochloa crus-galli	5		FACW
4. Chenopodium album	2		FACU
5.			
6.			
7.			
8.			
9.			
10.			
	92% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	5	x 2 =	10
FAC species	65	x 3 =	195
FACU species	2	x 4 =	8
UPL species	0	x 5 =	0
Column Totals:	72 (A)		213 (B)

Prevalence Index = B/A = 2.96

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

8% bare soils present. Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL F13

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 6	10YR 2/2	100					Sandy Clay Loam	
6 - 14	10YR 2/2	85	5YR 4/6	15	C	M	Sandy Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-02

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL F13 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 36 133N 71W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.2899515 Long: -99.5500314 Datum: WGS 84

Soil Map Unit Name: Reeder-Arnegard loams, 3 to 6 percent slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	
Hydric Soil Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data point is representative of uplands adjacent to wetland F13.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	100	✓	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	100	x 4 =	400
UPL species	0	x 5 =	0
Column Totals:	100 (A)		400 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL F13 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0 - 12	10YR 3/2	100					Sandy Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-02

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL F14

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range:

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave

Slope (%): 2-5 Lat: 46.3008112 Long: -99.5192569 Datum: WGS 84

Soil Map Unit Name: Max-Zahl-Arnegard complex, 9 to 35 percent slopes, very stony NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Persicaria longiseta	30	✓	FAC
2. Phalaris arundinacea	25	✓	FACW
3. Rumex crispus	20	✓	FAC
4. Hordeum jubatum	15		FAC
5. Helianthella sp.	10		
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	25	x 2 =	50
FAC species	65	x 3 =	195
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	90 (A)		245 (B)

Prevalence Index = B/A = 2.72

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL F14

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 6	10YR 2/2	100					Sandy Clay Loam	
6 - 14	10YR 2/2	85	10YR 4/6	15	C	M	Sandy Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-02

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL F14 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 30 133N 70W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.3007555 Long: -99.5193293 Datum: WGS 84

Soil Map Unit Name: Max-Zahl-Arnegard complex, 9 to 35 percent slopes, very stony NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	
Hydric Soil Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data point is representative of uplands adjacent to wetland F14.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	85	✓	FACU
2. Taraxacum officinale	15		FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	100	x 4 =	400
UPL species	0	x 5 =	0
Column Totals:	100 (A)		400 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL F14 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/2	100					Sandy Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-03

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL G1

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 30 133N 70W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave

Slope (%): 2-5% Lat: 46.3002268 Long: -99.5297061 Datum: WGS 84

Soil Map Unit Name: Bowdle-Lehr loams, 0 to 2 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEM) wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Eleocharis palustris	40	✓	OBL
2. Polygonum aviculare	25	✓	FAC
3. Hordeum jubatum	20	✓	FAC
4. Rumex crispus	5		FAC
5.			
6.			
7.			
8.			
9.			
10.			
	90% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	40	x 1 =	40
FACW species	0	x 2 =	0
FAC species	50	x 3 =	150
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	90 (A)		190 (B)

Prevalence Index = B/A = 2.11

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

10% bare soils present. Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL G1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 5	10YR 2/2	100					Sandy Clay Loam	
5 - 12	10YR 2/2	90	10YR 4/4	10	C	PL / M	Sandy Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ✓ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 1

Water Table Present? Yes ✓ No _____ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-03

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL G1 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 30 133N 70W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.3004063 Long: -99.5295743 Datum: WGS 84

Soil Map Unit Name: Bowdle-Lehr loams, 0 to 2 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	
Hydric Soil Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data point is representative of uplands adjacent to wetland G1.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Poa pratensis	60	✓	FAC
2. Achillea millefolium	20	✓	FACU
3. Taraxacum officinale	15		FACU
4. Grindelia squarrosa	5		FACU
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	60	x 3 =	180
FACU species	40	x 4 =	160
UPL species	0	x 5 =	0
Column Totals:	100 (A)		340 (B)

Prevalence Index = B/A = 3.40

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL G1 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0 - 12	10YR 3/2	100					Sandy Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-03

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL G2

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 30 133N 70W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave

Slope (%): 2-5% Lat: 46.2993127 Long: -99.5391435 Datum: WGS 84

Soil Map Unit Name: Bowdle-Lehr loams, 0 to 2 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation ✓, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No ✓

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland. Vegetation is disturbed by grazing.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Hordeum jubatum	40	✓	FAC
2. Polygonum aviculare	35	✓	FAC
3. Rumex crispus	5		FAC
4. Taraxacum officinale	5		FACU
5. Echinochloa crus-galli	2		FACW
6.			
7.			
8.			
9.			
10.			
	87% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	2	x 2 =	4
FAC species	80	x 3 =	240
FACU species	5	x 4 =	20
UPL species	0	x 5 =	0
Column Totals:	87 (A)		264 (B)

Prevalence Index = B/A = 3.03

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

13% bare soils present. Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL G2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 5	10YR 2/2	100					Sandy Clay Loam	
5 - 12	10YR 2/2	95	10YR 4/4	5	C	PL / M	Sandy Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-03

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL G2 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 30 133N 70W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.29944713 Long: -99.53918605 Datum: WGS 84

Soil Map Unit Name: Bowdle-Lehr loams, 0 to 2 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data point is representative of uplands adjacent to wetland G2.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Poa pratensis	75	✓	FAC
2. Taraxacum officinale	15		FACU
3. Artemisia frigida	10		
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	75	x 3 =	225
FACU species	15	x 4 =	60
UPL species	0	x 5 =	0
Column Totals:	90 (A)		285 (B)

Prevalence Index = B/A = 3.17

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL G2 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/2	100					Sandy Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-03

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL G3

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 25 133N 71W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave

Slope (%): 2-5% Lat: 46.3063378 Long: -99.5487283 Datum: WGS 84

Soil Map Unit Name: Lehr-Bowdle loams, 2 to 6 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Hordeum jubatum	45	✓	FAC
2. Typha latifolia	40	✓	OBL
3. Glycyrrhiza lepidota	5		FACU
4. Rumex crispus	5		FAC
5. Schoenoplectus tabernaemontani	3		OBL
6. Erigeron canadensis	2		FACU
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	43	x 1 =	43
FACW species	0	x 2 =	0
FAC species	50	x 3 =	150
FACU species	7	x 4 =	28
UPL species	0	x 5 =	0
Column Totals:	100 (A)		221 (B)

Prevalence Index = B/A = 2.21

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

13% bare soils present. Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL G3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 4	10YR 2/2	100					Sandy Clay Loam	
4 - 10	10YR 2/2	95	10YR 4/4	5	C	PL / M	Sandy Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-03

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL G3 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: Amor-Werner loams, 9 to 15 percent slopes

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.3061904 Long: -99.5487816 Datum: WGS 84

Soil Map Unit Name: Amor-Werner loams, 9 to 15 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	
Hydric Soil Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data point is representative of uplands adjacent to wetland G3.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Hordeum jubatum	40	✓	FAC
2. Glycine max	20	✓	
3. Glycyrrhiza lepidota	20	✓	FACU
4. Poa pratensis	10		FAC
5. Setaria pumila	10		FAC
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	60	x 3 =	180
FACU species	20	x 4 =	80
UPL species	0	x 5 =	0
Column Totals:	80 (A)		260 (B)

Prevalence Index = B/A = 3.25

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL G3 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 8	10YR 3/1	100					Sandy Clay Loam	
8 - 14	10YR 3/1	70	10YR 6/3	30			Sandy Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-03

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL G4

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 25 133N 71W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave

Slope (%): 2-5% Lat: 46.3007063 Long: -99.5521816 Datum: WGS 84

Soil Map Unit Name: Reeder-Arnegard loams, 3 to 6 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

Area is classified as a palustrine emergent (PEM) wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Typha latifolia	35	✓	OBL
2. Hordeum jubatum	30	✓	FAC
3. Leersia oryzoides	20	✓	OBL
4. Rumex crispus	2		FAC
5.			
6.			
7.			
8.			
9.			
10.			
	87% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	55	x 1 =	55
FACW species	0	x 2 =	0
FAC species	32	x 3 =	96
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	87 (A)		151 (B)

Prevalence Index = B/A = 1.74

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

13% open water present. Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL G4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 6	10YR 2/1	75	10YR 4/4	25	C	PL / M	Silty Clay Loam	
6 - 12	10YR 2/1	100					Silty Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ✓ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 1

Water Table Present? Yes ✓ No _____ Depth (inches): 4

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-03

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL G4 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 25 133N 71W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.3007653 Long: -99.5522094 Datum: WGS 84

Soil Map Unit Name: Reeder-Arnegard loams, 3 to 6 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	
Hydric Soil Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data point is representative of uplands adjacent to wetland G4.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Poa pratensis	70	✓	FAC
2. Hordeum jubatum	20	✓	FAC
3. Cirsium arvense	10		FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	90	x 3 =	270
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column Totals:	100 (A)		310 (B)

Prevalence Index = B/A = 3.10

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL G4 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/2	100					Sandy Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-03

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL G5

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 26 133N 71W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave

Slope (%): 2-5% Lat: 46.3011713 Long: -99.5612961 Datum: WGS 84

Soil Map Unit Name: Lehr-Bowdle loams, 2 to 6 percent slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMC) wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Carex stricta	63	✓	OBL
2. Leersia oryzoides	20	✓	OBL
3. Hordeum jubatum	10		FAC
4. Typha sp.	5		OBL
5. Rumex crispus	2		FAC
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	88	x 1 =	88
FACW species	0	x 2 =	0
FAC species	12	x 3 =	36
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		124 (B)

Prevalence Index = B/A = 1.24

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL G5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 6	10YR 2/1	75	10YR 4/4	25	C	PL / M	Silty Clay Loam	
6 - 12	10YR 2/1	100					Silty Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ✓ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 1

Water Table Present? Yes ✓ No _____ Depth (inches): 4

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-03

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL G5 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 26 133N 71W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.3012441 Long: -99.5612946 Datum: WGS 84

Soil Map Unit Name: Lehr-Bowdle loams, 2 to 6 percent slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data point is representative of uplands adjacent to wetland G5.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Poa pratensis	70	✓	FAC
2. Hordeum jubatum	20	✓	FAC
3. Cirsium arvense	10		FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	90	x 3 =	270
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column Totals:	100 (A)		310 (B)

Prevalence Index = B/A = 3.10

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL G5 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/2	100					Sandy Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-03

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL G6

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 27 133N 71W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave

Slope (%): 2-5% Lat: 46.3112740 Long: -99.5824775 Datum: WGS 84

Soil Map Unit Name: Arnegard loam, 0 to 2 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Phalaris arundinacea	65	✓	FACW
2. Rumex crispus	35	✓	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	65	x 2 =	130
FAC species	35	x 3 =	105
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		235 (B)

Prevalence Index = B/A = 2.35

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL G6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 2	10YR 2/1	100					Silty Clay Loam	
2 - 8	10YR 2/2	85	7.5YR 4/6	15	C	PL / M	Sandy Clay Loam	
8 - 14	10YR 2/1	75	10YR 5/3	25	C	PL / M	Sandy Clay Loam	
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 1

Water Table Present? Yes ✓ No _____ Depth (inches): 4

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-03

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL G6 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 27 133N 71W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.3112158 Long: -99.5824287 Datum: WGS 84

Soil Map Unit Name: Arnegard loam, 0 to 2 percent slopes NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data point is representative of uplands adjacent to wetland G6.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	60	✓	FACU
2. Medicago sativa	40	✓	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	100	x 4 =	400
UPL species	0	x 5 =	0
Column Totals:	100 (A)		400 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL G6 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/2	100					Sandy Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-03

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL G7

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 29 133N 71W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave

Slope (%): 2-5% Lat: 46.3101483 Long: -99.5849440 Datum: WGS 84

Soil Map Unit Name: Arnegard loam, 0 to 2 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Phalaris arundinacea	55	✓	FACW
2. Leersia oryzoides	20	✓	OBL
3. Bromus inermis	10		FACU
4. Taraxacum officinale	10		FACU
5. Rumex crispus	5		FAC
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	20	x 1 =	20
FACW species	55	x 2 =	110
FAC species	5	x 3 =	15
FACU species	20	x 4 =	80
UPL species	0	x 5 =	0
Column Totals:	100 (A)		225 (B)

Prevalence Index = B/A = 2.25

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL G7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 2	10YR 2/1	100					Silty Clay Loam	
2 - 8	10YR 2/2	85	7.5YR 4/6	15	C	PL / M	Sandy Clay Loam	
8 - 14	10YR 2/1	75	10YR 5/3	25	C	PL / M	Sandy Clay Loam	
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 1

Water Table Present? Yes ✓ No _____ Depth (inches): 4

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-03

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL G7 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 27 133N 71W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.3100980 Long: -99.5849213 Datum: WGS 84

Soil Map Unit Name: Arnegard loam, 0 to 2 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data point is representative of uplands adjacent to wetland G7.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Medicago sativa	70	✓	FACU
2. Bromus inermis	30	✓	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	100	x 4 =	400
UPL species	0	x 5 =	0
Column Totals:	100 (A)		400 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

✓ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL G7 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0 - 12	10YR 3/2	100					Sandy Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-03

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL G8

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 27 133N 71W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave

Slope (%): 0-2% Lat: 46.3095130 Long: -99.5903868 Datum: WGS 84

Soil Map Unit Name: Hamerly-Vallers loams, moderately saline, 0 to 3 percent slopes NWI classification: PEM1Ax

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMC) wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Phalaris arundinacea	60	✓	FACW
2. Leersia oryzoides	20	✓	OBL
3. Bromus inermis	10		FACU
4. Eleocharis palustris	10		OBL
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	30	x 1 =	30
FACW species	60	x 2 =	120
FAC species	0	x 3 =	0
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column Totals:	100 (A)		190 (B)

Prevalence Index = B/A = 1.90

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL G8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 3	10YR 2/1	100					Sandy Clay Loam	
3 - 9	10YR 2/1	85	7.5YR 4/6	15	C	PL / M	Sandy Clay Loam	
9 - 14	10YR 6/1	75	7.5YR 4/6	25	C	PL / M	Sandy Clay Loam	
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 1

Water Table Present? Yes ✓ No _____ Depth (inches): 4

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-03

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL G8 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 27 133N 71W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.3094735 Long: -99.5903231 Datum: WGS 84

Soil Map Unit Name: Hamerly-Vallers loams, moderately saline, 0 to 3 percent slopes NWI classification: PEM1Ax

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data Point is representative of uplands adjacent to wetland G8.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Elymus trachycaulus	70	✓	FACU
2. Bromus inermis	25	✓	FACU
3. Cirsium arvense	5		FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	100	x 4 =	400
UPL species	0	x 5 =	0
Column Totals:	100 (A)		400 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL G8 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/2	100					Sandy Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-03

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL G9

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 25 133N 71W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave

Slope (%): 0-2% Lat: 46.2930945 Long: -99.5791883 Datum: WGS 84

Soil Map Unit Name: Arnegard loam, 2 to 6 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Typha angustifolia	60	✓	OBL
2. Phalaris arundinacea	25	✓	FACW
3. Agrostis stolonifera	5		FACW
4. Carex stricta	5		OBL
5. Rumex crispus	5		FAC
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	65	x 1 =	65
FACW species	30	x 2 =	60
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		140 (B)

Prevalence Index = B/A = 1.40

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL G9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 8	10YR 2/1	100					Silty Clay Loam	
8 - 16	10YR 6/1	85	10YR 4/6	15	C	PL / M	Sandy Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ✓ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 2

Water Table Present? Yes ✓ No _____ Depth (inches): 5

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-03

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL G9 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range:

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.2929713 Long: -99.5791042 Datum: WGS 84

Soil Map Unit Name: Arnegard loam, 2 to 6 percent slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data point is representative of uplands adjacent to wetland G9.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	75	✓	FACU
2. Cirsium arvense	15		FACU
3. Elymus trachycaulus	8		FACU
4. Hieracium caespitosum	2		
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	98	x 4 =	392
UPL species	0	x 5 =	0
Column Totals:	98 (A)		392 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL G9 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/1	100					Sandy Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-03

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL G10

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 34 133N 71W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave

Slope (%): 0-2% Lat: 46.2895577 Long: -99.5816908 Datum: WGS 84

Soil Map Unit Name: Wabek-Appam complex, 6 to 9 percent slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEM) wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Hordeum jubatum	60	✓	FAC
2. Eleocharis palustris	30	✓	OBL
3. Phalaris arundinacea	10		FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	30	x 1 =	30
FACW species	10	x 2 =	20
FAC species	60	x 3 =	180
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		230 (B)

Prevalence Index = B/A = 2.30

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL G10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 3	10YR 2/1	100					Silty Clay Loam	
3 - 12	10YR 2/1	98	10YR 4/4	2	C	PL / M	Sandy Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-03

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL G10 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 34 133N 71W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.2895928 Long: -99.5816481 Datum: WGS 84

Soil Map Unit Name: Wabek-Appam complex, 6 to 9 percent slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	
Hydric Soil Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data point is representative of uplands adjacent to wetland G10.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	100	✓	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	100	x 4 =	400
UPL species	0	x 5 =	0
Column Totals:	100 (A)		400 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL G10 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/1	100					Sandy Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-03

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL G11

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 35 133N 71W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave

Slope (%): 0-2% Lat: 46.2861522 Long: -99.5794315 Datum: WGS 84

Soil Map Unit Name: Hamerly-Vallers loams, moderately saline, 0 to 3 percent slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMC) wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Typha angustifolia	60	✓	OBL
2. Eleocharis palustris	30	✓	OBL
3. Phalaris arundinacea	10		FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	90	x 1 =	90
FACW species	10	x 2 =	20
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		110 (B)

Prevalence Index = B/A = 1.10

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL G11

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 7	10YR 2/1	100					Clay Loam	
7 - 16	10YR 4/1	80	7.5YR 4/6	20	C	PL / M	Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 2

Water Table Present? Yes ✓ No _____ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-03

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL G11 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 35 133N 71W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.28607171 Long: -99.57912613 Datum: WGS 84

Soil Map Unit Name: Hamerly-Vallers loams, moderately saline, 0 to 3 percent slopes NWI classification: PEM1A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	
Hydric Soil Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data Point is representative of uplands adjacent to wetland G11.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	50	✓	FACU
2. Trifolium pratense	30	✓	FACU
3. Elymus trachycaulus	20	✓	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	100	x 4 =	400
UPL species	0	x 5 =	0
Column Totals:	100 (A)		400 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL G11 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/1	100					Sandy Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-03

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL G12

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 34 133N 71W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave

Slope (%): 0-2% Lat: 46.28851726 Long: -99.58235642 Datum: WGS 84

Soil Map Unit Name: Hamerly-Vallers loams, moderately saline, 0 to 3 percent slopes NWI classification: PEM1Ax

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Typha angustifolia	60	✓	OBL
2. Eleocharis palustris	30	✓	OBL
3. Phalaris arundinacea	10		FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	90	x 1 =	90
FACW species	10	x 2 =	20
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		110 (B)

Prevalence Index = B/A = 1.10

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL G12

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 7	10YR 2/1	100					Clay Loam	
7 - 16	10YR 4/1	80	7.5YR 4/6	20	C	PL / M	Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 2

Water Table Present? Yes ✓ No _____ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-03

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL G12 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 34 133N 71W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.2882708 Long: -99.5823664 Datum: WGS 84

Soil Map Unit Name: Hamerly-Vallers loams, moderately saline, 0 to 3 percent slopes NWI classification: PEM1Ax

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	
Hydric Soil Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data Point is representative of uplands adjacent to wetland G12.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	50	✓	FACU
2. Trifolium pratense	30	✓	FACU
3. Elymus trachycaulus	20	✓	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	100	x 4 =	400
UPL species	0	x 5 =	0
Column Totals:	100 (A)		400 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL G12 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/1	100					Sandy Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-03

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL G13

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 34 133N 71W

Landform (hillslope, terrace, etc.): Basin Local relief (concave, convex, none): Concave

Slope (%): 0-2% Lat: 46.28486881 Long: -99.58775856 Datum: WGS 84

Soil Map Unit Name: Harriet-Regan-Stirum complex, 0 to 2 percent slopes, occasionally flooded NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:

Area is classified as a palustrine emergent (PEMB) wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Leersia oryzoides	70	✓	OBL
2. Carex stricta	10		OBL
3. Phalaris arundinacea	10		FACW
4. Echinochloa crus-galli	5		FACW
5. Typha angustifolia	5		OBL
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	85	x 1 =	85
FACW species	15	x 2 =	30
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		115 (B)

Prevalence Index = B/A = 1.15

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks: (Include photo numbers here or on a separate sheet.)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL G13

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 9	10YR 2/1	100					Muck	
9 - 16	10YR 4/2	98	10YR 4/6	2	C	PL / M	Muck	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 2

Water Table Present? Yes ✓ No _____ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Badger Wind Project City/County: Logan Sampling Date: 2021-10-03

Applicant/Owner: Badger Wind, LLC State: North Dakota Sampling Point: WL G13 Upland

Investigator(s): D. Nigro, C. Scholten, K. Yantz -Atwell, LLC Section, Township, Range: 3 133N 71W

Landform (hillslope, terrace, etc.): Upland, Flat Local relief (concave, convex, none): None

Slope (%): 0 Lat: 46.2847094 Long: -99.5880095 Datum: WGS 84

Soil Map Unit Name: Harriet-Regan-Stirum complex, 0 to 2 percent slopes, occasionally flooded NWI classification: PEM1C

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	
Hydric Soil Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

Data Point is representative of uplands adjacent to wetland G13.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	50	✓	FACU
2. Trifolium pratense	30	✓	FACU
3. Elymus trachycaulus	20	✓	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	100	x 4 =	400
UPL species	0	x 5 =	0
Column Totals:	100 (A)		400 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: WL G13 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 6	10YR 3/2	100					Silty Clay Loam	
6 - 12	10YR 4/3	100					Silty Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: McIntosh County Sampling Date: 2022-05-03

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL H1

Investigator(s): K. Yantz, D Nigro-Atwell, LLC Section, Township, Range: sec 20 T132N R071W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.239390 Long: -99.590779 Datum: WGS84

Soil Map Unit Name: Wabek-Lehr-Appam complex, 9 to 25 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:
PEM depression within pasture

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Spartina pectinata*	70	Y	FACW
2. *Panicum virgatum*	20	Y	FAC
3. *Bromus inermis*	5	N	UPL
4. *Symphyotrichum lanceolatum*	3	N	FACW
5. *Poa sp.*	2	N	FACU
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	73.00	x 2 =	146.00
FAC species	20.00	x 3 =	60.00
FACU species	2.00	x 4 =	8.00
UPL species	5.00	x 5 =	25.00
Column Totals:	100.00 (A)		239.00 (B)

Prevalence Index = B/A = 2.39

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: WL H1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 2/1	100					CL	
8-18	10YR 2/1	95	5YR 6/2	5	D	M	CL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ✓ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 0

Water Table Present? Yes ✓ No _____ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? **Yes** ✓ **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: McIntosh County Sampling Date: 2022-05-03

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL H1 Upland

Investigator(s): K. Yantz, D Nigro-Atwell, LLC Section, Township, Range: sec 20 T132N R071W

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.239589 Long: -99.590786 Datum: WGS84

Soil Map Unit Name: Wabek-Lehr-Appam complex, 9 to 25 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Poa annua*	76	Y	FACU
2. *Bromus inermis*	20	Y	UPL
3. *Cornus racemosa*	2	N	FAC
4. *Solidago altissima*	2	N	FACU
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	0.00	x 2 =	0.00
FAC species	2.00	x 3 =	6.00
FACU species	78.00	x 4 =	312.00
UPL species	20.00	x 5 =	100.00
Column Totals:	100.00 (A)		418.00 (B)

Prevalence Index = B/A = 4.18

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: WL H1 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 2/2	100					CL	
10-18	10YR 3/4	100					CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: McIntosh County Sampling Date: 2022-05-03

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL H2

Investigator(s): K. Yantz, D Nigro-Atwell, LLC Section, Township, Range: sec 05 T132N R071W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.273806 Long: -99.596890 Datum: WGS84

Soil Map Unit Name: Arnegard loam, 2 to 6 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:
PEM depression within fallow field

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Typha X glauca*	50	Y	OBL
2. *Carex lacustris*	20	Y	OBL
3. *Phalaris arundinacea*	10	N	FACW
4. *Rumex crispus*	5	N	FAC
5.			
6.			
7.			
8.			
9.			
10.			
	85 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	70.00	x 1 =	70.00
FACW species	10.00	x 2 =	20.00
FAC species	5.00	x 3 =	15.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	85.00 (A)		105.00 (B)

Prevalence Index = B/A = 1.24

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: WL H2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR 2/1	100					MUCK	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ✓ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): 4

Water Table Present? Yes ✓ No ___ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: McIntosh County Sampling Date: 2022-05-03

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL H2 Upland

Investigator(s): K. Yantz, D Nigro-Atwell, LLC Section, Township, Range: sec 05 T132N R071W

Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.273752 Long: -99.596585 Datum: WGS84

Soil Map Unit Name: Arnegard loam, 2 to 6 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Poa annua*	90	Y	FACU
2. *Bromus inermis*	10	N	UPL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	0.00	x 2 =	0.00
FAC species	0.00	x 3 =	0.00
FACU species	90.00	x 4 =	360.00
UPL species	10.00	x 5 =	50.00
Column Totals:	100.00 (A)		410.00 (B)

Prevalence Index = B/A = 4.1

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: WL H2 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-18	10YR 3/2	100					CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: McIntosh County Sampling Date: 2022-05-03

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL I1

Investigator(s): K. Yantz, D Nigro-Atwell, LLC Section, Township, Range: sec 31 T133N R070W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.283135 Long: -99.519376 Datum: WGS84

Soil Map Unit Name: Wabek-Lehr complex, 2 to 6 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:
PEM roadside ditch

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	30	Y	FACW
2. *Panicum virgatum*	15	Y	FAC
3. *Rumex crispus*	10	N	FAC
4. *Typha X glauca*	3	N	OBL
5.			
6.			
7.			
8.			
9.			
10.			
	58 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 42

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	3.00	x 1 =	3.00
FACW species	30.00	x 2 =	60.00
FAC species	25.00	x 3 =	75.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	58.00 (A)		138.00 (B)

Prevalence Index = B/A = 2.38

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: WL I1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/2	97	5YR 5/2	3	D	M	CL	Faint redox.
6-16	10YR 2/1	100					MUCK	
16-18	10YR 2/1	80	5YR 5/2	20	D	M	CL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ✓ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): 6

Water Table Present? Yes ✓ No ___ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: McIntosh County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL I1 Upland

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 15 T131N R069W

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.16593 Long: -99.31107 Datum: WGS84

Soil Map Unit Name: Max-Zahl-Arnegard complex, 9 to 35 percent slopes, very stony NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Poa annua*	90	Y	FACU
2. *Bromus inermis*	10	N	UPL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	0.00	x 2 =	0.00
FAC species	0.00	x 3 =	0.00
FACU species	90.00	x 4 =	360.00
UPL species	10.00	x 5 =	50.00
Column Totals:	100.00 (A)		410.00 (B)

Prevalence Index = B/A = 4.1

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: WL I1 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/2	60	10YR 3/3	40			SCL	Faint redox. Mixed matrix.
6-18	10YR 3/2	100					SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: McIntosh County Sampling Date: 2022-05-03

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL I2

Investigator(s): K. Yantz, D Nigro-Atwell, LLC Section, Township, Range: sec 01 T132N R071W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.282490 Long: -99.518647 Datum: WGS84

Soil Map Unit Name: Wabek-Appam complex, 6 to 9 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:
PEM depression attached to larger wetland outside of the corridor.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	80	Y	FACW
2. *Rumex crispus*	10	N	FAC
3. *Typha X glauca*	10	N	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species 10.00	x 1 = 10.00
FACW species 80.00	x 2 = 160.00
FAC species 10.00	x 3 = 30.00
FACU species 0.00	x 4 = 0.00
UPL species 0.00	x 5 = 0.00
Column Totals: 100.00 (A)	200.00 (B)

Prevalence Index = B/A = 2.0

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: WL I2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/2	100					CL	
6-17	10YR 2/1	90	10YR 6/4	10	C	M	CL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Frozen ground

Depth (inches): 17

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ✓ No ___ Depth (inches): 6

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: McIntosh County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL I2 Upland

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 15 T131N R069W

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.16572 Long: -99.31066 Datum: WGS84

Soil Map Unit Name: Zahl-Max-Bowbells loams, 6 to 35 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Poa annua*	90	Y	FACU
2. *Bromus inermis*	10	N	UPL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	0.00	x 2 =	0.00
FAC species	0.00	x 3 =	0.00
FACU species	90.00	x 4 =	360.00
UPL species	10.00	x 5 =	50.00
Column Totals:	100.00 (A)		410.00 (B)

Prevalence Index = B/A = 4.1

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: WL I2 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR 3/3	100					SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL J1

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 33 T133N R070W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 8-15

Subregion (LRR): LRR F, MLRA 53B Lat: 46.294193 Long: -99.495439 Datum: WGS84

Soil Map Unit Name: Zahl-Williams loams, 9 to 15 percent slopes NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:
PEM depression within fallow field

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Panicum virgatum*	15	Y	FAC
2. *Symphyotrichum lanceolatum*	10	Y	FACW
3. *Agrostis stolonifera*	10	Y	FACW
4. *Rumex crispus*	5	N	FAC
5.			
6.			
7.			
8.			
9.			
10.			
	40 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 60

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	20.00	x 2 =	40.00
FAC species	20.00	x 3 =	60.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	40.00 (A)		100.00 (B)

Prevalence Index = B/A = 2.5

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: WL J1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/2	100					CL	
8-14	10YR 3/2	80	10YR 6/4	20	C	M/PL	CL	Distinct redox.
14-18	10YR 3/2	100					LS	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ✓ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ✓ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): 24

Water Table Present? Yes ✓ No ___ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL J1 Upland

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 33 T133N R070W

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.256731 Long: -99.552240 Datum: WGS84

Soil Map Unit Name: Zahl-Williams loams, 9 to 15 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Poa annua*	60	Y	FACU
2. *Bromus inermis*	30	Y	UPL
3. *Rumex crispus*	10	N	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	0.00	x 2 =	0.00
FAC species	10.00	x 3 =	30.00
FACU species	60.00	x 4 =	240.00
UPL species	30.00	x 5 =	150.00
Column Totals:	100.00 (A)		420.00 (B)

Prevalence Index = B/A = 4.2

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: WL J1 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 4/1	100					SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Thick rock layer

Depth (inches): 16

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL J2

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 29 T133N R070W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.300450 Long: -99.504017 Datum: WGS84

Soil Map Unit Name: Williams-Bowbells loams, 3 to 6 percent slopes NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:
PEM depression within pasture

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	20	Y	FACW
2. *Rumex crispus*	10	Y	FAC
3. *Typha X glauca*	5	N	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	35 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 65

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5.00	x 1 =	5.00
FACW species	20.00	x 2 =	40.00
FAC species	10.00	x 3 =	30.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	35.00 (A)		75.00 (B)

Prevalence Index = B/A = 2.14

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: WL J2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 2/2	95	10YR 5/4	5	C	M	CL	Distinct redox.
8-18	10YR 3/2	100					C	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ✓ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): 24

Water Table Present? Yes ✓ No ___ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL J2 Upland

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 29 T133N R070W

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.300542 Long: -99.503706 Datum: WGS84

Soil Map Unit Name: Williams-Bowbells loams, 3 to 6 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Poa annua*	60	Y	FACU
2. *Bromus inermis*	30	Y	UPL
3. *Rumex crispus*	10	N	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	0.00	x 2 =	0.00
FAC species	10.00	x 3 =	30.00
FACU species	60.00	x 4 =	240.00
UPL species	30.00	x 5 =	150.00
Column Totals:	100.00 (A)		420.00 (B)

Prevalence Index = B/A = 4.2

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: WL J2 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR 3/1	100					SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL J3

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 18 T133N R070W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 3-7

Subregion (LRR): LRR F, MLRA 53B Lat: 46.330169 Long: -99.520892 Datum: WGS84

Soil Map Unit Name: Max-Zahl-Arnegard complex, 9 to 35 percent slopes, very stony NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:
PEM depression within pasture

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	20	Y	FACW
2. *Juncus effusus*	20	Y	OBL
3. *Rumex crispus*	10	N	FAC
4. *Cyperus esculentus*	5	N	FACW
5.			
6.			
7.			
8.			
9.			
10.			
	55 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 45

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	20.00	x 1 =	20.00
FACW species	25.00	x 2 =	50.00
FAC species	10.00	x 3 =	30.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	55.00 (A)		100.00 (B)

Prevalence Index = B/A = 1.82

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: WL J3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 2/2	95	10YR 6/4	5	C	M	SCL	Prominent redox.
8-18	10YR 2/2	90	10YR 6/4	10	C	M	SCL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 6

Water Table Present? Yes ✓ No _____ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? **Yes** ✓ **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL J3 Upland

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 18 T133N R070W

Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): Convex Slope (%): 3-7

Subregion (LRR): LRR F, MLRA 53B Lat: 46.330251 Long: -99.520886 Datum: WGS84

Soil Map Unit Name: Max-Zahl-Arnegard complex, 9 to 35 percent slopes, very stony NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Poa annua*	80	Y	FACU
2. *Bromus inermis*	15	N	UPL
3. *Rumex crispus*	5	N	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	0.00	x 2 =	0.00
FAC species	5.00	x 3 =	15.00
FACU species	80.00	x 4 =	320.00
UPL species	15.00	x 5 =	75.00
Column Totals:	100.00 (A)		410.00 (B)

Prevalence Index = B/A = 4.1

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: WL J3 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR 3/2	100					SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL J4

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 18 T133N R070W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.328329 Long: -99.520249 Datum: WGS84

Soil Map Unit Name: Williams-Bowbells loams, 0 to 3 percent slopes NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:
PEM depression within pasture

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	35	Y	FACW
2. *Erigeron lonchophyllus*	30	Y	FACW
3. *Symphyotrichum lanceolatum*	15	N	FACW
4. *Rumex crispus*	10	N	FAC
5.			
6.			
7.			
8.			
9.			
10.			
	90 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 10

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	80.00	x 2 =	160.00
FAC species	10.00	x 3 =	30.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	90.00 (A)		190.00 (B)

Prevalence Index = B/A = 2.11

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: WL J4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/2	100					SCL	
8-12	10YR 3/2	70	10YR 4/4	30	C	M	SCL	Distinct redox.
12-18	10YR 3/4	100					SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): 6

Water Table Present? Yes ✓ No ___ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL J4 Upland

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 18 T133N R070W

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 3-7

Subregion (LRR): LRR F, MLRA 53B Lat: 46.328247 Long: -99.519921 Datum: WGS84

Soil Map Unit Name: Max-Zahl-Arnegard complex, 9 to 35 percent slopes, very stony NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	100	Y	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	0.00	x 2 =	0.00
FAC species	0.00	x 3 =	0.00
FACU species	0.00	x 4 =	0.00
UPL species	100.00	x 5 =	500.00
Column Totals:	100.00 (A)		500.00 (B)

Prevalence Index = B/A = 5.0

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: WL J4 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR 3/2	100					SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL K1

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 08 T133N R070W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.342178 Long: -99.506825 Datum: WGS84

Soil Map Unit Name: Zahl-Williams loams, 9 to 15 percent slopes NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:
PEM depression within pasture

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	40	Y	FACW
2. *Spartina pectinata*	20	Y	FACW
3. *Rumex crispus*	5	N	FAC
4. *Cyperus esculentus*	5	N	FACW
5.			
6.			
7.			
8.			
9.			
10.			
	70 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 30

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	65.00	x 2 =	130.00
FAC species	5.00	x 3 =	15.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	70.00 (A)		145.00 (B)

Prevalence Index = B/A = 2.07

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: WL K1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/1	100					SCL	
8-15	10YR 3/1	90	10YR 6/4	5	C	M	SCL	Distinct redox.
			10YR 6/2	5	D	M	SCL	
15-18	10YR 3/1	40	10YR 6/8	20	C	M	CL	Prominent redox.
			10YR 6/3	40	D	M	CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ✓ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): 24

Water Table Present? Yes ✓ No ___ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL K1 Upland

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 08 T133N R070W

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.342133 Long: -99.506886 Datum: WGS84

Soil Map Unit Name: Zahl-Williams loams, 9 to 15 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	60	Y	UPL
2. *Poa annua*	20	Y	FACU
3. *Rumex crispus*	20	Y	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33.33 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	0.00	x 2 =	0.00
FAC species	20.00	x 3 =	60.00
FACU species	20.00	x 4 =	80.00
UPL species	60.00	x 5 =	300.00
Column Totals:	100.00 (A)		440.00 (B)

Prevalence Index = B/A = 4.4

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: WL K1 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/3	100					SCL	
4-18	10YR 3/2	100					SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL K2

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 17 T133N R070W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.339510 Long: -99.507342 Datum: WGS84

Soil Map Unit Name: Zahl-Max-Bowbells loams, 6 to 35 percent slopes NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:
PEM depression within pasture

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	40	Y	FACW
2. *Spartina pectinata*	20	Y	FACW
3. *Carex stricta*	10	N	OBL
4. *Rumex crispus*	5	N	FAC
5.			
6.			
7.			
8.			
9.			
10.			
	75 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 15

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	10.00	x 1 =	10.00
FACW species	60.00	x 2 =	120.00
FAC species	5.00	x 3 =	15.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	75.00 (A)		145.00 (B)

Prevalence Index = B/A = 1.93

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: WL K2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/2	100					SCL	
8-15	10YR 3/1	85	10YR 6/4	5	C	M	CL	Distinct redox.
			10YR 6/2	10	D	M	SCL	
15-18	10YR 3/2	90	10YR 6/4	5	C	M	SL	Distinct redox.
			10YR 6/2	5	D	M	SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ✓ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ✓ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): 18

Water Table Present? Yes ✓ No ___ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL K2 Upland

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 08 T133N R070W

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 3-7

Subregion (LRR): LRR F, MLRA 53B Lat: 46.339588 Long: -99.507267 Datum: WGS84

Soil Map Unit Name: Zahl-Williams loams, 9 to 15 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Poa annua*	80	Y	FACU
2. *Bromus inermis*	20	Y	UPL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 80

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	0.00	x 2 =	0.00
FAC species	0.00	x 3 =	0.00
FACU species	80.00	x 4 =	320.00
UPL species	20.00	x 5 =	100.00
Column Totals:	100.00 (A)		420.00 (B)

Prevalence Index = B/A = 4.2

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: WL K2 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/3	100					SCL	
6-18	10YR 4/6	100					SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL K3

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 17 T133N R070W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.339106 Long: -99.508369 Datum: WGS84

Soil Map Unit Name: Zahl-Williams loams, 9 to 15 percent slopes NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:
Small PEM depression within pasture

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Phalaris arundinacea*	40	Y	FACW
2. *Spartina pectinata*	20	Y	FACW
3. *Carex stricta*	10	N	OBL
4. *Rumex crispus*	5	N	FAC
5.			
6.			
7.			
8.			
9.			
10.			
	75 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 15

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	10.00	x 1 =	10.00
FACW species	60.00	x 2 =	120.00
FAC species	5.00	x 3 =	15.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	75.00 (A)		145.00 (B)

Prevalence Index = B/A = 1.93

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: WL K3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/1	95	10YR 6/6	5	C	M	SCL	Prominent redox.
6-18	10YR 3/1	90	10YR 3/6	10	C	M	SCL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ✓ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 18

Water Table Present? Yes ✓ No _____ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? **Yes** ✓ **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL K3 Upland

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 17 T133N R070W

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 3-7

Subregion (LRR): LRR F, MLRA 53B Lat: 46.338975 Long: -99.508380 Datum: WGS84

Soil Map Unit Name: Zahl-Williams loams, 9 to 15 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Poa annua*	80	Y	FACU
2. *Bromus inermis*	10	N	UPL
3. *Cornus racemosa*	10	N	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	0.00	x 2 =	0.00
FAC species	10.00	x 3 =	30.00
FACU species	80.00	x 4 =	320.00
UPL species	10.00	x 5 =	50.00
Column Totals:	100.00 (A)		400.00 (B)

Prevalence Index = B/A = 4.0

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: WL K3 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-18	10YR 3/4	100					SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL K4

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 17 T133N R070W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.335953 Long: -99.509275 Datum: WGS84

Soil Map Unit Name: Zahl-Williams loams, 9 to 15 percent slopes NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:
PEM depression within pasture

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Spartina pectinata*	50	Y	FACW
2. *Carex stricta*	40	Y	OBL
3. *Rumex crispus*	10	N	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	40.00	x 1 =	40.00
FACW species	50.00	x 2 =	100.00
FAC species	10.00	x 3 =	30.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	100.00 (A)		170.00 (B)

Prevalence Index = B/A = 1.7

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: WL K4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/1	100					SCL	
6-12	10YR 3/1	90	10YR 6/4	10	C	M	SCL	Distinct redox.
12-18	10YR 3/1	85	10YR 6/4	15	C	M	CL	Distinct redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 12

Water Table Present? Yes ✓ No _____ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? **Yes** ✓ **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL K4 Upland

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 17 T133N R070W

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.336004 Long: -99.509123 Datum: WGS84

Soil Map Unit Name: Zahl-Williams loams, 9 to 15 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Poa annua*	80	Y	FACU
2. *Bromus inermis*	20	Y	UPL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	0.00	x 2 =	0.00
FAC species	0.00	x 3 =	0.00
FACU species	80.00	x 4 =	320.00
UPL species	20.00	x 5 =	100.00
Column Totals:	100.00 (A)		420.00 (B)

Prevalence Index = B/A = 4.2

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: WL K4 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/6	100					SL	
12-18	10YR 3/6	60	10YR 7/3	40	D	M	SL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL K5

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 17 T133N R070W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.334793 Long: -99.507923 Datum: WGS84

Soil Map Unit Name: Zahl-Williams loams, 9 to 15 percent slopes NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:
Small PEM depression within pasture

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Spartina pectinata*	50	Y	FACW
2. *Carex stricta*	15	Y	OBL
3. *Rumex crispus*	5	N	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	70 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 30

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	15.00	x 1 =	15.00
FACW species	50.00	x 2 =	100.00
FAC species	5.00	x 3 =	15.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	70.00 (A)		130.00 (B)

Prevalence Index = B/A = 1.86

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: WL K5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/1	100					MUCK	
4-12	10YR 3/1	90	10YR 6/4	10	C	M	SCL	Distinct redox.
12-18	10YR 3/1	100					SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ✓ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 18

Water Table Present? Yes ✓ No _____ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? **Yes** ✓ **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL K5 Upland

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 17 T133N R070W

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.334711 Long: -99.508059 Datum: WGS84

Soil Map Unit Name: Zahl-Williams loams, 9 to 15 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____ No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____ No ✓	
Wetland Hydrology Present?	Yes _____ No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Poa annua*	70	Y	FACU
2. *Bromus inermis*	20	Y	UPL
3. *Solidago altissima*	10	N	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	0.00	x 2 =	0.00
FAC species	0.00	x 3 =	0.00
FACU species	80.00	x 4 =	320.00
UPL species	20.00	x 5 =	100.00
Column Totals:	100.00 (A)		420.00 (B)

Prevalence Index = B/A = 4.2

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: WL K5 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR 3/3	100					SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL K6

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 17 T133N R070W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.333585 Long: -99.511102 Datum: WGS84

Soil Map Unit Name: Zahl-Williams loams, 9 to 15 percent slopes NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:
Small PEM depression within pasture

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Spartina pectinata*	50	Y	FACW
2. *Rumex crispus*	5	N	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	55 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 45

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	50.00	x 2 =	100.00
FAC species	5.00	x 3 =	15.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	55.00 (A)		115.00 (B)

Prevalence Index = B/A = 2.09

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: WL K6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/1	100					MUCK	
4-12	10YR 3/1	90	10YR 6/4	10	C	M	SCL	Distinct redox.
12-18	10YR 3/1	100					SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ✓ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 24

Water Table Present? Yes ✓ No _____ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? **Yes** ✓ **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL K6 Upland

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 17 T133N R070W

Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): Convex Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.333513 Long: -99.511060 Datum: WGS84

Soil Map Unit Name: Zahl-Williams loams, 9 to 15 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	90	Y	UPL
2. *Rumex crispus*	10	N	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	0.00	x 2 =	0.00
FAC species	10.00	x 3 =	30.00
FACU species	0.00	x 4 =	0.00
UPL species	90.00	x 5 =	450.00
Column Totals:	100.00 (A)		480.00 (B)

Prevalence Index = B/A = 4.8

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: WL K6 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-18	10YR 3/3	100					SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL K7

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 17 T133N R070W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.333080 Long: -99.511169 Datum: WGS84

Soil Map Unit Name: Zahl-Williams loams, 9 to 15 percent slopes NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:
Small PEM depression within pasture

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Spartina pectinata*	50	Y	FACW
2. *Rumex crispus*	5	N	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	55 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 45

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	50.00	x 2 =	100.00
FAC species	5.00	x 3 =	15.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	55.00 (A)		115.00 (B)

Prevalence Index = B/A = 2.09

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: WL K7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/1	100					MUCK	
4-12	10YR 3/1	90	10YR 6/4	10	C	M	SCL	Distinct redox.
12-18	10YR 3/1	100					SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ✓ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 24

Water Table Present? Yes ✓ No _____ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? **Yes** ✓ **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL K7 Upland

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 17 T133N R070W

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.333025 Long: -99.511177 Datum: WGS84

Soil Map Unit Name: Zahl-Williams loams, 9 to 15 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____ No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____ No ✓	
Wetland Hydrology Present?	Yes _____ No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	90	Y	UPL
2. *Rumex crispus*	10	N	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	0.00	x 2 =	0.00
FAC species	10.00	x 3 =	30.00
FACU species	0.00	x 4 =	0.00
UPL species	90.00	x 5 =	450.00
Column Totals:	100.00 (A)		480.00 (B)

Prevalence Index = B/A = 4.8

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: WL K7 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-18	10YR 3/3	100					SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL K8

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 17 T133N R070W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.331140 Long: -99.516496 Datum: WGS84

Soil Map Unit Name: Bowdle-Lehr loams, 0 to 2 percent slopes NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:
Small PEM depression within pasture

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Carex stricta*	30	Y	OBL
2. *Spartina pectinata*	20	Y	FACW
3. *Artemisia vulgaris*	10	N	UPL
4. *Rumex crispus*	5	N	FAC
5.			
6.			
7.			
8.			
9.			
10.			
	65 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 35

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	30.00	x 1 =	30.00
FACW species	20.00	x 2 =	40.00
FAC species	5.00	x 3 =	15.00
FACU species	0.00	x 4 =	0.00
UPL species	10.00	x 5 =	50.00
Column Totals:	65.00 (A)		135.00 (B)

Prevalence Index = B/A = 2.08

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: WL K8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/1	100					SCL	
8-15	10YR 3/1	90	10YR 3/6	10	C	M	SCL	Prominent redox.
15-18	10YR 3/1	90	10YR 3/6	10	C	M	SCL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 12

Water Table Present? Yes ✓ No _____ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? **Yes** ✓ **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL K8 Upland

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 17 T133N R070W

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.330860 Long: -99.516859 Datum: WGS84

Soil Map Unit Name: Zahl-Williams loams, 9 to 15 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	90	Y	UPL
2. *Rumex crispus*	10	N	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	0.00	x 2 =	0.00
FAC species	10.00	x 3 =	30.00
FACU species	0.00	x 4 =	0.00
UPL species	90.00	x 5 =	450.00
Column Totals:	100.00 (A)		480.00 (B)

Prevalence Index = B/A = 4.8

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: WL K8 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/2	60	10YR 3/3	40			SCL	Faint redox. Mixed Matrix.
6-18	10YR 3/2	100					SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL L1

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 28 T133N R071W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.301407 Long: -99.622210 Datum: WGS84

Soil Map Unit Name: Regan silt loam, 0 to 2 percent slopes, occasionally flooded NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:
Large PEM depression within pasture

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Spartina patens*	60	Y	FACW
2. *Phalaris arundinacea*	30	Y	FACW
3. *Carex stricta*	10	N	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	10.00	x 1 =	10.00
FACW species	90.00	x 2 =	180.00
FAC species	0.00	x 3 =	0.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	100.00 (A)		190.00 (B)

Prevalence Index = B/A = 1.9

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: WL L1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 2/2	100					CL	
4-12	10YR 2/2	60	10Y 6/1	40	D	M	SCL	Prominent redox.
12-18	10YR 2/2	90	10Y 6/1	10	D	M	SCL	Prominent redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ✓ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✓ **No** _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ✓ No _____ Depth (inches): 2

Water Table Present? Yes ✓ No _____ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 0

Wetland Hydrology Present? **Yes** ✓ **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL L1 Upland

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 28 T133N R071W

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.301162 Long: -99.622314 Datum: WGS84

Soil Map Unit Name: Tonka-Hamerly complex, 0 to 3 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	80	Y	UPL
2. *Bromus tectorum*	18	N	UPL
3. *Asclepias syriaca*	2	N	UPL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	0.00	x 2 =	0.00
FAC species	0.00	x 3 =	0.00
FACU species	0.00	x 4 =	0.00
UPL species	100.00	x 5 =	500.00
Column Totals:	100.00 (A)		500.00 (B)

Prevalence Index = B/A = 5.0

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: WL L1 Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-15	10YR 3/2	100					SCL	
15-18	10YR 3/2	65	10YR 5/2	35	C	M	SCL	Faint redox.

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 08/26/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL A1 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 31 133N 71W

Landform (hillslope, terrace, etc.): Drainage swale | Local relief (concave, convex, none): concave | Slope (%): 2-5%

Subregion (LRR): LRR F | Lat: 46.29365 | Long: -99.645451 | Datum: NAD83

Soil Map Unit Name: Hamerly and Vallers loams, saline, 0 to 3 percent slopes | NWI Classification: PEM1A

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Yes		
Hydric soil present?	Yes	**Is the sampled area within a wetland?**	YES
Wetland hydrology present?	Yes	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Data form representative for Wetlands A1, A2, A3, A4, & C1

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Herb stratum (Plot size: 5' radius)			
1 *Typha latifolia*	50	Y	OBL
2 *Carex lacustris*	20	Y	OBL
3 *Pastinaca sativa*	10	N	UPL
4 *Juncus effusus*	10	N	OBL
5 *Eleocharis palustris*	5	N	OBL
6			
7			
8			
9			
10			
	95	= Total Cover	
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	85	x 1 =	85
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	10	x 5 =	50
Column totals	95 (A)		135 (B)

Prevalence Index = B/A = 1.42

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Yes

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL A1 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-18+	10YR 2/1	100					Mucky clay	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- X Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- X 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- X Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- X Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes		No	X	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

Saturation present to soil surface.

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Project | City/County: Logan County | Sampling Date: 08/27/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL A1 (2020) Upland

Investigator(s): James Freshwater, Atwell, LLC | Section, Township, Range: 31 133N 71W

Landform (hillslope, terrace, etc.): upland terrace | Local relief (concave, convex, none): Convex | Slope (%): 0-2

Subregion (LRR): F | Lat: 46.293347 | Long: - 99.645896 | Datum: NAD83

Soil Map Unit Name: Williams loam, 6 to 9 percent slopes | NWI Classification: N/A

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation X, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	N
Hydric soil present?	N
Wetland hydrology present?	N

Is the sampled area within a wetland? No

If yes, optional wetland site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

The sample location is in the upper reaches of the watershed and is within the OHWM of an ephemeral channel. It may also be considered to be part of an ephemeral channel. Soils do not meet NTCHS definition of a hydric soil and no wetland hydrology observed.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5' radius)			
1 *Zea mays*	40	Y	UPL
2 *Glycine max*	40	Y	UPL
3			
4			
5			
6			
7			
8			
9			
10			
	80	= Total Cover	

Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum ____

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	80	x 5 =	400
Column totals	80 (A)		400 (B)

Prevalence Index = B/A = 5.00

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation

___ Dominance test is >50%

___ Prevalence index is ≤3.0*

___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)

___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

Sample taken within planted corn and soybean agricultural field.

SOIL

Sampling Point: WL A1 (2020) Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-8	10YR 3/1	100					Silt Loam	
8-12+	10YR 4/3	100					Silt Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? N

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present? Yes ___ No X Depth (inches): ___

Water table present? Yes ___ No X Depth (inches): ___

Saturation present? Yes ___ No X Depth (inches): ___

(includes capillary fringe)

Wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

No wetland hydrology indicators observed.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL A2 (2020)

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 31 T133N R071W

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.283227 Long: -99.656270 Datum: WGS84

Soil Map Unit Name: Marysland loam, 0 to 1 percent slopes NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No _____	**Is the Sampled Area within a Wetland?** Yes ✓ No _____
Hydric Soil Present?	Yes ✓ No _____	
Wetland Hydrology Present?	Yes ✓ No _____	

Remarks:
Large PEM depression within fallow field

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Typha X glauca*	60	Y	OBL
2. *Spartina patens*	20	Y	FACW
3. *Phalaris arundinacea*	10	N	FACW
4. *Carex stricta*	10	N	OBL
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	70.00	x 1 =	70.00
FACW species	30.00	x 2 =	60.00
FAC species	0.00	x 3 =	0.00
FACU species	0.00	x 4 =	0.00
UPL species	0.00	x 5 =	0.00
Column Totals:	100.00 (A)		130.00 (B)

Prevalence Index = B/A = 1.3

Hydrophytic Vegetation Indicators:

✓ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

✓ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: WL A2 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 5/2	100					CL	
8-18	10YR 6/1	100					CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ✓ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ✓ Geomorphic Position (D2)
- ✓ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): 24

Water Table Present? Yes ✓ No ___ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 0

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Badger Wind City/County: Logan County Sampling Date: 2022-05-05

Applicant/Owner: Orsted State: North Dakota Sampling Point: WL A2 (2020) Upland

Investigator(s): K. Yantz, D. Nigro -Atwell, LLC Section, Township, Range: sec 31 T133N R071W

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 0-2

Subregion (LRR): LRR F, MLRA 53B Lat: 46.283503 Long: -99.656789 Datum: WGS84

Soil Map Unit Name: Marysland loam, 0 to 1 percent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes _____	No ✓	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Bromus inermis*	80	Y	UPL
2. *Taraxacum officinale*	15	N	FACU
3. *Artemisia vulgaris*	5	N	UPL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.00 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0.00	x 1 =	0.00
FACW species	0.00	x 2 =	0.00
FAC species	0.00	x 3 =	0.00
FACU species	15.00	x 4 =	60.00
UPL species	85.00	x 5 =	425.00
Column Totals:	100.00 (A)		485.00 (B)

Prevalence Index = B/A = 4.85

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: WL A2 (2020) Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-18	10YR 3/3	100					SCL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 08/27/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL B1 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 21 133N 71W

Landform (hillslope, terrace, etc.): Drainage swale | Local relief (concave, convex, none): Concave | Slope (%): 2-5%

Subregion (LRR): LRR F | Lat: 46.314293 | Long: -99.617395 | Datum: NAD83

Soil Map Unit Name: Hamerly and Vallers loams, saline, 0 to 3 percent slopes | NWI Classification: PEM1A

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Y
Hydric soil present?	Y	If yes, optional wetland site ID:	
Wetland hydrology present?	Y		

Remarks: (Explain alternative procedures here or in a separate report.)

Seasonally saturated drainage basin which converges to linear swale; data also representative of Wetland C5

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Herb stratum (Plot size: 5' radius)			
1 *Phalaris arundinacea*	50	Y	FACW
2 *Juncus effusus*	10	N	OBL
3 *Juncus tenuis*	10	N	FAC
4 *Typha latifolia*	10	N	OBL
5 *Hordeum jubatum*	10	N	FACW
6			
7			
8			
9			
10			
	90	= Total Cover	
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum: 10

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	20	x 1 =	20	
FACW species	60	x 2 =	120	
FAC species	10	x 3 =	30	
FACU species	0	x 4 =	0	
UPL species	0	x 5 =	0	
Column totals	90	(A)	170	(B)

Prevalence Index = B/A = 1.89

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL B1 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-11	10YR 3/2	100					Loam	
11-18+	10YR 3/2	98	10YR 3/6	2	C	M	Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- X Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes		No	X	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 08/27/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL B2 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 28 133N 71W

Landform (hillslope, terrace, etc.): Drainage swale | Local relief (concave, convex, none): Concave | Slope (%): 2-5%

Subregion (LRR): LRR F | Lat: 46.308205 | Long: -99.605972 | Datum: NAD83

Soil Map Unit Name: Bowdle-Lehr loams, 0 to 2 percent slopes | NWI Classification: PEM1C

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Y
Hydric soil present?	Y	If yes, optional wetland site ID:	
Wetland hydrology present?	Y		

Remarks: (Explain alternative procedures here or in a separate report.)

Seasonally saturated drainage basin which converges to linear drainage swale

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Herb stratum (Plot size: 5' radius)			
1 *Typha latifolia*	20	Y	OBL
2 *Persicaria amphibia*	10	Y	OBL
3 *Ranunculus scleratus*	5	N	OBL
4 *Juncus effusus*	5	N	OBL
5			
6			
7			
8			
9			
10			
	40	= Total Cover	
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum: 50

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	40	x 1 =	40	
FACW species	0	x 2 =	0	
FAC species	0	x 3 =	0	
FACU species	0	x 4 =	0	
UPL species	0	x 5 =	0	
Column totals	40	(A)	40	(B)

Prevalence Index = B/A = 1.00

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? YES

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index calculated for reference purposes only.

SOIL

Sampling Point: WL B2 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-11	10YR 3/2	100					Loam	
11-18+	10YR 3/2	98	10YR 3/6	2	C	M	Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- X Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- X Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- X Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches):	___
Water table present?	Yes	___	No	X	Depth (inches):	___
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 08/27/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL B3 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 28 133N 71W

Landform (hillslope, terrace, etc.): Drainage swale | Local relief (concave, convex, none): Concave | Slope (%): 2-5%

Subregion (LRR): LRR F | Lat: 46.300804 | Long: -99.610761 | Datum: NAD83

Soil Map Unit Name: Arnegard loam, 0 to 6 percent slopes | NWI Classification: PEM1A

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y
Hydric soil present?	Y
Wetland hydrology present?	Y
Is the sampled area within a wetland?	Y
If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Seasonally saturated linear drainage swale

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0 = Total Cover		
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5' radius)			
1 *Typha latifolia*	50	Y	OBL
2 *Spartina pectinata*	25	Y	FACW
3 *Juncus effusus*	20	N	OBL
4 *Eleocharis palustris*	5	N	OBL
5			
6			
7			
8			
9			
10			
	100 = Total Cover		
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0 = Total Cover		

% Bare Ground in Herb Stratum: 0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	75	x 1 =	75
FACW species	25	x 2 =	50
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	100 (A)		125 (B)

Prevalence Index = B/A = 1.25

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? YES

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: WL B3 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-18+	10YR 2/1	100					Mucky clay	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- X Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- X 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- X Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- X Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- X Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes		No	X	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 08/27/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL B3 (2020) Upland

Investigator(s): James Freshwater, Atwell, LLC | Section, Township, Range: 28 133N 71W

Landform (hillslope, terrace, etc.): slight hillslope | Local relief (concave, convex, none): Convex | Slope (%): 2-5%

Subregion (LRR): LRR F | Lat: 46.301193 | Long: -99.611004 | Datum: NAD83

Soil Map Unit Name: Williams-Zahl-Parnell complex, 0 to 9 percent slopes | NWI Classification: R4SBC

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	N		
Hydric soil present?	N	**Is the sampled area within a wetland?**	N
Wetland hydrology present?	N	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Herb stratum (Plot size: 5' radius)			
1 *Bromus inermis*	40	Y	UPL
2 *Poa pratensis*	20	Y	FACU
3 *Artemisia absinthium*	10	N	UPL
4 *Cirsium arvense*	5	N	FACU
5 *Ambrosia artemisiifolia*	5	N	FACU
6			
7			
8			
9			
10			
	80	= Total Cover	
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum: 0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:				
OBL species	0	x 1 =	0	
FACW species	0	x 2 =	0	
FAC species	0	x 3 =	0	
FACU species	30	x 4 =	120	
UPL species	50	x 5 =	250	
Column totals	80	(A)	370	(B)

Prevalence Index = B/A = 4.63

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- ___ Dominance test is >50%
- ___ Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

Vegetation heavily grazed by cattle

SOIL

Sampling Point: WL B3 (2020) Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-7	10YR 2/2	100					Clay Loam	
7-12+	10YR 5/6	100					Silty Clay	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? N

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches): ___
Water table present?	Yes	___	No	X	Depth (inches): ___
Saturation present? (includes capillary fringe)	Yes	___	No	X	Depth (inches): ___

Wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

No wetland hydrology observed.

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: McIntosh County | Sampling Date: 08/27/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL B4 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 1 132N 72W

Landform (hillslope, terrace, etc.): Drainage swale | Local relief (concave, convex, none): Concave | Slope (%): 2-5%

Subregion (LRR): LRR F | Lat: 46.282241 | Long: - 99.636832 | Datum: NAD83

Soil Map Unit Name: Colvin Silt Loam | NWI Classification: PEM1C

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y
Hydric soil present?	Y
Wetland hydrology present?	Y
Is the sampled area within a wetland?	Y
If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Permanently saturated/flooded drainage basin which converges to linear drainage swale

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0 = Total Cover		
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5' radius)			
1 *Typha latifolia*	50	Y	OBL
2 *Spartina pectinata*	20	Y	FACW
3 *Juncus effusus*	10	N	OBL
4 *Schoenoplectus tabernaemontani*	10	N	OBL
5 *Sonchus arvensis*	5	N	FAC
6 *Eleocharis palustris*	5	N	OBL
7			
8			
9			
10			
	100 = Total Cover		
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0 = Total Cover		

% Bare Ground in Herb Stratum: 0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	75	x 1 =	75
FACW species	20	x 2 =	40
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	100 (A)		130 (B)

Prevalence Index = B/A = 1.30

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index calculated for reference purposes only.

SOIL

Sampling Point: WL B4 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-18+	10YR 2/1	100					Mucky clay	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- X Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- X 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- X Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- X Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- X Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	X	No		Depth (inches):	12-36+
Water table present?	Yes	X	No		Depth (inches):	0
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

Wetland partially inundated

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 08/27/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL B5 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 28 133N 71W

Landform (hillslope, terrace, etc.): Drainage swale | Local relief (concave, convex, none): Concave | Slope (%): 2-5%

Subregion (LRR): LRR F | Lat: 46.299927 | Long: - 99.614296 | Datum: NAD83

Soil Map Unit Name: Williams-Zahl-Parnell Complex, 0 to 9 percent slopes | NWI Classification: PEMF

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** Y
Hydric soil present? Y	If yes, optional wetland site ID: Wetland B2
Wetland hydrology present? Y	

Remarks: (Explain alternative procedures here or in a separate report.)

Permanently saturated/flooded drainage basin which converges to linear drainage swale

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Herb stratum (Plot size: 5' radius)			
1 *Hordeum jubatum*	50	Y	FACW
2 *Typha latifolia*	10	N	OBL
3 *Juncus effusus*	10	N	OBL
4 *Schoenoplectus tabernaemontani*	10	N	OBL
5 *Sonchus arvensis*	5	N	FAC
6 *Eleocharis palustris*	5	N	OBL
7 *Spartina pectinata*	3	N	FACW
8			
9			
10			
	93	= Total Cover	
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum: 0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	35	x 1 =	35
FACW species	53	x 2 =	106
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	93 (A)		156 (B)

Prevalence Index = B/A = 1.68

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? YES

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index calculated for reference purposes only.

SOIL

Sampling Point: WL B5 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-18+	10YR 2/1	100					Mucky clay	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- X Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- X 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes	X	No		Depth (inches):	10
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: McIntosh County | Sampling Date: 08/28/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL C2 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 6 132N 71W

Landform (hillslope, terrace, etc.): Drainage swale | Local relief (concave, convex, none): Concave | Slope (%): 2-5%

Subregion (LRR): LRR F | Lat: 46.273939 | Long: - 99.62295 | Datum: NAD83

Soil Map Unit Name: Zahl-Max loams, 15 to 25 percent slopes | NWI Classification: PEM1A

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	Y
Hydric soil present?	Y
Wetland hydrology present?	Y
Is the sampled area within a wetland?	Y
If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Large wetland complex; flooded network of drainage swales within hay field and active pasture; data form represents wetlands C2 and D1

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0 = Total Cover		
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5' radius)			
1 *Typha latifolia*	50	Y	OBL
2 *Spartina pectinata*	20	Y	FACW
3 *Juncus effusus*	10	N	OBL
4 *Schoenoplectus tabernaemontani*	10	N	OBL
5 *Sonchus arvensis*	5	N	FAC
6 *Eleocharis palustris*	5	N	OBL
7			
8			
9			
10			
	100 = Total Cover		
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0 = Total Cover		

% Bare Ground in Herb Stratum: 0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:				
OBL species	75	x 1 =	75	
FACW species	20	x 2 =	40	
FAC species	5	x 3 =	15	
FACU species	0	x 4 =	0	
UPL species	0	x 5 =	0	
Column totals	100	(A)	130	(B)

Prevalence Index = B/A = 1.30

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? YES

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL C2 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-18+	10YR 2/1	100					Mucky clay	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- X Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- X 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- X Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	X	No		Depth (inches):	1
Water table present?	Yes	X	No		Depth (inches):	0
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

Inundated wetland

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Project | City/County: Logan County | Sampling Date: 08/28/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL C2 (2020) Upland

Investigator(s): James Freshwater, Atwell, LLC | Section, Township, Range: 6 132N 71W

Landform (hillslope, terrace, etc.): slight hillslope | Local relief (concave, convex, none): none | Slope (%): 2-5

Subregion (LRR): F | Lat: 46.277247 | Long: - 99.617659 | Datum: NAD83

Soil Map Unit Name: Zahl-Max-Arnegard loams, 15 to 60 percent slopes | NWI Classification: None

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	N
Hydric soil present?	N
Wetland hydrology present?	N

Is the sampled area within a wetland? No

If yes, optional wetland site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

The sample location is in the upper reaches of the watershed and is within the OHWM of an ephemeral channel. It may also be considered to be part of an ephemeral channel. Soils do not meet NTCHS definition of a hydric soil and no indicators of wetland hydrology present.

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5' radius)			
1 *Poa pratensis*	40	Y	FACU
2 *Grindelia squarrosa*	10	N	UPL
3 *Bromus inermis*	10	N	UPL
4			
5			
6			
7			
8			
9			
10			
	60	= Total Cover	

Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum ____

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:				
OBL species	0	x 1 =	0	
FACW species	0	x 2 =	0	
FAC species	0	x 3 =	0	
FACU species	40	x 4 =	160	
UPL species	20	x 5 =	100	
Column totals	60	(A)	260	(B)

Prevalence Index = B/A = 4.33

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- ___ Dominance test is >50%
- ___ Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

Vegetation heavily grazed by cattle

SOIL

Sampling Point: WL C2 (2020) Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-8	10YR 2/2	100					Clay Loam	Restrictive gravel layer at 8"

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: Gravel

Depth (inches): 8" below soil surface

Hydric soil present? N

Remarks:

Restrictive gravel layer at 8"

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present? Yes ___ No X Depth (inches): ___

Water table present? Yes ___ No X Depth (inches): ___

Saturation present? Yes ___ No X Depth (inches): ___

(includes capillary fringe)

Wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

No wetland hydrology indicators observed.

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: McIntosh County | Sampling Date: 08/28/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL C3 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 7 132N 71W

Landform (hillslope, terrace, etc.): Drainage swale | Local relief (concave, convex, none): Concave | Slope (%): 2-5%

Subregion (LRR): LRR F | Lat: 46.272066 | Long: - 99.615619 | Datum: NAD83

Soil Map Unit Name: Zahl-Max-Bowbells loams, 6 to 25 percent slopes | NWI Classification: R4SBC

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Y
Hydric soil present?	Y	If yes, optional wetland site ID:	
Wetland hydrology present?	Y		

Remarks: (Explain alternative procedures here or in a separate report.)

Seasonally saturated linear drainage swale within pasture; data representative for Wetland D2

VEGETATION -- Use scientific names of plants.

	Absolute % Cover	Dominant Species	Indicator Staus
Tree Stratum (Plot size: 30' radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Herb stratum (Plot size: 5' radius)			
1 *Phalaris arundinacea*	80	Y	FACW
2 *Persicaria amphibia*	10	N	OBL
3 *Xanthium strumarium*	5	N	FAC
4			
5			
6			
7			
8			
9			
10			
	95	= Total Cover	
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum: 0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	10	x 1 =	10
FACW species	80	x 2 =	160
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	95 (A)		185 (B)

Prevalence Index = B/A = 1.95

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? YES

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL C3 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-11	10YR 3/2	100					Loam	
11-18+	10YR 3/2	98	10YR 3/6	2	C	M	Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches):	___
Water table present?	Yes	___	No	X	Depth (inches):	___
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: McIntosh County | Sampling Date: 08/28/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL C4 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 8 132N 71W

Landform (hillslope, terrace, etc.): Drainage swale | Local relief (concave, convex, none): Concave | Slope (%): 2-5%

Subregion (LRR): LRR F | Lat: 46.267675 | Long: - 99.602144 | Datum: NAD83

Soil Map Unit Name: Zahl-Max-Bowbells loams, 6 to 35 percent slopes | NWI Classification: R4SBC

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Y
Hydric soil present?	Y	If yes, optional wetland site ID:	
Wetland hydrology present?	Y		

Remarks: (Explain alternative procedures here or in a separate report.)

Seasonally saturated linear drainage swale within hay

VEGETATION -- Use scientific names of plants.

	Absolute % Cover	Dominant Species	Indicator Staus
Tree Stratum (Plot size: 30' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5' radius)			
1 *Persicaria amphibia*	70	Y	OBL
2 *Cirsium arvense*	20	Y	FACU
3 *Xanthium strumarium*	5	N	FAC
4			
5			
6			
7			
8			
9			
10			
	95 = Total Cover		
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0 = Total Cover		

% Bare Ground in Herb Stratum: 0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 50.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	70	x 1 =	70
FACW species	0	x 2 =	0
FAC species	5	x 3 =	15
FACU species	20	x 4 =	80
UPL species	0	x 5 =	0
Column totals	95 (A)		165 (B)

Prevalence Index = B/A = 1.74

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- ___ Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? YES

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: WL C4 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-11	10YR 3/2	100					Loam	
11-18+	10YR 3/2	98	10YR 3/6	2	C	M	Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes		No	X	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: McIntosh County | Sampling Date: 08/29/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL D3 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 8 132N 71W

Landform (hillslope, terrace, etc.): Drainage swale | Local relief (concave, convex, none): Concave | Slope (%): 2-5%

Subregion (LRR): LRR F | Lat: 46.260911 | Long: - 99.592574 | Datum: NAD83

Soil Map Unit Name: Bearpaw loam, 6 to 9 percent slopes | NWI Classification: PEM1A

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** Y
Hydric soil present? Y	If yes, optional wetland site ID:
Wetland hydrology present? Y	

Remarks: (Explain alternative procedures here or in a separate report.)

Permanently saturated/seasonally flooded drainage swale

VEGETATION -- Use scientific names of plants.

	Absolute % Cover	Dominant Species	Indicator Staus
Tree Stratum (Plot size: 30' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5' radius)			
1 *Phalaris arundinacea*	75	Y	FACW
2 *Typha latifolia*	10	N	OBL
3 *Sonchus arvensis*	10	N	FAC
4			
5			
6			
7			
8			
9			
10			
	95 = Total Cover		
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0 = Total Cover		

% Bare Ground in Herb Stratum: 0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	10	x 1 =	10
FACW species	75	x 2 =	150
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	95 (A)		190 (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? YES

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL D3 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-12	10YR 3/2	100					Loam	
12-18+	10YR 3/2	90	10YR 3/6	10	C	M	Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- X Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches):	___
Water table present?	Yes	___	No	X	Depth (inches):	___
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: McIntosh County | Sampling Date: 08/29/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL D4 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 8 132N 71W

Landform (hillslope, terrace, etc.): Drainage swale | Local relief (concave, convex, none): Concave | Slope (%): 2-5%

Subregion (LRR): LRR F | Lat: 46.265628 | Long: - 99.595921 | Datum: NAD83

Soil Map Unit Name: Bearpaw-Zeeland loams, 0 to 3 percent slopes | NWI Classification: PEM1A

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Y
Hydric soil present?	Y	If yes, optional wetland site ID:	
Wetland hydrology present?	Y		

Remarks: (Explain alternative procedures here or in a separate report.)

Temporarily flooded drainage swale

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5' radius)			
1 *Typha latifolia*	50	Y	OBL
2 *Phalaris arundinacea*	20	Y	FACW
3 *Symphyotrichum lanceolatum*	10	N	FACW
4 *Sonchus arvensis*	10	N	FAC
5 *Schoenoplectus tabernaemontani*	5	N	OBL
6			
7			
8			
9			
10			
	95	= Total Cover	

Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum: 0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	55	x 1 =	55	
FACW species	30	x 2 =	60	
FAC species	10	x 3 =	30	
FACU species	0	x 4 =	0	
UPL species	0	x 5 =	0	
Column totals	95	(A)	145	(B)

Prevalence Index = B/A = 1.53

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? YES

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL D4 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-18+	10YR 2/1	100					Mucky Clay	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- X Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- X Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- X Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes		No	X	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 08/29/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL D5 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 27 133N 71W

Landform (hillslope, terrace, etc.): Drainage swale | Local relief (concave, convex, none): Concave | Slope (%): 2-5%

Subregion (LRR): LRR F | Lat: 46.301826 | Long: - 99.59299 | Datum: NAD83

Soil Map Unit Name: Bearpaw-Zeeland loams, 3 to 6 percent slopes | NWI Classification: PEM1A

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Y
Hydric soil present?	Y	If yes, optional wetland site ID:	
Wetland hydrology present?	Y		

Remarks: (Explain alternative procedures here or in a separate report.)

Fringe wetland associated with Watercourse D1

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Herb stratum (Plot size: 5' radius)			
1 *Typha latifolia*	65	Y	OBL
2 *Symphyotrichum lanceolatum*	10	N	FACW
3 *Hordeum jubatum*	10	N	FACW
4 *Schoenoplectus tabernaemontani*	10	N	OBL
5 *Sonchus arvensis*	5	N	FAC
6			
7			
8			
9			
10			
	100	= Total Cover	
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum: 0

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	75	x 1 =	75	
FACW species	20	x 2 =	40	
FAC species	5	x 3 =	15	
FACU species	0	x 4 =	0	
UPL species	0	x 5 =	0	
Column totals	100	(A)	130	(B)

Prevalence Index = B/A = 1.30

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? YES

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL D5 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-18+	10YR 2/1	100					Mucky Clay	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- X Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- X 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- X Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- X Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- X Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes		No	X	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Project | City/County: Logan County | Sampling Date: 08/29/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL D12 (2020) Upland

Investigator(s): James Freshwater, Atwell, LLC | Section, Township, Range: 19 133N 70W

Landform (hillslope, terrace, etc.): Hillslope | Local relief (concave, convex, none): Linear slope | Slope (%): 2-5

Subregion (LRR): F | Lat: 46.31865 | Long: - 99.523407 | Datum: NAD83

Soil Map Unit Name: Vallers loam, 0 to 1 percent slopes | NWI Classification: PEM1A

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	N		
Hydric soil present?	N	**Is the sampled area within a wetland?**	No
Wetland hydrology present?	N	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5' radius)			
1 *Poa pratensis*	30	Y	FACU
2 *Grindelia squarosa*	10	Y	UPL
3 *Artemisia frigida*	10	Y	UPL
4			
5			
6			
7			
8			
9			
10			
	50	= Total Cover	

Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 3 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:				
OBL species	0	x 1 =	0	
FACW species	0	x 2 =	0	
FAC species	0	x 3 =	0	
FACU species	30	x 4 =	120	
UPL species	20	x 5 =	100	
Column totals	50	(A)	220	(B)

Prevalence Index = B/A = 4.40

Hydrophytic Vegetation Indicators:

___ Rapid test for hydrophytic vegetation

___ Dominance test is >50%

___ Prevalence index is ≤3.0*

___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)

___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

Vegetation difficult to identify due to heavy grazing in the area by cattle.

SOIL

Sampling Point: WL D12 (2020) Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-4	10YR 2/2	100					Clay Loam	
4-6	10YR 3/3	100					Clay	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: Clay layer

Depth (inches): 6

Hydric soil present? N

Remarks:

Restrictive clay layer at 6" - unable to dig father down below layer.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches): ___
Water table present?	Yes	___	No	X	Depth (inches): ___
Saturation present? (includes capillary fringe)	Yes	___	No	X	Depth (inches): ___

Wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

No wetland hydrology observed.

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind | City/County: Logan County | Sampling Date: 08/30/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL E1 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 29 133N 70W

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave | Slope (%): 1 to 2

Subregion (LRR): F | Lat: 46.30052 | Long: - 99.509334 | Datum: NAD83

Soil Map Unit Name: Hamerly loam, 0 to 3 percent slopes | NWI Classification: PEM1A

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y		
Hydric soil present?	Y	**Is the sampled area within a wetland?**	Yes
Wetland hydrology present?	Y	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Data form represents wetlands E1, E2, E4, E7, E8

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0 = Total Cover		
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5' radius)			
1 *Persicaria amphibia*	60	Y	OBL
2 *Typha latifolia*	10	N	OBL
3 *Bidens cernua*	10	N	OBL
4 *Echinochloa crus-galli*	10	N	FAC
5 *Spartina pectinata*	10	N	FACW
6			
7			
8			
9			
10			
	100 = Total Cover		
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0 = Total Cover		

% Bare Ground in Herb Stratum

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	80	x 1 =	80	
FACW species	10	x 2 =	20	
FAC species	10	x 3 =	30	
FACU species	0	x 4 =	0	
UPL species	0	x 5 =	0	
Column totals	100	(A)	130	(B)

Prevalence Index = B/A = 1.30

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL E1 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-11	10YR 3/2	100					Loam	
11-18+	10YR 3/2	98	10YR 3/6	2	C	M	Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches):	___
Water table present?	Yes	___	No	X	Depth (inches):	___
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind | City/County: Logan County | Sampling Date: 08/30/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL E3 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 32 133N 70W

Landform (hillslope, terrace, etc.): Depressional swale | Local relief (concave, convex, none): concave | Slope (%): 0 to 2

Subregion (LRR): F | Lat: 46.29762 | Long: - 99.510649 | Datum: NAD83

Soil Map Unit Name: Hamerly-Tonka-Parnell complex, 0 to 3 percent slopes | NWI Classification: R44SBC

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y		
Hydric soil present?	Y	**Is the sampled area within a wetland?**	Yes
Wetland hydrology present?	Y	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Data form represents wetlands E3 & E5

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5' radius)			
1 *Typha latifolia*	50	Y	OBL
2 *Spartina pectinata*	30	Y	FACW
3 *Persicaria amphibia*	10	N	OBL
4 *Sonchus arvensis*	5	N	FAC
5			
6			
7			
8			
9			
10			
	95	= Total Cover	

Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	60	x 1 =	60	
FACW species	30	x 2 =	60	
FAC species	5	x 3 =	15	
FACU species	0	x 4 =	0	
UPL species	0	x 5 =	0	
Column totals	95	(A)	135	(B)

Prevalence Index = B/A = 1.42

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL E3 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-18+	10YR 2/1	100					Mucky Clay	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- X Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- X 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- X Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- X Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes		No	X	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 08/30/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL E5 (2020) Upland

Investigator(s): James Freshwater, Atwell, LLC | Section, Township, Range: 32 133N 70W

Landform (hillslope, terrace, etc.): hillslope | Local relief (concave, convex, none): Convex | Slope (%): 2-5

Subregion (LRR): F | Lat: 46.29561 | Long: - 99.508384 | Datum: NAD83

Soil Map Unit Name: Lihen-Telfer loamy fine sands, 0 to 6 percent slopes | NWI Classification: N/A

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	N		
Hydric soil present?	Y	**Is the sampled area within a wetland?**	No
Wetland hydrology present?	N	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5' radius)			
1 *Bromus inermis*	40	Y	UPL
2 *Poa pratensis*	25	Y	FACU
3 *Pascopyrum smithii*	10	N	FACU
4 *Grindelia squarrosa*	7	N	UPL
5			
6			
7			
8			
9			
10			
	82	= Total Cover	

Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 0.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:				
OBL species	0	x 1 =	0	
FACW species	0	x 2 =	0	
FAC species	0	x 3 =	0	
FACU species	35	x 4 =	140	
UPL species	47	x 5 =	235	
Column totals	82	(A)	375	(B)

Prevalence Index = B/A = 4.57

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- ___ Dominance test is >50%
- ___ Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? N

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: WL E5 (2020) Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-10	10YR 2/1	100					Clay Loam	
10-14+	10YR 2/2	100					Clay	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? N

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches): ___
Water table present?	Yes	___	No	X	Depth (inches): ___
Saturation present? (includes capillary fringe)	Yes	___	No	X	Depth (inches): ___

Wetland hydrology present? N

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

No wetland hydrology indicators observed.

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind | City/County: Logan County | Sampling Date: 08/30/20
Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL E10 (2020)
Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 28 133N 70W
Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave | Slope (%): 2-5
Subregion (LRR): LRR F | Lat: 46.300729 | Long: - 99.488705 | Datum: NAD83
Soil Map Unit Name: Flaxton fine sandy loam, 3 to 6 percent slopes | NWI Classification: PEM1C
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y		
Hydric soil present?	Y	**Is the sampled area within a wetland?**	Yes
Wetland hydrology present?	Y	If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Data form represents Wetlands E10, E11, E12, E13, E17, E18, E19, & E20

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0 = Total Cover		
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5' radius)			
1 *Typha latifolia*	30	Y	OBL
2 *Persicaria amphibia*	20	Y	OBL
3 *Spartina pectinata*	20	Y	FACW
4 *Xanthium strumarium*	10	N	FAC
5 *Echinochloa crus-galli*	10	N	FAC
6			
7			
8			
9			
10			
	90 = Total Cover		
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0 = Total Cover		

% Bare Ground in Herb Stratum

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across all Strata: 3 (B)
Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	50	x 1 =	50	
FACW species	20	x 2 =	40	
FAC species	20	x 3 =	60	
FACU species	0	x 4 =	0	
UPL species	0	x 5 =	0	
Column totals	90	(A)	150	(B)

Prevalence Index = B/A = 1.67

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL E10 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-11	10YR 3/2	100					Loam	
11-18	10YR 3/2	90	10YR 3/6	10			Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- _X_ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- _X_ Saturation Visible on Aerial Imagery (C9)
- _X_ Geomorphic Position (D2)
- _X_ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	X	No		Depth (inches):	1-12"
Water table present?	Yes	X	No		Depth (inches):	0
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

Semi-permanently flooded depressions

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 08/30/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL E14 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 28 133N 70W

Landform (hillslope, terrace, etc.): Drainage | Local relief (concave, convex, none): Concave | Slope (%): 2-5

Subregion (LRR): LRR F | Lat: 46.299553 | Long: - 99.483299 | Datum: NAD83

Soil Map Unit Name: Parnell silty clay loam, 0 to 1 percent slopes | NWI Classification: PEM1C

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y
Hydric soil present?	Y
Wetland hydrology present?	Y

Is the sampled area within a wetland? Yes

If yes, optional wetland site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

Large permanently flooded drainage basin within fallow field

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5' radius)			
1 *Typha latifolia*	50	Y	OBL
2 *Spartina pectinata*	30	Y	FACW
3 *Persicaria amphibia*	10	N	OBL
4			
5			
6			
7			
8			
9			
10			
	90	= Total Cover	

Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum ____

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	60	x 1 =	60	
FACW species	30	x 2 =	60	
FAC species	0	x 3 =	0	
FACU species	0	x 4 =	0	
UPL species	0	x 5 =	0	
Column totals	90	(A)	120	(B)

Prevalence Index = B/A = 1.33

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL E14 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-11	10YR 3/2	100					Loam	
11-18	10YR 3/2	90	10YR 3/6	10			Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- X Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	X	No		Depth (inches):	1-12"
Water table present?	Yes	X	No		Depth (inches):	0
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

permanently flooded drainage basin

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: McIntosh County | Sampling Date: 08/31/20
Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL F3 (2020)
Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 7 132N 70W
Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave | Slope (%): 2-5
Subregion (LRR): F | Lat: 46.26754 | Long: - 99.494564 | Datum: NAD83
Soil Map Unit Name: Wildrose silty clay, 0 to 2 percent slopes | NWI Classification: PEM1A
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y
Hydric soil present?	Y
Wetland hydrology present?	Y
Is the sampled area within a wetland?	Yes
If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Data form represents Wetlands F3, F4, F5, F6, F7, & F8

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0 = Total Cover		
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5' radius)			
1 *Persicaria amphibia*	50	Y	OBL
2 *Echinochloa crus-galli*	30	Y	FAC
3 *Ambrosia artemisiifolia*	10	N	FACU
4 *Eleocharis palustris*	10	N	OBL
5			
6			
7			
8			
9			
10			
	100 = Total Cover		
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0 = Total Cover		

% Bare Ground in Herb Stratum

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across all Strata: 2 (B)
Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	60	x 1 =	60
FACW species	0	x 2 =	0
FAC species	30	x 3 =	90
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column totals	100 (A)		190 (B)

Prevalence Index = B/A = 1.90

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: F3 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-11	10YR 3/2	100					Loam	
11-18	10YR 3/2	90	10YR 3/6	10			Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	X	No		Depth (inches):	1-12"
Water table present?	Yes	X	No		Depth (inches):	0
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

Seasonally saturated/temporarily flooded wetland depressions

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 08/31/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL F9 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 8 133N 70W

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave | Slope (%): 2-5

Subregion (LRR): F | Lat: 46.34294 | Long: - 99.514052 | Datum: NAD83

Soil Map Unit Name: Arnegard loam, 2 to 6 percent slopes | NWI Classification: PEM1C

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** Yes
Hydric soil present? Y	If yes, optional wetland site ID:
Wetland hydrology present? Y	

Remarks: (Explain alternative procedures here or in a separate report.)

Data form represents Wetlands F9 & F10

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0 = Total Cover		
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5' radius)			
1 *Persicaria amphibia*	50	Y	OBL
2 *Spartina pectinata*	20	Y	FACW
3 *Echinochloa crus-galli*	10	N	FAC
4 *Alisma triviale*	5	N	OBL
5 *Bidens cernua*	5	N	OBL
6			
7			
8			
9			
10			
	90 = Total Cover		
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0 = Total Cover		

% Bare Ground in Herb Stratum

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	60	x 1 =	60
FACW species	20	x 2 =	40
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	90 (A)		130 (B)

Prevalence Index = B/A = 1.44

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: F9 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-11	10YR 3/2	100					Loam	
11-18	10YR 3/2	90	10YR 3/6	10			Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes		No	X	Depth (inches):	0
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

Semi-permanently flooded depressions (divided by existing two-track)

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 09/01/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL G1 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 20 133N 70W

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave | Slope (%): 2-5

Subregion (LRR): F | Lat: 46.322064 | Long: - 99.506714 | Datum: NAD83

Soil Map Unit Name: Grail silty clay loam, 0 to 2 percent slopes | NWI Classification: PEM1A

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** Yes
Hydric soil present? Y	If yes, optional wetland site ID:
Wetland hydrology present? Y	

Remarks: (Explain alternative procedures here or in a separate report.)

Data form represents Wetlands G1 & G3

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0 = Total Cover		
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5' radius)			
1 *Persicaria amphibia*	50	Y	OBL
2 *Echinochloa crus-galli*	30	Y	FAC
3 *Spartina pectinata*	10	N	FACW
4 *Eleocharis palustris*	10	N	OBL
5			
6			
7			
8			
9			
10			
	100 = Total Cover		
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0 = Total Cover		

% Bare Ground in Herb Stratum

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	60	x 1 =	60
FACW species	10	x 2 =	20
FAC species	30	x 3 =	90
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	100 (A)		170 (B)

Prevalence Index = B/A = 1.70

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: G1 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-11	10YR 3/2	100					Loam	
11-18	10YR 3/2	90	10YR 3/6	10			Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes		No	X	Depth (inches):	0
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

Seasonally saturated/temporarily flooded wetland depressions

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 09/01/20
Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL G2 (2020)
Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 20 133N 70W
Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave | Slope (%): 2-5
Subregion (LRR): F | Lat: 46.320567 | Long: - 99.505958 | Datum: NAD83
Soil Map Unit Name: Grail silty clay loam, 2 to 6 percent slopes | NWI Classification: PEM1C
Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)
Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes
Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y
Hydric soil present?	Y
Wetland hydrology present?	Y
Is the sampled area within a wetland?	Yes
If yes, optional wetland site ID:	

Remarks: (Explain alternative procedures here or in a separate report.)

Data form represents Wetlands G2, G12, G14, & G15

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0 = Total Cover		
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5' radius)			
1 *Persicaria amphibia*	30	Y	OBL
2 *Phalaris arundinacea*	30	Y	FACW
3 *Alisma triviale*	20	Y	OBL
4 *Spartina pectinata*	10	N	FACW
5 *Echinochloa crus-galli*	10	N	FAC
6			
7			
8			
9			
10			
	100 = Total Cover		
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0 = Total Cover		

% Bare Ground in Herb Stratum

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across all Strata: 3 (B)
Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	50	x 1 =	50
FACW species	40	x 2 =	80
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	100 (A)		160 (B)

Prevalence Index = B/A = 1.60

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL G2 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-11	10YR 3/2	100					Loam	
11-18	10YR 3/2	90	10YR 3/6	10			Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR K, L)**
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes		No	X	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

Seasonally saturated/temporarily flooded wetland depressions

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 09/01/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL G4 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 20 133N 70W

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): concave | Slope (%): 2-5

Subregion (LRR): LRR F | Lat: 46.324518 | Long: - 99.500376 | Datum: NAD83

Soil Map Unit Name: Lowe-Fluvaquents channeled complex, 0 to 2 percent slopes, flooded | NWI Classification: PEM1A

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** Yes
Hydric soil present? Y	If yes, optional wetland site ID:
Wetland hydrology present? Y	

Remarks: (Explain alternative procedures here or in a separate report.)

Seasonally saturated /temporarily flooded wetland depression

VEGETATION -- Use scientific names of plants.

	Absolute % Cover	Dominant Species	Indicator Staus
Tree Stratum (Plot size: 30' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5' radius)			
1 Hordeum jubatum	30	Y	FACW
2 Spartina pectinata	30	Y	FACW
3 Phalaris arundinacea	20	Y	FACW
4 Rumex crispus	10	N	FAC
5			
6			
7			
8			
9			
10			
	90 = Total Cover		
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0 = Total Cover		

% Bare Ground in Herb Stratum

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across all Strata: 3 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	80	x 2 =	160
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	90 (A)		190 (B)

Prevalence Index = B/A = 2.11

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL G4 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-11	10YR 3/2	100					Loam	
11-18	10YR 3/2	90	10YR 3/6	10			Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (LRR I, J)
- ___ Coast Prairie Redox (A16) (LRR F, G, H)
- ___ Dark Surface (S7) (LRR K, L)
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches):	___
Water table present?	Yes	___	No	X	Depth (inches):	___
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 09/01/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL G5 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 20 133N 70W

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave | Slope (%): 2-5

Subregion (LRR): F | Lat: 46.325255 | Long: - 99.501062 | Datum: NAD83

Soil Map Unit Name: Daglum-Belfield complex, 0 to 2 percent slopes | NWI Classification: PEM1C

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** Yes
Hydric soil present? Y	If yes, optional wetland site ID:
Wetland hydrology present? Y	

Remarks: (Explain alternative procedures here or in a separate report.)

Seasonally saturated /temporarily flooded wetland depression; data represents wetlands G5 and G6

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0 = Total Cover		
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5' radius)			
1 Calamagrostis canadensis	30	Y	FACW
2 Symphyotrichum lanceolatum	20	Y	FACW
3 Persicaria amphibia	20	Y	OBL
4 Rumex crispus	20	Y	FAC
5			
6			
7			
8			
9			
10			
	90 = Total Cover		
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0 = Total Cover		

% Bare Ground in Herb Stratum

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across all Strata: 4 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	20	x 1 =	20
FACW species	50	x 2 =	100
FAC species	20	x 3 =	60
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	90 (A)		180 (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL G5 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-11	10YR 3/2	100					Loam	
11-18	10YR 3/2	90	10YR 3/6	10			Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (LRR I, J)
- ___ Coast Prairie Redox (A16) (LRR F, G, H)
- ___ Dark Surface (S7) (LRR K, L)
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes		No	X	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

Seasonally saturated/temporarily flooded depressions

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 09/01/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL G7 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 16 133N 70W

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave | Slope (%): 2-5

Subregion (LRR): LRR F | Lat: 46.329341 | Long: - 99.497559 | Datum: NAD83

Soil Map Unit Name: Lowe loam, 0 to 2 percent slopes, occasionally flooded | NWI Classification: PEM1C

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y
Hydric soil present?	Y
Wetland hydrology present?	Y

Is the sampled area within a wetland? Yes

If yes, optional wetland site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

Data form represents Wetlands G7, G8, G9, & G10

VEGETATION -- Use scientific names of plants.

		Absolute % Cover	Dominant Species	Indicator Staus
Tree Stratum (Plot size: 30' radius)				
1				
2				
3				
4				
5				
		0	= Total Cover	
Sapling/Shrub stratum (Plot size: 15' radius)				
1				
2				
3				
4				
5				
		0	= Total Cover	
Herb stratum (Plot size: 5' radius)				
1	Typha latifolia	50	Y	OBL
2	Spartina pectinata	20	Y	FACW
3	Persicaria amphibia	20	Y	OBL
4	Alisma triviale	5	N	OBL
5				
6				
7				
8				
9				
10				
		95	= Total Cover	
Woody vine stratum (Plot size: 30' radius)				
1				
2				
		0	= Total Cover	

% Bare Ground in Herb Stratum ____

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across all Strata: 3 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	75	x 1 =	75
FACW species	20	x 2 =	40
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	95 (A)		115 (B)

Prevalence Index = B/A = 1.21

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL G7 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-11	10YR 3/2	100					Loam	
11-18	10YR 3/2	90	10YR 3/6	10			Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (LRR I, J)
- ___ Coast Prairie Redox (A16) (LRR F, G, H)
- ___ Dark Surface (S7) (LRR K, L)
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches):	___
Water table present?	Yes	___	No	X	Depth (inches):	___
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

Seasonally flooded depressions

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 09/01/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL G11 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 16 133N 70W

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave | Slope (%): 2-5

Subregion (LRR): F | Lat: 46.336941 | Long: - 99.495511 | Datum: NAD83

Soil Map Unit Name: Harriet loam, 0 to 2 percent slopes | NWI Classification: PUBFx

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** Yes
Hydric soil present? Y	If yes, optional wetland site ID:
Wetland hydrology present? Y	

Remarks: (Explain alternative procedures here or in a separate report.)

Large seasonally saturated basin with small permanently flooded area of open water

VEGETATION -- Use scientific names of plants.

	Absolute % Cover	Dominant Species	Indicator Staus
Tree Stratum (Plot size: 30' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5' radius)			
1 Typha latifolia	50	Y	OBL
2 Spartina pectinata	20	Y	FACW
3 Calamagrostis canadensis	20	N	FACW
4 Juncus effusus	10	N	OBL
5 Persicaria amphibia	5	N	OBL
6 Schoenoplectus tabernaemontani	3	N	OBL
7			
8			
9			
10			
	108 = Total Cover		
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0 = Total Cover		

% Bare Ground in Herb Stratum

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	68	x 1 =	68
FACW species	40	x 2 =	80
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	108 (A)		148 (B)

Prevalence Index = B/A = 1.37

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL G11 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-18+	10YR 2/1	100					Mucky Clay	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- X Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- X 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (LRR I, J)
- ___ Coast Prairie Redox (A16) (LRR F, G, H)
- ___ Dark Surface (S7) (LRR K, L)
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- X Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	X	No		Depth (inches):	1-12"
Water table present?	Yes	X	No		Depth (inches):	0
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

Inundated seasonally saturated basin, small area of open water present

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 09/01/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL G13 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 17 133N 70W

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave | Slope (%): 2-5

Subregion (LRR): LRR F | Lat: 46.340107 | Long: - 99.498633 | Datum: NAD83

Soil Map Unit Name: Rhoades-Daglum loams, 2 to 9 percent slopes | NWI Classification: PEM1C

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** Yes
Hydric soil present? Y	If yes, optional wetland site ID:
Wetland hydrology present? Y	

Remarks: (Explain alternative procedures here or in a separate report.)

Large permanently flooded isolated basin with a small open water feature

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0 = Total Cover		

Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		

Herb stratum (Plot size: 5' radius)			
1 Typha latifolia	50	Y	OBL
2 Spartina pectinata	20	Y	FACW
3 Calamagrostis canadensis	20	N	FACW
4 Juncus effusus	10	N	OBL
5 Persicaria amphibia	5	N	OBL
6 Schoenoplectus tabernaemontani	3	N	OBL
7			
8			
9			
10			
	108 = Total Cover		

Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0 = Total Cover		

% Bare Ground in Herb Stratum

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	68	x 1 =	68
FACW species	40	x 2 =	80
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	108 (A)		148 (B)

Prevalence Index = B/A = 1.37

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index calculated for reference purposes only.

SOIL

Sampling Point: WL G13 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-18+	10YR 2/1	100					Mucky Clay	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- X Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- X 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (LRR I, J)
- ___ Coast Prairie Redox (A16) (LRR F, G, H)
- ___ Dark Surface (S7) (LRR K, L)
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- X Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	X	No		Depth (inches):	1-12"
Water table present?	Yes	X	No		Depth (inches):	0
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

Isolated permanently flooded basin with open water feature

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 09/01/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL G16 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 18 133N 70W

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave | Slope (%): 2-5

Subregion (LRR): LRR F | Lat: 46.328646 | Long: - 99.534902 | Datum: NAD83

Soil Map Unit Name: Noonan-Niobell-Williams loams, 0 to 6 percent slopes | NWI Classification: PEM1C

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Yes
Hydric soil present?	Y	If yes, optional wetland site ID:	
Wetland hydrology present?	Y		

Remarks: (Explain alternative procedures here or in a separate report.)

Data form represents Wetlands G16, G15, & G14

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Herb stratum (Plot size: 5' radius)			
1 Spartina pectinata	30	Y	FACW
2 Echinochloa crus-galli	20	Y	FAC
3 Bidens cernua	20	Y	OBL
4 Juncus effusus	10	N	OBL
5 Alisma triviale	10	N	OBL
6 Persicaria amphibia	5	N	OBL
7			
8			
9			
10			
	95	= Total Cover	
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across all Strata: 3 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	45	x 1 =	45	
FACW species	30	x 2 =	60	
FAC species	20	x 3 =	60	
FACU species	0	x 4 =	0	
UPL species	0	x 5 =	0	
Column totals	95	(A)	165	(B)

Prevalence Index = B/A = 1.74

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ____ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL G16 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-18+	10YR 2/1	100					Mucky Clay	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- X 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (LRR I, J)
- ___ Coast Prairie Redox (A16) (LRR F, G, H)
- ___ Dark Surface (S7) (LRR K, L)
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- X Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	X	No		Depth (inches):	1-12"
Water table present?	Yes	X	No		Depth (inches):	0
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

Permanently flooded with open water feature

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 09/01/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL G17 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 13 133N 71W

Landform (hillslope, terrace, etc.): drainage | Local relief (concave, convex, none): concave | Slope (%): 2-5

Subregion (LRR): LRR F | Lat: 46.339605 | Long: - 99.558377 | Datum: NAD83

Soil Map Unit Name: Noonan-Niobell-Williams loams, 0 to 6 percent slopes | NWI Classification: PEM1C

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation X, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic?

SUMMARY OF FINDINGS

(If needed, explain any answers in remarks.)

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Yes
Hydric soil present?	Y	If yes, optional wetland site ID:	
Wetland hydrology present?	Y		

Remarks: (Explain alternative procedures here or in a separate report.)

Data form represents Wetlands G17 & H5

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Herb stratum (Plot size: 5' radius)			
1 Persicaria amphibia	30	Y	OBL
2 Phalaris arundinacea	20	Y	FACW
3 Spartina pectinata	20	Y	FACW
4 Echinochloa crus-galli	5	N	FAC
5			
6			
7			
8			
9			
10			
	75	= Total Cover	
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across all Strata: 3 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	30	x 1 =	30
FACW species	40	x 2 =	80
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	75 (A)		125 (B)

Prevalence Index = B/A = 1.67

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- X Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

These areas were disturbed by agricultural practices (hayed). Dominance Test & Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL G17 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-11	10YR 3/2	100					Loam	
11-18+	10YR 3/2	98	10YR 3/6	2			Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (LRR I, J)
- ___ Coast Prairie Redox (A16) (LRR F, G, H)
- ___ Dark Surface (S7) (LRR K, L)
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches): ___
Water table present?	Yes	___	No	X	Depth (inches): ___
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches): 0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

Seasonally saturated shallow basins

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 09/02/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL H1 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 6 133N 70W

Landform (hillslope, terrace, etc.): depression | Local relief (concave, convex, none): concave | Slope (%): 2-5

Subregion (LRR): F | Lat: 46.360815 | Long: - 99.534859 | Datum: NAD83

Soil Map Unit Name: Williams-Niobell loams, 3 to 6 percent slopes | NWI Classification: PEM1A

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** Yes
Hydric soil present? Y	If yes, optional wetland site ID:
Wetland hydrology present? Y	

Remarks: (Explain alternative procedures here or in a separate report.)

Temporarily flooded isolated depression

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0 = Total Cover		
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5' radius)			
1 Persicaria amphibia	60	Y	OBL
2 Spartina pectinata	20	Y	FACW
3 Rumex crispus	10	N	FAC
4 Symphyotrichum lanceolatum	3	N	FACW
5			
6			
7			
8			
9			
10			
	93 = Total Cover		
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0 = Total Cover		

% Bare Ground in Herb Stratum

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	60	x 1 =	60
FACW species	23	x 2 =	46
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	93 (A)		136 (B)

Prevalence Index = B/A = 1.46

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL H1 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-11	10YR 3/2	100					Loam	
11-18+	10YR 3/2	90	10YR 3/6	10			Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (LRR I, J)
- ___ Coast Prairie Redox (A16) (LRR F, G, H)
- ___ Dark Surface (S7) (LRR K, L)
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches):	___
Water table present?	Yes	___	No	X	Depth (inches):	___
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

Temporarily flooded

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 09/02/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL H2 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 7 133N 70W

Landform (hillslope, terrace, etc.): depression | Local relief (concave, convex, none): concave | Slope (%): 2-5

Subregion (LRR): F | Lat: 46.355654 | Long: - 99.534849 | Datum: NAD83

Soil Map Unit Name: Hamerly-Vallers loams, 3 to 6 percent slopes | NWI Classification: PEM1A

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** Yes
Hydric soil present? Y	If yes, optional wetland site ID:
Wetland hydrology present? Y	

Remarks: (Explain alternative procedures here or in a separate report.)

Temporarily flooded depressional wetland

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0 = Total Cover		
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5' radius)			
1 Persicaria amphibia	75	Y	OBL
2 Bidens cernua	10	N	OBL
3 Symphyotrichum lanceolatum	10	N	FACW
4 Rumex crispus	5	N	FAC
5			
6			
7			
8			
9			
10			
	100 = Total Cover		
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0 = Total Cover		

% Bare Ground in Herb Stratum

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	85	x 1 =	85
FACW species	10	x 2 =	20
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	100 (A)		120 (B)

Prevalence Index = B/A = 1.20

Hydrophytic Vegetation Indicators:

- ____ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- X Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

SOIL

Sampling Point: WL H2 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-11	10YR 3/2	100					Loam	
11-18+	10YR 3/2	98	10YR 3/6	2			Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (LRR I, J)
- ___ Coast Prairie Redox (A16) (LRR F, G, H)
- ___ Dark Surface (S7) (LRR K, L)
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches):	___
Water table present?	Yes	___	No	X	Depth (inches):	___
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

Temporarily flooded

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 09/02/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL H3 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 7 133N 70W

Landform (hillslope, terrace, etc.): depression | Local relief (concave, convex, none): concave | Slope (%): 2-5

Subregion (LRR): F | Lat: 46.343811 | Long: - 99.538917 | Datum: NAD83

Soil Map Unit Name: Hamerly-Vallers loams, moderately saline, 0 to 3 percent slopes | NWI Classification: PEM1C

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Yes
Hydric soil present?	Y	If yes, optional wetland site ID:	
Wetland hydrology present?	Y		

Remarks: (Explain alternative procedures here or in a separate report.)

Large basin with a small permanently flooded open water feature

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0 = Total Cover		
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5' radius)			
1 Typha latifolia	50	Y	OBL
2 Spartina pectinata	20	Y	FACW
3 Persicaria amphibia	10	N	OBL
4 Juncus effusus	10	N	OBL
5 Alisma triviale	3	N	OBL
6			
7			
8			
9			
10			
	93 = Total Cover		
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0 = Total Cover		

% Bare Ground in Herb Stratum

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	73	x 1 =	73
FACW species	20	x 2 =	40
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	93 (A)		113 (B)

Prevalence Index = B/A = 1.22

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- X Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL H3 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-18	10YR 2/1	100					Mucky clay	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- X 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (LRR I, J)
- ___ Coast Prairie Redox (A16) (LRR F, G, H)
- ___ Dark Surface (S7) (LRR K, L)
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	X	No		Depth (inches):	1-12"
Water table present?	Yes	X	No		Depth (inches):	0
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

small permanently flooded open water feature present

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 09/02/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL H4 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 12 133N 71W

Landform (hillslope, terrace, etc.): depression | Local relief (concave, convex, none): concave | Slope (%): 2-5

Subregion (LRR): F | Lat: 46.342418 | Long: - 99.541685 | Datum: NAD83

Soil Map Unit Name: Parshall fine sandy loam, 0 to 2 percent slopes | NWI Classification: PEM1C

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** Yes
Hydric soil present? Y	If yes, optional wetland site ID:
Wetland hydrology present? Y	

Remarks: (Explain alternative procedures here or in a separate report.)

Temporarily flooded depressional wetland

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Herb stratum (Plot size: 5' radius)			
1 Typha latifolia	50	Y	OBL
2 Eleocharis palustris	10	N	OBL
3			
4			
5			
6			
7			
8			
9			
10			
	60	= Total Cover	
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	60	x 1 =	60
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	60 (A)		60 (B)

Prevalence Index = B/A = 1.00

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ____ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- X Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index calculated for reference purposes only.

SOIL

Sampling Point: WL H4 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-11	10YR 3/2	100					Loam	
11-18+	10YR 3/2	90	10YR 3/6	10			Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- _X_ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (LRR I, J)
- ___ Coast Prairie Redox (A16) (LRR F, G, H)
- ___ Dark Surface (S7) (LRR K, L)
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches): ___
Water table present?	Yes	___	No	X	Depth (inches): ___
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches): 0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

temporarily flooded depression

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 09/02/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL H6 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 27 133N 71W

Landform (hillslope, terrace, etc.): drainage | Local relief (concave, convex, none): concave | Slope (%): 2-5

Subregion (LRR): F | Lat: 46.309049 | Long: - 99.602388 | Datum: NAD83

Soil Map Unit Name: Appam sandy loam, 2 to 6 percent slopes | NWI Classification: PEM1C

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** Yes
Hydric soil present? Y	If yes, optional wetland site ID:
Wetland hydrology present? Y	

Remarks: (Explain alternative procedures here or in a separate report.)

Fringe wetland system

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0 = Total Cover		
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5' radius)			
1 *Spartina pectinata*	30	Y	FACW
2 *Phalaris arundinacea*	20	Y	FACW
3 *Typha latifolia*	20	Y	OBL
4 *Persicaria amphibia*	10	N	OBL
5 *Sonchus arvensis*	5	N	FAC
6			
7			
8			
9			
10			
	85 = Total Cover		
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0 = Total Cover		

% Bare Ground in Herb Stratum

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across all Strata: 3 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	30	x 1 =	30
FACW species	50	x 2 =	100
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	85 (A)		145 (B)

Prevalence Index = B/A = 1.71

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL H6 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-11	10YR 3/2	100					Loam	
11-18+	10YR 3/2	90	10YR 3/6	10			Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (LRR I, J)
- ___ Coast Prairie Redox (A16) (LRR F, G, H)
- ___ Dark Surface (S7) (LRR K, L)
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- X Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- X Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- X Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	X	No	___	Depth (inches):	6-24"
Water table present?	Yes	X	No	___	Depth (inches):	0
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

Permanently flooded wetland on fringe of watercourse

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 09/02/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL H7 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 22 133N 71W

Landform (hillslope, terrace, etc.): Drainage | Local relief (concave, convex, none): concave | Slope (%): 2-5

Subregion (LRR): F | Lat: 46.31222 | Long: - 99.601723 | Datum: NAD83

Soil Map Unit Name: Appam sandy loam, 2 to 6 percent slopes | NWI Classification: PEM1C

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** Yes
Hydric soil present? Y	If yes, optional wetland site ID:
Wetland hydrology present? Y	

Remarks: (Explain alternative procedures here or in a separate report.)

Seasonally flooded drainage swale

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Herb stratum (Plot size: 5' radius)			
1 *Spartina pectinata*	60	Y	FACW
2 *Typha latifolia*	20	Y	OBL
3 *Persicaria amphibia*	10	N	OBL
4 *Sonchus arvensis*	5	N	FAC
5			
6			
7			
8			
9			
10			
	95	= Total Cover	
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	30	x 1 =	30
FACW species	60	x 2 =	120
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	95 (A)		165 (B)

Prevalence Index = B/A = 1.74

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL H7 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-18+	10YR 2/1	100					Mucky Clay	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- X 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (LRR I, J)
- ___ Coast Prairie Redox (A16) (LRR F, G, H)
- ___ Dark Surface (S7) (LRR K, L)
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- X Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- X Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes		No	X	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

Seasonally flooded

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 09/02/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL H8 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 22 133N 71W

Landform (hillslope, terrace, etc.): drainage | Local relief (concave, convex, none): concave | Slope (%): 2-5

Subregion (LRR): F | Lat: 46.314295 | Long: - 99.596402 | Datum: NAD83

Soil Map Unit Name: Bowdle-Lehr loams, 0 to 2 percent slopes | NWI Classification: R4SBC

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** Yes
Hydric soil present? Y	If yes, optional wetland site ID:
Wetland hydrology present? Y	

Remarks: (Explain alternative procedures here or in a separate report.)

Wetland fringe system

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0 = Total Cover		
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5' radius)			
1 Spartina pectinata	50	Y	FACW
2 Typha latifolia	20	Y	OBL
3 Persicaria amphibia	10	N	OBL
4 Sonchus arvensis	5	N	FAC
5 Xanthium strumarium	5	N	FAC
6 Schoenoplectus tabernaemontani	5	N	OBL
7			
8			
9			
10			
	95 = Total Cover		
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0 = Total Cover		

% Bare Ground in Herb Stratum

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	35	x 1 =	35
FACW species	50	x 2 =	100
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	95 (A)		165 (B)

Prevalence Index = B/A = 1.74

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL H8 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-18+	10YR 2/1	100					Mucky Clay	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- X 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (LRR I, J)
- ___ Coast Prairie Redox (A16) (LRR F, G, H)
- ___ Dark Surface (S7) (LRR K, L)
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- X Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- X Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- X Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	X	No	___	Depth (inches):	6-24"
Water table present?	Yes	X	No	___	Depth (inches):	0
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

permanently flooded; contains watercourse flowing through wetland

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 09/03/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL I1 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 14 133N 71W

Landform (hillslope, terrace, etc.): drainage | Local relief (concave, convex, none): concave | Slope (%): 2-5

Subregion (LRR): F | Lat: 46.3387 | Long: - 99.573163 | Datum: NAD83

Soil Map Unit Name: Bowdle-Lehr loams, 0 to 2 percent slopes | NWI Classification: R4SBC

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** Yes
Hydric soil present? Y	If yes, optional wetland site ID:
Wetland hydrology present? Y	

Remarks: (Explain alternative procedures here or in a separate report.)

Seasonally saturated wetland

VEGETATION -- Use scientific names of plants.

	Absolute % Cover	Dominant Species	Indicator Staus
Tree Stratum (Plot size: 30' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5' radius)			
1 Spartina pectinata	50	Y	FACW
2 Eleocharis palustris	20	Y	OBL
3 Juncus effusus	10	N	OBL
4 Scirpus atrovirens	10	N	OBL
5 Sonchus arvensis	5	N	FAC
6			
7			
8			
9			
10			
	95 = Total Cover		
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0 = Total Cover		

% Bare Ground in Herb Stratum

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	40	x 1 =	40
FACW species	50	x 2 =	100
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	95 (A)		155 (B)

Prevalence Index = B/A = 1.63

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL I1 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-18+	10YR 2/1	100					Mucky Clay	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- X 1 cm Muck (A9) (LRR F, G, H)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (LRR I, J)
- ___ Coast Prairie Redox (A16) (LRR F, G, H)
- ___ Dark Surface (S7) (LRR K, L)
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- X Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- X Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes		No	X	Depth (inches):	
Water table present?	Yes		No	X	Depth (inches):	
Saturation present? (includes capillary fringe)	Yes	X	No		Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

Seasonally saturated

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 09/03/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL I2 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 14 133N 71W

Landform (hillslope, terrace, etc.): Drainage | Local relief (concave, convex, none): Concave | Slope (%): 2-5

Subregion (LRR): F | Lat: 46.337953 | Long: - 99.571981 | Datum: NAD83

Soil Map Unit Name: Lehr-Bowdle loams, 2 to 6 percent slopes | NWI Classification: R4SBC

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Yes
Hydric soil present?	Y	If yes, optional wetland site ID:	
Wetland hydrology present?	Y		

Remarks: (Explain alternative procedures here or in a separate report.)

Seasonally saturated wetland

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	

Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	

Herb stratum (Plot size: 5' radius)			
1 Spartina pectinata	75	Y	FACW
2			
3			
4			
5			
6			
7			
8			
9			
10			
	75	= Total Cover	

Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum: 25

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	0	x 1 =	0
FACW species	75	x 2 =	150
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	75 (A)		150 (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL I2 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-11	10YR 3/2	100					Loam	
11-18+	10YR 3/2	98	10YR 3/6	2			Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (LRR I, J)
- ___ Coast Prairie Redox (A16) (LRR F, G, H)
- ___ Dark Surface (S7) (LRR K, L)
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches):	___
Water table present?	Yes	___	No	X	Depth (inches):	___
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

Seasonally saturated

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: Logan County | Sampling Date: 09/03/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL I3 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 14 133N 71W

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave | Slope (%): 2-5

Subregion (LRR): F | Lat: 46.331724 | Long: - 99.572678 | Datum: NAD83

Soil Map Unit Name: Lehr-Bowdle loams, 2 to 6 percent slopes | NWI Classification: PEM1A

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** Yes
Hydric soil present? Y	If yes, optional wetland site ID:
Wetland hydrology present? Y	

Remarks: (Explain alternative procedures here or in a separate report.)

Temporarily flooded depressional wetland

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0 = Total Cover		
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5' radius)			
1 Typha latifolia	50	Y	OBL
2 Spartina pectinata	20	Y	FACW
3 Phalaris arundinacea	20	Y	FACW
4 Echinchloa drus-galli	10	N	FAC
5			
6			
7			
8			
9			
10			
	100 = Total Cover		
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0 = Total Cover		

% Bare Ground in Herb Stratum: 25

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across all Strata: 3 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	50	x 1 =	50
FACW species	40	x 2 =	80
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column totals	100 (A)		160 (B)

Prevalence Index = B/A = 1.60

Hydrophytic Vegetation Indicators:

- X Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Dominance Test and Prevalence Index are calculated for reference purposes only.

SOIL

Sampling Point: WL I3 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-11	10YR 3/2	100					Loam	
11-18+	10YR 3/2	90	10YR 3/6	10			Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (LRR I, J)
- ___ Coast Prairie Redox (A16) (LRR F, G, H)
- ___ Dark Surface (S7) (LRR K, L)
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches):	___
Water table present?	Yes	___	No	X	Depth (inches):	___
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

Temporarily flooded depression

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: McIntosh County | Sampling Date: 09/03/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL I4 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 29 132N 71W

Landform (hillslope, terrace, etc.): Depression | Local relief (concave, convex, none): Concave | Slope (%): 2-5

Subregion (LRR): F | Lat: 46.226255 | Long: - 99.601916 | Datum: NAD83

Soil Map Unit Name: Divide loam, 0 to 2 percent slopes | NWI Classification: R4SBC

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present?	Y	**Is the sampled area within a wetland?**	Yes
Hydric soil present?	Y	If yes, optional wetland site ID:	
Wetland hydrology present?	Y		

Remarks: (Explain alternative procedures here or in a separate report.)

Temporarily flooded depressional wetland

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0	= Total Cover	
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Herb stratum (Plot size: 5' radius)			
1 Echinochloa crus-galli	75	Y	FAC
2 Juncus effusus	10	N	OBL
3 Eleocharis palustris	5	N	OBL
4 Symphyotrichum lanceolatum	5	N	FACW
5 Ambrosia atremisiifolia	5	N	FACU
6			
7			
8			
9			
10			
	100	= Total Cover	
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum: 25

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across all Strata: 1 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	15	x 1 =	15	
FACW species	5	x 2 =	10	
FAC species	75	x 3 =	225	
FACU species	5	x 4 =	20	
UPL species	0	x 5 =	0	
Column totals	100	(A)	270	(B)

Prevalence Index = B/A = 2.70

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL I4 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-11	10YR 3/2	100					Loam	
11-18+	10YR 3/2	90	10YR 3/6	10			Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (LRR I, J)
- ___ Coast Prairie Redox (A16) (LRR F, G, H)
- ___ Dark Surface (S7) (LRR K, L)
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches) _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches):	___
Water table present?	Yes	___	No	X	Depth (inches):	___
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

seasonally saturated/temporarily flooded

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm | City/County: McIntosh County | Sampling Date: 09/03/20

Applicant/Owner: Badger Wind, LLC | State: ND | Sampling Point: WL I5 (2020)

Investigator(s): Ernest Schenk, Atwell, LLC | Section, Township, Range: 29 132N 71W

Landform (hillslope, terrace, etc.): depression | Local relief (concave, convex, none): concave | Slope (%): 2-5

Subregion (LRR): F | Lat: 46.226912 | Long: - 99.601496 | Datum: NAD83

Soil Map Unit Name: Divide loam, 0 to 2 percent slopes | NWI Classification: PEM1C

Are climatic/hydrologic conditions of the site typical for this time of the year? Y (If no, explain in remarks)

Are vegetation ____, soil ____, or hydrology ____ significantly disturbed? Are "normal circumstances" present? Yes

Are vegetation ____, soil ____, or hydrology ____ naturally problematic? (If needed, explain any answers in remarks.)

SUMMARY OF FINDINGS

Hydrophytic vegetation present? Y	**Is the sampled area within a wetland?** Yes
Hydric soil present? Y	If yes, optional wetland site ID:
Wetland hydrology present? Y	

Remarks: (Explain alternative procedures here or in a separate report.)

Seasonally saturated/temporarily flooded depressional wetland

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30' radius)	Absolute % Cover	Dominant Species	Indicator Staus
1			
2			
3			
4			
5			
	0 = Total Cover		
Sapling/Shrub stratum (Plot size: 15' radius)			
1			
2			
3			
4			
5			
	0 = Total Cover		
Herb stratum (Plot size: 5' radius)			
1 Echinochloa crus-galli	50	Y	FAC
2 Xanthium strumarium	20	Y	FAC
3 Symphyotrichum lanceolatum	10	N	FACW
4 Ambrosia atremisiifolia	10	N	FACU
5 Eleocharis palustris	5	N	OBL
6			
7			
8			
9			
10			
	95 = Total Cover		
Woody vine stratum (Plot size: 30' radius)			
1			
2			
	0 = Total Cover		

% Bare Ground in Herb Stratum: 25

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across all Strata: 2 (B)

Percent of Dominant Species that are OBL, FACW, or FAC: 100.00% (A/B)

Prevalence Index Worksheet

Total % Cover of:

OBL species	5	x 1 =	5
FACW species	10	x 2 =	20
FAC species	70	x 3 =	210
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column totals	95 (A)		275 (B)

Prevalence Index = B/A = 2.89

Hydrophytic Vegetation Indicators:

- ___ Rapid test for hydrophytic vegetation
- X Dominance test is >50%
- X Prevalence index is ≤3.0*
- ___ Morphogical adaptations* (provide supporting data in Remarks or on a separate sheet)
- ___ Problematic hydrophytic vegetation* (explain)

*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic vegetation present? Y

Remarks: (Include photo numbers here or on a separate sheet)

Prevalence Index is calculated for reference purposes only.

SOIL

Sampling Point: WL I5 (2020)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type*	Loc**	Texture	Remarks
0-11	10YR 3/2	100					Loam	
11-18+	10YR 3/2	90	10YR 3/6	10			Clay Loam	

*Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. **Location: PL = Pore Lining, M = Mat

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise note

- ___ Histisol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (LRR F)
- ___ 1 cm Muck (A9) (LRR F, G, H)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (LRR
- ___ 5 cm Mucky Peat or Peat (S3) (LRR F
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils:

- ___ 1 cm Muck (A9) (LRR I, J)
- ___ Coast Prairie Redox (A16) (LRR F, G, H)
- ___ Dark Surface (S7) (LRR K, L)
- ___ High Plains Depressions (F16) (LRR H outside of M:RA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in remarks)

*Indicators of hydrophytic vegetation and weltand hydrology must be present, unless disturbed or problematic

Restrictive Layer (if observed):
Type: _____
Depth (inches): _____

Hydric soil present? Y

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface water present?	Yes	___	No	X	Depth (inches):	___
Water table present?	Yes	___	No	X	Depth (inches):	___
Saturation present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	0

Wetland hydrology present? Y

Describe recorded data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

NA

Remarks:

Seasonally saturated/temporarily flooded depression

APPENDIX E

AQUATIC RESOURCES TABLES

Table 2a. Field-delineated wetlands within the Survey Area

Feature ID	Cowardin Class[1]	Delineated Acreage	Latitude	Longitude	Likely Jurisdictional Status	Mapbook Page
Wetland A1	PEM	0.81	46.351601	-99.515810	Likely Jurisdictional	8
Wetland A2	PEM	0.09	46.359364	-99.518336	Likely Jurisdictional	4
Wetland A3	PEM	0.02	46.354464	-99.529774	Likely Jurisdictional	8
Wetland A4	PEM	0.04	46.354137	-99.530740	Likely Jurisdictional	7
Wetland A5	PEM	0.18	46.328309	-99.530308	Likely Isolated	16
Wetland A6	PEM	0.34	46.322352	-99.522399	Likely Isolated	17
Wetland B1	PEM	0.27	46.328523	-99.602005	Likely Jurisdictional	14
Wetland B2	PEM	1.22	46.336294	-99.602075	Likely Jurisdictional	9
Wetland B3	PEM	0.26	46.345466	-99.608037	Likely Jurisdictional	9
Wetland B4	PEM	0.52	46.352812	-99.624754	Likely Jurisdictional	6
Wetland B5	PEM	2.75	46.374102	-99.647178	Likely Jurisdictional	1
Wetland B6	PEM	0.65	46.361542	-99.638420	Likely Jurisdictional	2
Wetland C1	PEM	0.07	46.344199	-99.607878	Likely Jurisdictional	9
Wetland D1	PEM	0.10	46.285881	-99.668352	Likely Jurisdictional	30
Wetland D2	PEM	1.31	46.286183	-99.671807	Likely Jurisdictional	30
Wetland D3	PEM	1.22	46.289884	-99.640063	Likely Jurisdictional	31
Wetland D4	PEM	2.36	46.293660	-99.631281	Likely Jurisdictional	31
Wetland D5	PEM	1.58	46.284790	-99.616925	Likely Jurisdictional	32
Wetland D6	PEM	4.16	46.309120	-99.593674	Likely Jurisdictional	20
Wetland D7	PEM	3.99	46.318109	-99.616252	Likely Jurisdictional	19
Wetland D8	PEM	3.91	46.302558	-99.616266	Likely Jurisdictional	25
Wetland D9	PEM	0.96	46.304667	-99.615406	Likely Jurisdictional	25

Feature ID	Cowardin Class[1]	Delineated Acreage	Latitude	Longitude	Likely Jurisdictional Status	Mapbook Page
Wetland E1	PEM	0.20	46.283545	-99.518903	Likely Isolated	35
Wetland F1	PEM	0.25	46.326612	-99.512792	Likely Isolated	17
Wetland F2	PEM	0.04	46.332953	-99.512319	Likely Jurisdictional	12
Wetland F3	PEM	0.03	46.339464	-99.510361	Likely Jurisdictional	12
Wetland F4	PEM	0.41	46.344220	-99.507461	Likely Isolated	12
Wetland F5	PEM	0.02	46.300248	-99.490269	Likely Isolated	29
Wetland F6	PEM	<0.01	46.300308	-99.490460	Likely Isolated	29
Wetland F7	PEM	0.71	46.299414	-99.487307	Likely Isolated	29
Wetland F8	PEM	0.02	46.306963	-99.502058	Likely Jurisdictional	22
Wetland F9	PEM	0.25	46.305672	-99.507416	Likely Jurisdictional	28
Wetland F10	PEM	0.30	46.307322	-99.509922	Likely Jurisdictional	22
Wetland F11	PEM	12.52	46.296426	-99.501109	Likely Jurisdictional	28
Wetland F12	PEM	0.14	46.289992	-99.532060	Likely Jurisdictional	34
Wetland F13	PEM	0.02	46.289890	-99.550022	Likely Jurisdictional	34
Wetland F14	PEM	0.20	46.300726	-99.519212	Likely Jurisdictional	28
Wetland G1	PEM	0.40	46.300330	-99.529812	Likely Isolated	28
Wetland G2	PEM	0.18	46.299327	-99.539155	Likely Jurisdictional	27
Wetland G3	PEM	1.56	46.306738	-99.547519	Likely Jurisdictional	21
Wetland G4	PEM	7.42	46.301237	-99.556873	Likely Jurisdictional	27
Wetland G5	PEM	1.15	46.300961	-99.562543	Likely Jurisdictional	27
Wetland G6	PEM	0.08	46.311324	-99.582651	Likely Jurisdictional	20
Wetland G7	PEM	0.06	46.309641	-99.585550	Likely Jurisdictional	20
Wetland G8	PEM	0.26	46.309362	-99.590386	Likely Jurisdictional	20
Wetland G9	PEM	5.69	46.293442	-99.576707	Likely Jurisdictional	33

Feature ID	Cowardin Class[1]	Delineated Acreage	Latitude	Longitude	Likely Jurisdictional Status	Mapbook Page
Wetland G10	PEM	0.04	46.289571	-99.581693	Likely Jurisdictional	33
Wetland G11	PEM	5.54	46.287506	-99.580730	Likely Jurisdictional	33
Wetland G12	PEM	0.61	46.287962	-99.582127	Likely Jurisdictional	33
Wetland G13	PEM	2.31	46.285648	-99.587206	Likely Jurisdictional	33
Wetland H1	PEM	0.21	46.239439	-99.590733	Likely Jurisdictional	47
Wetland H2	PEM	2.74	46.273683	-99.596823	Likely Jurisdictional	38
Wetland I1	PEM	0.12	46.283075	-99.519862	Likely Jurisdictional	35
Wetland I2	PEM	0.01	46.282469	-99.518691	Likely Jurisdictional	35
Wetland J1	PEM	0.66	46.294329	-99.495287	Likely Jurisdictional	29
Wetland J2	PEM	0.36	46.300300	-99.504249	Likely Jurisdictional	28
Wetland J3	PEM	0.19	46.330262	-99.520323	Likely Jurisdictional	17
Wetland J4	PEM	0.05	46.328252	-99.520087	Likely Isolated	17
Wetland K1	PEM	3.35	46.342805	-99.506203	Likely Isolated	12
Wetland K2	PEM	0.63	46.339351	-99.507191	Likely Jurisdictional	12
Wetland K3	PEM	0.02	46.339107	-99.508441	Likely Jurisdictional	12
Wetland K4	PEM	0.38	46.335235	-99.509448	Likely Jurisdictional	12
Wetland K5	PEM	0.19	46.333641	-99.507779	Likely Jurisdictional	12
Wetland K6	PEM	0.13	46.333641	-99.511172	Likely Jurisdictional	12
Wetland K7	PEM	0.08	46.332995	-99.511352	Likely Jurisdictional	12
Wetland K8	PEM	0.05	46.331076	-99.516576	Likely Jurisdictional	17
Wetland L1	PEM	3.93	46.301641	-99.620982	Likely Jurisdictional	25
Wetland A1 (2020)	PEM	11.26	46.294566	-99.648780	Likely Jurisdictional	24
Wetland A2 (2020)	PEM	19.97	46.282465	-99.659645	Likely Jurisdictional	30
Wetland A3 (2020)	PEM	11.78	46.276429	-99.653603	Likely Jurisdictional	37

Feature ID	Cowardin Class[1]	Delineated Acreage	Latitude	Longitude	Likely Jurisdictional Status	Mapbook Page
Wetland A4 (2020)	PEM	4.19	46.303925	-99.639571	Likely Jurisdictional	24
Wetland B1 (2020)	PEM	10.23	46.314159	-99.618301	Likely Jurisdictional	19
Wetland B2 (2020)	PEM	9.80	46.308065	-99.611488	Likely Jurisdictional	1
Wetland B3 (2020)	PEM	2.27	46.300551	-99.611125	Likely Jurisdictional	25
Wetland B4 (2020)	PEM	3.90	46.282647	-99.637065	Likely Jurisdictional	31
Wetland B5 (2020)	PEM	0.61	46.300071	-99.614339	Likely Jurisdictional	25
Wetland C1 (2020)	PEM	6.57	46.276142	-99.645904	Likely Jurisdictional	37
Wetland C2 (2020)	PEM	9.64	46.273166	-99.623785	Likely Jurisdictional	38
Wetland C3 (2020)	PEM	2.34	46.272343	-99.614878	Likely Jurisdictional	38
Wetland C4 (2020)	PEM	0.23	46.267314	-99.602124	Likely Jurisdictional	42
Wetland D1 (2020)	PEM	2.40	46.279702	-99.608128	Likely Jurisdictional	38
Wetland D2 (2020)	PEM	0.03	46.281105	-99.608223	Likely Jurisdictional	38
Wetland D3 (2020)	PEM	1.00	46.260442	-99.592410	Likely Jurisdictional	42
Wetland D4 (2020)	PEM	1.85	46.264021	-99.595125	Likely Jurisdictional	42
Wetland D5 (2020)	PEM	7.28	46.301687	-99.592436	Likely Jurisdictional	26
Wetland D6 (2020)	PEM	0.16	46.297081	-99.582690	Likely Isolated	26
Wetland D7 (2020)	PEM	0.46	46.298354	-99.557949	Likely Jurisdictional	27
Wetland D8 (2020)	PEM	0.49	46.298409	-99.551573	Likely Jurisdictional	27
Wetland D9 (2020)	PEM	0.03	46.316643	-99.527733	Likely Isolated	22
Wetland D10 (2020)	PEM	0.34	46.316845	-99.526518	Likely Jurisdictional	22
Wetland D11 (2020)	PEM	0.07	46.318915	-99.525355	Likely Jurisdictional	22
Wetland D12 (2020)	PEM	0.07	46.318914	-99.523444	Likely Jurisdictional	22
Wetland D13 (2020)	PEM	0.02	46.318134	-99.522365	Likely Jurisdictional	22
Wetland E1 (2020)	PEM	0.17	46.300579	-99.509364	Likely Jurisdictional	28

Feature ID	Cowardin Class[1]	Delineated Acreage	Latitude	Longitude	Likely Jurisdictional Status	Mapbook Page
Wetland E2 (2020)	PEM	0.10	46.301219	-99.508517	Likely Jurisdictional	28
Wetland E3 (2020)	PEM	0.08	46.297528	-99.510484	Likely Jurisdictional	28
Wetland E4 (2020)	PEM	0.08	46.297630	-99.509496	Likely Jurisdictional	28
Wetland E5 (2020)	PEM	1.31	46.296008	-99.508991	Likely Jurisdictional	28
Wetland E7 (2020)	PEM	0.10	46.292352	-99.485160	Likely Isolated	36
Wetland E8 (2020)	PEM	0.03	46.293544	-99.490111	Likely Isolated	29
Wetland E9 (2020)	PEM	14.20	46.296542	-99.495027	Likely Jurisdictional	29
Wetland E10 (2020)	PEM	0.83	46.300811	-99.488534	Likely Jurisdictional	29
Wetland E11 (2020)	PEM	0.11	46.300996	-99.489841	Likely Jurisdictional	29
Wetland E12 (2020)	PEM	0.04	46.300813	-99.490011	Likely Jurisdictional	29
Wetland E13 (2020)	PEM	0.03	46.301012	-99.490410	Likely Jurisdictional	29
Wetland E14 (2020)	PEM	0.73	46.299679	-99.483096	Likely Jurisdictional	29
Wetland E15 (2020)	PEM	0.90	46.300172	-99.484417	Likely Isolated	29
Wetland E16 (2020)	PEM	0.84	46.301958	-99.488474	Likely Jurisdictional	29
Wetland E17 (2020)	PEM	0.01	46.303125	-99.495705	Likely Isolated	29
Wetland E18 (2020)	PEM	0.04	46.303274	-99.495480	Likely Isolated	29
Wetland E19 (2020)	PEM	0.06	46.303191	-99.494532	Likely Isolated	29
Wetland E20 (2020)	PEM	0.10	46.303120	-99.492422	Likely Isolated	29
Wetland E21 (2020)	PEM	0.21	46.301756	-99.505885	Likely Jurisdictional	28
Wetland E22 (2020)	PEM	1.75	46.303260	-99.504728	Likely Jurisdictional	28
Wetland F1 (2020)	PEM	5.36	46.285337	-99.512214	Likely Jurisdictional	35
Wetland F2 (2020)	PEM	0.51	46.282873	-99.516396	Likely Jurisdictional	35
Wetland F3 (2020)	PEM	0.17	46.267471	-99.494380	Likely Isolated	43
Wetland F5 (2020)	PEM	0.24	46.315040	-99.507355	Likely Isolated	22

Feature ID	Cowardin Class[1]	Delineated Acreage	Latitude	Longitude	Likely Jurisdictional Status	Mapbook Page
Wetland F6 (2020)	PEM	0.13	46.320780	-99.511435	Likely Isolated	17
Wetland F7 (2020)	PEM	0.03	46.318325	-99.514883	Likely Isolated	22
Wetland F8 (2020)	PEM	0.06	46.339904	-99.513549	Likely Isolated	12
Wetland F9 (2020)	PEM	6.09	46.343343	-99.514044	Likely Jurisdictional	12
Wetland F10 (2020)	PEM	3.19	46.343378	-99.510531	Likely Jurisdictional	12
Wetland F11 (2020)	PEM	0.50	46.346815	-99.502340	Likely Jurisdictional	8
Wetland G1 (2020)	PEM	0.04	46.322063	-99.506670	Likely Isolated	17
Wetland G2 (2020)	PEM	0.64	46.320425	-99.505742	Likely Isolated	17
Wetland G3 (2020)	PEM	0.02	46.322143	-99.505109	Likely Jurisdictional	17
Wetland G4 (2020)	PEM	0.02	46.324519	-99.500391	Likely Jurisdictional	17
Wetland G5 (2020)	PEM	0.15	46.325231	-99.501140	Likely Jurisdictional	17
Wetland G6 (2020)	PEM	0.12	46.328334	-99.500988	Likely Isolated	17
Wetland G7 (2020)	PEM	1.15	46.329293	-99.497196	Likely Isolated	17
Wetland G8 (2020)	PEM	2.33	46.331815	-99.499631	Likely Jurisdictional	12
Wetland G9 (2020)	PEM	1.08	46.334071	-99.498573	Likely Isolated	12
Wetland G10 (2020)	PEM	1.69	46.336452	-99.497285	Likely Jurisdictional	12
Wetland G11 (2020)	PEM	6.71	46.337360	-99.495376	Likely Jurisdictional	12
Wetland G12 (2020)	PEM	0.26	46.339527	-99.497012	Likely Isolated	12
Wetland G12 (2020)	PEM	1.32	46.306189	-99.621359	Likely Jurisdictional	25
Wetland G13 (2020)	PEM	2.19	46.340836	-99.498484	Likely Isolated	12
Wetland G14 (2020)	PEM	0.14	46.334164	-99.525999	Likely Isolated	11
Wetland G15 (2020)	PEM	0.01	46.328735	-99.533529	Likely Isolated	16
Wetland G16 (2020)	PEM	0.24	46.328517	-99.535101	Likely Isolated	16
Wetland G17 (2020)	PEM	5.19	46.339966	-99.558202	Likely Jurisdictional	10

Feature ID	Cowardin Class[1]	Delineated Acreage	Latitude	Longitude	Likely Jurisdictional Status	Mapbook Page
Wetland H1 (2020)	PEM	0.94	46.360867	-99.535345	Likely Isolated	3
Wetland H2 (2020)	PEM	0.01	46.355659	-99.534853	Likely Isolated	7
Wetland H3 (2020)	PEM	7.23	46.343373	-99.539590	Likely Jurisdictional	11
Wetland H4 (2020)	PEM	0.18	46.342305	-99.541764	Likely Jurisdictional	11
Wetland H5 (2020)	PEM	2.95	46.342379	-99.552058	Likely Jurisdictional	11
Wetland H6 (2020)	PEM	1.14	46.309309	-99.602216	Likely Jurisdictional	19
Wetland H7 (2020)	PEM	0.68	46.312539	-99.602020	Likely Jurisdictional	19
Wetland H8 (2020)	PEM	1.82	46.314172	-99.595731	Likely Jurisdictional	20
Wetland H9 (2020)	PEM	1.51	46.257577	-99.591612	Likely Jurisdictional	42
Wetland I1 (2020)	PEM	0.59	46.338433	-99.573612	Likely Jurisdictional	10
Wetland I2 (2020)	PEM	0.01	46.337980	-99.571947	Likely Jurisdictional	10
Wetland I3 (2020)	PEM	0.04	46.331723	-99.572616	Likely Isolated	15
Wetland I4 (2020)	PEM	0.04	46.226294	-99.601903	Likely Jurisdictional	48
Wetland I5 (2020)	PEM	0.07	46.226977	-99.601463	Likely Jurisdictional	48
w-ab-007	PEM	3.02	46.244159	-99.566666	Likely Jurisdictional	46
w-ab-013	PEM	0.83	46.244243	-99.581670	Likely Jurisdictional	46
w-ab-015a	PEM	1.84	46.240380	-99.589902	Likely Jurisdictional	47

[1] PEM = Palustrine Emergent Wetland

Table 2b. Field-delineated waterbodies within the Survey Area

Feature ID	Cowardin Class[2]	Delineated Acreage	Latitude	Longitude	Likely Jurisdictional Status	Mapbook Page
Waterbody B1	PUB3H	0.35	46.344557	-99.608160	Likely Jurisdictional	9

Feature ID	Cowardin Class[2]	Delineated Acreage	Latitude	Longitude	Likely Jurisdictional Status	Mapbook Page
Waterbody F1	PUB3H	0.29	46.307140	-99.509203	Likely Jurisdictional	22
Waterbody G1	PUB3H	0.20	46.303156	-99.539116	Likely Isolated	27

[2] PUB3H = Palustrine Unconsolidated Bottom, mud, permanently flooded

Table 2c. Field-delineated watercourses within the Survey Area

Feature ID	Hydrologic Regime	Delineated Linear Feet	Delineated Acreage	Latitude	Longitude	Likely Jurisdictional Status	Mapbook Page
Watercourse D1	Perennial	1232	1.83	46.309314	-99.593630	Likely Jurisdictional	20
Watercourse G1	Perennial	2863	2.43	46.285161	-99.588318	Likely Jurisdictional	33
Watercourse D1 (2020)	Perennial	1291	0.16	46.301362	-99.592306	Likely Jurisdictional	26
Watercourse E1 (2020)	Perennial	1060	1.82	46.290758	-99.511861	Likely Jurisdictional	35
Watercourse H1 (2020)	Intermittent	333	0.02	46.309044	-99.602515	Likely Jurisdictional	19
Watercourse H2 (2020)	Perennial	689	0.18	46.315088	-99.596037	Likely Jurisdictional	20

Wetlands and Waterbodies Assessment
Badger Wind Project
Logan and McIntosh Counties, North Dakota

Report



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ACRONYMS AND ABBREVIATIONS

Atwell	Atwell, LLC
Badger Wind	Badger Wind, LLC
CWA	Clean Water Act
GPS	Global Positioning System
m	meter
MW	megawatt
NHD	National Hydrography Dataset
NWI	National Wetland Inventory
OHWM	Ordinary High Water Mark
PEM	Palustrine Emergent
PFO	Palustrine Forested
PSS	Palustrine Scrub Shrub
Project	Badger Wind Project
USACE	US Army Corps of Engineers
USDA	US Department of Agriculture
USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
WEST.	Western EcoSystems Technology, Inc.
WOTUS	waters of the US

INTRODUCTION

Badger Wind, LLC (Badger Wind) is proposing the Badger Wind Project (Project) in Logan and McIntosh counties, North Dakota. The Project is located approximately two miles (mi) west of Wishek, North Dakota (Figure 1). Previously delineated wetlands and waterbodies within the permitted Project area are included in the Aquatic Resources Delineation Report (Atwell 2022).The objective of the assessment was to identify (desktop review) and delineate (field review) precise boundaries of wetlands (land with presence of hydric soils, hydrology, and hydrophytic vegetation) and waterbodies (any type of perennial, intermittent, or ephemeral waterway or catch basin where water flows, or could flow, or is held), and to assign an informal jurisdictional determination (determination) to delineated features within the 2023 Wetland Survey Area. Due to poor weather and late season conditions, which prevented the full wetland delineation protocol from being adequately performed, wetlands and waterbodies were mapped. This report presents the combined results of the aquatic resources delineation surveys conducted for the Project in 2020, 2021, and 2022 (Atwell 2022) and during 2023 to address changes/updates to the Project since 2022.

SURVEY AREA

The 2023 Wetland Survey Area consisted of newly proposed Project infrastructure or previously surveyed infrastructure that changed locations and their associated survey buffers. The 2023 Wetland Survey Area encompassed approximately 1,819 acres (ac) and lies within the larger Project, which is situated in the Northwestern Glaciated Plains Level III Ecoregion, an ecoregion dominated by mixed-grass prairie (US Environmental Protection Agency 2013). The Project will be sited entirely on private lands. Topography within the Project ranges from relatively flat to rolling hills and elevations range from 2,020 to 2,200 feet (ft). Overall, the Project drains to the southwest and to the north, into South Branch Beaver Creek and Beaver Creek, tributaries to the Missouri River. The Project contains numerous unnamed drainages, a few of which may be intermittent or perennial waterbodies or wetlands (Figures 2 and 3). Primary land uses in the Project include agriculture and livestock grazing.

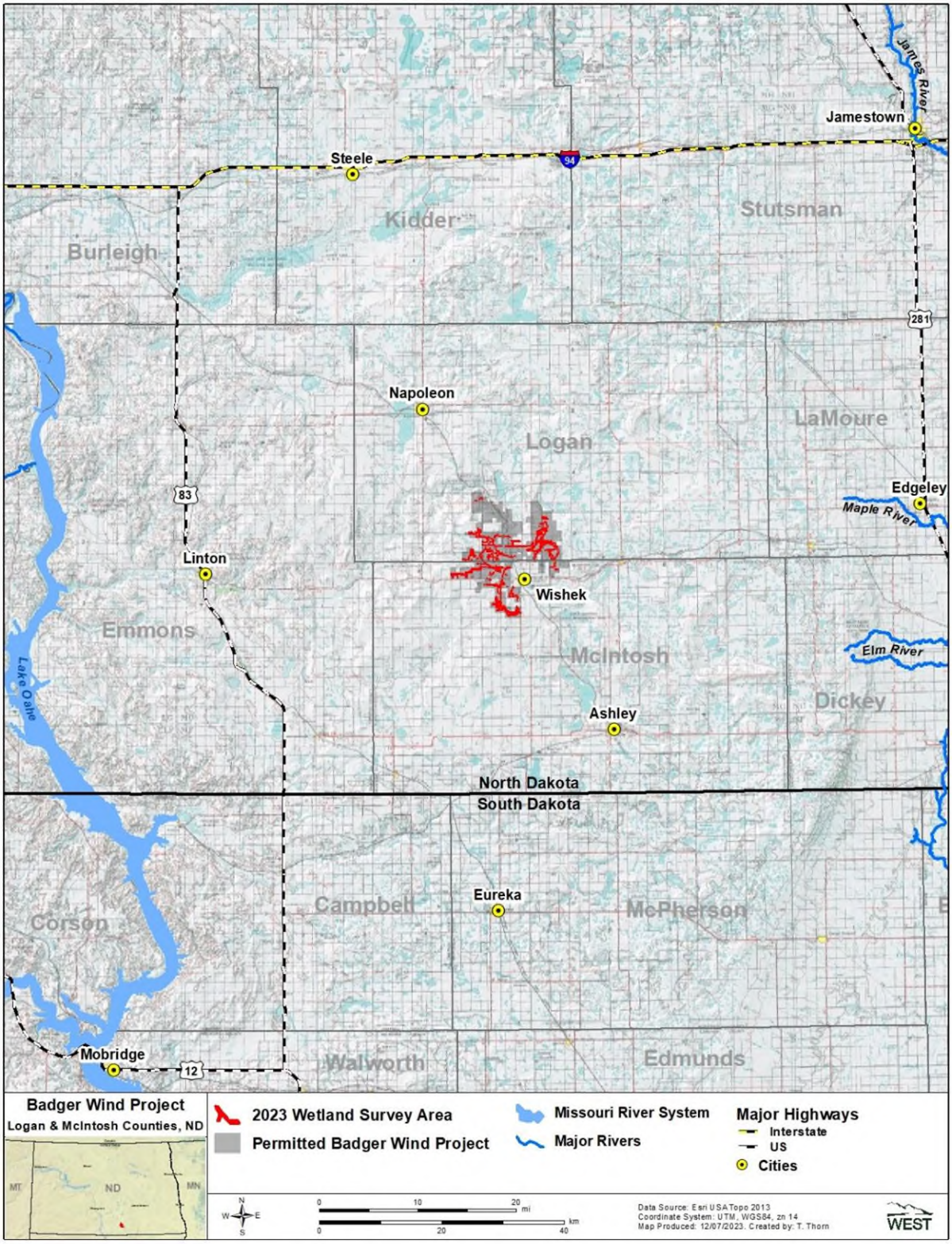

Figure 1. Location of the 2023 Wetland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota.

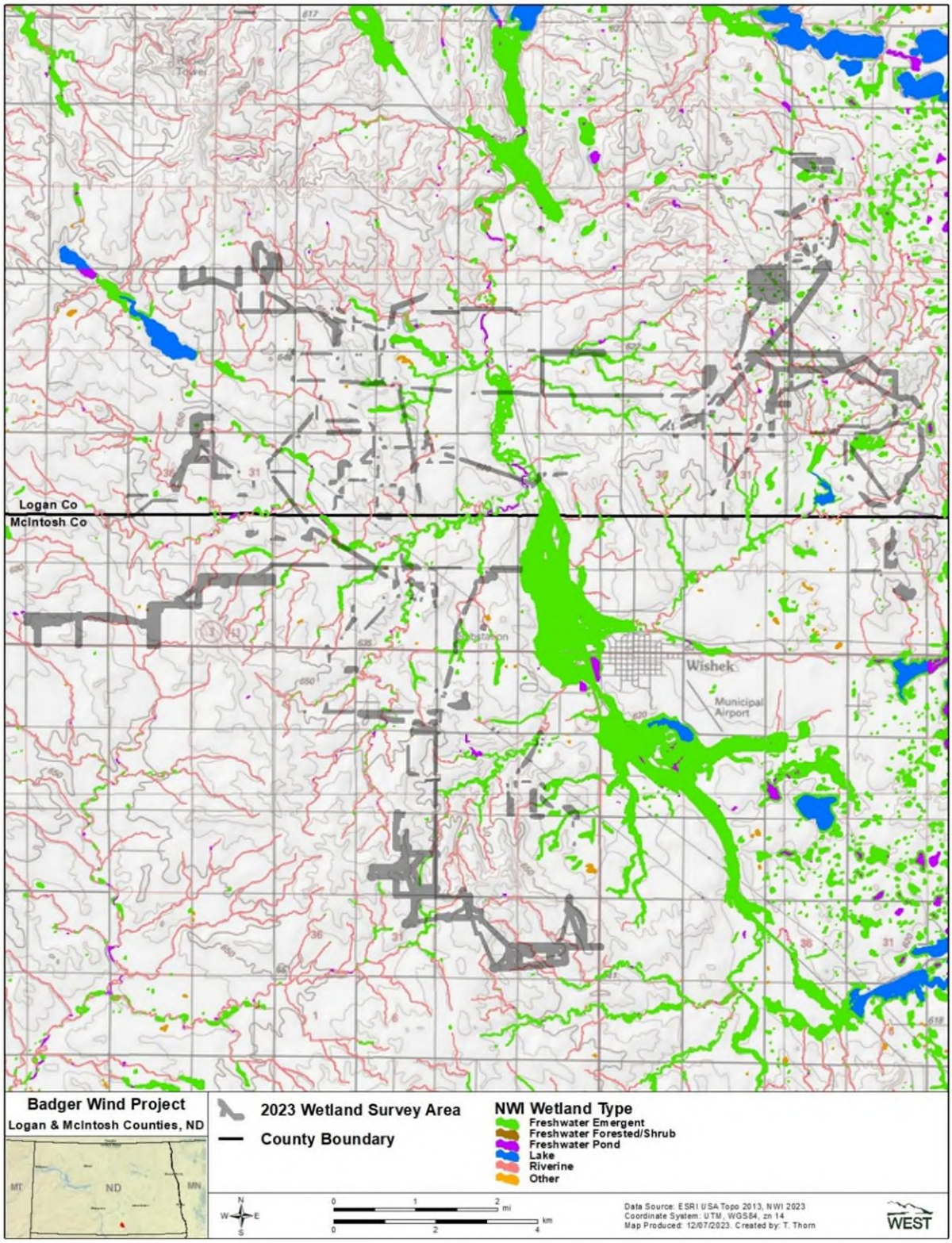

Figure 2. National Wetland Inventory features within the 2023 Wetland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota.

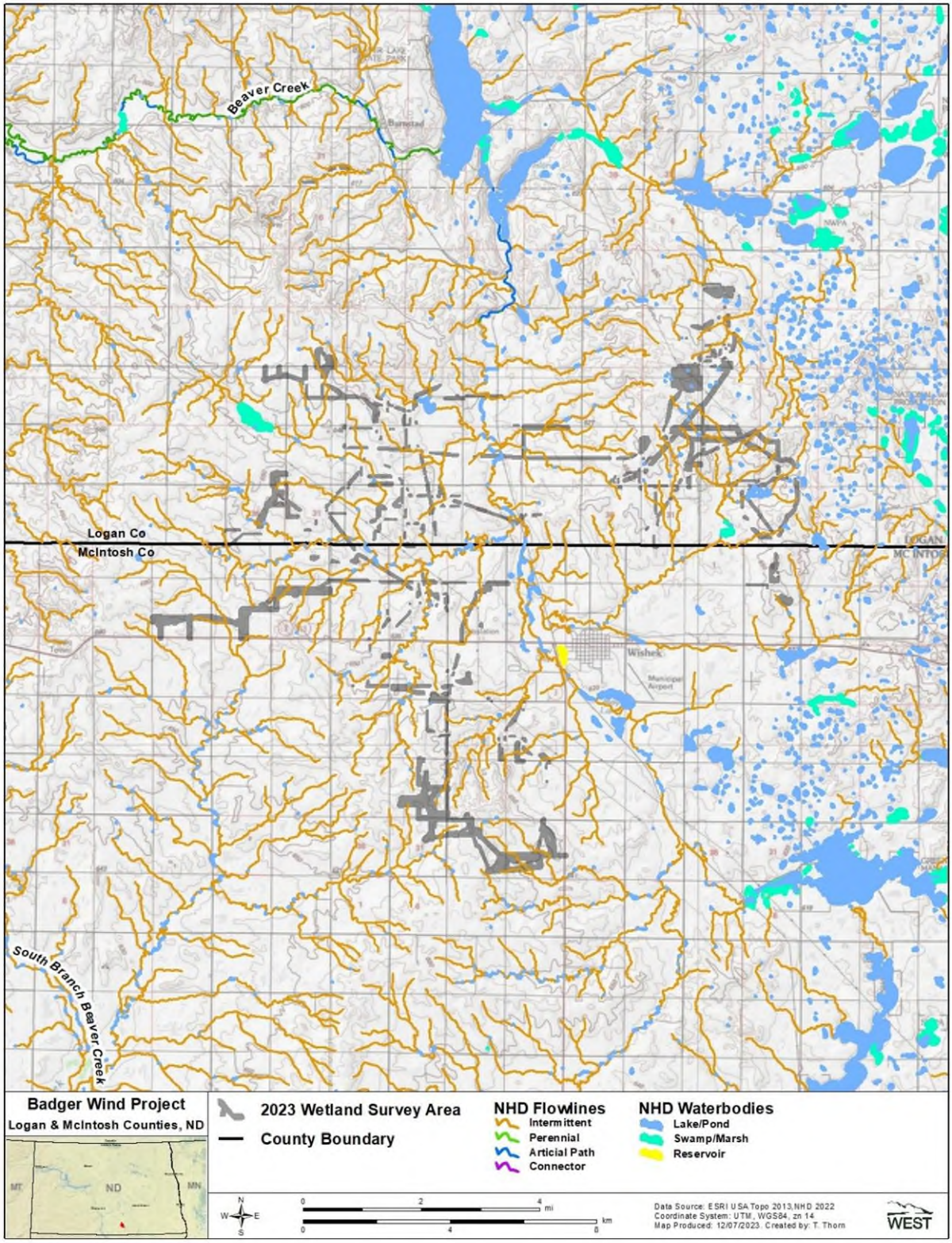

Figure 3. National Hydrologic Dataset features within the 2023 Wetland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota.

REGULATORY BACKGROUND

Waters of the United States

Section 404 of the Clean Water Act (CWA) is the primary federal statute regulating impacts (dredge and fill) to wetlands and waterbodies. Wetlands and waterbodies that are subject to federal jurisdiction under the CWA are referred to as waters of the United States (WOTUS; US Environmental Protection Agency [USEPA] 2023). Under the CWA, it is unlawful to discharge any pollutant from a point source into a WOTUS without a permit.

Waters that have consistently been considered jurisdictional WOTUS by the US Army Corps of Engineers (USACE) include traditional navigable waters (Section 10 waters), interstate waters, territorial seas, and impoundments of these WOTUS. Jurisdictional status of tributaries to these categories of WOTUS and adjacent wetlands continue to be both challenged in courts and clarified by agencies. On August 29, 2023, the US Environmental Protection Agency and USACE jointly released information announcing an Amendment to the definition of Waters of the United States (USEPA 2023). Coordination with the USACE regarding jurisdictional status of wetlands and waterbodies documented in this report will be necessary to evaluate Section 404 permit requirements for the Project.

METHODS

2023 Desktop Assessment

A comprehensive desktop assessment of publicly available wetlands and waterbodies data in the 2023 Wetland Survey Area was completed using United States Department of Agriculture (USDA) National Agriculture Imagery Program (NAIP, NAIP 2021 and 2022), US Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) data (USFWS; 2023), and the US Geological Survey (USGS) National Hydrography Dataset (NHD; USGS NHD 2022). Based on this review, areas identified as potentially being wetlands or WOTUS were targeted for field verification along with the rest of the 2023 Wetland Survey Area.

Using these public data sources, potential wetlands and waterbodies located within the 2023 Wetland Survey Area were identified and mapped in the desktop assessment using Geographic Information Systems (GIS) mapping software. Wetland and waterbody types (i.e. freshwater emergent wetland, freshwater pond, riverine, lake, freshwater forested/shrub wetlands, and rivers and streams) are based on wetland nomenclature used by the USFWS NWI (2023; based on Cowardin et al. 1979) and USGS NHD (2022).

2023 Field Reconnaissance Assessment

The field reconnaissance assessment occurred in two phases. Phase one consisted of wetland delineations and phase two consisted of wetland mapping. Wetland delineations indicated wetland and waterbody type and boundaries based on field observations of hydrophytic

vegetation, hydrology, and presence of hydric soils. Wetland mapping indicated type and boundaries based on field observations of hydrophytic vegetation and hydrology; this phase does not evaluate the presence of hydric soils. The goal of both phases was to identify and confirm the presence or absence and extent of wetlands and waterbodies initially identified during the desktop assessment within the 2023 Wetland Survey Area. Wetlands and waterbodies were mapped in both phases using a tablet with Collector for ArcGIS software (ESRI 2023) coupled with an Arrow Lite global positioning system (GPS) receiver with submeter accuracy. Wetlands and waterbodies observed in the field (i.e., wet or saturated features, hydrophytic vegetation, surface hydrology), but not recorded during the initial desktop assessment, were also mapped.

Proposed infrastructure survey corridors were provided by Badger Wind as a spatial file in October 2023. Project infrastructure and associated buffers located within the 2023 Wetland Survey Area included:

- 250-ft radius centered around turbines
- 300-ft wide corridor for turbine access roads
- 100-ft wide corridor for underground collection lines
- 200-ft wide corridor for aircraft detection and lighting system tower, batch plant, crane walk paths, laydown yard, meteorological tower, operations and maintenance facility, marshaling yard, substation, transmission line, and turning radii locations

Shapefiles depicting the infrastructure and associated buffers were loaded onto the tablet and used in the field to ensure boundaries were accurately identified and included during field surveys. NWI and NHD features were also loaded onto the tablet for accurate field-verification.

Photographs were recorded for wetlands identified within the 2023 Wetland Survey Area. Each delineated/mapped wetland was assigned a unique identification (ID) name consisting of an alphanumeric name in a series, differentiated according to the two observers (e.g. WET001, WET201).

NWI or NHD features that intersected the 2023 Wetland Survey Area but clearly did not meet the definition of a WOTUS were photo documented and a non-WOTUS point was collected on the tablet. Such points were identified with a sequential alphanumeric name differentiated according to the two observers (e.g. 212U, 501U; 701U).

Wetland delineations were conducted on October 24 – 25, 2023 and wetland mapping on October 31, November 1-2, and November 17 and 20, 2023.

Wetland Delineation

Wetlands were delineated in accordance with the 1987 *Corps of Engineers Wetlands Delineation Manual* (US Army Corps of Engineers [USACE] 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains* (Version 2.0; USACE 2010). The 1987 manual outlines a three-parameter approach, which requires presence of hydrophytic plants (dominant vegetative cover), hydric soils, and wetland hydrology. All three parameters must be

present and meet the wetland criteria of each parameter in order for an area to be considered a wetland.

The delineated wetlands were classified according to the classification system outlined in Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1979). Wetland plant indicator status was determined using the most recent version of the National Wetland Plant List (USACE 2020). Paired sample plots (wetland and upland) were established, and USACE regional datasheets were completed for each potential wetland within the 2023 Wetland Survey Area. Wetland sample plots were located in areas that represented the wetland community that was present, utilizing an upland sample plot to characterize the adjoining upland community. A wetland boundary was then established between these points and the boundary was recorded based on the observations made at the paired sample points. Additional sample plots were established in locations where NWI or aerial signatures suggested wetland conditions may be present. Wetlands are typically categorized as one of three common types of wetlands including:

- Palustrine emergent (PEM) wetlands are defined as inland freshwater areas dominated by hydrophytic vascular plants such as rushes, sedges, forbs, and other herbaceous or grass-like plants.

- Palustrine scrub-shrub (PSS) wetlands are defined as inland freshwater areas dominated by woody vegetation less than 20 feet tall, such as buttonbush, alders, and many kinds of saplings.

- Palustrine forested (PFO) wetlands are defined as inland freshwater areas dominated by woody vegetation equal to or over 20 feet tall.

Drainage features (e.g. streams) and other waterbodies (e.g., stock ponds) within the 2023 Wetland Survey Area, including those identified in the NWI and NHD datasets, were examined for inclusion as potential WOTUS. The field assessment was focused on the presence of a definable bed and bank, ordinary high water mark (OHWM), downstream surface connection to a potential WOTUS, evidence of flow, and/or presence of areas that meet the USACE criteria for wetlands. If present, the OHWM of each of these features was recorded with GPS. These features were mapped and documented in a similar manner as wetlands. If detected, each waterbody feature possessing an OHWM would have been assigned its own unique ID, however none were identified during field surveys.

In addition to evaluating the 2023 Wetland Survey Area for features that met wetland and waterbody definitions, the professional judgment of the WEST delineator was used to make an informal determination of jurisdiction. Certain features are jurisdictional based on regulation and do not require further assessments (e.g., territorial seas, traditional navigable waters, interstate waters, and impoundments of these features). As previously noted in the Regulatory Background section, there have recently been both regulatory guidance changes as well as court decisions that are influencing how the USACE determines jurisdiction of wetlands and waterbodies. WEST utilized the best available information from the agencies to make the determinations; however,

the informal jurisdictional determinations in this report are subject to USACE review and final determination.

The WOTUS definition further identifies features that are exempt from jurisdiction, including prior converted croplands, waste treatment systems, ditches (including roadside ditches), artificially irrigated areas, artificial lakes/ponds, artificial reflecting pools, waterfilled depressions, and swales and erosional features.

The delineator assigned a likely, unlikely, or unknown jurisdictional status to the delineated and mapped wetlands and waterbodies based on best professional judgement and experience in the region. Wetland and waterbody determinations included in this report are informal as only the USACE can make a formal jurisdictional determination.

Wetland Mapping

Wetlands were identified based on two parameters: hydrology and wetland vegetation (see above description). The wetland boundary was mapped following wetland/upland vegetation breaks, slope, and other hydrology indicators. A list of plant species observed was recorded in field notes. All other areas not mapped as wetland were considered uplands (i.e., areas containing upland vegetation and lacking hydrological indicators) and recorded as non-wetland ("no") points. An informal jurisdictional determination was not made for mapped resources.

2024 Desktop Assessment

A comprehensive desktop assessment of publicly available wetlands and waterbodies data for areas adjusted for reroutes that were not included in the previous aquatic resources inventory or wetland mapping efforts. The desktop assessment followed methodology as outlined above in the 2023 desktop assessment section. Based on this review, areas identified as potentially being wetlands or WOTUS will be targeted for wetland delineations in spring 2024.

RESULTS

2023 Wetland Delineations

Thirteen wetlands, totaling 11.76 ac, were identified, and delineated during the field reconnaissance (Table 1, Figure 4). Detailed maps of wetland locations are provided in Appendix A. Table 1 provides a summary of wetland classifications and acreages. All the 13 delineated wetlands were classified as Palustrine Emergent (PEM) wetlands. Nine of the wetlands occurred in depressions, two in flat areas, and two along hillslopes. Five of the delineated wetlands appeared to have a downstream connection to WOTUS and were therefore considered potentially or likely jurisdictional. Eight delineated wetlands were apparently isolated and lacked a downstream surface connection to WOTUS and were therefore considered unlikely to be jurisdictional (Table 1). Wetland determination data forms and representative photographs of wetlands are provided in Appendices B and C, respectively.

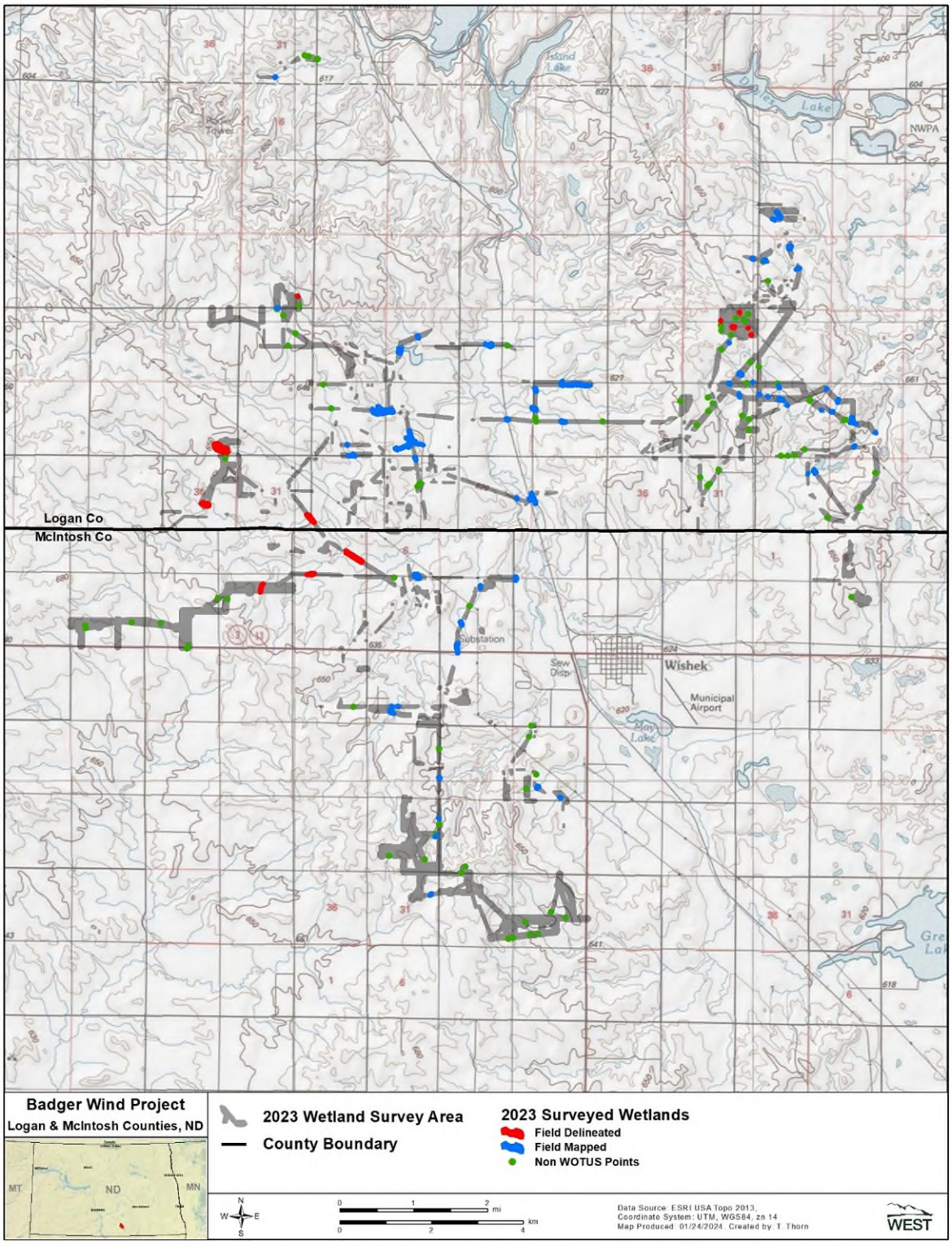

Figure 4. Results of the National Wetland Inventory and National Hydrography Dataset review within the 2023 Wetland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, October 24 – 25 and 31, November 1 – 2, 17, and 20, 2023.

Vegetation

The most common wetland species encountered in the13 delineated wetlands within the 2023 Wetland Survey Area were prairie cordgrass (*Spartina pectinata*), foxtail barley (*Hordeum jubatum*), and cattail (*Typha sp.*).

Hydrology

Hydrology indicators included surface water, high water table, saturation, and inundation visible on aerial imagery. Documented saturation, high water table, and surface water were the primary hydrologic indicators present for wetlands. Other hydrology indicators noted during the field investigation were redox dark surface, algal mat or crust, thin muck surface, salt crust, water-stained leaves, hydrogen sulfide odor, geomorphic position, and FAC-neutral test.

Table 1. Summary of all field delineated wetlands within the 2023 Wetland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, October 24 – 25, 2023.[1]

Feature ID	Acres	Cowardin Classification[2]	Latitude/Longitude[3]	Landform	Informal Jurisdictional Determination[4]
WET001	0.12	PEM	46.321769/-99.520417	Depression	Unlikely
WET003	0.02	PEM	46.323157/-99.521396	Depression	Unlikely
WET004	0.05	PEM	46.326259/-99.523731	Depression	Unlikely
WET005	0.42	PEM	46.323369/-99.525442	Depression	Unlikely
WET006	0.03	PEM	46.324534/-99.529152	Flat fence line	Unlikely
WET007	0.05	PEM	46.328772/-99.648972	Depression	Unlikely
WET008	4.36	PEM	46.297969/-99.668968	Flat	Unlikely
WET009	0.72	PEM	46.287986/-99.675265	Depression	Likely
WET010a	0.65	PEM	46.285454/-99.645177	Depression	Likely
WET010b	0.54	PEM	46.285454/-99.645177	Depression	Likely
WET011	3.65	PEM	46.276730/-99.630194	Hillslope	Likely
WET012	0.78	PEM	46.274184/-99.644255	Hillslope	Likely
WET013	0.37	PEM	46.272032/-99.658492	Depression	Unlikely

[1] Wetlands delineated in 2021 and 2022 are present in Flaig (2021) and Atwell (2022) reports.
[2] PEM = Palustrine emergent wetland
[3] Location from wetland sample plot
[4] Determination based on WEST's professional judgement and subject to change based on USACE review

Soils

Soil colors were predominantly dark (e.g., 10 YR 2/1 and 3/1) and included iron concentrations. The primary field hydric soil indicator used was, redox dark surface. The majority of the soil was clay loams and clay.

Wetland Mapping

Wetlands

Sixty-seven wetlands, totaling 21.93 ac, were identified and mapped during the field assessment (Table 2, Figure 4). Detailed maps of wetland locations are provided in Appendix A. All 67 wetlands were classified as PEM wetlands based on observed vegetation. Landform type was not assessed for mapped wetlands, but generally appeared similar to that of the delineated wetlands. Common wetland species recorded for each mapped wetland were similar to those for delineated wetlands. Hydric soils were not assessed. Photographs of representative wetlands are provided in Appendix C.

Non-wetland Points

Eighty-six NWI/NHD features identified during the desktop assessment as wetlands were evaluated within the 2023 Wetland Survey Area and determined to lack characteristics of WOTUS (Appendix D). These locations were recorded with the tablet with Collector for ArcGIS software coupled with an Arrow Lite GPS as “non-WOTUS” (“no”) points and were photo documented. Fourteen no points were recorded during the wetland delineation field effort (503U – 516U). Specifically, these drainages lacked an OHWM and were composed of upland vegetation. Seventy-two no points were recorded during the wetland mapping field effort, indicating these locations lacked wetland vegetation and hydrology (212U, 517U – 539U, 541U – 554U, 640U, 700U – 711U, 2000U – 2019U, and 5201U). Detailed maps of non-WOTUS points are provided in Appendix A and representative photographs are provided in Appendix C.

Table 2. Summary of all mapped wetlands within the 2023 Wetland Survey Area of the Badger Wind Project in Logan and McIntosh Counties, North Dakota, November 1 – 2, November 17, and November 20, 2023.

Feature ID	Acres	Cowardin Classification[1]
WET014	0.06	PEM
WET015	0.11	PEM
WET016	0.44	PEM
WET017	0.15	PEM
WET018	0.29	PEM
WET019	0.42	PEM
WET020	0.17	PEM
WET021	0.12	PEM
WET023	0.12	PEM
WET024	0.18	PEM
WET025	0.30	PEM
WET027a	0.03	PEM
WET027b	0.35	PEM
WET028	0.17	PEM
WET029	1.43	PEM

Table 2. Summary of all mapped wetlands within the 2023 Wetland Survey Area of the Badger Wind Project in Logan and McIntosh Counties, North Dakota, November 1 – 2, November 17, and November 20, 2023.

Feature ID	Acres	Cowardin Classification[1]
WET030	0.01	PEM
WET031	0.13	PEM
WET032	0.15	PEM
WET098	2.39	PEM
WET099	0.13	PEM
WET200	0.64	PEM
WET201	0.23	PEM
WET202	0.02	PEM
WET203	0.08	PEM
WET204	0.06	PEM
WET205	0.42	PEM
WET206	0.06	PEM
WET207	0.04	PEM
WET208	0.15	PEM
WET209	0.15	PEM
WET210	0.42	PEM
WET211	0.08	PEM
WET212	2.91	PEM
WET213	0.13	PEM
WET214	0.21	PEM
WET215	0.26	PEM
WET216	0.26	PEM
WET217	0.69	PEM
WET219	0.25	PEM
WET220	0.11	PEM
WET221	0.26	PEM
WET224	0.09	PEM
WET225	0.59	PEM
WET226	0.13	PEM
WET228	0.47	PEM
WET229	0.14	PEM
WET234	1.42	PEM
WET236	0.81	PEM
WET237	0.13	PEM
WET238	0.09	PEM
WET239	0.07	PEM
WET241	0.06	PEM
WET340	0.39	PEM
WET1002	0.22	PEM
WET1003	0.05	PEM
WET1004	0.01	PEM
WET1005	0.01	PEM
WET1006	0.08	PEM
WET1007	0.00	PEM
WET1008	0.01	PEM
WET1009	1.08	PEM
WET1013	0.70	PEM
WET1014	0.27	PEM
WET1015	0.07	PEM
WET1016	0.12	PEM
WET1017	0.31	PEM

Table 2. Summary of all mapped wetlands within the 2023 Wetland Survey Area of the Badger Wind Project in Logan and McIntosh Counties, North Dakota, November 1 – 2, November 17, and November 20, 2023.

Feature ID	Acres	Cowardin Classification[1]
WET1018	0.03	PEM

[1] PEM = Palustrine emergent wetland

2024 Desktop Assessment

A total of three potential wetlands totaling 0.24 ac were identified for the re-routed survey area (Figure 5).

CONCLUSION

Aquatic resources delineations and wetland mapping were completed in the months of September 2020, October 2020, September 2021, May 2022, October 2023, and November 2023 and a desktop assessment was completed January 2024 for re-routed infrastructure. Further details regarding surveys conducted pre-2023 can be found in the Aquatic Resources Delineation Report (Atwell 2022). A combined total of 193 wetlands were identified through field delineation, comprising 185.11 ac and 64 additional wetlands were mapped, totaling 30.5 ac during surveys (Figure 5). Four waterbody features were delineated, comprising 0.78 ac and seven watercourses were identified, comprising a cumulative total of 5.18 ac. A total of three potential wetlands as identified by the desktop review totaling 0.24 ac were identified for the re-routed survey area (Figure 5).

Areas identified as potentially being wetlands or WOTUS in the 2024 desktop assessment and mapped wetlands from the 2023 field reconnaissance will be targeted for wetland delineations in spring 2024. Informal jurisdictional determinations provided in this report must be verified and/or finalized with USACE. Project activities that impact WOTUS must be authorized by USACE prior to activities occurring.

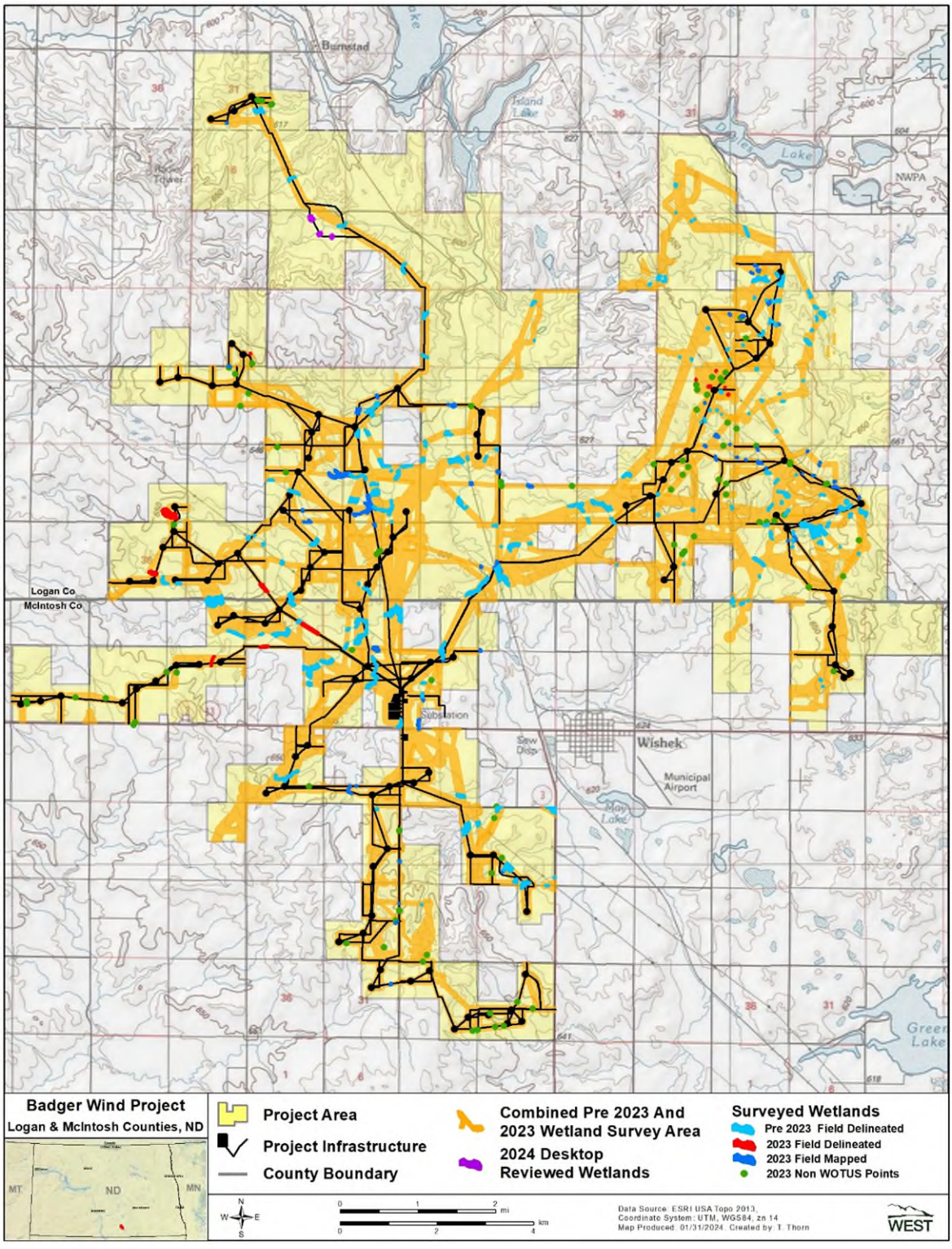

Figure 5. Wetland survey results for field surveys conducted in 2020, 2021, 2022, and 2023, and 2024 desktop review at the Badger Wind Project in Logan and McIntosh counties, North Dakota.

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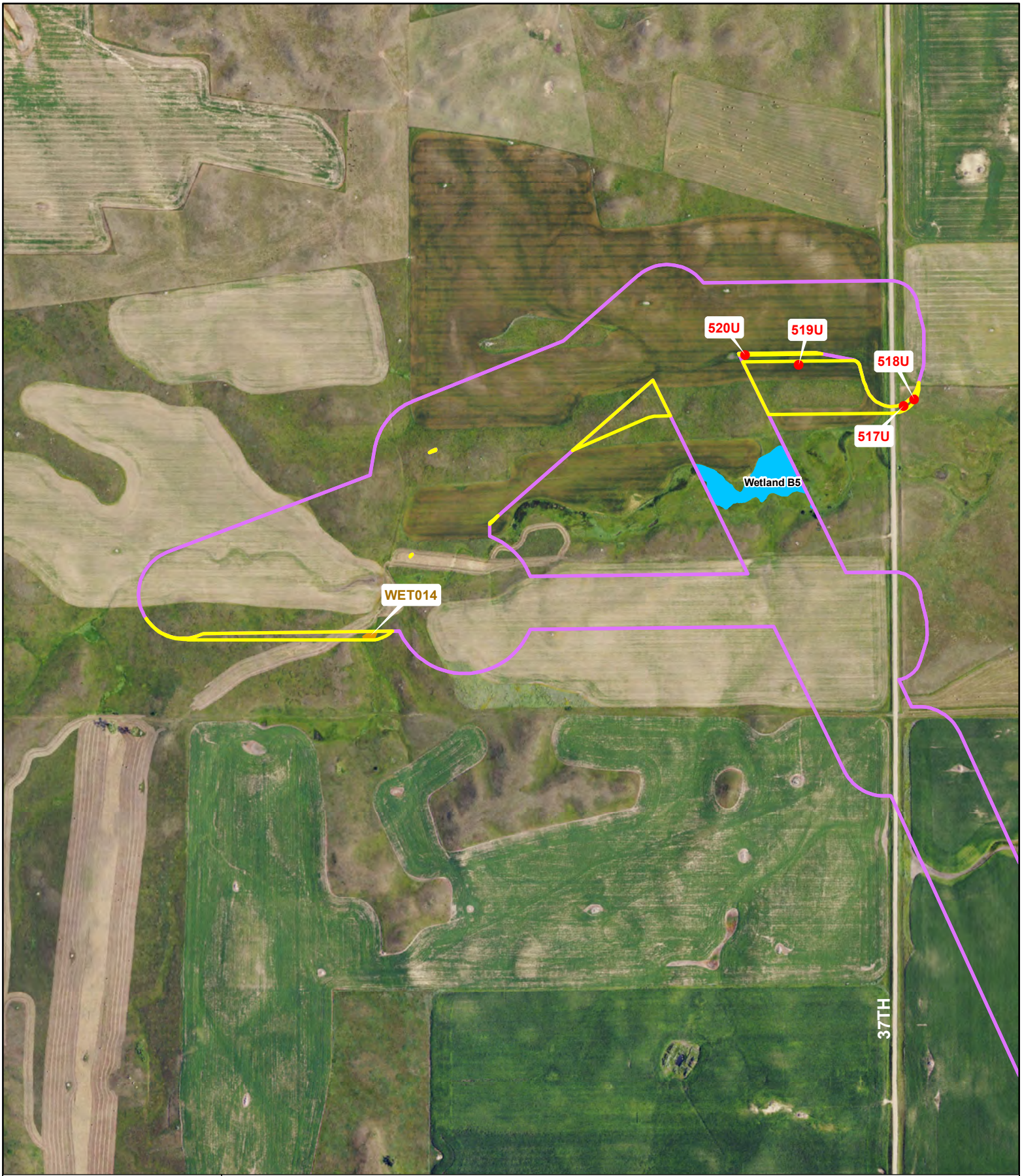
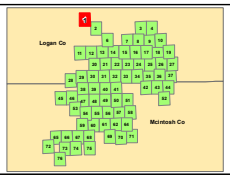
Appendix A. Field Delineated and Mapped Wetland Locations within the 2023 Wetland Survey Area of the Badger Wind Project in Logan and McIntosh Counties, North Dakota



Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

Pre 2023 Wetland Survey Area

County Boundary

State Highway

2023 Surveyed Wetlands

Field Delineated

Field Mapped

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Surveyed Wetlands

Field Delineated

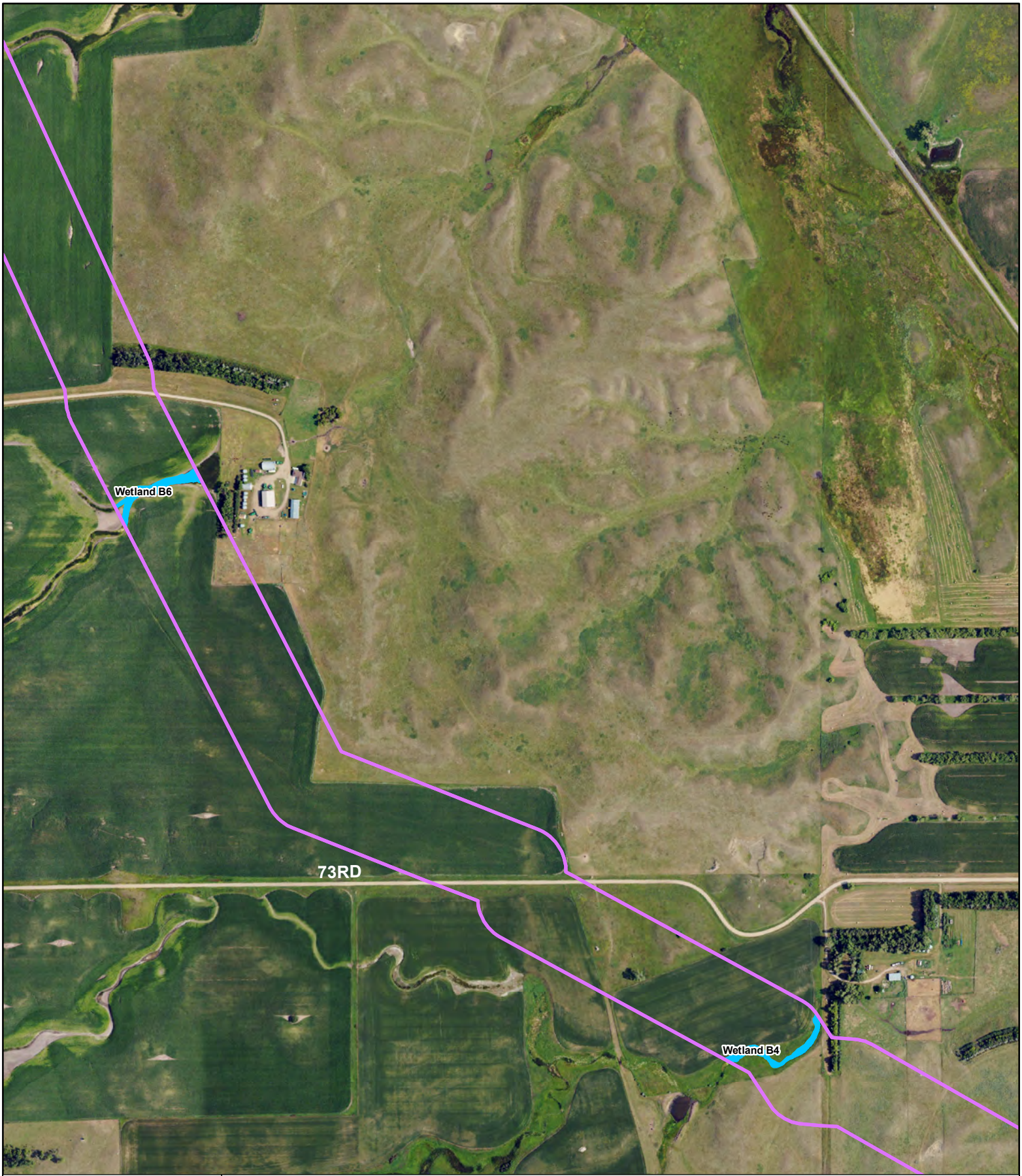
N W E S

0 0.1 0.2 mi

0 0.2 0.4 km

Data Source: NAIP 2023
Coordinate System: UTM, WGS84, zn 14
Map Produced: 01/25/2024. Created by: T. Thorn

WEST



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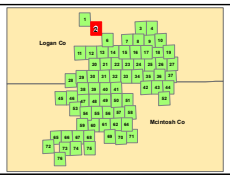
Logan & McIntosh Counties, ND



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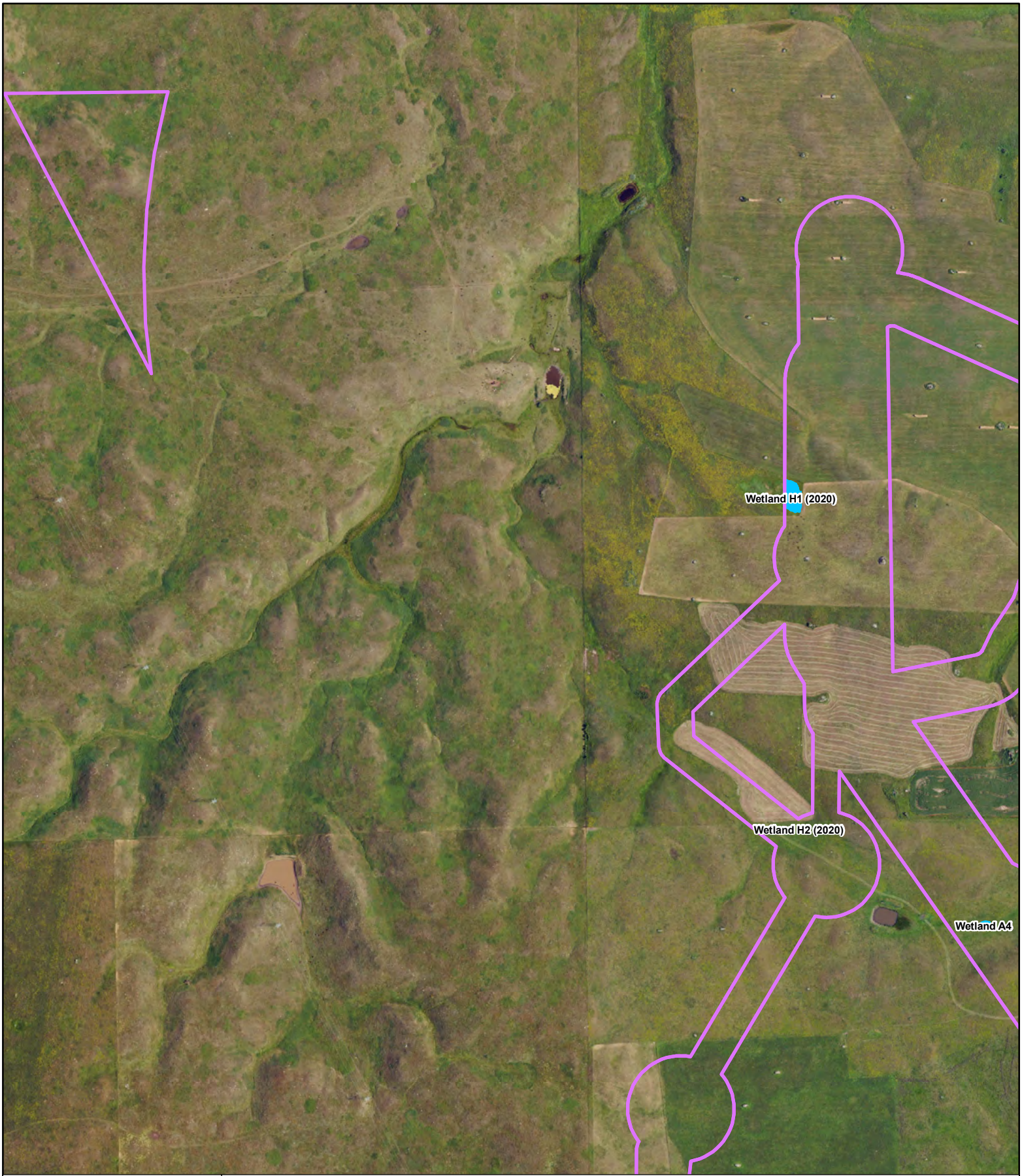

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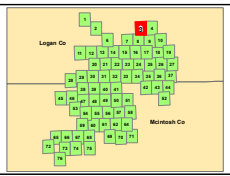
Logan & McIntosh Counties, ND



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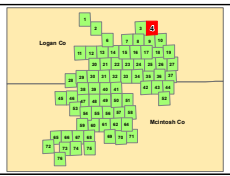
Logan & McIntosh Counties, ND



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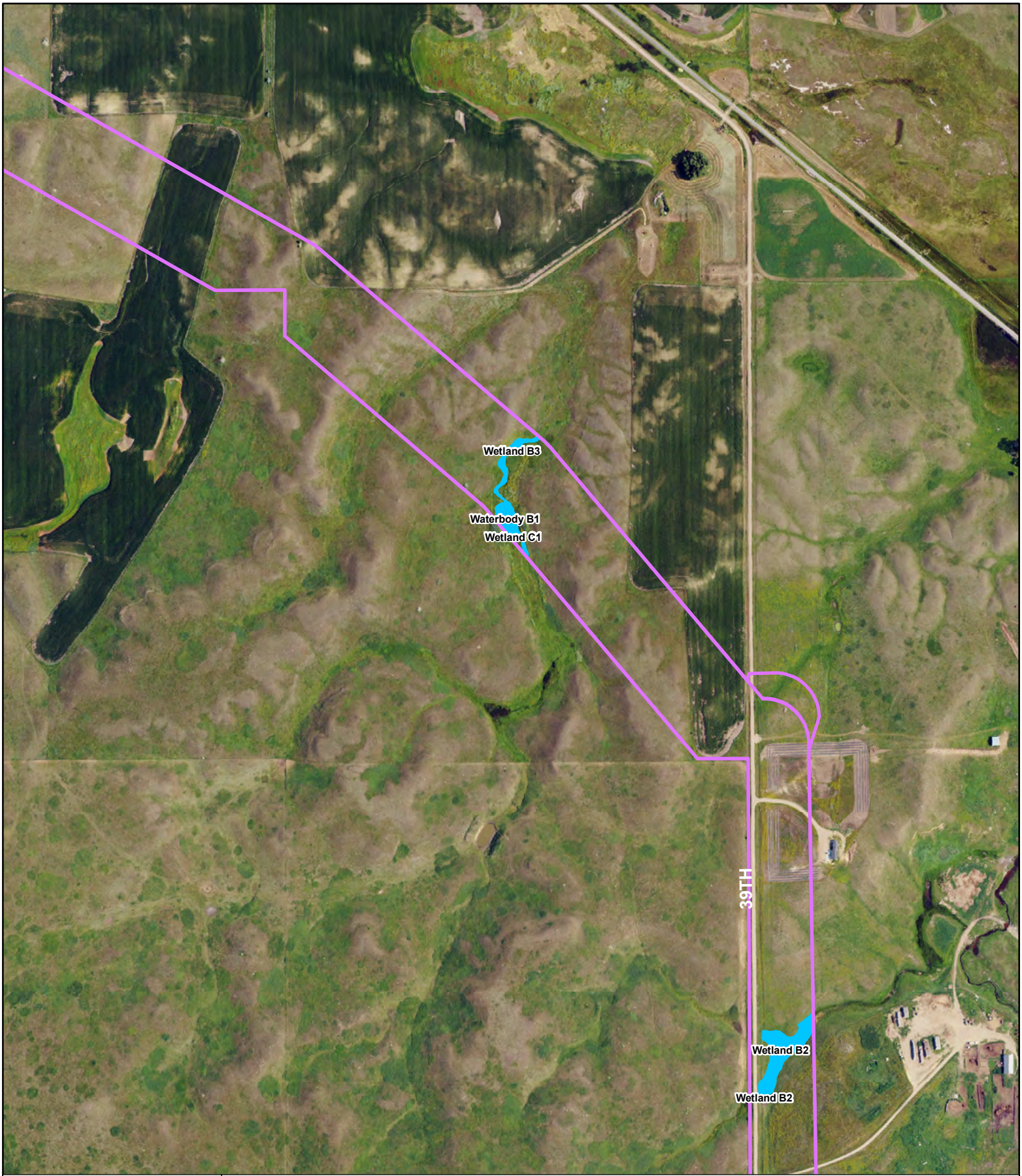

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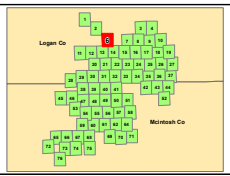
Logan & McIntosh Counties, ND



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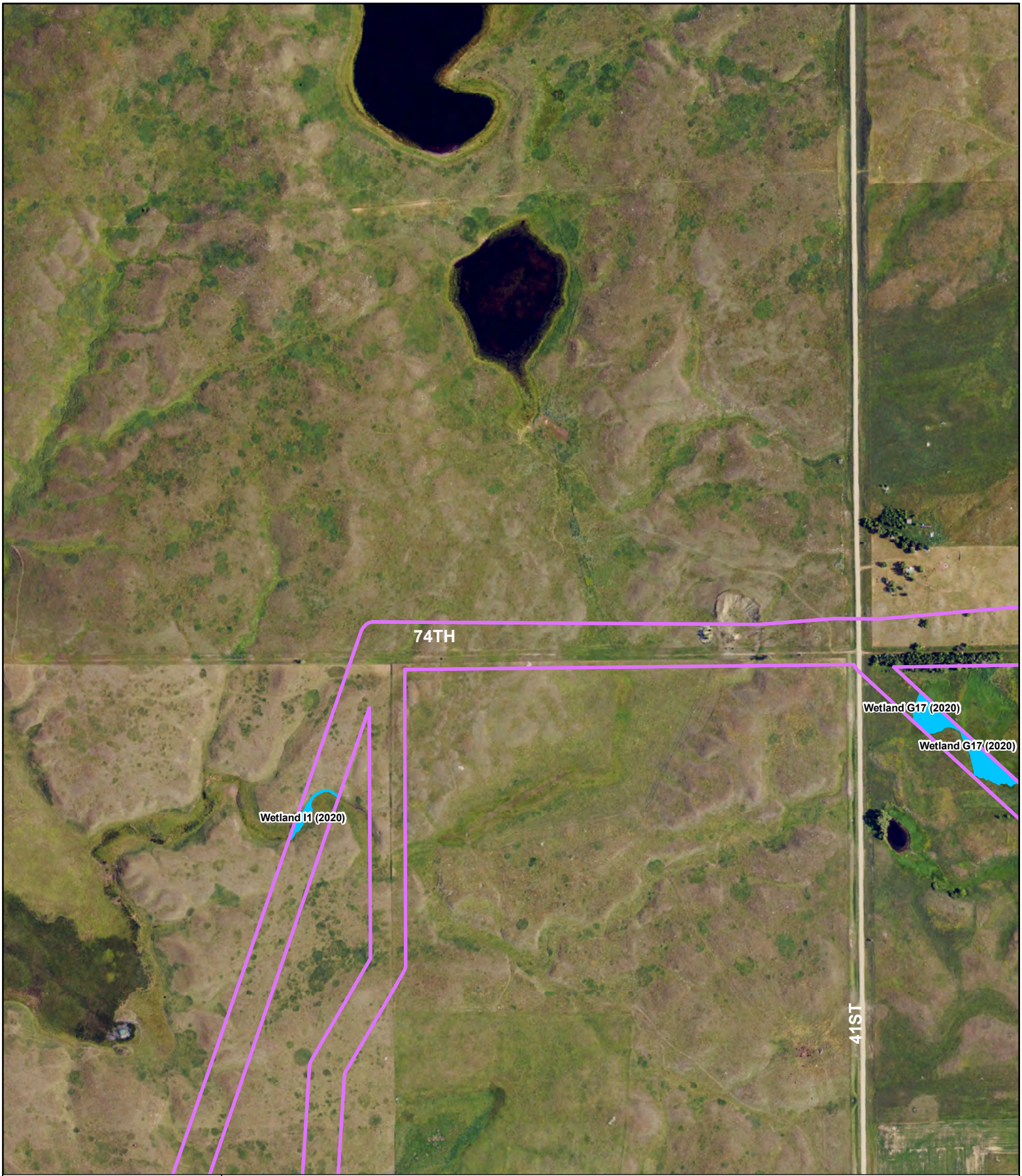

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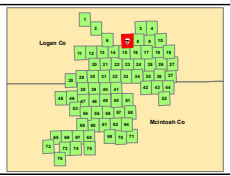

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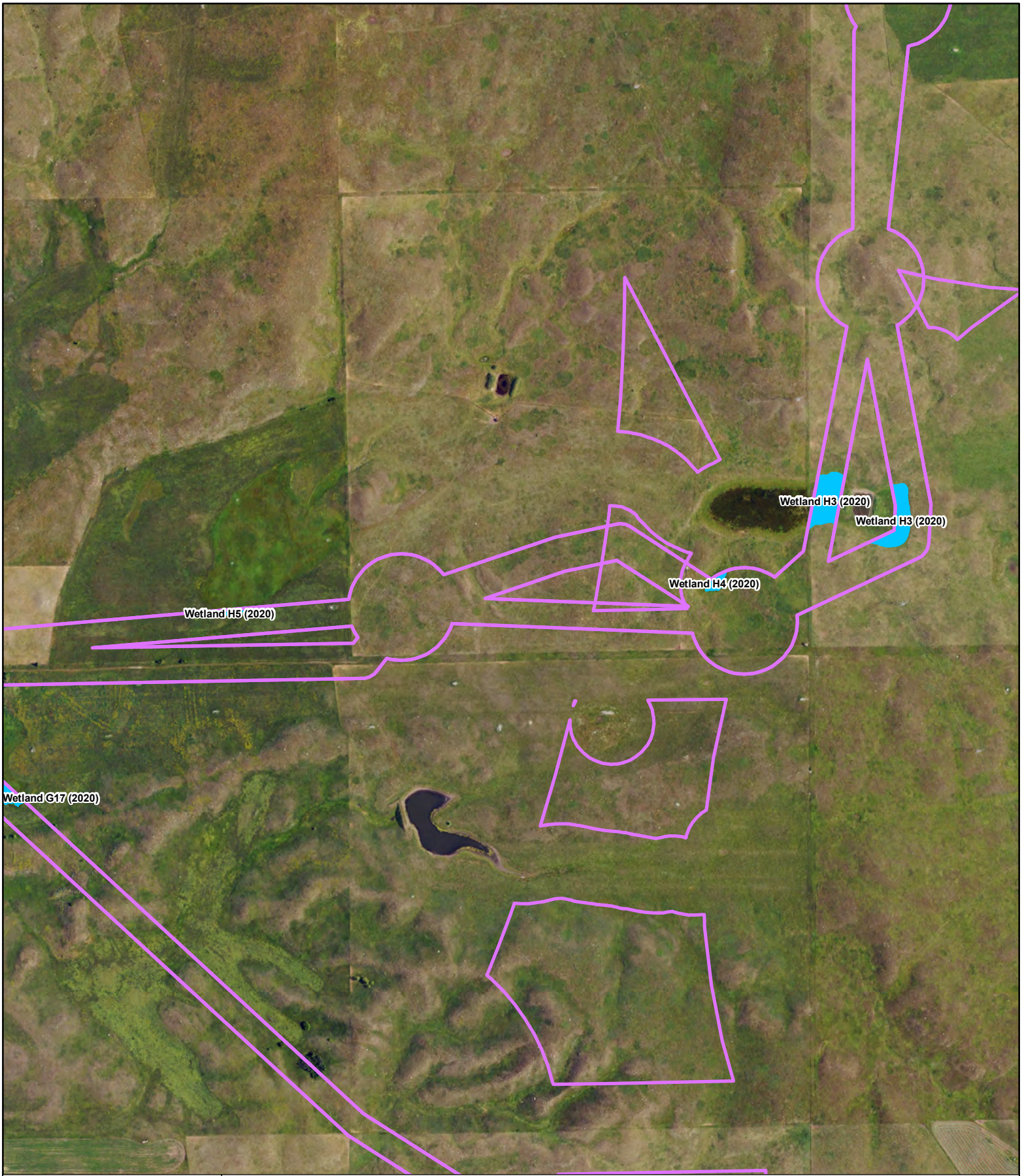

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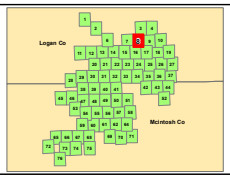
Logan & McIntosh Counties, ND



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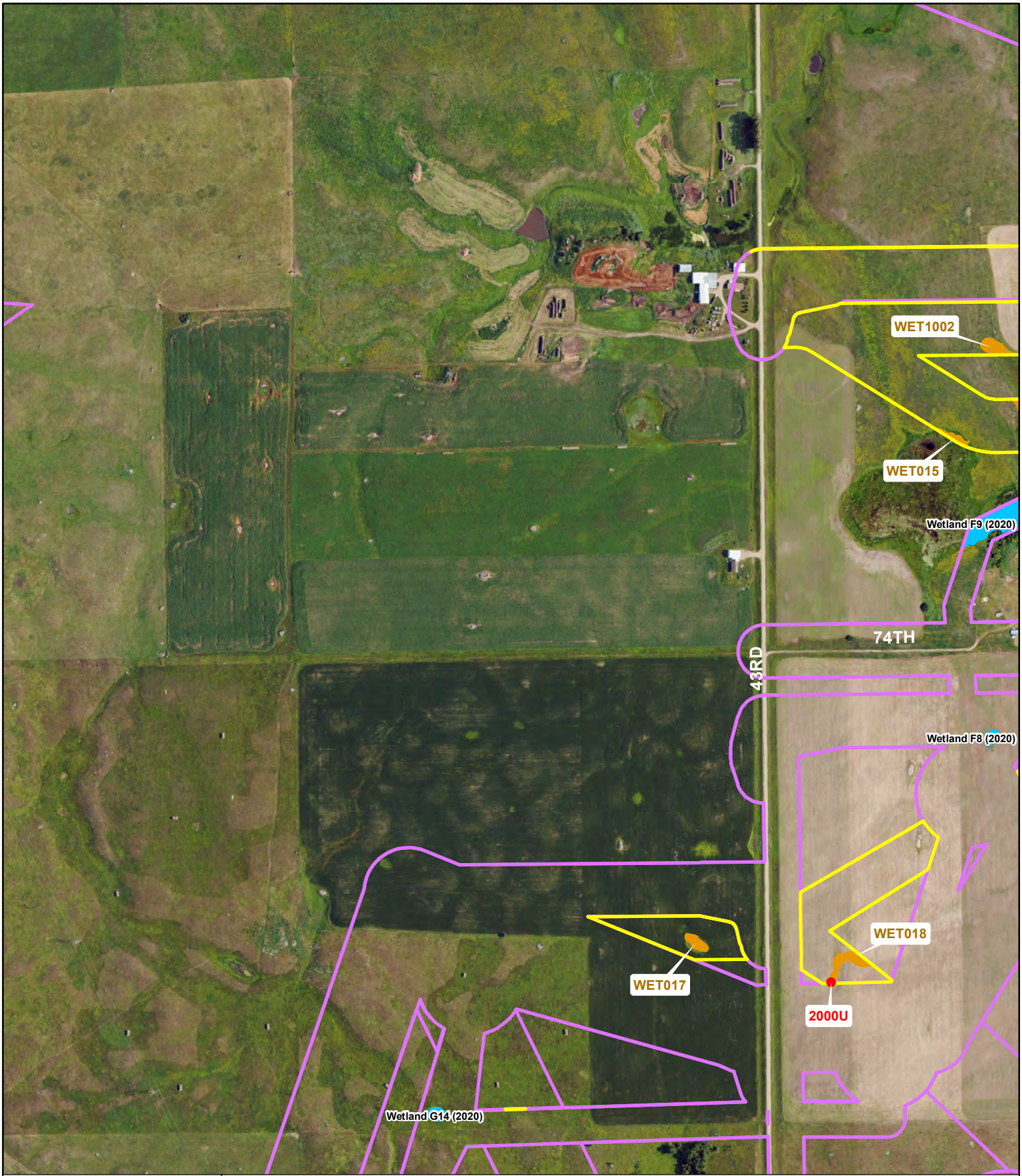

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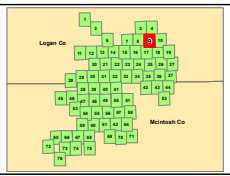

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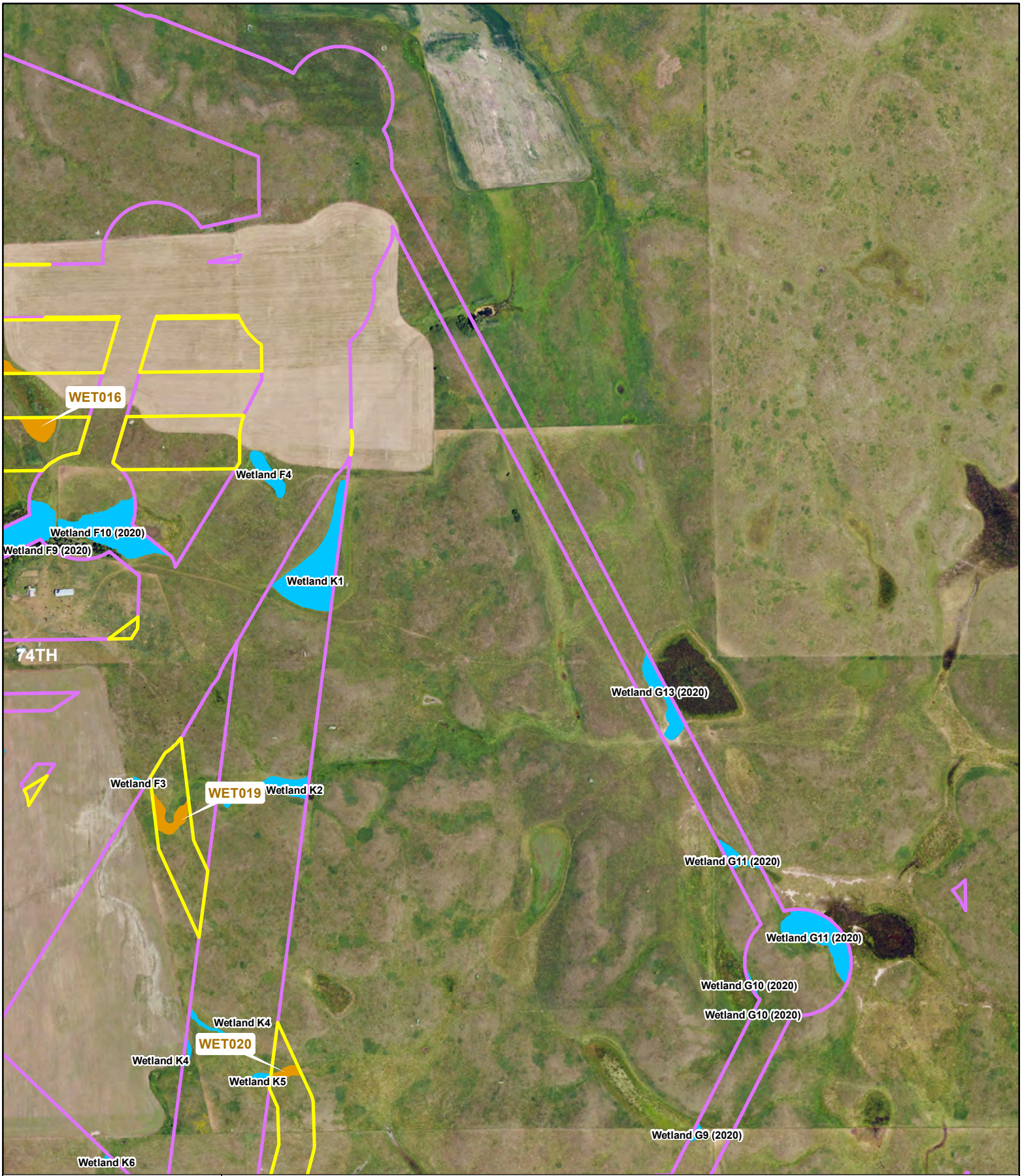

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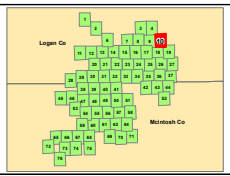

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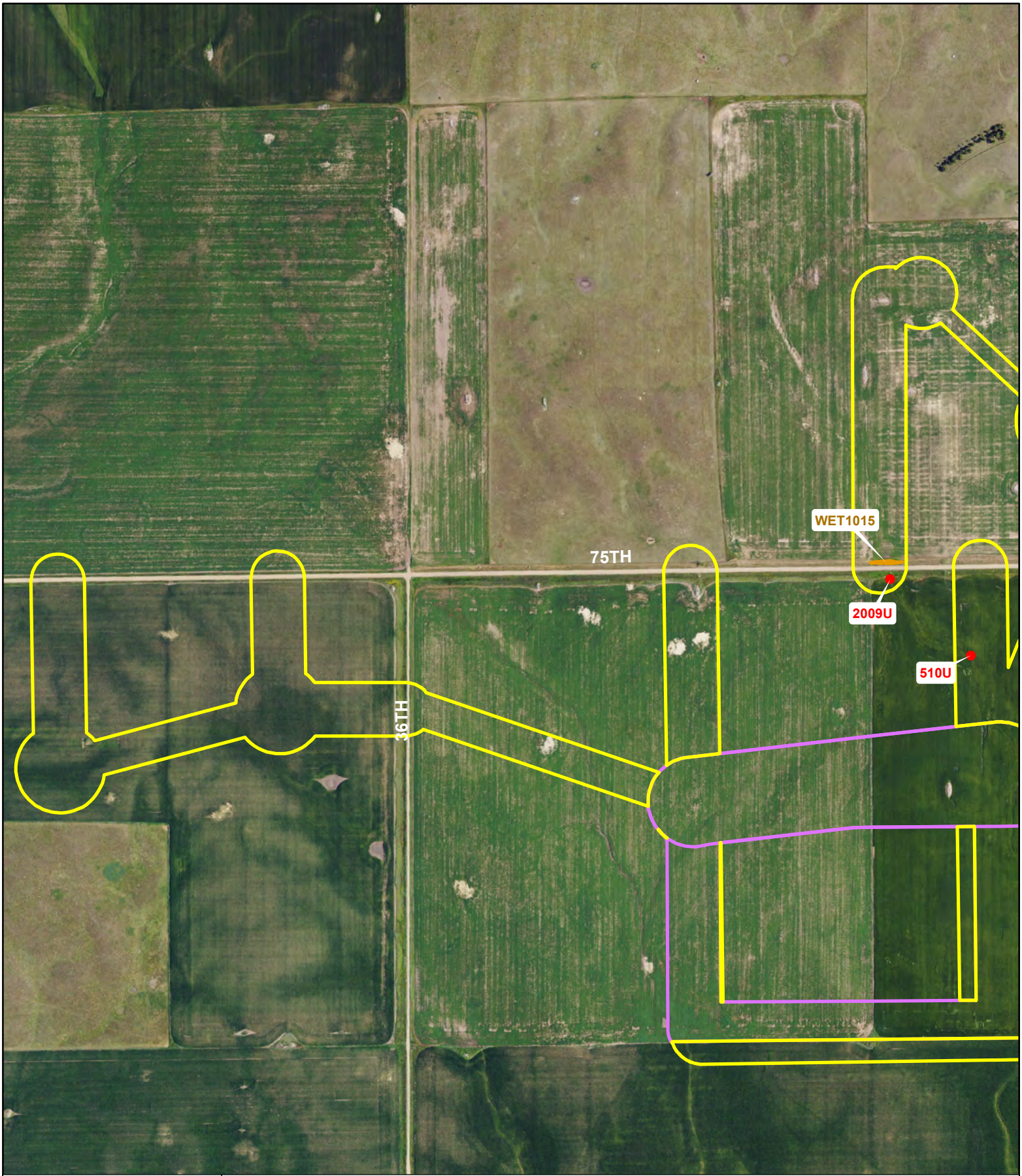

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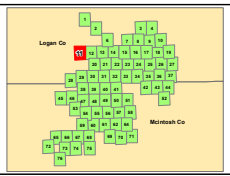

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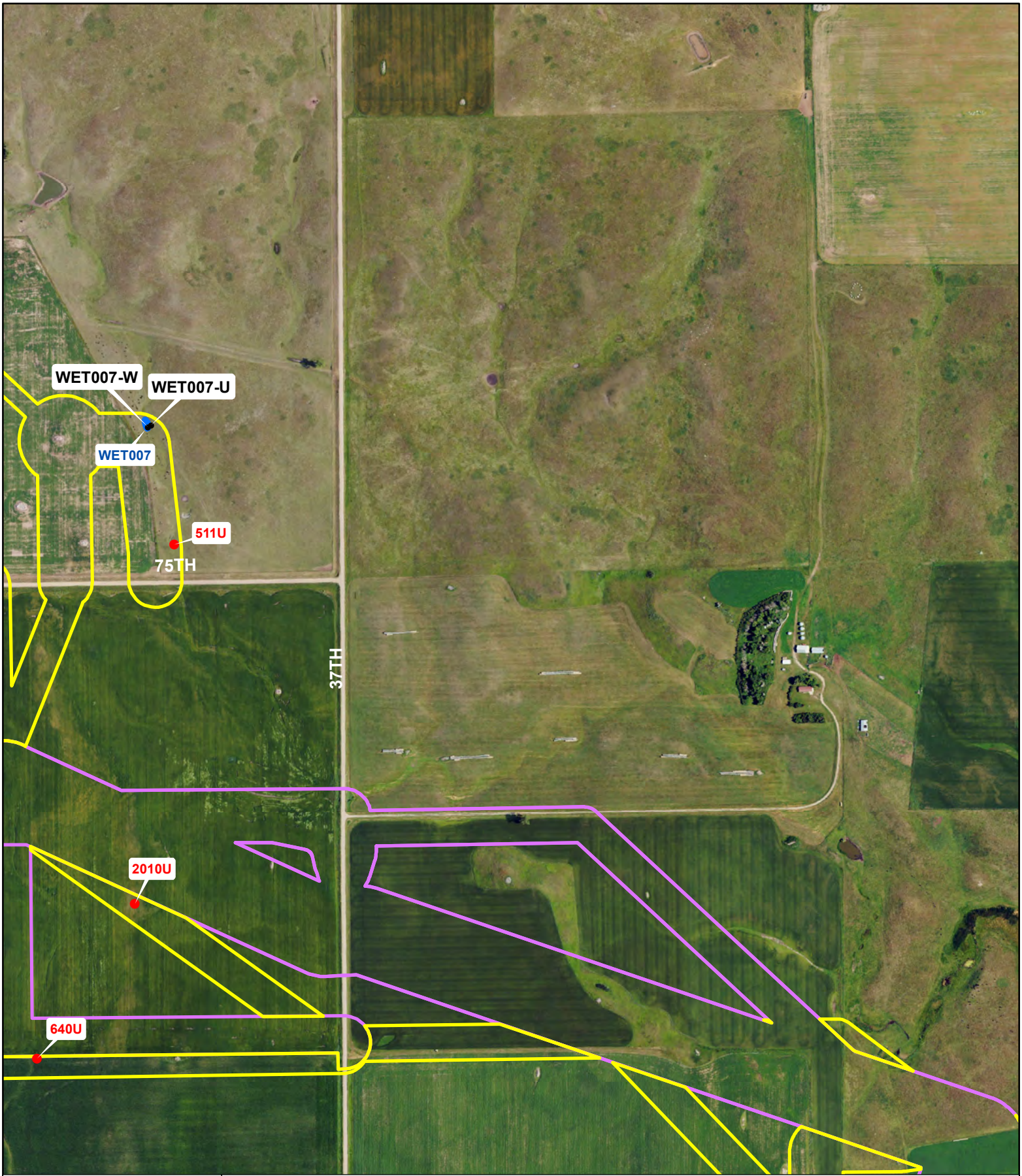

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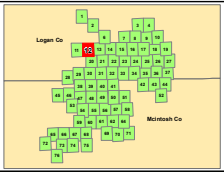

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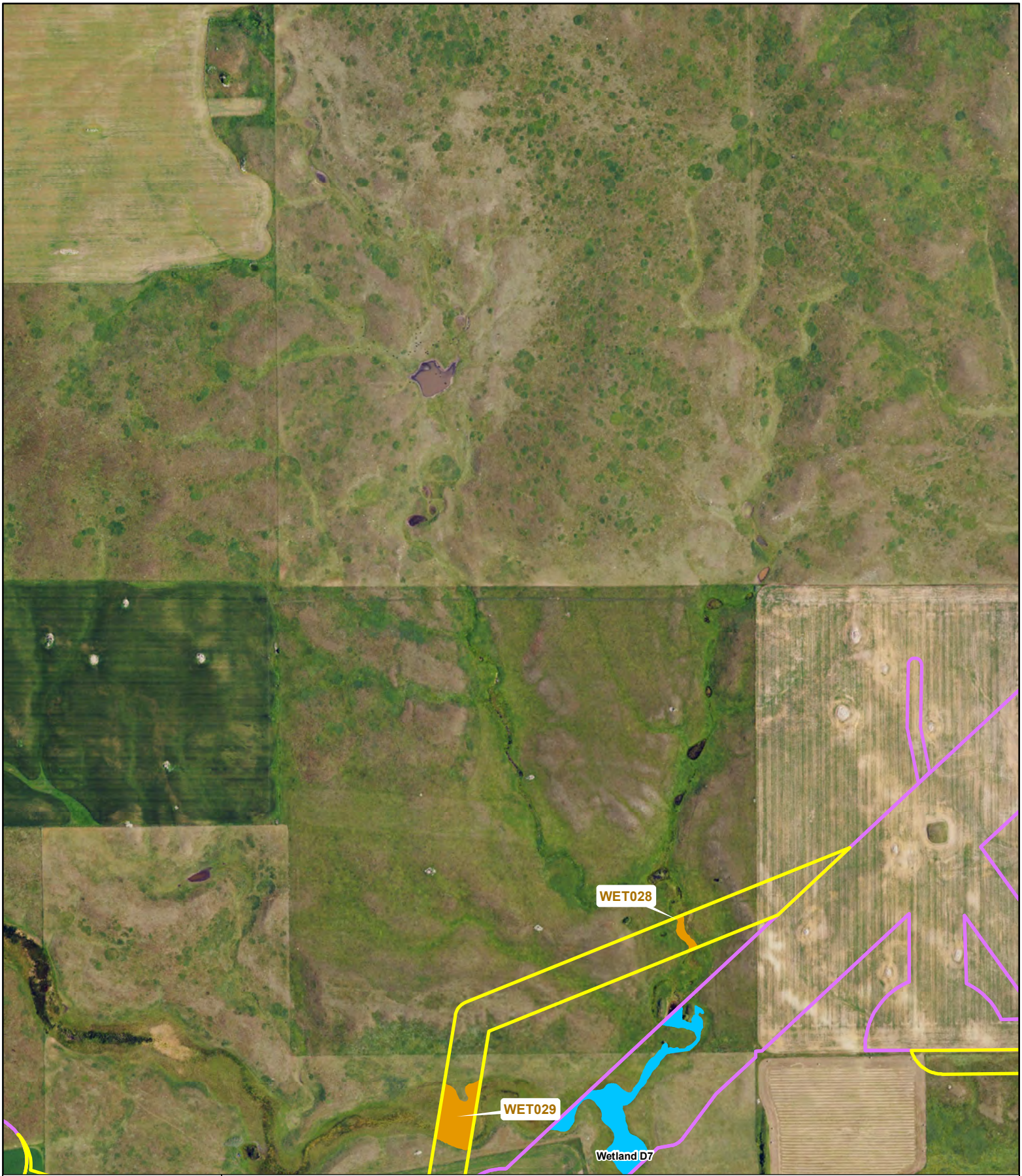

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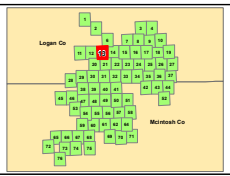

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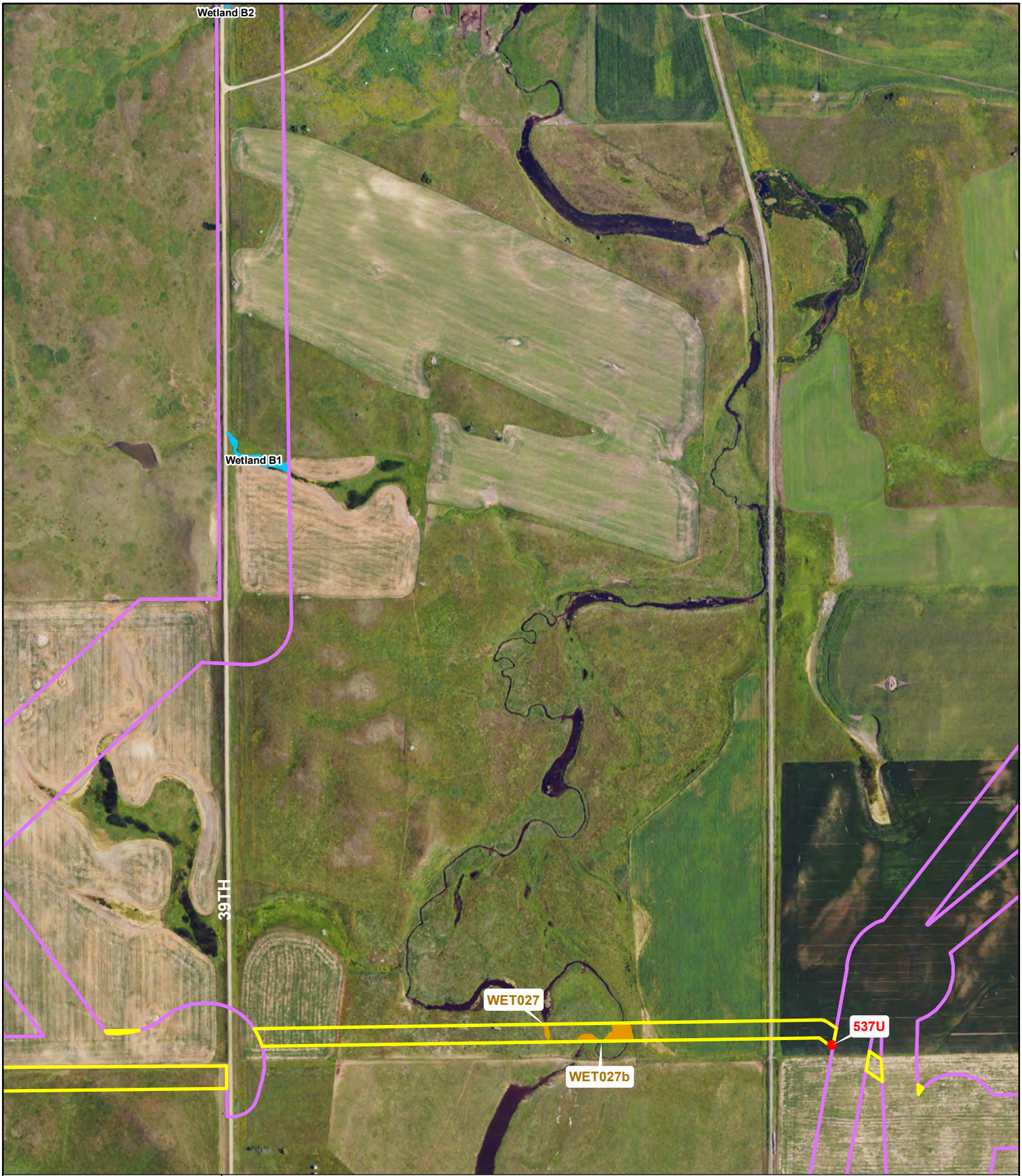

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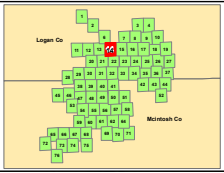

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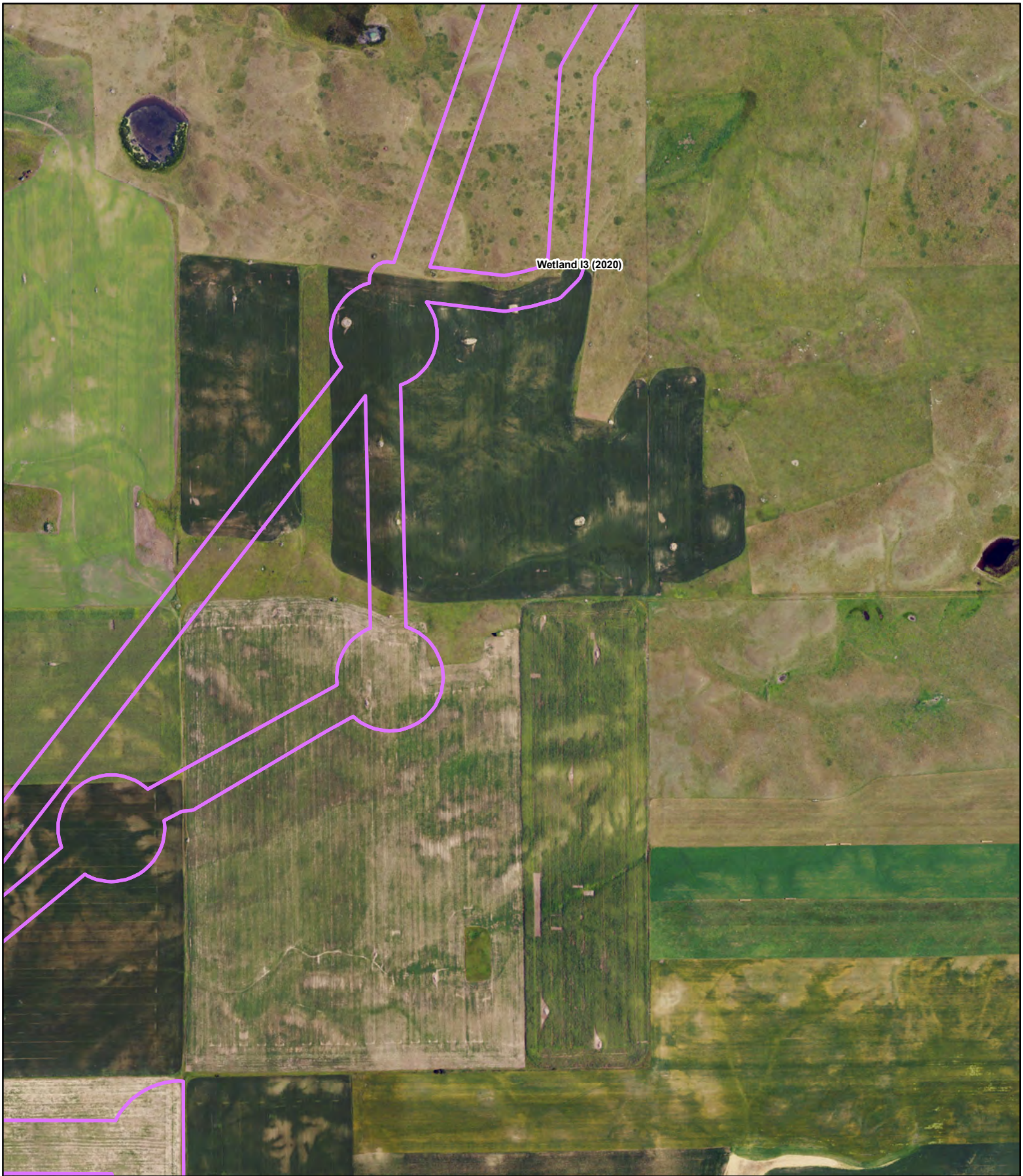

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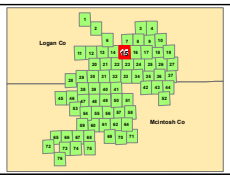

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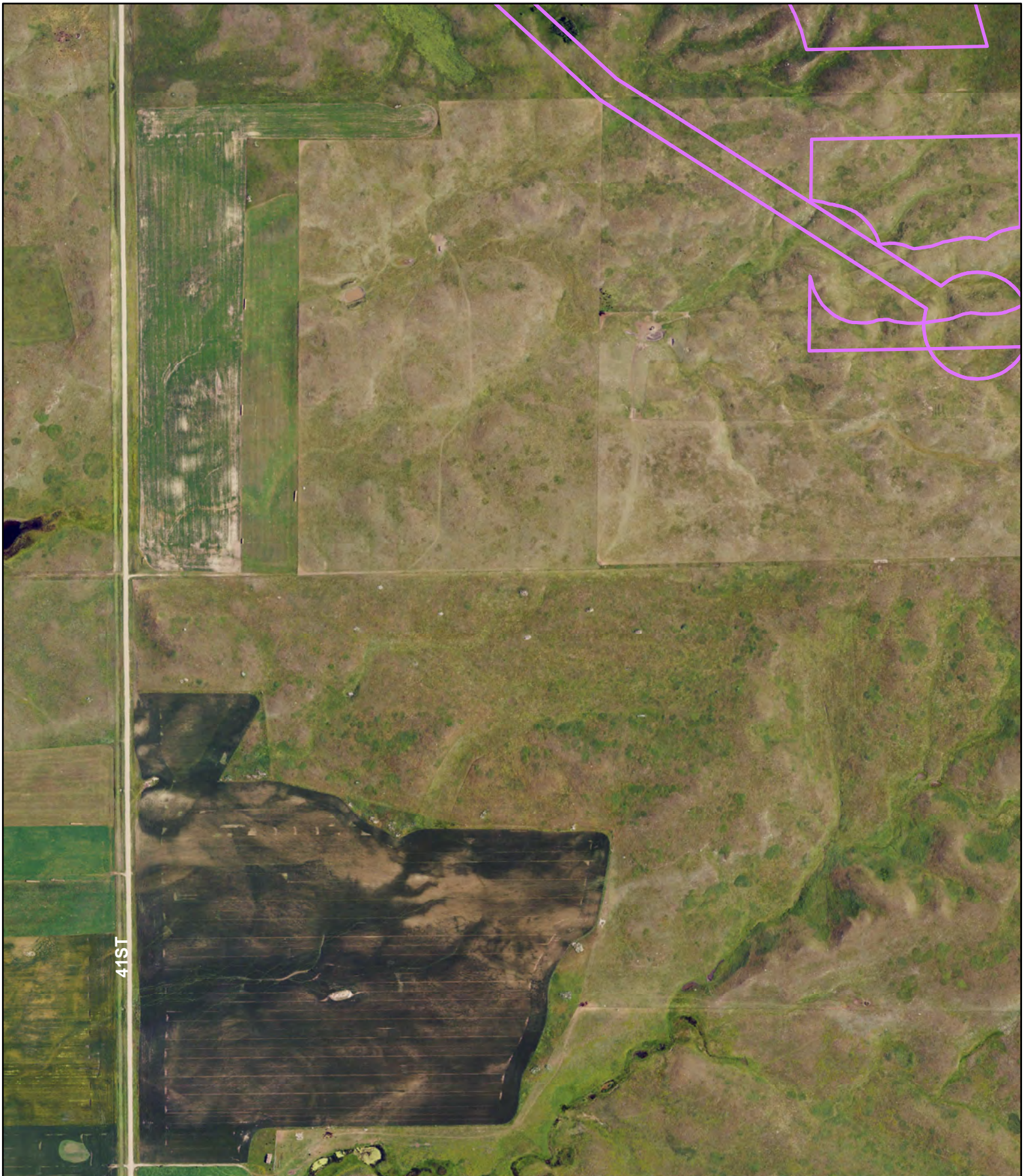

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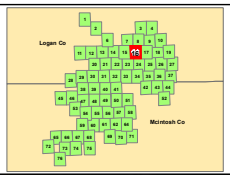

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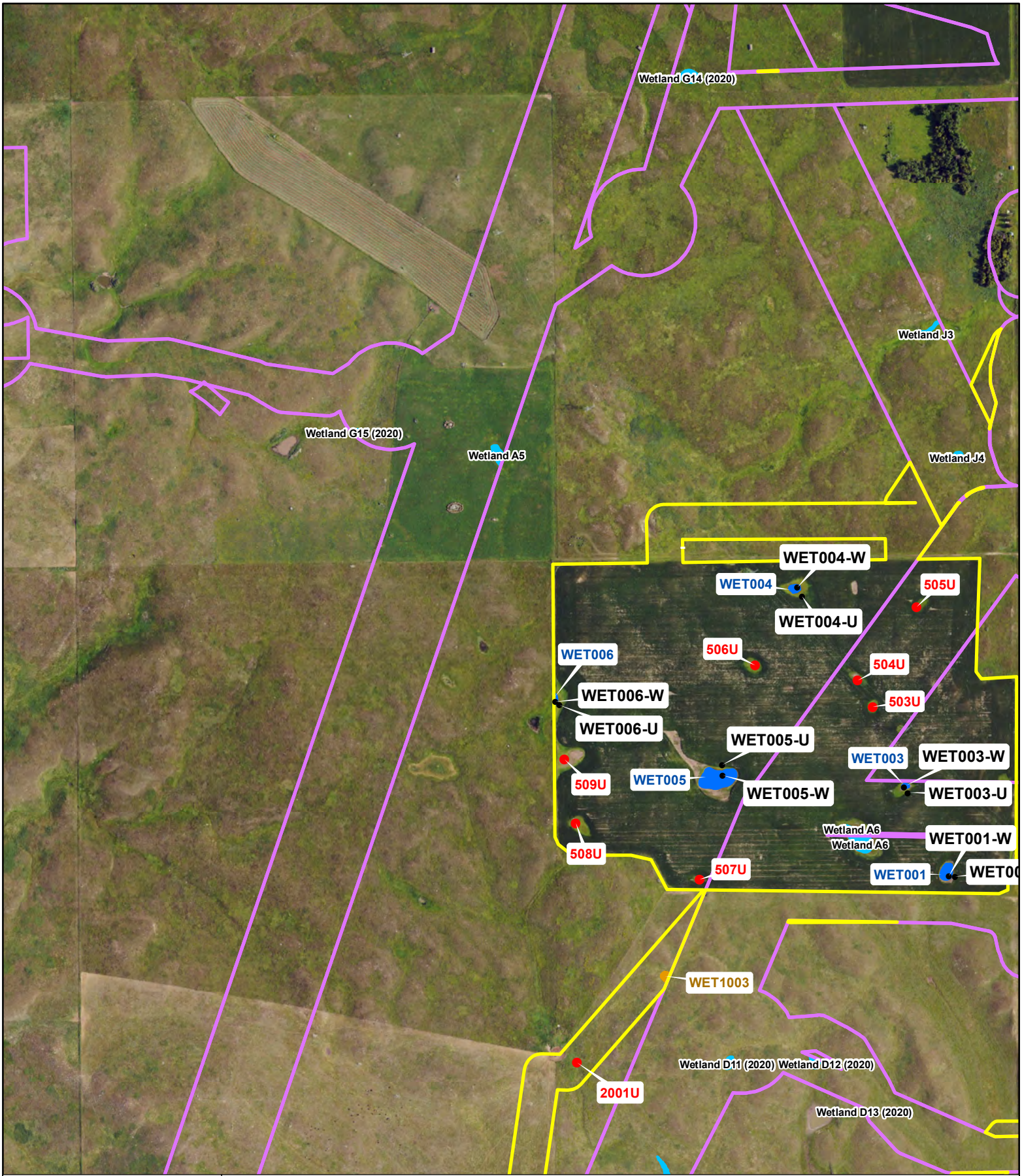

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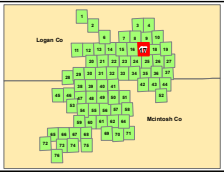

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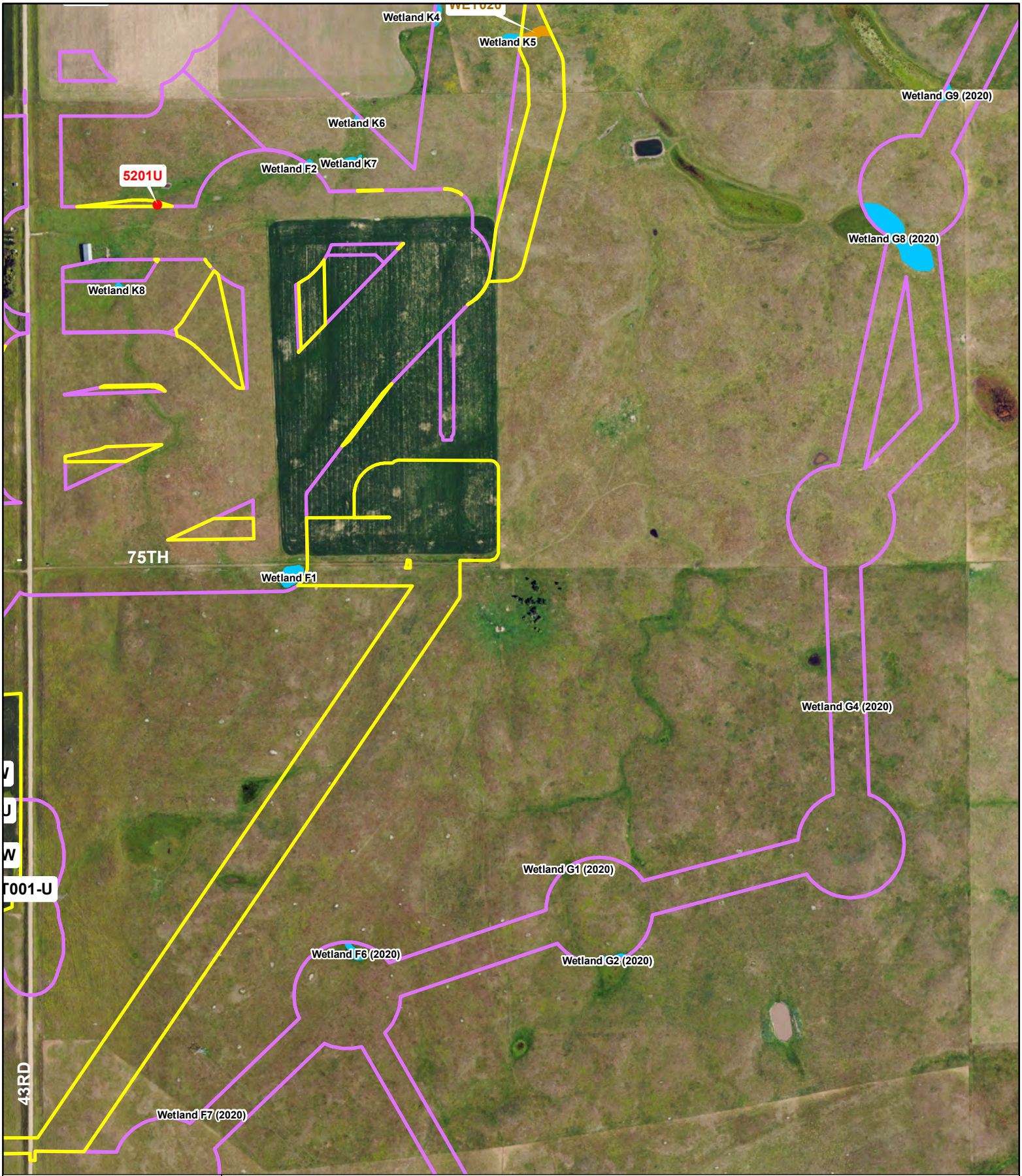

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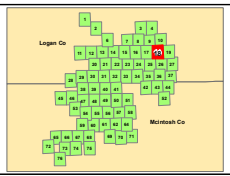

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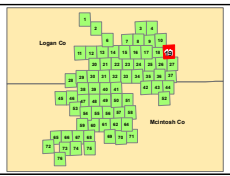

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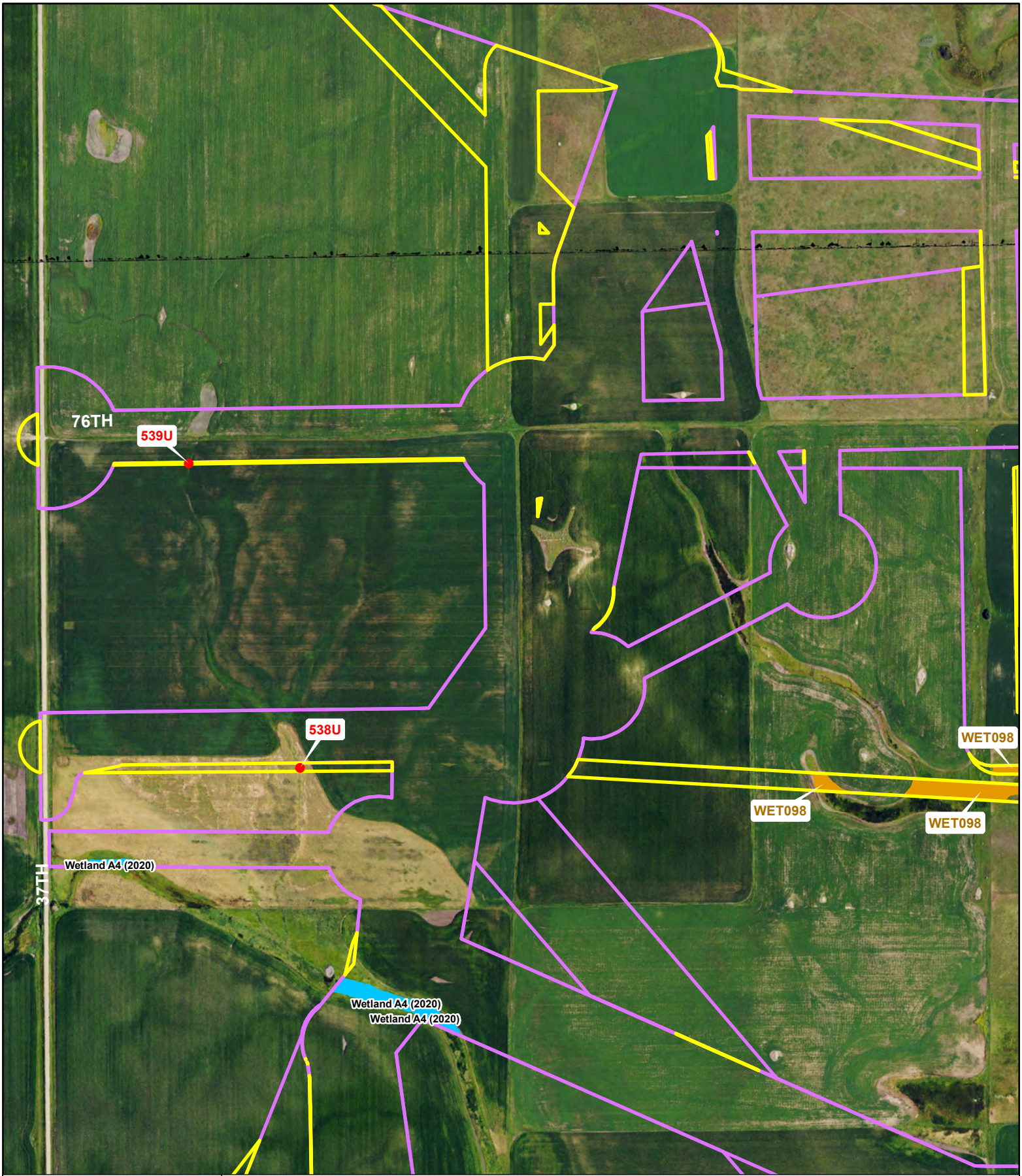

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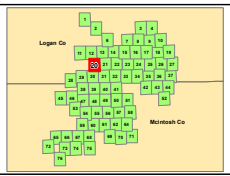

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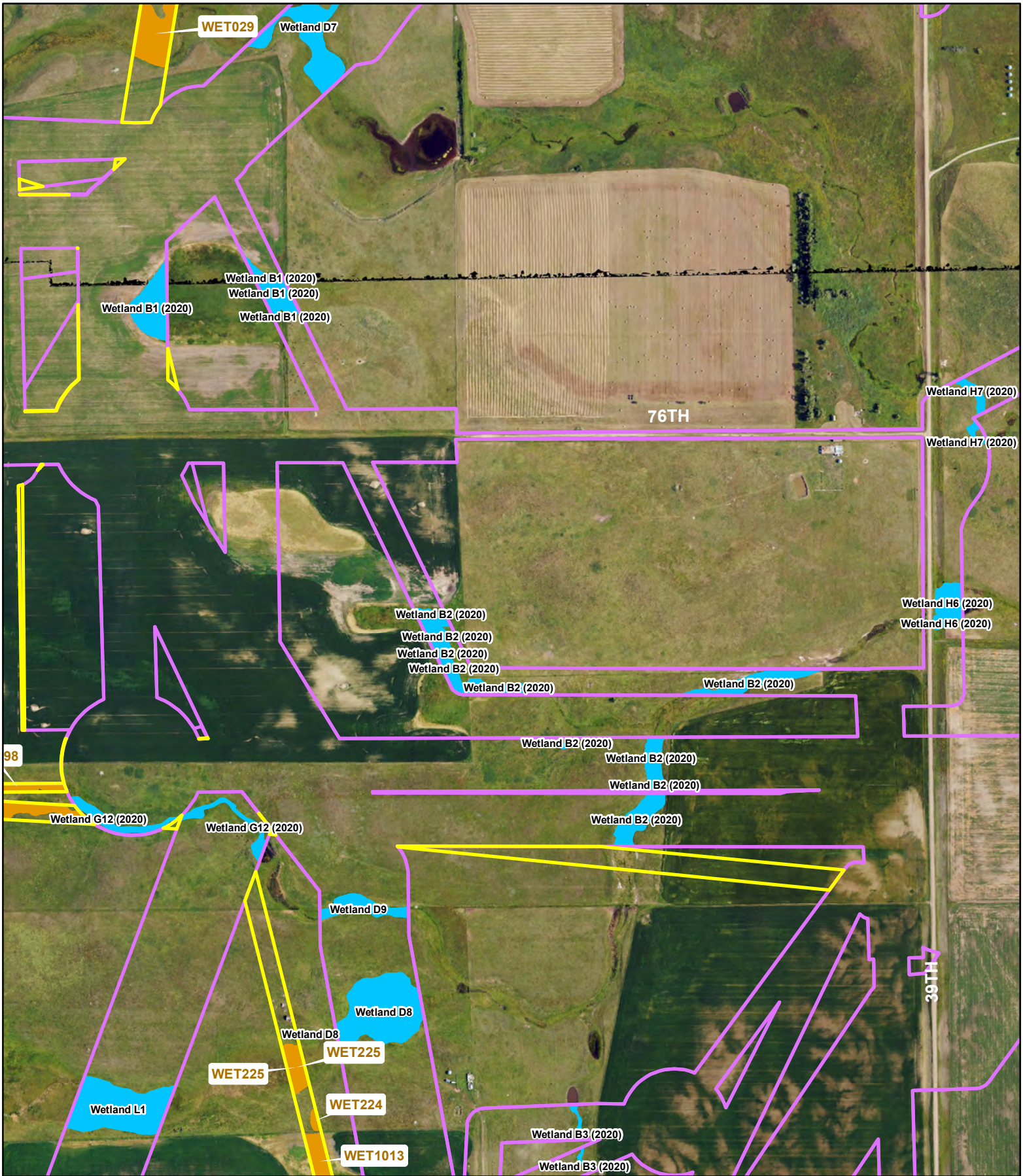
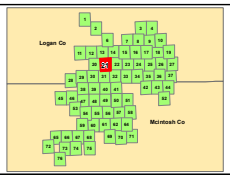


Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

Pre 2023 Wetland Survey Area

County Boundary

State Highway

2023 Surveyed Wetlands

Field Delineated

Field Mapped

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Surveyed Wetlands

Field Delineated

N W E S

0 0.1 0.2 mi

0 0.2 0.4 km

Data Source: NAIP 2023
Coordinate System: UTM, WGS84, zn 14
Map Produced: 01/25/2024. Created by: T. Thorn

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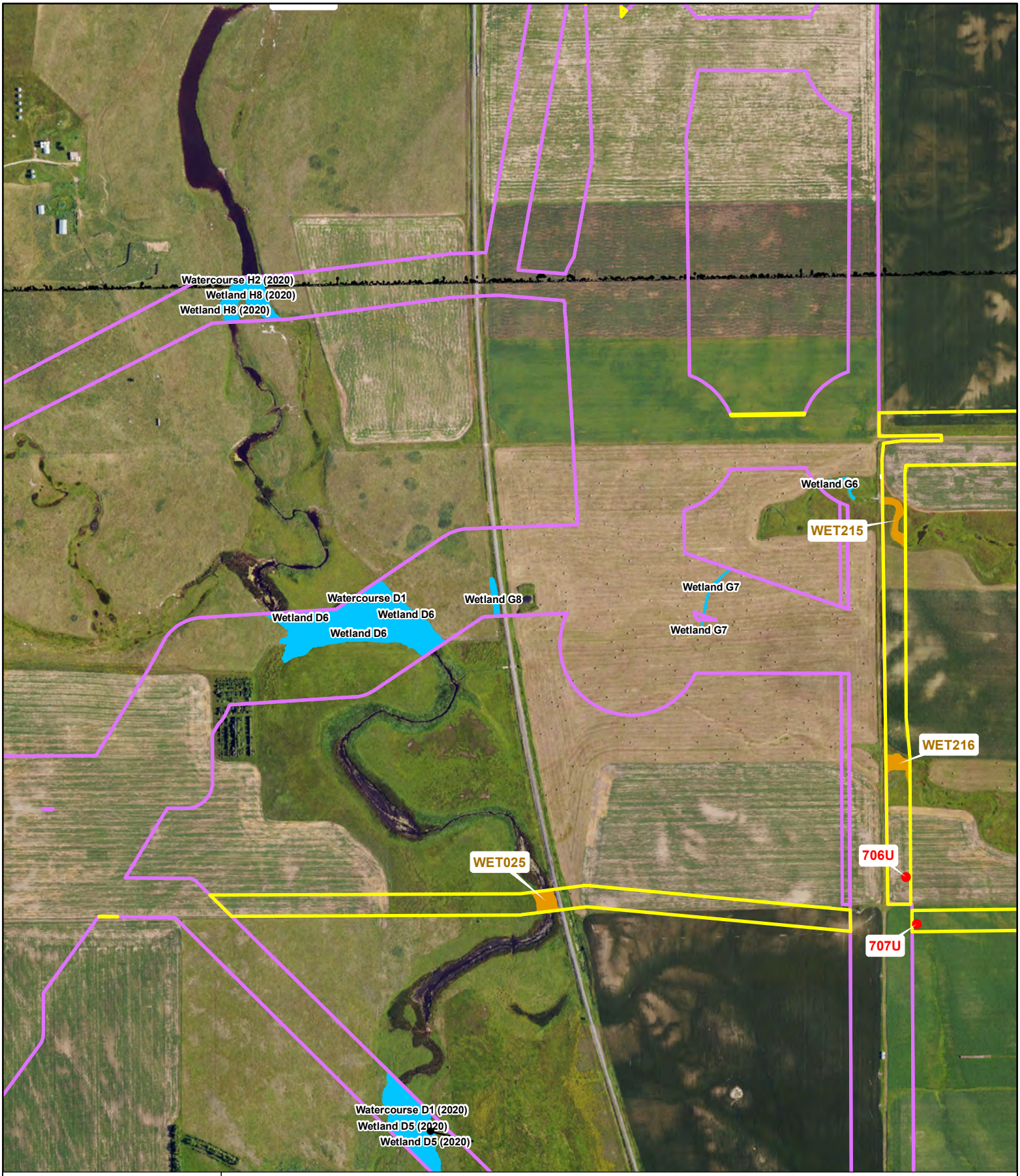
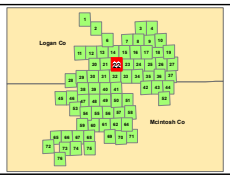


Badger Wind Project

Logan & McIntosh Counties, ND



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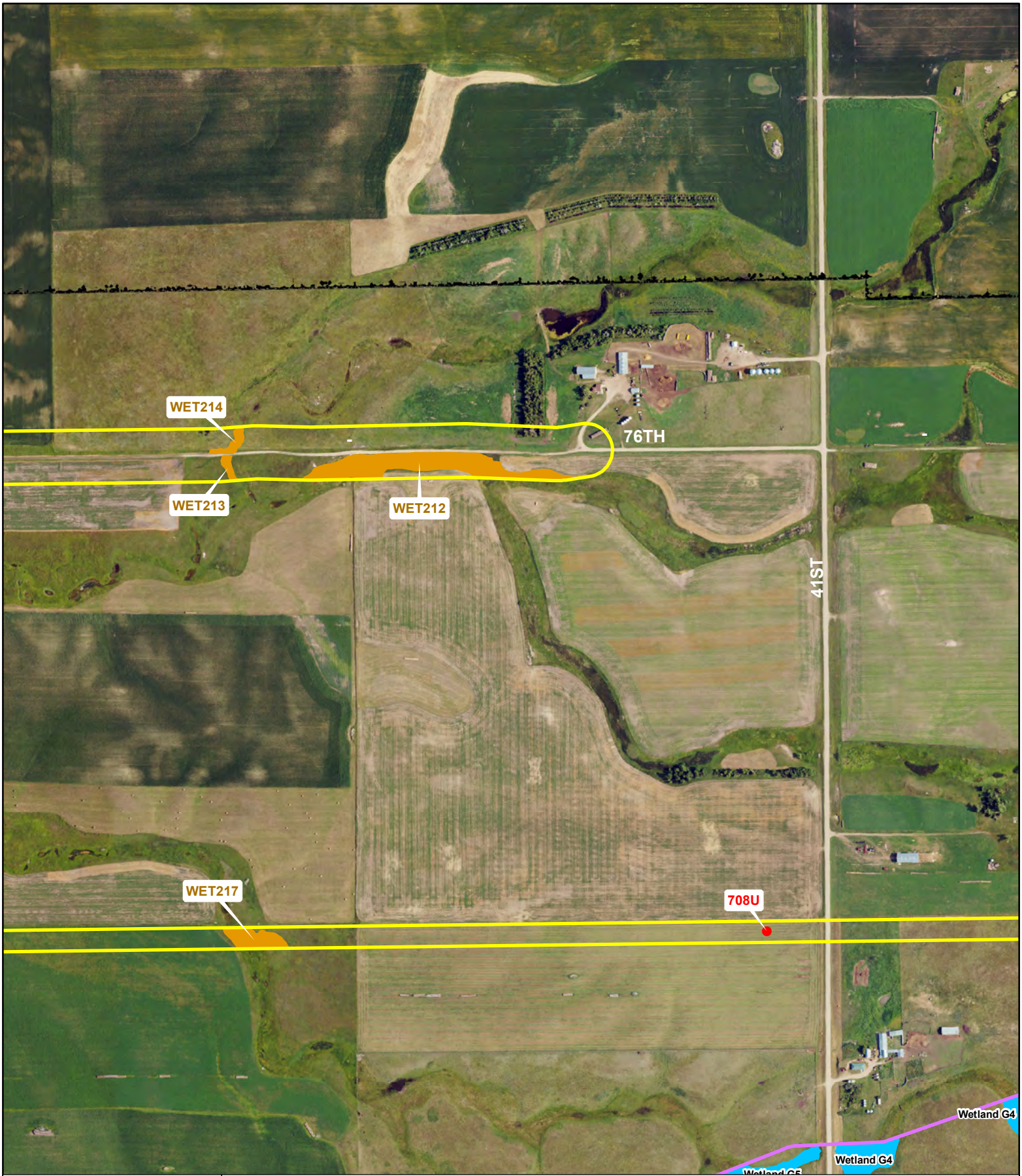
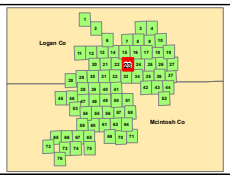


Badger Wind Project

Logan & McIntosh Counties, ND



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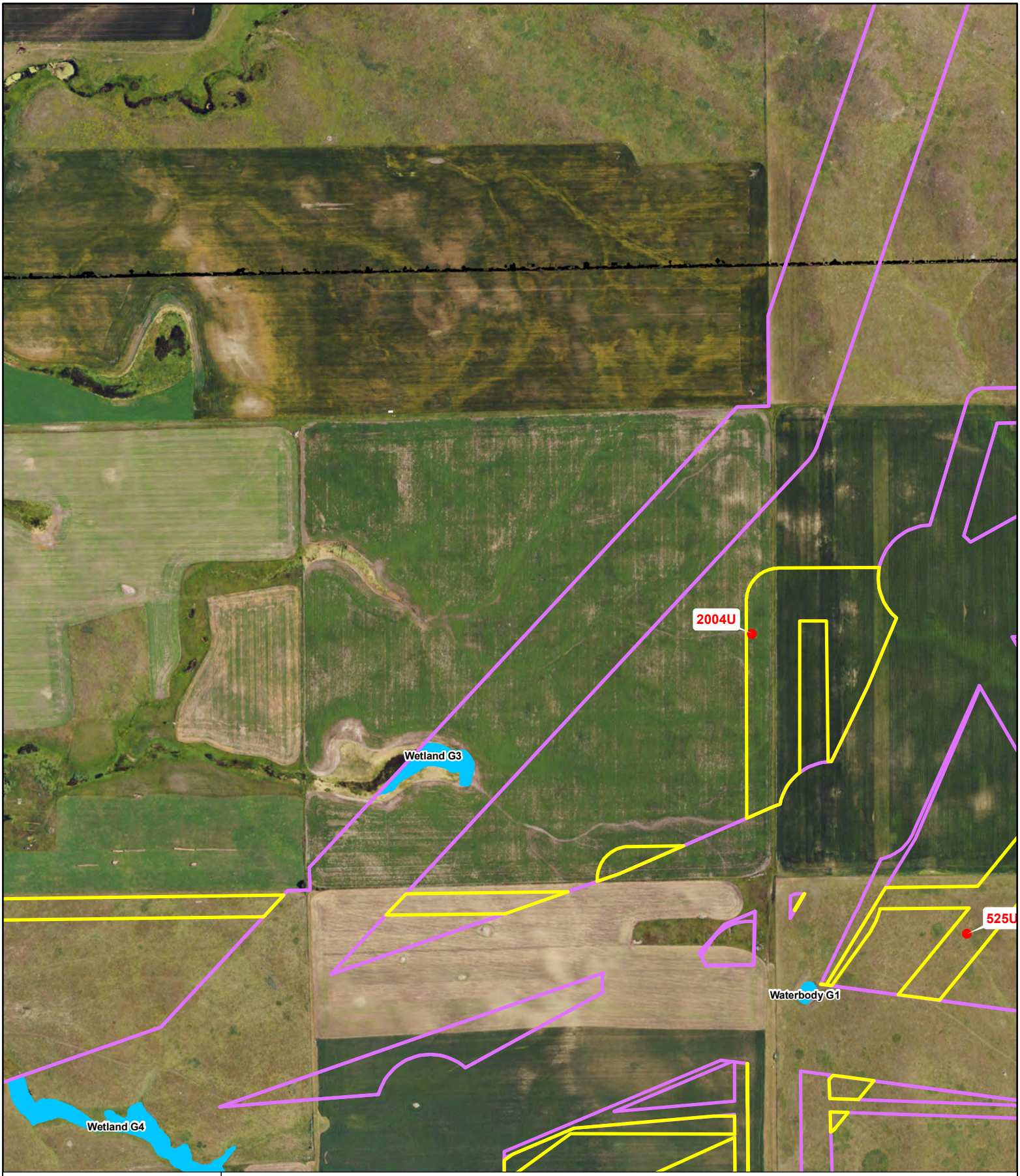
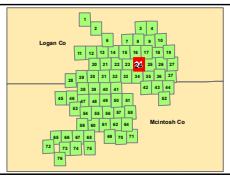


Badger Wind Project

Logan & McIntosh Counties, ND



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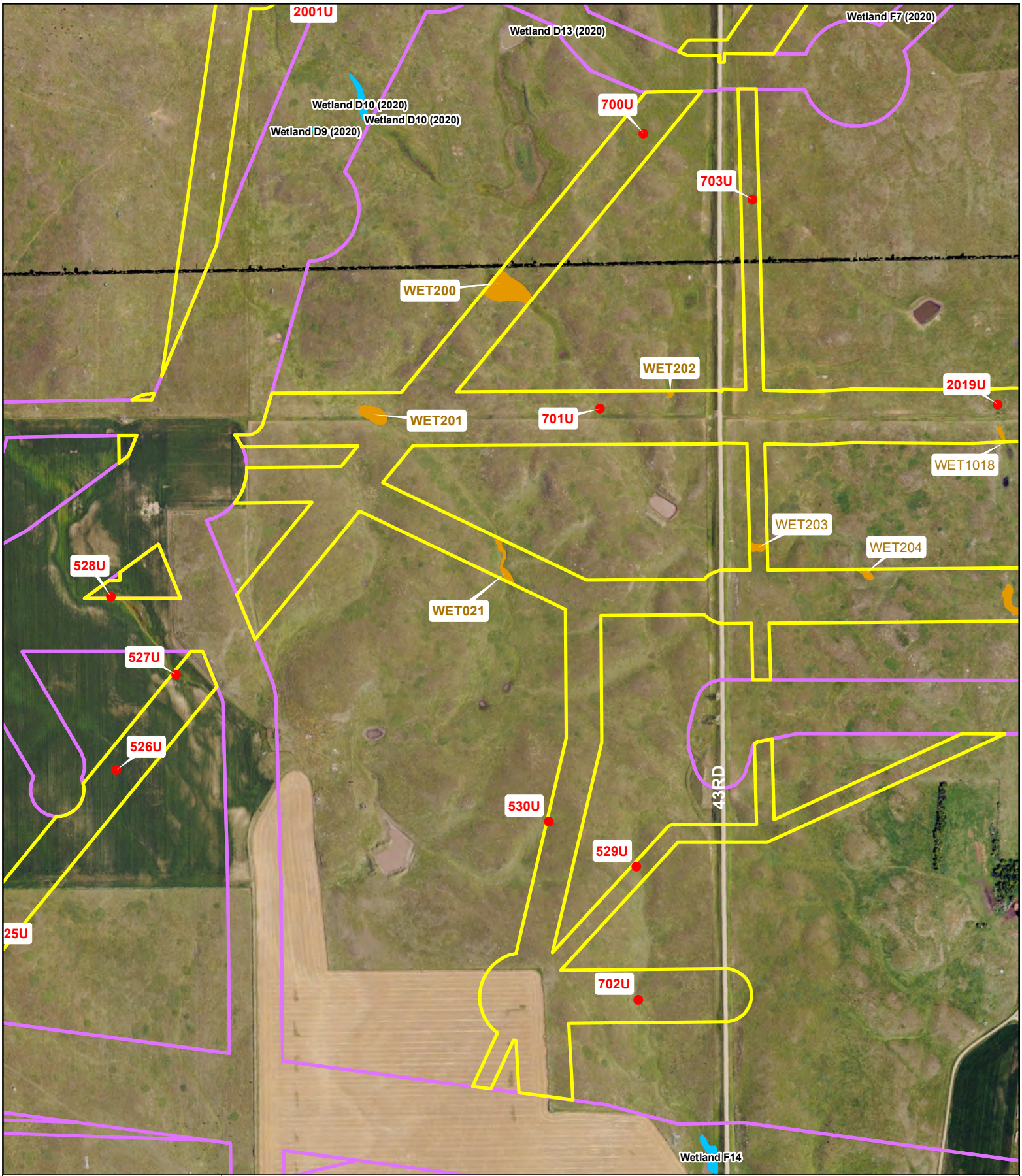
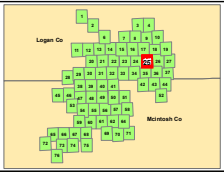


Badger Wind Project

Logan & McIntosh Counties, ND



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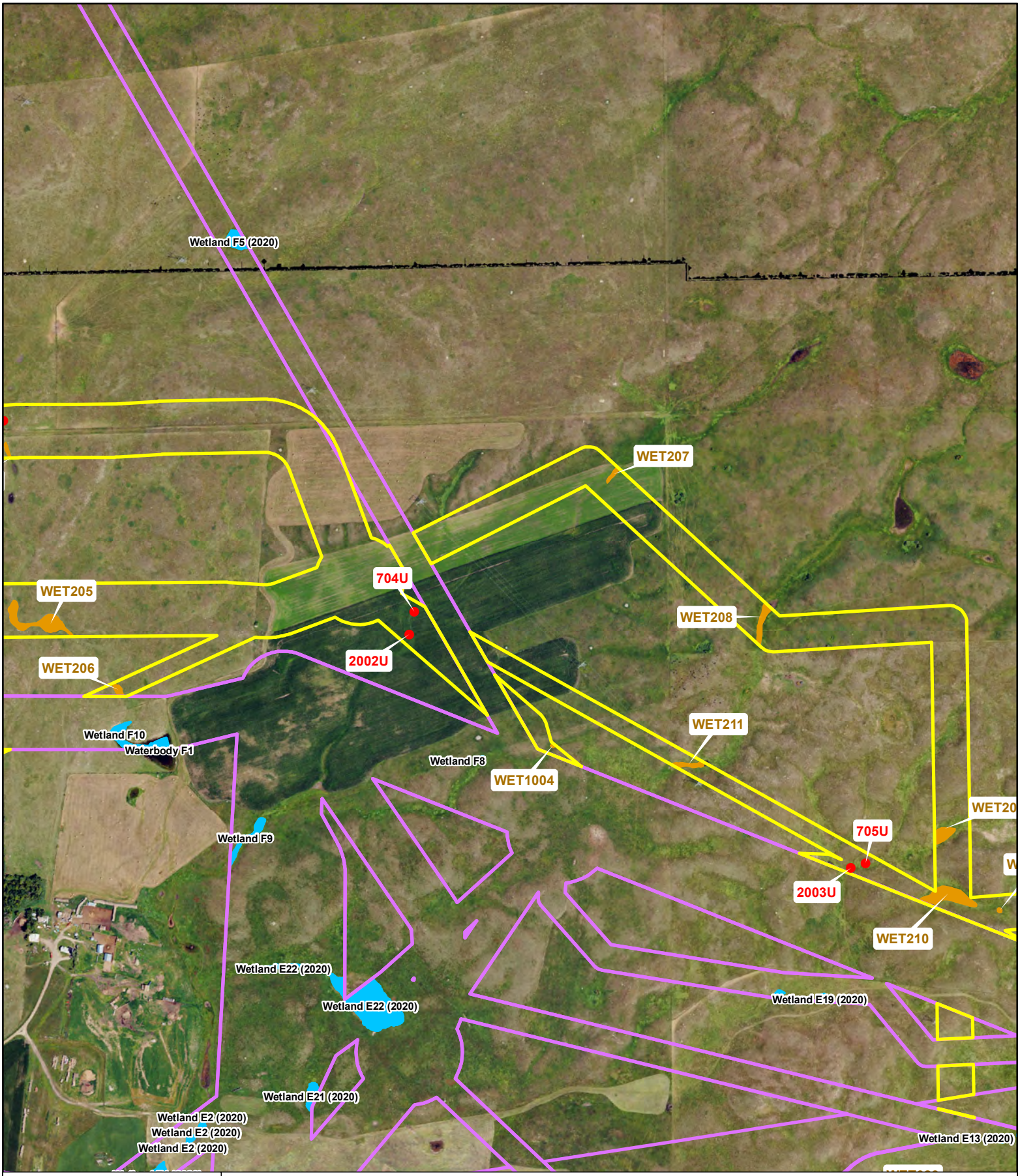

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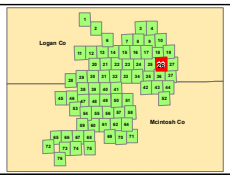
Logan & McIntosh Counties, ND



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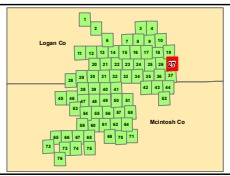
Badger Wind Project

Logan & McIntosh Counties, ND



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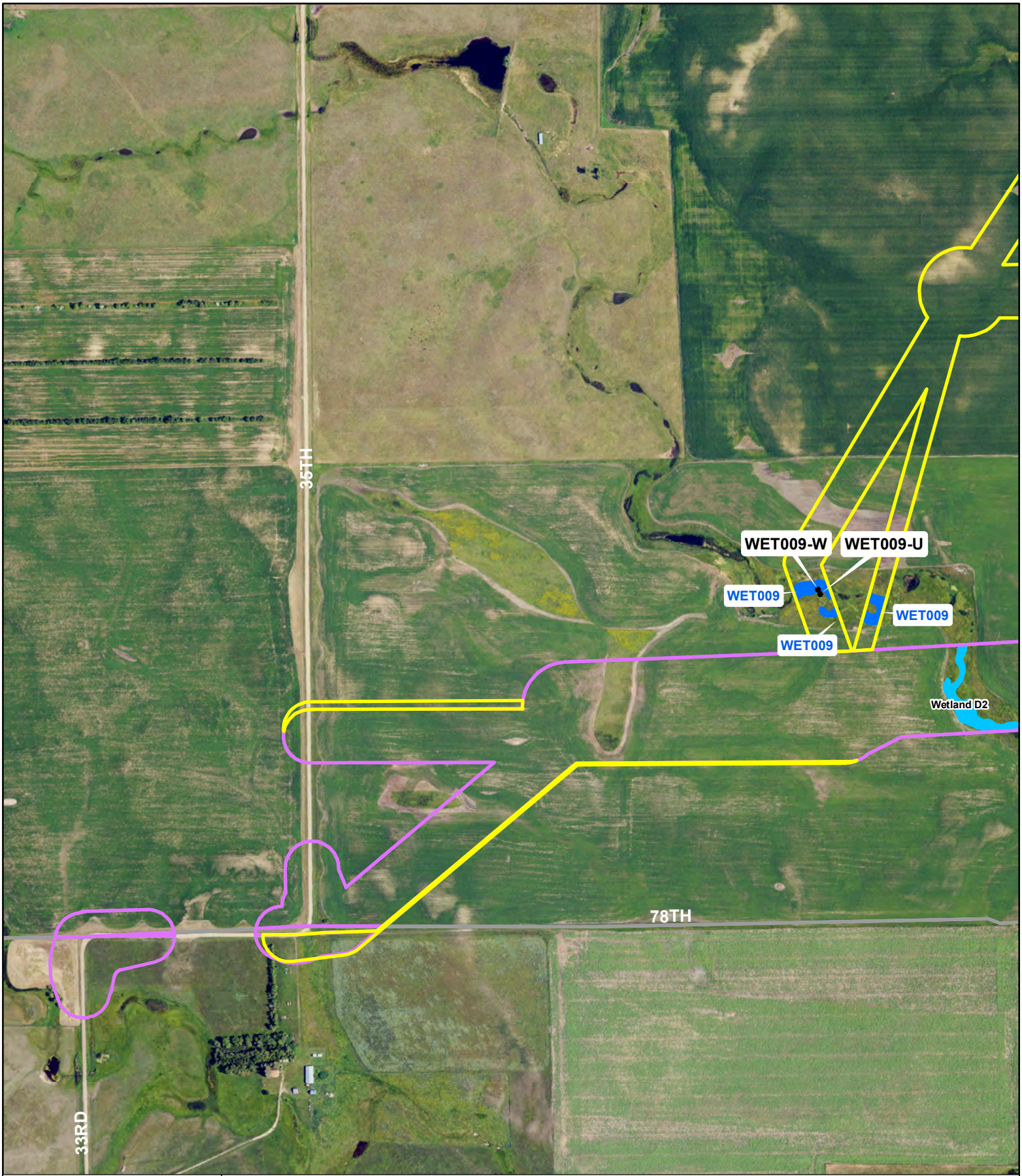
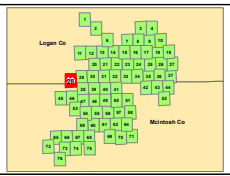


Badger Wind Project

Logan & McIntosh Counties, ND



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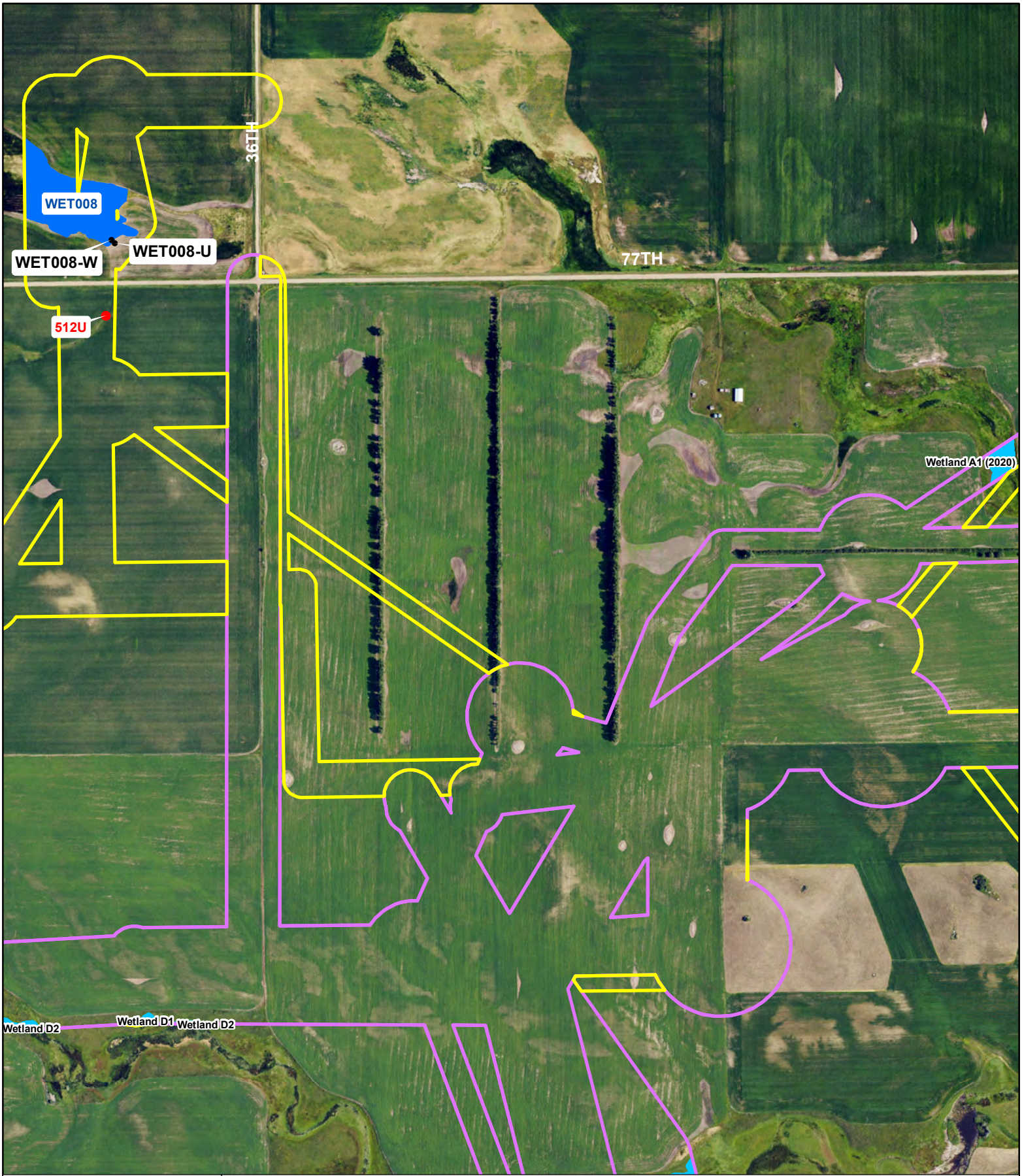
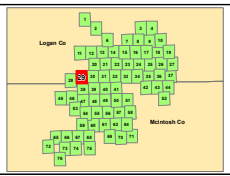


Badger Wind Project

Logan & McIntosh Counties, ND



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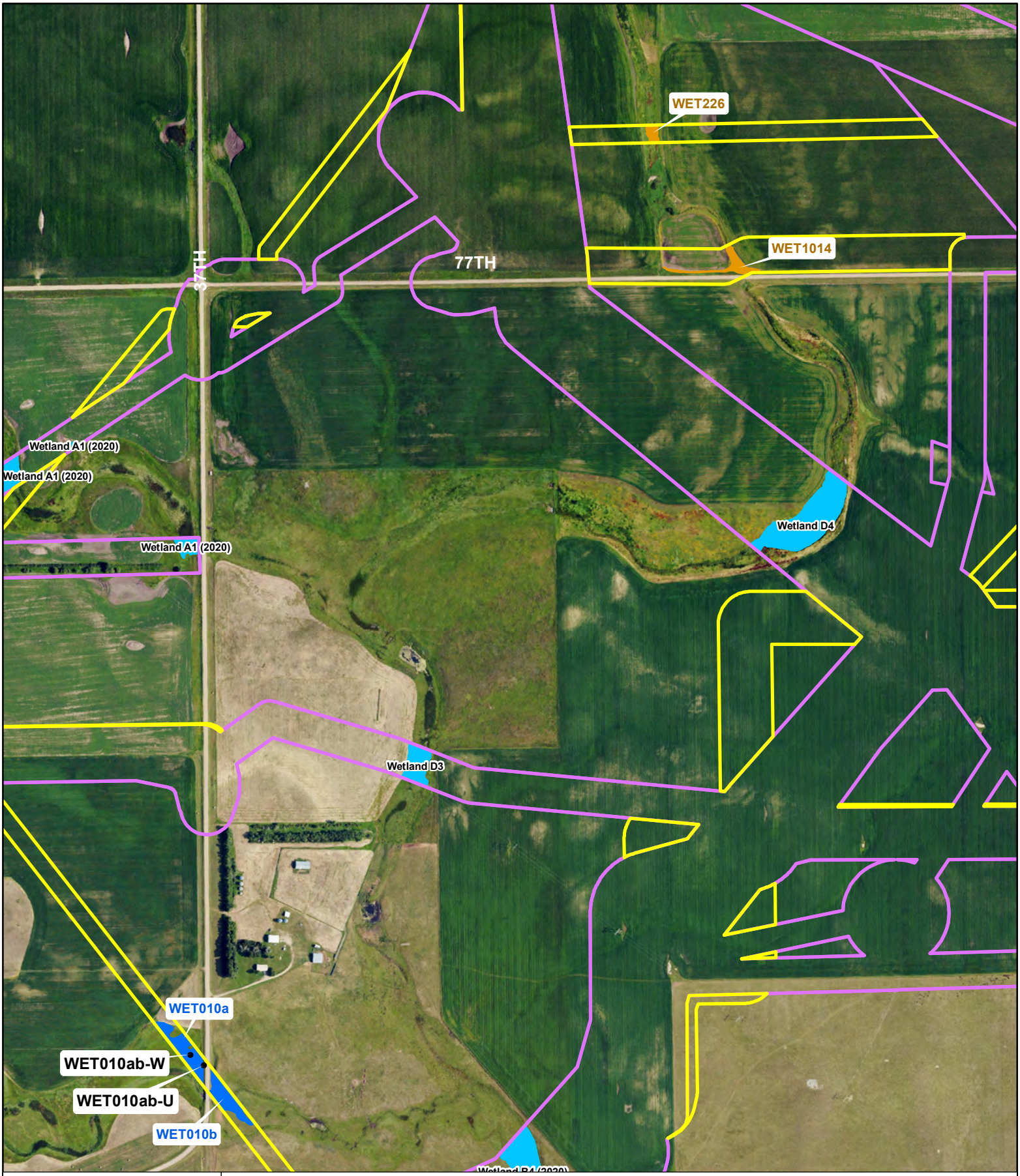
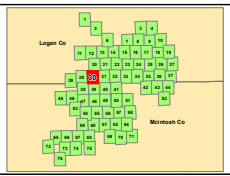


Badger Wind Project

Logan & McIntosh Counties, ND



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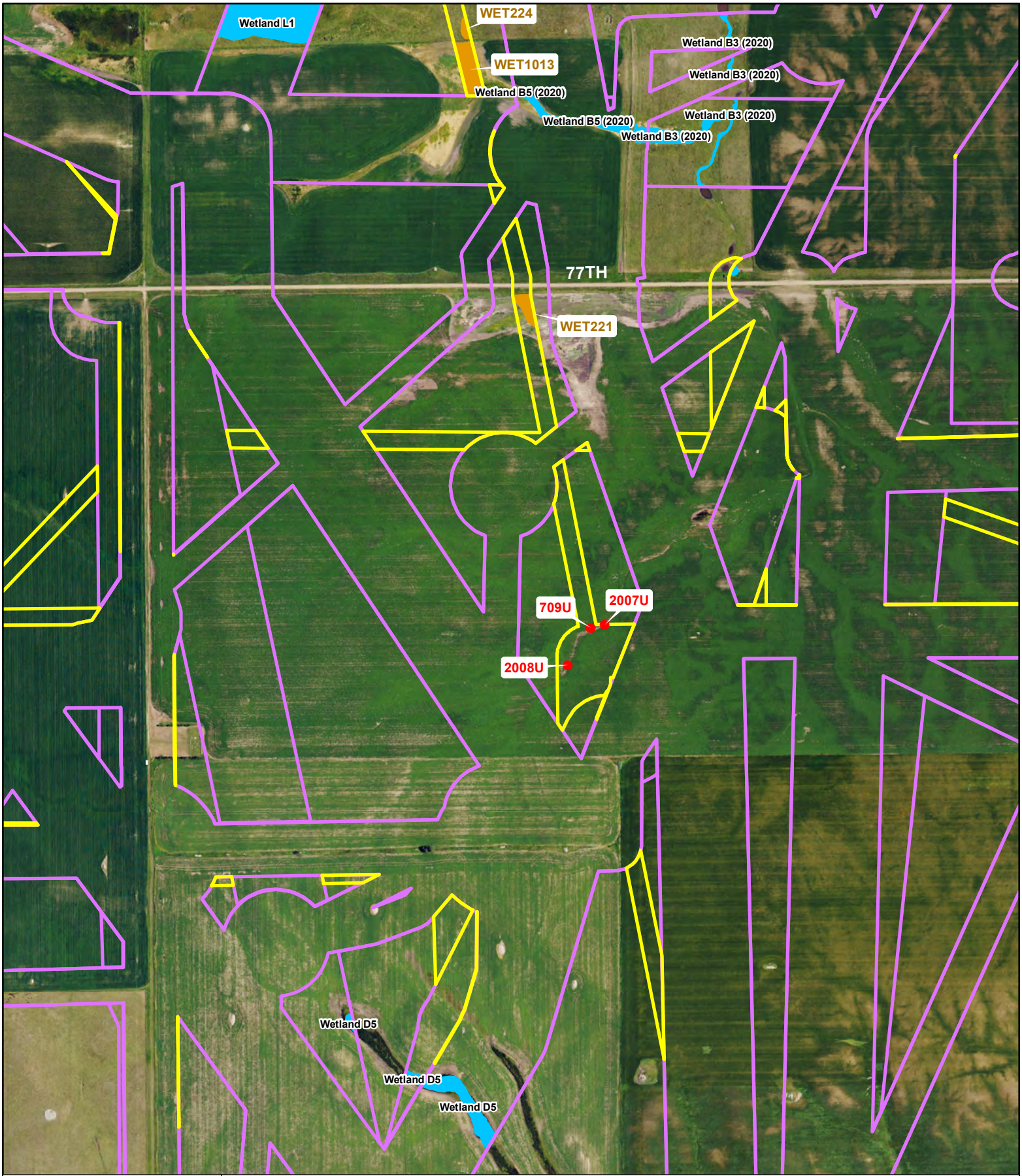
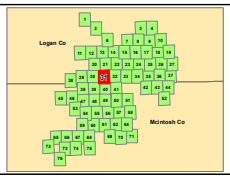


Badger Wind Project

Logan & McIntosh Counties, ND



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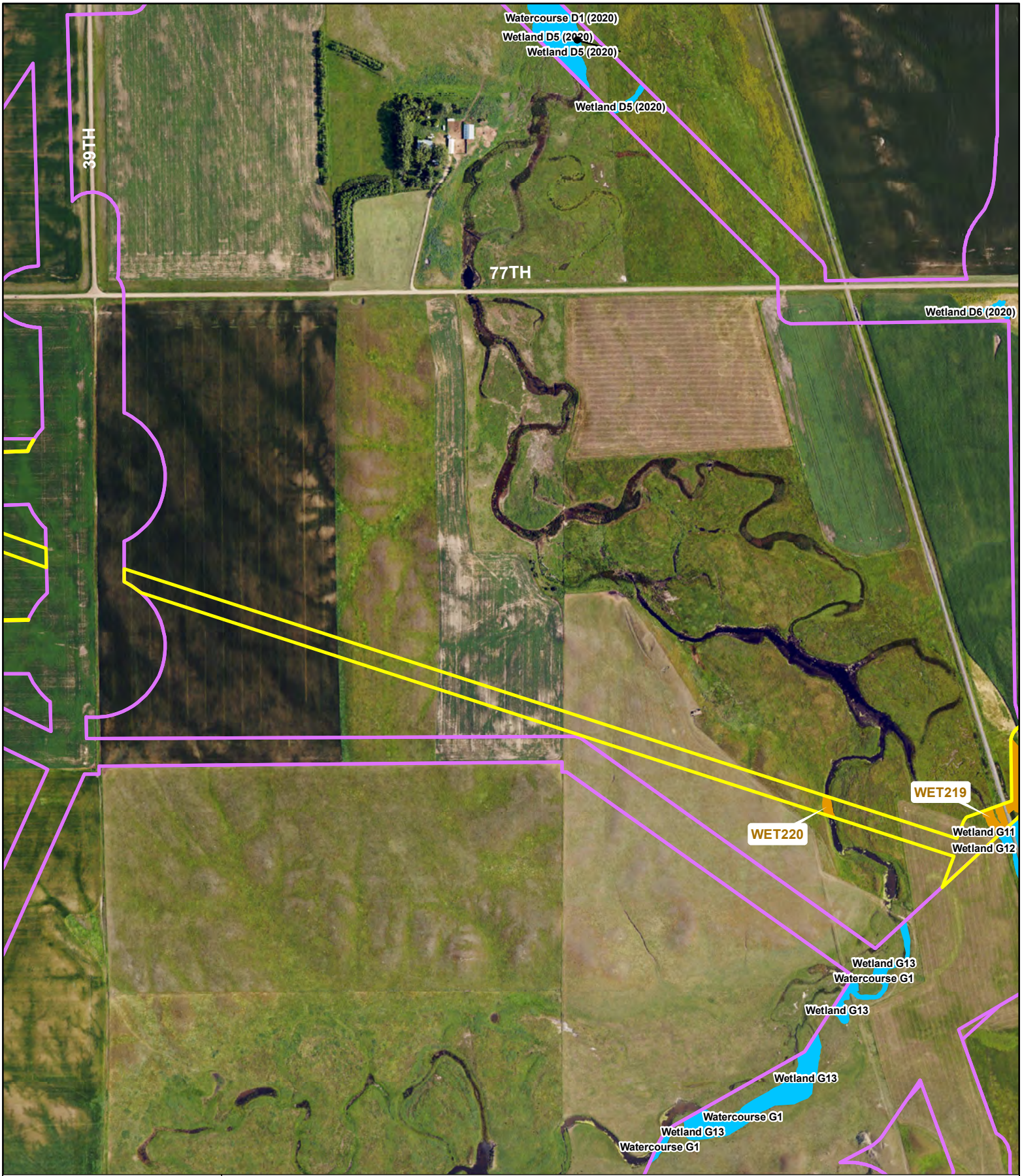
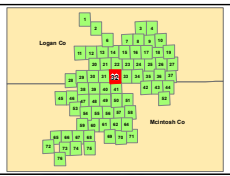


Badger Wind Project

Logan & McIntosh Counties, ND



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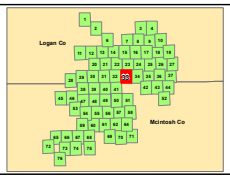

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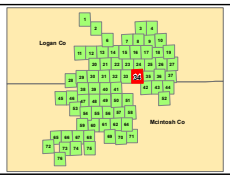

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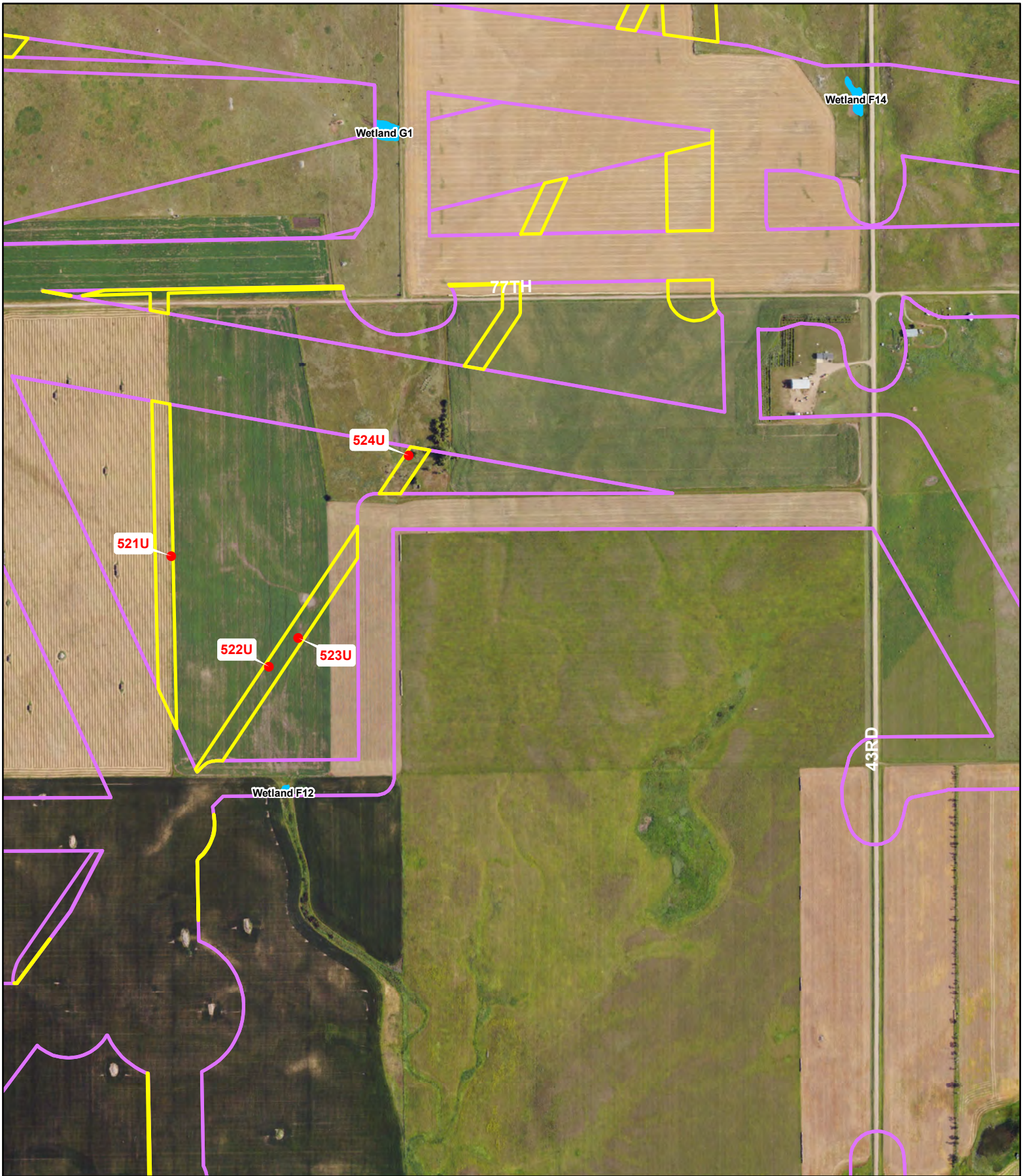

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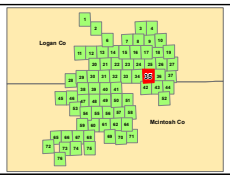

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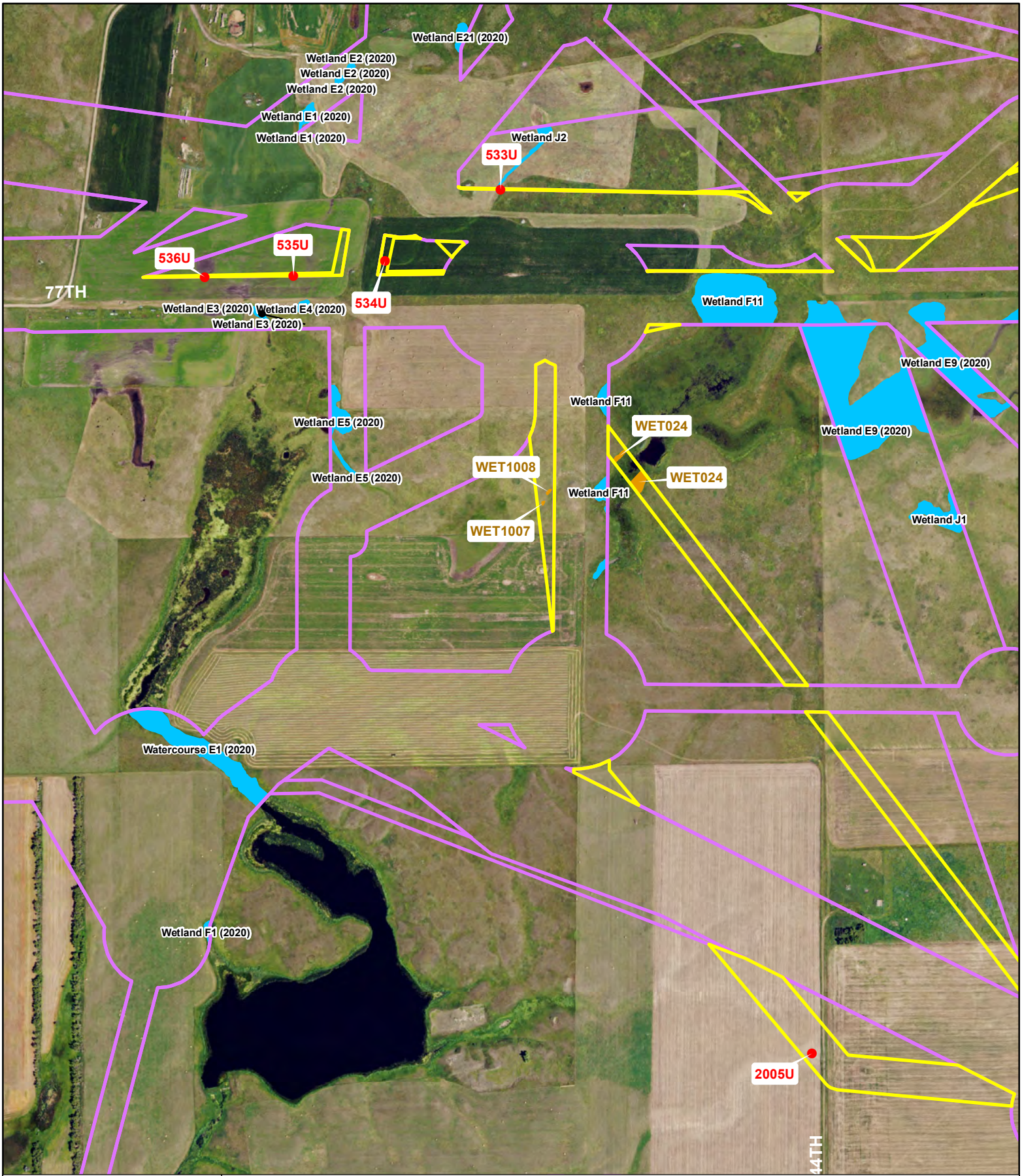

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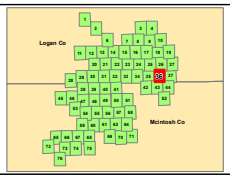

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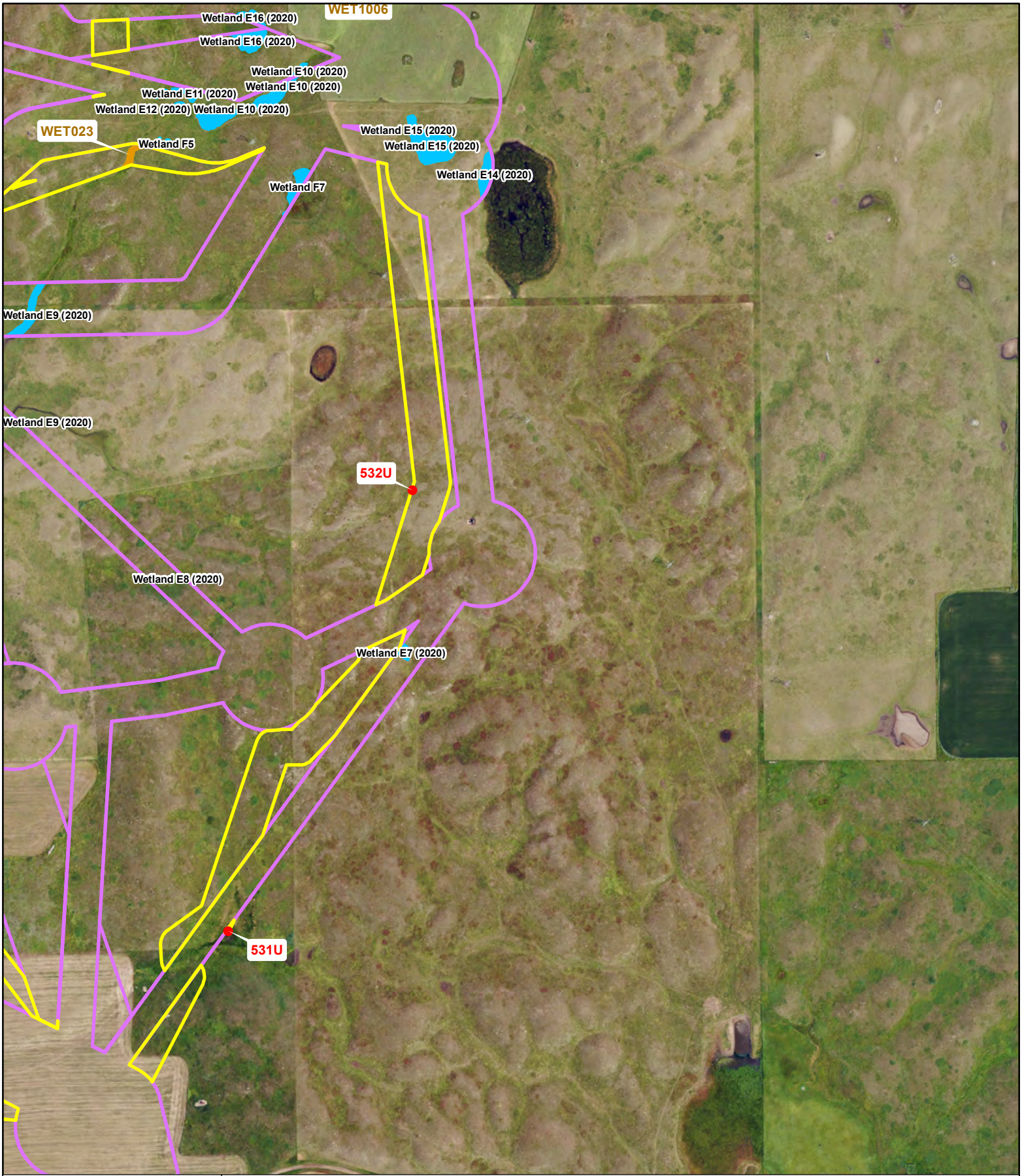

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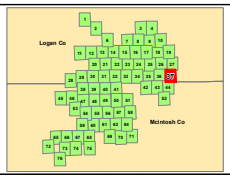

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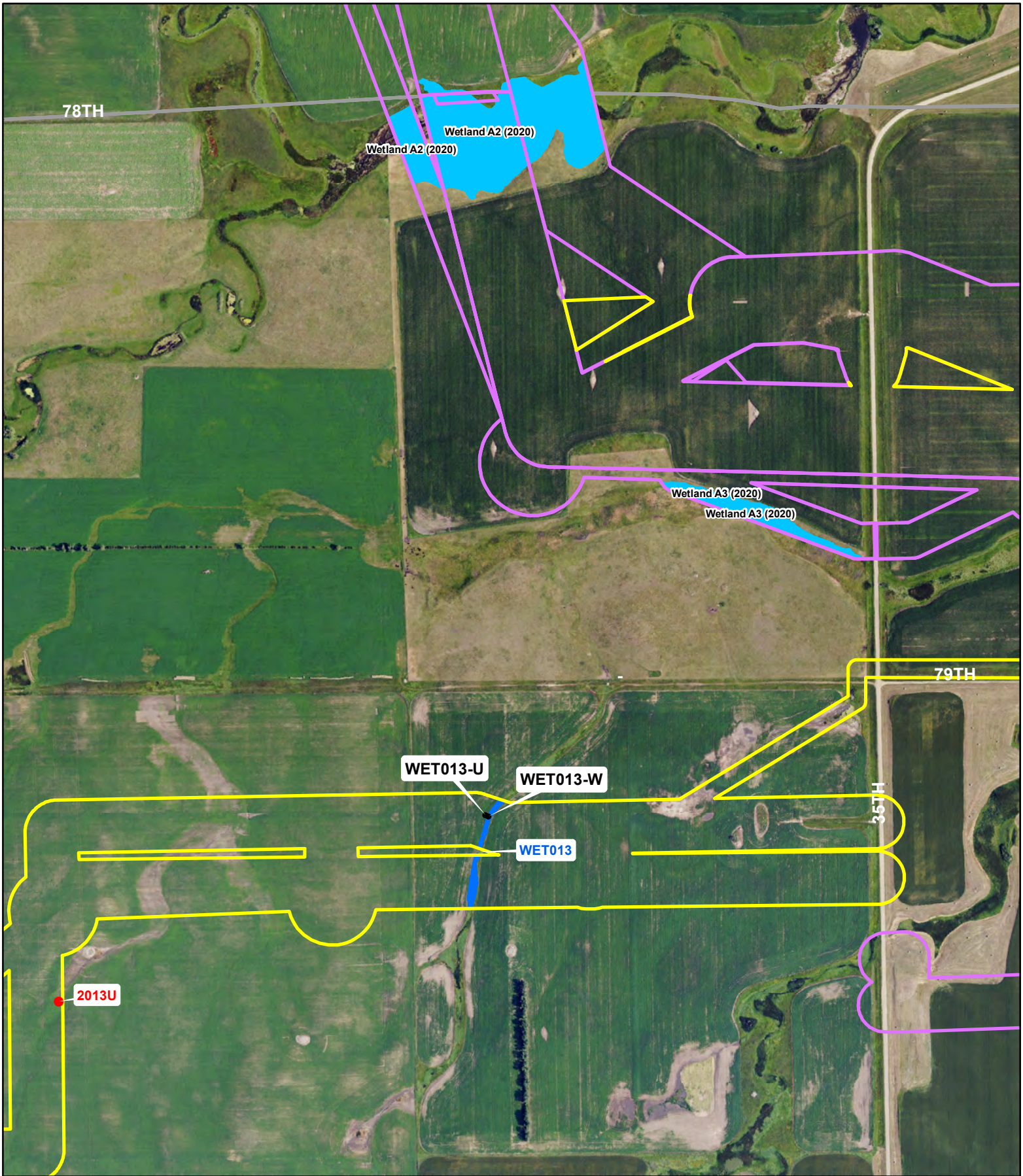

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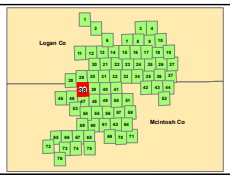

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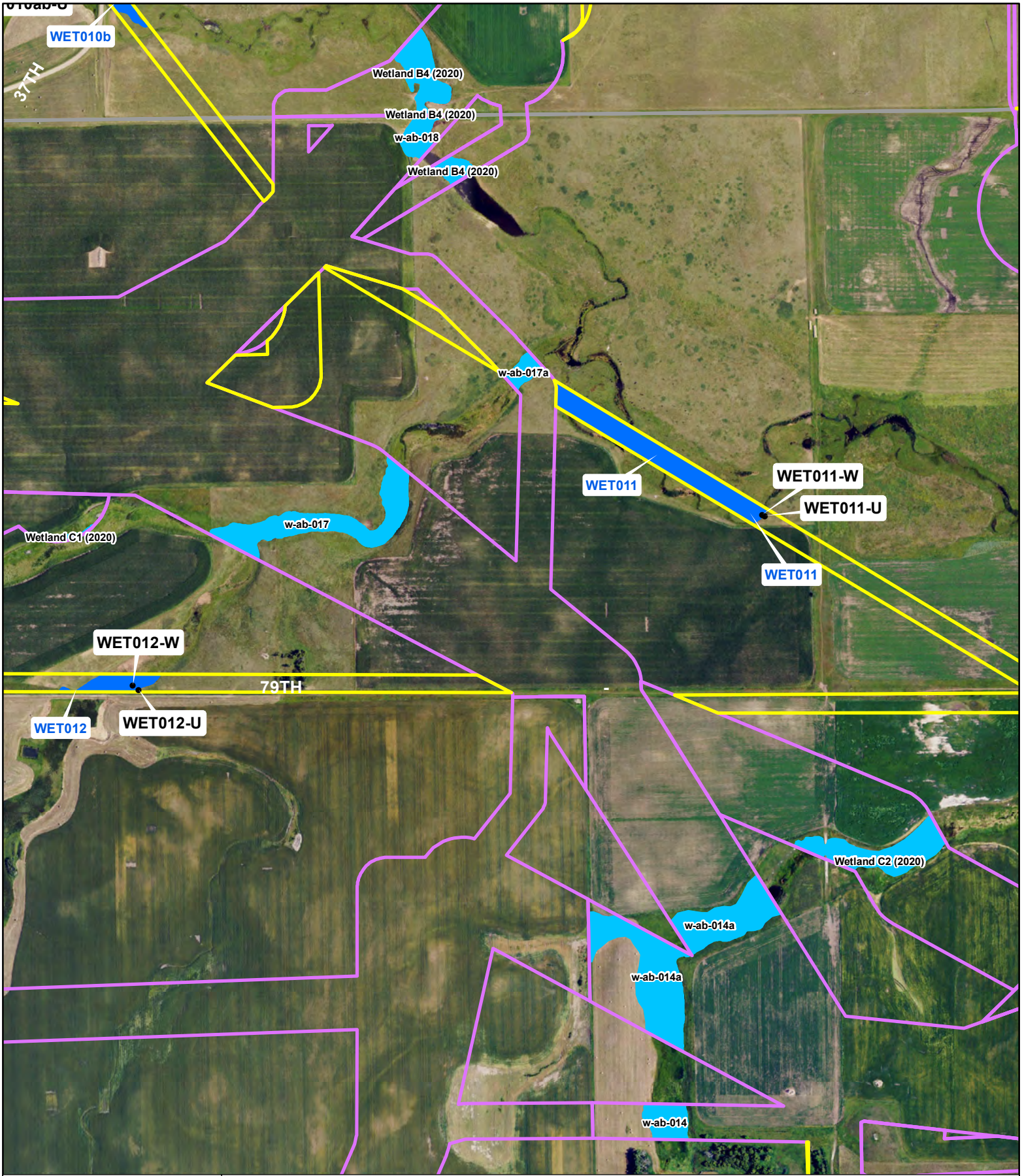

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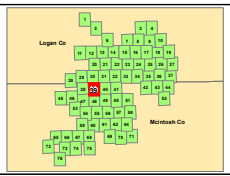

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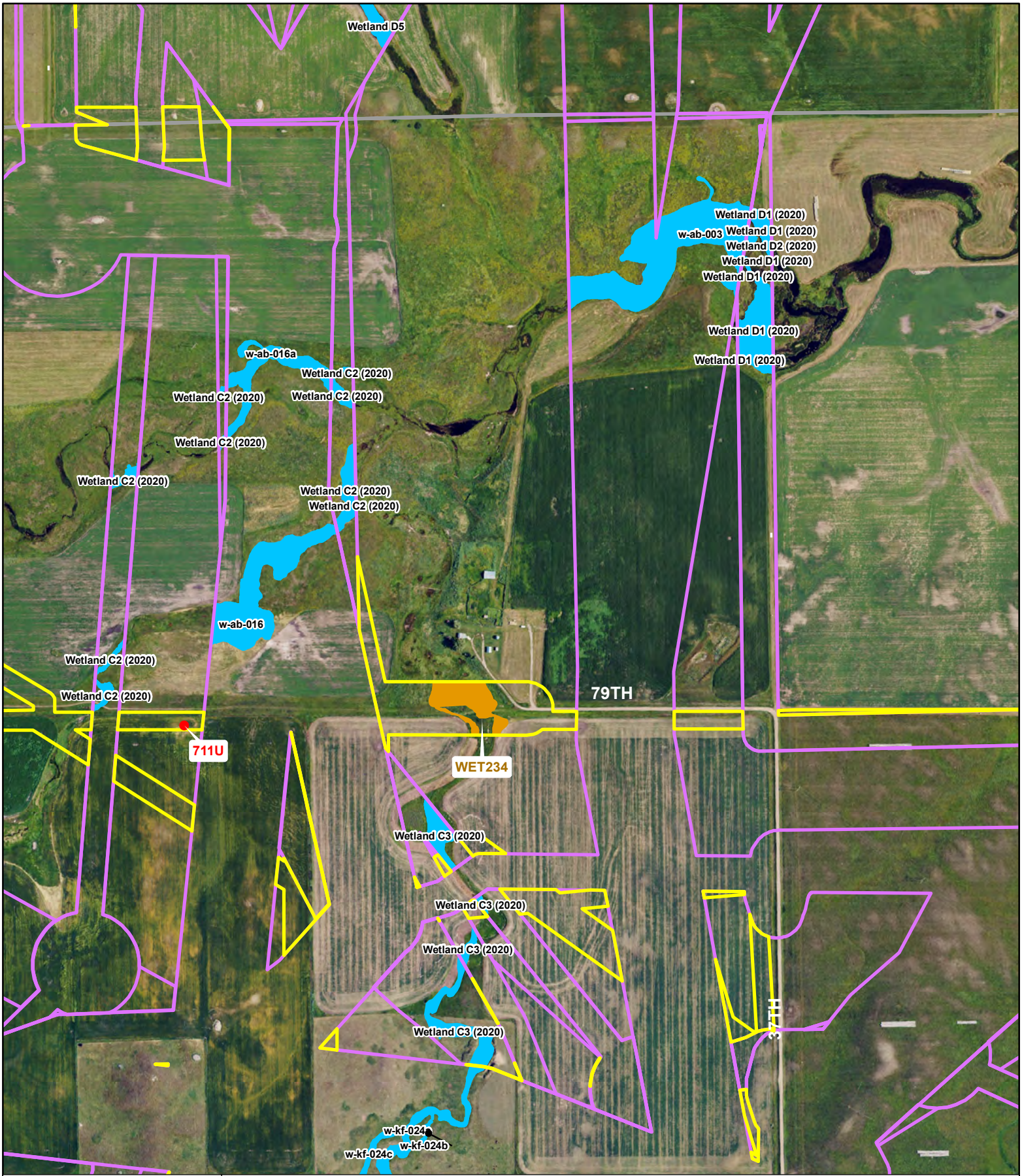
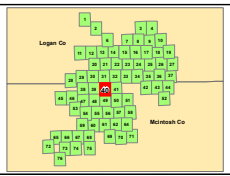


Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

Pre 2023 Wetland Survey Area

County Boundary

State Highway

2023 Surveyed Wetlands

Field Delineated

Field Mapped

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Surveyed Wetlands

Field Delineated

N W E S

0 0.1 0.2 mi

0 0.2 0.4 km

Data Source: NAIP 2023
Coordinate System: UTM, WGS84, zn 14
Map Produced: 01/25/2024. Created by: T. Thorn

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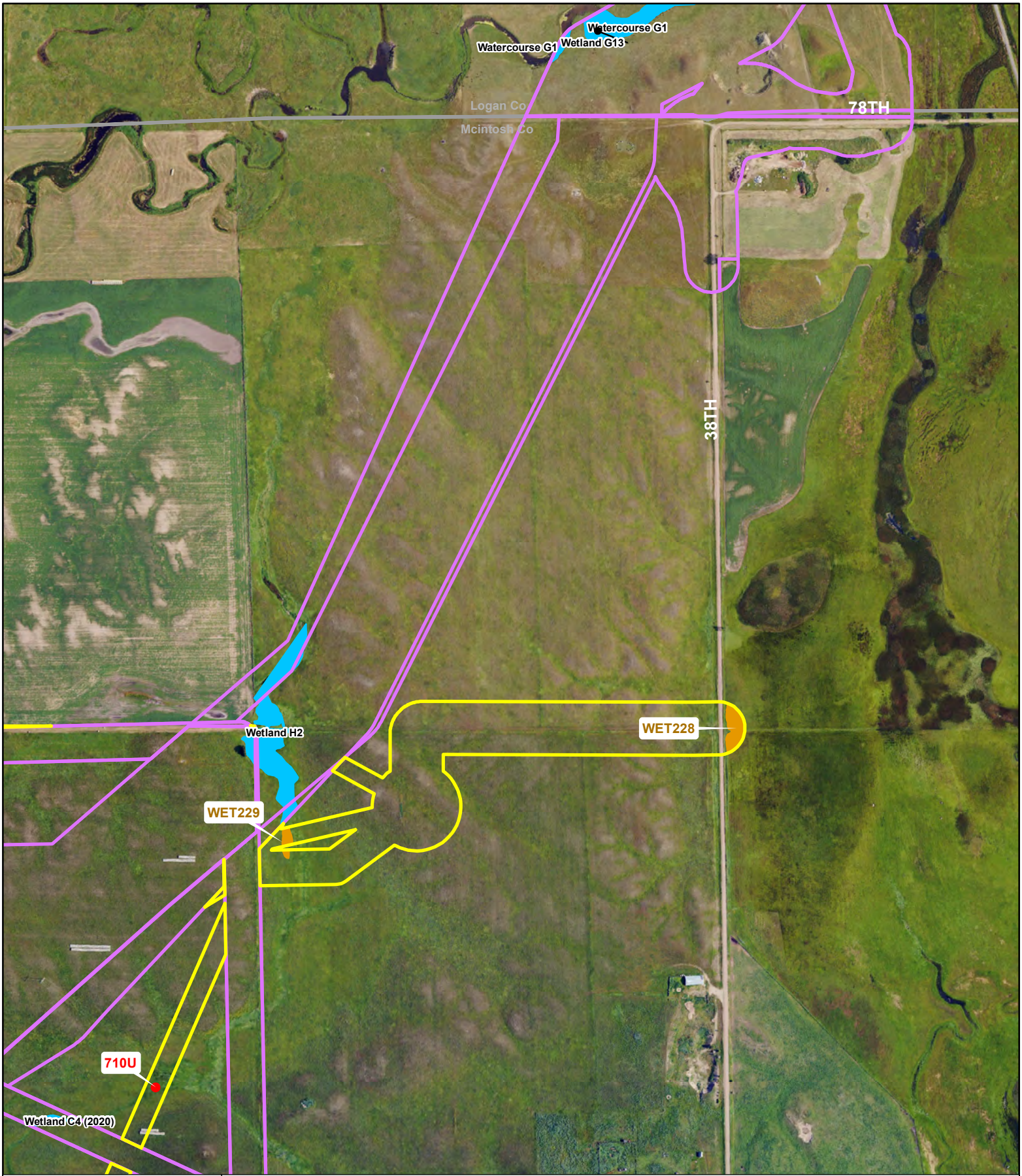
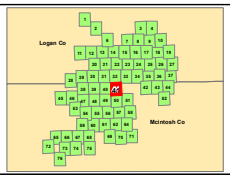


Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

2023 Surveyed Wetlands

Field Delineated Field Mapped

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Pre 2023 Wetland Survey Area

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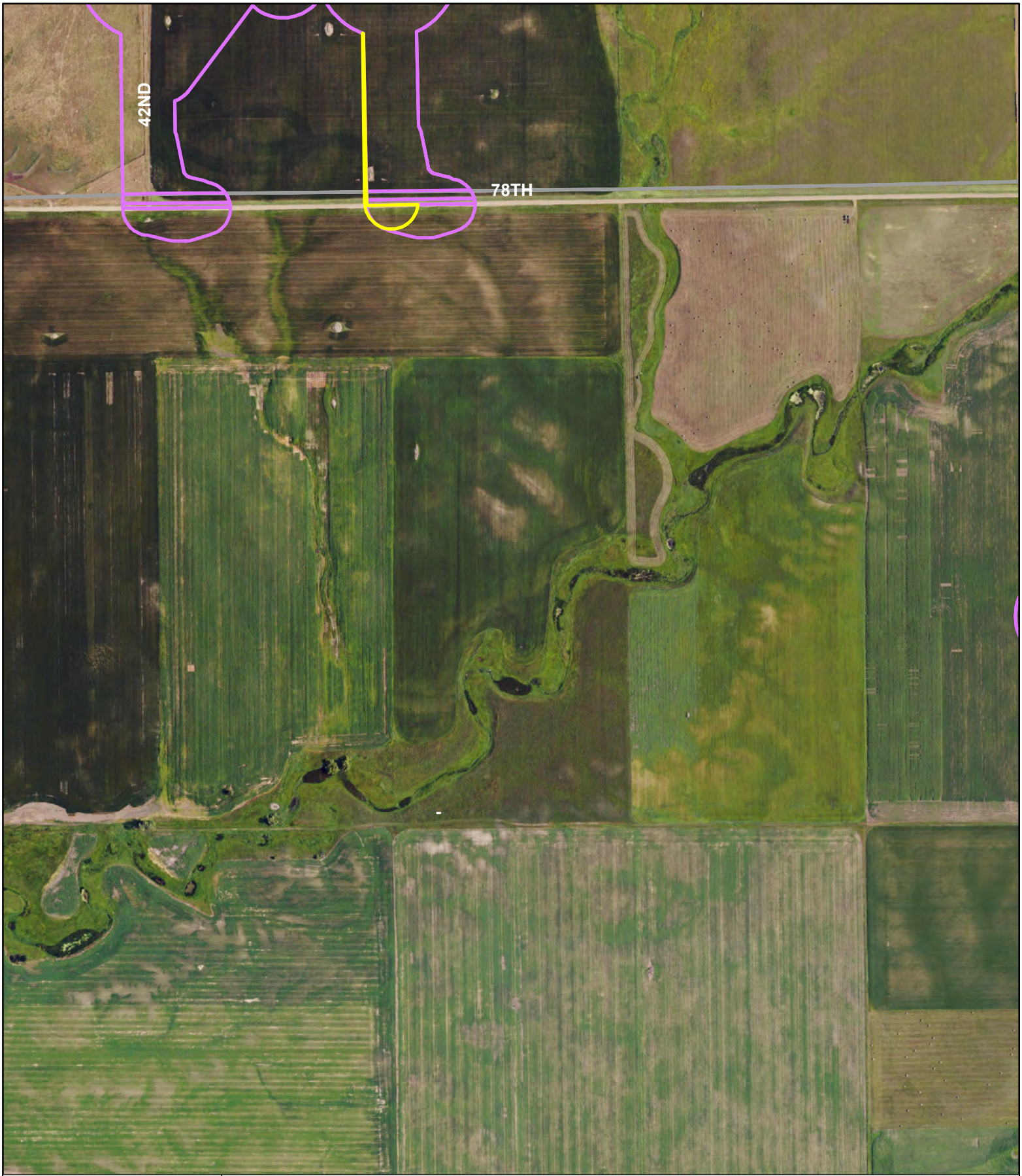
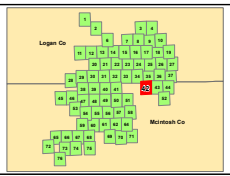


Badger Wind Project

Logan & McIntosh Counties, ND



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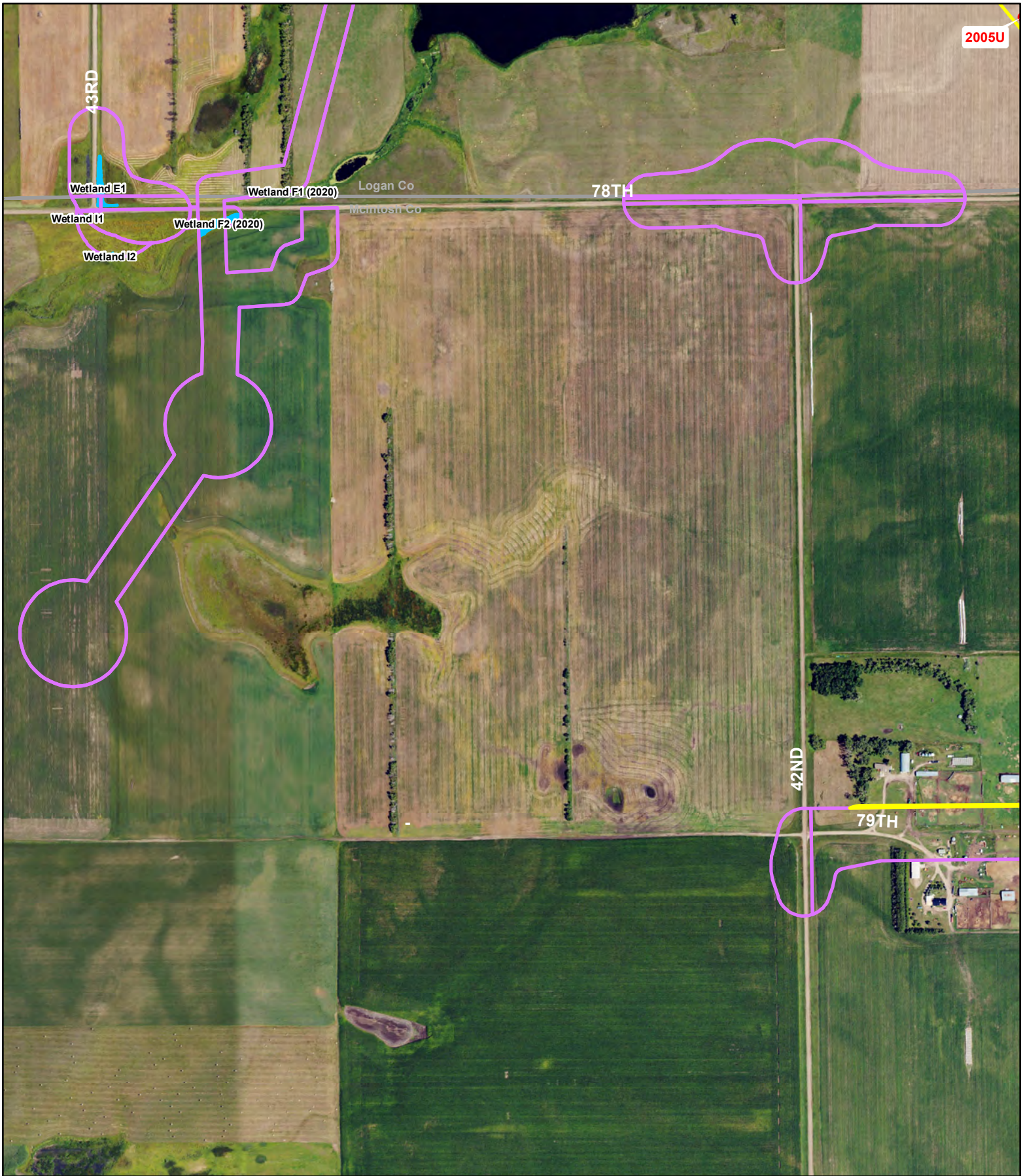
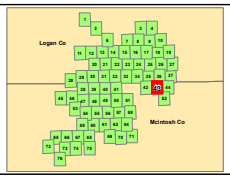


Badger Wind Project

Logan & McIntosh Counties, ND



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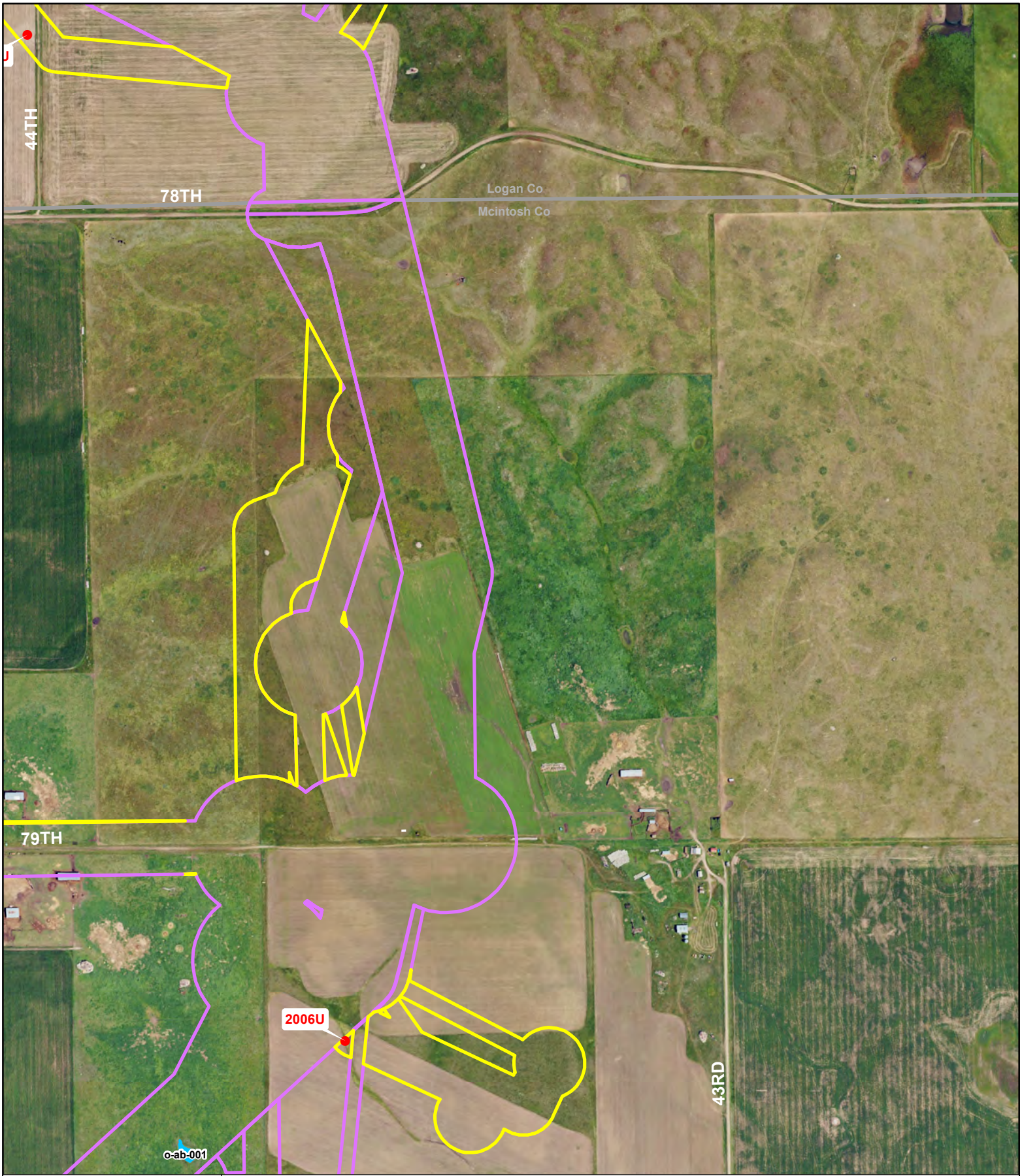
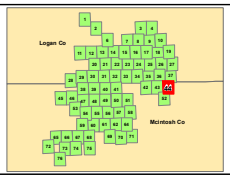


Badger Wind Project

Logan & McIntosh Counties, ND



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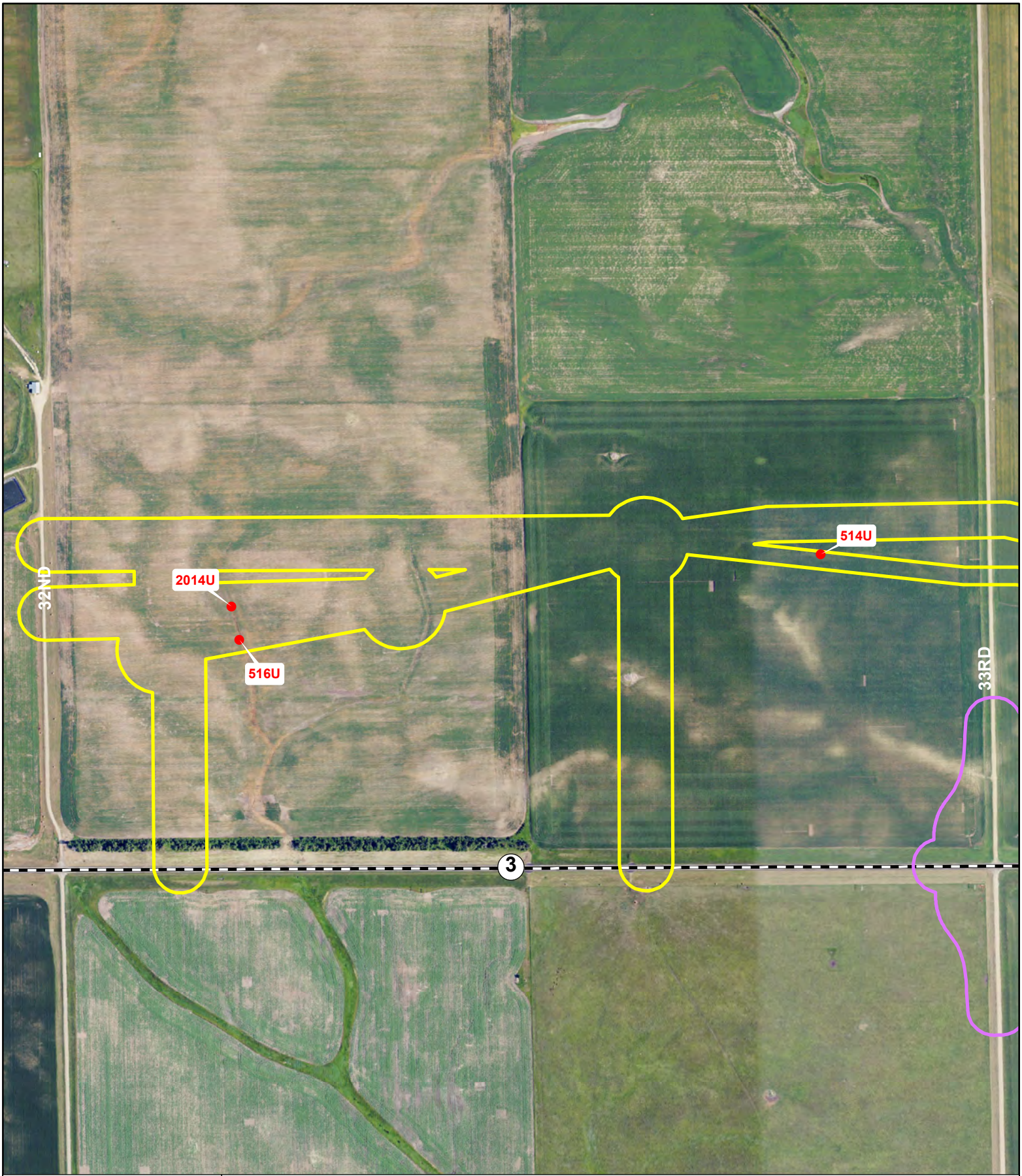
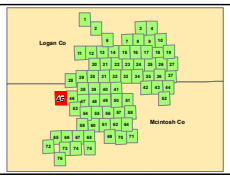


Badger Wind Project

Logan & McIntosh Counties, ND



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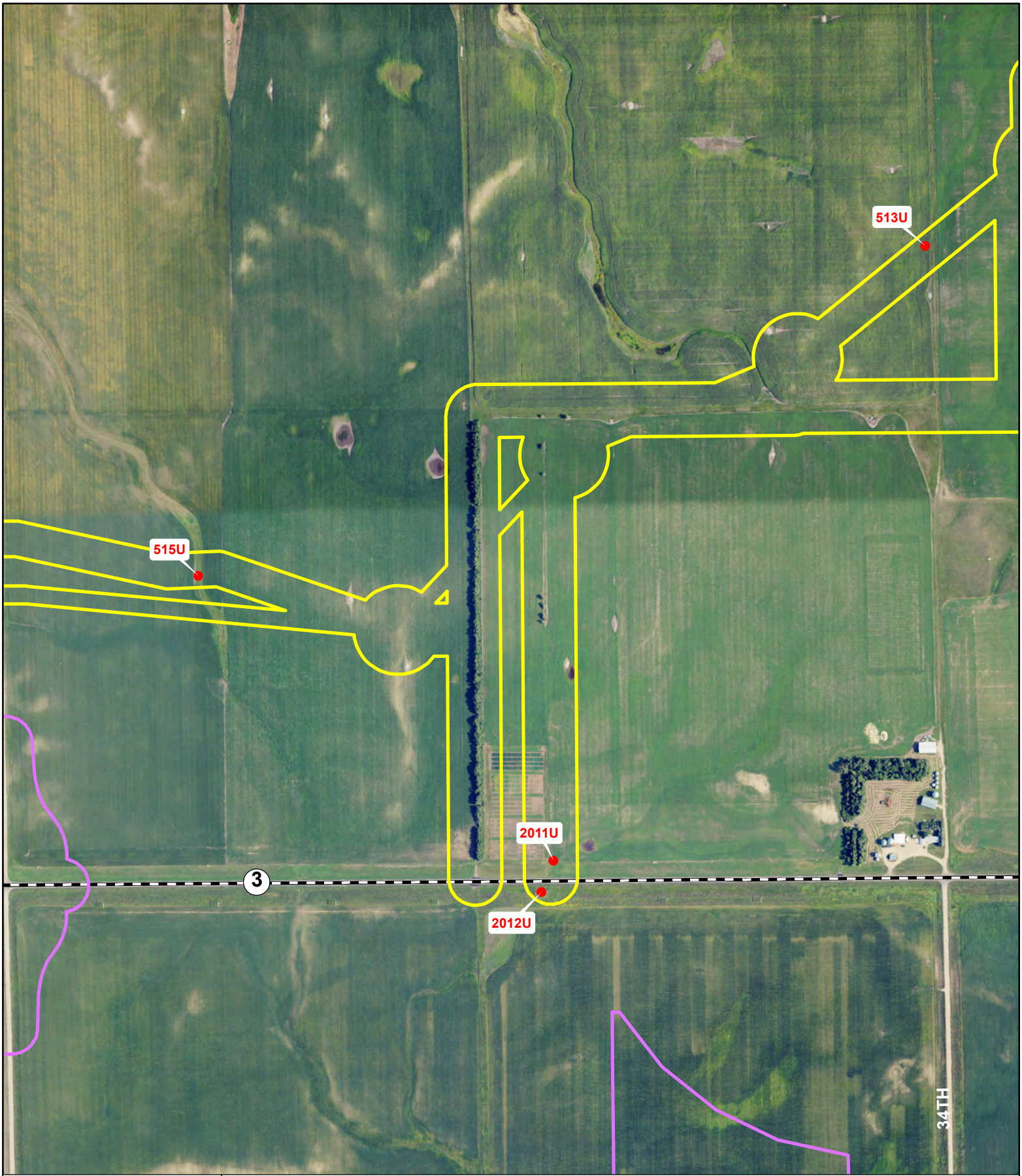
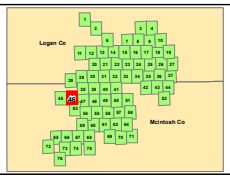


Badger Wind Project

Logan & McIntosh Counties, ND



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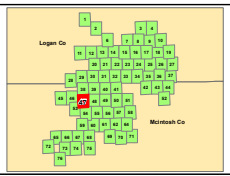
Badger Wind Project

Logan & McIntosh Counties, ND



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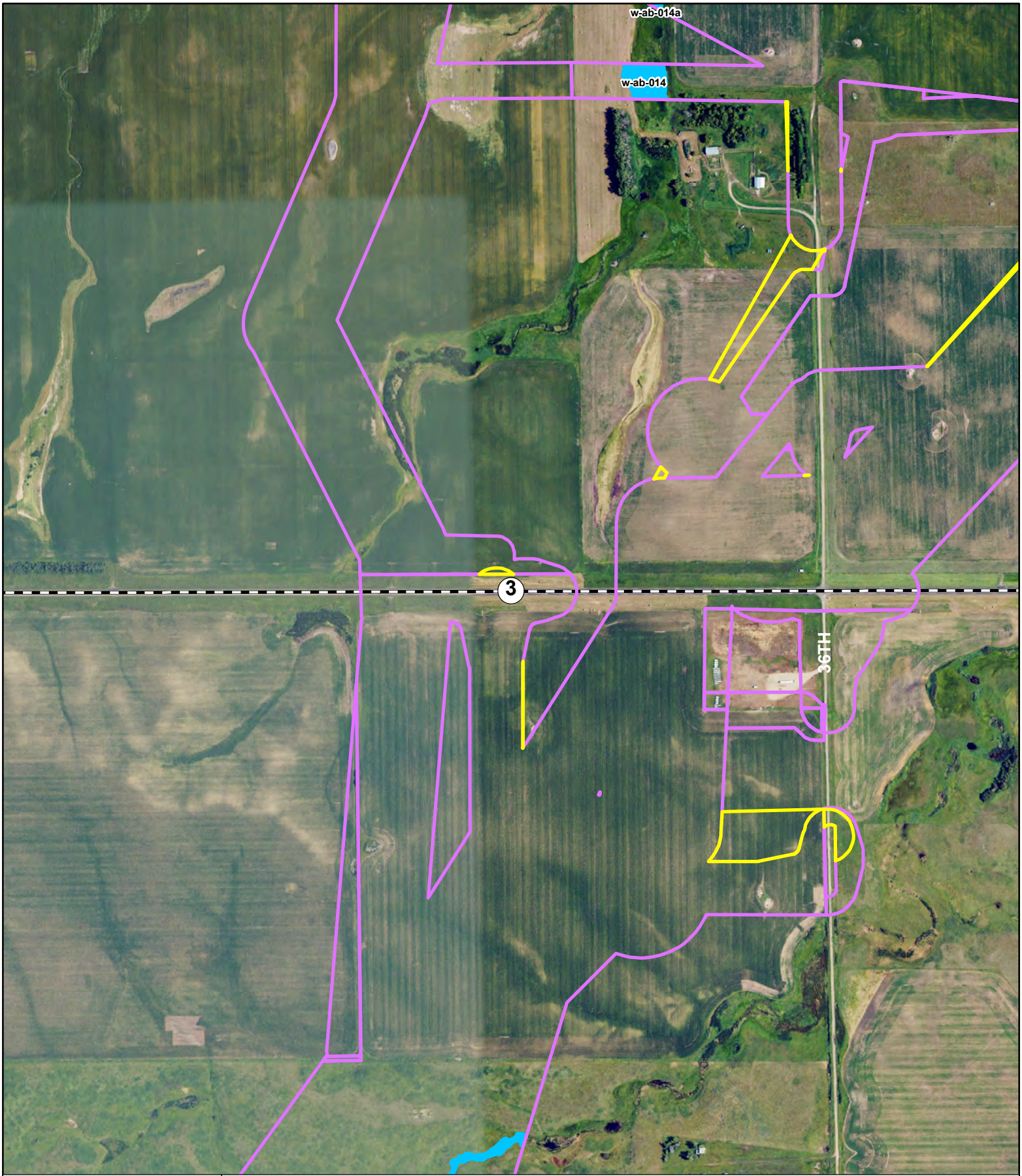
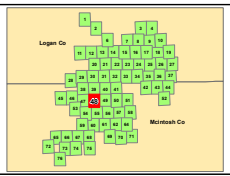


Badger Wind Project

Logan & McIntosh Counties, ND



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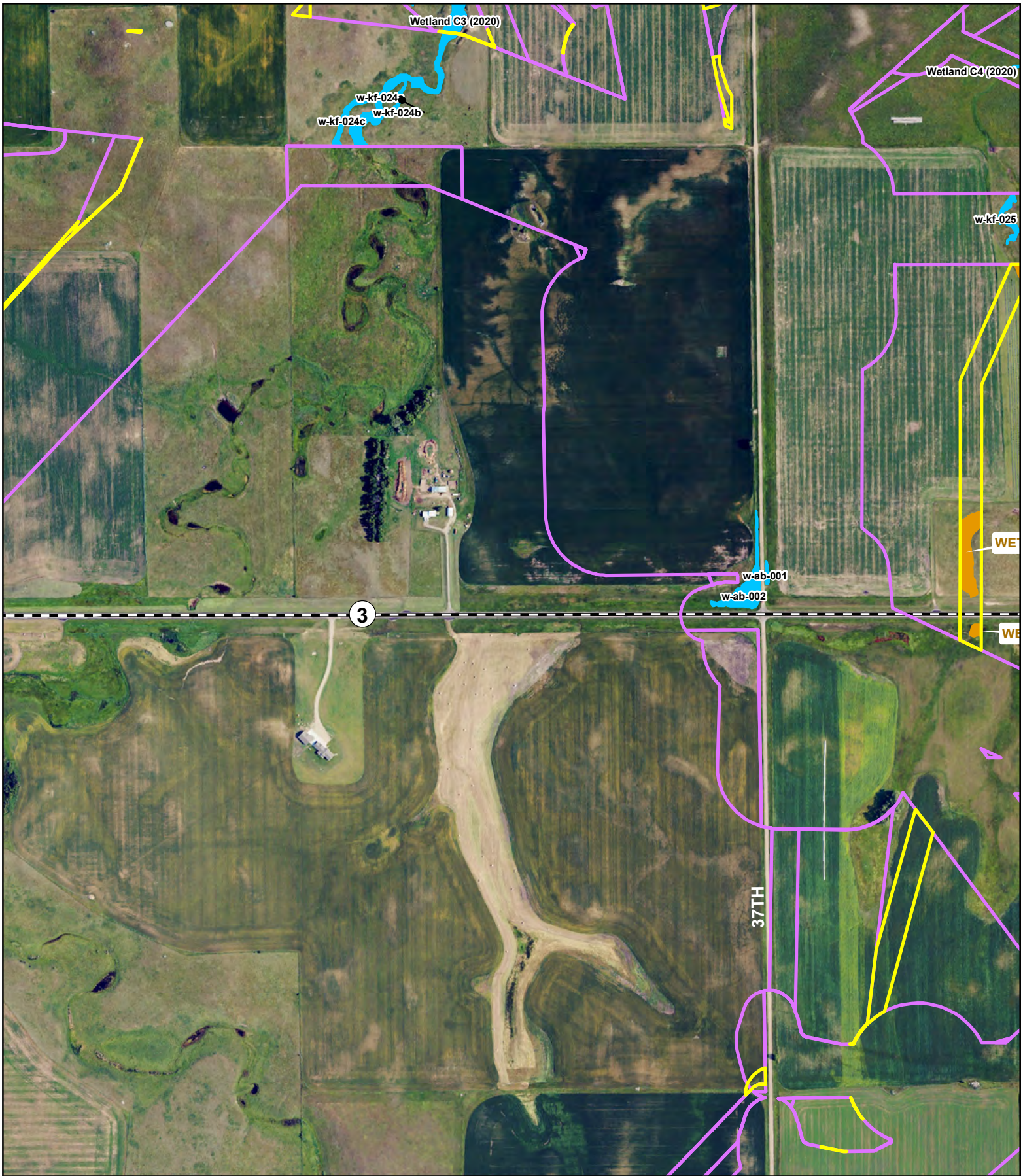
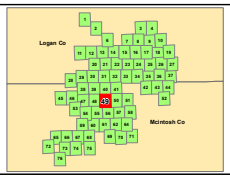


Badger Wind Project

Logan & McIntosh Counties, ND



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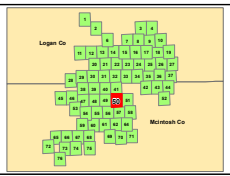
Badger Wind Project

Logan & McIntosh Counties, ND



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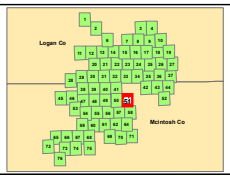
Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

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Field Delineated Field Mapped

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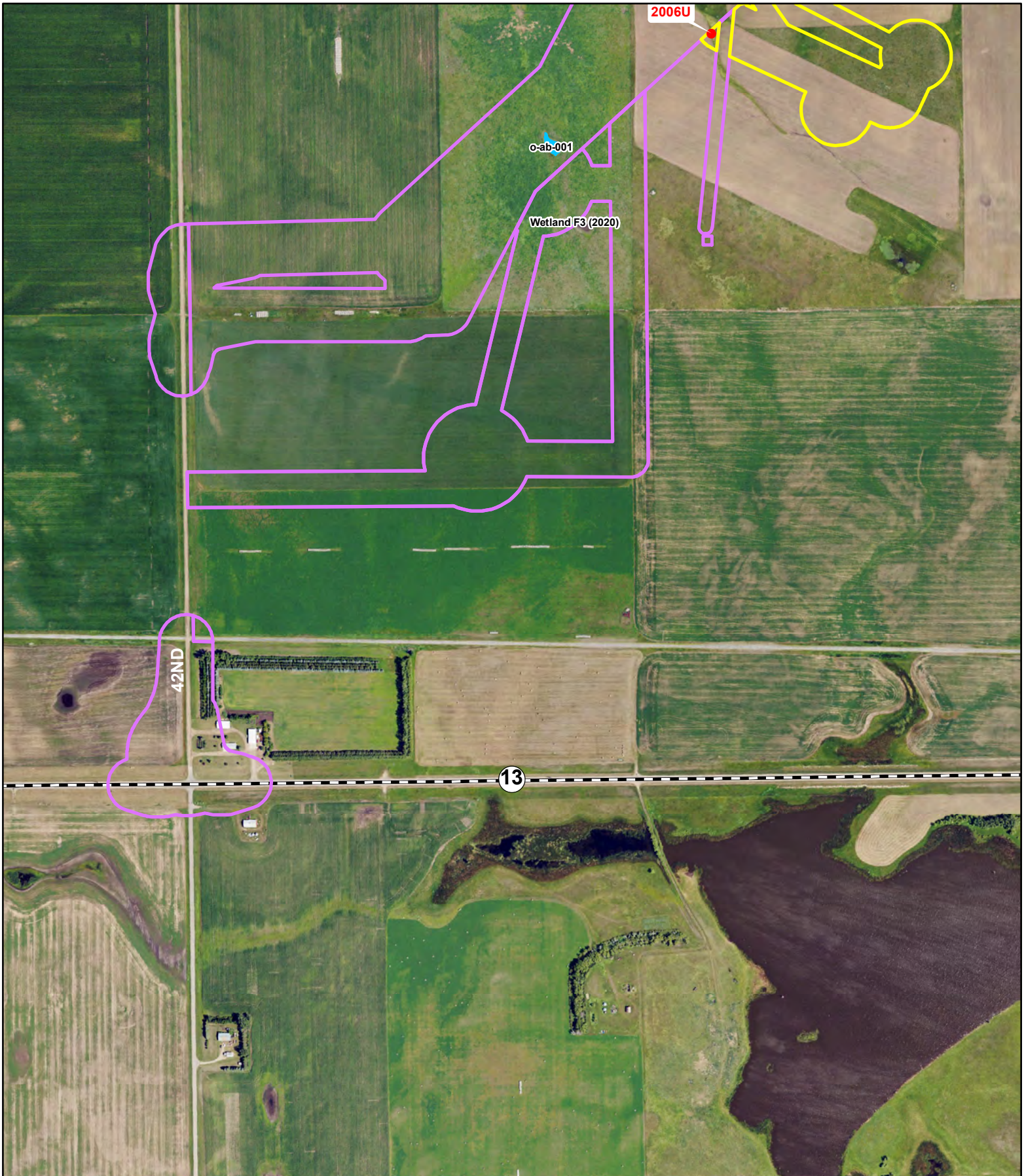
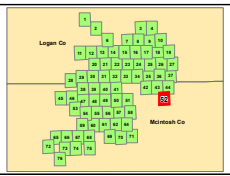


Badger Wind Project

Logan & McIntosh Counties, ND



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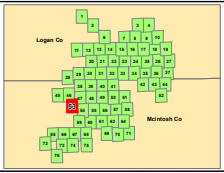
Logan & McIntosh Counties, ND



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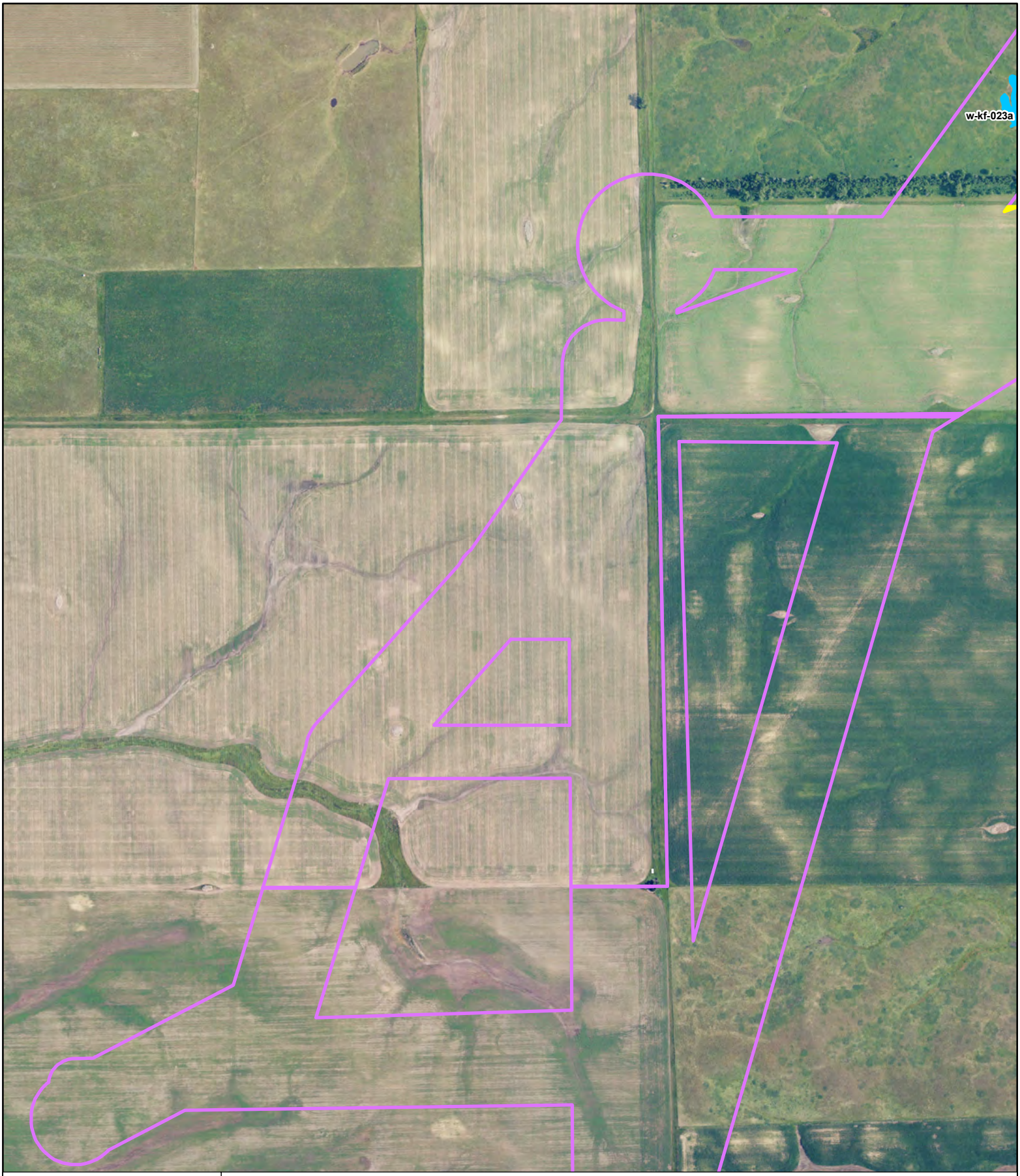
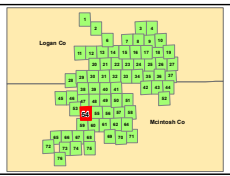


Badger Wind Project

Logan & McIntosh Counties, ND



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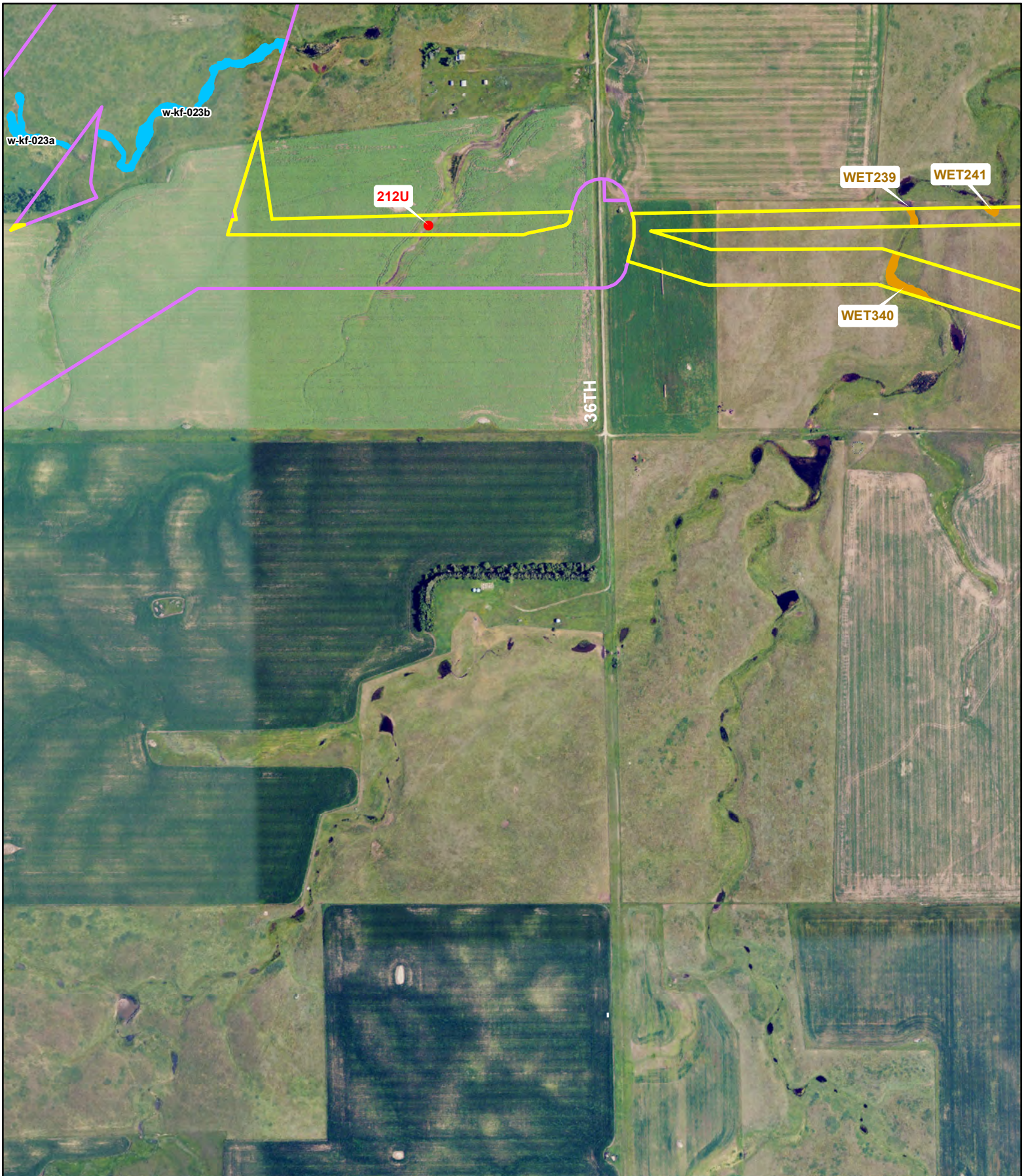

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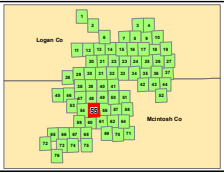
Logan & McIntosh Counties, ND



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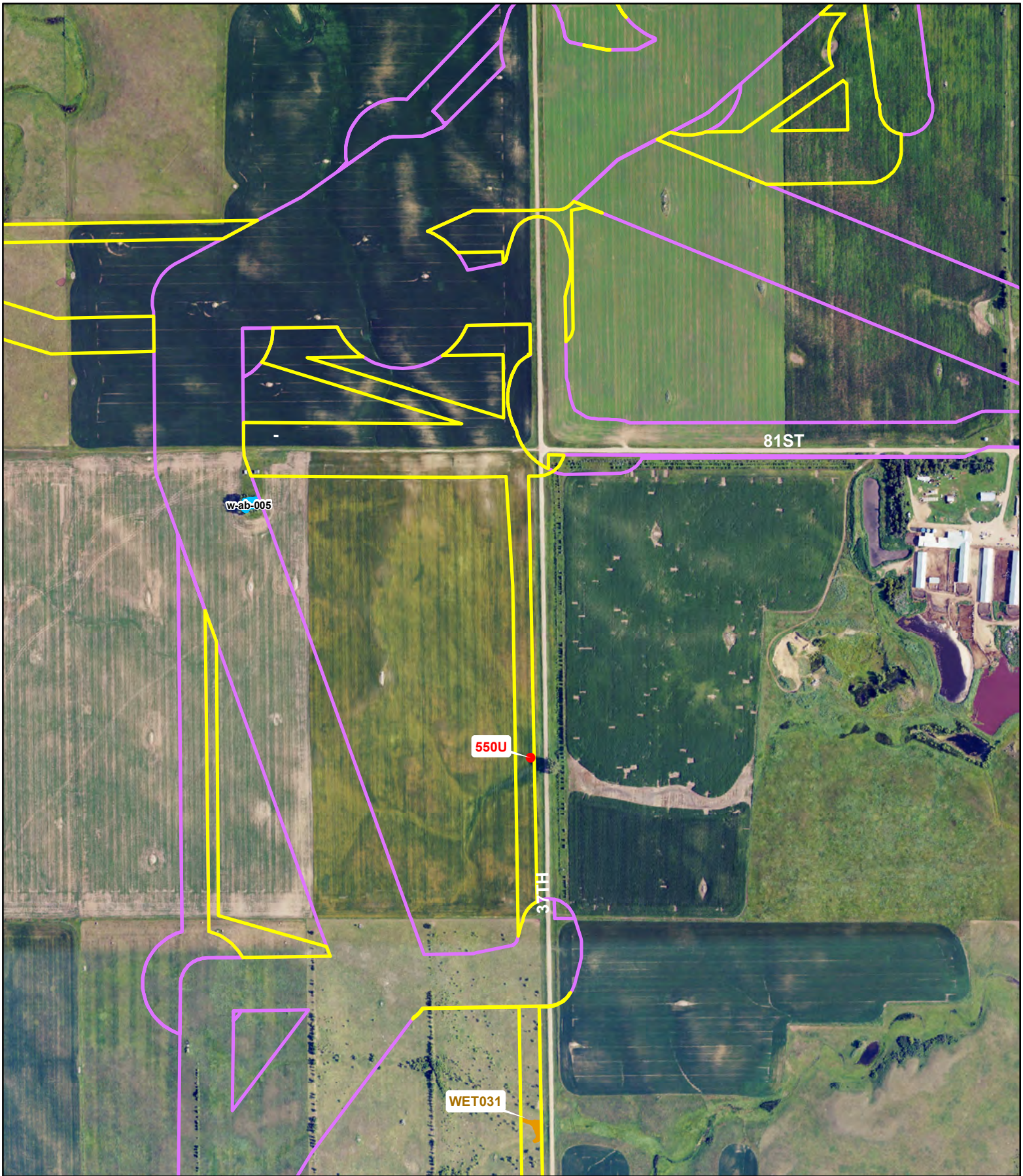
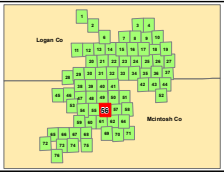


Badger Wind Project

Logan & McIntosh Counties, ND



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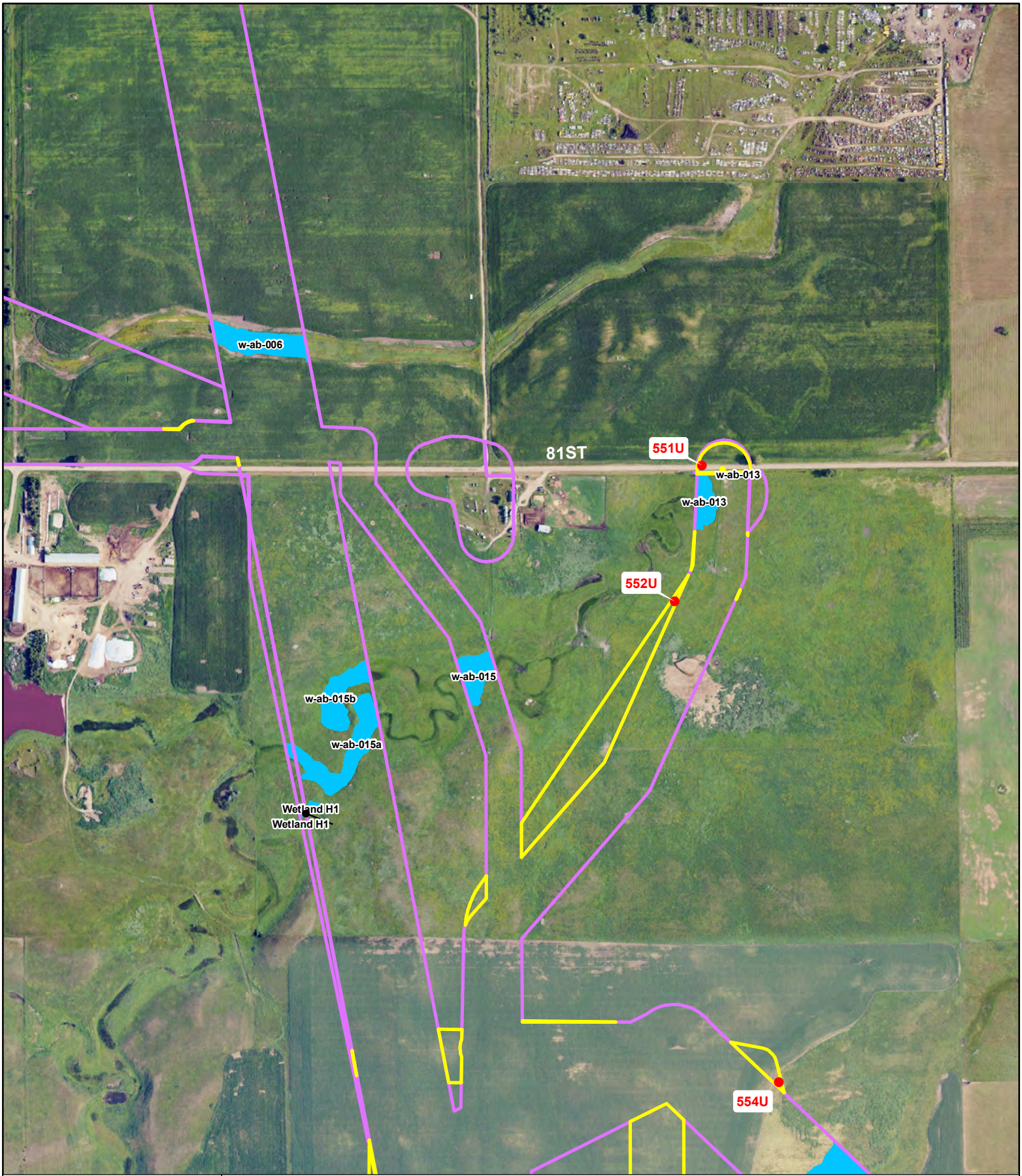
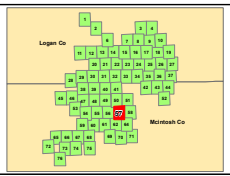


Badger Wind Project

Logan & McIntosh Counties, ND



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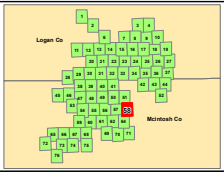
Badger Wind Project

Logan & McIntosh Counties, ND



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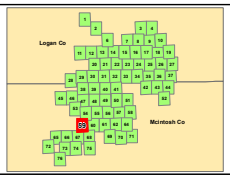

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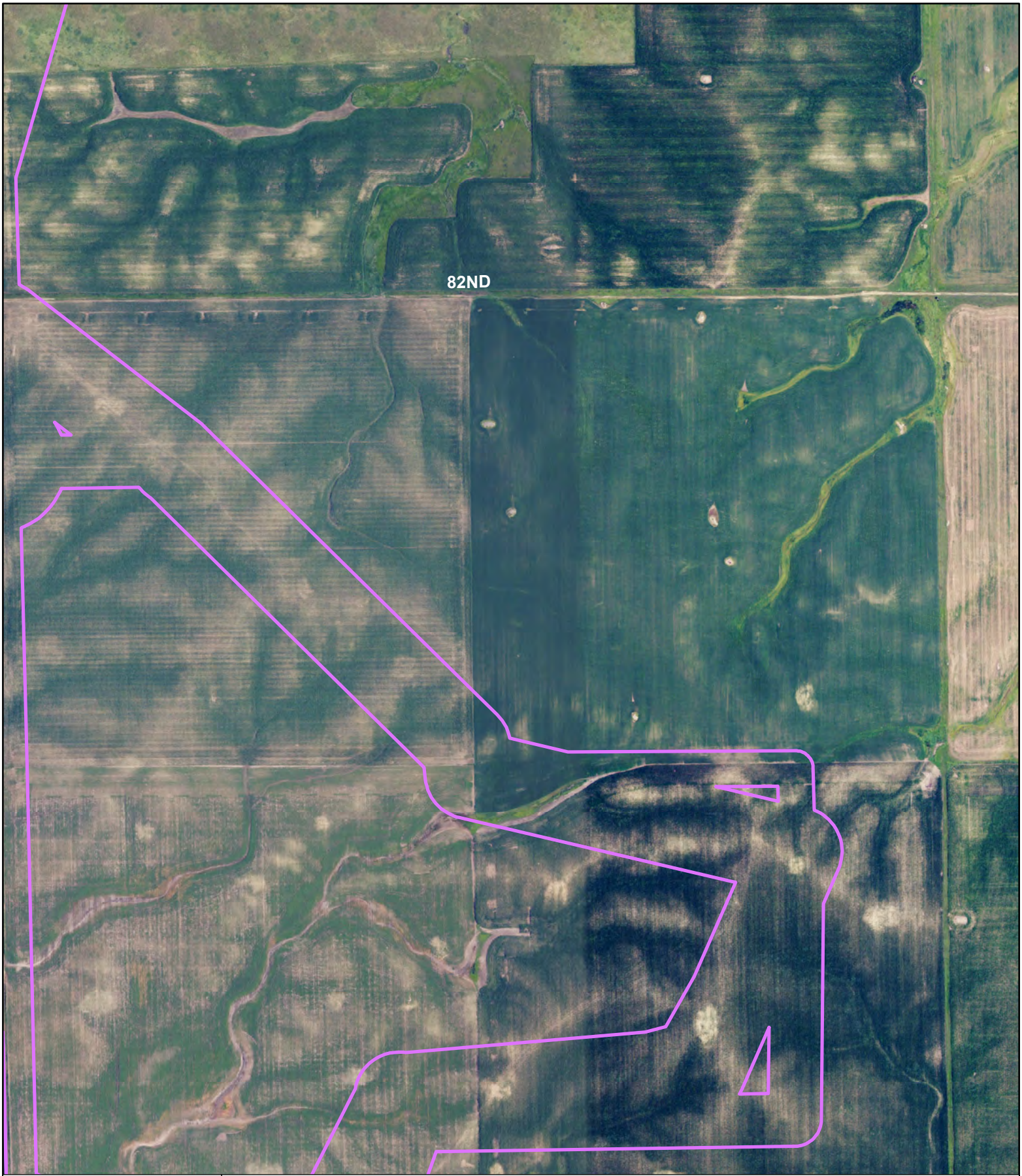
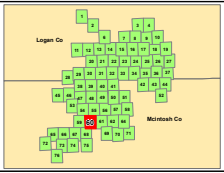


Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

2023 Surveyed Wetlands

Field Delineated

Field Mapped

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Wetland Survey Area

Pre 2023 Surveyed Wetlands

Field Delineated

County Boundary

State Highway

N W E S

0 0.1 0.2 mi

0 0.2 0.4 km

Data Source: NAIP 2023
Coordinate System: UTM, WGS84, zn 14
Map Produced: 01/25/2024. Created by: T. Thorn

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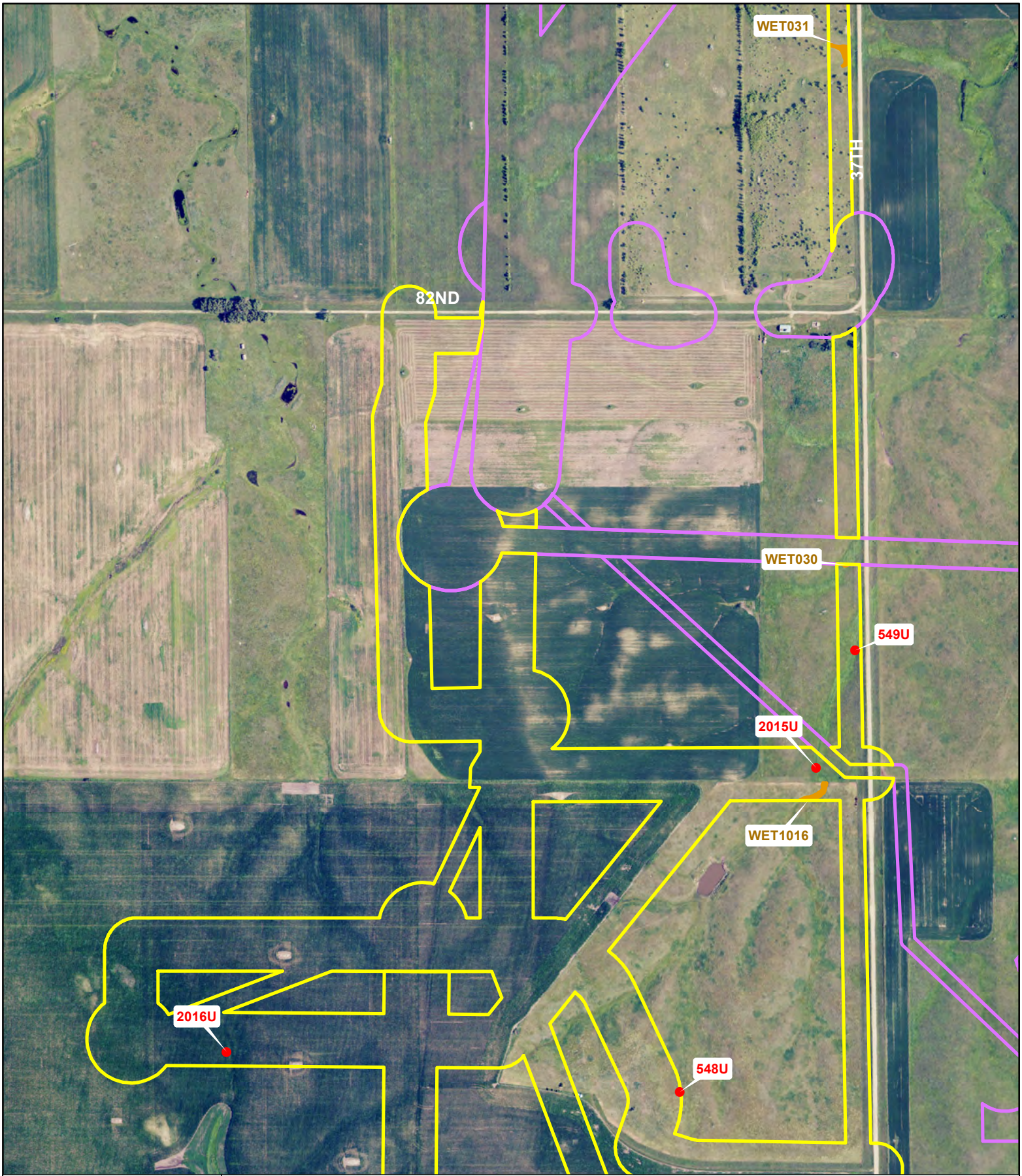
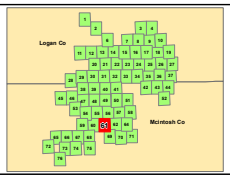


Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

2023 Surveyed Wetlands

Field Delineated Field Mapped

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Wetland Survey Area

Pre 2023 Surveyed Wetlands

Field Delineated

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0 0.1 0.2 mi

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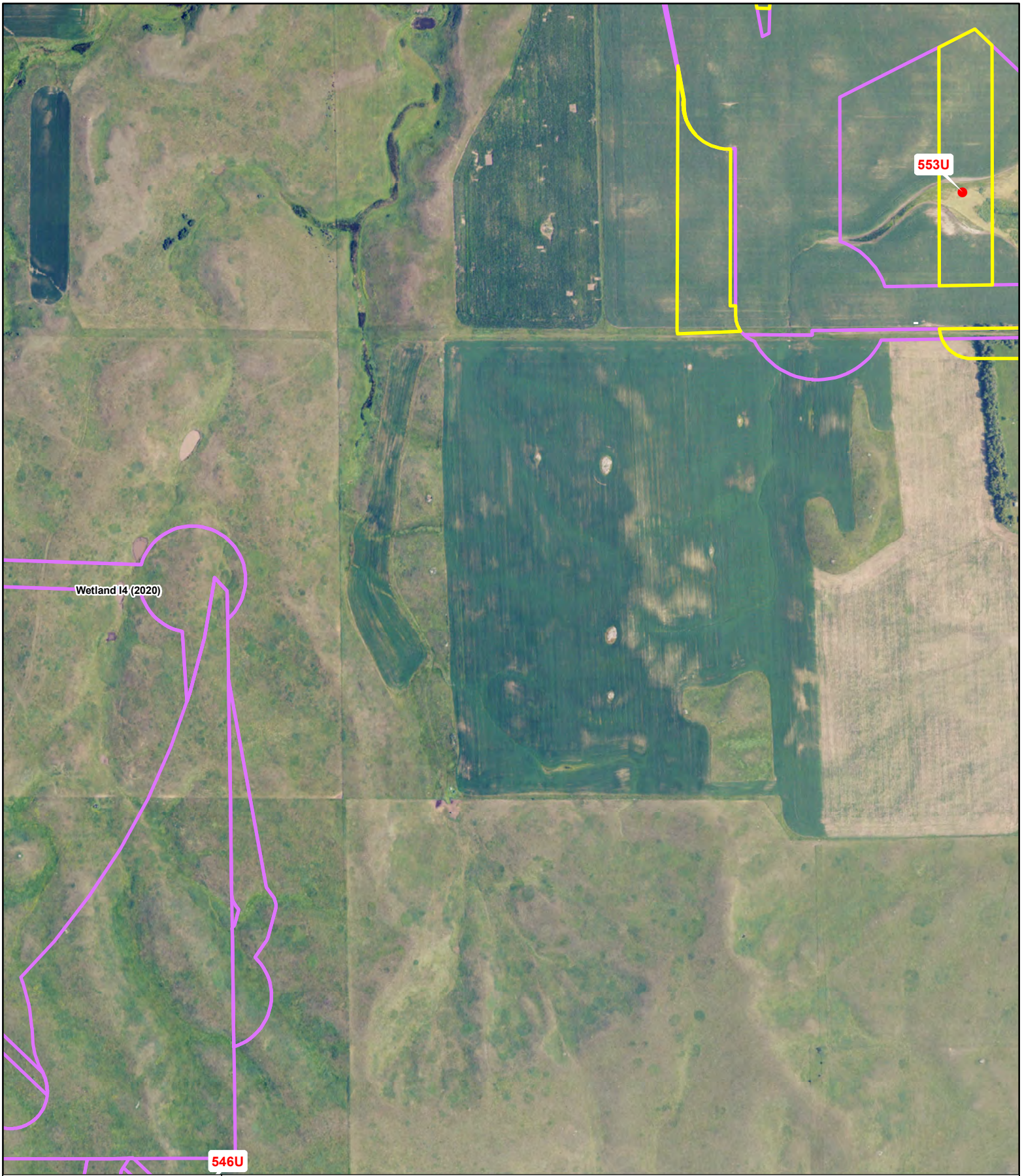
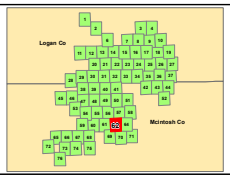


Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

Pre 2023 Wetland Survey Area

County Boundary

State Highway

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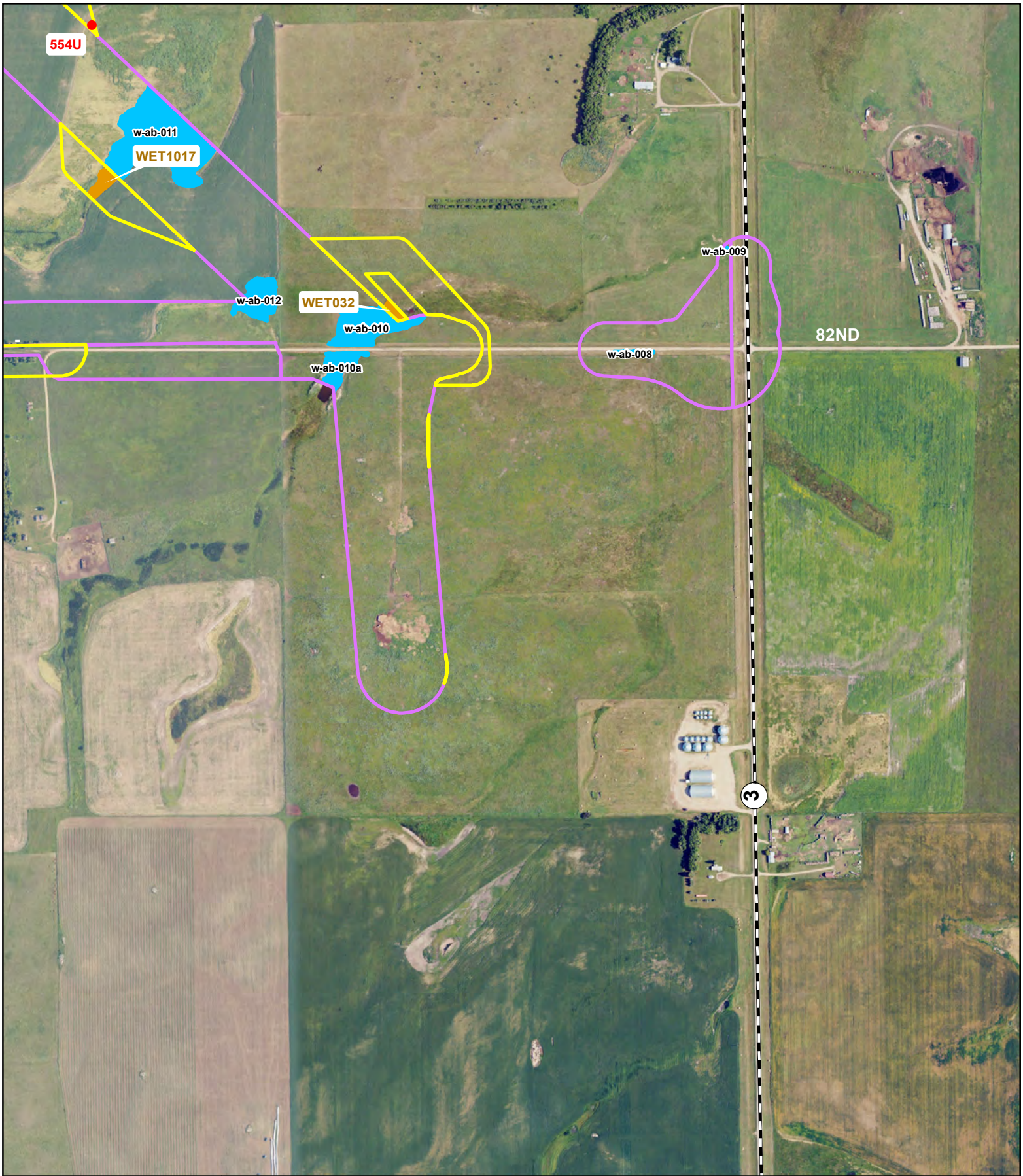
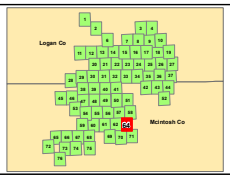


Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

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Field Delineated Field Mapped

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Wetland Survey Area

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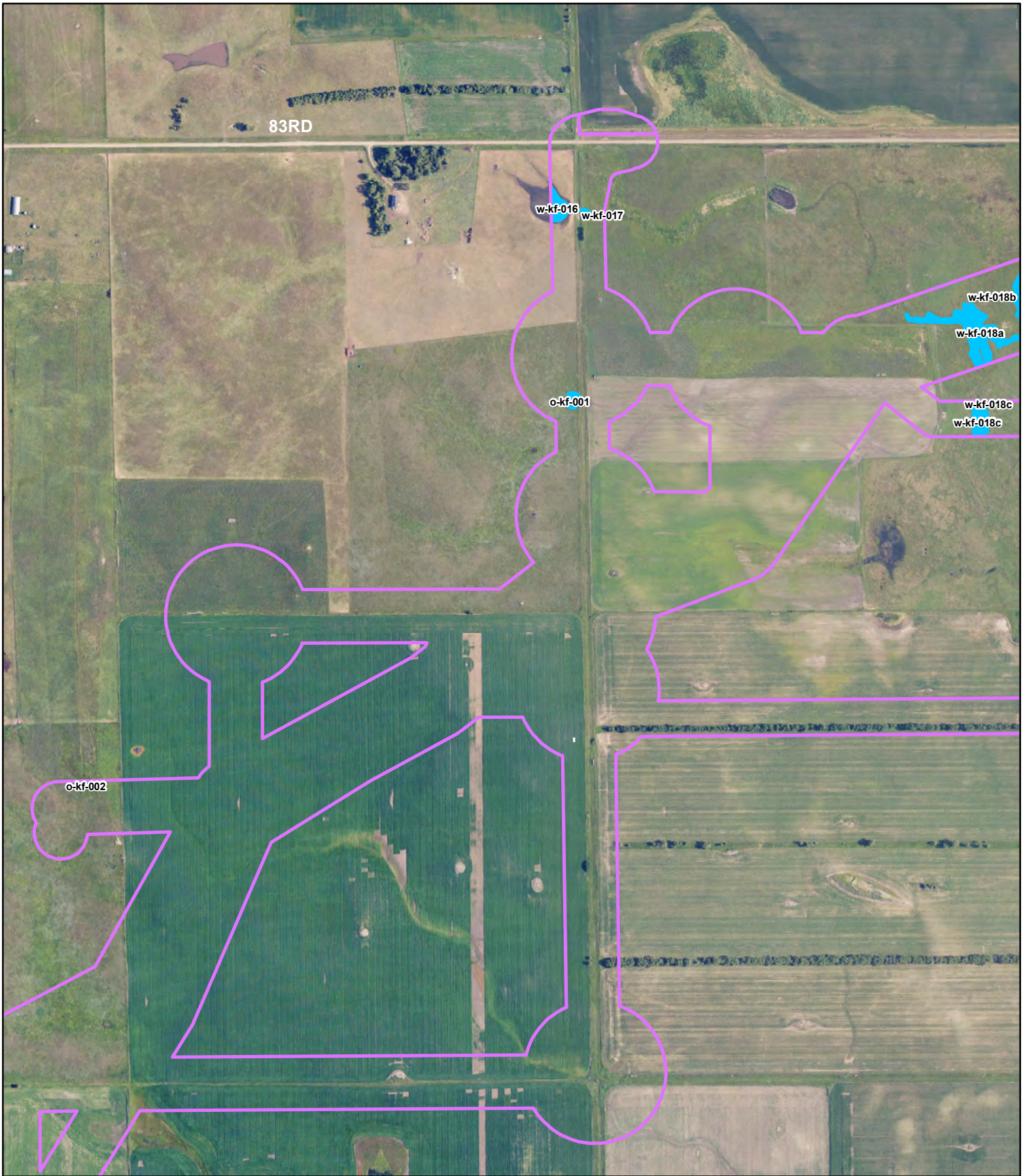
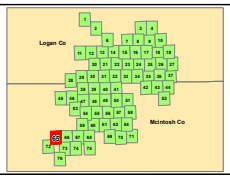


Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

2023 Surveyed Wetlands

Field Delineated **Field Mapped**

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Wetland Survey Area

Pre 2023 Surveyed Wetlands

Field Delineated

County Boundary

State Highway

N W E S

0 0.1 0.2 mi

0 0.2 0.4 km

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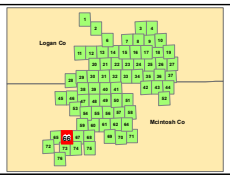
WEST



Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

2023 Surveyed Wetlands

Field Delineated Field Mapped

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Wetland Survey Area

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Field Delineated

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N W E S

0 0.1 0.2 mi

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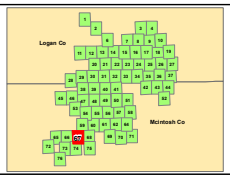
Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

2023 Surveyed Wetlands

Field Delineated **Field Mapped**

Non WOTUS Points

Wetland/Upland Sample Points

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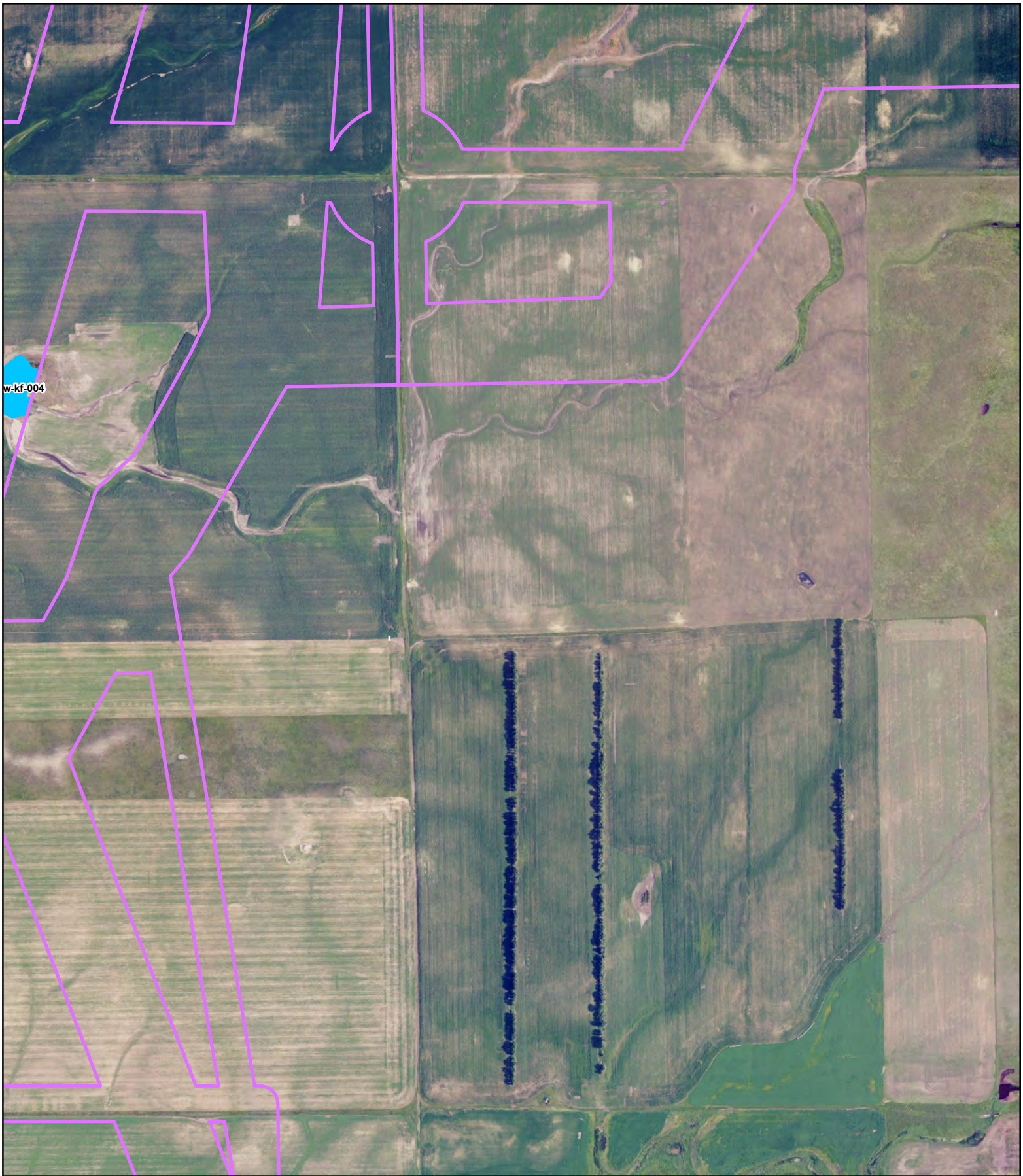
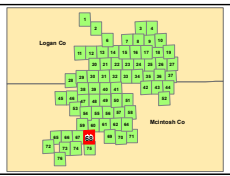


Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

2023 Surveyed Wetlands

Field Delineated Field Mapped

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Wetland Survey Area

Pre 2023 Surveyed Wetlands

Field Delineated

County Boundary

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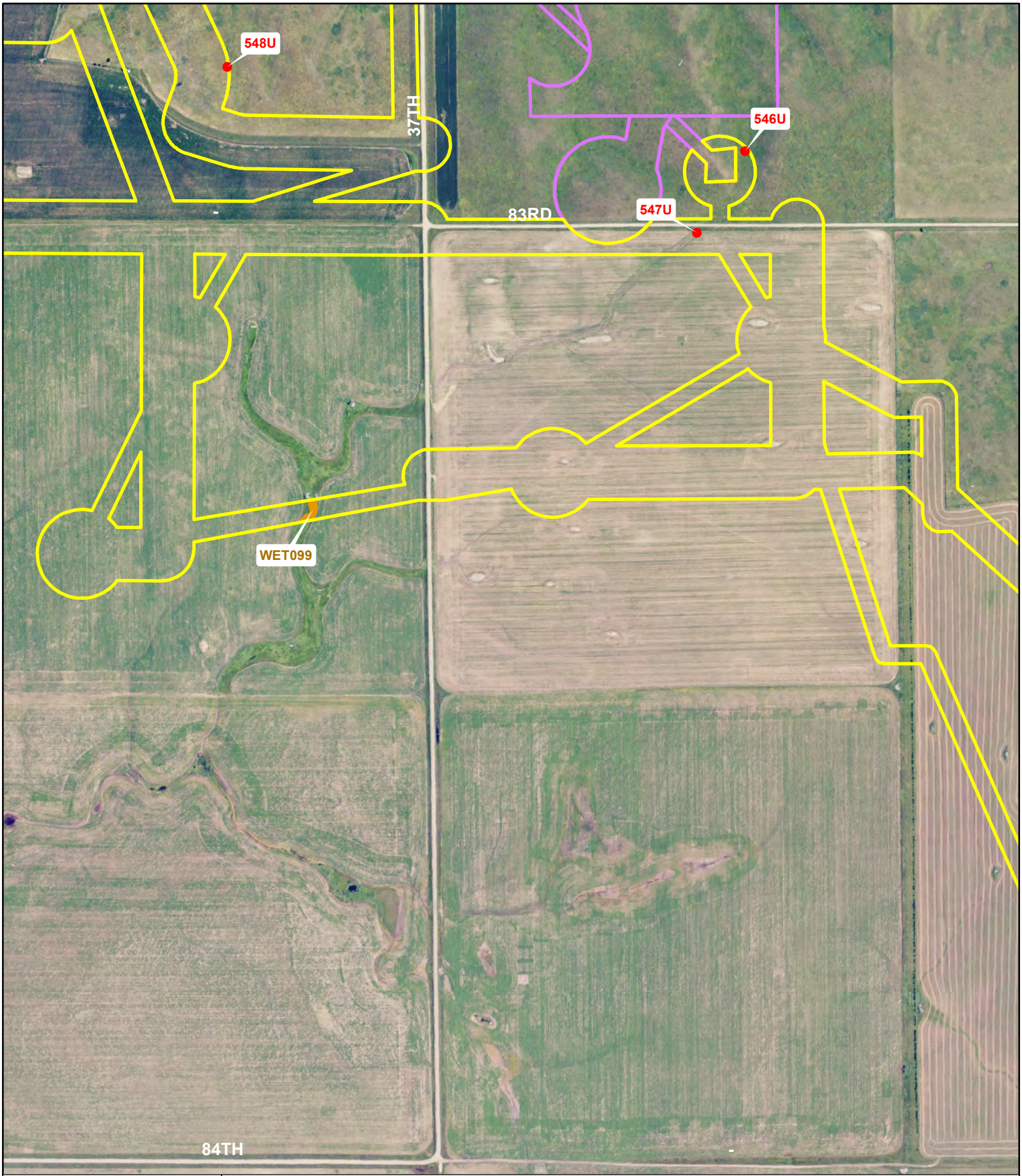
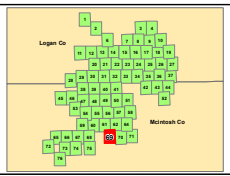


Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

Pre 2023 Wetland Survey Area

County Boundary

State Highway

2023 Surveyed Wetlands

Field Delineated

Field Mapped

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Surveyed Wetlands

Field Delineated

N W E S

0 0.1 0.2 mi

0 0.2 0.4 km

Data Source: NAIP 2023
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Map Produced: 01/25/2024. Created by: T. Thorn

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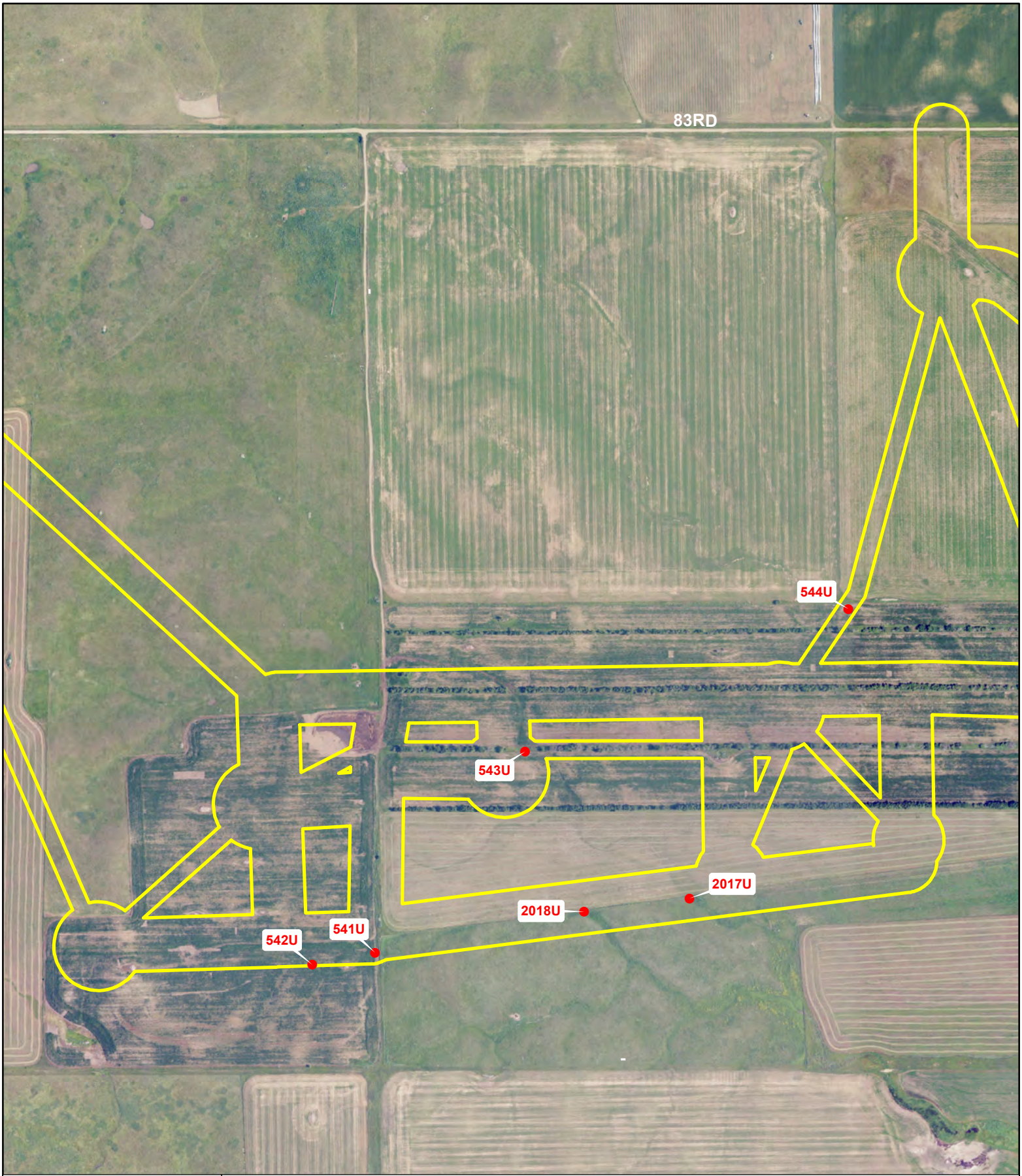
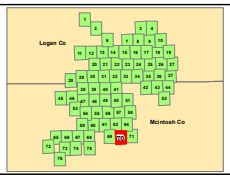


Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

2023 Surveyed Wetlands

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Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Wetland Survey Area

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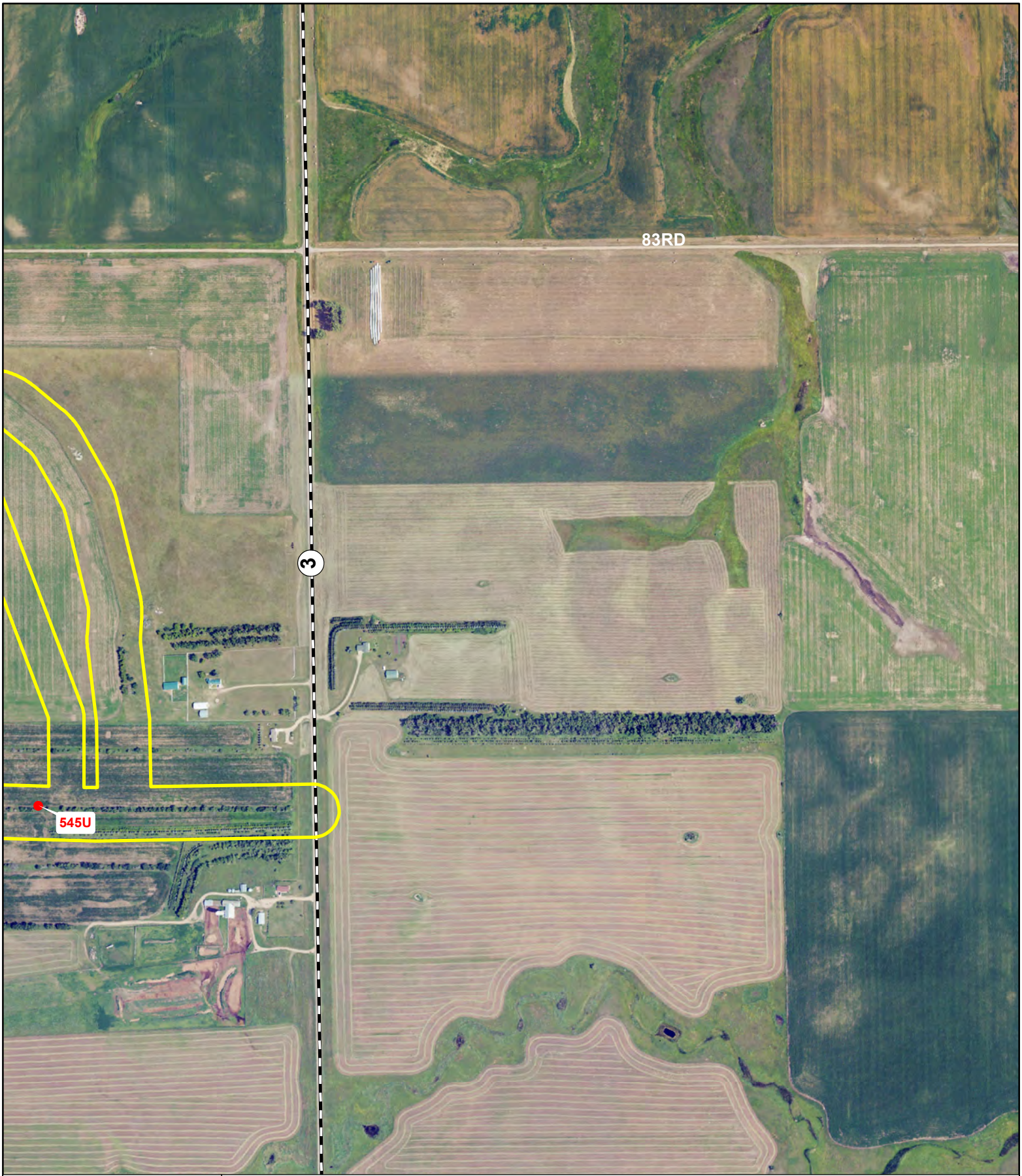
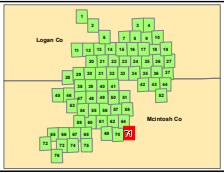


Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

2023 Surveyed Wetlands

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Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Wetland Survey Area

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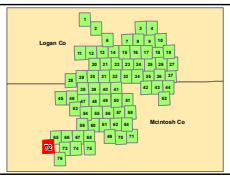
Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

2023 Surveyed Wetlands

Field Delineated

Field Mapped

Non WOTUS Points

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Pre 2023 Wetland Survey Area

Pre 2023 Surveyed Wetlands

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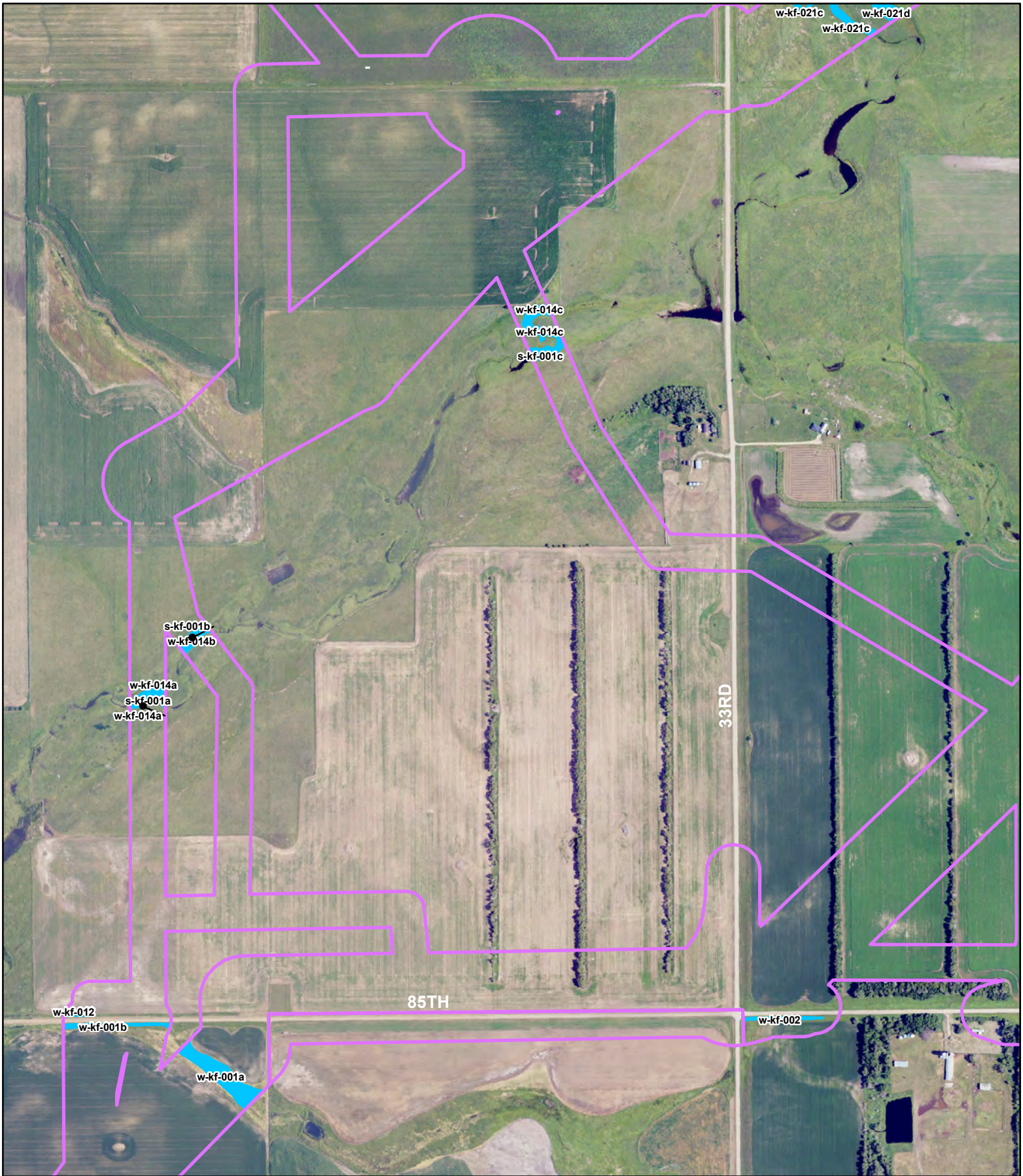
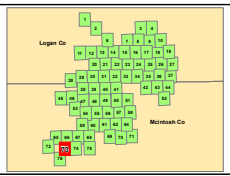


Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

Pre 2023 Wetland Survey Area

County Boundary

State Highway

2023 Surveyed Wetlands

Field Delineated

Field Mapped

Non WOTUS Points

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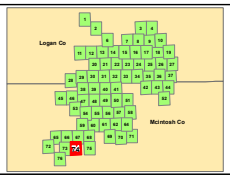
Logan & McIntosh Counties, ND



2023 Wetland Survey Area

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Wetland/Upland Sample Points

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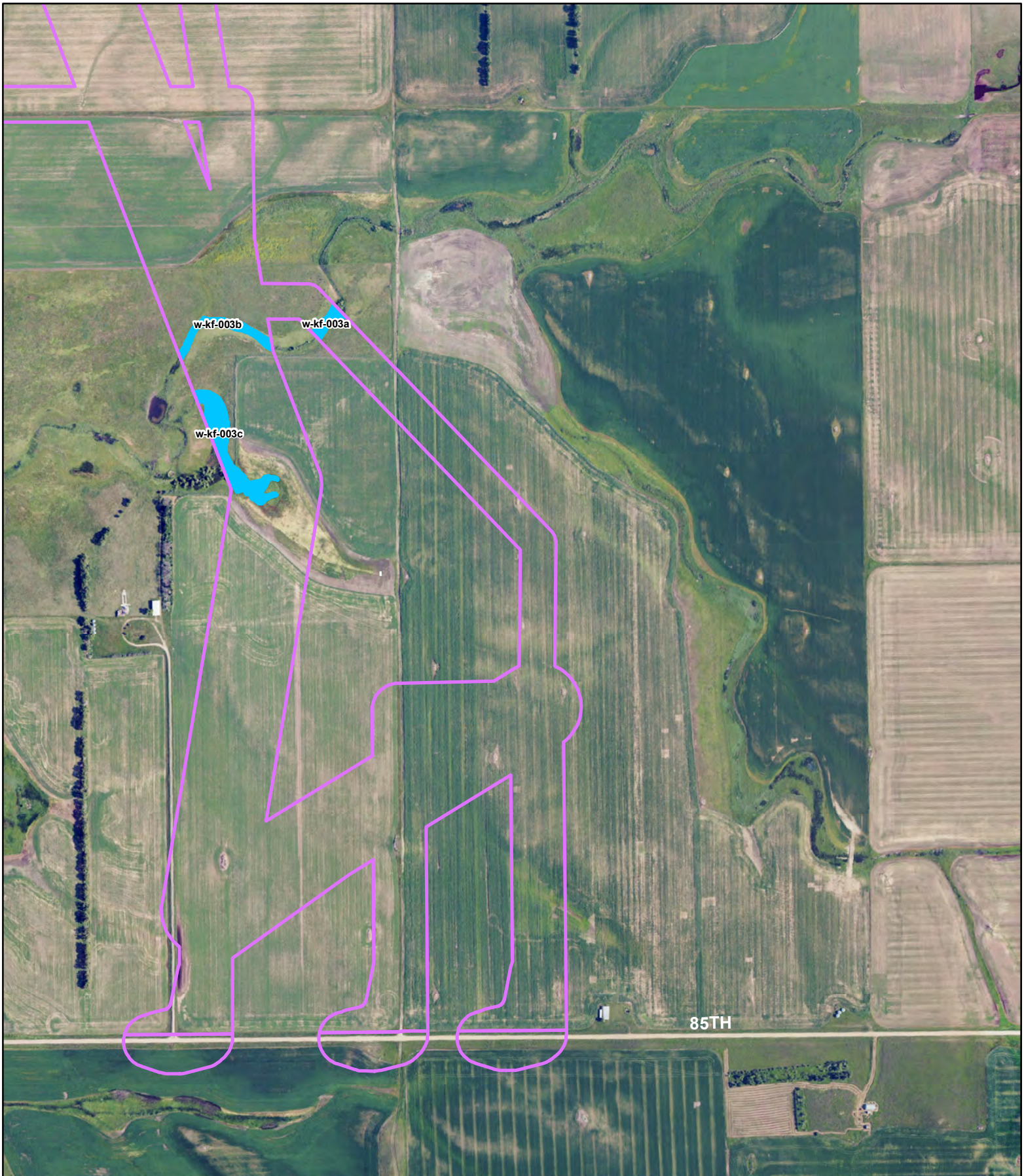
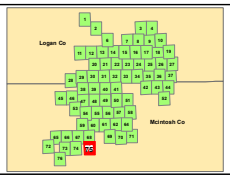


Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

2023 Surveyed Wetlands

Field Delineated **Field Mapped**

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Wetland Survey Area

Pre 2023 Surveyed Wetlands

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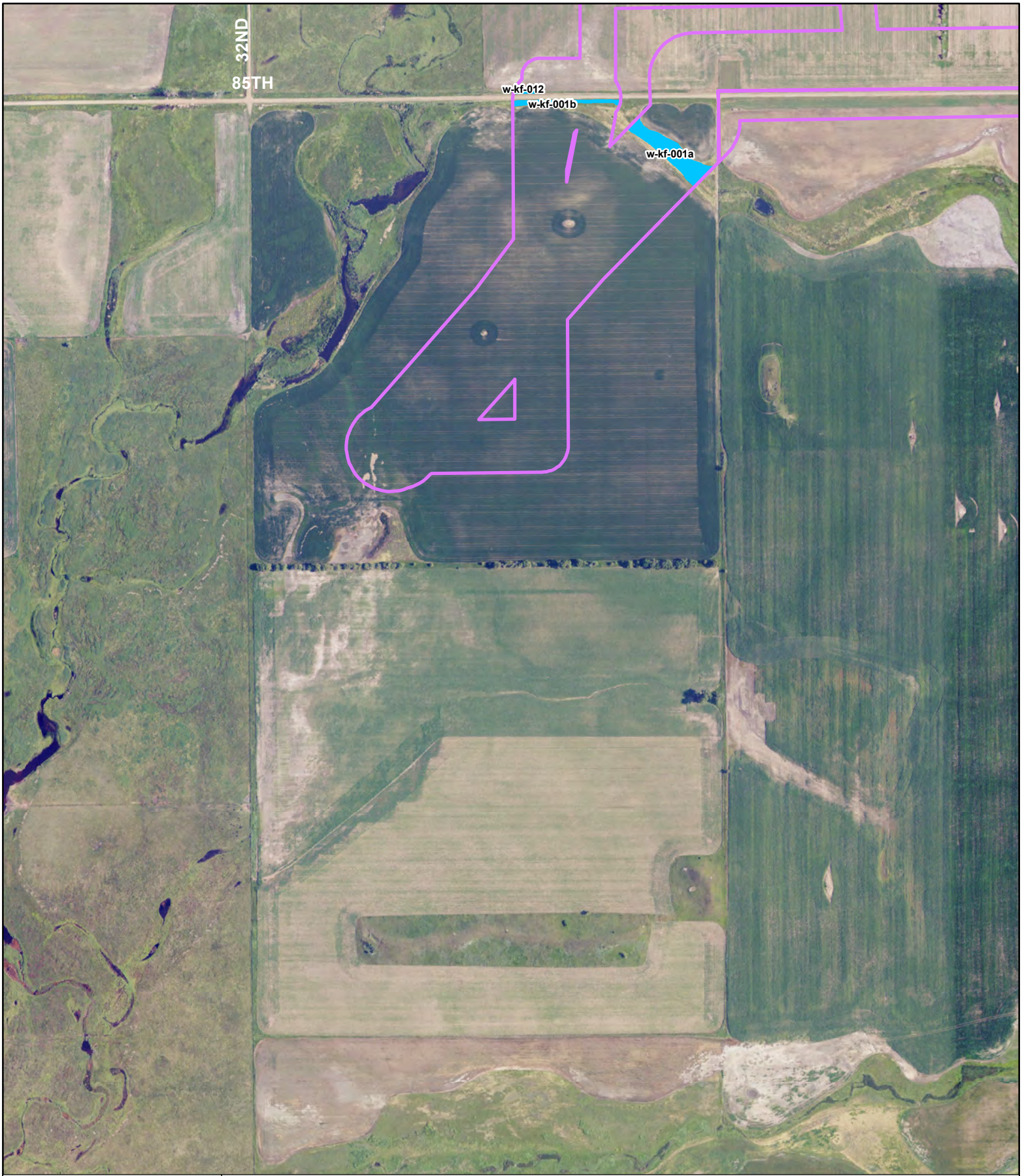
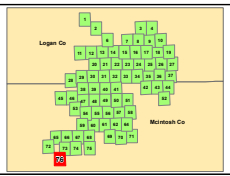


Badger Wind Project

Logan & McIntosh Counties, ND



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Map Produced: 01/25/2024. Created by: T. Thorn

WEST

Appendix B. US Army Corps of Engineers Great Plains Region Datasheets for Wetland Delineation within the 2023 Wetland Survey Area of the Badger Wind Project in Logan and McIntosh Counties, North Dakota

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-24-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 001 W
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R70W, Section 19
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 2
Subregion (LRR): LRRF Lat: 46.32176935 Long: -99.52041749 Datum: NAD83
Soil Map Unit Name: Zahl-Williams-Zahill complex, 6-9% slopes NWI Classification: PEMA
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation X ,Soil ___ ,or Hydrology X significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ ,Soil ___ ,or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___
Hydric Soil Present?	Yes X	No ___
Wetland Hydrology Present?	Yes X	No ___

Is the Sampled Area within a Wetland? Yes X No ___

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 30 ft.)	Absolute % cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Juncus spp.	2	NO	OBL
2. Echinochloa crusgalli	50	YES	FAC
3. Amaranthus spp.	10	NO	FAC
4. Setaria pumila	18	NO	FAC
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 20

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:
OBL species	2	x 1 = 2
FACW species	0	x 2 = 0
FAC species	78	x 3 = 234
FACU species	0	x 4 = 0
UPL species	0	x 5 = 0
Column Totals:	80 (A)	236 (B)

Prevalence Index = B/A = 2.95

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤ 3.0[1]
___ 4 - Morphological Adaptations[1] (Explain)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes X No ___

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-24-2023
Applicant/Owner: Badger Wind, LLC State: ND Sampling Point: 001 U
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T113N, R70W, Sec. 19
Landform (hillslope, terrace, etc.): Flat field Local relief (concave, convex, none): none Slope (%): 0
Subregion (LRR): LRRF Lat: 46.32176470 Long: -99.52027913 Datum: NAD83
Soil Map Unit Name: Zahill-Williams-Zahill complex, 6-9% slopes NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation X, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Triticum spp.	100	Yes	NI
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤ 3.0[1]
___ 4 - Morphological Adaptations[1] (Explain)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (if observed, list morphological adaptations below).
Cultivated crop

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-24-2012
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: CO2 W
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R70W, Sec 19
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 2
Subregion (LRR): LRRF Lat: 46.32232562 Long: -99.52211948 Datum: NAD83
Soil Map Unit Name: Zahl-Williams-Zahill complex 6-9% slopes NWI Classification: PEMF
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation X, Soil ____, or Hydrology X significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Spartina pectinata	30	yes	FACW
2. Cicuta spp.	25	NO	OBL
3. Juncus spp.	1	No	OBL
4. Echinochloa crusgalli	30	Yes	FAC
5. Setaria pumila	14	NO	FAC
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 15

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	26	x 1 =	26
FACW species	30	x 2 =	60
FAC species	44	x 3 =	132
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		218 (B)

Prevalence Index = B/A = 2.18

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-24-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 002 U
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R70W, Sec. 19
Landform (hillslope, terrace, etc.): Flat Field Local relief (concave, convex, none): None Slope (%): 0
Subregion (LRR): LRRF Lat: 46.32236180 Long: -99.52198079 Datum: NAD83
Soil Map Unit Name: Zahl-Williams-Zahill complex, 6-9% slopes NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation N, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X
Hydric Soil Present? Yes ____ No X
Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Triticum spp.	100	Yes	N/I
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test is >50%
____ 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-24-2007
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 003W
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R70W, Sec 19
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): concave Slope (%): 1
Subregion (LRR): LRRF Lat: 46.323157440 Long: -99.521329594 Datum: NAD83
Soil Map Unit Name: Williams-Zahl loams, 3-6% NWI Classification: PEMA
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation X, Soil ____, or Hydrology X significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes Y No ____
Hydric Soil Present? Yes Y No ____
Wetland Hydrology Present? Yes Y No ____

Is the Sampled Area within a Wetland? Yes Y No ____

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Echinochloa crusgalli	55	Yes	FAC
2. Setaria pumila	14	NO	FAC
3. Juncus spp.	1	NO	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 30

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 % (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	1	x 1 =	1
FACW species	0	x 2 =	0
FAC species	69	x 3 =	207
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	70 (A)		208 (B)

Prevalence Index = B/A = 2.97

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-24-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 003 U
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R70W, Sec. 19
Landform (hillslope, terrace, etc.): Flat Field Local relief (concave, convex, none): None Slope (%): 0
Subregion (LRR): LRRF Lat: 46.32306620 Long: -99.52131209 Datum: NAD83
Soil Map Unit Name: Williams-Zahl loams, 3-6% NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation ∝, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ∝	
Hydric Soil Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** Yes ____ No X
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 5 ft.)			
1. Trifolium spp.	100	Yes	NI
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
= Total Cover			
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
= Total Cover			
% Bare Ground in Herb Stratum 0			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test is >50%
____ 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-24-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 004W
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R70W, Sec 19
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 1
Subregion (LRR): LRRF Lat: 46.32625942 Long: -99.52373076 Datum: NAD83
Soil Map Unit Name: Williams-Zahl loams, 3-6% NWI Classification: PEMA
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation X, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 30 ft.)	Absolute % cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Artemisia biennis	3	No	FAC
2. Echinochloa crusgalli	50	Yes	FAC
3. Setaria pumila	22	No	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 20

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	75	x 3 =	225
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	75 (A)		225 (B)

Prevalence Index = B/A = 3

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (if observed, list morphological adaptations below).
Grazed by cattle

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-24-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 0040
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R70W, Sec. 19
Landform (hillslope, terrace, etc.): Flat Field Local relief (concave, convex, none): none Slope (%): 0
Subregion (LRR): LRRF Lat: 46.32611807 Long: -99.52362385 Datum: NAD83
Soil Map Unit Name: Williams-Zahl loams, 3-6% NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation N, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Triticum spp.	100	Yes	NI
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test is >50%
____ 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (if observed, list morphological adaptations below).
Harvested crop

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-24-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 005W
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R70W, Sec. 19
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0
Subregion (LRR): LRRF Lat: 46.3233693 Long: -99.52544168 Datum: NAD83
Soil Map Unit Name: Williams-Bowbells loams, 3-6% NWI Classification: PEMC
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 30 ft.)	Absolute % cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Typha spp.	2	No	OBL
2. Persicaria spp.	30	Yes	OBL
3. Cirsium spp.	30	Yes	OBL
4. Carex spp.	3	No	OBL
5. Setaria pumila	25	No	FAC
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 10

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	65	x 1 =	65
FACW species	0	x 2 =	0
FAC species	25	x 3 =	75
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	90	(A)	140 (B)

Prevalence Index = B/A = 1.56

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (if observed, list morphological adaptations below).
Grazed and mowed over

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-24-2022
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 005U
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R70W, Sec. 19
Landform (hillslope, terrace, etc.): Flat Field Local relief (concave, convex, none): none Slope (%): 0
Subregion (LRR): LRRF Lat: 46.32352727 Long: -99.52614849 Datum: NAD83
Soil Map Unit Name: Williams-Bowbells loams, 3-6% NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation X, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 5 ft.)			
1. Triticum spp.	100	Yes	NI
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
= Total Cover			
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
= Total Cover			
% Bare Ground in Herb Stratum 0			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test is >50%
____ 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (if observed, list morphological adaptations below).

Harvested crop

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-24-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: CDOGW
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R70W, Sec. 19
Landform (hillslope, terrace, etc.): Flat Fence line Local relief (concave, convex, none): none Slope (%): 0
Subregion (LRR): LRRF Lat: 46.324534105 Long: -99.579151189 Datum: NAD83
Soil Map Unit Name: Williams-Bowbells loams, 3-6% NWI Classification: PEMC
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes Y No ____
Hydric Soil Present? Yes Y No ____
Wetland Hydrology Present? Yes Y No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Spartina pectinata	95	Yes	FACW
2. Hordeum jubatum	5	no	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	100	x 2 =	200
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		200 (B)

Prevalence Index = B/A = 2

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- X 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Explain)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (if observed, list morphological adaptations below).
Fenceline

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-24-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 00 64
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R70W, Sec. 19
Landform (hillslope, terrace, etc.): Flat field Local relief (concave, convex, none): none Slope (%): 0
Subregion (LRR): LRRF Lat: 46.324618236 Long: -99.529062 18 Datum: NAD83
Soil Map Unit Name: Williams-Bowbells loams, 3-6% NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X
Hydric Soil Present? Yes ____ No X
Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Triticum spp.	100	Yes	NI
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0	(A)	0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test is >50%
____ 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-25-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 007W
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R71W, Sec. 18
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): concave Slope (%): 3
Subregion (LRR): LRRF Lat: 46.32877191 Long: -99.64897192 Datum: NAD83
Soil Map Unit Name: Reeder-Farnuf loams, 3-6% NWI Classification: PEMC
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 5 ft.)			
1. Echinochloa crusgalli	35	Yes	FAC
2. Hordeum jubatum	10	No	FACU
3. Carex spp.	25	Yes	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
= Total Cover			
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 30

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	25	x 1 =	25
FACW species	10	x 2 =	20
FAC species	35	x 3 =	105
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	70	(A)	150 (B)

Prevalence Index = B/A = 2.14

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤ 3.0[1]
___ 4 - Morphological Adaptations[1] (Explain)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-25-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 007U
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R71W, Sec. 18
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 2
Subregion (LRR): LRRF Lat: 46.32880252 Long: -99.64890498 Datum: NAD83
Soil Map Unit Name: Bretdet-Farnuf loams, 3-6% NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X
Hydric Soil Present? Yes ____ No X
Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 30 ft.)	Absolute % cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Poa palustris	70	Yes	FACU
2. Trifolium spp.	10	NO	NI
3. Artemisia campestris	5	NO	UPL
4. Nassella viridula	15	NO	NI
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	70	x 4 =	280
UPL species	0	x 5 =	0
Column Totals:	70	(A)	280 (B)

Prevalence Index = B/A = 4

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test is >50%
____ 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-25-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 008W
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R72W, Sec. 25
Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): none Slope (%): 0
Subregion (LRR): LRRF Lat: 46.29796946 Long: -99.66896850 Datum: NAD83
Soil Map Unit Name: Reeder-Arnegard loams, 3-6% NWI Classification: PEMF
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 5 ft.)			
1. Typha spp.	50	Yes	OBL
2. Hordeum jubatum	40	Yes	FACW
3. Artemisia biennis	5	No	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
= Total Cover			
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 5

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	50	x 1 =	50
FACW species	45	x 2 =	90
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	95 (A)		140 (B)

Prevalence Index = B/A = 1.47

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤ 3.0[1]
___ 4 - Morphological Adaptations[1] (Explain)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-25-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 0084
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R72W, Sec. 25
Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): none Slope (%): 0
Subregion (LRR): LRRF Lat: 46.29791306 Long: -99.16889156 Datum: NAD83
Soil Map Unit Name: Reeder-Arnegard loams, 3-6% NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 30 ft.)	Absolute % cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Glycine max	80	Yes	NI
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	____ = Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum 80

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test is >50%
____ 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (if observed, list morphological adaptations below).

Harvested crop

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-25-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 009W
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R72W, Sec. 36
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 2
Subregion (LRR): LRRF Lat: 46.28798563 Long: -99.67526475 Datum: NAD83
Soil Map Unit Name: Beardle-Lehr loams, 0-2% NWI Classification: PEMF
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation X, Soil X, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 30 ft.)	Absolute % cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Spartina pectinata	60	Yes	FACW
2. Rumex crispus	10	No	FAC
3. Typha spp.	27	Yes	OBL
4. Hordeum jubatum	3	No	FACW
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	27	x 1 =	27
FACW species	63	x 2 =	126
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100	(A)	183 (B)

Prevalence Index = B/A = 1.83

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤ 3.0[1]
___ 4 - Morphological Adaptations[1] (Explain)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (if observed, list morphological adaptations below).

Farmer mowed over wetland

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-25-2021
Applicant/Owner: Badger Wind, LLC State: ND Sampling Point: 0091
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R72W, Sec. 36
Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): none Slope (%): 0
Subregion (LRR): LRRF Lat: 46.28791195 Long: -99.67521006 Datum: NAD83
Soil Map Unit Name: Bowbells-Lehr loams, 0-2% NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation X, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 5 ft.)			
1. Bromus inermis	100	Yes	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
= Total Cover			
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	100	x 5 =	500
Column Totals:	100 (A)		500 (B)

Prevalence Index = B/A = 5

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test is >50%
____ 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (if observed, list morphological adaptations below).

Mowed over

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-25-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 010w
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R71W, Sec 33
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): concave Slope (%): 1
Subregion (LRR): LRRF Lat: 46.285415409 Long: -99.64517727 Datum: NAD83
Soil Map Unit Name: Lowe loam, 0-2%, occasionally flooded NWI Classification: PEMF
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation X, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Spartina pectinata	90	Yes	FACW
2. Polygonaceae	5	NO	UI
3. Hordeum jubatum	5	NO	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	95	x 2 =	190
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	95 (A)		190 (B)

Prevalence Index = B/A = 2

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤ 3.0[1]
___ 4 - Morphological Adaptations[1] (Explain)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (if observed, list morphological adaptations below).

Mowed over

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-25-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: d10 U
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R71W, Sec 33
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 8
Subregion (LRR): LRRF Lat: 46.28528442 Long: -99.64487937 Datum: NAD83
Soil Map Unit Name: Lowell loam, 0-2%, occasionally flooded NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation X, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X
Hydric Soil Present? Yes ____ No X
Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 30 ft.)	Absolute % cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Browns meadowrue	95	Yes	UPL
2. Solidago spp.	5	No	UPL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	100	x 5 =	500
Column Totals:	100	(A)	500 (B)

Prevalence Index = B/A = 5

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤ 3.0[1]
___ 4 - Morphological Adaptations[1] (Explain)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (if observed, list morphological adaptations below).

Mowed over

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: McIntosh Sampling Date: 10-25-2021
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 011W
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T132N, R72W, Sec. 1
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 8
Subregion (LRR): LRRF Lat: 46.276730 24 Long: -99.630193 79 Datum: NAD83
Soil Map Unit Name: Harriet loam, 0-2% NWI Classification: PEMC
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Sparganium eurycarpum	80	Yes	FACW
2. Hordeum jubatum	3	No	FACW
3. Typha spp.	17	No	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	17	x 1 =	17
FACW species	83	x 2 =	166
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		183 (B)

Prevalence Index = B/A = 1.83

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤ 3.0[1]
___ 4 - Morphological Adaptations[1] (Explain)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: McIntosh Sampling Date: 10-25-2021
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: C11A
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T132N, R72W, Sec. 1
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): Convex Slope (%): 4
Subregion (LRR): LRRF Lat: 46.27671052 Long: -99.63013720 Datum: NAD83
Soil Map Unit Name: Harriet loam, 0-2% NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X
Hydric Soil Present? Yes ____ No X
Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 30 ft.)	Absolute % cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1. Symphoricarpos occidentalis	5	No	UPL
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Bromus inermis	80	Yes	UPL
2. Grindelia squarrosa	5	No	UPL
3. Melilotus spp.	10	No	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	10	x 4 =	40
UPL species	90	x 5 =	450
Column Totals:	100	(A)	490 (B)

Prevalence Index = B/A = 4.9

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤ 3.0[1]
___ 4 - Morphological Adaptations[1] (Explain)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: McIntosh Sampling Date: 10-25-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 01>W
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T132N, R72W, Sec. 1
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 2
Subregion (LRR): LRRF Lat: 46.27418414 Long: -99.64426503 Datum: NAD83
Soil Map Unit Name: Lowe loam, 0-2%, occasionally flooded NWI Classification: PEMC
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Spartina pectinata	90	Yes	FACW
2. Hordeum jubatum	5	No	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 5

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	95	x 2 =	190
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	95 (A)		190 (B)

Prevalence Index = B/A = 2

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- X 3 - Prevalence Index is ≤ 3.0[1]
- ___ 4 - Morphological Adaptations[1] (Explain)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: McIntosh Sampling Date: 10-25-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 012U
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T132N, R72W, Sec 1
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 5
Subregion (LRR): LRRF Lat: 46.27411408 Long: -99.64412278 Datum: NAD83
Soil Map Unit Name: Lowe loam, 0-2%, occasionally flooded NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X
Hydric Soil Present? Yes ____ No X
Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1. Symphoricarpos occidentalis	5	No	UPL
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 5 ft.)			
1. Bromus inermis	95	Yes	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
= Total Cover			
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	100	x 5 =	500
Column Totals:	100 (A)		500 (B)

Prevalence Index = B/A = 5

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test is >50%
____ 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: McIntosh Sampling Date: 10-25-2005
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 013W
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T132N, R72W, Sec 11
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 2
Subregion (LRR): LRRF Lat: 46.27203170 Long: -99.65849247 Datum: NAD83
Soil Map Unit Name: Daglum-Belfield complex, 0-2% NWI Classification: PEMC
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes Y No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks:
Photos:
Harvested crop boarders wetland

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 30 ft.)	Absolute % cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Typha spp.	40	Yes	OBL
2. Rumex crispus	3	NO	FAC
3. Artemisia ludoviciana	2	NO	FAC
4. Hordeum jubatum	10	NO	FACW
5. Spartina pectinata	25	YES	FACW
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 20

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	40	x 1 =	40
FACW species	35	x 2 =	70
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	80 (A)		125 (B)

Prevalence Index = B/A = 1.56

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: McIntosh Sampling Date: 10-25-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 013 U
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T132N, R72W, Sec 11
Landform (hillslope, terrace, etc.): [illegible] Local relief (concave, convex, none): Concave Slope (%): 1
Subregion (LRR): LRRF Lat: 46.27205480 Long: -99.65855912 Datum: NAD83
Soil Map Unit Name: Daglum - Belfield complex, 0-2% NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation X, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X
Hydric Soil Present? Yes ____ No X
Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks:
Photos:
Harvested crop

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 5 ft.)			
1. Glycine max	90	Yes	NI
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
= Total Cover			
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 10

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤ 3.0[1]
___ 4 - Morphological Adaptations[1] (Explain)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (if observed, list morphological adaptations below).

Appendix C. Wetland, Waterbody, and Non-WOTUS Wetlands Photographs within the 2023 Wetland Survey Area of the Badger Wind Project in Logan and McIntosh Counties, North Dakota



Appendix C1. WET005



Appendix C2. WET012



Appendix C3. WET219



Appendix C4. WET220



Appendix C5. WET225



Appendix C6. WET234



Appendix C7. WET241



Appendix C8. WET1015



Appendix C9. WET1016



Appendix C10. WET1017



Appendix C11. 505U



Appendix C12. 511U



Appendix C13. 2014U

Appendix D. Summary of Non-Wetland and Non-Waterbody Points Recorded within the 2023 Wetland Survey Area of the Badger Wind Project in Logan and McIntosh Counties, North Dakota

Appendix D. Summary of all non-wetland and non-waterbody points recorded within the Survey Area of the Badger Wind Expansion Project in Logan and McIntosh counties, North Dakota.[1]

Non-wetland ID	Type[1]	Latitude	Longitude
212U	Non-wetland	46.248238	-99.632207
503U[2]	Non-wetland	46.324398	-99.522076
504U[2]	Non-wetland	46.324810	-99.522404
505U[2]	Non-wetland	46.325938	-99.521074
506U[2]	Non-wetland	46.325062	-99.524693
507U[2]	Non-wetland	46.321761	-99.525981
508U[2]	Non-wetland	46.322657	-99.528729
509U[2]	Non-wetland	46.323641	-99.528960
510U[2]	Non-wetland	46.324982	-99.652904
511U[2]	Non-wetland	46.326950	-99.648413
512U[2]	Non-wetland	46.296798	-99.669109
513U[2]	Non-wetland	46.269339	-99.670745
514U[2]	Non-wetland	46.264433	-99.695189
515U[2]	Non-wetland	46.264345	-99.687006
516U[2]	Non-wetland	46.263189	-99.708153
517U	Non-wetland	46.375233	-99.643976
518U	Non-wetland	46.375338	-99.643734
519U	Non-wetland	46.375883	-99.646309
520U	Non-wetland	46.376048	-99.647504
521U	Non-wetland	46.293770	-99.534573
522U	Non-wetland	46.292048	-99.532430
523U	Non-wetland	46.292488	-99.531764
524U	Non-wetland	46.295282	-99.529267
525U	Non-wetland	46.304049	-99.535540
526U	Non-wetland	46.306795	-99.532380
527U	Non-wetland	46.308261	-99.531019
528U	Non-wetland	46.309474	-99.532457
529U	Non-wetland	46.305217	-99.520812
530U	Non-wetland	46.305929	-99.522755
531U	Non-wetland	46.288057	-99.489138
532U	Non-wetland	46.294834	-99.484909
533U	Non-wetland	46.299418	-99.505084
534U	Non-wetland	46.298329	-99.507672
535U	Non-wetland	46.298123	-99.509717
536U	Non-wetland	46.298117	-99.511690
537U	Non-wetland	46.319381	-99.589391
538U	Non-wetland	46.306730	-99.639082
539U	Non-wetland	46.311446	-99.641497
541U	Non-wetland	46.203083	-99.586475
542U	Non-wetland	46.202901	-99.587869
543U	Non-wetland	46.206166	-99.583090
544U	Non-wetland	46.208319	-99.575860
545U	Non-wetland	46.207135	-99.571718
546U	Non-wetland	46.216998	-99.600213
547U	Non-wetland	46.215742	-99.601298
548U	Non-wetland	46.218380	-99.611711

Appendix D. Summary of all non-wetland and non-waterbody points recorded within the Survey Area of the Badger Wind Expansion Project in Logan and McIntosh counties, North Dakota.[1]

Non-wetland ID	Type[1]	Latitude	Longitude
549U	Non-wetland	46.225177	-99.607710
550U	Non-wetland	46.240128	-99.607870
551U	Non-wetland	46.244729	-99.581818
552U	Non-wetland	46.242626	-99.582459
553U	Non-wetland	46.232353	-99.583064
554U	Non-wetland	46.235181	-99.580250
640U	Non-wetland	46.319031	-99.651576
700U	Non-wetland	46.316545	-99.520476
701U	Non-wetland	46.312300	-99.521517
702U	Non-wetland	46.303161	-99.520795
703U	Non-wetland	46.315506	-99.518062
704U	Non-wetland	46.309264	-99.503520
705U	Non-wetland	46.305298	-99.493500
706U	Non-wetland	46.305231	-99.581317
707U	Non-wetland	46.304505	-99.581081
708U	Non-wetland	46.304590	-99.562212
709U	Non-wetland	46.292144	-99.613974
710U	Non-wetland	46.268199	-99.599594
711U	Non-wetland	46.273671	-99.620989
2000U	Non-wetland	46.336155	-99.517174
2001U	Non-wetland	46.318950	-99.528759
2002U	Non-wetland	46.308915	-99.503638
2003U	Non-wetland	46.305223	-99.493825
2004U	Non-wetland	46.308736	-99.540264
2005U	Non-wetland	46.286017	-99.498350
2006U	Non-wetland	46.270418	-99.491510
2007U	Non-wetland	46.292183	-99.613666
2008U	Non-wetland	46.291569	-99.614496
2009U	Non-wetland	46.326168	-99.654687
2010U	Non-wetland	46.321404	-99.649365
2011U	Non-wetland	46.259893	-99.679147
2012U	Non-wetland	46.259415	-99.679424
2013U	Non-wetland	46.269236	-99.668095
2014U	Non-wetland	46.263709	-99.708323
2015U	Non-wetland	46.223366	-99.608607
2016U	Non-wetland	46.219068	-99.621789
2017U	Non-wetland	46.203872	-99.579459
2018U	Non-wetland	46.203683	-99.581808
2019U	Non-wetland	46.312297	-99.512643
5201U	Non-wetland	46.332374	-99.515691

[1] Wetlands delineated in 2020, 2021, and 2022 are presented in Atwell (2022) and Flaig (2021) reports.

"Non-WOTUS" ("no") points that lacked wetland or waterbody characteristics and were composed of upland vegetation.

[2] Documented during wetland delineation field effort; other "no" points in table were documented during wetland mapping effort.

Appendix C. Key Contacts

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Appendix C. Overview of study design and search methods for post-construction fatality monitoring at the Dakota Range I and II Wind Project, Grant and Codington counties, South Dakota, from March 16 – December 11, 2022.

Resource	Name, Title	Contact Information
US Fish and Wildlife Service, Region 6 Migratory Bird Office, Denver, Colorado	NA	1-303-236-8171
US Fish and Wildlife Service, North Dakota Field Office Bismarck, North Dakota	Heidi Riddle, Fish and Wildlife Biologist	Heidi_riddle@fws.gov; 1-701-355-8545
North Dakota Game and Fish Department Bismarck, North Dakota	Elisha Mueller, Conservation Biologist	ekmueller@nd.gov; 1-701-328-6300
Federal Environmental Incident Reporting Federal National Response Center (NRC) for the US Environmental Protection Agency (USEPA) and the US Coast Guard	N/A	1-800-424-8802
Local Environmental Incident Reporting North Dakota Department of Environmental Quality (DEQ)	N/A	1-701-328-5210
Badger Wind, LLC Operations and Maintenance	To Be Determined	To Be Determined
Badger Wind, LLC Environmental Operations Support	To Be Determined	To Be Determined

Appendix I
Badger Wind Reclamation and Weed Management Plan

Badger Wind, LLC
February 2024

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BADGER WIND ENERGY PROJECT

Badger Wind Reclamation and Weed Management Plan

Badger Wind, LLC

Document No.: 10455420-HOU-R-01
Issue: B, **Status:** DRAFT
Date: 29 November 2023





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Project name:	Badger Wind Energy Project	DNV Energy USA Inc.
Report title:	Badger Wind Reclamation and Weed Management Plan	621 SW Morrison St, Suite 500,
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	Chicago, IL 60611	Enterprise No.: 23-2625724
Contact person:	Andrew Krieger	
Date of issue:	29 November 2023	
Project No.:	10455420	
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Task and objective:
This report presents the results of analysis conducted by DNV on behalf of Badger Wind, LLC.

Prepared by:	Verified by:	Approved by:
Alyssa Garvey Permitting Biologist, Environmental and Permitting Services	Amanda Klehr Project Biologist, Environmental and Permitting Services	David De Caro Midwest Permitting Manager, Environmental and Permitting Services

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Issue	Date	Reason for Issue	Prepared by	Verified by	Approved by
A	12 October 2023	Draft	A. Garvey	A. Klehr	D. De Caro

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APPENDIX B – IDENTIFICATION AND CONTROL OF INVASIVE AND TROUBLESOME WEEDS IN NORTH DAKOTA

List of abbreviations

Abbreviation	Meaning
ADLS	Aircraft Detection Lighting System
APHIS	Animal and Plant Health Inspection Service
BMPs	best management practices
DNV	DNV Energy USA Inc.
EPA	Environmental Protection Agency
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
MW	megawatt
NDCC	North Dakota Century Code
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
O&M	Operation and maintenance
PLS	pure live seed
SPCC	Spill Prevention, Control, and Countermeasure
SWPPP	Stormwater Pollution Prevention Plan
USDA	U.S. Department of Agriculture

1 INTRODUCTION

Badger Wind, LLC (“Badger Wind” or “Customer”) retained DNV Energy USA Inc. (“DNV”) to review and update the February 2022 Reclamation and Weed Management Plan developed by Atwell [1] for the proposed Badger Wind Energy Project (the “Project”) in Logan and McIntosh Counties, North Dakota. Since the February 2022 plan was developed and accepted by the Logan County Weed Board during a meeting on 27 June 2022 (Appendix A), Badger Wind has altered the Project layout. The Project would comprise a nameplate capacity of up to 262.26 megawatts (MW), with up to 252 MW delivered to the grid. This would be accomplished by construction and operation of up to 93 wind turbines with an approximately 35,227-acre Project Area. The Project is located in Logan and McIntosh Counties, in south-central North Dakota. Project infrastructure includes turbines, access roads, a collector substation(s), collection lines, a transmission line, up to three permanent meteorological evaluation towers (MET towers), an Aircraft Detection Lighting System (ADLS) tower, and an operation and maintenance (O&M) facility. Crane walk paths and temporary laydown yards will be employed during Project construction.

The updates DNV has included herein are minor, but DNV has made new references to weed control and other appropriate guidance documents, some of which have also been added as Appendices.

2 RECLAMATION PLAN

The objectives for this reclamation effort are to:

- Reclaim areas affected by surface-disturbing activities to as near as practicable to the conditions as it existed prior to the beginning of Project construction
- Prevent soil and water erosion on the Project site
- Prevent the introduction and spread of noxious weeds on the Project site.

The Project Area currently supports a matrix of grasslands, pastures, hayfields, and croplands. Because the duration of construction is expected to be relatively short, Badger Wind's revegetation approach places a strong emphasis on conservation and the re-use of existing site resources such as topsoil. Strategic implementation of revegetation activities will have the goal of minimizing changes to native soil conditions as well as the number of equipment passes through the project area to accomplish successful revegetation. Revegetation will include seeding with vegetation similar in composition to surrounding areas and free of noxious weeds. Revegetation with appropriate seed mix will be conducted immediately upon completion of the project installation.

Fertilizer and soil amendments will not be applied. Soil that is currently supporting native vegetation or agricultural crops within the Project Area indicates that sufficient soil nutrient content is present. Even slow-release organic fertilizers can stimulate weed establishment, and in keeping with the strategy of changing native soil conditions the least amount possible, soil amendments are not warranted in this situation. However, application of granular humate and an endomycorrhizal inoculum are recommended to increase the potential of local topsoil to support germination and establishment of seeded plant species.

The methods for accomplishing this approach are described in the sections below.

2.1 Topsoil Care

Living organisms in healthy topsoil improve the ability of native plants to capture and uptake water and nutrients, establish, and reproduce. Preservation of soil structure and organisms during construction enhances revegetation success. Topsoil will be treated with care, as a resource for successful vegetation. Topsoil will be salvaged, segregated from subsoil, stored, and replaced as described below.

- A North Dakota Public Service Commission (Commission) third-party construction inspector will be present on the Project site during initial topsoil removal/segregation to observe that topsoil is being properly removed and kept segregated from subsoil.
- Badger Wind will establish the date and time for the third-party construction inspector's topsoil removal oversight in the preconstruction conference.
- To the extent practicable, erosion and sediment control measures (e.g., construction footprint will be minimized in areas of native vegetation, all vehicle traffic will be limited to roads or specific construction pathways) shall be installed prior to any required grading activities. At all times during Project construction, all temporary and permanent erosion and sediment control measures shall be maintained and repaired as needed to prevent accelerated erosion on the site and any adjacent properties.
- All topsoil to a depth of up to 12 inches, or to the depth of cultivation, whichever is greater, will be salvaged from all areas of temporary and permanent surface disturbance. This should include any rooted herbaceous plants, roots, shrub twigs, and branches that are present.
- Unless otherwise approved by the Commission, topsoil must be removed before topsoil freezes in the late fall/ early winter to the point that frost inhibits proper soil segregation.

- Any area on which excavated subsoil will be placed must be first stripped of topsoil, to the specified depth.
- Topsoil will be carefully stripped to the specified depth and segregated from subsoil.
- Stripped and segregated topsoil will be stockpiled for storage. No topsoil shall be removed from the site. Topsoil stockpiles must not be placed in natural drainages and will be protected from water erosion and compaction by heavy machinery.
- Runoff from stockpiled topsoil areas will be controlled to prevent erosion.
- For collection line trenches, topsoil will be stripped to the specified depth, including any rooted herbaceous plants, roots, shrub twigs, and branches that are present, and will be bladed from Project disturbance areas into windrows at each outer edge of temporary construction limits. Topsoil windrows will be constructed to lie parallel to slopes.
- After backfilling excavation areas with subsoil is complete, any excess subsoil must be placed over the excavation area, blending the grade into existing topography.
- Topsoil will be redistributed after subsoils have been integrated into the disturbed areas. This surface will be rough graded to provide a suitable base for topsoil. Topsoil will be evenly distributed and lightly raked or harrowed to provide an appropriate surface to be seeded and/or planted.

2.2 Construction Sequencing

Sequence of Project construction activities will generally be as follows, and may vary depending on Project constraints:

1) Grading of access roads and installation/replacement of culverts, as necessary

2) Construction of access roads

3) Preparation of crane walk paths

4) Trenching for collection lines, including boring protected areas such as wetlands, waterways, and other natural areas

5) Construction/installation of Project infrastructure, including establishment of permanent, non‐vegetated surface cover, as necessary

6) Temporary reclamation in areas with anticipated further surface disturbance

7) Final reclamation of all temporary disturbance areas not included in permanent infrastructure footprints.

2.3 Prevention of Soil Loss Due to Water Erosion

- A National Pollutant Discharge Elimination System (NPDES) permit, Storm Water Pollution Prevention Plan (SWPPP), and associated best management practices (BMPs) will be developed and implemented prior to the commencement of construction. Erosion and sedimentation will be reduced through the use of BMPs, which may include mulching, hydroseeding, erosion control blankets, silt fence installation, jute matting, revegetation, and/or interim reclamation.
- Silt fences are used to intercept sediment and sheet flow from disturbed areas during construction. They shall also be used for perimeter control across the site. Silt fences should be placed prior to any site grading and regularly checked to ensure that runoff has not eroded a channel beneath the fence. The fence itself should also be checked for tears and sagging that can occur during construction activities. Regular maintenance shall be provided at a minimum of once every 14 days or when deficiencies in the fencing are found.

- Straw bales are used to intercept and filter sediment in the runoff and prevent it from entering local drainage systems. Straw bales shall be installed prior to any site grading and shall remain in place until the upstream disturbed area is stabilized.
- Surface flows will be directed away from cut-and-fill slopes and into ditches that discharge into natural drainages.

2.4 Prevention of Soil Loss Due to Wind Erosion

- Fugitive dust emissions resulting from grading activities and/or wind shall be controlled using the best available control technology as defined by the North Dakota Department of Health at the time of grading.
- Sediment control logs (which may act as perimeter control if silt fencing is not used) shall be installed prior to any up-gradient land-disturbing activities.

2.5 Reclamation Soil Preparation

- Following the completion of construction, impacted soils that will not continue to be used for operation of Project facilities will be restored to pre-construction condition in accordance with landowner lease agreements and Commission requirements.
- Subsoil to be used as backfill will be spread out around the construction areas, graded in some locations to drain away from turbines or other infrastructure, and topped with gravel or topsoil as appropriate. As part of the post-construction reclamation efforts, compacted soils in areas where Project infrastructure is not located will be ripped with a grader, spread with topsoil stockpiled during construction, and revegetated by seeding. Depending upon the timing of reclamation activity, these areas may be reseeded with temporary cover crops or planted with row crops.
- At the end of the Project's life, Project facilities will be decommissioned, and soils will be returned back to agricultural or other desired use in accordance with the Commission's requirements and the Project's Decommissioning Plan.

2.6 Seeding Preparation and Seeding

Successful site reclamation via seeding is most successful when the following steps are taken, in order described.

- Temporary soil stabilization measures shall be applied as quickly as reasonably possible to disturbed areas. Permanent soil stabilization measures shall be applied to disturbed areas as quickly as reasonably possible after final grade is reached on any portion of the site.
- Any areas severely compacted by machinery and equipment during construction should be ripped by tractor or backhoe to loosen soils and allow for water infiltration and root growth.
- Disturbed surface areas will be final-graded to match previous conditions and tied into new parking and road areas in a natural grade, as possible.
- Topsoil and composite plant debris will be redistributed within the graded areas to be revegetated after rough grading to provide a suitable base for areas that will be seeded.
- Following seed bed preparation, soil surface stabilization will comprise seeding with a seed mix appropriate to site-specific conditions:
    - a temporary cover crop when additional surface - disturbing activities are anticipated;
    - a pasture seed mix, developed in coordination with local U.S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) office and landowners (subject to Commission approval, as needed); or
    - a mix of native grass and forb species common to natural local grasslands, developed in coordination with local NRCS office and landowners (subject to Commission approval, as needed).

- Per NRCS recommendations, as necessary, temporary soil stabilization shall consist of seeding with Canada wildrye (*Elymus canadensis*) at 40 pounds pure live seed (PLS)/acre. Temporary seeding areas will be hydromulched with wood fiber/tackifier at one ton/acre.
- Following soil surface preparation, areas of permanent reclamation will be drill seeded with the appropriate seed mix at the specified seeding rate. Smaller areas may also be broadcast seeded at double the seeding rate used for drill seeding.
- Seeding areas will be hydromulched with wood fiber with tackifier at a rate of one ton/acre. Alternative acceptable mulching will be 1.5 tons of weed-free straw per acre, mechanically or hand crimped into topsoil.

3 WEED MANAGEMENT PLAN

This weed management plan provides general information on an integrated approach to noxious weed management during the construction and operation of the Project.

3.1 Plan Goals

Noxious weeds and other invasive plant species pose an increasing threat to native ecosystems, croplands, and other plant communities. Invasive and noxious weeds are not only a problem on disturbed sites, but they can also easily become established within relatively undisturbed ecosystems. Because they have few, if any, natural predators, competitors, or pathogens, the growth of invasive and noxious weeds can increase unchecked, removing moisture, nutrients, and sunlight from surrounding plant communities. In addition, invasive and noxious weeds can alter ecosystem structure and function, threatening wildlife biodiversity and ecosystem integrity.

The overall goal of this plan is to describe weed management practices to prevent and control the spread of noxious weeds and other nonnative invasive plant species on lands owned, leased, and managed by Badger Wind.

3.2 State and County Noxious Weed Law and Policy

North Dakota law (North Dakota Century Code [NDCC] §4.1-47-02) [2] requires every person to do all things necessary and proper to control the spread of noxious weeds. The North Dakota Department of Agriculture coordinates the efforts of county and city weed boards and state and federal land managers to implement integrated weed management programs. The agricultural commissioner is required to create and maintain a list of noxious weeds within the state. There are currently 13 noxious weeds on the list that require management, as follows:

- Absinth wormwood (*Artemisia absinthium*)
- Canada thistle (*Cirsium arvense*)
- Dalmatian toadflax (*Linaria genistifolia* spp. *dalmatica*)
- Diffuse knapweed (*Centaurea diffusa*)
- Houndstongue (*Cynoglossum officinale*)
- Leafy spurge (*Euphorbia esula*)
- Musk thistle (*Carduus nutans*)
- Palmer amaranth (*Amaranthus palmeri*)
- Purple loosestrife (*Lythrum salicaria, Lythrum virgatum*, and all cultivars)
- Russian knapweed (*Centaurea repens*)
- Salt cedar or tamarisk (*Tamarisk* spp.)
- Spotted knapweed (*Centaurea maculosa*)
- Yellow toadflax (*Linaria vulgaris*)

Counties have the option to add additional weeds to the noxious weeds list for enforcement within their jurisdiction. Logan County designates black henbane (*Hyoscyamus niger*) as a noxious weed. McIntosh County has no additional noxious weed designations. A guidance document developed by the North Dakota State University Extension and the North Dakota Department of Agriculture is included in Appendix B. This guidance document provides information on the identification of the aforementioned noxious weeds and various control methods that can be applied to prevent and treat the spread of noxious weeds.

3.3 Weed Management Strategy

Weed management is a constant and iterative process that accommodates the specific ecological conditions, weed species, and land uses of a site. To control activities of extensive existing populations requires an integration of techniques that will be implemented for multiple years.

However, in the meantime, small, incipient populations will be eradicated to prevent them from expanding and requiring additional, large management efforts.

Weed management must be accomplished through several integrated actions that address the varied aspects of weed incidence, occurrence, and management. These actions are discussed in the context of their application at the Project in greater detail below:

- Prevent new weed infestations with scrupulous use of best land management practices and increased public awareness;
- Monitor site for incipient weed infestations;
- Detect and eradicate small and incipient weed populations; and
- Prioritize and rigorously manage large weed populations emphasizing integrated weed management methods with the intention of containment and control.

3.3.1 Prevent New Weed Infestations

Prevention is a proactive control measure with long-term ecological and economic benefits. If new weed populations are prevented from establishing, ecological health is encouraged, and future control actions are considerably minimized.

Weed prevention can be addressed by:

- Limiting opportunities for weed propagules (e.g., seeds, shoots, root fragments) to enter the property
- Reducing negative human impacts to existing vegetation
- Maintaining healthy and vigorous plant communities that can exclude weeds, should they enter the local system.

Many weeds enter a location via seeds or other propagules in contaminated construction and fill material, sand and gravel, or topsoil. Weeds can also be transported from colonized areas to weed-free areas through maintenance activities. Weeds and plant propagules can be transported on vehicles or human workers.

Human visitors may also inadvertently transport problem plant species on vehicles, clothing, shoes, and dogs. Human transportation corridors such as roads and trails are often the point source of weed infestations into natural plant communities. Making these areas a high priority for monitoring and spot treatment will reduce the chance that additional weeds that enter as point infestations will spread into adjacent areas and become large management issues.

Some noxious weeds have been known to enter new sites as planted ornamentals in landscaped areas and gardens. These types of plants are usually well adapted to local conditions, which make them appealing to landscapers and gardeners. However, these characteristics also allow some plant species to escape cultivation, naturalize, and spread in the surrounding open lands. Raising the awareness of residents to this problem may prevent similar infestations in the future. The invasive nature of any ornamental plants used in future site landscaping should be investigated before planting.

Several sources have noted that thick cover of a healthy, strongly competing native plant community can be an important component of weed control. Management practices that minimize disturbance to native plant communities reduce opportunities for weeds to invade the site. This includes careful use of off - road vehicles and avoiding soil disturbances in natural vegetation areas whenever possible.

Careful revegetation of surface disturbed areas will also help prevent new weed infestations by using certified weed - free fill, topsoil, seeds, mulch, and vigorous native plant materials. A seed mix of native grasses found to grow well on, or in the vicinity of the Project, will be developed in coordination with the NRCS for revegetation of disturbed areas.

Construction activities for the Project will be conducted in a manner that supports the goal of preventing new weed infestations. The following best management practices will be employed during construction and will be included in the Final Plat and plans for site grading, drainage, and erosion control as notes:

- Other than vehicles essential to construction and maintenance activities, no motorized vehicles will be allowed off-road on open space or any other common property.
- Soil from areas with noxious weed populations will not be removed or introduced to the construction site, to avoid transport of weed seeds or other propagules.
- Construction activities will not be conducted such that noxious weeds are disturbed when they bear mature seed heads (to prevent release of seed into other areas). Or, before construction activities in such areas the weed plants will be cut or mown, and the material removed and disposed of before plants set seed.
- All earth moving equipment will be washed at a controlled location prior to being moved onto the Project site.
- All seed, soil, and mulch imported onto the Project site will be certified as weed-free.
- All excavations, placement of fill soil, or other areas of surface disturbance will be revegetated with appropriate site seed mix within 14 days of completion of grading, in order to facilitate establishment of desirable vegetation and discourage weed infestation.

3.3.2 Monitor for Incipient Weed Populations

Studies have shown that most weed infestations begin as small points of one or a few individual plants. These point infestations tend to gradually expand over time, then spread explosively into large populations with the potential to seriously impact native vegetation. Control at the point infestation stage is easier, more economical, and more effective than after a weed population becomes established.

Monitoring known weed populations and checking for new introductions should be done throughout the growing season. This is especially important along road and parking lot edges and other heavily used areas. This process is facilitated if all maintenance personnel are trained to recognize the potential noxious weeds in the area and keep track of new point infestations, the boundaries of established weed populations, and monitoring the success of management activities.

3.3.3 Detect and Eradicate New Weed Populations

Small weed infestations are much easier to control than larger ones because they have less-developed root systems, smaller seed reserves in the soil, and fewer resources accumulated in roots and rhizomes. The goal of managing small, focal weed populations can appropriately complete eradication. This can be accomplished with any of the methods described below in Section 3.3.4 that are appropriate for a specific weed. Mechanical methods are often very effective at this stage of a weed infestation, as are spot herbicide treatments of individual plants. Any particular treatment will need to be repeated several times to eradicate new point infestations. These areas should continue to be monitored following control activities and treatment methods should be reevaluated if the populations do not respond or increase in size.

3.3.4 Treatment Method

Expansion of noxious weeds is a dynamic process. Existing infestations of weeds can continue to spread and new infestations can become established. Reducing the spread of noxious weeds requires a timely, adaptive, and integrated

approach. Due to the dynamics of noxious weeds, treatment areas and approaches vary from year to year. The following sections describe the methods that may be employed to control invasive and noxious weed species.

3.3.4.1 Manual or Mechanical Removal

Manual techniques involve the use of tools such as shovels, axes, rakes, grubbing hoes, and hand clippers to expose, cut, and remove most of the target plant's central root mass. Hand grubbing (uprooting individual plants by hand) is another technique used where soil disturbance must be held to a minimum. Manual treatments can be far more species-selective and can be used in sensitive habitats where herbicides would not be appropriate or in areas not accessible to ground vehicles.

Mechanical methods primarily include mowing to cut herbaceous vegetation above the ground surface. Tillage for noxious weed control generally involves plowing, sweeping, or disking of a site to kill and incorporate existing vegetation in preparation of a seedbed. However, these methods involve a significant amount of ground disturbance and are generally not recommended.

3.3.4.2 Biological Control

Biological noxious weed control programs employ living organisms to selectively suppress noxious weed populations. Primary techniques include controlled foraging by herbivorous animals (e.g., sheep or goats) and introduction of host-specific pathogens or insects.

Grazing can aid in control of noxious weeds through removal of herbaceous vegetation. Also, by timing grazing to correspond with the peak palatability of a noxious weed species or peak vulnerability of a species, effects on surrounding vegetation can be minimized. In addition, depending on the species and the site conditions, grazing can be used to remove decadent aboveground biomass and noxious weed litter. This can temporarily decrease soil surface moisture and open the canopy, which may be favorable for native species competition and regeneration. Grazing animals may also eat desirable vegetation, and replanting afterward may be necessary.

Insects, pathogens, or a combination of the two may be released in an area infested by noxious weeds to selectively feed on or infect target plants. Introduced insects and or pathogens can weaken the target species directly by attacking vital plant parts (e.g., roots, seeds, or leaves) or indirectly by creating an environment that reduces the species' competitive advantage. The insects to be introduced must be approved and recommended for use by the USDA Animal and Plant Health Inspection Service (APHIS) [3] and any importation, interstate movement, and environmental release of biocontrol agents will require a permit (PPQ 526) unless they are obtained from a commercial or public source that has such a permit for release of the biocontrol agent in North Dakota. Information on obtaining insects for biological control for noxious weeds can also be provided by the local USDA-APHIS Plant Protection and Quarantine office. Any proposed inoculation of noxious weeds with larval stage insects will require specific approval from County Weed Coordinators, depending on the location of the proposed release. DNV notes, however, that biocontrol with insects or pathogens works best when weeds and other pest populations are widespread; small populations would be best controlled by using another control method.

3.3.4.3 Herbicide Treatments

Chemical treatment methods employ herbicides to control noxious weeds. All applications of herbicides will adhere to required and recommended restrictions on herbicide labels. A communication plan will be implemented to provide notification of treatment activities. Herbicides will be applied from ground vehicles (e.g., trucks, all-terrain vehicles, and tractors), from backpack equipment, or small hand sprayers. Target species will be spot treated where this method is practical and effective. Ground vehicles and backpack applicators will be equipped with handheld spraying equipment (e.g.,

wands and spray guns) for spot treatment. Additional items in backpack equipment may include drip and wick applicators, or whirling disk applicators. Dry formulations may be applied with mechanical broadcast equipment, or by hand. Truck mounted boom sprayers or broadcast spreaders would be used only where target vegetation is dense enough and infestation size large enough (usually >1 acre) to warrant such methods.

All herbicides used in weed control on the Project Area will be registered by the U.S. Environmental Protection Agency (EPA) for forestry, right-of-way, and rangeland uses. Specific chemicals will be selected for each treatment area based on efficacy of control for the target species, relative risks to non-target species (both plant and animal), and human safety. Species-specific chemical control recommendations are updated annually and printed in the “North Dakota Weed Control Guide”.

In the event of an herbicide spill, the emergency spill plan outlined in Section 3.4 will be followed. All workers, including contractors, will have the appropriate knowledge and equipment to carry out the plan, and a copy of the spill plan will be kept in all project-related transport vehicles.

All herbicide applications will follow EPA label instructions. Seasonal application of herbicides will be species-specific and follow North Dakota (Appendix B) and County Weed Board guidance. Application of herbicides will be suspended when any of the following conditions exist: wind velocity exceeds six miles per hour during application of liquid or granular herbicides; snow or ice covers the foliage of noxious weeds; or precipitation is occurring or is imminent.

Vehicle-mounted sprayers (e.g., handgun, boom, injector) will be used mainly in open areas that are readily accessible by vehicle. Hand application methods (e.g., backpack spraying) that target individual plants will be used to treat small or scattered weed populations in rough terrain. Calibration checks of equipment will be conducted at the beginning of spraying and periodically to ensure that proper application rates are achieved.

Herbicides will be transported to, and applied within, the Project site with the following provisions:

- All herbicide use will be conducted in compliance with the North Dakota Department of Agriculture Pesticide Program, under delegated authority to enforce the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) under state laws and administrative rules.
- Herbicides will be transported to the Project site daily or will be stored under proper precautions at the Project O&M facility.
- On-site herbicide quantities will be limited as practicable.
- Concentrate will be transported in approved containers only and in a manner that will prevent tipping or spilling, and in a compartment that is isolated from food, clothing, and safety equipment.
- Mixing will be conducted in an upland area and at a distance greater than 100 feet from open or flowing water or wetlands, greater than 200 feet from private wells, and greater than 400 feet from public wells.
- All herbicide equipment and containers will be inspected for leaks daily.
- All herbicide applicators will have a Commercial Applicator’s license with the State of North Dakota for the use of restricted use herbicides and have adequate training for the use of general herbicides.
- Exercise “safety first” at all times.
- Herbicide will be applied only as intended and consistent with state and federal pesticide use laws.
- Herbicide will only be applied as directed by the product label.

3.3.4.4 Safety Considerations and Herbicide Restrictions

Always wear gloves and eye protection when hand pulling or digging. Several weed species have irritating effects to human skin and eyes. Weeds removed through pulling, digging, or cutting should be bagged and removed from the site. County Weed Coordinators may be able to provide a disposal site, or suggestions for such a site, depending on location.

If chemical weed control methods (herbicides) are chosen for integration into the weed management program, the physical characteristics of each specific site must be carefully considered. Incorrect application of an herbicide can cause severe damage to native plant species as well as the physical environment. Particular attention should be paid to soils, water table depth, surface water locations, and specific native plants that occur alongside the target weed species.

Only experienced personnel, using calibrated equipment and appropriate personal protection, should apply herbicide treatments. Before using any herbicide, all label instructions and restrictions must be read, understood, and followed precisely. Please note that herbicide labels are changed regularly and should be reviewed often. Supplemental labels are also often available for specific areas and environmental conditions. Herbicides must be applied in conformance with every aspect of their label. Herbicide application beyond the bounds specified on the label is illegal.

3.3.5 Control Existing Populations

To successfully control or manage established weed populations, several factors need to be examined and understood. Priorities for control must be established and management activities should be planned for efficient use of resources and optimal control results. The planning process must consider the physical characteristics of each site, the surrounding non-target plant species, and the life history and phenology of each target weed species, which provides windows of vulnerability to different mechanical, biological, or chemical control methods. The timing of all control techniques must be carefully considered and implemented to maximize effectiveness and minimize risk to non-target organisms.

Types of noxious weed species that could be found on the Badger Wind site are discussed below. Appropriate control measures are discussed in terms of life histories and specific site conditions.

3.3.5.1 Annual Species

Annual species complete their entire life cycle (germinating, growing, flowering, and producing seeds) in one year. Because annual plants depend entirely on seeds for reproduction, seeds are the focus of most control measures. Mechanical control methods include preventing seed set, blocking entrance of seeds into the soil seed bank, and optimizing conditions that will hasten the depletion of viable seeds from the seed bank.

The single listed annual noxious weed in North Dakota is Palmer amaranth.

3.3.5.2 Biennial Species

Biennial plants complete their entire life cycle in two growing seasons. The first year an individual biennial plant grows as a cluster of basal leaves or a rosette without producing flowers its first growing season. The rosette overwinters and in the second year the plant produces a flowering stalk, seeds, and dies. This life history strategy implies a large dependence upon seeds, and the two-year old seed-bearing individuals, for continuing in current locations and colonizing new sites.

Removing the seed head buds before flowering by cutting the stalks, mowing, or hand-pulling is an effective way to reduce or eliminate seed formation. These activities should begin in the late spring and summer and must be repeated throughout the growing season, as the plants will continue to produce flower buds in an attempt to reproduce. Assiduous mechanical control that involves prevention of seed set by biennial weeds for multiple growing seasons will eventually exhaust the viable seed bank in the soil and reduce or eliminate additional seeds from entering the plant community.

Biological control agents also usually target seed production, or seed producing individuals, in biennial species.

Herbicides are usually applied to biennials at the rosette stage, either in the fall or spring, depending on the species. Herbicide treatments are particularly effective when combined with mechanical methods that have weakened individual plants and reduced the number of seeds entering the system.

Biennial species listed as noxious weeds in North Dakota include diffuse knapweed, houndstongue, musk thistle, spotted knapweed (or a short-lived perennial), and black henbane.

3.3.5.3 Perennial Species

Individuals of perennial species persist for several years due to their formation of extensive root systems. Many perennials are able to reproduce both by seed and vegetatively. These life history traits make control of perennial weed species more difficult than annuals or biennials as individual plants must be eradicated both above - and below - ground. Seeds and growing plants (including the belowground component) must be destroyed at the same time for effective control. Because of this, mechanical methods are often not sufficient in themselves for control. But mowing or pulling throughout the growing season does weaken perennials, making them more susceptible to herbicides applied in the fall.

Perennial species listed as noxious weeds in North Dakota include absinth wormwood, Canada thistle, Dalmatian toadflax, leafy spurge, purple loosestrife, Russian knapweed, tamarisk, spotted knapweed (can also be a biennial), and yellow toadflax.

3.3.6 Monitoring

Weed management is a constant and iterative process. Continual monitoring of treated populations, and the entire Project site, is strongly recommended. If weed management goals are not being met, or new species or populations are observed, the control strategies may need to be recalculated. Likewise, species may be shifted to different priority-to-control groups based on response to control treatments and behavior within the surrounding plant community. It is important to note that research on weed ecology and management techniques is ongoing. The methods discussed above only include those known at the time of the writing of this plan. New techniques should be integrated into this plan, as information is available.

3.4 Emergency Spill Plan for Herbicides

Badger Wind will implement a Spill Prevention, Control, and Countermeasure (SPCC) Plan for construction and operations that incorporates all reasonable precautions to be taken to avoid herbicide spills. In the event of a spill, cleanup will be immediate. Employees and contractors will keep spill kits in their vehicles and in herbicide storage areas to allow for a quick and effective response to spills. Items to be included in the spill kit are:

- Protective clothing and gloves
- A minimum of 10 pounds of suitable commercial adsorbent and barrier materials
- Plastic bags and bucket
- Shovel
- Fiber brush and screw-in handle
- Dustpan
- Caution tape
- Detergent

The response to an herbicide spill will vary depending on the material spilled, and the size and location of the spill. The order of priorities after discovering a spill are to protect the safety of personnel and the public, minimize damage to the environment, and conduct cleanup and remediation activities.

All herbicide contractors and employees will obtain and have readily available copies of the appropriate material safety data sheets and the herbicide labels for the herbicides used. All herbicide spills will be reported in accordance with applicable laws and requirements.

4 REFERENCES

[1] Atwell, LLC, Badger Wind Reclamation and Weed Management Plan, prepared for Badger Wind, LLC, Project No. 19000785, dated February 2022.

[2] North Dakota Department of Agriculture, North Dakota's Noxious Weed Law and Regulations, dated May 2021. Available online at: https://www.ndda.nd.gov/sites/www/files/documents/files/2021%20Noxious%20Weeds%20Book.pdf.

[3] U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Technical Advisory Group for Biological Control Agents of Weeds Manual, Second Edition Issued 2021.

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APPENDIX A – LOGAN COUNTY WEED BOARD MEETING MINUTES

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Logan County Weed Board Meeting Minutes

Monday, June 27th, 2022, 8:11 PM: Logan County Courthouse Commissioner's Room

Roll call: Bobby Buchholz, Dustin Hammond, Elmer Schlecht, Blanche Schumacher, Adam Schumacher, Sheldon Gerhardt
Absent: Randy Ben, Heather Moser

Call Meeting to Order: Bob Buchholz called the meeting to order at 8:11 PM

Minutes from Previous Meeting (Dustin)

- May 17th minutes were provided to the LCWB. No edits or corrections. Adam motioned to accept the minutes as presented. Blanche seconded. Motion passed

Weed officer report

- No report

Treasurer's Report (Dustin)

- Copy of year-to-date budget provided (5/31/2022) $77,125.15
- Balance available: $77,125.15
- Overall weed control board fund: $105,208.97
- TAG has a two-year allocation for July 1st, 2021– June 30th, 2023
  - TAG (Targeted Assistance Grant) (covers 75% equipment/cost share)
  - Grant $5,000 (spend $6,666.66 to receive full amount)
  - Equipment needs or problem weed areas
    - Sheldon advised that we can use the funds for either spraying of county roadsides or to pay off the excess amount of cost-share expenses
- LAP (Landowners Assistance Program) now has a one-year deadline of June 30th, 2022
  - Covers 100% of expenditures (Landowners Assistance) Grant $14,338.44.
  - The current total cost-share expenditures are $8794.73
    - Balance of $5205.27 for the spring cost-share program.
      - TAG funds can be used to offset the costs of cost-shares or offset expenses in the county weed spraying budget

Old Business: (Bob)

- Plateau Inventory: 19.5 gallons in inventory
  - Courthouse inventory: 9 gallons
  - ~~Heather 8.5 Unknown; strike from the record~~
  - Bob 2
    - Order or wait? Possible rise in cost in July 2022
      - Adam; purchase 20 gals of Plateau
      - Elmer seconded. Motion carried
        - ACTION ITEM! Contact South Dakota

New Business: (Bob)

- Emmons County Weed Control
    - Updates regarding costs and availability (Blanche)
        - Producer suggested that we contact Emmons County
            - $125 per hour with trucks, $100 per hour with SxS/4-wheeler, always a crew of 2
            - Concerns:
                - Mileage costs to the far side of the county (Elmer)
                - Will the CoComs support it?
                - County or state roads? Both
                    - State roads first or county roads first
                        - Same area is the most cost effective
- Call to CJ Jahner (7013299090)
    - CoComs from EC (Emmons County) are OK with the spraying?
        - Budgets are OK; Approved by CoComs
            - Weed Board will meet on Wednesday, June 29th
    - Logistics: 2 guys will work in Logan, rest of the crew will work in EC.
        - Fed aid and highways will be sprayed.
        - Water? Available at DFC, Highway Dept. No water in Gackle
        - One year or ??? If yes for next year, they would have to get more help.
            - Public and private work (pastures)
        - Billing? Biweekly?
            - Chemical costs are very high this year
                - EC uses Grassland, Opensite primarily (with 24-D added)
                - Jugs and shuttles; whichever is available.
            - Bills paid at the end of the month
            - DOT contracts: We would have to contact and bill the DOT.
                - EC is projecting that our spraying costs will be very high (17K +)
                - EC will complete the paperwork as necessary (time, mileage, chemicals, etc)
            - $110 an hour for the labor + chemicals
                - EC will supply the chemicals (at cost)
                - Fuel costs/surcharge: Board will decide on Wednesday
        - Discussion
            - Budgetary amount for spraying
                - Federal aid? State budgets? County funds?
                    - Sheldon will contact the DOT for additional funds for roadside spraying
                - Adam moved to allot 20K for the budget
                    - Blanche 2nd
                        - Passed unanimously

- Badger Wind Management Plan (Handouts)
    - Ratify/Approval requested

        - Discussed and proposal accepted.
            - Blanche Motioned
                - Adam 2nd
                    - Passed
            - Notify Francesca (notified)

- Fall 2022 Cost Share: Discussion? Changes? (Bob et al.)
    - Fall 2022 program: Leafy Spurge, Yellow Toadflax, Spotted knapweed, Canada Thistle, and wormwood (80% rangeland, 100% roadside, additional limits $500 on wormwood and Canada Thistle and $5,000/year/producer) $500 for manual removal of Palmer amaranth.
    - Houndstongue (Sheldon)
        - Add to the Cost Share program. Within the $5000 dollar mix
            - M Adam, 2nd Elmer
                - Motion passed
- Approve vouchers for the Spring Cost Share Program (14 applicants)
    - Approved: All
    - Tabled: None
- Sign travel allowance vouchers. (All)
    - All signed.

Adjourn: 10:02 PM

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APPENDIX B – IDENTIFICATION AND CONTROL OF INVASIVE AND TROUBLESOME WEEDS IN NORTH DAKOTA

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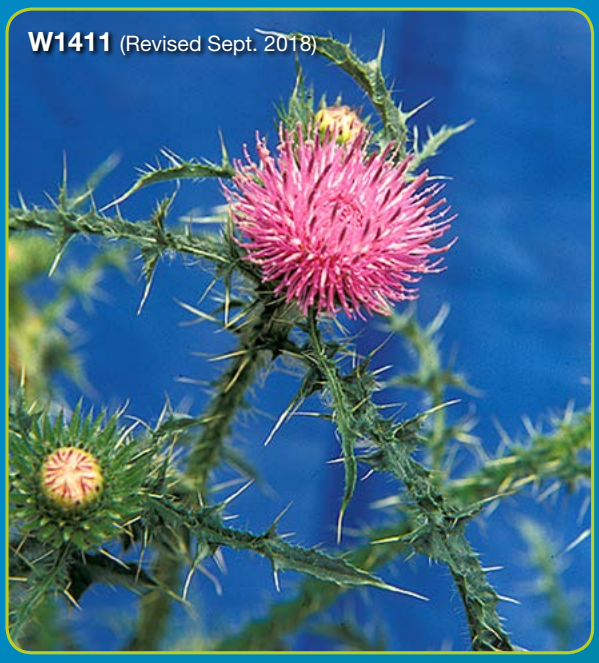






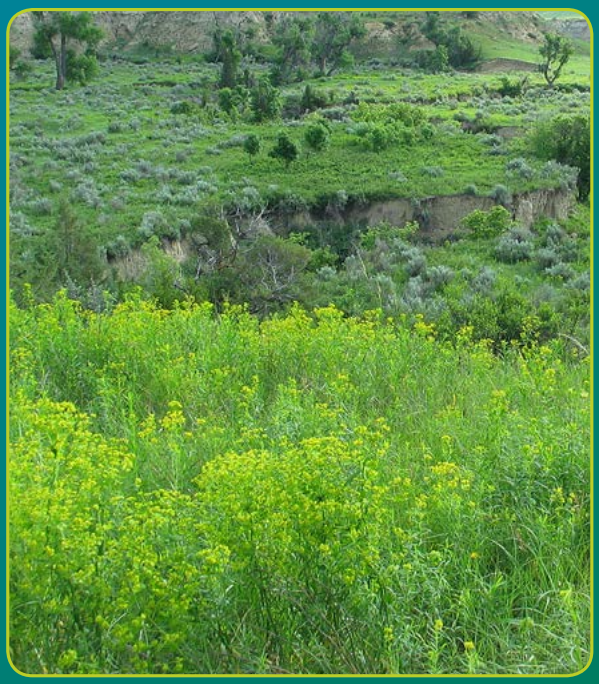
Identification and Control of INVASIVE AND TROUBLESOME WEEDS in North Dakota

Rodney G. Lym, Professor of Weed Science
NDSU Department of Plant Sciences















NDSU NORTH DAKOTA STATE UNIVERSITY
N.D. Agricultural Experiment Station
NDSU Extension

Revised and reprinted September 2018

This publication was made possible by collaboration of the author, North Dakota State University Extension and the North Dakota Department of Agriculture, with funding from the U.S. Forest Service for printing. This publication is intended to help land managers properly identify and control noxious and invasive weeds found in the state. The current list of 11 noxious weeds are included, as well as species listed by various counties as noxious. Other species included are either invasive weeds found in bordering states with the potential to move into North Dakota or are commonly misidentified native species that do not require control efforts, such as the native thistles.

Control recommendations are current at publication, but options change rapidly. Before beginning any management program, please consult with your local county Extension agent and/or weed officer for the latest chemical, cultural and biological control recommendations. Chemical control recommendations are updated annually and printed in the "North Dakota Weed Control Guide," Extension publication W253, and are updated more frequently on the Web at www.ndsu.edu/weeds.

For the latest in biological control options, contact the North Dakota Department of Agriculture and/or the local staff of the U.S Department of Agriculture – Animal and Plant Health Inspection Service in Bismarck.

WEEDS

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Dame's rocket 18
Downy brome 20
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Halogeton 24
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Thistle, wavyleaf 74
Toadflax, Dalmatian and yellow 76
Yellow starthistle 80

ABSINTH WORMWOOD

(*Artemisia absinthium* L.)







ABSINTH WORMWOOD

State Listed Noxious Weed

Absinth wormwood is a member of the sagebrush family, which is easily recognized by the strong sage odor. The plant also is known as American or common wormwood, mugwort or madderwort, and wormwood sage. Unlike other plants in the sagebrush family, absinth wormwood dies back to the root crown each winter, with new shoots emerging each spring. Absinth wormwood is grown in herb gardens for the sage flavor of the leaves. The young flower heads are the source of aromatic oil used to prepare vermouth and absinth. The oil of absinth wormwood is also an active ingredient in antiseptic liniments.

Identification and growth form:

Absinth wormwood is a perennial fragrant forb or herb. The plant commonly grows 3 to 5 feet tall at maturity. Absinth wormwood is woody at the base and regrows from the soil level each spring from a large taproot. Leaves are light to olive green, 2 to 5 inches long and divided two or three times into deeply lobed leaflets. Leaves and stems are covered with fine, silky hairs that give the plant a grayish appearance. Flower stalks appear at each upper leaf node and produce numerous yellow flower heads 1/8 inch in diameter, which appear from late July through mid-August in North Dakota. Each fruit contains one seed, which is less than 1/16 inch long, smooth, flattened and light gray-brown. These small seeds are scattered easily by wind, water and animals, and in hay. Absinth wormwood is a prolific seed producer but also can spread by short roots. The plant is most often found on dry soils, in overgrazed pasture and rangeland, wastelands and roadsides.

Why is this plant a concern?

Absinth wormwood causes economic losses by reducing available forage, tainting the milk of cattle that graze it, and medically as a pollen source for allergies and asthma. Absinth wormwood can reduce forage production severely in pasture and rangeland and is especially troublesome when land is overgrazed. Allergy sufferers should avoid walking through absinth wormwood infestations when the plant is flowering in late July and August.

How do I control this plant?

Chemical. A variety of auxin-type herbicides, including products that contain clopyralid (Stinger, Transline or Curtail), dicamba (various), Milestone (aminopyralid), 2,4-D, Tordon (picloram) and glyphosate (various), will control absinth wormwood. These herbicides should be applied when the plant is at least 12 inches tall and actively growing. Herbicides applied too early in the growing season generally result in poor control. If a fall treatment is desired, the plants should be mowed in early to midsummer to promote active regrowth and to improve herbicide coverage.

Cultural. Livestock generally will not graze absinth wormwood except in early spring. Mowing and cultivation do not control this weed.

Biological. No biological control agents or pathogens are available for this weed.

BABY'S BREATH

(*Gypsophila paniculata* L.)







BABY'S BREATH

County Listed Noxious Weed

Baby's breath is an ornamental plant of Eurasian origin introduced to the U.S. in the 1800s. The plant is a member of the Pinks or Carnation family and is used by the floral industry as a filler in bouquets. The plant escaped cultivation and now infests pasture and rangeland in several areas of the West.

Identification and growth form:

Baby's breath is a perennial with widely branching stems. The plant often grows to 3 feet tall and is easily identified by the presence of many small white flowers. The leaves occur in pairs of up to 4 inches long and end with a point. The number of leaves decreases with increasing plant height and during flowering. The flowers are small, about 1/8 inch, and generally white and five lobed, often with a purple midstripe. Flowering occurs from late June to late August in North Dakota.

Seeds are black, with two to five contained in capsules, and resemble pepper. The seeds can germinate in 10 to 15 days and plants grow rapidly. Each plant can produce 10,000 or more seeds, which are spread when the branches dry, break off and are moved in the wind similar to Russian thistle and kochia. The plant has a large, deep taproot that allows it to grow well in dry and poor soil conditions.

Why is this plant a concern?

Baby's breath forms dense stands and displaces desirable grasses and forbs. Because of the large taproot and the ability to produce millions of seeds in a small area, this plant is difficult to remove once it has established in an area. Baby's breath has been listed as a noxious weed in several Western states.

How do I control this plant?

Chemical. Baby's breath can be controlled with herbicides that contain metsulfuron (Escort or Ally) applied during the bolt to preflower growth stage.

Cultural. Hand-pulling this weed is not practical because of the large taproot. Baby's breath has not become a problem in cropland that is cultivated.

Biological. No biological control agents or pathogens are available for this weed.

BLACK HENBANE

(*Hyoscyamus niger* L.)









BLACK HENBANE

County Listed Noxious Weed

Black henbane is native to Europe and was cultivated as a medicinal and ornamental plant. In 1670, the plant escaped cultivation in the United States and became sparingly naturalized by 1859. Black henbane has since spread throughout much of the United States, particularly in the Northeast, Midwest and the Rocky Mountains. Two alkaloids in black henbane tissues (hyoscyamine and scopolamine) are useful sedative or anti-spasmodic drugs when used under controlled conditions.

Identification and growth form:

Black henbane is an annual or biennial plant that can range in height from 1 to 3 feet. Rosette leaves are alternate and have petioles almost as long as the leaf blades. Stems of mature plants are erect, leafy, thick, coarse and widely branched. Leaves are alternate, oblong to ovate, coarsely toothed to shallowly lobed and grayish green. The foliage is covered with fine, sticky hairs and has a foul odor. Flowers are funnel-shaped, five-lobed, brownish yellow with dark purple veins, and arranged in long, leafy, spikelike clusters. Fruit of the plant is pineapple shaped, approximately 1 inch long, and contains hundreds of tiny, black seeds.

Seeds germinate and develop a rosette with a large, whitish branched taproot the first growing season. During the second growing season, the plant bolts and flowers from June to August. The plant produces hundreds of seeds from July to October that can remain viable for five years or more.

Why is this plant a concern?

Black henbane contains alkaloids (hyoscyamine, hyoscine or scopolamine, and atropine) that have caused occasional livestock poisoning. The plant is not usually grazed by animals unless more palatable forage is unavailable. All parts of the plant, including the seeds, contain the alkaloids that can be toxic to humans and animals if eaten. Even just smelling the flowers can cause headaches and nausea in some people.

How do I control this plant?

Chemical. Herbicides recommended for black henbane control include 2,4-D, dicamba (various), glyphosate (various), metsulfuron (Escort or Ally), Milestone (aminopyralid) and Tordon (picloram). Herbicides should be applied prior to flowering to prevent seed production.

Mechanical. Hand pulling, cutting or digging small infestations of black henbane can be effective. Wear gloves and protective clothing when handling these plants. Disking or plowing should be repeated annually because seeds can persist in the soil for an extended period of time.

Biological. No biological control agents or pathogens are available for this weed.

FALSE and SCENTLESS CHAMOMILE

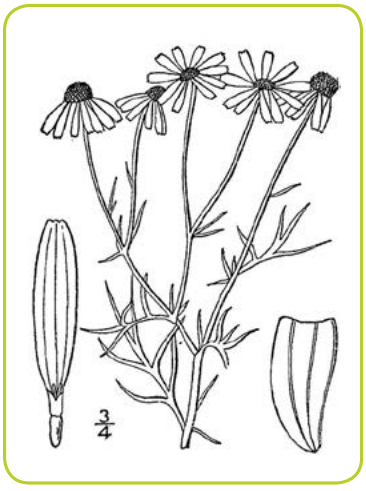
[*Matricaria recutita* L. and *Tripleurospermum perforatum* (Mérat) M. Lainz]



False chamomile

County Listed Noxious Weed: Scentless chamomile only.

False chamomile (aka German chamomile) and scentless chamomile are members of the aster family and have flowers that resemble the common daisy. Some taxonomists place these plants in the genius *Anthemis.* Both plants are native to Eurasia, are considered naturalized in the northern Great Plains and are common in the region. The most obvious difference between the two species is the pleasant aroma of false chamomile, while, as the name implies, scentless chamomile has very little odor when crushed.



False chamomile
(from NRCS plants database)



Scentless chamomile
(from NRCS plants database)



Scentless chamomile

FALSE and SCENTLESS CHAMOMILE

False chamomile has been used for medicinal purposes for hundreds of years and most often is consumed today as chamomile tea, which reportedly has relaxation benefits. As with many homeopathic medicines, chamomile is credited with curing a variety of aches and illnesses, including soothing and calming of nerves, reducing inflammation and aching muscles, and reducing hay fever, asthma and morning sickness. Today chamomile commonly is found in air fresheners, cosmetics, insect repellents and potpourri.

Identification and growth form:

Both chamomile species are annual herbs and have white daisylike flowers. False chamomile blooms from May through August, and scentless chamomile blooms somewhat later from June through September. Plants grow 6 to 18 inches tall and commonly are found in wet sites, road ditches, old gardens and weedy (waste) areas. Scentless chamomile flowers tend to be larger (1 to 1.5 inches across) than false chamomile (0.5 to 1 inch across). Seeds are approximately 1/16 inch long, dark brown, with three ribs on one side and a broad brown central area on the other. Both plants have very finely divided leaves from 0.75 to 2.3 inches long, but scentless chamomile generally has more leaves and appears more bushy than false chamomile.

Why is this plant a concern?

False chamomile was a candidate for the North Dakota state noxious weed list in the late 1970s and early 1980s because the weed was spreading fast in cropland, especially in the north-central region of the state. Many farmers were concerned because false chamomile was tolerant to all herbicides then available for use in crops. However, with the introduction of Glean (chlorsulfuron), landowners had an effective herbicide for false chamomile control. This plant is listed on several county noxious weed lists. Spring and fall-emerging plants can reduce wheat yields by 20 percent to 60 percent if left unattended. In addition, scentless chamomile has poor nutrition value and is not palatable to livestock.

Several other members of the "daisy" family, including pineapple-weed (*Matricaria discoidea* DC.), oxeye daisy (*Leucanthemum vulgare* Lam.) and dog fennel or mayweed chamomile (*Anthemis cotula* L.), also can become weedy. Of these species, oxeye daisy has been the most invasive and is included on several state and provincial noxious weed lists.

How do I control these plants?

Chemical. Today, chamomile species can be controlled easily with any sulfonylurea herbicide such as Ally, Cimarron or Escort (metsulfuron) and Telar (chlorsulfuron). Bromoxynil plus MCPA and Tordon (picloram) also provide good chamomile control.

Mechanical. Hand-pulling can be an effective control method in small infestations of chamomile. Mowing early in the growing season or before plants flower will reduce populations but should be repeated often. Shallow tillage is recommended during hot, dry weather.

Biological. No biocontrol agents for false chamomile are permitted in the U.S. In Canada, the seed-head weevil, *Omphalapion hookerorum,* feeds on developing seeds of the plant, thereby reducing seed production. The stem-boring weevil, *Microplontus endentulus,* feeds on the interior of the stem and produces hollow areas that reduce the vigor of the plant. *Rhopalmyia tripleurospermi,* the scentless chamomile gall midge, forms a gall on the plant, which acts as a nutrient sink that can interrupt and stunt the growth of the plant.

COMMON BURDOCK

[*Arctium minus* (Hill) Bernh.]









COMMON BURDOCK

County Listed Noxious Weed

Common burdock, also referred to as wild rhubarb, is a member of the Asteraceae or sunflower family. Common burdock is native to Europe and now is established throughout much of North America. A tea once was made from the roots to treat gout and rheumatism. The plant is able to spread to new areas by seeds that are found within burs of the plant that cling to hair, fur or clothing of passing animals or people.

Identification and growth form:

Common burdock often is found growing along roadsides and ditch banks and in pastures and waste areas. Burdock is a taprooted biennial that reproduces only by seed. In the first year of growth, the plant forms a rosette of large, heart-shaped, thickly hairy leaves similar to rhubarb. Burdock plants bolt in the second year of growth and grow 3 to 10 feet tall. Leaves of the plant are alternate and large with the broadest leaves located at the base. Leaves are dark green above and whitish green and woolly-hairy beneath with margins that are toothed or wavy. Flowers of the plant are pink, lavender, purple or white and 0.75 inch across. Numerous flower heads present are borne in leaf axils or at the end of branches. The heads are enclosed in a prickly bur that is composed of numerous smooth or woolly bracts that are tipped with hooked spines.

The head, or bur, of the flower breaks off and scatters the seeds. Achenes are gray to brown, mottled, oblong, about 0.25 inch long, flattened and slightly curved. Flowering and seed production occur from July to September. One plant is capable of producing 15,000 to 60,000 seeds.

Why is this plant a concern?

The plant is a host to powdery mildew and root rot that can spread to economically important plants. Burs of common burdock can become entangled in the wool of sheep and significantly damage the quality. Burs also can become entangled in the hair of livestock, allowing seeds to be distributed to new areas. The burs can cause eye disease, mouth sores and skin infections. In addition, milk products may become tainted if the plant is grazed in large quantities.

Common burdock has been used as a medicinal herb; however, the plant has been listed as a poisonous plant due to its diuretic effects. The bristles of the plant also may cause localized allergic reactions for some individuals.

How do I control this plant?

Chemical. Burdock is controlled easily by herbicides such as 2,4-D, dicamba (various) and Escort (metsulfuron). However, the plant usually grows in areas difficult to reach with spray equipment. Herbicides are most effective when applied in the first year during the rosette growth stage of the plant.

Cultural. Hand-pulling or digging can be an effective control method for small infestations if conducted prior to seed production. The plant will not survive in areas that are tilled. Mowing or cutting can eliminate seed production if conducted after the plant has bolted but prior to flowering.

Biological. The burdock moth *Metzneria lappella* Zeller provides some control of seed production. The larvae feed on burdock seed but damage varies greatly from year to year since the number of healthy larvae per bur ranges widely. The adults emerge in late June to early July and have pale brown wings approximately 0.5 inch across.

COMMON MULLEIN

(*Verbascum thapsus* L.)









COMMON MULLEIN

County Listed Noxious Weed

Common mullein is a native of Asia but was introduced into the U.S. from Europe and now is common throughout North America. This plant is found most often in gravely, dry soils, waste areas and bottomlands. Livestock do not graze the plant because of the pubescence. Leaves were smoked by Europeans to relieve asthma and other pulmonary diseases.

Identification and growth form:

Common mullein is a biennial that forms a large, thick- and fuzzy-leaved rosette the first year and a long tap root. The second season, the plant bolts and a single, stiff, erect stem of 2 to 6 feet tall emerges. The leaves are generally 10 to 20 inches long, alternate, overlap one another and generally light green. The leaves also are very pubescent, or wooly, which distinguishes this plant from most others. The flowers are found on long terminal spikes, and are sulfur or sometimes pale yellow, five petaled and approximately 1 inch in diameter. The flowers are seen in June and July, are fragrant and attract several species of insects. Seed capsules are two-chambered and contain many small brown seed.

Why is this plant a concern?

Common mullein is not a concern in cropland but can spread from wastelands to pasture, especially during dry seasons and/or in overgrazed situations. Woolly leaves complicate control by discouraging grazers and obstructing herbicide contact. Common mullein can become dense following a controlled burn or wild fire and slows the re-establishment of native herbs and grasses. The plant is unpalatable to livestock due to the heavy pubesence.

How do I control this plant?

Chemical. Several herbicides will control common mullein, but all must be applied with a surfactant to overcome the extreme pubescence of the plant. Tordon (picloram), Milestone (aminopyralid), dicamba (various) and Telar (chlorsulfuron) will control this weed.

Mechanical. Individual plants can be dug out or cut just at the soil surfaces as long as the whole rosette is removed. Common mullein will not survive cultivation.

Biological. The larvae of the mullein seed-eating weevil, *Gymnetron tetrum*, feed on the seeds, reducing seed production by approximately 50 percent.

COMMON TANSY

(*Tanacetum vulgare* L.)





COMMON TANSY

County Listed Noxious Weed

Common tansy, also referred to as garden tansy, golden buttons and bitter buttons, is a member of the Asteraceae or sunflower family. Common tansy is native to Europe and first was introduced to the United States as early as the 1600s as an ornamental plant and for medicinal purposes. The plant contains alkaloids that can be toxic to humans and livestock if consumed in large quantities. However, animals rarely ingest common tansy due to the strong smell of the plant. Illnesses in humans have been reported after hand pulling, suggesting toxins may be absorbed through unprotected skin. Common tansy still is used in some medicines and is listed in the United States Pharmacopoeia as a treatment for colds and fever.

Identification and growth form:

Common tansy is an aromatic perennial forb or herb that commonly grows from 1.5 to 6 feet tall. The plant reproduces both by seed and creeping rootstocks. Roots of the plant are fibrous and produce rhizomes. Stems of the plant are purplish-red. Leaves are alternate, smooth to slightly pubescent, 2 to 10 inches long and 1.5 to 3 inches wide, and deeply divided into numerous narrow, toothed segments that appear fernlike. Glandular dots on the leaves of the plant produce the strong, unique odor of the plant. Flowers of the plant are yellow, 0.25 to 0.5 inch across and buttonlike in flat-topped, dense clusters. Each head is composed of mainly yellow disk flowers that are arranged at the stem top in a flat-top cluster in which the outer flowers bloom first. Flowering typically occurs from July to September. Flower heads turn brown and maintain their shape at seed set. Seeds are yellowish brown with short five-toothed crowns.

Common tansy sometimes is confused with tansy ragwort (*Senecio jacobaea* L.). However, tansy ragwort is nonaromatic, has ray flowers and does not have the sharp, toothed leaves found on common tansy.

Why is this plant a concern?

Common tansy is an aggressive plant that can form dense vegetative colonies on disturbed sites and generally is found on roadsides, fence rows, pastures, vacant lands, stream bank, and waste areas. Disturbances can promote the colonization and spread of the plant. Common tansy reduces overall pasture productivity because the plant displaces desirable grasses and forbs and animals are reluctant to graze it. In addition, unpleasant tasting milk may result when dairy cattle graze the leaves of common tansy. Wildlife habitat also is affected negatively by the plant.

How do I control this plant?

Chemical. Herbicides for common tansy control include Escort (metsulfuron) and Telar (chlorsulfuron). Chaparral (aminopyralid plus metsulfuron) works well when infestations of common tansy also include thistle species. Herbicides may be most effective when applied in the spring during early bud development.

Cultural. Hand-pulling or digging may provide control for small infestations of common tansy if the entire root system is removed. However, gloves and protective clothing should be worn to prevent absorption of toxins through the skin. Mowing can reduce seed production if conducted during the bud stage; however, plants are able to regrow from rootstock.

Biological. No biological agents or pathogens are available for this weed.

DAME'S ROCKET

(*Hesperis matronalis* L.)







Fall rosette

DAME'S ROCKET

Not Listed by State or County

Dame's rocket is an escaped ornamental from Eurasia and most often found along roads, streams, near woods and in thickets. The first introductions to North America began in the 1660s and the plant is now considered naturalized. However, infestations have been increasing rapidly in the north-central states.

Identification and growth form:

Dame's rocket is a biennial or occasionally short-term perennial herb in the mustard family. The plant resembles phlox, but has four petals, not five. The plant grows 2 to 4 feet tall; the stems are erect and often branched. Leaves are alternate, lanceolate, sharply toothed and pubescent. Dame's rocket flowers are found from early May through June, fragrant and generally purple but occasionally pink or white. Seeds are produced in long pods typical of the mustard family. Dame's rocket overwinters as a rosette.

Why is this plant a concern?

Even though this common garden flower has been in the U.S. since colonial times, it is now becoming invasive in many areas of the north-central Plains, especially in woody areas. Dame's rocket is in the same family as garlic mustard, an invasive plant that has invaded woody areas and forests in neighboring states such as Minnesota and Wisconsin. Dames rocket aggressively competes with native species. This plant has been listed as a noxious weed in nearby states of Colorado and Wisconsin.

How do I control this plant?

Chemical. Herbicides used for mustard control in cropland such as MCPA and 2,4-D will kill Dame's rocket and can be used in wooded areas as long as the herbicide is not applied to the tree bark. Glyphosate will kill Dame's rocket and is best applied to rosettes in the fall to lessen damage to nearby vegetation. Typical pasture and rangeland control herbicides such as Tordon (picloram), dicamba (various), Milestone (aminopyralid) and Transline (clopyralid) will not control this weed.

Cultural. Hand-pulling or digging Dame's rocket is an effective control measure. Seeds remain in the soil for several years, so sites should be revisited each year to keep the plant from reestablishing.

Biological. No biological control agents or pathogens are available for this weed.

DOWNY BROME

(*Bromus tectorum* L.)







DOWNY BROME

County Listed Noxious Weed

Downy brome is native to the Mediterranean region and is thought to have been introduced first near Denver, Colo., as a contaminant in packing material. The plant now is distributed widely throughout North America. Downy brome often is found as a contaminant in grass and crop seed and is difficult to separate from the desirable species.

Identification and growth form:

Downy brome is an annual or winter annual grass that can range in height from 4 to 30 inches. Seedlings are bright green with conspicuously hairy leaves. Stems are erect, slender and glabrous or slightly hairy. Foliage and seed heads of mature plants often change color from green to purple to brown or tan as the plant dries. A single downy brome plant can be comprised of one or two tillers or as many as 20 tillers. Inflorescence is dense, slender, usually drooping, one-sided, and 2 to 6 inches in length. Spikelets are nodding, slender and up to 0.75 inch long. Plants have five to eight florets per spikelet. Long, straight awns are attached to florets that are 3/8 to 5/8 inch long and are usually purple at maturity.

Seedlings germinate in the fall or winter at very high rates as soon as moisture conditions are favorable. Downy brome grows rapidly until late fall when the soil freezes, although above-ground growth may continue during warm or rainy conditions. The root system often will continue to develop throughout the winter. In the spring, the plant develops rapidly and produces heads in late April to early May, flowers within a week and produces seed by mid to late June. Downy brome is a prolific seed producer with production ranging from 25 to 5,000 seeds per plant.

Why is this plant a concern?

Downy brome can thrive in a variety of habitats and the plant quickly displaces desirable plant communities and lowers plant diversity. Downy brome can be a ready fuel source for fires because the plant grows in high densities and dries down very early in the season. Downy brome is palatable to livestock but only for a brief period during the spring and early summer. The seeds have long awns that may cause sores in the mouth and eyes of livestock that graze it and reduce wool values when it attaches to sheep as they walk through an infested area. Downy brome can become especially weedy in winter wheat.

How do I control this plant?

Chemical. Glyphosate has been effective at any plant growth stage or seasonal timing. In cropland, PRE herbicides such as Dual (metolachlor), Zidua (pyroxasulfone), Prowl (pendimethalin) and Valor (flumioxazin, Payload for noncrop areas) reduce establishment of seedlings, and atrazine is effective PRE or POST to seedlings. See the latest edition of the "North Dakota Weed Control Guide" (W253) for additional herbicides useful for downy brome control. Plateau (imazapic) applied in the fall will control downy brome in pasture and rangeland.

Mechanical. Hand-pulling small infestations may eliminate current seed production. Disking is often ineffective, unless tilled 4 to 6 inches deep in order to bury seeds and prevent germination. Mowing may reduce plant production but seeds already may be viable and plants may regenerate new culms if conducted during the early growth stage.

Biological. No biological control agents or pathogens are available for this weed.

FIELD BINDWEED

(*Convolvulus arvensis* L.)









County Listed Noxious Weed

Field bindweed (creeping jenny) is a member of the morning glory family and is well-adapted to the North Dakota climate and environment. Field bindweed is a native of Europe and western Asia and was introduced to this country during colonial days when it was referred to as devilgut. Field bindweed primarily is a problem in the dryland farming areas of the Great Plains and Western states. Field bindweed is found in both cropland and pasture and rangeland in North Dakota.

Identification and growth form:

Field bindweed is a long-lived perennial that produces a dense ground cover. The twining stems vary from 1.5 to 6 feet or more in length. Leaf size and shape are variable, but generally the leaves are 1 to 2 inches long, smooth and shaped like an arrowhead. Flowers are funnel-shaped, about 1 inch diameter and white or pink. The flower stalk has two small bracts located 0.5 to 2 inches below the flower. The bracts, along with leaf shape and smaller flower size, distinguish field bindweed from hedge bindweed.

Field bindweed also may be confused with wild buckwheat because of similarities in leaf shape and vining habit. However, wild buckwheat is an annual rather than a perennial and has a very small (about 1/8 inch diameter) greenish-white flower.

Roots of established plants may extend 20 to 30 feet laterally and be excavated as deep as 30 feet below the surface. Buds along the root system can send up shoots that start new plants. The root system contains a large quantity of carbohydrates that provide energy for both above- and below-ground plant growth. Buds located all along the root can send up new shoots or establish a new patch when roots are cut and moved, such as from cultivation.

Seeds of field bindweed vary from dark to brownish gray and are about 1/8 inch long. The fruit is a small, round capsule that contains up to four hard-coated seeds that can remain viable for at least 50 years. Field bindweed produces numerous seed in growing seasons with high temperatures and low rainfall and humidity.

Field bindweed can be spread by seed, root fragments carried by farm implements, infested soil adhering to the roots of nursery stock, root growth from infested areas and by animals.

FIELD BINDWEED

Why is this plant a concern?

Field bindweed has a deep root system that competes with crop plants for water and nutrients. Vines climb on plants and shade crops, cause lodging of small grains and make harvesting difficult by clogging machinery. Dense field bindweed infestations may reduce crop yields by 50 percent to 60 percent. Land infested with field bindweed is reduced in value.

How do I control this plant?

Established field bindweed is difficult to control. An effective control program should prevent seed production, kill roots and root buds, and prevent infestation by seedlings. This plant is very persistent and a successful control program must be more persistent.

The best control of field bindweed is obtained with a combination of cultivation, selective herbicides, and competitive crops or forage grasses.

Chemical. Long-term control of field bindweed from herbicides depends on movement of a sufficient amount of herbicide through the root system to kill the roots and root buds. This requires use of systemic (movement throughout the plant) herbicides. Examples of herbicides that will reduce field bindweed infestations are products that contain dicamba (various), Facet L (quinclorac), Tordon (picloram) and glyphosate (various).

Successful control of field bindweed requires a long-term management program. A herbicide applied once never will eliminate established stands; rather, several re-treatments are required to control field bindweed and keep it suppressed. Because of long seed viability and tremendous food reserves stored in the roots, repeated chemical and/or mechanical control measures must be used.

Herbicides should be applied when field bindweed is growing actively and stems are at least 12 inches long. Herbicide performance can vary greatly due to environmental conditions in which the plants have been exposed. Plants growing under moisture or heat stress usually have smaller leaves with a thicker cuticle and slower biological processes than plants growing in more favorable conditions. As plant stress increases, herbicide uptake and translocation decreases, which in turn decreases herbicide performance. This is the reason why field bindweed is harder to control in the more semiarid area of central and western North Dakota than in the eastern region.

Cultural. Intensive cultivation controls newly emerged seedlings, may kill young field bindweed infestations and contributes to control of established stands. Timely cultivations deplete the root reserves of established plants and stimulate dormant seeds to germinate.

Intensive cultivation alone is not practical because crops cannot be grown during the tillage period, and repeated tillage exposes the soil to erosion. However, applying herbicides in combination with cultivation has been successful in reducing both field bindweed infestations and the number of tillage operations.

Biological. Two non-native insects have been released to control field bindweed with minimal success to date in North America. The bindweed gall mite *(Aceria malherbae)* is microscopic in size and feeding by nymphs causes galling of field bindweed stems. The larvae of the bindweed moth *(Tyta luctuosa)* feed at night on field bindweed flowers and leaves. Several native insects occasionally feed on this weed but damage to the plant is minimal. No insect has been released to feed on field bindweed roots, which would be the most likely method of success in controlling this weed.

HALOGETON

[*Halogeton glomeratus* (M. Bieb.) C. A. Mey.]









HALOGETON

County Listed Noxious Weed

Halogeton, also called saltlover, is a poisonous weed introduced from Eurasia and first was reported in Nevada in 1934. Since then it has spread to millions of acres in the western U.S., especially in range and wildlands. This plant often is found in alkaline soils and semiarid regions, particularly when the areas have been disturbed by overgrazing, off-road vehicles, new roads and similar disturbances. Halogeton was reported in North Dakota for the first time in 2009, but because of the size of the infestations, it likely has been in the state for some time.

Identification and growth form:

Halogeton is an annual weed in the goosefoot family and grows from a only a few inches to more than 24 inches tall, depending on location and moisture. Each plant has about five main stems that grow out and then up from the crown, branching out similarly to Russian thistle, which this plant resembles. The blue-green leaves are small and sausage-shaped, and have a short bristle or spine at the end. The flowers are found in the leaf axils, greenish and not showey. Even though the plant is an annual, the taproot can grow nearly 2 feet down and out from the crown. Mature plants have red stems. The brown-black seeds are contained in a bracted pouch that often are mistaken for flowers and give the plant a "wooly" appearance at maturity. Halogeton produces as many as 75 seeds per inch of stem and seeds are viable from one year (early season production) to more than 10 years (developed after mid-August).

Why is this plant a concern?

Halogeton contains soluble sodium oxalates that are poisonous to sheep and cattle. The plant is not palatable when green but may be consumed in toxic quantities in late summer, fall and winter. Dried plants may contain 30 to 40 percent sodium oxalate, and the lethal dose for an adult sheep is reached when the animal consumes 0.3 to 0.5 percent of total body weight in a short time. Cattle are not likely to eat enough to be poisoned unless feed is short. Sheep can develop a tolerance to halogeton through time and consume this weed without illness if foliage from other plants is also part of the diet.

How do I control this plant?

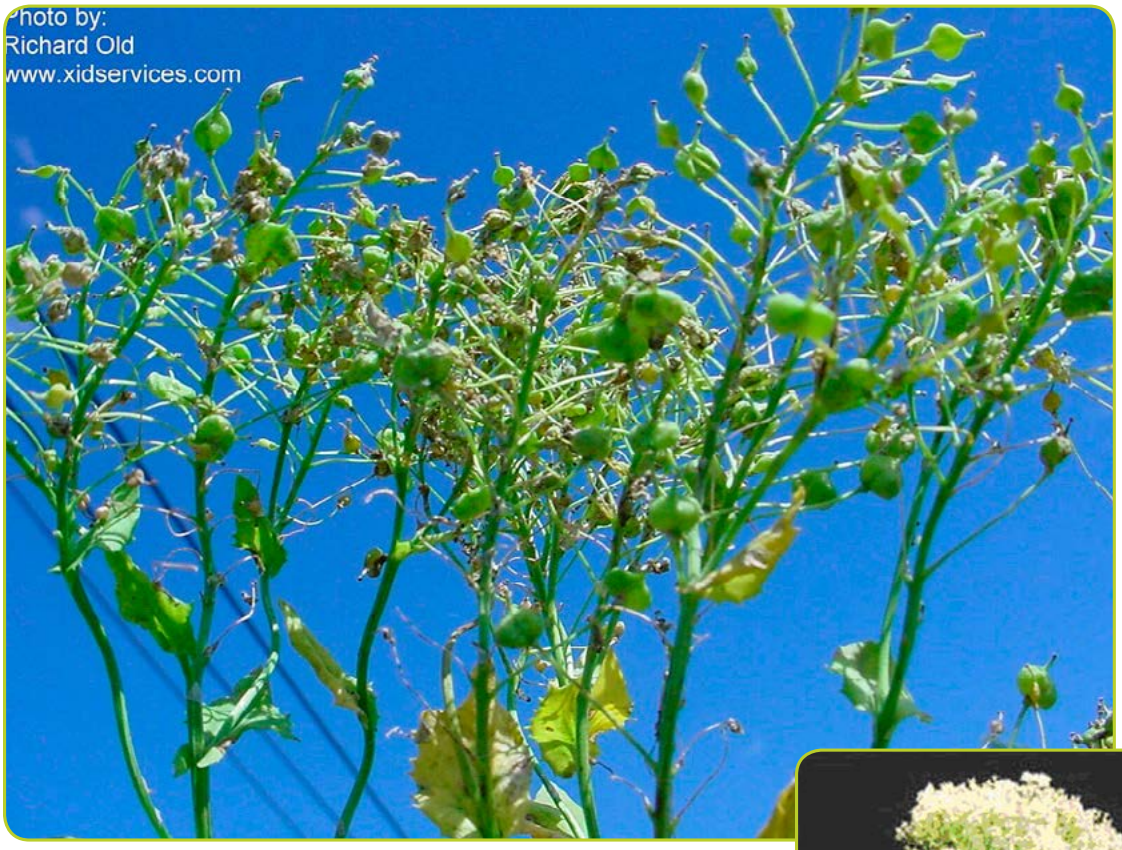
Chemical. 2,4-D will control plants if applied very early in the spring prior to flowering. Escort (metsulfuron) is very effective and can be applied throughout the growing season. Plateau (imazapic) also will control this weed and can be applied both pre- and post-emergence. Spike (tebuthiuron) provides total vegetation control for several years and may be desirable for use on railroad ballast and oil field locations, where halogeton often is found.

Cultural. Halogeton is an early invader of disturbed sites. Avoid overgrazing an area and reseed disturbed sites to native grasses and forbs to prevent halogeton from becoming established. Halogeton competes poorly with established perennial vegetation.

Biological. No biological control agents or pathogens are available for this weed.

HOARY CRESS

[*Cardaria draba* (L.) Desv.]





HOARY CRESS

County Listed Noxious Weed

Hoary cress (also called whitetop) is native to the Balkan Peninsula, Armenia, Turkey, Israel, Syria, Iraq and Iran. The plant is widely introduced and naturalized throughout Europe and all other continents. Hoary cress first was introduced to the United States at Long Island, N.Y., in 1862 through a ship's ballast or contaminated seed.

Identification and growth form:

Hoary cress is a deep-rooted perennial forb that can grow up to 2 feet tall. Stems of the plant are erect, branching above, glabrous or slightly to densely pubescent below, and appear gray. Hoary cress has both basal and stem leaves. Basal leaves have scattered to dense pubescence, are irregularly toothed to entire and taper to a short stalk that attaches to the crown of the plant near the ground. Middle and upper stem leaves are sparsely pubescent, have two lobes clasping the stem and are grayish green. Flowers of the plant are white, four-petaled and borne on slender stalks. Seed capsules are shaped like an inverted heart and usually contain two seeds. The seeds are oval or round at one end, narrow to a blunt point at the other and reddish-brown.

Seedlings of hoary cress germinate in the fall and overwinter as rosettes. The perennial root system is established the following spring and consists of vertical and lateral roots. Both root types can produce adventitious buds that develop into rhizomes and new shoots. Plants flower from May to June and begin producing seeds by July. A single plant can produce between 1,200 and 4,800 seeds each year, with a single flowering stem capable of producing as many as 850 seeds. Seeds can remain viable in the soil for approximately three years.

Why is this plant a concern?

Hoary cress is an aggressive plant that can form dense monocultures on disturbed land. Disturbances such as grazing, cultivation and especially irrigation can promote the colonization and spread of the plant. Hoary cress can displace native plant species, thereby reducing biodiversity and forage production. Whitetop contains glucosinolates that can be toxic to cattle but livestock only graze hoary cress in the spring if more palatable forage is not available.

How do I control this plant?

Chemical. Hoary cress is in the mustard family so herbicides commonly used to control mustards generally work well on this weed. Escort or Ally (metsulfuron), Oust (sulfometuron) or Telar (chlorsulfuron), MCPA and 2,4-D have been used to control the plant. However, timing of herbicide application is important and should be done in early spring or in the fall after seed germination. Glyphosate (various) can be used as a spot-treatment for small infestations.

Mechanical. Digging can provide control for small infestations of hoary cress if the entire root system is removed. Hand-pulling generally is not effective because the root system may not be entirely removed. Cultivation is the major factor for the spread of the plant because root fragments that are left behind can produce new plants. Cultivation can eradicate plants if cultivations are repeated frequently throughout the growing season for a period of two to four years.

Biological. No biological control agents or pathogens are available for this weed.

HOUNDSTONGUE

(*Cynoglossum officinale* L.)

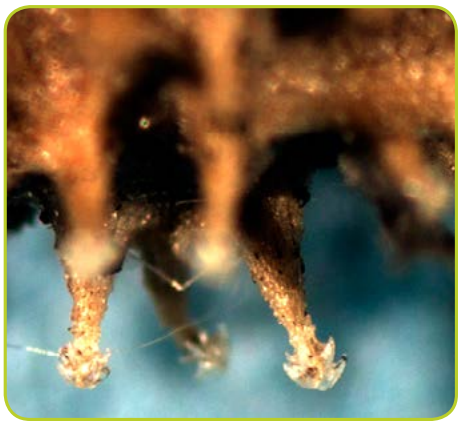












HOUNDSTONGUE

State Listed Noxious Weed

Houndstongue is a biennial poisonous herb that is native to Eurasia. The plant is a member of the Borage family, which includes more commonly known plants such as Virginia Bluebells, Forget-Me-Nots and the fiddlenecks. Houndstongue commonly is found in disturbed areas, including roadsides, trails, and in pasture and woodlands following soil disturbance or overgrazing.

Identification and growth form:

Houndstongue is a biennial that forms a rosette the first year of growth and bolts and flowers the second season. The plant only reproduces from seed, but can spread great distances because the barbs on the nutlets cling to clothing, machinery and animals. The leaves are oblong, very pubescent and rough, which resembles a hound's tongue. Plants bolt during early summer, the second year of growth, to a height of 1 to 4 feet and flower in mid-June. The flowers are small, arranged in clusters and not showy. Flower color ranges from red to burgundy. Each flower produces three to four nutlets, which are flat and tear-drop shaped with a very hard seed coat and numerous barbs. Plants generally are found along trails and roadsides, on the edge of wooded areas and in disturbed habitats. Infestations often establish near areas where cattle and other livestock rub against something such as fence posts and trees or shrubs.

Why is this plant a concern?

Houndstongue tends to be a nuisance weed rather than a noxious plant unless infestations grow to become large patches. The nutlets often become imbedded in the wool or hair of livestock, which can cause a loss of value of the wool and/or increase costs to remove the burs. Eye damage can occur if burs become embedded in the eye or eyelids. The burs can be problematic for hikers, hunters and fishermen and also to their pets.

Houndstongue contains alkaloids that are especially toxic to cattle and horses. The plant is rarely eaten in the green state; however, animals will eat the dried plant in hay. Sheep are more resistant to the pyrrolizidine alkaloids than other livestock, while horses, especially when confined to small areas infested with houndstongue, are more likely to ingest toxic levels. Fatal liver disease in horses occurred following two weeks of feeding hay with as little as 6 percent houndstongue.

How do I control this plant?

Prevention is the best method to keep houndstongue from invading North Dakota. Use only certified weed seed-free hay and eradicate new infestations before the plant can spread.

Chemical. Escort (metsulfuron) is very effective for controlling houndstongue and can be applied throughout the growing season. First-year houndstongue rosettes are easily controlled with 2,4-D applied from late May to mid-June. Second-year plants are much less susceptible to 2,4-D. Plateau (imazapic) at high rates will control houndstongue both pre- and post-emergence, but grass injury, especially to the cool season species is likely when Plateau is applied at the maximum rate.

Biological. A root weevil, *Mogulones crucifer,* has been released for control of houndstongue in Canada. The insect has become well-established in Alberta and has greatly reduced the houndstongue infestation in that province. The insect has spread naturally and become established in Washington state. However, this biological control agent has not been approved for release in the U.S. and interstate movement is not allowed. Several other insects have been evaluated for biological control of houndstongue; however, initial results were not nearly as promising as those of the root weevil.

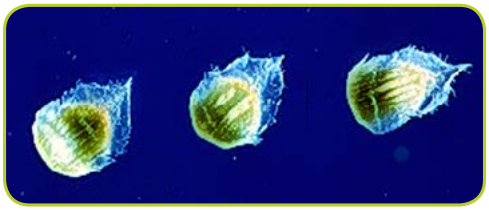
RUSSIAN KNAPWEED

[*Acroptilon repens* (L.) DC.] syn. (*Centaurea repens* L.)









RUSSIAN KNAPWEED

State Listed Noxious Weed

Russian knapweed is the most widespread of the knapweeds in North Dakota. It also is the only perennial of the noxious knapweeds and is the most difficult to control. Russian knapweed often is found in poorly drained and saline/alkaline soils with supplemental water sources such as rivers and streams. This persistent weed often is found in southwestern North Dakota, but increasingly infestations have been found statewide. Russian knapweed grows especially well in areas with supplemental water sources such as the Little Missouri and Heart rivers in North Dakota.

Identification and growth form:

Russian knapweed is a long-lived, deep-rooted perennial with growth characteristics similar to Canada thistle. The weed emerges in the spring from roots and grows to 2 to 3 feet tall and is shrublike with spreading branches. Once established, Russian knapweed spreads mainly by underground root stocks as seed production is limited compared with other knapweed species. The leaves are alternate and lobed lower on the plant while upper leaves are entire. Flowering occurs from June to September and flowers vary from light pink to lavender. The stems die back to the soil surface each year.

Two key characteristics distinguish Russian knapweed from spotted and diffuse knapweed. First, the flowers have rounded bracts with transparent tips that are quite different in appearance than the dark bracts of spotted and diffuse knapweed. Second, the root of this perennial is dark brown to black, scaly as if the plant had been burned, and can grow to depths of greater than 20 feet. The flowers of Russian knapweed vary from light pink to lavender.

Why is this plant a concern?

Russian knapweed can spread rapidly and is very competitive with native species. Russian knapweed will reduce forage production to near zero as the site often becomes a monoculture. Russian knapweed also will infest roadsides, pasture and rangeland and is the only knapweed in the state that causes significant losses in cropland.

How do I control this plant?

Russian knapweed is one of the most difficult perennial weeds to control. If the plant is found in cropland, then a combination of cultivation and herbicide treatments will suppress the plant. However, herbicides at labeled rates for cropland use will not control Russian knapweed.

Chemical. Tordon (picloram) is one of the most effective herbicides used for Russian knapweed control. The best control is obtained when picloram is applied following several hard frosts (mid-October). Russian knapweed plants may be dormant with gray stems and no leaves, but control the following spring is nearly 100 percent. Application in mid-September or during flowering in midsummer provides shorter-term control than late applications. Other herbicides used for Russian knapweed control include Escort (metsulfuron) and Milestone (aminopyralid).

Cultural. Livestock generally will not graze Russian knapweed. Mowing and cultivation do not control this weed.

Biological. Exploration and evaluation of biocontrol agents for Russian knapweed are in progress. The gall fly *Jaapiella ivannikovi* was released in 2009, has established and will be available for wider distribution. A gall wasp, *Aulacidea acroptilonica*, also was released but has had minimal impact.

SPOTTED and DIFFUSE KNAPWEED

[*Centaurea stoebe* spp. *micranthos* (Gugler) Hyek] and (*C. diffusa* Lam.)





Diffuse knapweed flower with spiny bracts



Spotted and diffuse knapweed



Spotted knapweed flower with black bracts



SPOTTED and DIFFUSE KNAPWEED

State Listed Noxious Weed (both species)

The knapweeds are one of the most rapidly spreading invasive species in the western U.S. Knapweeds already infest more acreage than leafy spurge in Montana and Minnesota, and have been found in more than 25 counties in North Dakota. Knapweeds are related to thistles and can spread even faster. For instance, spotted knapweed infested approximately 25 acres in eight North Dakota counties in 1984 and had spread to more than 1,000 acres in 14 counties by 1997. Diffuse knapweed can spread as quickly as spotted knapweed but has been kept in check in North Dakota and infests less than 650 acres. Spotted knapweed had infested more than 30,000 acres by 2017.

Identification and growth form:

Both are short-lived perennials or sometimes biennial plants reproducing solely by seed. Seed remains viable in the soil five years or more, so infestations may occur a number of years after vegetative plants have been eliminated. The seeds can germinate from spring through early fall. Seedlings emerging in the fall often overwinter as a rosette of leaves, resuming growth again in the spring. The plants grow 2 to 4 feet tall with one or more stems. The leaves are pale green and 3 to 4 inches long. Rosette leaves are deeply lobed. The physical appearance of these two knapweed species is similar, except diffuse knapweed is generally shorter and more highly branched. Plants flower from early July through August and produce 1,000 or more seeds per plant.

These species are distinguished by the bracts below the flower. Spotted knapweed has stiff, black-tipped bracts while diffuse knapweed has a rigid terminal spine about one-third of an inch long with four to five pairs of shorter, lateral spines (crablike). If the plant is not flowering, search for last season's flower stalk and identify the plant based on the flower bracts. Both species have pink to light purple and occasionally white flowers.

Why is this plant a concern?

Spotted and diffuse knapweed are aggressive, introduced weed species that rapidly invade pasture, rangeland and fallow land and cause a serious decline in forage and crop production. Spotted knapweed has few natural enemies and is not preferred by livestock as forage. Knapweed infestations in North Dakota largely can be traced to seed or hay brought in from neighboring states. Researchers in Montana have observed that spotted knapweed may remain in a confined location for several years and then spread rapidly to adjacent areas. Controlling spotted and diffuse knapweed plants when they are first observed and monitoring the site for several years to prevent reinfestation from seed are important

How do I control these plants?

Chemical and Cultural. Spotted and diffuse knapweed confined to small, well-defined areas should be pulled by hand or treated with a herbicide as soon as detected to avoid spread of the weed. First, all visible knapweed plants should be removed and destroyed by burning or mulching. Then the areas should be treated with a herbicide to prevent reinfestation from seedlings. The most effective herbicides for spotted and diffuse knapweed control include Milestone (aminopyralid), Tordon (picloram) and dicamba (various). Treat an extra 10 to 15 feet around the knapweed patches to control seedlings. A careful follow-up program is necessary to control missed plants and seedlings. Many attempts to control knapweed have failed because follow-up treatments were not applied.

Biological. In general, the knapweed infestations are small enough that herbicide and hand removal are the best and most cost-effective treatments in North Dakota. Biological control agents have been introduced in neighboring states to control spotted knapweed. There are 13 biological control agents currently permitted for use against knapweed species. Consult the N.D. Dept. of Agriculture or NDSU weed specialists for the latest information on which agents may be successful in the state.

KOCHIA

[*Bassia prostrata* (L.) A.J. Scott]









KOCHIA

County Listed Noxious Weed

Kochia, also referred to as fireweed, summer-cypress or Mexican firebush, is a member of the Chenopodiaceae or goosefoot family. Kochia is native to Eurasia and was introduced to the United States in the early 1900s as an ornamental. Kochia is palatable to livestock and has good forage quality when grazed early in the season. Kochia sometimes is referred to as tumbleweed.

Identification and growth form:

Kochia is a taprooted annual forb that typically grows from 1 to 6 feet tall. Stems of the plant are erect and spreading, much branched from the base and usually soft-hairy, but occasionally smooth. Stems are usually yellowish-green to green and often turn red with maturity. Leaves of the plant are alternate, lance-shaped and 0.5 to 2 inches long and have fringed hairs on the margins. The upper surface of the leaf is usually smooth and the lower surface usually is covered with soft hairs. Kochia flowers are inconspicuous and greenish and form short, dense, terminal, bracted spikes. Flowering generally occurs from July to September.

Kochia reproduces only by seed with more than 14,000 seeds produced per plant. Seeds are oval or egg shaped, dull brown, slightly ribbed and dispersed in the fall when the plant becomes a tumbleweed. Seeds germinate in the spring and have little or no seedbank viability and either germinate or decay in one year.

Why is this plant a concern?

Although kochia has been grown as a drought-resistant forage and may have reclamation value on disturbed land, the plant is a serious cropland weed. Kochia is an exceptionally competitive weed and a few uncontrolled plants can cause severe yield losses. Kochia is highly adaptable and can be found on pasture, rangeland, road sides, ditch banks, wastelands and cultivated fields.

Kochia can contain high nitrate levels and is toxic if overgrazed. Nitrate poisoning in livestock causes bloat and photosensitization. Toxic substances identified within the plant include saponins, alkaloids, nitrates and oxalates. Kochia is a main contributor to fall hay fever sufferers.

How do I control this plant?

Chemical. Kochia has become resistant to several commonly used herbicides. ALS- and 2,4-D/MCPA resistance is widespread throughout North Dakota, and glyphosate resistance can be found in the eastern half of the state. Resistance to dicamba and Starane (fluroxypyr) products is scattered, and triazine resistance is fairly rare. Use of multiple sites of action within a season is important to reduce the risk of resistance establishment or spread. Where possible, the use of soil-applied PPO inhibitors Spartan/Authority/Portfolio (sulfentrazone) or Valor/Payload (flumioxazin) products provides several weeks of residual control. Treatments that contain bromoxynil, atrazine or PPO-inhibiting herbicides such as Aim (carfentrazone) or Flexstar (fomesafen) can provide excellent control when plants are small, 2 inches tall or less, but treatments that include Starane (fluroxypyr) and/or dicamba have provided the most reliable control across plant sizes.

Mechanical. Early tillage in the spring provides good control when conducted during the seedling stage of the plant. Mowing kochia prior to flowering reduces seed production but may not kill the plant.

Biological. No biological agents or pathogens are available for this weed.

LEAFY SPURGE

(*Euphorbia esula* L.)



State Listed Noxious Weed

Leafy spurge was once the most difficult noxious weed to control in North Dakota and infests all 53 counties. Scientists at the North Dakota Agricultural College (NDAC) recognized leafy spurge could be a problem soon after it was first identified in the state, growing along a Fargo street in 1909. However, the plant was not added to the state noxious weed list until 1935, when leafy spurge was found growing in all but 10 counties. The largest single infestation at that time was estimated to be 193 acres in Foster County.



Latex is found in all plant parts



True flower





Leafy spurge gall



Aphthona lacertosa



Aphthona nigriscutis

LEAFY SPURGE

Despite several control programs led by the State Agriculture Department and NDSU Extension, leafy spurge doubled in acreage every 10 years, reaching nearly 1.8 million acres in the 1980s. A coordinated integrated program of biological, chemical and cultural methods directly led to the first-ever reports of a decline in leafy spurge infestation in the state in the 1990s.

Identification and growth form:

Leafy spurge is a long-lived perennial that normally grows 2 to 3 feet tall from a woody crown from below the soil surface. Each crown area produces several upright stems, giving the plant a clumplike appearance. The plant bears numerous linear-shaped leaves with smooth margins. The leaves have a characteristic bluish-green color but turn yellow or reddish orange in the fall. Stems originating from crown buds and roots begin growth in late April, making leafy spurge one of the first plants to emerge in the spring. The early and rapid growth gives leafy spurge a competitive advantage over crop and pasture plants. All parts of the plant contain a milky juice called latex, which is a useful identifying characteristic.

Leafy spurge produces a flat-topped cluster of yellowish-green petal-like structures called bracts, which surround the true flowers. The showy, yellow bracts appear in late May and early June, giving the plant the appearance of "blooming." However, the true flowers, which are small and green, do not develop until mid-June. Spring-applied herbicides are more effective on plants with developing true flower parts than on plants with developed bracts but undeveloped flowers.

Seeds are borne in pods, which contain three gray-brown, oblong, smooth seeds. After the seed has matured, the seed pods burst explosively and throw seeds up to 15 feet from the parent plant. An average of 140 seeds is produced per stem, and seeds may remain viable in the soil at least eight years.

Leafy spurge seeds may germinate to re-establish infestations where total control of leafy spurge tops and roots has been achieved. The peak period of germination is late May and early June, but seeds can germinate and seedlings become established throughout the growing season. Leafy spurge seedlings have a remarkable capacity for vegetative reproduction and can reproduce vegetatively within seven to 10 days after emergence. Seedlings typically do not flower during the first year.

The root system of leafy spurge is extensive and consists of numerous coarse and fine roots that occupy a large volume of soil. Roots are most abundant in the upper foot of soil, but some roots can extend to a depth of 15 feet or more. The roots are woody and durable in structure, with numerous buds capable of producing new shoots. The root system contains a large nutrient reserve capable of sustaining the plant for years.

Why is this plant a concern?

Leafy spurge infestations may have more than 200 stems per square yard in sandy soil and even higher densities in heavy clay soil. Patches of leafy spurge usually spread vegetatively from 1 to 3 feet per year and form dense stands that crowd out other plants by shading and competing for moisture and nutrients. Forage production may be reduced to 20 percent or less and most native plants are eliminated because they cannot out-compete this weed.

Leafy spurge contains a toxic substance that, when consumed by livestock, is an irritant, emetic and purgative. It causes scours and weakness in cattle and may result in death. The toxin has produced inflammation and loss of hair on the feet of horses from freshly mowed stubble during haying and has caused mortality of sheep that grazed leafy spurge exclusively. However, sheep and goats will graze leafy spurge as a portion of their diet and can be used as a form of cultural control. Animals will eat dried plants in hay, but many livestock, particularly cattle, avoid eating live plants

LEAFY SPURGE

How do I control this plant?

Leafy spurge control must be considered a long-term management program. Generally, less than 6 inches of the root system is destroyed regardless if the control method is biological, chemical or cultural. Research at North Dakota State University has shown that more of the root system is killed when a combination of control methods are used, compared with any method used alone.

Chemical. Proper timing of herbicide applications is essential for good leafy spurge control. Leafy spurge is most susceptible to dicamba (Banvel and other trade names), Facet L (quinclorac), Method (aminocyclopyrachlor), and Tordon (picloram). Plateau (imazapic), fall-applied, provides better long-term control and less grass injury than spring or summer treatments. Combinations of Tordon plus Plateau or Tordon plus Plateau plus 2,4-D applied in June provide improved leafy spurge control compared with Tordon plus 2,4-D or Plateau applied alone in June. The Tordon plus Plateau combination is not recommended for use in the fall.

The combination of Tordon plus Overdrive also will improve leafy spurge control compared with Tordon used alone. Overdrive contains dicamba plus difluenzopyr, which is an anti-auxin compound that often improves broadleaf weed control when applied with auxin-like herbicides such as Tordon, dicamba and 2,4-D.

Glyphosate (various) applied for leafy spurge control has a different optimum application timing than the auxin herbicides (2,4-D, dicamba, picloram and quinclorac) or Plateau. Glyphosate is most effective for leafy spurge control when applied either after seed filling in midsummer or after fall regrowth has begun but before a killing frost. Glyphosate alone applied during spring growth stages generally provides poor long-term control.

Grazing. Sheep and goats provide an alternative for controlling leafy spurge top growth in pasture and rangeland. Grazing alone will not eradicate leafy spurge but will reduce the infestation, slow the spread of the weed and allow grasses to be grazed by cattle and horses.



Aphthona larvae



Longhorned beetle larvae



Leafy spurge hawkmoth



Grazing should be started early in the spring when the plant first emerges. On large infestations, pastures should be divided so animals can be rotated regularly and the entire infestation grazed in a timely manner.

Sheep and goats are best suited to control leafy spurge on large infestations or along waterways and tree areas where chemical control is restricted or cost is prohibitive and/or where success with biological control agents has been minimal.

Leafy spurge provides good forage value and compares favorably with widely used regional forages such as alfalfa (*Medicago sativa* L.), smooth brome (*Bromus inermis* Leyss.) and crested wheatgrass (*Agropyron desertorum* Fischer ex Link). Before moving animals to a leafy spurge-free area, they should be contained for three to five days so viable seed can pass through the digestive system.

Biological. Biological control of leafy spurge was initiated in the mid-1980s. To date, 10 species of insects have been released in North Dakota for control of leafy spurge, and six have become established. Four of the six established insects are flea beetles (*Aphthona* spp.), which have reduced the leafy spurge density more than any other agent.

LEAFY SPURGE

The first flea beetle released in North Dakota was *Aphthona flava* Guill in 1986. This flea beetle has established at only a few sites in the state and occurs at densities too low to be effective. In 1988, a mixed population of *Aphthona czwalinae* Weise and *Aphthona lacertosa* Rosenhauer were released near Valley City, N.D. By 1995, the majority (greater than 90 percent) of this mixed population was *A. lacertosa*. Two additional flea beetles, *Aphthona cyparissiae* Koch and *Aphthona nigriscutis* Foudras, were released the following year. *A. lacertosa* and *A. nigriscutis* were established in almost every county in North Dakota by 1996 and have become the major biocontrol agents used for leafy spurge control.

Although *Aphthona* spp. adults feed on leafy spurge foliage, the major damage to the plant occurs when the larvae feed on the roots. Larvae feed on both the fine feeder roots used by the plant to absorb water and nutrients and the storage tissue of the root crown. This feeding both destroys root tissue directly and causes the plant to be more susceptible to other methods of control, such as herbicides and infection from soil borne pathogens.

Research at North Dakota State University found flea beetle establishment was best on silt loam, silt clay loam, clay loam and clay soils with an organic matter content of 6 percent to 9.5 percent. Flea beetles were least productive in fine sand to loamy fine sand soils with an organic matter content of 1 percent to 3 percent. In addition, the release area needs to be well-drained and not subject to frequent prolonged flooding or standing water, which will kill the larvae. Generally, flea beetles have not been very successful in controlling leafy spurge growing along waterways, in shaded areas or in very sandy soil.

The *Spurgia esulae* gall midge causes stem tip galls on leafy spurge, thereby decreasing seed production. It has been most successful near wooded areas. However, a second control method was needed to reduce the original leafy spurge infestation and to prevent spread from roots. A stem-boring beetle, *Oberea erythrocephala* Shrank, has been released and established in North Dakota in the 1980s, but to date, the population never has increased to sufficient numbers to decrease leafy spurge. The spurge hawkmoth (*Hyles euphorbiae* L.), a foliar feeder, was introduced in the 1970s but generally has not survived and when it did survive, control was too late in the growing season to be very useful.

Limitations to biological control. Although flea beetles have become established throughout North Dakota, they have not been successful in all environments. To date, approximately 30 percent of the releases have established and the leafy spurge stem density has been reduced. In another 30 percent of the releases, the insects have become established but the population density is too low to be effective. In the remaining releases, flea beetles have not established.

Cultural. Cultural control of leafy spurge includes properly timed cultivation and/or planting of competitive grass species. Cultural methods that only control leafy spurge top growth include mowing and fire. All cultural control methods are more successful when combined with herbicide treatments than when used alone.

Leafy spurge infestations must be controlled with herbicides such as glyphosate prior to seeding grass species. Some perennial grass species that have competed effectively to provide leafy spurge control include: Bozoisky Russian wildrye [*Psathyrostachys juncea* (Fisch.) Nevski] and Luna pubescent wheatgrass [*Agropyron trichophorum* (Link) Richter], Rebound smooth brome (*Bromus inermis* Leyss.) and Rodan western wheatgrass [*Pascopyrum smithi* (Rydb.) A. Löve]. They are examples of grass species that can compete relatively well with leafy spurge. Not only were the grasses very competitive with leafy spurge, but they also provided high yields and good nutritive value for grazing. Grazing following grass establishment should be limited and conducted at the proper growth stage of the grasses or leafy spurge will re-infest the seeded area rapidly.

Mowing and burning have been ineffective for reducing leafy spurge infestations, but may result in uniform regrowth that allows a more timely herbicide treatment. Also, mowing will reduce seed production if repeated every two to four weeks during the growing season.

COMMON MILKWEED and SHOWY MILKWEED

(*Asclepias syriaca* L. and *Asclepias speciosa* Torr.)



Common milkweed flower





Monarch butterfly larvae



Common milkweed



Showy milkweed flower

COMMON MILKWEED and SHOWY MILKWEED

County Listed Noxious Weed: Common milkweed only.

Common and showy milkweed are native to North America. Both species are robust, fleshy perennial plants that flourish in orchards, waste places and along roadsides. Milkweed has been used for medicinal, industrial, decorative and even for food purposes, despite having some degree of toxicity. Milkweed is best known as a primary food source for the monarch butterfly.

Identification and growth form:

As the common name implies, both species contain a thick, white, milky latex throughout the plant. Flowers are arranged in clusters at the top of the plant and are pink to white. Common milkweed flowers are held in tighter clusters and are more pink than white compared with showy milkweed. Showy milkweed flowers also have long lobes that stand upright, which are not found on common milkweed. Both species grow 2 to 4 feet tall and have large opposite leaves 3 to 5 inches wide and 6 to 10 inches long, which are covered with fine pubescence. These perennial plants have shallow fibrous roots. Milkweed grows over a wide range of soil moisture conditions, but can become dense under medium or high moisture levels.

Seed pods are 3 to 5 inches long and contain dozens of flat, reddish-brown seeds with tufts of hairs that allow the seed to travel long distances in the wind. An established market exists for milkweed seed floss as a nonallergenic fill to replace imported duck and goose down in comforters and for seed sales in prairie restorations and butterfly gardens. Most commercial milkweed supplies still are collected from the wild.

Why is this plant a concern?

Common milkweed can be aggressive in cropland areas given the right conditions. Reasons for the increase in milkweed densities in cropland include spread by the extensive root system, farmers using less tillage, several years of high rainfall and tolerance to most commonly used herbicides. Given the opportunity to spread and become established, common milkweed is extremely difficult to control.

How do I control these plants?

Since milkweed plants are native and a major food source for the monarch and other butterfly species, control is discouraged. However, if the plant becomes established in cropland, crop yield loss may occur and control would be warranted.

Chemical. Tordon (picloram) plus 2,4-D at high rates will reduce milkweed density but cannot be used in cropland. Glyphosate (various) will suppress milkweed temporarily in cropland while Express (tribenuron) can be applied with 2,4-D plus dicamba for spot treatment.

Cultural. Cultivation will reduce milkweed species in cropland but care must be taken not to spread the roots to noninfested areas.

Biological. Monarch butterfly larvae feed heavily on milkweed and often remove a majority of the leaves on a plant.

NARROWLEAF HAWKSBEARD

(*Crepis tectorum* L.)



County Listed Noxious Weed

Narrowleaf hawksbeard is native to Siberia and much of Eurasia. The plant is a member of the sunflower family and has bright yellow flowers very similar to dandelion or sowthistle. Narrowleaf hawksbeard commonly is found in most of Canada, including the neighboring provinces of Manitoba and Saskatchewan, where it is listed as a noxious weed. Narrowleaf hawksbeard will grow in many ecological zones, ranging from forests, lakeshores and seashores to dry prairies, mountains and parklands. Although narrowleaf hawksbeard can be found as far south as New Mexico and north to Alaska, the weed is primarily problematic in the northern tier of U.S. states and Canadian Prairie Provinces. Prior to 1950, O.A. Stevens of the North Dakota Ag College reported narrowleaf hawksbeard was well-established along a road in Walhalla, N.D., and had collected samples from Bottineau and Stark counties.









NARROWLEAF HAWKSBEARD

Identification and growth form:

Narrowleaf hawksbeard is a winter or spring annual that grows 2 to 3 feet tall from a tap-rooted basal rosette. The plant has a single main stem and often branches. The leaf shape gradually changes, going from the base to the tip of the plant. Rosette leaves are up to 6 inches long, 1 inch wide and coarsely toothed with a pointed tip. Basal leaves die off as the plant matures, which can help distinguish this plant from common dandelion or annual sowthistle. Stem leaves are alternate, and go from 4 inches long to less than an inch at the tip of the plant. Leaves are wider at the tip than the stem and often have a pair of small lobes at the base and curled edges. A white milky sap is found throughout the plant.

Mature narrowleaf hawksbeard has bright yellow dandelion-like flowers, which are found from late May through September in North Dakota. The seed are dark purple to brown, ribbed and attached to a pappus that will carry them in the wind or on animals. Each plant contains 30 to 70 flowers and can produce up to 50,000 seeds. Narrowleaf hawksbeard reproduces only by seed, which has a short dormancy and can germinate shortly after dispersal. Up to 90 percent of the seedlings that emerge from August to mid-September will overwinter. Survival declines the later in the season that seeds germinate, but even those that emerge in early to mid-October can overwinter and should be controlled.

Why is this plant a concern?

Narrowleaf hawksbeard traditionally was found along roadsides and disturbed land in North Dakota but now has become especially troublesome in no-till cropland, cropland seeded with cereals, pulses or oilseed crops, hay fields, and along newly established pipelines. Narrowleaf hawksbeard develops rapidly in the spring, which gives the species a competitive advantage, especially in forage crops. The weed will outcompete annual crops for nutrients and moisture, thus reducing yield, and can displace native plants in wildlands.

How do I control this plant?

Chemical. Narrowleaf hawksbeard is best controlled in late fall or very early spring with herbicides. The plant is much more difficult to control after bolting. Glyphosate applied alone or with other herbicides such as dicamba or 2,4-D will control rosettes in the fall. High rates of 2,4-D alone will control narrowleaf hawksbeard but can damage some crops. 2,4-DB is more effective than 2,4-D for control of this weed and is useful in forage crops such as alfalfa. Low rates of 2,4-D and dicamba generally do not control narrow leaf hawksbeard in the spring; rather glyphosate at 2 quarts per acre or more is required. ALS-inhibiting herbicides such as metsulfuron or tribenuron also will control this weed and often are mixed with glyphosate. Consult the latest edition of the "North Dakota Weed Control Guide" (W253) for additional herbicides used to control narrowleaf hawksbeard.

Cultural. Because narrowleaf hawksbeard only spreads by seed, plant certified weed-free seed and clean all farm equipment before moving from an infested to a noninfested field. Cultivation in late fall or very early spring will remove this weed from cropland. Preventive management such as maintaining good crop cover, minimizing disturbance and removing infestations when they are small will help contain the spread of narrowleaf hawksbeard. Mowing of noncrop sites before seed-set will reduce the spread of this weed.

Biological. No biological control agents or pathogens are available for this weed.

ORANGE HAWKWEED

(*Hieracium aurantiacum* L.)







ORANGE HAWKWEED

County Listed Noxious Weed

Orange hawkweed is native to northern and central regions of Europe. The plant first was introduced in North America in Vermont in 1875 as an ornamental. Orange hawkweed escaped from landscape plantings, gardens and cemeteries and now occurs throughout the eastern seaboard, into the Midwest, extending west to Minnesota and Iowa and south to Virginia and North Carolina, and has been steadily spreading to the West. Orange hawkweed is described as the worst weed problem in the northern Minnesota Iron Range and has become a major weed problem in the Pacific Northwest.

Identification and growth form:

Orange hawkweed is a herbaceous perennial that contains a milky sap and commonly grows up to 12 inches tall. In the vegetative stage, the plant appears as a basal rosette with many hairy leaves. Leaves are 4 to 6 inches long, dark green above, light green beneath, narrow and spatula-shaped. Each rosette is capable of producing 10 to 30 flower stems. Stems of the plant have short, stiff hairs and may have one to three small, clasping leaves located below the midpoint of the stem.

Orange hawkweed produces between five and 30 red-orange flower heads that are 0.5 to 0.75 inch diameter. Flower heads are arranged in a flat-topped cluster. Orange hawkweed seeds are tiny and black, and have a tawny tuft of bristles on the flattened end. The plant spreads primarily vegetatively through runners (like strawberries) and rhizomes or to new sites by seed.

Why is this plant a concern?

Orange hawkweed is an aggressive species that quickly can develop into large, dense patches, thus reducing native plant communities. The plant colonizes rapidly, forming a solid mat of rosettes. Orange hawkweed may have allelopathic effects on neighboring plants.

How do I control this plant?

Chemical. Orange hawkweed can be controlled with Tordon (picloram), products that contain clopyralid (Curtail, Stinger, Transline), Milestone (aminopyralid) or dicamba (various) plus 2,4-D. Monitor infested areas for several years to control new seedlings.

Mechanical. Pulling or digging is not recommended unless the infestation only consists of a few plants because digging stimulates the growth of new plants from rhizomes, stolons and fragmented roots.

Biological. Biological control of orange hawkweed is in the research stage. The gall wasp *Aulacidea subterminalis* was released in the U.S. for evaluation but did not establish.

PALMER AMARANTH

(*Amaranthus palmeri* S. Watson)



County Listed Noxious Weed

Palmer amaranth is a member of the pigweed family and is native to the southwestern and southcentral U.S. as far south as northwestern Mexico and as far north as southern Nebraska. The plant is one of the more aggressive pigweed species and often hybridizes with other pigweeds, including redroot pigweed (*A. retroflexus* L.) and waterhemp [*A. rudis tuberculatus* (Moq.) Sauer]. Palmer amaranth has developed resistance to multiple classes of herbicides and become one of the most difficult to control weeds in croplands of the Midwest and northern Great Plains.

Identification and growth form:

Palmer amaranth is a summer annual that emerges from seed throughout the growing season. The plant commonly grows 6 to 8 feet tall and can reach more than 10 feet in height. The plant has one very thick central stem, often more than 5 inches in diameter, which supports many lateral







PALMER AMARANTH

branches. Under optimum conditions, the plant can grow 2 to 3 inches per day. Palmer amaranth leaves are smooth, 2 to 8 inches long, arranged in an alternate pattern and lance or egg-shaped. The leaves have a small, sharp spine on the leaf tip. A whitish V-shaped or thumbprint mark is found on leaves of some but not all plants. Palmer amaranth is dioecious, with male and female flowers appearing on long leafless branching spikes at the top of the plant. The flowers are green, not showy, and end in three spiny bracts. The seed head spikes can be up to 3 feet long, and the female flowers are very prickly.

Palmer amaranth reproduces only by seed. Seed viability is more than 90 percent the first year after flowering and declines slowly through time, with some seed remaining viable for three to five years. Each plant can produce from 100,000 to more than 500,000 seeds, which are small (1 to 1.3 millimeters) and dark reddish brown. Palmer amaranth spreads from region to region as a contaminant in seed, livestock feed and hay. Once established in an area, the plant can be spread on farm equipment, in manure and by wildlife that feed on the seed.

Why is this plant a concern?

Palmer amaranth has reduced yield up to 91 percent in corn and 79 percent in soybean. The weed has a wide genetic diversity, which allows the plant to adapt to new environments and has enabled the weed to develop resistance to many herbicides used to control pigweed species. Palmer amaranth has developed resistance to ALS, HPPD and PPO inhibitors, dinitroanilines triazines and glyphosate, leaving few options for control in cropland. Once introduced, Palmer amaranth can spread quickly. For instance, it infested four southern Iowa counties in 2016 but was found statewide in more than a third of the counties one year later.

How do I control this plant?

Chemical. Palmer amaranth is difficult to control because it can be resistant to multiple classes of herbicides and their different modes of action. Foliar-applied herbicides must be applied before Palmer amaranth plants are taller than 4 inches. Herbicides that control or suppress susceptible Palmer amaranth include auxins such as dicamba, chloroacetamide, diphenylethers, glufosinate, glyphosate and HPPD inhibitors. Consult the latest edition of the "North Dakota Weed Control Guide" (W253) and the NDSU Palmer amaranth website (www.ag.ndsu.edu/palmeramaranth) for updates on controlling Palmer amaranth infestations.

Cultural. Early identification and eradication are the best method to prevent Palmer amaranth from becoming established in North Dakota. Use seed from reliable sources that are certified weed-free. Much of the spread of Palmer amaranth in neighboring states was due to planting infested seed. If plants are found, they should be removed by hand and destroyed. Place plants into large plastic garbage bags when removing them from fields to prevent seed spread, then burn or compost the plant material. Mowing is not an effective control method because plants will regrow from cut stalks and set-seed, often out of sight below the crop canopy.

Crop rotation is important to prevent Palmer amaranth from becoming established in North Dakota. Rotate soybean with grass crops such as wheat or corn or a perennial forage to help prevent the weed from spreading. Rotating crops allows the use of herbicides from various chemical families that are more effective on Palmer amaranth and other pigweed species than soybean herbicides and will reduce the buildup of herbicide-resistant populations.

Palmer amaranth sometimes is called carelessweed. Carelessness in allowing just a few plants to become established can result in large crop losses in only a few years. Be vigilant in scouting and removing even a single Palmer amaranth plant.

Biological. No biological control agents or pathogens are available for this weed.

POISON IVY

[*Toxiodendron rydbergii* (Small ex Rydb.) Greene]







POISON IVY

Not Listed by State or County

Poison ivy is a native species commonly found in wooded areas and in brushy areas, especially those along streams or lakes. It can grow as a small shrub or vine and is found in North America from Canada to Mexico. The first published records of poison ivy in North America date back to the 1600s. A similar plant called poison oak *(T. diversiloba)* is found only in states along the Pacific coast.

Identification and growth form:

Poison ivy is a perennial native small shrub that spreads by both rhizomes and seeds. The leaves are alternate with trifoliate leaflets. Remember the rhyme: Leaves of three — let it be! The leaves are shiny green in the spring and turn yellow and deep red in the fall. The flowers grow in axillary panicles, are yellow-green and not showy. The fruit is globed shaped, resembling small pumpkins, and turns yellow or light brown when mature.

Why is this plant a concern?

The "poison" in this plant is from a white oil called urushiol found in the phloem that causes an allergic contact dermatitis in about 85 percent of the population. Plants retain urushiol even after desiccation and smoke from burning poison ivy can carry the oil. The reaction is to the oil, not the plant itself, so one can react by touching objects that have come in contact with the plant, such as tools, and when removing footwear. Since it is an allergic reaction, people not sensitive to poison ivy can become sensitized through time.

How do I control this plant?

The best control is avoidance, but if the plant is found close to walking trails, near a home or in your favorite fishing area, herbicides that contain triclopyr such as Garlon are very effective.

PURPLE LOOSESTRIFE

(*Lythrum salicaria* L.)



State Listed Noxious Weed

Purple loosestrife, a beautiful garden plant with an aggressive nature, first was introduced into North America in the early 1800s. The plant was sold in North Dakota by its genus name, *Lythrum,* for at least 50 years. Lythrum plants were brought to North Dakota for flower gardens because of their striking color, ease of growth, winter hardiness and lack of insect or disease problems. The garden varieties of purple loosestrife were sold by many cultivar names, including Morden Pink, Dropmore Purple and Morden Gleam. These garden cultivars were thought to be sterile but now have been shown to cross-pollinate with the wild *Lythrum* type and sometimes with other *Lythrum* cultivars.

Identification and growth form:

Purple loosestrife is a rhizomatous perennial forb. Wild infestations are associated with moist or marshy sites. The stems are erect (1.5 to 8 or more feet tall) and four to six angled, and can be smooth or pubescent with few branches. Leaves are simple (0.75 to 4 inches long, 0.2 to 0.5 inch wide), entire, and can be opposite or whorled.

The most identifiable characteristic of purple loosestrife is the striking rose to purple flowers. The flowers are



Galerucella spp. feeding on leaves





PURPLE LOOSESTRIFE

arranged on a spike, which can be a few inches to 3 feet long. Each flower has five to seven petals arising from a cylindrical green tube. The plant usually flowers from early July to mid-September in North Dakota. The seed capsule is two-celled and contains many very small seeds (1 millimeter long or less). The roots become thick and woody in mature plants. The aerial shoots die in the fall and new shoots arise the following spring from buds at the top of the root crown. Although the root crown expands and produces more shoots each year, the maximum growth of the root crown diameter is limited to about 20 inches.

Spread of purple loosestrife is primarily by seed, but the plant also can spread vegetatively from stem cuttings. Research at NDSU has shown that seed viability of purple loosestrife growing in North Dakota wetlands ranged from 50 percent to 100 percent. With approximately 2.7 million seeds produced per plant, purple loosestrife has the potential to spread rapidly once established in an area.

Why is this plant a concern?

The most destructive impact of purple loosestrife invasions is on the ecology of aquatic sites. Purple loosestrife forms dense monotypic stands as it displaces native wetland plants. Under optimum conditions, a small, isolated group of purple loosestrife plants can spread to cover aquatic sites in just one growing season. When purple loosestrife replaces native vegetation, it also can displace wildlife. Waterfowl, especially ducks, avoid wetlands that have become dominated with purple loosestrife. In addition, overall waterfowl production decreases as suitable nesting habitat is eliminated. The plant's growth is generally too compact to offer cover, and cover may be as crucial to wildlife as food.

How do I control this plant?

Several methods are available for purple loosestrife control, including mechanical, biological and chemical. The size and location of a specific infestation will determine the best control methods. In general, small infestations of a few plants can be controlled by digging, especially when plants are only a few years old. Larger infestations require treatment with herbicides and/or biological control agents.

Chemical. Herbicides can be used to control purple loosestrife in areas too large to be controlled by digging. Also, herbicides can be applied to individual plants selectively in landscape situations to prevent killing desirable plants. Infestations growing along streams or in marshy areas may require specialized equipment and application by trained professionals.

Glyphosate (various trade names) will provide good control of purple loosestrife when applied from July to early September. Many formulations of glyphosate are sold but only those labeled for aquatic use can be applied in or near water. Garlon (triclopyr) is a selective broadleaf herbicide that will not kill cattail or other desirable monocot species. Garlon will provide good to excellent purple loosestrife control when applied in the pre- to early flower or late-flower growth stages but should not be used in landscapes or flower beds because soil residual of the herbicide may prevent establishment of other horticultural plants. Milestone (aminopyralid) and Capstone (aminopyralid plus triclopyer) can be used in seasonally dry wetlands.

Biological. Three biocontrol insect species were introduced in North Dakota in 1997. They were:

Galerucella pusilla — a leaf-feeding beetle
Galerucella calmariensis — a leaf-feeding beetle
Hylobius transversovittatus — a root-mining weevil

Of these insects, the two *Galerucella* spp. leaf-feeding beetles have been most successful. These insects overwinter as adults and lay eggs in early June in North Dakota. The adults and especially the larvae feed on the leaves and flowers of purple loosestrife. Following several summers of heavy feeding, purple loosestrife infestations have been reduced greatly. However, since the largest infestations in North Dakota are in urban areas, mosquito control programs have kept these insects from becoming well established.

SALTCEDAR

(*Tamarix* spp.)







SALTCEDAR

State Listed Noxious Weed

Saltcedar is the common name for several introduced species of shrubs or small trees, including *Tamarix chinensis, T. parviflora* and *T. ramosissima.* Saltcedar is native to Eurasia and first was introduced into the U.S. to reclaim eroded areas and prevent further loss of stream banks, primarily in the southwest. Saltcedar has been sold in the horticultural industry, primarily for its wide adaptability and pink flowers. Saltcedar became established in North Dakota as escapes from ornamental plantings or from seed floating along rivers.

Identification and growth form:

Saltcedar is a shrubby bush or tree that can range in size from 5 to 20 feet tall. The bark is a reddish brown, especially on younger branches. The leaves are small and flat and resemble evergreen shrubs such as arborvitae. Flowers are pink to white and five-petaled, and appear from mid to late summer. The seeds are extremely tiny and similar in size and color to pepper. Each seed has a pappus, which allows it to float long distances in water or move in the wind. Seeds are short-lived and usually germinate within a few months after dispersal.

Once saltcedar seed germinates, it can grow rapidly to a small flowering shrub in one to two years. The plant is deciduous and very hardy, and horticultural varieties are advertised to grow "in sun or shade, and in wet or dry areas" from USDA hardiness zones 2 to 7. The plant quickly establishes a long, woody taproot to support a voracious thirst for water. The root system is capable of producing many new shoots if the top growth is removed by mechanical control methods or fire.

Why is this plant a concern?

Saltcedar can become a monoculture quickly along lakes and waterways. In the early morning and evening, moisture with high salt content is exuded from the foliage, causing the soil to become saline. Saltcedar can choke waterways and even has dried up entire lakes. Native riparian species are quickly displaced by saltcedar, which in turn causes displacement of native birds and animals that generally do not feed on the leaves or eat the saltcedar seeds. Saltcedar, even in the seedling stage, will tolerate short-term flooding and can establish away from waterways when seeds are washed in during flooding. Once established, the plants can become so thick cattle will not graze the area.

How do I control this plant?

Prevention is the best method to keep saltcedar from invading North Dakota wetlands and wildlands. Scouting along waterways and removal of ornamental plantings have been effective in reducing the spread of saltcedar in North Dakota.

Chemical. Arsenal (imazapyr) is the most widely used herbicide to control saltcedar. Arsenal also can be applied with a glyphosate formulation labeled for use in water. Do not remove saltcedar top growth for three years following herbicide application or resprouting will occur. Garlon (triclopyr) has been effective when applied in the spring or late fall.

Cultural. Control methods such as burning or bulldozing have not been successful.

Biological. Several leaf beetles (*Diorhabda* spp.) have been released in North America to control saltcedar. The insects feed on leaves of saltcedar and slowly reduces plant vigor. However, the insects have not been consistently successful in reducing saltcedar infestations. Biological control of saltcedar in North Dakota is not recommended because of the small size of most plants and low infestation levels in the state.

ANNUAL AND SPINY SOWTHISTLE

[*Sonchus oleraceus* L. and *Sonchus asper* (L.) Hill]



Annual sowthistle





Spiny sowthistle





ANNUAL AND SPINY SOWTHISTLE

County Listed Noxious Weed – annual sowthistle only

These sowthistle species are from Europe and now are established widely in the region. The plants often are mistaken for perennial sowthistle. However, perennial sowthistle has a creeping perennial root system and larger and longer leaves, and grows 4 to 6 feet tall. Annual and spiny sowthistle often are found along roadsides and in waste areas, gardens and cultivated fields.

Identification and growth form:

Annual and spiny sowthistle are both annuals and differ primarily in leaf form. Spiny sowthistle, as the name implies, has sharp, stiff prickles along the stem and leaves. Leaves clasp the stem with rounded basal lobes (auricles) that resemble a ram's horn. Annual sowthistle leaves are deeply toothed lower on the plant but progressively less so on the upper stem and auricles are distinctly pointed. Both species have yellow flowers, borne on a long vaselike involucre, with several in a cluster. Annual and spiny sowthistle contain a milky latex and both grow from a small taproot. Spiny sowthistle has slightly larger flower heads (0.5 to 1 inch across) compared with annual sowthistle (0.25 to 0.75 inch). The seeds for both are flattened with three to five ribs. Both species grow 2 to 4 feet tall.

Why is this plant a concern?

These annual sowthistle species can become competitive in cropland, but otherwise are more nuisance species than invasive. Because annual and spiny sowthistle often are found in waste areas and heavily used ground, such as parking lots and trails, they can be an indicator that land is being overgrazed or otherwise abused when these species start to appear in pasture and hay land.

How do I control these plants?

Annual and perennial sowthistle species are not true thistles and control options differ between these weed families.

Chemical. Products that contain metsulfuron such as Escort or Ally are very effective in controlling sowthistle species. Commonly used herbicides for Canada thistle control such as Milestone (aminopyralid), Tordon (picloram) and dicamba (various) are less effective and require higher use rates.

Cultural. Cultivation will control annual sowthistle species in cropland.

Biological. No biological control agents or pathogens are available for these weeds.

PERENNIAL and MARSH SOWTHISTLE

[*Sonchus arvensis* L. and *Sonchus arvensis* L. ssp. *uliginosus* (M. Bieb.) Nyman]



Perennial sowthistle



Marsh sowthistle flower







PERENNIAL and MARSH SOWTHISTLE

County Listed Noxious Weed

Perennial sowthistle was introduced from Europe and placed on the state noxious weed list in 1935 when it became a severe problem, especially in the northwestern part of the state. The weed subsequently was removed from the list in 1999 after revised farming practices and new herbicides had severely reduced the infested acreage. Most sowthistle infestations in North Dakota are annual not perennial species.

Identification and growth form:

Marsh sowthistle is a subspecies of perennial sowthistle and thus the plants are very similar in form and growth habit. Both species have bright yellow flowers similar to dandelion, but perennial sowthistle flower bracts are covered with gland-tipped hairs, while marsh sowthistle has smooth flower bracts. Both weeds have an extensive creeping root system. Leaves are lobed below, but less so above and have prickles on the margin and are 4 to 10 inches long (longer than the annual species). Generally, perennial sowthistle has fewer but larger flowers (1 to 1.5 inches across) than the annual species and end in a terminal cluster. Some taxonomists consider marsh a separate species from perennial sowthistle; others consider it a subspecies. Both contain latex and grow from 1.5 to 6 feet in height. Seeds are dark brown, with prominent ridges and have a tuft of white pappus or bristles.

Sowthistle generally flowers from July through September. Seed production is highly variable, but typically averages 30 seeds per flower head. Seed viability is relatively low for sowthistle and seeds usually do not survive longer than a year.

Perennial and marsh sowthistle can tolerate variable environments and can adapt well to wet areas with little soil disturbance. The plant commonly is found in cultivated areas, ditches, meadows, waste areas, sloughs, woods, lawns, roadsides, beaches, along rivers and lake shores. Sowthistle is adapted to many soil types, but seems to prefer low, fine-textured loam soils.

Why is this plant a concern?

Perennial and marsh sowthistle can displace native plant communities by invading disturbed areas and undisturbed natural habitats. Sowthistle can cause reduced crop yields, and lead to increased cultivation and herbicide costs.

How do I control these plants?

Annual and perennial sowthistle species are not true thistles and control options differ between these weed families.

Chemical. Products that contain metsulfuron such as Escort and Ally or Express (tribenuron) are very effective in controlling perennial sowthistle species. Preharvest applications of glyphosate (various) and products that contain clopyralid or glufosinate will reduce perennial sowthistle. Tordon (picloram) and Milestone (aminopyralid) will control sowthistle species in noncropland.

Cultural. Cultivation will reduce perennial sowthistle species in cropland but care must be taken not to spread the roots to noninfested areas.

Biological. No biological control agents or pathogens are available for these weeds. Insects can be observed on the flower heads of these plants, especially perennial sowthistle, but they are feeding on sticky residue from the glands on the flower bracts, which does not harm the plant.

ST. JOHNSWORT

(*Hypericum perforatum* L.)



Not Listed by State or County

St. Johnswort, also referred to as Klamath weed, is native to Europe, North Africa and parts of Asia and first was introduced to the United States in the late 1600s for ornamental and medicinal purposes. St. Johnswort is sold as an antidepressant, often in the form of tea. However, St. Johnswort is also well-known to cause photosensitizing in man and animals. Numerous cultivated hybrids are available.

Identification and growth form:

St. Johnswort is a taprooted perennial herb that typically grows 1 to 5 feet tall. Stems are multi-branched, smooth, reddish and woody at the base. The leaves are opposite, entire, linear to oblong with in-rolled edges and 3/8 to 1 inch long. The leaves are dark green above and light green below and dotted with tiny, translucent glands. The "spotted leaf" appearance is a key characteristic for identification.





St. Johnswort has opaque spots on the leaves

ST. JOHNSWORT

Flowers of the plant are yellow, starlike with five petals and 0.5 to 1 inch in diameter, with tiny black dots on the margins. Petals are twice as long as the sepals and numerous stamens arranged in three groups are apparent. The seeds are egg-shaped and are held within a three-valved capsule that bursts at maturity. Seeds are tiny, dark brown, 3/64 inch long, somewhat cylindrical, slightly pointed at the ends and coarsely pitted.

St. Johnswort spreads both by underground and above-ground creeping stems, and by seed. Annual seed production ranges from 15,000 to 33,000 up to 100,000 with a small percentage germinating and reaching maturity. Seeds may remain viable in the soil for up to 10 years. Germination occurs during the warm summer months; however, seedlings may require several years to reach reproductive maturity. Basal foliage that has overwintered may begin to bolt during early March and by early April, older plants will have produced floral shoots. Flowering generally occurs from May through September and may be dependant on soil moisture.

Why is this plant a concern?

Glands found on the plant produce oils that contain hypericin, a phototoxin. Once the plant is consumed, animals become overly sensitive to sunlight, which results in dermatitis, an inflammation of the mucus membranes causing itching, swelling, blisters and open sores. All growth stages of the plant are toxic, including dried plants in hay. Poisoning or hypericism has been reported in cattle, horses, sheep and goats, with symptoms detectable within two to 21 days following ingestion of the plant. Light-haired or unpigmented skin areas such as the mouth, nose, ears and hooves are the most sensitive.

Livestock that suffer from hypericism generally lose weight, are difficult to manage and have reduced market value. Affected animals usually recover once consumption of St. Johnswort is stopped. St. Johnswort has become popular as an herbal stimulant and will induce photosensitivity in some people.

How do I control this plant?

Chemical. A variety of herbicides can be applied for St. Johnswort control and are most effective when applied to seedlings and young plants. Tordon (picloram) or glyphosate (various) are most effective when applied in the spring. Escort (metsulfuron) also will control St. Johnswort effectively. Herbicide treatments are most successful if applied at bud stage before flowering occurs and late in the fall when the plant is going dormant. Repeated applications often are required to achieve adequate management.

Mechanical. Hand-pulling or digging may be effective on small and isolated infestations if repeated several times per season and if conducted prior to flowering and seed production. In larger infestations, lateral roots of older plants left behind can give rise to new plants.

Biological. Several biological agents have been introduced into the United States for St. Johnswort control since the mid-1940s. The Klamath weed beetle *(Chrysolina quadrigemina)* was one of the first highly successful biological control insects introduced into North America. This insect is credited with controlling St. Johnswort on millions of acres in California and the Pacific Northwest.

However, the Klamath weed beetle has not been successful in all areas St. Johnswort occurs, so other agents have been introduced. The root-boring beetle *Agrilus hyperici* and the leaf bud gall-forming midge *Zeuxidiplosis giardi* have become established but the effectiveness has been quite variable. More recently, a St. Johnswort foliage- and flower-feeding moth, *Aplocera plagiata*, has established in the northwestern U.S. with limited success in controlling this weed.

BULL THISTLE

[*Cirsium vulgare* (Savi) Tenore]









BULL THISTLE

County Listed Noxious Weed

Bull thistle is the least serious of the introduced thistles in North Dakota. Native Americans used bull thistle to treat hemorrhoids, which they likely learned from French fur trappers. Bull thistle often is referred to as edible. Many plant parts from the root to the flower are eaten. The flower petals are used as chewing gum.

Identification and growth form:

Bull thistle is a biennial that grows from a flat rosette of leaves the first year to a flowering stem the second year, often 5 feet or more in height. Plants are multibranched; stems have purple veins and are winged. The plant appears bushy rather than the candelabra appearance of plumeless or Canada thistle. A distinguishing characteristic of bull thistle is the leaves. Leaf margins are deeply toothed and toothed again (double dentate) with prominent stiff spines. The leaf surface has a distinct center vein with slight prickly hairs above and cottony pubescence below. The stems are very pubescent with dark purple veins. The rosettes of bull thistle are very pubescent with deeply lobed leaves and dark purple ribs.

Bull thistle flower heads usually are found singularly at the end of each stem branch. The flowers are gumdrop shaped, large (2 to 3 inches tall), with long, stiff, yellow-tipped spines. Bull thistle flowers from July to September, which is somewhat later than other thistles in the region. The flowers are generally purple but rarely a white form is observed. Achenes are 0.1 to 0.15 inch long, glossy light brown to pale yellow or white with narrow dark brown stripes and favored by birds.

Why is this plant a concern?

Bull thistle occurs in all 48 contiguous states and most of Canada, but is designated noxious in only a few states. Bull thistle generally is found growing singularly or in small patches in the northern and eastern counties of the state. The large size and showy flowers of the plant makes it quite noticeable in pasture and rangeland, but it has little economic or ecological consequence.

How do I control this plant?

Bull thistle seldom reaches high enough densities to warrant treatment.

Chemical. Fall is the preferred time for applying herbicides for bull thistle control. Fall treatment allows more time for herbicide application than in the spring and thistle control is generally best with fall treatments. Seedlings that emerge in summer after tillage or previous herbicide applications will not bolt but remain in the rosette stage. Bull thistles are most susceptible to herbicides in the rosette form.

Bull thistles can be controlled effectively with Milestone (aminopyralid), clopyralid (Stinger, Transline or Curtai), Tordon (picloram), or dicamba (various) or dicamba plus diflufenzopyr (Overdrive). Products that contain metsulfuron (Escort, Cimarron Max, others) will control bull thistles in the spring and will eliminate seed production when applied in the bolting to bud growth stages.

Cultural. Cultivation or hand-digging the rosette prior to bolting will kill the plant and prevent seed-set.

Biological. The seed head gall fly *Urophora stylata* lays eggs on flower buds and the larvae then feed on the seed. However, this insect has been only marginally successful in reducing bull thistle populations. This insect is not appropriate for control of small infestations.

CANADA THISTLE

[*Cirsium arvense* (L.) Scop.]





Female flower



Male flower





CANADA THISTLE

State Listed Noxious Weed

Canada thistle was introduced in North America as a seed contaminant in both French and British colonies. The first legislation to control the weed was passed by Vermont in 1795. Canada thistle has the dubious distinction of being one of three weeds listed in 1885 by Dakota Territory as required of "every person" to be destroyed. The native distribution of Canada thistle includes Europe, North Africa and central Asia. It also is found in China and Japan and has spread so extensively that it is difficult to distinguish the plant's original native range. Canada thistle is considered to be naturalized in the northern Great Plains

Identification and growth form:

Canada thistle is a long-lived perennial that usually grows 2 to 3 feet tall and bears alternate, dark green leaves that vary in size. The leaves are oblong, usually deeply cut, and have spiny, toothed edges. Canada thistle has small (3/4 inch diameter), compact flower heads that appear on the upper stems.

Canada thistle has been classified into several varieties. Within these varieties are many ecotypes, which differ in growth characteristics, response to day length, and susceptibility to herbicides and cultivation. For example, leaf shape, head structure, and the number and size of spines can differ with ecotypes. Canada thistle requires a 14- to 16-hour photoperiod to bolt and flower (April 19 to Aug. 22 in North Dakota). Flower color can range from purple to light lavender or even white. Stem color also can differ from green to lavender.

Flowering occurs from June to September. Male and female flowers are produced on different plants, so cross-pollination is necessary for seed production. Flowers produce from 40 to 80 seeds per head, which can move long distances, although most seed remain in the head until winter and eventually germinate nearby.

The smooth, light brown seeds (achenes) have a conical point and are loosely attached to a tannish pappus at the tip, which aids in seed dispersal by wind. Seeds mature rapidly and are able to germinate within eight to 10 days after pollination. Canada thistle overwinters in the rosette growth stage.

Canada thistle has an extensive underground root system that may penetrate the soil to a depth of 10 feet or more and grow laterally 12 to 15 feet per year. Root buds occur randomly along the roots and initiate new shoots whenever environmental conditions are favorable. Root segments as small as 0.6 inch can initiate shoot growth and become established. Canada thistle is adapted to a wide range of soils, but it produces deeper roots in clay or muck soils than in sand, gravel or limestone soils.

Root bud development can occur nearly anytime during the growing season, but is greatest when soil temperatures are warm, air temperatures are cool and the photoperiod shortens to 13 hours. These conditions generally are found during the fall growing season. Therefore, more Canada thistle root-bud development occurs in the fall than any other time of the year. Canada thistle grows best in the northern regions of North America where temperature and rainfall are moderate. Growth ceases when temperatures exceed 85 degrees for extended periods.

Why is this plant a concern?

Canada thistle has the potential to form dense infestations rapidly through vegetative reproduction, and the spread of these clones may continue indefinitely, crowding out and displacing native grasses and forbs through shading, competition and possibly allelopathy. Canada thistle spread can change structure and species composition of natural areas and reduce plant and animal diversity. Infestations of Canada thistle may contribute to the elimination of endangered and/or endemic plant species. In wildlands, Canada thistle has the potential to increase fire frequency and perhaps severity as a result of its abundant and readily ignited litter and flammable above-ground biomass.

Canada thistle can reduce yield of many crops severely. Yield losses are directly proportional to the density and patchiness of the infestation, with more than $40 million annually lost in production in North Dakota alone. Wheat is a poor competitor and Canada thistle infestations often increase in a continuous-wheat farming program. Canada thistle also can be a severe problem in corn and soybean grown in rotation, with greater losses in soybean than corn.

CANADA THISTLE

How do I control this plant?

Canada thistle is the only thistle in North Dakota that has become a cropland pest. Control strategies differ for Canada thistle in cropland compared with pasture, range and wildland.

Chemical. *Cropland.* The best approach to Canada thistle control in cropland should include an in-crop herbicide treatment to suppress Canada thistle growth, minimize crop yield losses and prepare the thistle for a fall postharvest treatment. Preharvest and fall-applied treatments provide the most effective long-term control. The best herbicide to use will vary depending on crop rotation. However, the control program must be uninterrupted for two to three years if the infestation is to be reduced.

Glyphosate (various trade names) can be used to control Canada thistle in glyphosate-resistant crops. In-crop applications will not kill established thistle stands. However, when used as part of an overall management program, glyphosate can reduce infestations.

Pasture, range and wildlands. Herbicides that control Canada thistle in noncropland include products that contain clopyralid (various), Tordon (picloram), dicamba (various) dicamba plus diflufenzopyr (Overdrive), Method (aminocyclopyrachlor) and Milestone (aminopyralid). Control is greatest when applied to Canada thistle at the early bud growth stage (early summer) or in the fall to plants in the rosette form. These herbicides applied at low rates may be the most cost-effective method for controlling dense infestations that require broadcast application. Re-treatment will be necessary for several years to obtain long-term control.

Cultural. *Cropland.* Canada thistle roots are much less winter hardy then many other perennial weeds and timely cultivation actually can increase winter kill. Soil temperatures of 20 degrees or colder can reduce Canada thistle regrowth from roots by more than 50 percent. Following crop harvest, cultivate fields before the Canada thistle is 3 inches tall and repeat before regrowth reaches 3 inches tall until freeze-up. This method has the combined advantage of decreasing carbohydrate root reserves and the bare ground from the tillage will lead to colder soil temperatures, which increases winter-kill.

An option for Canada thistle in row crops and fallow that includes both tillage and herbicides is known as the rosette technique. The objective is to prevent the plants from bolting by using tillage and/or herbicide treatments until the day length is less than 15 hours, the photoperiod required for most Canada thistle plants to bolt. The thistles then will regrow as rosettes only. Research at North Dakota State University has found herbicide absorption and translocation to the roots of Canada thistle is greater when applied to the rosette growth stage than when applied to bolted plants, making fall treatment of rosettes the most cost-effective method for long-term Canada thistle control.

The rosette technique for Canada thistle control in fallow includes the use of tillage and fall-applied herbicides, while control in row crops includes in-crop herbicide treatments, tillage and fall-applied herbicides. Periodic tillage in fallow is used to control Canada thistle shoots and other weeds until late July, when the day length is less than 15 hours. Herbicides used for Canada thistle control, such as glyphosate or clopyralid, then are applied to rosettes in late September or early October. Research at NDSU has found that cultivation until late June prevented more than 90 percent of Canada thistle from bolting in corn and soybean.

CANADA THISTLE

Pasture, range, and wildlands. Repeated mowing will reduce Canada thistle infestations. Mow whenever the plants are in the early bud growth stage to prevent seed-set. Several mowings a year are needed because plant populations vary in maturity. Mow as close to the surface as possible. If plants are cut above the terminal bud before the stems elongate, they likely will regrow. Mowing before the flowers start showing color is important because plants mowed after that likely will produce some viable seed. Mowing for several years will reduce the root vitality of Canada thistle and will prevent seed production, reducing the seed reserve. Mowing should be combined with a chemical control program for best results.

Controlled burns often are used to help restore wildlands to a more natural plant community. Contrary to popular thought, research at North Dakota State University found that fall prescribed burns did not cause a long-term increase in Canada thistle density; rather, Canada thistle emerged earlier in the burned compared with the nonburned areas. The effect was short-lived and Canada thistle densities were similar regardless of burn treatment the second growing season after the burn. Also, no differences in Canada thistle control occurred when herbicides were used alone or combined with a prescribed burn.

Biological. Two biological control agents have been introduced for Canada thistle control, and a third was introduced accidentally. To date, none have been effective at reducing the weed on a large scale. The most widespread insect is *Hadroplontus litura* (formerly *Ceutorhynchus litura*) weevil, which first was released in North Dakota in the 1970s. The larvae feed on the underground parts of Canada thistle for a short time but infestations generally are not reduced. One may take advantage of the early season stress on Canada thistle from *H. litura* feeding by using additional control methods such as mowing or applying herbicides. In addition, natural soil pathogens may become more destructive due to multiple entry sites established by the insect. However, do not expect these insects alone to reduce a Canada thistle infestation.

A gall-producing fly, *Urophora cardui*, causes meristematic galls but does little long-term damage to the perennial thistle. The Canada thistle bud weevil *Larinus planus* was an accidental introduction into North America and is not permitted for distribution. The insect feeds on developing flowers to prevent seed production. Although *L. planus* can survive under a wide range of climates, it has not reduced established Canada thistle stands.

The painted lady butterfly *(Vanessa cardui)* can be a very effective biological control agent but only on an intermittent basis. Larvae of the butterfly feed on Canada thistle plants and can eliminate an infestation. However, the insect generally is found only in southern states such as Arizona and New Mexico and will build up populations large enough to migrate north only once every eight to 11 years. The insect will migrate north as far as Canada and those fortunate enough to reside within the migratory pathway will see a dramatic decrease in the Canada thistle population. Unfortunately, the insect feeds on many plants, including crops such as soybean and sunflower, and is not a candidate for long-term biological control of Canada thistle.

A native pathogen, *Pseudomonas syringae* pv. *tagetis* (Pst), causes the top of Canada thistle plants to turn yellow to white. This pathogen may release a toxin into the phloem of Canada thistle and kill the plant. The pathogen is most widespread during wet periods. Attempts to produce this pathogen as a commercial biocide have not been successful. A native rust (*Puccinia punctiformis*) has reduced Canada thistle in the wild but has not been introduced successfully as an effective biological control agent.

FLODMAN THISTLE

[*Cirsium flodmanii* (Rydb.) Arthur]









FLODMAN THISTLE

Not Listed by State or County

Flodman thistle is a native species found from Saskatchewan and Manitoba to Iowa and Colorado. This thistle is a food source for a variety of insect and bird species. The stems of Flodman thistle can be peeled and eaten and were part of the Native American diet.

Identification and growth form:

Flodman thistle is a deep-rooted perennial and usually grows 3 to 4 feet tall. The leaves are shiny green on top with slight pubescence and are white and very pubescent below, alternate, rigid and deeply lobed. Stem leaves are prominently lobed; each lobe has three points that end in a spine. One lobe sticks out at nearly right angles, giving a flipping appearance, which is helpful to distinguish this plant from the often similar-appearing wavyleaf thistle.

The rosettes are often 4 to 6 inches in diameter with oblong or lanceolate leaves that vary from deeply lobed to nearly complete. The leaves are green to gray and especially pubescent below. The flowers are deep purple to pink, rarely white, tube shaped and approximately 1 inch long. The flower heads have a strong yellow spine and a sticky secretion that attracts and catches insects. Flodman thistle usually flowers from mid-July through September in North Dakota. The achenes are about 0.1 to 0.15 inch long and oval, and vary from tan to brown and have a conspicuous yellow collar.

Why is this plant a concern?

Flodman thistle is more competitive than most other native species and has the potential to infest large areas. It is tolerant to high salt concentration in soil but not as tolerant as Canada thistle. Although it grows best under moist conditions as most thistles do, it can survive under drought conditions, which gives it a competitive advantage on semiarid rangeland.

How do I control this plant?

Native thistle species such as Flodman thistle seldom become weedy because of the variety of insects and birds that feed on the plant and several pathogens that cause a variety of diseases. However, of the native thistles found in the region, Flodman thistle is one that can form dense colonies, especially in dry years.

Herbicides that are effective for controlling Flodman thistle in noncropland include products that contain clopyralid (various), Tordon (picloram), dicamba (various), Overdrive (dicamba plus diflufenzopyr) and Milestone (aminopyralid). Control is greatest when applied to thistle at the early bud growth stage (early summer) or in the fall to plants in the rosette form. Herbicide treatment will not be necessary if one allows the native pests to build in population and reduce this thistle through time. Flodman thistle has not been a problem weed in cropland.

MUSK THISTLE

(*Carduus nutans* L.)









State Listed Noxious Weed

Musk thistle is the most common biennial invasive thistle in North Dakota. Musk thistle is native in southern Europe and western Asia and was introduced into North America in the early 1900s. Two subspecies that differ in flower size and pubescence occur in North Dakota.

Identification and growth form:

Musk thistle likely is the most easily identified invasive thistle in North Dakota, yet many people confuse this plant with either bull thistle or plumeless thistle. Musk thistle often grows in excess of 6 feet tall, has very large flowers that tend to droop, and the flower has very characteristic brown bracts that resemble a pine cone. The flowers usually are deep rose, solitary and very large, ranging from 1.5 to 3 inches in diameter. Rosettes are dark green with a light green midrib, usually smooth and lacking pubescence and often grow 2 feet or more in diameter.

Musk thistle stems are usually very branched with spiny wings; however, the wings are interrupted and not complete along the stem as with bull or plumeless thistle. The leaves are oblong to lanceolate and lobed with slender spines along the margin. They generally have little pubescence underneath, which helps distinguish musk thistle from plumeless thistle. However, the subspecies *C. nutans macrocephalus* (Desf.) has very pubescent leaves.

Musk thistle flowers from July to late September. The average musk thistle plant produces in excess of 10,000 seeds per plant and, under favorable conditions, may produce 120,000 seeds per plant. Seed germination averages 30 percent. The seed generally germinates in the summer and fall, and the plant overwinters as a rosette. The following spring, the plant resumes vegetative growth, bolts and flowers. After setting seed, the plant

MUSK THISTLE

dies, thereby completing the life cycle. Occasionally biennial thistles have winter annual, annual or short-lived perennial characteristics.

Why is this plant a concern?

Musk thistle tends to invade overgrazed or otherwise disturbed pastures, rangeland, roadsides and waste areas. Movement into cropland is generally from nearby noncropland or roadsides. Musk thistle spreads rapidly and can form very dense stands that crowd out desirable forages and native species.

How do I control this plant?

Since biennial plants such as musk thistle reproduce only from seed, the key to a successful management program is to control the plants before flowering.

Chemical. Fall is the preferred time for applying herbicides for biennial thistle control. Fall treatment allows more time for herbicide application than in the spring and thistle control is generally best with fall treatments. Seedlings that emerge in summer after tillage or previous herbicide applications will not bolt but remain in the rosette stage. Biennial thistles are most susceptible to herbicides in the rosette form.

Biennial thistles can be controlled effectively with Milestone (aminopyralid), Stinger, Transline or Curtail (clopyralid), Tordon (picloram), Method (aminocyclopyrachlor), or dicamba (various) or dicamba plus diflufenzopyr (Overdrive). Products that contain metsulfuron (Escort, Cimarron Max, others) will control biennial thistles in the spring and will eliminate seed production when applied in the bolting to bud growth stages.

Cultural. Repeated mowing will reduce musk thistle infestations. Mow whenever the plants are in the early bud growth stage to prevent seed-set. Several mowings a year are needed because plant populations vary in maturity. Mow as close to the surface as possible. Plants should be cut below the terminal bud before the stem elongates or the weed will regrow. Mowing before the flowers start showing color is important because plants mowed after that likely will produce some viable seed. Mowing should be combined with a chemical control program for best results.

Biological. The seed weevil *Rhinocyllus conicus* was introduced from Eurasia to control musk thistle by reducing seed production. Larvae develop in the flower head and consume the seed as it develops. The weevils can reduce seed production by nearly 80 percent, but they are attracted more to earlier blooming rather than to later blooming flowers. The late-season flowers produce seeds with little damage from the weevil, which sustains the musk thistle population. Building a high enough population of insects to greatly reduce seed production takes five to 10 years. These insects first were introduced into North Dakota in the early 1970s. *R. conicus* is not specific to musk thistle and has been found feeding on other invasive thistles, such as Canada thistle. However, this insect also feeds on native thistles, including several that are on the protected or endangered species list and interstate transport is not permitted.

The thistle crown weevil *(Trichosirocalus horridus)* was introduced into North America from Europe in the mid-1970s. Larvae of this insect feed on the growing tip as the musk thistle rosette bolts. While seldom effective by itself, it does help control musk thistle when combined with *Rhinocyllus conicus.* Feeding by *T. horridus* larvae on musk thistle growing tips causes the plant to produce multiple shoots. The resulting flower heads are reduced in size and produce fewer seeds, and the increased number of flower heads results in an increased population of *R. conicus*. Interstate transport of *T. horridus* is no longer permitted.

The rust fungus *Puccinia carduorum* was released in the eastern U.S. in 1987 for Canada thistle control. The rust has moved westward by natural unaided spread and can reduce musk thistle, especially when in combination with the previously mentioned insects.

PLUMELESS THISTLE

(*Carduus acanthoides* L.)











PLUMELESS THISTLE

Not Listed by State or County

Plumeless thistle first was introduced into North America in the 1870s along the East Coast as a contaminant in ship ballast. Plumeless thistle is one of the most common invasive thistles in the mid-Atlantic and upper Midwestern states. Although found as far west as Washington state, it is less common than musk and bull thistle and is not listed on the North Dakota state noxious weed list.

Identification and growth form:

Plumeless thistle is a winter annual or biennial and generally is found only in eastern North Dakota. Plumeless thistle tends to be shorter than other noxious biennial thistles and generally reaches 1 to 4 feet tall. The stems are winged and very branched, giving the plant a candelabrum appearance. The wings are very spiny and are continuous along the stem and not interrupted as musk thistle. The leaves are deeply lobed, narrower than musk thistle and very pubescent underneath. Each lobe has one to three very sharp marginal spines. Flower heads are small (0.5 to 1 inch) but very numerous and pink to purple or very rarely white. The bracts are very narrow and resemble spines. The heads can be singular or in clusters of two to five. The achenes are small, gray to light brown with a distinct, light apical collar and slightly curved.

Rosettes of plumeless thistle resemble musk thistle rosettes, but are more deeply lobed and much more pubescent. Plumeless thistle rosettes have wavy leaves with yellow spines along the white leaf margins and resemble holly. The plant bolts and flowers in late April to early May.

Why is this plant a concern?

Plumeless thistle can become very weedy and form dense colonies, especially along waterways, ditches and roadsides in summers following wet falls. Plumeless thistle seldom is found in cultivated fields, even when infestations are nearby in roadsides or pastures. The numerous spiny branches make walking through infestations by people or grazing by animals very difficult.

How do I control this plant?

Chemical. Fall is the preferred time for applying herbicides for plumeless thistle control. Fall treatment allows more time for herbicide application than in the spring and thistle control is generally best with fall treatments. Seedlings that emerge in summer after tillage or previous herbicide applications will not bolt but remain in the rosette stage. Plumeless thistles are most susceptible to herbicides in the rosette form.

Plumeless thistles can be controlled effectively with Milestone (aminopyralid), Stinger, Transline or Curtail (clopyralid), Tordon (picloram), or dicamba (various) or dicamba plus diflufenzopyr (Overdrive). Products that contain metsulfuron (Escort, Cimarron Max, others) will control biennial thistles in the spring and will eliminate seed production when applied in the bolting to bud growth stages.

Cultural. Repeated mowing will reduce plumeless thistle population but must be done prior to flowering or viable seed will be produced. Plumeless thistle will not survive tillage operations used in cropland.

Biological. Both *Rhinocyllus conicus* and *Trichosirocalus horridus,* which were released for musk thistle control, attack plumeless thistle. Control from these agents has been minimal.

SCOTCH THISTLE

(*Onopordum acannthium* L.)







SCOTCH THISTLE

County Listed Noxious Weed

Scotch thistle is a native of Eurasia and has become naturalized in portions of western North America. Scotch thistle can thrive in well-drained, sandy or stony soils. The plant occurs in pastures, croplands, rangelands, roadsides and construction sites but prefers disturbed areas and sites near ditches. Scotch thistle has regal stature. During the reign of Malcolm I of Scotland, Norsemen attempted to capture the Staines Castle by wading across the moat in their bare feet, only to find the moat dry and overgrown with thistle. The painful cries by the warriors roused the castle guards and the Norsemen were defeated. To commemorate this victory, the flower became the emblem of Scotland.

Identification and growth form:

Scotch thistle is a biennial herb that can grow up to 12 feet tall. Stems of the plant are hairy or cottony, and have broad, spiny wings. Leaves are large, spiny and covered with fine, dense hairs that give Scotch thistle a grayish-green, cottony appearance. Upper leaves are alternate and have prominent triangular lobes that occur on the margins. Lobes of the leaf end with a prominent, sharp, green to white spines.

Flower heads are terminal, numerous and 1 to 2 inches in diameter. Flowers are pale purple to red and subtended with a series of overlapping bracts tipped with a spine. Seeds are oblong to obovate, four-angled, deep brown to black, about 3/16 of an inch long and wrinkled. Plants can produce 70 to more than 300 flower heads that can produce 100 to 200 seeds per head. Therefore, a single plant can produce 8,400 to 40,000 seeds. Seed viability can range from one to more than 16 years, depending on seed burial depth.

Why is this plant a concern?

Scotch thistle is an aggressive species that can out-compete and decrease desirable forage. The plant also can degrade wildlife habitats and recreational areas. Scotch thistle infestations can become impenetrable, thorny barriers that severely limit land use by wildlife, livestock and man.

How do I control this plant?

Scotch thistle reproduces solely through seed production. Seeds generally germinate in late fall but germination can occur anytime throughout the year.

Chemical. Scotch thistle can be controlled effectively with Milestone (aminopyralid), Stinger, Transline or Curtail (clopyralid), Tordon (picloram), Method (aminocyclopyrachlor), or dicamba (various) or Overdrive (dicamba plus diflufenzopyr). Products that contain metsulfuron (Escort, Cimarron Max, others) will control biennial thistles in the spring and will eliminate seed production when applied in the bolting to bud growth stages.

Mechanical. Hand-pulling small infestations of Scotch thistle can be an effective control method. Mowing prior to seed dispersal may limit the amount of seed available for germination. However, if the plant is cut after flowers begin to show color, viable seed may still be dispersed.

Biological. Both *Rhinocyllus conicus* and *Trichosirocalus horridus,* which were released for musk thistle control, attack Scotch thistle. Control from these agents has been minimal.

WAVYLEAF THISTLE

[*Cirsium undulatum* (Nutt.) Spreng.]





WAVYLEAF THISTLE

Not Listed by State or County

Wavyleaf thistle is a native species and is common in western North Dakota. Various Native American tribes used wavyleaf thistle to treat gonorrhea and syphilis. The remedy involved drinking a tea made from the plant and then elevating the body temperature to induce sweating. A tea also was made from the roots to treat diabetes and stomachache. The roots were boiled and used in soup.

Identification and growth form:

Wavyleaf thistle is a perennial native plant that often is confused with Flodman thistle. Wavyleaf thistle tends to flower from July to September, often a week or two earlier than Flodman thistle. Wavyleaf thistle tends to be more spiny and the leaves less deeply lobed than Flodman thistle. Also, wavyleaf thistle is found in well-drained soils, generally in drier locations than those occupied by Flodman thistle. Wavyleaf thistle grows 3 to 4 feet tall and often is associated with sagebrush communities and rangeland but is less common in moist meadows.

The leaves of wavyleaf are alternate and tipped with yellow spines. The leaves are very pubescent, giving the plant a gray cast, and are less deeply lobed than Flodman thistle. Leaves are strongly undulated or wavy, which gives the plant its common name. The stem of wavyleaf thistle is very pubescent and generally thicker than Flodman thistle. Rosette leaves are also very wavy and gray in appearance.

The flowers are most often pink or purple, but there is a white-flowered form, *f. album* Farwell. The flowers are usually more than 2 inches in diameter, with globe-shaped heads. The yellow spines on the heads lack the sticky secretion found on Flodman thistle. The achenes are brown without a lighter apical band or with only a very narrow lighter margin.

Wavyleaf thistle is a larger plant than Flodman thistle. Generally Flodman thistle is more common than wavyleaf in eastern North Dakota, but wavyleaf gradually becomes the predominant species in the central and western portions of the state.

Why is this plant a concern?

Generally wavyleaf thistle is kept in check by native insects and birds that feed on the plant as well as native pathogens that reduce plant vigor and growth. Wavyleaf has become a problem when the plant spreads beyond its normal range, such as the Pacific coast. Otherwise this plant does not warrant control efforts.

DALMATIAN TOADFLAX and YELLOW TOADFLAX

[*Linaria dalmatica* (L.) Mill.] and (*Linaria vulgaris* Mill.)



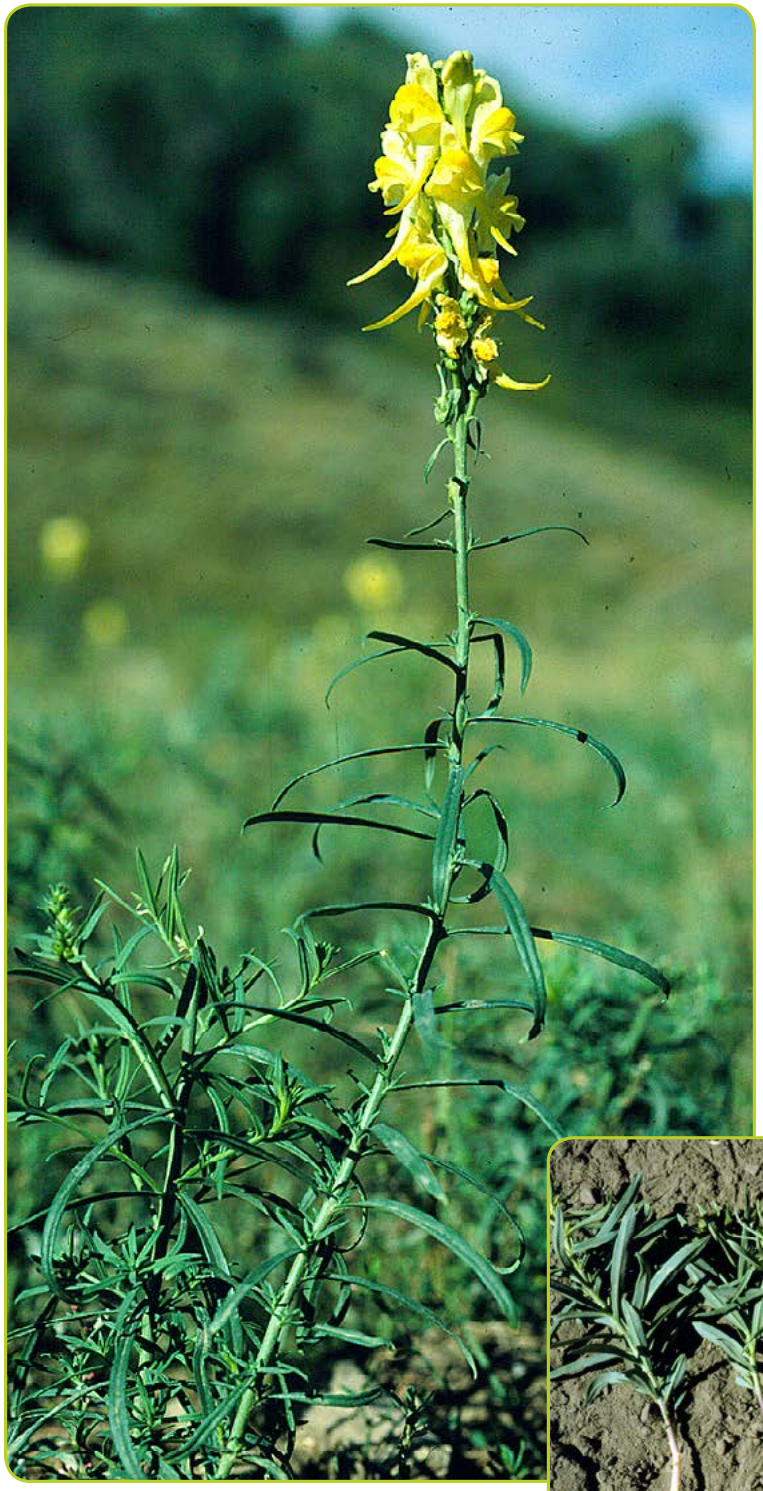
Dalmatian toadflax





Dalmatian toadflax has broad heart-shaped leaves

DALMATIAN TOADFLAX and YELLOW TOADFLAX



Yellow toadflax



Yellow toadflax has narrow linnear leaves



Yellow toadflax flowers have orange throats



DALMATIAN TOADFLAX and YELLOW TOADFLAX

State Listed Noxious Weed – both species

Both Dalmatian and yellow toadflax are escaped perennial ornamental plants that were introduced in the mid-1800s. Dalmatian toadflax is native to the Mediterranean region, specifically the Dalmatian Coast of Croatia, while yellow toadflax is from Eurasia. Yellow toadflax first was recorded in North Dakota by H.L. Bolley from a collection made in Fargo and described as "most abundant in Barnes County" in the 1940s by O.A. Stevens. The first record of Dalmatian toadflax is from Walhalla in Pembina County in 1937 by Stevens.

The toadflaxes are most likely to be found along highways, railroad tracks and other transportation or communication lines, or anywhere livestock is brought into the state. Often the origins of an infested area can be traced back to an escape from an ornamental planting. Dalmatian toadflax has been reported only as small patches in a few counties, generally in the western part of North Dakota. However, yellow toadflax has been found in many counties across the state and is on the verge of becoming a major problem for land managers in North Dakota.

Identification and growth form:

Dalmatian and yellow toadflax are members of the snapdragon family and thus easily recognizable by the bright yellow flowers, which have swollen corolla tubes that flare into two "lips" with an orange throat (yellow toadflax) and long spur. The flowers are 1 to 1.5 inches long with many flowers on a raceme. Both species have an extensive creeping rhizomatous root system that spreads like leafy spurge. The most distinctive difference between the species is that Dalmatian toadflax has broad, heart-shaped leaves that clasp a woody stem, whereas yellow toadflax has narrow, linear leaves with a narrow stem.

The plants begin regrowth from the roots as soon as the soil warms in early spring. Toadflax flowers from late June through August in North Dakota and single plants may produce more than 500,000 seeds that are dispersed by wind, rain, wildlife, and movement of forage and livestock. The seed is disk-shaped, 0.08 inch in diameter and dark brown to black, and often have irregular papery wings. Seed dispersal begins a few weeks after flowering and continues into winter. The roots of a single plant can extend 10 feet and give rise to daughter plants every few inches.

Why are these plants a concern?

The toadflax species are aggressive and will displace forage in pastureland and native species in wildland. Yellow toadflax can be mildly poisonous to livestock that graze it. Although the toadflaxes may be slow to establish, once plants take root, control is very difficult since most herbicides are ineffective.

Dalmatian toadflax seedlings are relatively poor competitors with grass species, but once established, the weed can become extremely invasive, especially on dryland sites, disturbed areas and roadsides. Yellow toadflax is adapted to more moist sites than Dalmatian toadflax and often is found in pasture, meadows and ditches.

DALMATIAN TOADFLAX and YELLOW TOADFLAX

How do I control these plants?

Prevention is the best method to keep Dalmatian and yellow toadflax from invading North Dakota pasture, rangeland and wildlands. Herbicides can be effective but require repeated treatments at high rates.

Chemical. Tordon (picloram), Plateau (imazapic) and Telar (chlorsulfuron) will control Dalmatian toadflax when applied at maximum use rates during flowering or late fall. No herbicide is labeled for yellow toadflax control, but research has found that a combination treatment of Tordon plus Overdrive (dicamba plus diflufenzopyr) applied from mid-June through mid-September will reduce yellow toadflax infestations for a least two years. See the latest edition of the "North Dakota Weed Control Guide" for application rate and timing recommendations.

Cultural. The long-term use of proper stocking rates to maintain competitive forage species has helped reduce the spread of toadflax into grazing lands. Burning is not effective because soil temperatures do not get high enough to kill the roots. Burning even may have a detrimental effect and cause an increase in the number of stems due to reduced cover.

Biological. Several insects have been introduced for toadflax control. The stem-boring weevil *Mecinus janthiniformis* has been the most successful and can reduce Dalmatian toadflax stands relatively quickly. *M. janthiniformis* larvae mine in Dalmatian toadflax stems, which slowly causes the plants to wilt and die. Repeated attempts to establish *M. janthiniformis* on yellow toadflax in North Dakota have failed, likely because the larvae cannot survive in the much narrower diameter stem of yellow compared with Dalmatian toadflax. *Mecinus janthinus* is currently being evaluated for yellow toadflax control.

A foliage feeding moth, *Calophasie lunula*, was introduced in the U.S. in 1968 but has had little effect on controlling yellow toadflax. Several other insects have been introduced for biological control of both toadflax species but have not established or have not controlled the weeds

YELLOW STARTHISTLE

(*Centaurea solstitialis* L.)



Not Listed by State or County

Yellow starthistle is an extremely invasive, fast-spreading member of the knapweed family and native of the Mediterranean region. Yellow starthistle first was collected in North Dakota in 1964 and was added to the state noxious weed list for a time beginning in 1999 after plants were observed in several newly seeded CRP fields. Successful control of these and other infestations led to the delisting of the weed, but yellow







YELLOW STARTHISTLE

starthistle remains a threat and any infestation should be eradicated immediately. Yellow starthistle infests more than 15 million acres in California and has displaced leafy spurge as the most invasive weed found in Idaho. Yellow starthistle presently has been found in the neighboring states of Montana, South Dakota and Minnesota.

Identification and growth form:

Yellow starthistle is an annual that often grows 3 feet or more tall and is branched with winged stems. Each stem terminates in bright yellow flowers with needlelike straw-colored bracts often up to 2 inches long. Lower leaves are deeply lobed while upper leaves are entire. Both stems and leaves are covered with pubescent hairs that give the plant a grayish appearance. Yellow starthistle reproduces (and thus spreads) only by seed. A single plant can produce as many as 150,000 seeds, of which 90 percent or more are viable and can remain dormant in the soil for a few years. Most yellow starthistle seeds are plumed and disperse when mature. However, some seeds are plumeless and stay in the flower head until winter storms disperse them in blowing snow. Yellow starthistle has a long tap root similar to spotted knapweed or dandelion.

Yellow starthistle seeds can germinate either in the fall following cool rains and overwinter as a rosette or in the spring after snowmelt. Yellow starthistle begins to bolt in late May to early June. Flowering starts in early to mid-July, similar to Canada thistle. Yellow starthistle often can go unnoticed until the plant begins to flower, but once the bright yellow, dandelionlike flowers bloom, the plant is easily detected. Flowering continues until mid to late August, then the plant dries to a straw color, the seeds mature and the cycle repeats.

Why is this plant a concern?

Livestock and wildlife will not graze where yellow starthistle grows because of the sharp spines around the flower. Yellow starthistle is adapted to a wide variety of environments and will out-compete most native plants for nutrients and moisture, reducing both native wildlife and plant diversity. Yellow starthistle can cause "chewing disease" in horses, which is a lethal neurological disorder. However, to present symptoms, such as the inability to eat or drink, stiff or trembling legs and a stiff, swollen, "frozen" face, a horse must eat an amount nearly equivalent to its body weight.

How do I control this plant?

Prevention is the best method to keep yellow starthistle from invading North Dakota cropland, rangeland and wildlands. Yellow starthistle is most likely to be found in recently seeded pastures or CRP fields; along highways, railroad tracks and other transportation or communication lines; or anywhere livestock is brought into the state. Previous infestations in the state can be traced to contaminated grass seed, including those used in CRP and contaminated hay, and from movement of out-of-state livestock and vehicles into North Dakota.

Chemical. The most effective herbicides for yellow starthistle control include Milestone (aminopyralid), Tordon (picloram) and dicamba (various). Treat an extra 10 to 15 feet around the infestations to control seedlings. A careful follow-up program is necessary to control missed plants and seedlings.

Cultural. Grazing, mowing, burning, cultivation and maintaining competitive forages can be used in conjunction with herbicides to keep yellow starthistle from establishing in North Dakota. Hand-pulling is also effective for control of this annual weed.

Biological. Several biological control agents have been introduced into states with large acreages of yellow starthistle such as California and Idaho. However, biological control is not recommended in North Dakota, and any new infestations should be eradicated using chemicals or by digging and removing by hand.

Photo credits

All photos in the publication are by Rodney G. Lym, North Dakota State University, except as noted below.

Page 8. Black henbane plant, rosette and pineapple-shaped fruit courtesy of Weeds of the West, Tom Whitson, editor.

Flower photograph courtesy of Washington State Noxious Weed Control Board.

Page 10. False chamomile photos from Richard Old, XID Services Inc.

Line drawings are from USDA-NRCS PLANTS data base.

Page 16. Common tansy photos courtesy of Celestine Duncan, Weed Management Services, Helena, Mont.

Page 20. Downy brome infestation photo courtesy of Leslie J. Mehrhoff, IPANE.

Panicle photograph courtesy of J.C. Schou, Biopix.dk

Ligule photograph from Virginia Tech Weed Guide.

Page 24. Halogeton photos courtesy of Blake Schaan, North Dakota Department of Agriculture, Bismarck, N.D.

Page. 26. Hoary cress photos from Richard Old, XID Services Inc.

Page 30. Russian knapweed bracts courtesy of Steve Dewey, formerly of Utah State University.

Page 32. Spotted and diffuse knapweed bracts courtesy of Steve Dewey, formerly of Utah State University.

Page 34. Kochia seedling courtesy of Richard Zollinger, formerly of North Dakota State University.

Pages 36 and 37. Insect photos from Biological Control of Leafy Spurge CD, USDA-APHIS and USDA-ARS, TEAM Leafy Spurge's IPM information series No. 1.

Page 40. Narrowleaf hawksbeard photographs of flowering and rosette plants courtesy of Clair Keene, NDSU.

Close-up photos of flower and stem courtesy of Lindsay Green, Minot State University.

Seed photo courtesy of Brian Jenks, NDSU.

Page 46. Palmer amaranth young plant and flower stalk courtesy of Alicia Harstad, NDSU.

Flower spike photo courtesy of Katelyn Hain, NDSU.

Biotypes photo courtesy Richard Zollinger, formerly of North Dakota State University.

Page 56. Marsh sowthistle flower photo from Richard Old, XID Services Inc.

Page 58. St. Johnswort photo courtesy of Corie Lund, Selfridge, N.D.

Page 72. Scotch thistle photos from Richard Old, XID Services Inc.

Pages 76 and 77. Toadflax photos courtesy of Steve Dewey, formerly of Utah State University.

Do You Have Noxious Weeds?

Noxious Weeds: It's Everyone's Job

By law, every person is required to do all things necessary and proper to control the spread of noxious weeds.

What should I do if I find a suspected noxious weed?

Contact your local county weed officer, NDSU local extension agent or the North Dakota Department of Agriculture at 1-800-242-7535. For a list of county weed officers, go to https://www.nd.gov/ndda/county_weed_officers.

If I do have noxious weeds on my property, is there any help available to control them?

Yes! Here are a couple of options:

Funding – You may be eligible for a cost-share program with your local county weed board. Contact your local county weed officer for more information.

Biological Control – There are biological control options available for certain weeds in certain populations. For example, the release of flea beetles can help control large populations of leafy spurge. Options are also available for yellow toadflax, Canada thistle, purple loosestrife and spotted knapweed. Visit https://www.nd.gov/ndda/weeds for more information on biological control options.

Agriculture Commissioner
Doug Goehring



















The printing and design costs of this publication were paid for in part by the North Dakota Department of Agriculture and U.S. Forest Service.

This publication was originally authored by Rodney G. Lym, Professor of Weed Science, NDSU Department of Plant Sciences and Andrea J. Travnicek, Natural Resources Specialist in 2010.

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5M-4-10, 2.25M-6-11, 6.5M-10-12, 3M-5-15, 7.5M-8-18



About DNV

DNV is a global quality assurance and risk management company. Driven by our purpose of safeguarding life, property and the environment, we enable our customers to advance the safety and sustainability of their business. We provide classification, technical assurance, software and independent expert advisory services to the maritime, oil & gas, power and renewables industries. We also provide certification, supply chain and data management services to customers across a wide range of industries. Operating in more than 100 countries, our experts are dedicated to helping customers make the world safer, smarter and greener.

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Appendix J
Badger Wind Sound Waivers

Badger Wind, LLC
February 2024

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SPECIAL MESSAGE TO PROPERTY OWNERS
(N.D. Cent. Code §17-04-06)

This is an important agreement our lawyers have drafted that will bind you and your land for up to forty-eight (48) years. We will give you enough time to study and thoroughly understand it. We strongly encourage you to hire a lawyer to explain this agreement to you. You may talk with your neighbors about the wind project and find out if they also received a proposed contract. You and your neighbors may choose to hire the same attorney to review the agreement and negotiate changes on your behalf.

Regards,

Philip Moore
Vice President
Badger Wind, LLC

North Dakota law requires that this document may not be executed by the parties until at least 10 business days after it has been delivered to the property owner ("Owner"). Owner acknowledges that the document was delivered, and if applicable executed, on the dates set forth below.

	Date/Days	**Owner Signature**
Date document delivered to Owner	October 8, 2018	Rolland F Sayler Name: Rolland F. Sayler Joan Sayler Name: Joan Sayler
DO NOT SIGN BEFORE October 23, 2018		
Date document signed by Owner	10-30-, 2018	Rolland F Sayler Name: Rolland F. Sayler Joan Sayler Name: Joan Sayler
Number of business days between delivery and signing (**excluding holidays and weekends**)	16 DAYS	Rolland F Sayler Name: Rolland F. Sayler Joan Sayler Name: Joan Sayler

ORIGINAL

SPECIAL MESSAGE TO PROPERTY OWNERS
(N.D. Cent. Code §17-04-06)

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Regards,

Philip Moore
Vice President
Badger Wind, LLC

North Dakota law requires that this document may not be executed by the parties until at least 10 business days after it has been delivered to the property owner ("Owner"). Owner acknowledges that the document was delivered, and if applicable executed, on the dates set forth below.

	Date/Days	**Owner Signature**
Date document delivered to Owner	October 8, 2018	Name: Kathy Pfeifle
DO NOT SIGN BEFORE October 23, 2018		
Date document signed by Owner	10/30, 2018	Name: Kathy Pfeifle
Number of business days between delivery and signing (**excluding holidays and weekends**)	16 DAYS	Name: Kathy Pfeifle

ORIGINAL

SPECIAL MESSAGE TO PROPERTY OWNERS
(N.D. Cent. Code §17-04-06)

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Regards,

Philip Moore
Vice President
Badger Wind, LLC

North Dakota law requires that this document may not be executed by the parties until at least 10 business days after it has been delivered to the property owner ("Owner"). Owner acknowledges that the document was delivered, and if applicable executed, on the dates set forth below.

	Date/Days	Owner Signature
Date document delivered to Owner	October 8, 2018	Name: Rolland Sayler, Jr.
DO NOT SIGN BEFORE October 23, 2018		
Date document signed by Owner	11 13, 2018	Name: Rolland Sayler, Jr.
Number of business days between delivery and signing (**excluding holidays and weekends**)	0 27 DAYS S.S.	Name: Rolland Sayler, Jr.

ORIGINAL

SPECIAL MESSAGE TO PROPERTY OWNERS
(N.D. Cent. Code §17-04-06)

This is an important agreement our lawyers have drafted that will bind you and your land for up to forty-eight (48) years. We will give you enough time to study and thoroughly understand it. We strongly encourage you to hire a lawyer to explain this agreement to you. You may talk with your neighbors about the wind project and find out if they also received a proposed contract. You and your neighbors may choose to hire the same attorney to review the agreement and negotiate changes on your behalf.

Regards,

Philip Moore
Vice President
Badger Wind, LLC

North Dakota law requires that this document may not be executed by the parties until at least 10 business days after it has been delivered to the property owner ("Owner"). Owner acknowledges that the document was delivered, and if applicable executed, on the dates set forth below.

	Date/Days	**Owner Signature**
Date document delivered to Owner	October 8, 2018	Kim Mathwich Name: Kim Mathwich
DO NOT SIGN BEFORE October 23, 2018		
Date document signed by Owner	10/23, 2018	Kim Mathwich Name: Kim Mathwich
Number of business days between delivery and signing (**excluding holidays and weekends**)	15 DAYS	Kim Mathwich Name: Kim Mathwich

WIND ENERGY LEASE AND EASEMENT AGREEMENT

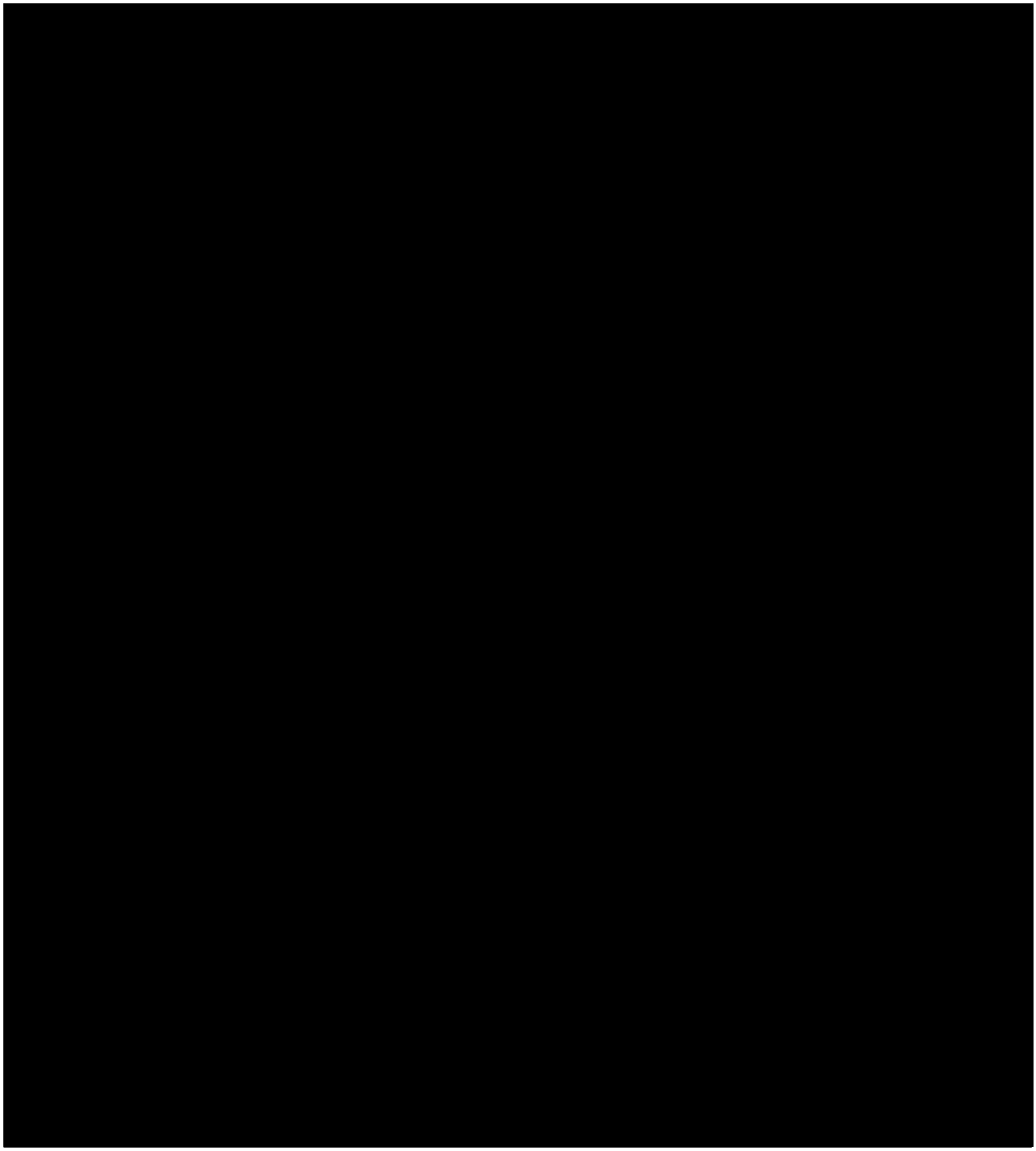
between

A LIFE ESTATE TO ROLLAND F. SAYLER AND JOAN SAYLER, HUSBAND AND WIFE WITH REMAINDER TO KATHY PFEIFLE, A MARRIED WOMAN AND ROLLAND SAYLER, JR., A MARRIED MAN AND KIM MATHWICH, A SINGLE WOMAN

and

BADGER WIND, LLC

ORIGINAL



10.13 Waivers. To the extent that Grantee, its permitted successor, assign or Affiliate owns, leases or holds an easement over land adjacent to the Property, and has installed or constructed or desires to install or construct any Windpower Facilities on said land at and/or near the common boundary between the Property and said land, Owner waives any and all setbacks and setback requirements, whether imposed by law or by any person or entity, including, without limitation, any setback requirements described in the zoning ordinance of the county in which the Property or said land is located or in any governmental entitlement or permit heretofore or hereafter issued to Grantee, its permitted successor, assign or Affiliate ("**Setback Requirements**"). Waiver of Setback

Requirements includes, but is not limited to, waiver of the property line setback in N.D.C.C. § 49-22-05.1(3) and N.D.A.C. § 69-06-08-01(2)(5); the residence setback in N.D.C.C. § 49-22-05.1(3); and the sound level avoidance area criteria in N.D.A.C. § 69-06-08-01(4). Owner further waives any Setback Requirements which may apply to the installation of Windpower Facilities on the Property, including, but not limited to, the sound level avoidance area criteria in N.D.A.C. § 69-06-08-01(4). Further, if so requested by Grantee, its permitted successor, assign, or Affiliate, Owner shall promptly, without demanding additional consideration therefore, execute, and if appropriate cause to be acknowledged and recorded, any setback waiver or other document or instrument required by any governmental authority, and hereby authorizes Grantee to provide a copy of this Agreement to any permitting authority as evidence of Grantor's support for any waiver or variance that may need to be obtained for Grantee to utilize the aforementioned waivers. Owner acknowledges that certain aspects inherent to the operation of the wind energy facilities may result in some nuisance, such as visual impacts, possible increased noise levels, possible shadow flicker on residences, and other possible effects of electrical generation and transmission including without limitation potential interference with radio, television, telephone, mobile telephone or other electronic devices. Grantee shall take reasonable efforts to minimize any impacts to Owner in part by taking commercially reasonable steps to meet or exceed standard U.S. wind industry practices in designing the Windpower Facilities, and abiding by all regulations pertaining to the permitting and design of the Windpower Facilities. Without limiting the grant of easement made in Section 2(ii) of this Agreement, Owner understands and has been informed by Grantee that the Windpower Facilities on the Property may result in some nuisance, and hereby accepts such nuisance, and Owner waives their/its right to object to such nuisance provided that Grantee complies with its obligations in this Agreement. "**Affiliate**" for purposes of this Agreement means any person or entity which directly or indirectly controls, or is under common control with, or is controlled by, Grantee. As used in this definition, "control" (including, "controlled by" and "under common control with") means possession, directly or indirectly, of power to direct or cause the direction of management or policies (whether through ownership of securities or other ownership interests, by contract or otherwise); any person or entity which owns directly or indirectly ten percent (10%) or more of the securities having ordinary voting power for the election of directors or other governing body of an entity will be deemed to control such entity.



OWNER:
A LIFE ESTATE TO ROLLAND F. SAYLER AND JOAN SAYLER, HUSBAND AND WIFE WITH REMAINDER TO KATHY PFEIFLE, A MARRIED WOMAN AND ROLLAND SAYLER, JR., A MARRIED MAN AND KIM MATHWICH, A SINGLE WOMAN

By: Rolland F Sayler
Name: Rolland F. Sayler

By: Joan Sayler
Name: Joan Sayler

GRANTEE:
Badger Wind, LLC
By: Lincoln Clean Energy, LLC
Its sole member

By:
Name: Philip Moore

Its: Vice President of Development

ORIGINAL

OWNER:
A LIFE ESTATE TO ROLLAND F. SAYLER AND JOAN SAYLER, HUSBAND AND WIFE WITH REMAINDER TO KATHY PFEIFLE, A MARRIED WOMAN AND ROLLAND SAYLER, JR., A MARRIED MAN AND KIM MATHWICH, A SINGLE WOMAN

By: _____
Name: Kathy Pfeifle

GRANTEE:
Badger Wind, LLC
By: Lincoln Clean Energy, LLC
Its sole member

By: _____

Name: Philip Moore

Its: Vice President of Development

ORIGINAL

OWNER:
A LIFE ESTATE TO ROLLAND F. SAYLER AND JOAN SAYLER, HUSBAND AND WIFE WITH REMAINDER TO KATHY PFEIFLE, A MARRIED WOMAN AND ROLLAND SAYLER, JR., A MARRIED MAN AND KIM MATHWICH, A SINGLE WOMAN

By: _____
Name: Rolland Sayler, Jr.

GRANTEE:
Badger Wind, LLC
By: Lincoln Clean Energy, LLC
Its sole member

By: _____

Name: Philip Moore

Its: Vice President of Development

OWNER:
A LIFE ESTATE TO ROLLAND F. SAYLER AND JOAN SAYLER, HUSBAND AND WIFE WITH REMAINDER TO KATHY PFEIFLE, A MARRIED WOMAN AND ROLLAND SAYLER, JR., A MARRIED MAN AND KIM MATHWICH, A SINGLE WOMAN

By: Kim Mathwich
Name: Kim Mathwich

GRANTEE:
Badger Wind, LLC
By: Lincoln Clean Energy, LLC
Its sole member

By: _____

Name: Philip Moore

Its: Vice President of Development

ORIGINAL

EXHIBIT "A"

A LIFE ESTATE TO ROLLAND F. SAYLER AND JOAN SAYLER, HUSBAND AND WIFE WITH REMAINDER TO KATHY PFEIFLE ETAL / 798.42 ACRES

Legal Description of Property

The following described land located in Logan County, North Dakota, containing 798.42 acres, more or less:

FIRST TRACT:
All of Section 32-133-71, Logan County, North Dakota

Tax Parcel No.: 00801000 (NEQ)
Estimated Acres: 160.00
Tax Parcel No.: 00802000 (NWQ)
Estimated Acres: 160.00
Tax Parcel No.: 00803000 (SWQ)
Estimated Acres: 160.00
Tax Parcel No.: 00804000 (SEQ)
Estimated Acres: 160.00

SECOND TRACT:
SE ¼ of Section 31-133-71, Logan County, North Dakota

Tax Parcel No.: 00800000 (SEQ)
Estimated Acres: 158.42

SPECIAL MESSAGE TO PROPERTY OWNERS
(N.D. Cent. Code §17-04-06)

This is an important agreement our lawyers have drafted that will bind you and your land for up to forty-eight (48) years. We will give you enough time to study and thoroughly understand it. We strongly encourage you to hire a lawyer to explain this agreement to you. You may talk with your neighbors about the wind project and find out if they also received a proposed contract. You and your neighbors may choose to hire the same attorney to review the agreement and negotiate changes on your behalf.

Regards,

Philip Moore
Vice President
Badger Wind, LLC

North Dakota law requires that this document may not be executed by the parties until at least 10 business days after it has been delivered to the property owner ("Owner"). Owner acknowledges that the document was delivered, and if applicable executed, on the dates set forth below.

	Date/Days	**Owner Signature**
Date document delivered to Owner	6.27.18	Mary Wald Mary Wald, Partner
DO NOT SIGN BEFORE		
Date document signed by Owner	7.17, 2018	Mary Wald Mary Wald, Partner
Number of business days between delivery and signing (**excluding holidays and weekends**)	15 DAYS	Mary Wald Mary Wald, Partner

SPECIAL MESSAGE TO PROPERTY OWNERS
(N.D. Cent. Code §17-04-06)

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Regards,

Philip Moore
Vice President
Badger Wind, LLC

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	Date/Days	**Owner Signature**
Date document delivered to Owner	June 28, 2018	Marsha Kauk Name: Marsha Kauk, Partner
DO NOT SIGN BEFORE July 16, 2018		
Date document signed by Owner	July 17, 2018	Marsha Kauk Name: Marsha Kauk, Partner
Number of business days between delivery and signing (**excluding holidays and weekends**)	11 DAYS	Marsha Kauk Name: Marsha Kauk, Partner

SPECIAL MESSAGE TO PROPERTY OWNERS
(N.D. Cent. Code §17-04-06)

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Regards,

Philip Moore
Vice President
Badger Wind, LLC

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	Date/Days	**Owner Signature**
Date document delivered to Owner	June 28, 2018	Name: Melissa Klimpel, Partner
DO NOT SIGN BEFORE July 16, 2018		
Date document signed by Owner	July 18, 2018	Name: Melissa Klimpel, Partner
Number of business days between delivery and signing (**excluding holidays and weekends**)	12 DAYS	Name: Melissa Klimpel, Partner

WIND ENERGY LEASE AND EASEMENT AGREEMENT

between

MMM WALD PARTNERSHIP, A NORTH DAKOTA FAMILY PARTNERSHIP

and

BADGER WIND, LLC

[redacted]

10.13 Waivers. To the extent that Grantee, its permitted successor, assign or Affiliate owns, leases or holds an easement over land adjacent to the Property, and has installed or constructed or desires to install or construct any Windpower Facilities on said land at and/or near the common boundary between the Property and said land, Owner waives any and all setbacks and setback requirements, whether imposed by law or by any person or entity, including, without limitation, any setback requirements described in the zoning ordinance of the county in which the Property or said land is located or in any governmental entitlement or permit heretofore or hereafter issued to Grantee, its permitted successor, assign or Affiliate ("**Setback Requirements**"). Waiver of Setback Requirements includes, but is not limited to, waiver of the property line setback in N.D.C.C. § 49-22-05.1(3) and N.D.A.C. § 69-06-08-01(2)(5); the residence setback in N.D.C.C. § 49-22-05.1(3); and the sound level avoidance area criteria in N.D.A.C. § 69-06-08-01(4). Owner further waives any Setback Requirements which may apply to the installation of Windpower Facilities on the Property, including, but not limited to, the sound level avoidance area criteria in N.D.A.C. § 69-06-08-01(4). Further, if so requested by Grantee, its permitted successor, assign, or Affiliate, Owner shall promptly, without demanding additional consideration therefore, execute, and if appropriate cause to be acknowledged and recorded, any setback waiver or other document or instrument required by any governmental authority, and hereby authorizes Grantee to provide a copy of this Agreement to any permitting authority as evidence of Grantor's support for any waiver or variance that may need to be obtained for Grantee to utilize the aforementioned waivers. Owner acknowledges that certain aspects inherent to the operation of the wind energy facilities may result in some nuisance, such as visual impacts, possible increased noise levels, possible shadow flicker on residences, and other possible effects of electrical generation and transmission including without limitation potential interference with radio, television, telephone, mobile telephone or other electronic devices. Grantee shall take reasonable efforts to minimize any impacts to Owner in part by taking commercially reasonable steps to meet or exceed standard U.S. wind industry practices in designing the Windpower Facilities, and abiding by all regulations pertaining to the permitting and design of the Windpower Facilities. Without limiting the grant of easement made in Section 2(ii) of this Agreement, Owner understands and has been informed by Grantee that the Windpower Facilities on the Property may result in some nuisance, and hereby accepts such nuisance, and Owner waives their/its right to object to such nuisance provided that Grantee complies with its obligations in this Agreement. "**Affiliate**" for purposes of this Agreement means any person or entity which directly or indirectly controls, or is under common control with, or is controlled by, Grantee. As used in this definition, "control" (including, "controlled by" and "under common control with") means possession, directly or indirectly, of power to direct or cause the direction of management or policies (whether through ownership of securities or other ownership interests, by contract or otherwise); any person or entity which owns directly or indirectly ten percent (10%) or more of the securities having ordinary voting power for the election of directors or other governing body of an entity will be deemed to control such entity.

[redacted]

OWNER:
MMM WALD PARTNERSHIP, A NORTH DAKOTA FAMILY PARTNERSHIP

By: _____
Name: Mary Wald, Partner

GRANTEE:
Badger Wind, LLC
By: Lincoln Clean Energy, LLC
Its sole member

By: _____

Name: Philip Moore

Its: Vice President

OWNER:
MMM WALD PARTNERSHIP, A NORTH DAKOTA FAMILY PARTNERSHIP

By: Marsha Kauk
Name: Marsha Kauk, Partner

GRANTEE:
Badger Wind, LLC
By: Lincoln Clean Energy, LLC
Its sole member

By: _____
Name: Philip Moore
Its: Vice President

OWNER:
MMM WALD PARTNERSHIP, A NORTH DAKOTA FAMILY PARTNERSHIP

By: _____
Name: Melissa Klimpel, Partner

GRANTEE:
Badger Wind, LLC
By: Lincoln Clean Energy, LLC
Its sole member

By: _____

Name: Philip Moore

Its: Vice President

EXHIBIT "A"

MMM WALD PARTNERSHIP, A NORTH DAKOTA FAMILY PARTNERSHIP / 406.00 ACRES

Legal Description of Property

The following described land located in McIntosh County, North Dakota, containing 406.00 acres, more or less:

FIRST TRACT:
Gov. Lots One (1), Two (2), Three (3), Four (4) of Section Six (6), in Township One Hundred Thirty-two (132) North, Range Seventy-one (71) West of the Fifth Principal Meridian, McIntosh County, North Dakota.

Tax Parcel No.: 02595000 (Lots 1 & 2)
Estimated Acres: 41.00
Tax Parcel No.: 02596000 (Lots 3 & 4)
Estimated Acres: 41.00

SECOND TRACT:
The Southeast Quarter (SE ¼) of Section Six (6),), in Township One Hundred Thirty-two (132) North, Range Seventy-one (71) West of the Fifth Principal Meridian, McIntosh County, North Dakota.

Tax Parcel No.: 02598000
Estimated Acres: 160.00

THIRD TRACT:
Gov. Lots Five (5) and Six (6) and the East Half of the Southwest Quarter (E ½ SW ¼) of Section Six (6), in Township One Hundred Thirty-two (132) North, Range Seventy-one (71) West of the Fifth Principal Meridian, McIntosh County, North Dakota.

Tax Parcel No.: 02597000 (SWQ)
Estimated Acres: 164.00

SPECIAL MESSAGE TO PROPERTY OWNERS
(N.D. Cent. Code §17-04-06)

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Regards,

Philip Moore
Vice President
Badger Wind, LLC

North Dakota law requires that this document may not be executed by the parties until at least 10 business days after it has been delivered to the property owner ("Owner"). Owner acknowledges that the document was delivered, and if applicable executed, on the dates set forth below.

	Date/Days	**Owner Signature**
Date document delivered to Owner	May 29, 2018	Verna Hochhalter Name: Verna Hochhalter
DO NOT SIGN BEFORE June 13, 2018		
Date document signed by Owner	June 13, 2018 2018, 2018	Verna Hochhalter [redacted] Name: Verna Hochhalter
Number of business days between delivery and signing (**excluding holidays and weekends**)	10 DAYS RS	Verna Hochhalter Name: Verna Hochhalter

SPECIAL MESSAGE TO PROPERTY OWNERS
(N.D. Cent. Code §17-04-06)

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Vice President
Badger Wind, LLC

North Dakota law requires that this document may not be executed by the parties until at least 10 business days after it has been delivered to the property owner ("Owner"). Owner acknowledges that the document was delivered, and if applicable executed, on the dates set forth below.

	Date/Days	**Owner Signature**
Date document delivered to Owner	May 29, 2018	Terry Lee Hochhalter Name: Terry Lee Hochhalter Debra Hochhalter Name: Debra Hochhalter, spouse of Terry Lee Hochhalter
DO NOT SIGN BEFORE June 13, 2018		
Date document signed by Owner	June 13, 2018	Terry Lee Hochhalter 6/13/18 Name: Terry Lee Hochhalter Debra Hochhalter Name: Debra Hochhalter, 6/13/18 spouse of Terry Lee Hochhalter
Number of business days between delivery and signing (**excluding holidays and weekends**)	10 DAYS RS	Terry Lee Hochhalter Name: Terry Lee Hochhalter Debra Hochhalter Name: Debra Hochhalter, 6/13/18 spouse of Terry Lee Hochhalter

WIND ENERGY LEASE AND EASEMENT AGREEMENT

between

A LIFE ESTATE TO VERNA HOCHHALTER, A WIDOWED WOMAN, WITH REMAINDER TO TERRY LEE HOCHHALTER, A MARRIED MAN

and

BADGER WIND, LLC

[redacted]

10.13 Waivers. To the extent that Grantee, its permitted successor, assign or Affiliate owns, leases or holds an easement over land adjacent to the Property, and has installed or constructed or desires to install or construct any Windpower Facilities on said land at and/or near the common boundary between the Property and said land, Owner waives any and all setbacks and setback requirements, whether imposed by law or by any person or entity, including, without limitation, any setback requirements described in the zoning ordinance of the county in which the Property or said land is located or in any governmental entitlement or permit heretofore or hereafter issued to Grantee, its permitted successor, assign or Affiliate ("**Setback Requirements**"). Waiver of Setback Requirements includes, but is not limited to, waiver of the property line setback in N.D.C.C. § 49-22-05.1(3) and N.D.A.C. § 69-06-08-01(2)(5); the residence setback in N.D.C.C. § 49-22-05.1(3); and the sound level avoidance area criteria in N.D.A.C. § 69-06-08-01(4). Owner further waives any Setback Requirements which may apply to the installation of Windpower Facilities on the Property, including, but not limited to, the sound level avoidance area criteria in N.D.A.C. § 69-06-08-01(4). Further, if so requested by Grantee, its permitted successor, assign, or Affiliate, Owner shall promptly, without demanding additional consideration therefore, execute, and if appropriate cause to be acknowledged and recorded, any setback waiver or other document or instrument required by any governmental authority, and hereby authorizes Grantee to provide a copy of this Agreement to any permitting authority as evidence of Grantor's support for any waiver or variance that may need to be obtained for Grantee to utilize the aforementioned waivers. Owner acknowledges that certain aspects inherent to the operation of the wind energy facilities may result in some nuisance, such as visual impacts, possible increased noise levels, possible shadow flicker on residences, and other possible effects of electrical generation and transmission including without limitation potential interference with radio, television, telephone, mobile telephone or other electronic devices. Grantee shall take reasonable efforts to minimize any impacts to Owner in part by taking commercially reasonable steps to meet or exceed standard U.S. wind industry practices in designing the Windpower Facilities, and abiding by all regulations pertaining to the permitting and design of the Windpower Facilities. Without limiting the grant of easement made in Section 2(ii) of this Agreement, Owner understands and has been informed by Grantee that the Windpower Facilities on the Property may result in some nuisance, and hereby accepts such nuisance, and Owner waives their/its right to object to such nuisance provided that Grantee complies with its obligations in this Agreement. "**Affiliate**" for purposes of this Agreement means any person or entity which directly or indirectly controls, or is under common control with, or is controlled by, Grantee. As used in this definition, "control" (including, "controlled by" and "under common control with") means possession, directly or indirectly, of power to direct or cause the direction of management or policies (whether through ownership of securities or other ownership interests, by contract or otherwise); any person or entity which owns directly or indirectly ten percent (10%) or more of the securities having ordinary voting power for the election of directors or other governing body of an entity will be deemed to control such entity.

[redacted]

OWNER:
A LIFE ESTATE TO VERNA HOCHHALTER, A WIDOWED WOMAN, WITH REMAINDER TO TERRY LEE HOCHHALTER, A MARRIED MAN

By: Verna Hochhalter
Name: Verna Hochhalter

GRANTEE:
Badger Wind, LLC
By: Lincoln Clean Energy, LLC
Its sole member

By: _____
Name: Philip Moore
Its: Vice President

OWNER:
A LIFE ESTATE TO VERNA HOCHHALTER, A WIDOWED WOMAN, WITH REMAINDER TO TERRY LEE HOCHHALTER, A MARRIED MAN

By: _____
Name: Terry Lee Hochhalter

By: _____
Name: Debra Hochhalter, spouse of Terry Lee Hochhalter

GRANTEE:
Badger Wind, LLC
By: Lincoln Clean Energy, LLC
Its sole member

By: _____
Name: Philip Moore
Its: Vice President

EXHIBIT "A"

A LIFE ESTATE TO VERNA HOCHHALTER, A WIDOWED WOMAN, WITH REMAINDER TO TERRY LEE HOCHHALTER, A MARRIED MAN / 228.00 ACRES

Legal Description of Property

The following described land located in McIntosh County, North Dakota, containing 228.00 acres, more or less:

FIRST TRACT:
Southeast Quarter (SE ¼) of Section Thirteen (13), Township One Hundred and Thirty-two (132) North, Range Seventy-two (72) West, McIntosh County, North Dakota.

Tax Parcel No.: 2768000
Estimated Acres: 160.00

SECOND TRACT:
East Half of Northeast Quarter (E ½ NE ¼), of Section Thirteen (13), Township One hundred and Thirty-two (132) North, Range Seventy-two (72) West, McIntosh County, North Dakota.

Tax Parcel No.: 02765000
Estimated Acres: 68.00

SPECIAL MESSAGE TO PROPERTY OWNERS
(N.D. Cent. Code §17-04-06)

This is an important agreement our lawyers have drafted that will bind you and your land for up to forty eight (48) years. We will give you enough time to study and thoroughly understand it. We strongly encourage you to hire a lawyer to explain this agreement to you. You may talk with your neighbors about the wind project and find out if they also received a proposed contract. You and your neighbors may choose to hire the same attorney to review the agreement and negotiate changes on your behalf.

Regards,

Philip Moore
Vice President
Badger Wind, LLC

North Dakota law requires that this document may not be executed by the parties until at least 10 business days after it has been delivered to the property owner ("Owner"). Owner acknowledges that the document was delivered, and if applicable executed, on the dates set forth below.

	Date / Days	Owner Signatures
Date document delivered to Owner	6-15, 2018	x Clyde R Meidinger x Anna Meidinger
Date document executed by Owner	6-29, 2018	x Clyde R Meidinger x Anna Meidinger
Number of business days between delivery and execution (excluding holidays and weekends)	11 days	

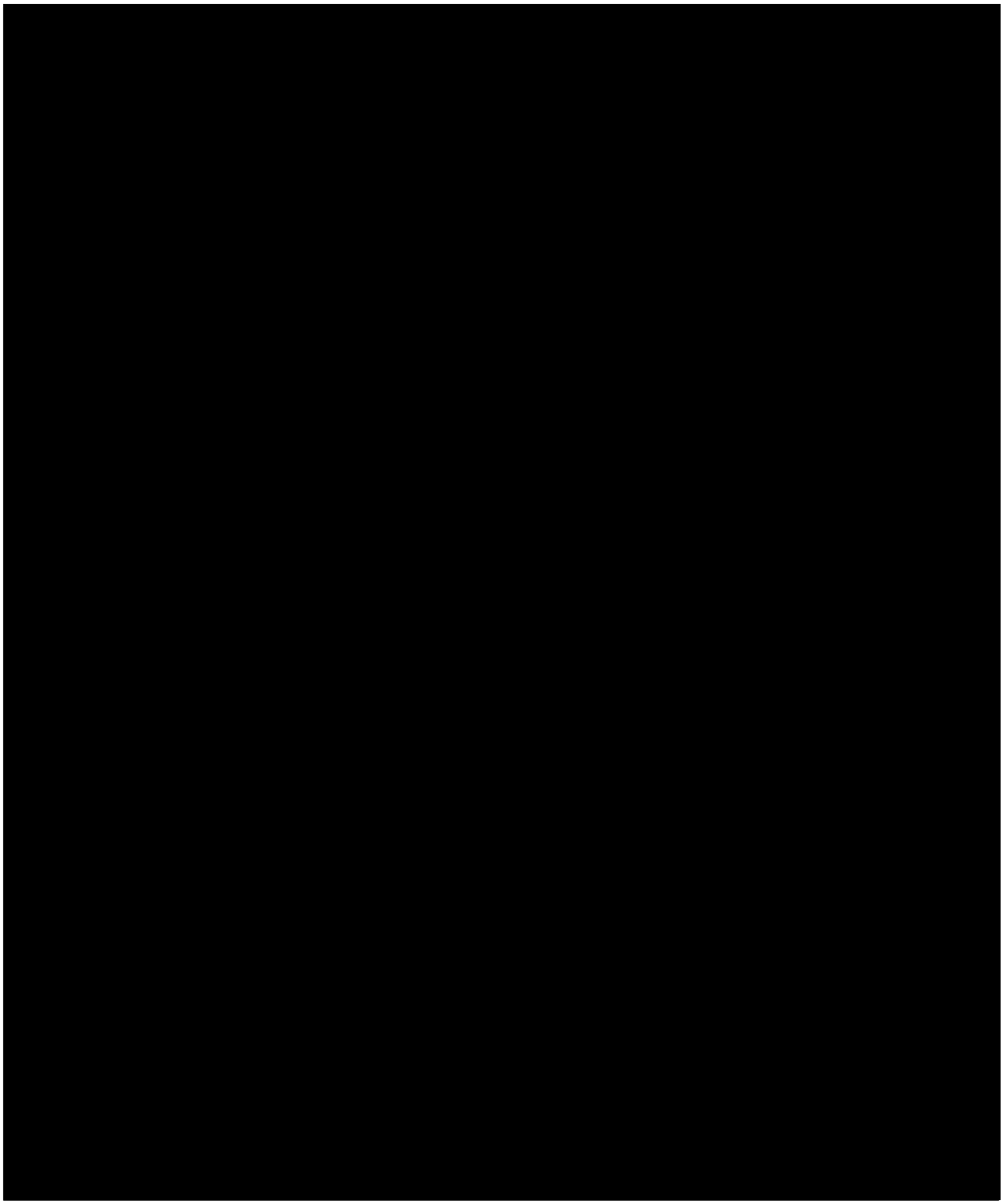
WIND ENERGY LEASE AND EASEMENT AGREEMENT

between

CLYDE MEIDINGER AND ANNA MEIDINGER, HUSBAND AND WIFE

and

BADGER WIND, LLC



10.13 Waivers. To the extent that Grantee, its permitted successor, assign or Affiliate owns, leases or holds an easement over land adjacent to the Property, and has installed or constructed or desires to install or construct any Windpower Facilities on said land at and/or near the common boundary between the Property and said land, Owner waives any and all setbacks and setback requirements, whether imposed by law or by any person or entity,

including, without limitation, any setback requirements described in the zoning ordinance of the county in which the Property or said land is located or in any governmental entitlement or permit heretofore or hereafter issued to Grantee, its permitted successor, assign or Affiliate ("**Setback Requirements**"). Waiver of Setback Requirements includes, but is not limited to, waiver of the property line setback in N.D.C.C. § 49-22-05.1(3) and N.D.A.C. § 69-06-08-01(2)(5); the residence setback in N.D.C.C. § 49-22-05.1(3); and the sound level avoidance area criteria in N.D.A.C. § 69-06-08-01(4). Owner further waives any Setback Requirements which may apply to the installation of Windpower Facilities on the Property, including, but not limited to, the sound level avoidance area criteria in N.D.A.C. § 69-06-08-01(4). Further, if so requested by Grantee, its permitted successor, assign, or Affiliate, Owner shall promptly, without demanding additional consideration therefore, execute, and if appropriate cause to be acknowledged and recorded, any setback waiver or other document or instrument required by any governmental authority, and hereby authorizes Grantee to provide a copy of this Agreement to any permitting authority as evidence of Grantor's support for any waiver or variance that may need to be obtained for Grantee to utilize the aforementioned waivers. Owner acknowledges that certain aspects inherent to the operation of the wind energy facilities may result in some nuisance, such as visual impacts, possible increased noise levels, possible shadow flicker on residences, and other possible effects of electrical generation and transmission including without limitation potential interference with radio, television, telephone, mobile telephone or other electronic devices. Grantee shall take reasonable efforts to minimize any impacts to Owner in part by taking commercially reasonable steps to meet or exceed standard U.S. wind industry practices in designing the Windpower Facilities, and abiding by all regulations pertaining to the permitting and design of the Windpower Facilities. Without limiting the grant of easement made in Section 2(ii) of this Agreement, Owner understands and has been informed by Grantee that the Windpower Facilities on the Property may result in some nuisance, and hereby accepts such nuisance, and Owner waives their/its right to object to such nuisance provided that Grantee complies with its obligations in this Agreement. "**Affiliate**" for purposes of this Agreement means any person or entity which directly or indirectly controls, or is under common control with, or is controlled by, Grantee. As used in this definition, "control" (including, "controlled by" and "under common control with") means possession, directly or indirectly, of power to direct or cause the direction of management or policies (whether through ownership of securities or other ownership interests, by contract or otherwise); any person or entity which owns directly or indirectly ten percent (10%) or more of the securities having ordinary voting power for the election of directors or other governing body of an entity will be deemed to control such entity.



OWNER:
CLYDE MEIDINGER AND ANNA MEIDINGER, HUSBAND AND WIFE

By: _____
Name: Clyde Meidinger

By: _____
Name: Anna Meidinger

GRANTEE:
Badger Wind, LLC
By: Lincoln Clean Energy, LLC
Its sole member

By: _____

Name: Philip Moore

Its: Vice President

EXHIBIT "A"

CLYDE MEIDINGER AND ANNA MEIDINGER, HUSBAND AND WIFE / 480.00 ACRES

Legal Description of Property

The following described land located in McIntosh County, North Dakota, containing 480.00 acres, more or less:

FIRST TRACT:
The Southeast Quarter (SE ¼) of Section Nineteen (19), Township One Hundred and Thirty-two (132) North, Range Seventy-one (71) West, McIntosh County, North Dakota.

Tax Parcel No.: 02648000
Estimated Acres: 160.00

SECOND TRACT:
The Southwest Quarter (SW ¼) of Section Twenty (20), Township One Hundred and Thirty-two (132) North, Range Seventy-one (71) West, McIntosh County, North Dakota.

Tax Parcel No.: 02651000
Estimated Acres: 160.00

THIRD TRACT:
The Northeast Quarter (NE ¼) of Section Thirty (30), Township One Hundred and thirty-two (132) North, Range Seventy-one (71) West, McIntosh County, North Dakota.

Tax Parcel No.: 02689000
Estimated Acres: 160.00

SPECIAL MESSAGE TO PROPERTY OWNERS
(N.D. Cent. Code §17-04-06)

This is an important agreement our lawyers have drafted that will bind you and your land for up to forty-eight (48) years. We will give you enough time to study and thoroughly understand it. We strongly encourage you to hire a lawyer to explain this agreement to you. You may talk with your neighbors about the wind project and find out if they also received a proposed contract. You and your neighbors may choose to hire the same attorney to review the agreement and negotiate changes on your behalf.

Regards,

Philip Moore
Vice President
Badger Wind, LLC

North Dakota law requires that this document may not be executed by the parties until at least 10 business days after it has been delivered to the property owner ("Owner"). Owner acknowledges that the document was delivered, and if applicable executed, on the dates set forth below.

	Date/Days	**Owner Signature**
Date document delivered to Owner	August 7, 2018	Jon F. Stock Name: Jon F. Stock Linda M. Stock Name: Linda M. Stock
DO NOT SIGN BEFORE August 22, 2018		
Date document signed by Owner	9-14, 2018	Jon F. Stock Name: Jon F. Stock Linda M. Stock Name: Linda M. Stock
Number of business days between delivery and signing (**excluding holidays and weekends**)	38 DAYS	Jon F. Stock Name: Jon F. Stock Linda M. Stock Name: Linda M. Stock

WIND ENERGY LEASE AND EASEMENT AGREEMENT

between

JON F. STOCK AND LINDA M. STOCK, HUSBAND AND WIFE AS JOINT TENANTS WITH RIGHT OF SURVIVORSHIP AND NOT AS TENANTS IN COMMON

and

BADGER WIND, LLC

[redacted]

10.13 Waivers. To the extent that Grantee, its permitted successor, assign or Affiliate owns, leases or holds an easement over land adjacent to the Property, and has installed or constructed or desires to install or construct any Windpower Facilities on said land at and/or near the common boundary between the Property and said land, Owner waives any and all setbacks and setback requirements, whether imposed by law or by any person or entity, including, without limitation, any setback requirements described in the zoning ordinance of the county in which the Property or said land is located or in any governmental entitlement or permit heretofore or hereafter issued to Grantee, its permitted successor, assign or Affiliate ("**Setback Requirements**"). Waiver of Setback Requirements includes, but is not limited to, waiver of the property line setback in N.D.C.C. § 49-22-05.1(3) and N.D.A.C. § 69-06-08-01(2)(5); the residence setback in N.D.C.C. § 49-22-05.1(3); and the sound level avoidance area criteria in N.D.A.C. § 69-06-08-01(4). Owner further waives any Setback Requirements which may apply to the installation of Windpower Facilities on the Property, including, but not limited to, the sound level avoidance area criteria in N.D.A.C. § 69-06-08-01(4). Further, if so requested by Grantee, its permitted successor, assign, or Affiliate, Owner shall promptly, without demanding additional consideration therefore, execute, and if appropriate cause to be acknowledged and recorded, any setback waiver or other document or instrument required by any governmental authority, and hereby authorizes Grantee to provide a copy of this Agreement to any permitting authority as evidence of Grantor's support for any waiver or variance that may need to be obtained for Grantee to utilize the aforementioned waivers. Owner acknowledges that certain aspects inherent to the operation of the wind energy facilities may result in some nuisance, such as visual impacts, possible increased noise levels, possible shadow flicker on residences, and other possible effects of electrical generation and transmission including without limitation potential interference with radio, television, telephone, mobile telephone or other electronic devices. Grantee shall take reasonable efforts to minimize any impacts to Owner in part by taking commercially reasonable steps to meet or exceed standard U.S. wind industry practices in designing the Windpower Facilities, and abiding by all regulations pertaining to the permitting and design of the Windpower Facilities. Without limiting the grant of easement made in Section 2(ii) of this Agreement, Owner understands and has been informed by Grantee that the Windpower Facilities on the Property may result in some nuisance, and hereby accepts such nuisance, and Owner waives their/its right to object to such nuisance provided that Grantee complies with its obligations in this Agreement. "**Affiliate**" for purposes of this Agreement means any person or entity which directly or indirectly controls, or is under common control with, or is controlled by, Grantee. As used in this definition, "control" (including, "controlled by" and "under common control with") means possession, directly or indirectly, of power to direct or cause the direction of management or policies (whether through ownership of securities or other ownership interests, by contract or otherwise); any person or entity which owns directly or indirectly ten percent (10%) or more of the securities having ordinary voting power for the election of directors or other governing body of an entity will be deemed to control such entity.

[redacted]

OWNER:
JON F. STOCK AND LINDA M. STOCK, HUSBAND AND WIFE AS JOINT TENANTS WITH RIGHT OF SURVIVORSHIP AND NOT AS TENANTS IN COMMON

By: Jon F. Stock
Name: Jon F. Stock

By: Linda M. Stock
Name: Linda M. Stock

GRANTEE:
Badger Wind, LLC
By: Lincoln Clean Energy, LLC
Its sole member

By: [signature]
Name: Philip Moore
Its: Vice President

EXHIBIT "A"

JON F. STOCK AND LINDA M. STOCK, HUSBAND AND WIFE AS JOINT TENANTS WITH RIGHT OF SURVIVORSHIP AND NOT AS TENANTS IN COMMON / 1120.00 ACRES

Legal Description of Property

The following described land located in Logan County, North Dakota, containing 1120.00 acres, more or less:

FIRST TRACT:
SE ¼ of Section 28, Township 133, Range 70, Logan County, North Dakota.

Tax Parcel No.: 00644000 (SEQ)
Estimated Acres: 160.00

SECOND TRACT:
W ½ of Section 28, Township 133, Range 70, Logan County, North Dakota.

Tax Parcel No.: 00642000 (NWQ)
Estimated Acres: 160.00
Tax Parcel No.: 00643000 (SWQ)
Estimated Acres: 160.00

THIRD TRACT:
All of Section 29, Township 133, Range 70, Logan County, North Dakota.

Tax Parcel No.: 00645000 (NEQ)
Estimated Acres: 160.00
Tax Parcel No.: 00646000 (NWQ)
Estimated Acres: 160.00
Tax Parcel No.: 00647000 (SWQ)
Estimated Acres: 160.00
Tax Parcel No.: 00648000 (SEQ)
Estimated Acres: 160.00

30417 **Bk MS-31 Pg 442**
McINTOSH COUNTY Pg 1 of 6
Recorded: 2/14/2022 at 1:33 PM
Return To: ORSTED ONSHORE NA, LLC 101 W 6TH ST
AUSTIN,TX 78701-2935

Brandner, Bradley_Sheryl
BAD960 GNA

30417 Fee: $20.00
STATE OF NORTH DAKOTA MCINTOSH COUNTY
Recorded: 2/14/2022 at 1:33 PM
I certify that this instrument was filed for record this date
Carol Fey , County Recorder
By Eva Becker, Deputy

RECORDING REQUESTED BY
AND WHEN RECORDED MAIL TO:

Badger Wind, LLC
c/o Orsted Onshore North America, LLC
812 San Antonio Street, Suite 500
Austin, TX 78701
Attn: Legal Department

(The above space for use of the Register of Deeds)

MEMORANDUM OF WIND PROJECT NEIGHBOR AGREEMENT

Bradley Brandner and Sheryl Brandner, husband and wife, collectively, and their successors and assigns ("***Landowner***"), and Badger Wind, LLC, a Delaware limited liability company and its successors and assigns ("***Grantee***"), have executed a Wind Project Neighbor Agreement ("***Neighbor Agreement***") and have agreed to record this memorandum ("***Memorandum***") solely to give notice of the existence of the Neighbor Agreement. This Memorandum does not amend, supplement or supersede the Neighbor Agreement, which will govern if any provision of this Memorandum conflicts with or is inconsistent with any provision of the Neighbor Agreement. *Capitalized terms used and not defined herein shall have the meanings given the same in the Neighbor Agreement.*

Summary of Provisions: The Neighbor Agreement is being executed in connection with a wind power project ("***Wind Project***") affecting Landowner's Property, which Property is described on the attached copy of **Exhibit A**. The Neighbor Agreement includes provisions regarding television reception and other impacts.

Term: The covenant and other agreements contained in the Neighbor Agreement run with the land. The term of the Neighbor Agreement ("***Initial Term***") began on February 11, 2022 and shall end on the date that is thirty (30) years following the date on which the Wind Project reaches its Operations Date unless otherwise terminated or extended as set forth in the Neighbor Agreement. "***Operations Date***" shall mean the first date when electricity generated by a Wind Turbine installed on the Wind Project, but not including Test Energy, is sold to a third party power purchaser, offtaker, merchant buyer or other third party purchaser. Grantee may, but shall not be obligated to, file an instrument in the public records of McIntosh County, North Dakota to give notice of the Operations Date. Grantee may, by giving notice to Landowner prior to the expiration of the Initial Term, elect to extend the Neighbor Agreement for a specific period of time not to exceed ten (10) years ("***Extended Term***") commencing upon the expiration of the Operations Period. The terms and conditions set forth in the Neighbor Agreement shall continue and remain in effect

during the Extended Term. The "Initial Term" and the "Extended Term" may collectively be referred to herein and in the Neighbor Agreement as the "***Term***".

Upon extension of the Term in accordance with the Neighbor Agreement, Grantee may, but shall not be obligated to, file an instrument in the public records of McIntosh County, North Dakota to give notice of such extension of the Neighbor Agreement. Upon termination of the Neighbor Agreement, Grantee shall promptly file a termination of this Memorandum in these public records of McIntosh County, North Dakota.

Mortgages and Assignments: Grantee may, upon notice to Landowner, but without need to obtain Landowner's consent or approval: (i) mortgage, collaterally assign, or otherwise encumber and grant security interests in all or any part of its interest in this Neighbor Agreement; and (ii) assign or otherwise convey all or part of its interest in this Neighbor Agreement to third parties. Landowner may sell, mortgage, assign or convey away all or a part of Landowner's interest in Landowner's Property without consent of Grantee, but any conveyance shall be subject to the terms of the Neighbor Agreement.

Sound Waiver: To the fullest extent allowed by law, Landowner hereby waives any and all potential and actual sound or noise requirements (and variations thereof), whether imposed by applicable law, ordinance (including, but not limited to, the applicable county zoning ordinance, if any), regulation, rule (including, but not limited to, North Dakota Administrative Code Section 69-06-08-01(4)), or by any person or entity, or in any governmental entitlement or permit issued to Grantee or its affiliates for the Wind Project (including Wind Turbines, Transmission Facilities, Met Towers, and other Facilities and appurtenant equipment) installed or constructed or to be installed or constructed on Wind Project Property adjoining, adjacent to, or near the common boundary between the Landowner's Property and any of the Wind Project Property.

Construction and Interpretation: Landowner's and Grantee's rights and obligations related to the Neighbor Agreement are more particularly set forth in the Neighbor Agreement. This Memorandum has been executed and delivered by the parties for the purpose of recording and giving notice of the Neighbor Agreement. The terms and conditions of the Neighbor Agreement are incorporated by reference into this Memorandum as if set forth fully herein at length. In the event of any conflict between the terms and provisions of the Neighbor Agreement and this Memorandum, the Neighbor Agreement shall control. This Memorandum may be executed by parties on any number of separate counterparts and by different parties on separate counterparts, all of which shall be considered one and the same agreement and each of which shall be deemed an original. The Neighbor Agreement shall inure to the benefit of and be binding upon Landowner and, to the extent provided in the Neighbor Agreement, any assignee of Landowner, and their respective heirs, transferees, successors and assigns, and all persons claiming under them.

30417
McINTOSH COUNTY Pg 2 of 6
Recorded: 2/14/2022 at 1:33 PM
Return To: ORSTED ONSHORE NA, LLC 101 W 6TH ST
AUSTIN,TX 78701-2935

(signatures to follow)

IN WITNESS HEREOF, the Parties have executed this Memorandum to be effective as of the Effective Date.

LANDOWNER:
LANDOWNER:
BRADLEY BRANDNER AND SHERYL BRANDNER, HUSBAND AND WIFE

By: Bradley Brandner
Bradley Brandner

Sheryl Brandner
Sheryl Brandner

Address:
Bradley & Sheryl Brandner
3665 Hwy 13
Wishek, ND 58495
Ph.: 701-226-0801
Email:

ACKNOWLEDGEMENT

STATE OF NORTH DAKOTA §
§
COUNTY OF McIntosh §

The foregoing instrument was acknowledged before me this 8 day of February, 2022 by **BRADLEY BRANDNER AND SHERYL BRANDNER, HUSBAND AND WIFE.**

[SEAL] CANDACE K BADER
Notary Public
State of North Dakota
My Commission Expires August 20, 2022

Candace K. Bader
Notary Public
State of North Dakota

My commission expires: Aug. 20, 2022

GRANTEE:

BADGER WIND, LLC,
a Delaware limited liability company

By: Orsted Onshore DevCo, LLC
Its sole member

By: Orsted Onshore North America, LLC
Its sole member

By: Philip Moore
Its: Senior Vice President

ACKNOWLEDGMENT

THE STATE OF TEXAS §
§
COUNTY OF TRAVIS §

This instrument was acknowledged before me on this 11th day of February, 2022, by **PHILIP MOORE**, as the Senior Vice President of Orsted Onshore North America, LLC, a Delaware limited liability company, acting in its capacity as sole member of Orsted Onshore DevCo, LLC, a Delaware limited liability company, acting in its capacity as sole member of Badger Wind, LLC, a Delaware limited liability company, on behalf of Orsted Onshore North America, LLC, a limited liability company.

[SEAL]

CASIE C TIBBETTS
Notary ID #131019887
My Commission Expires
March 21, 2025

Notary Public
State of Texas

My commission expires:

3/21/2025

EXHIBIT A to Memorandum of Wind Project Neighbor Agreement

BRADLEY BRANDNER AND SHERYL BRANDNER / 55.90 ACRES

LANDOWNER'S PROPERTY

The following tract of land located in McIntosh County, North Dakota, consisting of approximately 55.90 acres, more or less:

TRACT ONE:
A parcel of land located in the West Half of the Southeast Quarter (W ½SE ¼) of Section Seven (7), Township One Hundred and Thirty-two (132) North, Range Seventy-one (71) West, McIntosh County, North Dakota, and more particularly described in plat dated December 17, 1998 and recorded January 30, 2004 in the office of McIntosh County Recorder in Book 115 of Deeds, page 116, containing 5.90 acres more or less, and being more particularly described as follows:

COMMENCING in the Southeast corner of Section Seven (7);

THENCE N 89° 44'00" W on the South line of Section 7, a distance of 1720.00 feet;

THENCE N 0°16'55" E a distance of 100.00 feet to a northerly right a way of North Dakota State Highway Number 13, the POINT OF BEGINNING;

THENCE N 89°44'00" W on said right of way a distance of 280.00 feet;

THENCE leaving said right of way N 2°45'16" E a distance of 912.06 feet;

THENCE S 89°20'51" E a distance of 289.52 feet;

THENCE S 0°7'03" W a distance of 448.34 feet;

THENCE S 45°04'07' W a distance of 96.45 feet;

THENCE S 2°20'10" E a distance of 392.74 feet to the POINT OF BEGINNING;

Orsted PIN: G_950
McIntosh County PIN: 2602000
Estimated Acres: 5.90

TRACT TWO:

The Southeast Quarter (SE ¼) of Section Seven (7), Township One Hundred and Thirty-two (132) North, Range Seventy-one (71) West, of the Fifth Principal Meridian, McIntosh County, North Dakota, **LESS AND EXCEPT THE FOLLOWING:**

COMMENCING in the Southeast corner of Section Seven (7);

THENCE N 89° 44'00" W on the South line of Section 7, a distance of 1720.00 feet;

THENCE N 0°16'55" E a distance of 100.00 feet to a northerly right a way of North Dakota State Highway Number 13, the POINT OF BEGINNING;

THENCE N 89°44'00" W on said right of way a distance of 280.00 feet;

THENCE leaving said right of way N 2°45'16" E a distance of 912.06 feet;

THENCE S 89°20'51" E a distance of 289.52 feet;

THENCE S 0°7'03" W a distance of 448.34 feet;

THENCE S 45°04'07' W a distance of 96.45 feet;

THENCE S 2°20'10" E a distance of 392.74 feet to the POINT OF BEGINNING;

ALSO LESS AND EXCEPT:

The East Half of the East Half of the West Half of the Southeast Quarter (E ½ E ½ W ½ SE ¼) of Section Seven (7) , Township One Hundred and Thirty-two (132) North, Range Seventy-one (71) West, McIntosh County, North Dakota.

ALSO LESS AND EXCEPT:

East Half of the Southeast Quarter (E ½ SE ¼) of Section Seven (7) , Township One Hundred and Thirty-two (132) North, Range Seventy-one (71) West, McIntosh County, North Dakota.

Orsted PIN:
McIntosh County PIN: 2602001
Estimated Acres: 50.00

Appendix K
Updated Receptor Table

Badger Wind, LLC
February 2024

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Badger Wind, LLC
Badger Wind Project
PU-22-086

Badger Wind Project Receptor Chart							
Receptor ID	**Occupied Residence or Community Building**	**Status (Participating "P" or Nonparticipating "NP")**	**Closest Turbine or Transformer**	**Distance to Closest Turbine or Transformer (feet)**	**Shadow Flicker (hr/year)**	**Sound (dBA)**	**Waiver Required or Obtained**
143	Occupied Residence	P	T3	2675	0	41.3	No
153	Occupied Residence	NP	T3	4440	2	36.2	No
261	Occupied Residence	NP	T63	2587	12	44.2	No
262	Occupied Residence	P	T64	3281	3	41.3	No
351	Occupied Residence	P	T17	2760	4	44.1	No
356	Occupied Residence	NP	T28	3686	8	44.1	No
357	Occupied Residence	NP	T28	3854	9	44.1	No
367	Occupied Residence	P	T38	3140	12	43.6	No
402	Occupied Residence	P	T73	2007	4	46.1	Obtained
403	Occupied Residence	P	T54	3246	5	41.3	No
417	Occupied Residence	P	T34	2858	7	43.7	No
475	Occupied Residence	P	T23	2204	27	49.0	Obtained
490	Occupied Residence	P	T72	2501	7	44.2	No
492	Occupied Residence	P	T72	2568	9	44.5	No
493	Occupied Residence	P	T72	2592	7	44.0	No
511	Occupied Residence	NP	T6	2635	1	44.1	No
517	Occupied Residence	P	T47	1652	7	48.5	Obtained
531	Occupied Residence	P	T84	2884	5	42.6	No
548	Occupied Residence	P	T83	2073	8	44.0	No
551	Occupied Residence	P	T83	2389	6	43.1	No
564	Occupied Residence	NP	T83	5239	0	34.3	No
982	Occupied Residence	NP	T105	4628	0	40.7	No
1003	Occupied Residence	NP	TR2	3086	0	45.5	Pending
1010	Occupied Residence	NP	TR2	2590	0	46.7	Pending
1014	Occupied Residence	NP	TR1	2681	1	45.5	Obtained
1023	Occupied Residence	NP	T42	3984	6	43.7	No
1042	Occupied Residence	NP	T97	2817	7	45.0	No
1064	Occupied Residence	P	T42	1558	11	49.3	Obtained
1068	Occupied Residence	NP	T66	3692	7	44.9	No
1078	Occupied Residence	NP	T68B	4070	3	41.2	No
1091	Occupied Residence	NP	T68B	4436	2	40.3	No
1112	Occupied Residence	NP	T80	4635	0	38.4	No
1114	Occupied Residence	NP	T80	4721	0	38.2	No
1804	Occupied Residence	NP	T80	4917	1	37.7	No
1817	Occupied Residence	P	T81	3750	3	40.5	No
1920	Occupied Residence	P	T77	1960	1	47.2	Obtained
1921	Occupied Residence	P	T77	1768	0	47.7	Obtained
1922	Occupied Residence	NP	T81	2200	8	44.9	No
1934	Occupied Residence	NP	T81	2101	1	44.0	No
1992	Occupied Residence	NP	T107	4848	0	38.2	No
2001	Occupied Residence	NP	T115	2764	6	42.6	No
2002	Occupied Residence	P	T115	2224	5	44.9	No
2003	Occupied Residence	P	T115	2670	4	43.6	No
2004	Occupied Residence	P	T114	2848	7	42.6	No
2052	Occupied Residence	NP	T114	5219	0	38.0	No
2055	Occupied Residence	NP	T114	5162	0	38.1	No
2652	Occupied Residence	NP	T92	4317	2	37.0	No
1071	Community building	NP	T68B	4263	N/A	41.2	No
1098	Community building	NP	T68B	4145	N/A	40.6	No
1099	Community building	NP	T68B	4528	N/A	40.0	No
1100	Community building	NP	T68B	4612	N/A	39.9	No
1101	Community building	NP	T68B	4658	N/A	39.9	No
1102	Community building	NP	T68B	4063	N/A	40.7	No

Note : Receptors 564, 2052 and 2055 are not included in the Shadow Flicker report because they fall outside the approximate 5000 foot calculation domain but have been included here to match up with the Sound receptors, which have been included up to 1 mile.

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Appendix L
Archaeological Reconnaissance Survey Report

Badger Wind, LLC
February 2024

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10. List the legal description* and study unit. For study unit assignment, use the township tables in the *State Plan*, http://history.nd.gov/hp/stateplan_arch.html. Study Units: LM, CB, KN, HE, SM, GA, JA, GR, NR, SR, SO, SH, YE

    **For inventory*, *formal testing* and *excavation* projects, *list the CLASS III legal locations only*.

County Township Range Section Study Unit

Township (T)	Range (R)	Section	County	Study Unit
132 N	70 W	6, 7	McIntosh	SM
132 N	71 W	2, 6–8, 16–21, 28–34	McIntosh	SM
132 N	72 W	1–3, 8–13, 15, 16	McIntosh	SM
133 N	70 W	8, 17–20, 28–33	Logan	SM
133 N	71 W	18–23, 25–36	Logan	SM
133 N	72 W	13, 24, 25, 35, 36	Logan	SM
134 N	71 W	31	Logan	SM

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A REPORT FOR CLASS III ARCHAEOLOGICAL SURVEY

Badger Wind Project – 2023 Expansion Areas

Logan and McIntosh Counties, North Dakota

JANUARY 24, 2024

PREPARED FOR:

Ørsted

PREPARED BY:

Westwood

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Westwood

Class III Archaeological Survey

Badger Wind Project – 2023 Expansion Areas

Logan and McIntosh Counties, North Dakota

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Project Number: R0031120.00
Date: January 24, 2024

Abstract

Ørsted Onshore North America, LLC (Ørsted) retained Westwood Professional Services, Inc. (Westwood), to conduct an archaeological survey in support of developing the Badger Wind Project (Project or Project Area) in Logan and McIntosh Counties, North Dakota. This report is being provided to Ørsted to facilitate an understanding of the cultural resources present in the Project identified during Westwood's October and November surveys. The work performed here is for an expansion of the Project and supplements previous surveys performed by Cultural Resource Analysts, Inc in 2022 (Ferriman and Thurman 2022; Thurman and Weston 2022). It is assumed the project is being conducted at a state level review due to anticipated requirements of the Public Service Commission (PSC) as part of the Certificate of Site Compatibility (Site Permit) required under the North Dakota Energy Conversion and Transmission Facility Siting Act (North Dakota Century Code Chapter 49-22).

The North Dakota State Historic Preservation Office (SHPO) requires that cultural resource investigations be conducted by qualified archaeologists who meets the Secretary of the Interior's qualifications as outlined in 36 Code of Federal Regulations (C.F.R.) 61. Westwood archaeologists Rigden Glaab, Master of Arts (MA), Register of Professional Archaeologists (RPA), Dean Sather, MA, RPA, and Ryan Steeves, MA, RPA, meet these qualifications and directly oversaw all cultural resource work. Ryan Grohnke, Bachelor of Arts (BA), Registered Archaeologist (RA), served as Cultural Resource Manager for the Project facilitating client interactions and budget management. Mr. Glaab, Mr. Grohnke, and Mr. Sather are all permitted to conduct archaeological investigations in North Dakota.

Fieldwork on the Project was carried out October 23 through November 22, 2023, over the course of three field sessions. Fieldwork was overseen by Principal Investigator Rigden Glaab, MA, RPA, with assistance from Ryan Steeves, MA, RPA, Lindsay Schwartzkopf, BA, Dean Sather, MA, RPA, and Abigail Kennedy, Master of Science (MSc). Field investigators utilized pedestrian survey to examine the APE, which are locations of proposed ground disturbance. The cultural resource surveys were conducted to comply with state permitting requirements. The archaeological survey was completed within the Area of Potential Effect (APE) of the Project as currently designed. The APE currently consists of locations of potential ground disturbance including the proposed locations of access roads, turbines, MET towers, and utility corridors (e.g., crane paths, collections lines, gen-tie, and fiber optic lines). The APE surveyed by Westwood in 2023 is 1,092 acres.

There are no previously recorded cultural resources in the current APE. Westwood archaeologists identified a total of one new historic site (32LO174) and one new prehistoric isolated find (32LOX76) in the Project APE. Site 32LO174 is a historic farmstead consisting of three structure foundations and associated trash from the 1940s through 1970s. Isolated Find 32LOX76 is a prehistoric utilized flake made from Knife River flint (KRF). A second piece of KRF shatter was identified to the northwest of the utilized flake. These resources are recommended *not eligible* for inclusion in the National Register of Historic Places (NRHP). No further avoidance measures are recommended on behalf of Ørsted by Westwood. Should any proposed Project design be located outside of previously constructed or previously surveyed areas, that aspect of the design should first be surveyed for unrecorded cultural resources.

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Appendix A: Representative Photographs of the Project Area, Isolated Find, and Site

1.0 Introduction

Ørsted Onshore North America, LLC (Ørsted) contracted Westwood Professional Services, Inc. (Westwood), to perform a Class III Archaeological Survey of the Badger Wind Project in Logan and McIntosh Counties, North Dakota (Project or Project Area; **Exhibits 1 and 2**; **Appendix A**). The content of this document reflects the Project based on client layout in a KMZ dated to November 28, 2023. The Project's proposed 250 megawatts (MW) generating capacity is conceptually placed on 34,867 acres of leased land. Westwood conducted a Class III Archaeological Survey of the Area of Potential Effects (APE), which is for expansion areas of the Project encompassing 1,092 acres in this conceptual area. This 1,092-acre APE currently covers aspects of Project developments including the proposed locations of access roads, turbines, MET towers, and utility corridors (e.g., crane paths, collections lines, gen-tie, and fiber optic lines). This work supplements previous surveys performed for the Project by Cultural Resource Analysts, Inc. (CRA) in 2022 (Ferriman and Thurman 2022; Thurman and Weston 2022). This report is being provided to Ørsted to discuss the cultural resources present in the Project identified during Westwood's October and November 2023 surveys. The Project is being conducted at a state level review due to anticipated requirements of the Public Service Commission (PSC) as part of the Certificate of Site Compatibility (Site Permit) required under the North Dakota Energy Conversion and Transmission Facility Siting Act (North Dakota Century Code Chapter 49-22).

The Project surrounds the town of Wishek, North Dakota, in Logan and McIntosh Counties. The legal location of the Project is listed in **Table 1** below.

Table 1: Legal Description of the Badger Wind Project

Township (T)	Range (R)	Section	County
132 N	70 W	6, 7	McIntosh
132 N	71 W	2, 6–8, 16–21, 28–34	McIntosh
132 N	72 W	1–3, 8–13, 15, 16	McIntosh
133 N	70 W	8, 17–20, 28–33	Logan
133 N	71 W	18–23, 25–36	Logan
133 N	72 W	13, 24, 25, 35, 36	Logan
134 N	71 W	31	Logan

The North Dakota State Historic Preservation Office (SHPO) requires that archaeological investigations be conducted by a qualified archaeologist who meets the Secretary of the Interior's qualifications as outlined in 36 Code of Federal Regulations (C.F.R.) 61. The North Dakota SHPO also outlines standards and guidelines for conducting work in the state. Rigden Glaab, Master of Arts (MA), Register of Professional Archaeologists (RPA), of Westwood meets the Secretary of Interior's Professional Standards for Archaeology, as stipulated in 36 C.F.R. Part 61, and served as Principal Investigator for the archaeological survey. Mr. Glaab resides in North Dakota and has performed cultural resource inventories in the state since 2011. Westwood's cultural resource field team for the Project included Mr. Glaab (Principal Investigator), Ryan Steeves, MA, RPA, Lindsay Schwartzkopf, Bachelor of Arts (BA), Dean Sather, MA, RPA, and Abigail Kennedy, Master of Science (MSc; Westwood Archaeologists). Westwood's Cultural Resources Manager, Ryan Grohnke, provided administrative oversight in schedule development and client communication.

2.0 Scope of Work

A Class III Archaeological Survey was conducted to determine whether any undocumented, significant archaeological resources are present within the proposed Project's APE and to define vertical and horizontal boundaries of identified sites. If new sites are identified, archaeologists assess proposed construction impacts and provide recommendations on avoidance or additional work. The APE for this Project is any location where ground disturbance could occur, including the entire 1,092-acre APE surveyed by Westwood in October and November of 2023 (**Exhibits 1 and 2**). This APE surveyed by Westwood excludes all areas previously surveyed.

3.0 Survey Methods

Project survey methods included background research, a literature review, and field investigations in the form of pedestrian survey. Environmental background and historic contexts were used to assess site probability and determine site types most likely to be encountered in the area. A catalog of previously identified and recorded cultural resources for the area was compiled from the records maintained at the North Dakota SHPO. The data collected from these sources includes the state archaeological site files, historic property files, the North Dakota National Register inventory, and archival collections of published and unpublished reports of previous cultural resource investigations. (See **Section 5: Literature Review**.)

The methodology for the pedestrian survey involved walking the APE in parallel transects no more than 15 meters apart. In locations where artifacts or features were observed, an intensive pedestrian survey at transects no more than 5 meters apart was performed over the landform to assist in delineating the site boundaries. The APE is comprised of locations of potential ground disturbance including the proposed locations of access roads, turbines, MET towers, and utility corridors (e.g., crane paths, collections lines, gen-tie, and fiber optic lines). The field inventory consisted of a Class III intensive archaeological survey of a 250-foot radius around 32 turbines. Additionally, this area included approximately 10.5 miles of new corridor, and five proposed MET towers. These corridor locations included access roads (100 feet [ft] wide), collection lines (75 ft wide), and a 150-foot buffer around turning radii. Crane walks generally followed same corridors as collection lines. No shovel testing was performed due to the excellent ground surface visibility (GSV) across the project (e.g., 60–95 percent). Locations excluded from survey included wetlands, terrain with a significant slope (greater than 20 percent), and obviously disturbed areas. All cultural resources were mapped using GPS equipment. All cultural resources were documented to standards accepted by the North Dakota SHPO.

4.0 Results of Background Investigations

4.1 Environmental Background

The Project is located in a sparsely populated agricultural region of south-central North Dakota in Logan and McIntosh Counties surrounding the town of Wishek (**Exhibits 1 and 2**). The entirety of the Project is located on agricultural land with corn, wheat, hay, and soybeans being the dominant crops. Rocky fields unsuitable for cultivation are also commonly used for livestock pasture. GSV throughout the Project ranged from 60 percent to 95 percent.

4.1.1 Landscape and Climate

The Project is located in the Southern Missouri River Study Unit as defined by the North Dakota SHPO in Logan and McIntosh Counties (Gregg et al. 2021:5.6). This study unit is located in the Glaciated Missouri Plateau Subsection of the Missouri Plateau Section of the Great Plains physiographic province (Bluemle 2016). The Project region broadly encompasses aspects of the Missouri Coteau and Coteau Slope east of the Missouri River Trench. The Coteau region was formed by glacial dead-ice moraines and ice-disintegration features, which also includes potholes and sloughs. Beaver Creek is the largest drainage in the Project Area, which is located north and northwest of the Project (Gregg et al. 2021:5.7).

The climate of the Project Area is characterized as a semiarid continental type with significant seasonal fluctuation in temperatures. For example, the mean temperature in January is 9° Fahrenheit (F), while the mean temperature in July is 72° F (Gregg et al. 2021:5.7). The Project Area receives an average of 14 to 17 inches (in) per year (Gregg et al. 2021:5.7). Temperatures during Westwood's October and November 2023 fieldwork ranged from 20° F to 45° F that included intermittent snowstorms. (Westwood field measurements in 2023 were taken using weather applications, such as WeatherBug.)

4.1.2 Flora and Fauna

Prior to European settlement in the region, grasses would have dominated a Prairie Grassland Biome. Forested areas in the region tend to be concentrated along the major drainages (e.g., Beaver Creek, Missouri River). Common native trees in these locations include cottonwoods (*Populus* sp.), bur oak (*Quercus* sp.), willow (*Salix* sp.), box elder (*Acer negundo*), and green ash (*Fraxinus lanceolate*; Gregg et al. 2021:5.9). Endemic prairie grasses are green needlegrass (*Stipa viridula*), blue grama (*Bouteloua gracilis*), and western wheatgrass (*Agropyron smithii*). Prairie turnip (*Psoralea esculenta*) was an important vegetal food source for Native Americans in the past.

Common large mammals historically in the Project Area were white-tailed deer (*Odocoileus virginianus*), mule deer (*Odocoileus hemionus*), bison (*Bison bison*), elk (*Cervus elaphus*), and antelope (*Antilocapra americana*). Predators include wolf (*Canis lupis*), coyote (*Canis latrans*), and fox (*Vulpes* sp.). Catfish (*Ictalurus* sp.) was a common fish that would have been available to Native Americans in the Project Area. Various turtles and mussels would have been procured along drainages. Eagles, hawks, owls, pelicans, and a diverse assortment of waterfowl are also present seasonally across the Project today.

4.1.3 Soils

Westwood, and Thurman and Weston (2022) reviewed the Project Area in the Web Soil Survey database, which is maintained by the Natural Resources Conservation Service (NRCS 2023). The Project Area is characterized by loams overlaying horizons of clay loams that cover a substrate of gravely and sandy loams. Common soil series across the Project are Typic Calciustolls, Typic Pachic Argiustolls, and Typic Pachic Haplustolls (NRCS 2023). Soils of these types develop in very deep, well-drained contexts of till and alluvium on glacial plains and moraines (Thurman and Weston 2022).

4.1.4 Geology and Geomorphology

According to macrostrat.org (2023), the bedrock geology of the Project Area is comprised of the Hell Creek Formation and Fox Hills Formation, which are Late Cretaceous-age (100.5–66 million years ago) stratigraphic units. Pierre Formation shales are also present. The major lithology of the Hell Creek Formation is sandstone, siltstone, and claystone, while the Fox Hills Formation is made up of principally shale. These layers formed during the retreat of the Western Interior Seaway. The geomorphology of the Project Area surface is comprised of rolling hills with interspersed pothole lakes and wetlands (Wilk et al. 2022:4–5). Glacial deposits from the Pleistocene cover the region and consist of sand and gravel outwash ranging in thickness from 0 ft to 50 ft (Wilk et al. 2022:4–5).

4.2 Cultural History

In general, there are five major archaeological traditions in North Dakota that consist of the Paleoindian, Plains Archaic, Plains Woodland, Plains Village, and the Contact and Post-Contact Periods (Gregg et al. 2021). These traditions represent varying degrees of cultural adaptations to changing environmental conditions, endemic population growth, and the movement of Native American and Euroamerican groups in the past. The following cultural context presents a brief interpretation of this history based on current archaeological research and broadly accepted models for pre-contact and post-contact social lifeways. Gregg et al. (2021) have synthesized this work in the *Southern Missouri River Study Unit* of the *North Dakota Comprehensive Plan for Historic Preservation: Archaeological Component*.

4.2.1 Paleoindian Period (13,000 to 9000 Before Present [B.P.])

The Paleoindian Period represents the earliest evidence of human occupation in North Dakota. This is typically separated into an Early Paleoindian (13,000–12,500 B.P.) and Late Paleoindian (12,500–9000 B.P.) periods (Frison 1998; Gregg et al. 2021). Spear technology is important during this time frame, as opposed to the emphasis on atlatl and bow and arrow lithic technology seen during later periods. This reflects a subsistence strategy focused on large game hunting and high mobility (Gregg et al. 2021:5.61).

Clovis culture is commonly regarded as the earliest occupation in North Dakota during the Early Paleoindian period. Its signature implement, the Clovis projectile point, is made from high quality lithic materials, and has a central channel flake that extends part way up the proximal shaft of the tool (Frison 1998). Folsom is another technology that temporally follows Clovis during the Paleoindian Period. Its projectile point is typically also made from high quality materials; however, the central channel flake extends the entire length of the implement to the distal tip (Hofman 1995).

The Late Paleoindian Period in North Dakota is characterized by an unfluted variety of projectile points similar to earlier lanceolate forms that are associated with the Plano Complex (Dobbs 1990). Agate Basin, Eden, Hell Gap, and Scottsbluff are varieties of projectile points found during this time, which are often associated with bison kill sites (Gregg et al. 2021:5.62).

4.2.2 Plains Archaic Period (9000 to 2500 B.P.)

Approximately 9000 B.P., a new mode of subsistence strategy began to emerge in the archaeological record across North America (Emerson et al. 2011). The general pattern of this

change is the replacement of lanceolate spear points used during the Paleoindian Period, and the adoption of atlatl technology with the presence of some ground stone implements. This represents a fundamental difference from earlier forager behavior with a diversification of economy that incorporated more plants into the diets of Native Americans (Gregg et al. 2021:5.62–5.63).

Xeric environmental conditions began around 9000 B.P. with the spread of prairie grassland across much of North Dakota and western Minnesota (Anfinson 1997). Many of the lakes that had been created as a product of Pleistocene glaciation started to dry during this time leading to a reduction in game (e.g., bison, fish, birds, etc.) dependent on these resources. These environmental transformations promoted a diversification in hunting strategies, which differed dramatically from the Paleoindian Period (Gregg et al. 2021:5.62–5.63). The Plains Archaic Period is found across North Dakota and western parts of Minnesota representing an adaption to grassland environments.

4.2.3 Plains Woodland Tradition (3000 B.P. to 950 B.P.)

Substantial cultural changes began to occur in North Dakota approximately 2,500 to 3,000 years ago with Native American adaptations mirroring broader trends across the southern and eastern US (Arzigian 2008). This timeframe, known as the Woodland Period, is marked by the presence of burial mounds, pottery, bow and arrow technology (ca. 1450 B.P.), and intensive plant cultivation. Archaeological settlement patterns show Native American groups beginning to aggregate into larger populations along lakes, rivers, and associated drainages. The "Three Sisters" of squash, beans, and corn were grown in small garden plots, which were further supplemented with other resources, such as fish and aquatic mammals (Gregg et al. 2021:5.70–5.71).

Woodland archaeological sites are often broken into one of a classic tripartite temporal division of Early Woodland (3000–2150 B.P.), Middle Woodland (2150–1450 B.P.), and Late Woodland (1450–950 B.P.) periods (Emerson et al. 2008). Traditionally, variations in the Woodland Period across time and space are argued to derive from broader influences that shaped significant trends in cultural practices. These interaction spheres include the Adena (Early Woodland Period), Hopewell (Middle Woodland Period), and Mississippian (Late Woodland Period) cultures (Anfinson 1997; Gibbon 2012; Gregg et al. 2021).

4.2.4 Plains Village Period (950 B.P. to European Contact)

The Woodland Period ends throughout most of North Dakota and surrounding regions around 950 B.P. (Arzigian 2008; Gibbon 2012). The dominant major regional influence was the site of Cahokia in the American Bottom near the modern city of St. Louis, Missouri, on the Mississippi River (Pauketat 2009). A widespread cultural complex called Oneota to the east of North Dakota is concurrent with the regional influences of Cahokia lasting from approximately 950 B.P. until the time of French contact (Gibbon 2012). These mobile groups shared Middle Mississippian traits that included corn horticulture and shell-tempered ceramics (e.g., globular vessels with high rims), but lacked permanent structures such as burial mounds (Gregg et al. 2021:5.77–5.79).

Plains Village groups from the region of the Missouri River in the Dakotas began to interact with the Oneota in western Minnesota after 950 B.P. (Anfinson 1997; Ahler and Kay 2007). These groups hunted bison and practiced corn horticulture and lived within earth-lodges protected within palisaded forts. Globular-shaped ceramic jars with crushed rock temper are a hallmark

technology of this period. Psinomani groups are believed to be the ancestors of the modern Dakota people who lived in east-central Minnesota (Gibbon 2012).

4.2.5 Contact Period and Post-Contact (A.D. 1700 to Present)

The introduction of the horse had a profound effect on Native American lifeways beginning in the early-1700s in North Dakota (Gregg et al. 2021:5.82). This period is also referred to as protohistoric, a time when the indigenous people were coming into contact with and being influenced by European culture (Gregg et al. 2021:5.82). This contact was not always direct interaction between Native and Euro-American peoples, but sometimes through contact with items of Euro-American cultural material being traded throughout the area (Gregg et al. 2021:5.82).

Later in the 1800s, Euro-Americans pushed westward and increasingly settled in the Dakotas. Although North and South Dakota were initially within the Missouri Territory, the Dakota Territory was eventually established in 1861 and encompassed North Dakota, South Dakota, and much of Montana and Wyoming (North Dakota History-American Settlement 2024). Dakota Territory was opened to homesteaders in 1862 (North Dakota History-American Settlement 2024). Following the opening of the Dakota Territory several railroads that served the territory, including the Dakota Southern and Manitoba (known later as the Great Northern) Railways, were built, and the Gold Rush of 1876 began (North Dakota History-Statehood 2024). These events led to massive Euro-American settlement of the Dakota Territory between 1872 and 1887 (North Dakota History-Statehood 2024). This period is known as the Great Dakota Boom; a severe drought brought the Boom to an end between 1886 and 1887 (North Dakota History-Statehood 2024).

In 1889 North and South Dakota were admitted to the Union as the 39th and 40th states, in no particular order (North Dakota History-Statehood 2024). The states were the leading producers of wheat until the drought and Great Depression in the 1930s, and railroads continued to expand and run until the collapse of the farming industry in the 1980s (North Dakota History-Postwar Economics and Politics 2024). Significant events witnessed by residents of North and South Dakota throughout the twentieth century included discovering oil in 1927 and 1951, enduring record blizzards, creating numerous military bases and nuclear missile silos, and constructing dams (North Dakota History-Postwar Economics and Politics 2024).

5.0 Literature Review

The Project Area has been subject to several intensive cultural resource literature reviews from 2020 to present on behalf of Ørsted (Bring and Freshwater 2021; Ferriman and Thurman 2022; Thurman and Weston 2022; Wilk et al. 2022). These reviews led to Project-related archaeological fieldwork during three separate surveys (Ferriman and Thurman 2022; Thurman and Weston 2022; Wilk et al. 2022). The archaeological work conducted by CRA, over the summer of 2022 reflects the Project layout closest to Westwood's 2023 inventory (Ferriman and Thurman 2022; Thurman and Weston 2022).

The Class I Literature Review performed by Atwell, LLC (Atwell), encompasses a broad study area (57,413 acres), which generally overlaps all iterations of Project layout subsequently surveyed by Atwell, CRA, and Westwood (Wilk et al. 2022). Previously recorded resources identified by this

literature review consist of nine historic architectural sites, 11 historic archaeological sites, one prehistoric archaeological site, and 36 previous cultural resource inventories in the Project Area. In addition, Atwell's Class III Cultural Resource Survey that followed documented seven historic archaeological sites, one site historic cemetery site lead, and two prehistoric isolated finds (Wilk et al. 2022).

A cultural resource literature of the Project Area was performed by CRA in May and July of 2022, which included archaeological surveys that summer (Ferriman and Thurman 2022; Thurman and Weston 2022). The larger, May 2022 search identified 18 previous inventories, one isolated find, 20 archaeological sites, and one site lead. In addition, a related literature review cataloged 578 architectural resources principally concentrated in the town of Wishek, North Dakota (see Dickerson and Ball 2022). The 2022 inventories by CRA recorded two new historic sites, one historic isolated find, and three prehistoric isolated finds.

A search of Bureau of Land Management (BLM) General Land Office (GLO) records was conducted by Thurman and Weston (2022) to assess the potential for historic resources to be present in earlier configurations of the Project. Westwood performed a GLO search specific to the Project area that was surveyed in 2023 and is overlapped by CRA's study (Westwood Architectural Historian S. Nelson, December 2023). GLO maps published from 1868 to 1902 have been digitized and provided by the North Dakota Department of Water Resources (NDDWR) and were viewed in ArcPro GIS software (NDDWR 2022). There are several small and intermittent unnamed streams crisscrossing the Project, but the GLO maps do not show indications of settlement or land claims. Bluffs are indicated along many of the creek beds. One road is depicted in T 133, R 71 on the Logan County map: it runs along a southeasterly route through sections (from the northwest corner) 18, 17, 20, 29, 28, 33, and 34. The road begins 5 miles northwest of the Project where it runs southeast from an east-west route along the south side of Beaver Creek. The road does not continue south onto the McIntosh County (T 132) map. The roadway is not depicted in later maps such as the 1916 Logan County atlas and topographic maps published since 1953 (Topoview 2023). By 1916, the county atlas shows the Minneapolis, St. Paul & Sault Ste. Marie railroad corridor had been laid through the center of T (s) 132 and 133, Range 71 along a northerly track (Ogle 1916).

Ørsted has used these data discussed above to aid in creating the current Project layout, which avoids all known cultural resources in relation to the APE (**Exhibits 1 and 2**). Out of due diligence, Mr. Glaab performed a check of the North Dakota SHPO records in Bismarck on October 23, 2023. No additional cultural resources have been documented in the current APE since the 2022 review by CRA. No previously recorded resources were present in the APE surveyed by Westwood in 2023. The previous literature reviews and surveys indicated the Project's potential for architectural (e.g., houses, farmstead structures, sheds), prehistoric archaeological (e.g., stone features, lithic scatters, isolated tools), and historic archaeological (e.g., trash scatters [> 50 years], foundations, collapsed structures) sites to be present.

6.0 Field Investigations

Fieldwork in the Project Area was carried out by Westwood between October 23 and November 22, 2023. The Class III Cultural Resource Inventory was performed by Westwood's cultural resource field team comprised of Principal Investigator Rigden Glaab, MA, RPA, and Ryan Steeves, MA, RPA, Lindsay Schwartzkopf, BA, Dean Sather, MA, RPA, and Abigail Kennedy, MSc.

(Westwood Archaeologists). The Project Area consists of rolling hills with coulees and drainages flowing northwest and north towards Beaver Creek. Internally draining areas are also present along with wetlands that were excluded from survey. The field methods utilized were pedestrian survey. Weather was conducive to survey with partly cloudy conditions and temperatures ranging from 20° F to 45° F. The GSV throughout the Project Area averaged 60 to 95 percent, which permitted pedestrian survey throughout the APE (**Exhibits 1 and 2; Appendix A**). No previously recorded cultural resources are present in the 2023 APE surveyed by Westwood. Two newly recorded cultural resources were documented (*Site 32LO174*; *Isolated Find 32LOX76*). The discussion below focuses on these archaeological results and provides management recommendations for the National Register of Historic Places (NRHP).

6.1 Site 32LO174 (Historic Foundations and Cultural Material Scatter [CMS]; Temp. No. Site Badger-HIS-2)

Site 32LO174 is a historic farmstead that is comprised of three heavily eroded concrete foundations (Features A, B, and C) and a linear CMS dating from the 1940s to 1970s (**Exhibits 1, 2, and 3**; **Appendix A**). The site is located directly northeast of the intersection of 43rd Avenue SE and 76th Street SE. Access to the farm was probably from 43rd Avenue SE in the past. The site is in the northeast APE of the Project, and the GSV throughout averaged 40 percent. Significant exposures of ground surface are created across the site by areas cattle frequent. The site boundary, including the features and CMS, measures 296 ft east-west by 348 ft north-south. The topography is comprised of open pasture generally trending to the northeast at a 4 to 6° slope; the ground surface is level near features. Elevated at 2,196 ft above sea level (asl), the legal location for the site is the [redacted] Logan County, North Dakota.

Site 32LO174 contains three concrete foundation features (Features A–C). Feature A measures 29 ft 6 in east-west by 65 ft 7 in north-south. The probable house foundation has three visible walled areas each oriented east-west with one entrance to the north, three opening east, and one to the south. The northern room (13 ft 5 in north-south x 29 ft 6 in east-west) may be a foyer, the central space (29 ft 6 in east-west x 33 ft 5 in north-south) a living room, and the southern room (18 ft 8 in north-south x 29 ft 6 in east-west) a kitchen. The remnants of a collapsed fireplace are visible in the southernmost partition. Located 70 ft to the northeast from Feature A, Feature B is a concrete foundation that measures 24 ft east-west by 48 ft north-south, has no visible partitions, and was accessed from two openings located on the northern and southern sides. Feature C is the concrete foundation of a barn and is approximately 100 ft to the south from Feature B. Feature C measures 20 ft east-west by 70 ft north-south and is comprised of a single space with no visible entry points.

A linear CMS of mixed historic-period trash from the 1940s through the 1970s is present in a 100 ft northwest-southeast oriented drainage ditch that is 67 ft south from Feature C. These artifacts were not fully documented due to an abundance of recent trash, but a sample of the older materials was recorded. It is unclear if the source of these materials is related to the occupation of the main site, or if it is an area of roadside deposits from 76th Street SE. Observed artifacts that may be contemporaneous with the site include several clear glass food or condiment bottles bearing pre-1954 and post-1954 Owens-Illinois trademarks with possibly 1953 and 1959 dates (Owens-Illinois Trademarks 2023). Older appearing metal scrap is in the ditch as well that may be from stove or automobile body parts.

A review of BLM GLO records did not identify any land patents at the specific location of Site 32LO174 in the [redacted] of Section [redacted] Logan County, North Dakota. Available records in Section [redacted] show a patent for 160 acres issued (Document #9388) to Sadie Miles in the [redacted] of Section [redacted] on September 21, 1908 (BLM GLO 2023). An internet search of this individual's name did not produce information regarding their historic importance (*sensu* Criterion B). The GLO search conducted by Thurman and Weston (2022) did not reveal any other patent records near the site location.

Westwood contacted the Logan County Recorder's Office in Napoleon, North Dakota, via email on December 11, 2023, and provided the legal location of the site. The Logan County Recorder's Office provided two deeds that pertain to the age of the artifact and feature assemblages observed during site documentation. The first (Document #56049) is an indenture drafted on December 4, 1944, between Logan County and William E. Huber (unclear if he is the father of or individual referenced below) of Wishek, North Dakota (Logan County Recorder's Office 2023). It appears the property was acquired by Logan County during deed proceedings following nonpayment of taxes between the years of 1929 and 1940. On November 17, 1940, Mr. Huber paid $512.94 to reacquire the land from the county and settle unpaid taxes. If the father, Mr. Huber may have originally purchased the land from Sadie Miles referenced above in the GLO search.

The second attachment provided by Logan County (Document #60884) is a deed made on June 26, 1950, between Harold Mattes, and Emelia Huber (Mr. Huber's mother), William E. Huber, and his wife Phyllis M. Huber (Logan County Recorder's Office 2023). The form indicates they all maintained post office boxes in Wishek, North Dakota. No cost is provided for the property exchange. An internet search of these individuals did not produce significant information regarding their importance in North Dakota or regional history (*sensu* Criterion B). An obituary for Mr. Huber notes he had a career as a real estate, insurance, and tax accounting specialist in Wishek (Bismarck Tribune 2023) Harold Mattes is associated with an Appaloosa breeding registry and is noted for the horse Dogtown Eris (T-19628), which was a mare born in 1961(Appaloosa Territory 2023). The horse was sold to Wheeler and Horton of Tilden, Texas.

Site 32LO174 is recommended *not eligible* for inclusion in the NRHP, and Westwood recommends no other avoidance measures for this site. The location of the concrete foundations may be important to know for safety considerations during construction. The site exhibits minimal importance with respect to the seven aspects of NRHP integrity. The significance of the "Location," "Design," "Setting," and "Materials" of the site is limited to its construction as a standard farmstead in central North Dakota. The site condition is in a heavily degraded state and it does not retain any maintain any important aspects of architectural form. The site integrity of "Workmanship," "Feeling," and "Association" cannot be demonstrated as a significant aspect of the historic farmstead. Its layout and utilitarian design follow a template found at many farmsteads across North Dakota.

Regarding its potential NRHP eligibility, Site 32LO174 is not associated with broad patterns of a discernable history beyond the utilitarian nature of a farmstead (Criterion A). It cannot be related to historically important individuals (Criterion B). The degraded concrete foundations lack meaningful architectural elements emblematic of an important style (Criterion C). Finally, the data potential of the site has been fully exhausted during the current documentation. The site contains no potential for additional cultural materials that could address significant archaeological research paradigms (Criterion D).

6.2 Isolated Find 32LOX76 (Knife River Flint [KRF] Utilized Flake and Shatter; Temp. No. Isolated Find Badger-PRE-3if)

Isolated Find 32LOX76 consists of a utilized flake and a piece of lithic shatter made from KRF (**Exhibits 1 and 2**; **Appendix A**). The isolated find is located on the southeast-trending slope (average 10° slope) of a rolling hill to the northwest, and is 317 ft west of 37th Avenue SE. The isolated find is in the northwest APE of the Project, and the GSV throughout averaged 70 percent. The area is currently used for hay production. The isolated find is at 2,110 ft asl, and the legal location is the [redacted] Logan County, North Dakota.

The KRF utilized flake measures 4.0 x 3.6 x .7 centimeters (cm), bears no cortex, has eight dorsal scars, and five ventral scars. The tool was used along 1.3 cm of one margin. It may have served as a cutting implement for butchering. A single piece of KRF shatter was identified 8 meters northwest of the utilized flake. It is unclear if it is prehistoric in age, or the product of mechanical plow shearing. Small, naturally-occurring nodules of KRF (range 1–4 cm diameter) were observed in this portion of the Project's APE. Bipolar lithic reduction may have been a preferred method for creating tools from these diminutive cores. No other cultural materials were identified after an extensive field search by three archaeologists.

The isolated find does not exhibit any of the seven aspects of NRHP integrity. The significance of the "Location," "Design," "Setting," "Workmanship," "Feeling," and "Association" would not apply as this is likely an expediently used tool with a focused, limited purpose. It does not have any characteristics (e.g., bifacial flaking) found in formally produced tools, such as projectile points. The resource is also limited in density (e.g., two artifacts). Integrity of "Materials" is also limited because of the implement being made from KRF, which is a common lithic tool stone found across western and central North Dakota.

Isolated Find 32LOX76 is recommended by Westwood *not eligible* for inclusion in the NRHP, and the Project does not need to avoid this resource. Considering its potential NRHP eligibility, Isolated Find 32LOX76 cannot be linked to broad patterns history (Criterion A), nor can it be related to historically important individuals (Criterion B). There are no architectural components to this isolated find (Criterion C). The archaeological research potential of the isolated find has been completely documented by the 2023 inventory (Criterion D).

7.0 Summary and Recommendations

Westwood recommends no further work at Site 32LO174 and Isolated Find 32LOX76. These resources are recommended *not eligible* for inclusion in the NRHP. Westwood also recommends no further cultural resource work for the Project within the surveyed APE as of the most current layout in November 2023. Westwood stresses that if construction plans are altered to include areas not previously surveyed, those locations must be examined for cultural resources. Although an archaeological survey was completed, the possibility of unidentified resources remains. If unrecorded archaeological sites are discovered during construction, all ground-disturbing activities in the area should stop and the archaeologist on record and ND SHPO should be contacted. Further, if human remains are encountered during construction activities, all ground-disturbing activity must cease, and local law enforcement along with professional archaeologists, must be notified.

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APPENDIX A

Representative Photos of the Project Area, Isolated Find, and Site.

Badger Wind Project – 2023 Expansion Areas

Logan and McIntosh Counties, North Dakota

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Photo 1: Overview of the northern Project Area, facing south.

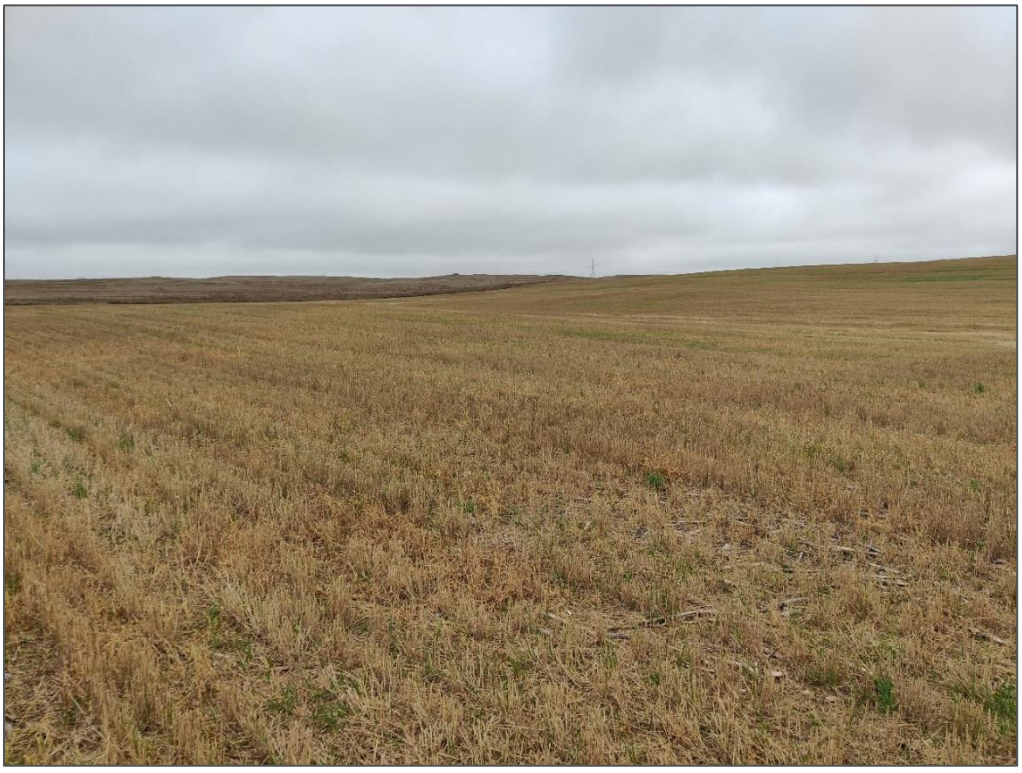

Photo 2: Overview of the northern Project Area, facing southwest.



Photo 3: Overview of the eastern Project Area, facing west.



Photo 4: Overview of the eastern Project Area, facing west.



Photo 5: Overview of the southern Project Area, facing north.



Photo 6: Overview of the southern Project Area, facing north.



Photo 7: Overview of the western Project Area, facing east.



Photo 8: Overview of the western Project Area, facing east.



Photo 9: Overview of the central Project Area, facing east.



Photo 10: Overview of the central Project Area, facing east.

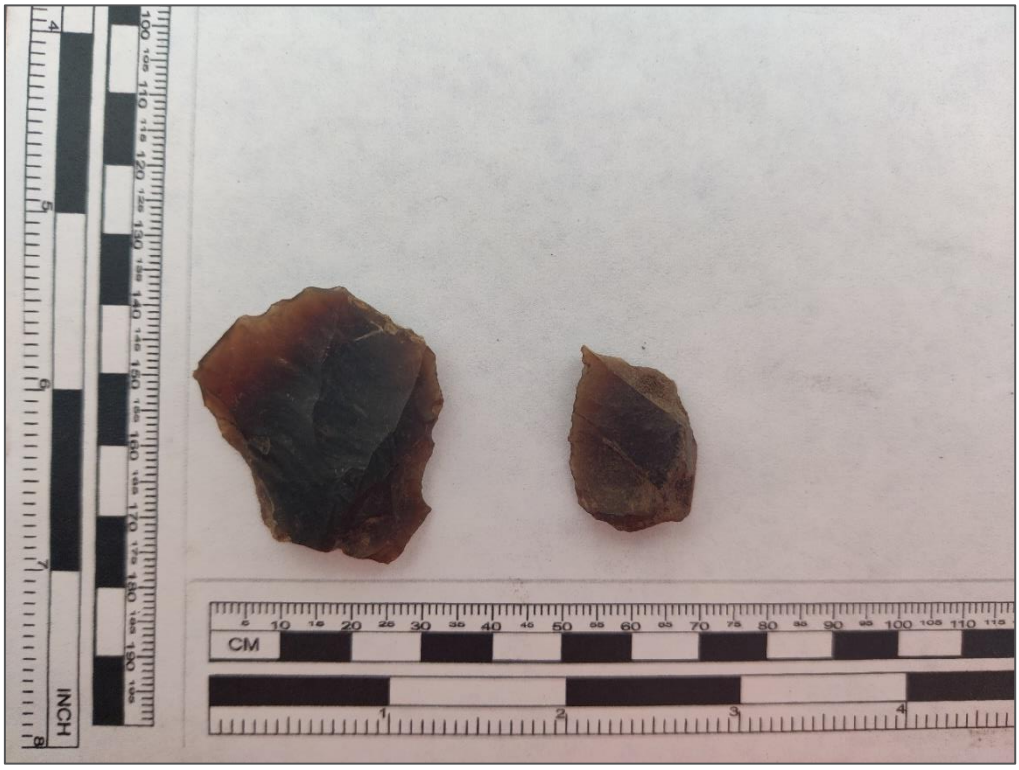

Photo 11: Isolated Find 32LOX76, Knife River flint utilized flake and shatter.

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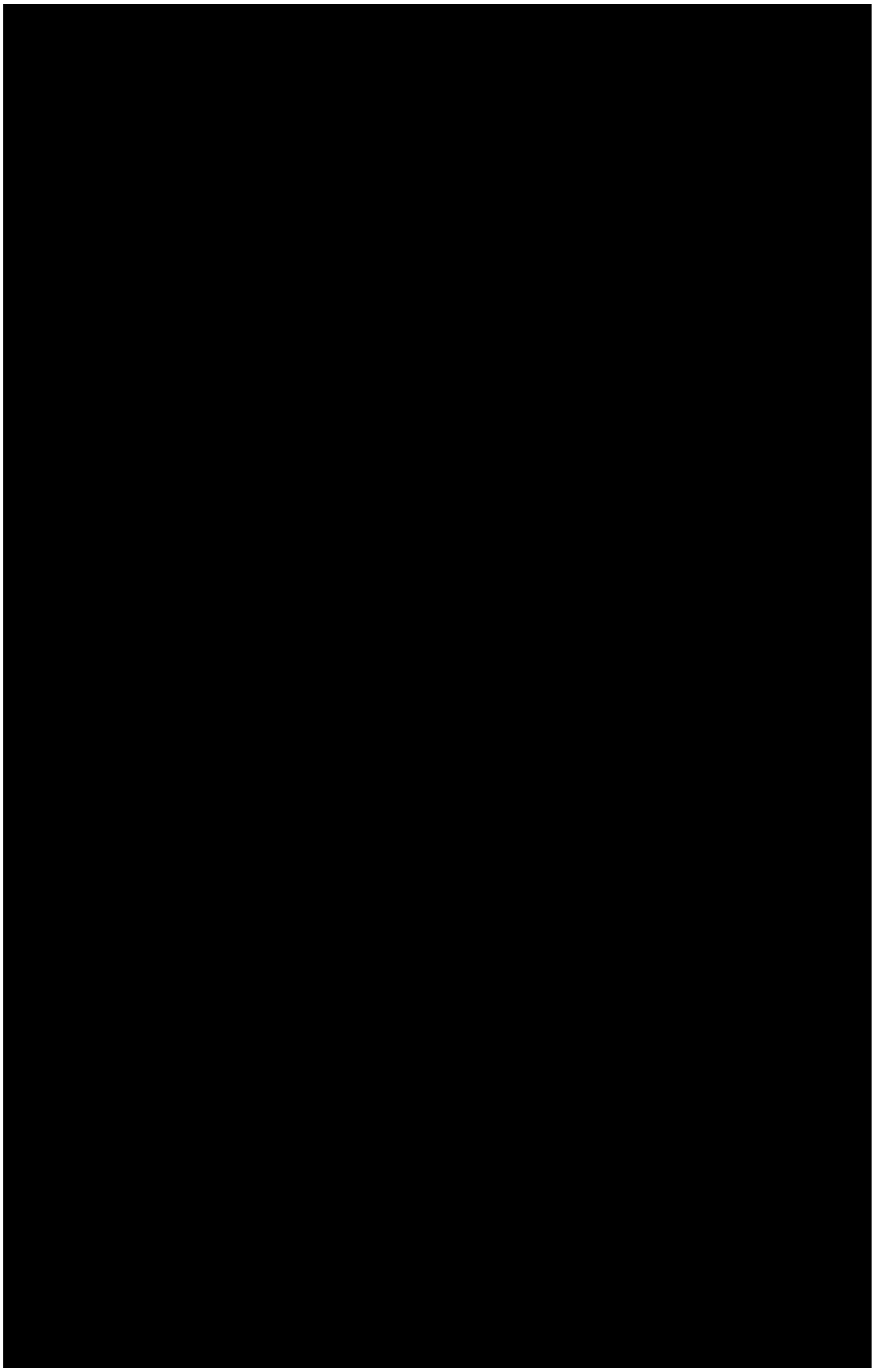

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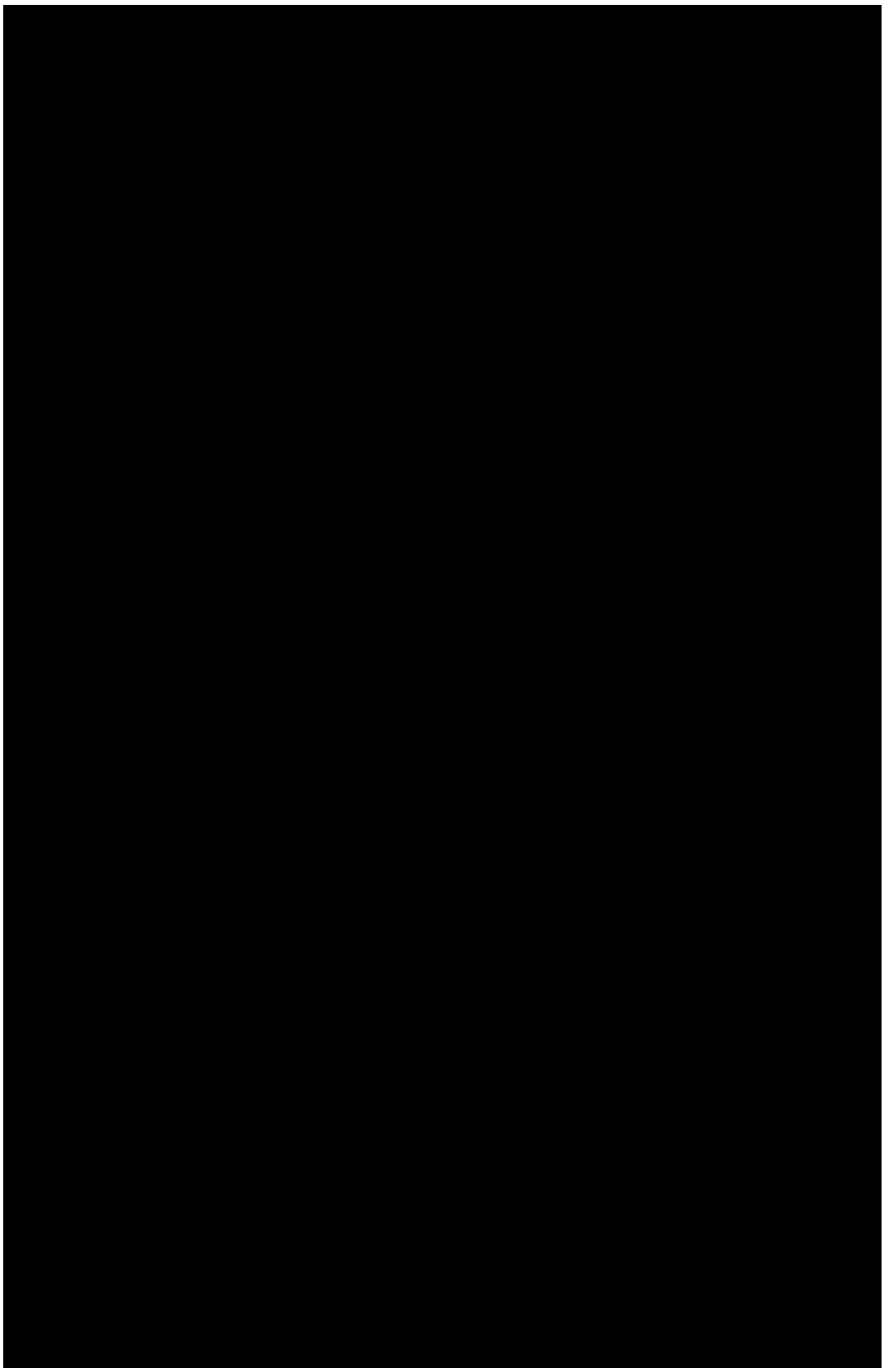

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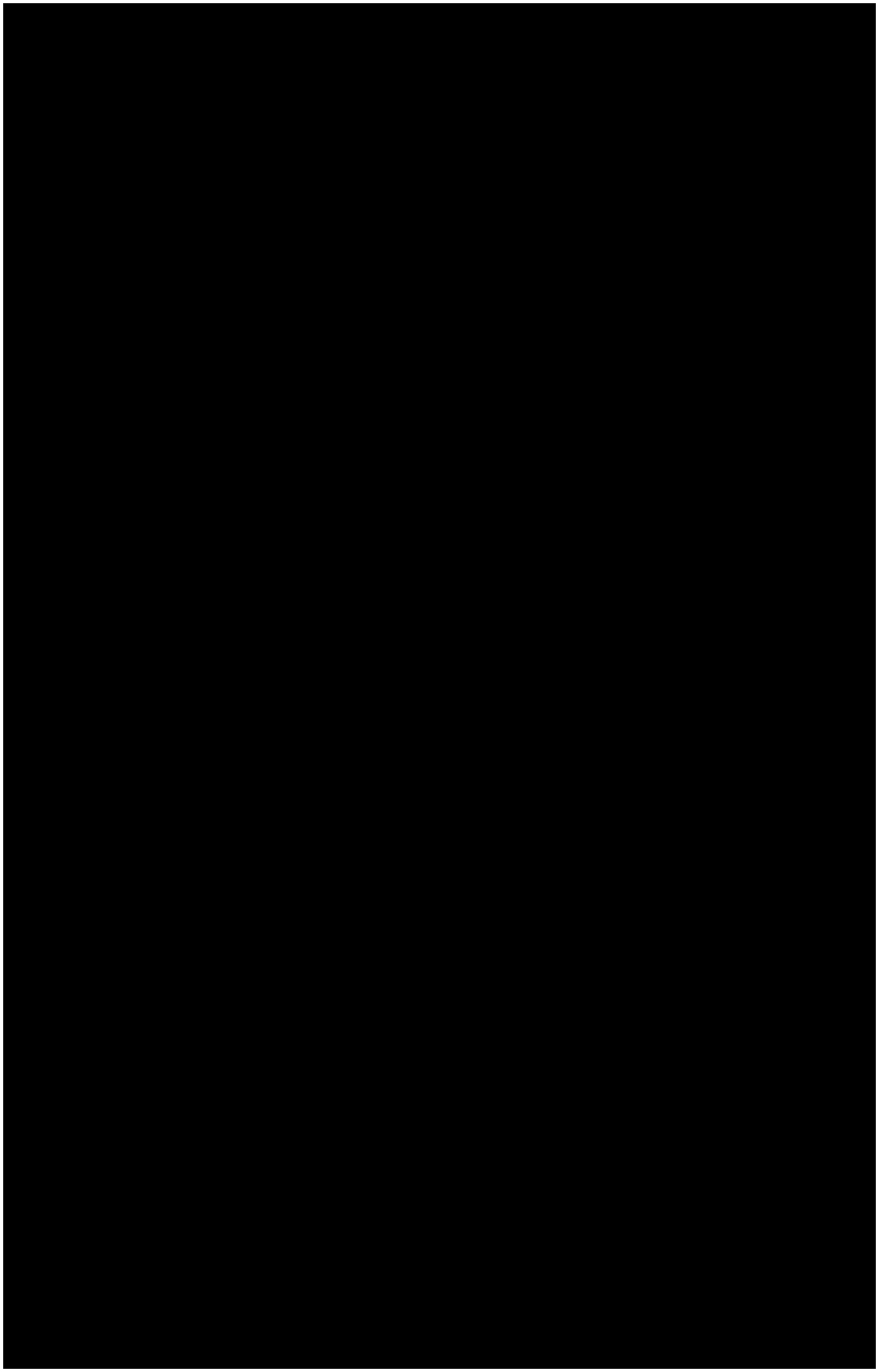

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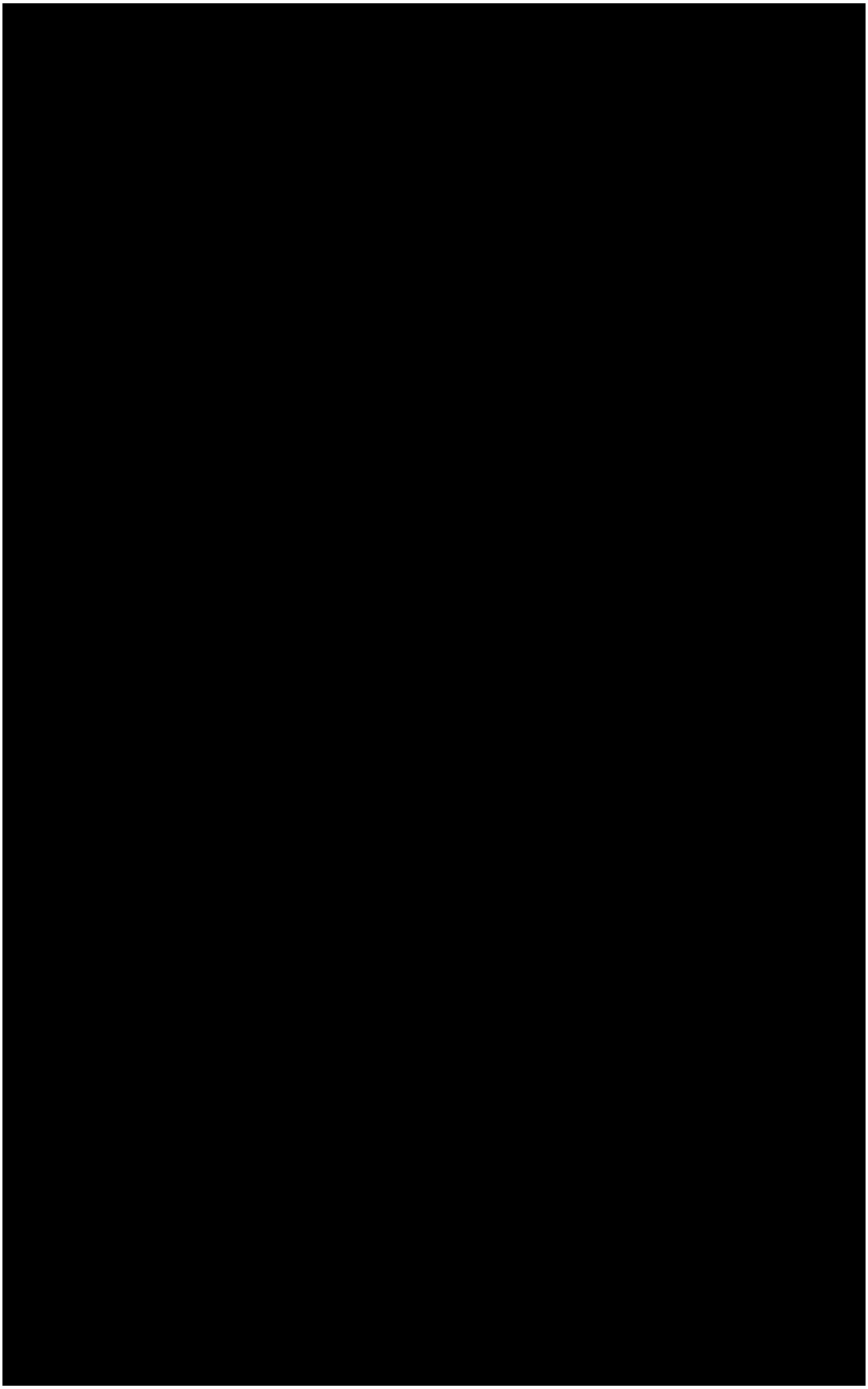

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De Caro, David

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Sent: Friday, January 26, 2024 10:50 AM
To: Andrew Krieger; De Caro, David; Wallace, Erin
Cc: Ryan Grohnke; Ryan Steeves
Subject: FW: Westwood Submittal: Badger Wind Project, Logan and McIntosh Counties, ND

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Thanks,

Rigden

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From: Rigden Glaab
Sent: Friday, January 26, 2024 9:49 AM
To: Meidinger, Lorna B. <lbmeidinger@nd.gov>
Cc: Reed, Timothy A. <treed@nd.gov>; Ryan Grohnke <Ryan.Grohnke@westwoodps.com>
Subject: Westwood Submittal: Badger Wind Project, Logan and McIntosh Counties, ND

Good morning Lorna,

We have mailed the report for the Badger Wind Project along with the processing check. The GIS data and digital version of the document have also been uploaded to the FTP site (Badger_Wind_Project folder).

Thank you, and please let me know if you have any questions.

Best regards,

Rigden

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Appendix M
Architectural Reconnaissance Survey Report

Badger Wind, LLC
February 2024

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Contract Publication Series 23-373

CLASS I LITERATURE REVIEW AND CLASS II ARCHITECTURAL RECONNAISSANCE INVENTORY FOR THE BADGER WIND PROJECT EXPANSION AREAS LOGAN AND MCINTOSH COUNTIES, NORTH DAKOTA

For Official Use Only: Disclosure of site locations prohibited (43 CFR 7.18)





by
Robert Ball, MHP

Prepared for

DNV Energy, USA, Inc.

Prepared by

cra
cultural resource analysts, inc

Kentucky | West Virginia | Wyoming
Indiana | Louisiana | Tennessee | Virginia

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Contract Publication Series 23-373

CLASS I LITERATURE REVIEW AND CLASS II ARCHITECTURAL RECONNAISSANCE INVENTORY FOR THE BADGER WIND PROJECT EXPANSION AREAS LOGAN AND MCINTOSH COUNTIES, NORTH DAKOTA

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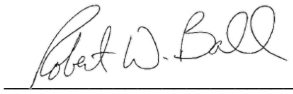

Robert W. Ball, MHP
Principal Investigator

December 15, 2023

Lead Agency: State Historical Society of North Dakota
612 East Boulevard Avenue
Bismarck, North Dakota 58505

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ABSTRACT

In November and December 2023, Cultural Resource Analysts, Inc., personnel completed a Class I Literature Review and Class II Architectural Reconnaissance Inventory for the expansion of the Badger Wind Project in Logan and McIntosh Counties, North Dakota. The survey was conducted at the request of David De Caro of DNV Energy USA, Inc., on behalf of Badger Wind, LLC.

The proposed expansion of the Badger Wind Project includes additional turbine locations, turbine strings, and facilities that extend beyond the previously conducted architectural reconnaissance inventory (Dickerson and Ball 2022). The expansion occurs primarily within agricultural fields located to the west and south of the town of Wishek.

The purpose of the study was to identify historic architectural resources within the area of potential effects for the proposed project and to evaluate each identified resource's eligibility for inclusion in the National Register of Historic Places. Based on the North Dakota State Historic Preservation Office Guidelines, the area of potential effects for wind turbines 400 feet or higher is defined as parcels within the proposed locations of the wind turbines, and a two-mile buffer extending outwards from each proposed turbine location.

Prior to initiating fieldwork, personnel initiated a review of records maintained by the North Dakota State Historic Preservation Office, to determine if previously documented architectural resources 45 years of age or older were located in the area of potential effects for the expansion areas of the proposed project. This review indicated that one aboveground cultural resource had been previously documented within the area of potential effects (32MT00038). The review indicated that the one historic aboveground, previously recorded resource identified within the area of potential effects had either not been fully evaluated for listing in the National Register of Historic Places or was previously determined not eligible for inclusion.

During the field survey, Cultural Resource Analysts, Inc., personnel identified a total of nine aboveground resources (Sites 1–9) within the area of potential effects, none of which have been previously surveyed. During the field survey, the one cultural resource identified during the records review (32MT00038) was determined to no longer be extant.

Cultural Resource Analysts, Inc., recommends that Sites 1–9 are not eligible for listing in the National Register of Historic Places under Criterion A, B, or C. Thus, Cultural Resource Analysts, Inc., recommends a finding of No Effect for the proposed expansion areas of the Badger Wind Project.

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I. INTRODUCTION

In November and December of 2023, Cultural Resource Analysts, Inc. (CRA), personnel completed a Class I Literature Review and Class II Architectural Reconnaissance Inventory for the expansion of the Badger Wind Project in Logan and McIntosh Counties, North Dakota (Figure 1). The survey was conducted at the request of David De Caro of DNV Energy USA, Inc., on behalf of Badger Wind, LLC.

The proposed project expansion areas encompass a portion of the southwest corner of Logan County and the northwest corner of McIntosh County in south-central North Dakota. There are two expansion areas that fall outside the original area of potential effects (APE) of the Badger Wind Project. The first is located approximately 2.5 miles south of the city of Wishek and is bisected by State Highway 3. The second area is located approximately 7 miles west of the city of Wishek and is bisected by State Highway 13.

The APE for the proposed project, which took into consideration the scale and nature of the project and the environmental settings, was defined, in accordance with the North Dakota State Historic Preservation Office (ND SHPO) *Guidelines Manual for Cultural Resource Inventory Projects* (Revised Edition), as a two-mile radius surrounding the proposed turbine locations.

The purpose of the survey was to:

1) Identify and document all historic architectural resources (above ground resources 45 years of age or older) located within the APE;

2) Evaluate their eligibility for listing in the National Register of Historic Places (NRHP) and recommend boundaries, if eligible; and

3) Evaluate the effects of the project on any properties listed in, or eligible for listing in, the NRHP.

The following report presents a summary of the survey findings. The report was prepared by and under the supervision of Robert Ball, who served as Principal Investigator and was issued a Cultural Resource Annual Permit as an Architectural Historian by the ND SHPO on December 7, 2022. Fieldwork was completed under the direct supervision of Mr. Ball, who was assisted by Architectural Historian John Hurley, who also meets the Secretary of the Interior's Professional Qualifications for Architectural History. Fieldwork was completed in approximately 64 personnel hours between November 14 and 17, 2023, at the request of David De Caro of DNV Energy USA, Inc., on behalf of Badger Wind, LLC. Conditions were sunny and cold. All survey efforts occurred from the public right-of-way (ROW).

During the field survey, nine individual architectural resources (Survey Sites 1–9) were identified and surveyed, none of which were previously surveyed. The one cultural resource identified during the records review (32MT00038) was determined to no longer be extant.

Of the nine sites identified during the field survey, CRA recommends that Sites 1–9 are not eligible for listing in the NRHP under Criterion A, B, or C.

II. PROJECT DESCRIPTION AND ENVIRONMENTAL SETTING

The proposed expansion areas to the Badger Wind Project are illustrated in Figures 2 and 3. They are generally located to the south and west of the city of Wishek. The expansion areas will include additional turbine locations, turbine strings, and facilities that extend beyond the previously conducted cultural resource inventories.

The APE for the project encompasses historic architectural resources 45 years of age or older that are located within a two-mile radius of the proposed additional turbine locations. Included within the APE are undulating agricultural fields interspersed with ephemeral drainages (Figures 4–6).

The proposed Badger Wind Project is situated within portions of Logan and McIntosh Counties, which lie in south-central North Dakota within the Southern Missouri River Study Unit (SMRSU) as defined by the ND SHPO and the North Dakota State Historical Society (ND SHPO 2009:16; Gregg et al. 2008:5.1). This unit has been subdivided into four portions, stemming east to west: The Missouri Coteau, the Coteau Slope, the Missouri River Trenches, and an unnamed upland area west of the Missouri River Trenches. The area of investigation for the proposed Badger Wind Project is located on the eastern end of the SMRSU within the Missouri Coteau. Located approximately 36 miles west of the area of investigation lies the Missouri River. Undulating grassy plain, interspersed with both named and unnamed drainages. Vegetation consists of a variety of weeds and grasses with intermittent stands of trees located along parcel boundaries and around residences.

III. LITERATURE REVIEW

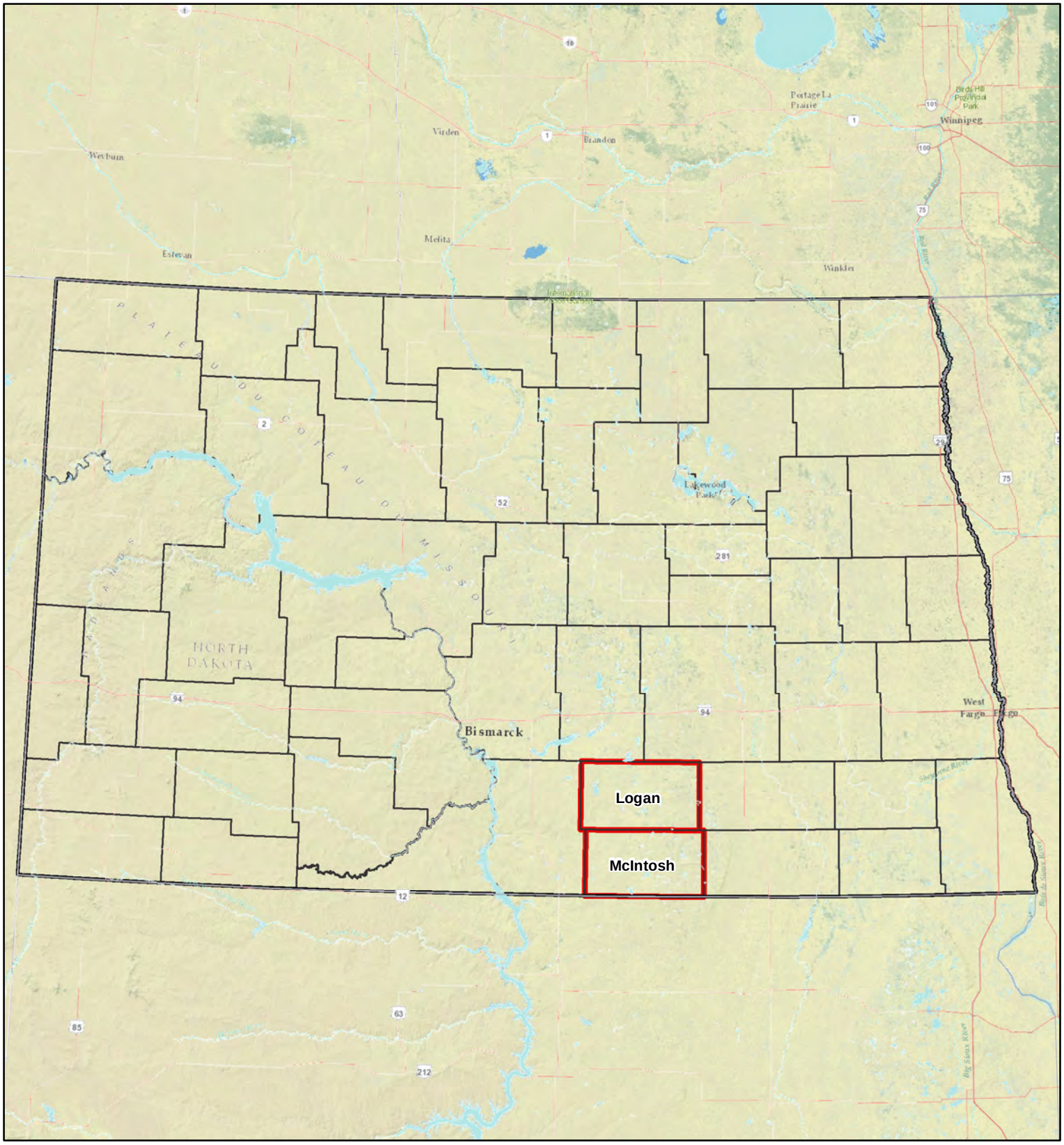
In 2021-2022, CRA personnel conducted the Class I Literature Review and Class II Architectural Reconnaissance Inventory for the Badger Wind Project in Logan and McIntosh Counties, North Dakota (Dickerson and Ball 2022). That survey documented 578 resources, including much of the city of Wishek. As this current survey and report is a continuation of that project, this report mimics the layout and pulls information utilized in the previous report.

Prior to entering the field, available surveys, reports, studies, maps, and other data pertinent to the project's location were identified and reviewed as part of the Class I literature review. This task began with a review of the historic architectural resources records, maintained by the ND SHPO, to determine if previously documented architectural resources were located within the APE for the proposed project. One previously recorded historic architectural resource (32MT00038) was identified within the project study area and two-mile buffer during the historic architectural records review. The resource represents a historic farmstead. The previously recorded historic resource was either recommended not eligible for the NRHP or not evaluated. Furthermore, the previously recorded historic resource (32MT00038) was razed sometime prior to the current investigation.

As part of the archival research, the Wishek Public Library and the Bismarck Veterans Memorial Library, were visited in person during the previous survey to consult county histories in order to develop a historic context for the project APE and resources within it. These resources are listed in the bibliography. Archival research also included a review of the following available maps to help identify potential historic resources in the APE of the expansion areas.

1901 Rich Lands Along the Minneapolis, ST. Paul & Sault Ste. Marie R'Y in North Dakota (ndstudies.gov). Depicted on this map are the North Dakota counties, as well as those counties' more significant settlements. Rail lines are shown in red connecting many of these towns and cities. The Soo Rail Line is depicted as connecting Kulm and Wishek, and Wishek to Ashley. The rail line then continues northwest past Beaver Lake and onto Napoleon.

1911 Atlas of McIntosh County, North Dakota (George A. Ogle & Company 1911). Residences and parcels are depicted within each township on this map complete with owner names. Rural schools are mapped along county roads in each township. The Soo Rail Line is depicted traveling along the north side of Wishek and includes a round house northwest of town. West of Wishek, the rail line turns northwest and southeast before continuing in both directions.



Project Location by County

State Boundary

County Boundary

Badger Wind Project

Figure 1: Project Location Map

0 560,000 Feet

0 172,000 Meters

N

1:3,000,000

1 inch = 250,000 feet

1 inch = 76,200 meters

cra

cultural resource analysts, inc

248 West Brundage St., Sheridan, Wyoming 82801

307.674.1702

CONFIDENTIAL

Prepared By: MAT	Date: 12/11/2023
Project Number: Y230355	Project Name: Badger Wind 2023

Coordinate System:
UTM NAD 83 Zone14N

For Official Use Only:
Disclosure of site locations prohibited (43 CFR 7.18)

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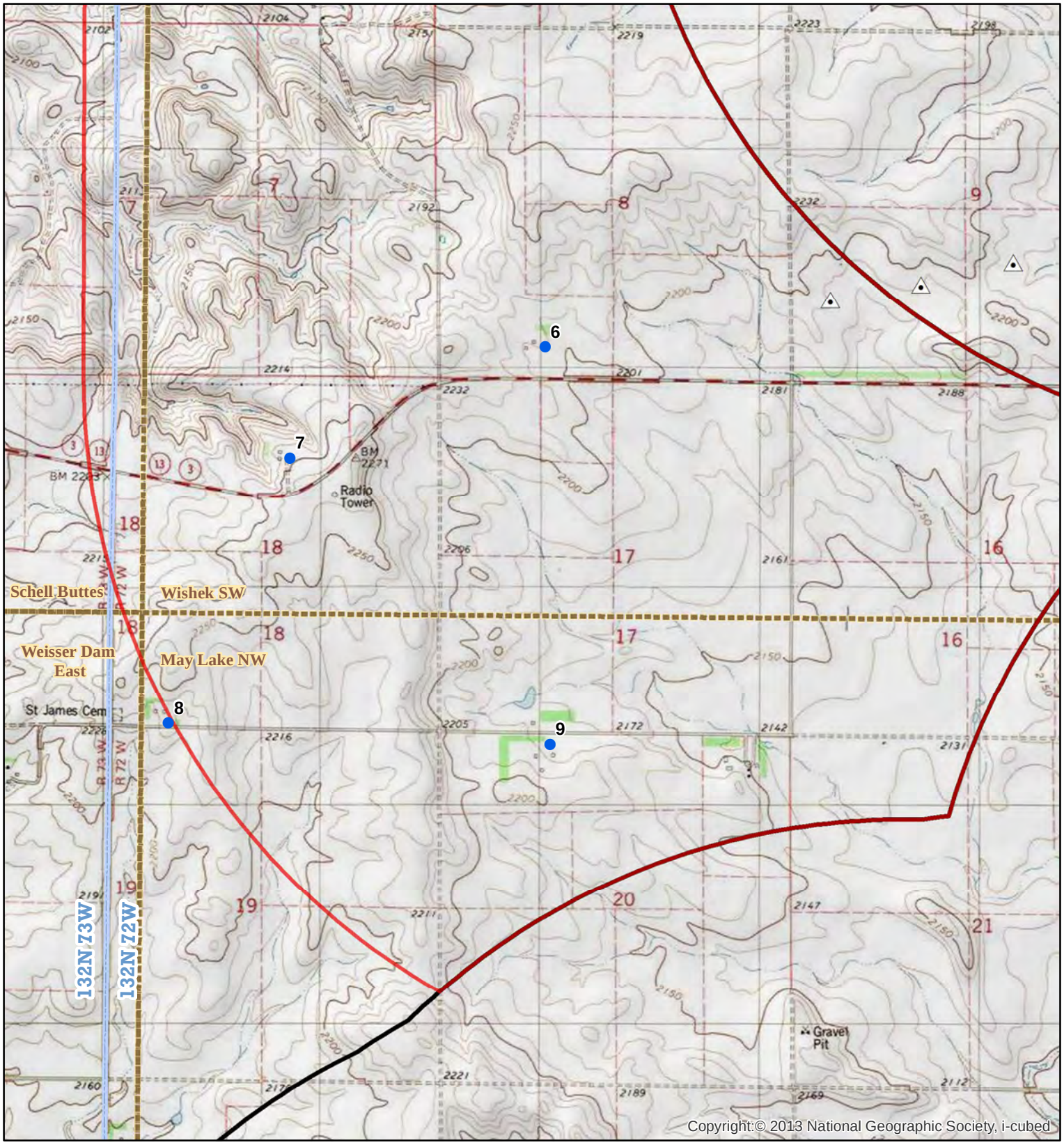

Expanded APE
Original APE
Survey Site
Turbine Location
Township/Range Boundary
Quadrangle Boundary

Badger Wind Project

Figure 2: Survey Site Location Map

Map 1 of 3

0 4,400 Feet

0 1,400 Meters

N

1:24,000

1 inch = 2,000 feet

1 inch = 610 meters

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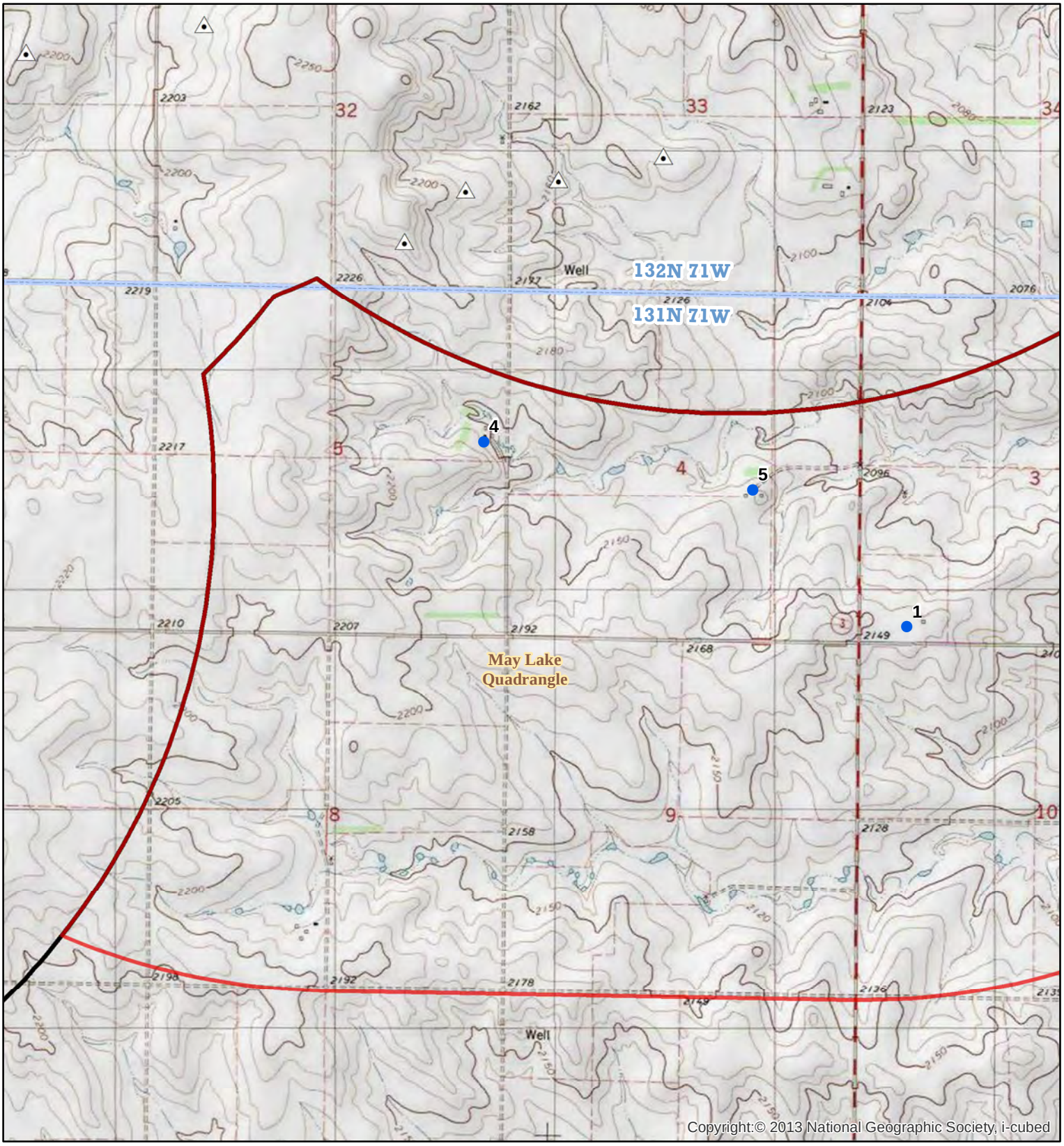

Expanded APE
Original APE
Survey Site
Turbine Location
Township/Range Boundary

Badger Wind Project

Figure 2: Survey Site Location Map

Map 2 of 3

0 4,400 Feet

0 1,400 Meters

N

1:24,000

1 inch = 2,000 feet

1 inch = 610 meters

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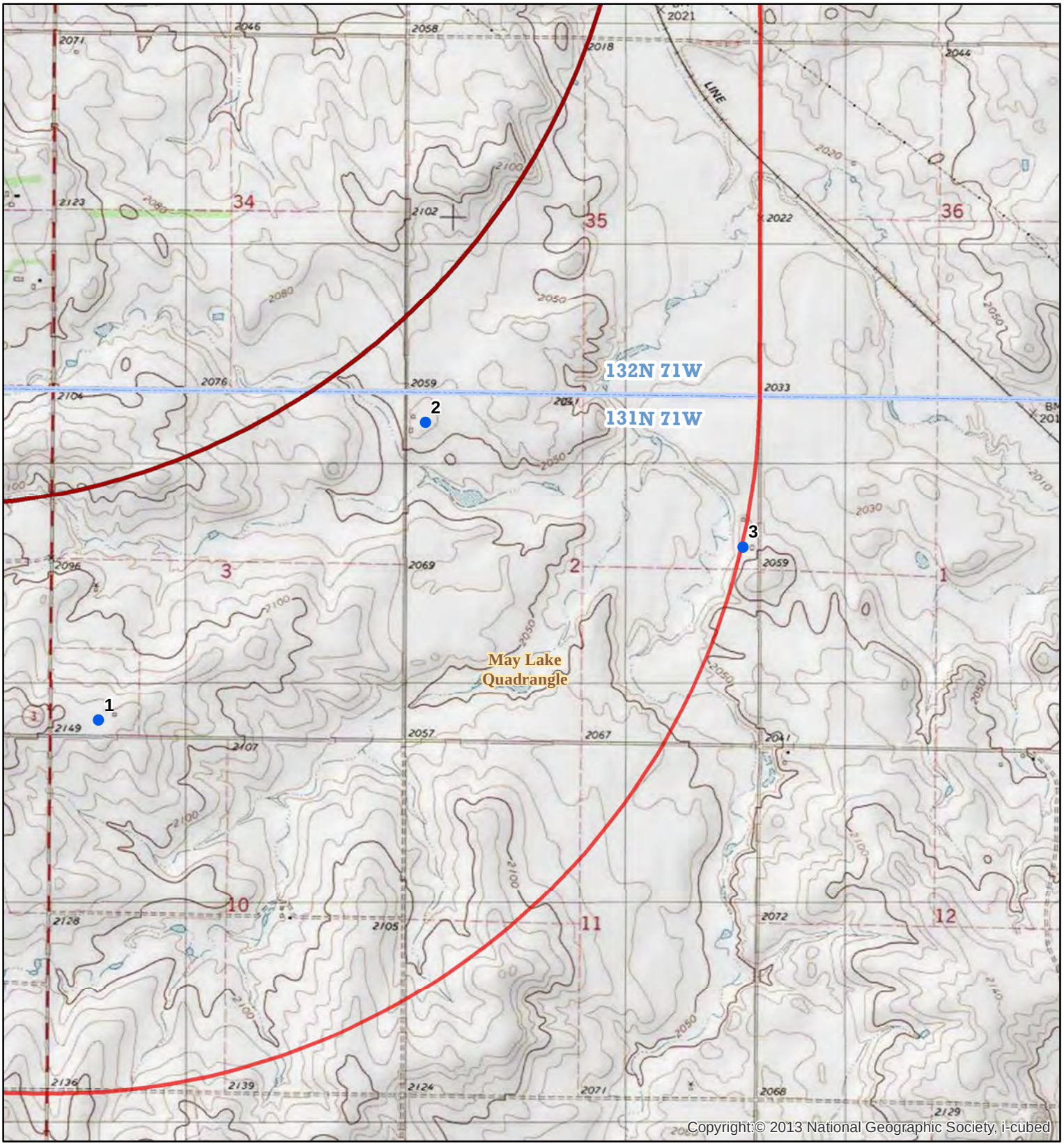

Expanded APE
Original APE
Survey Site
Township/Range Boundary

Badger Wind Project

Figure 2: Survey Site Location Map

Map 3 of 3

0 4,400 Feet
0 1,400 Meters

N

1:24,000
1 inch = 2,000 feet
1 inch = 610 meters

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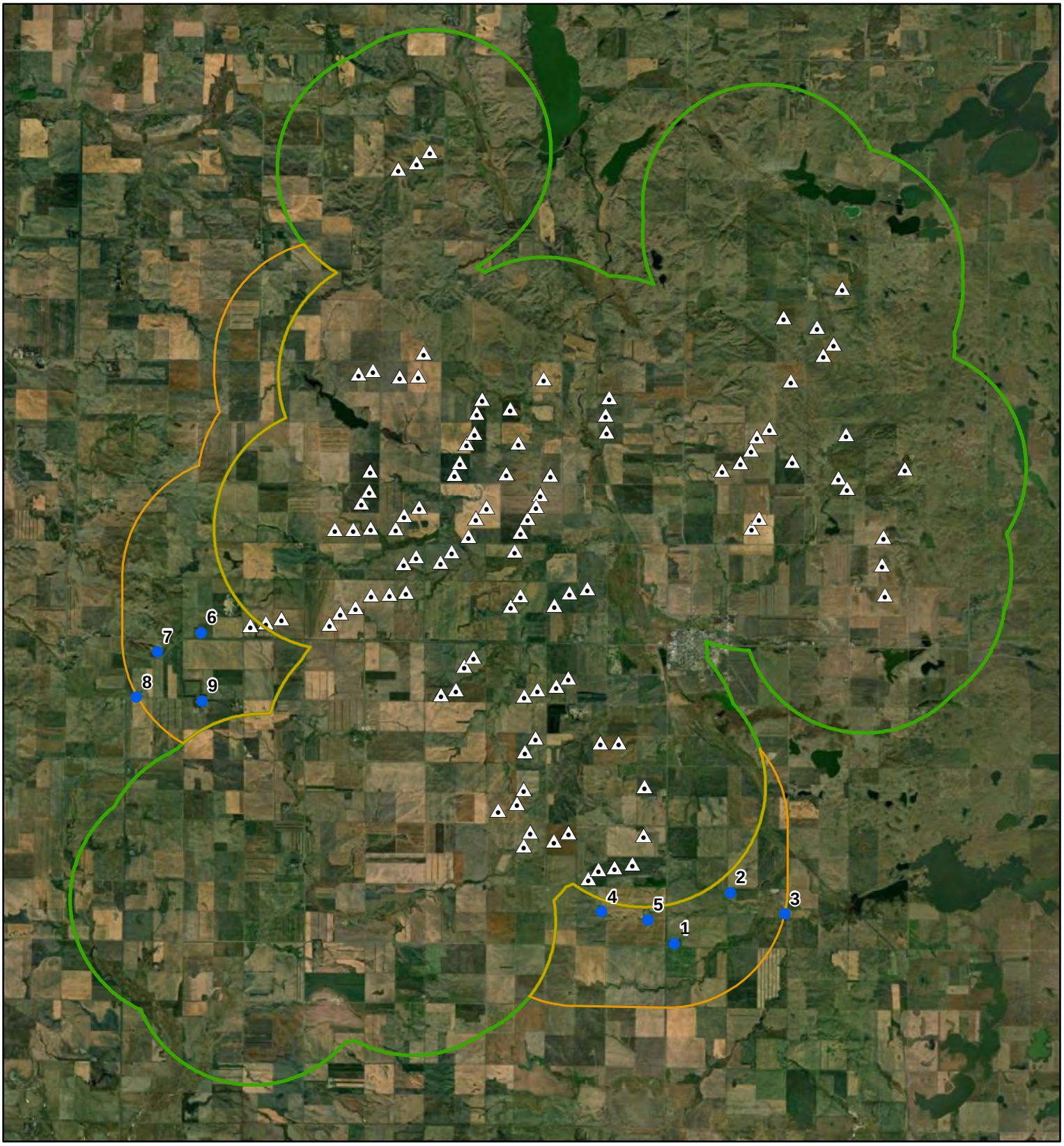

Expanded APE
Original APE
Survey Site
Turbine Location

Badger Wind Project

Figure 3: Project Location Aerial Image Map

0 27,600 Feet
0 8,000 Meters

N

1:140,000
1 inch = 11,667 feet
1 inch = 3,556 meters

cra
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Figure 4. Overview of the project area along 40th Avenue Southeast, looking west.



Figure 5. Overview of the project area along 80th Street Southeast, looking east.



Figure 6. Overview of the project area along 80th Street Southeast, looking northeast.

1916 Atlas of Logan County, North Dakota (George A. Ogle & Company 1916). Residences and parcels are depicted within each township on this map and include landowner names. The map includes rural county roads, mapped school houses, and major geographic features, such as Beaver Lake.

1960 Atlas of McIntosh County, North Dakota (Northwest Atlas Company 1960). This map depicts parcel boundaries, landowner names, county and state roads, railroads, schools, cemeteries, and churches. However, residences are not mapped for individual parcels.

1967 Atlas of Logan County, North Dakota (Directory Service Company 1967). Residences with accompanying landowner names, as well as cemeteries, railroads, and geographic landforms are depicted within each township alongside county roads. The Soo Rail Line is depicted along the west side of the town of Burnstad.

1982 USGS May Lake NW, North Dakota, 7.5-minute series topographic quadrangle (USGS 1982a); 1982 USGS Wishek SW, North Dakota, 7.5-minute series topographic quadrangle (USGS 1982b). These topographic quadrangle maps depict an undulating prairie landscape interspersed with ephemeral drainages, creeks, ponds, and lakes. Residences and outbuildings are depicted as being scattered throughout the area and reflect the rural agricultural industry that has dominated the area of interest. The number of outbuildings have diminished in some areas or homes have disappeared. New residences are depicted as well.

IV. HISTORIC CONTEXT

Logan County

Organized on September 1, 1884, Logan County, North Dakota, is located in the south-central portion of the state. Counties bordering Logan County include Kidder and Stutsman to the north, Lamoure to the east, McIntosh to the south, and Emmons to the west. The county was named in honor of General John Alexander Logan, who served the United States during the Mexican-American War and the Civil War. Logan County includes ten separate townships: Bryant, Dixon, Finn, Glendale, Gutschmidt, Hagg, Janke, Red Lake, Sealy, and Starkey.

Comprised largely of rural, family owned, farmsteads measuring on average 1,298 acres, Logan County relies heavily on the agriculture industry supplemented with livestock and poultry. “It has been said that some of the best ranching and farming land in the entire state of North Dakota is located 100 miles southeast of Bismarck in an area near Beaver Lake” (Gavett 2009:115).

The same year the county was founded, 1884, Napoleon was chosen as the county seat. The town was named in honor of Napoleon Goodsill, a lumber merchant from Bedford, Iowa. In 1886, a group of settlers, known as The Pennsylvania Colony, settled in Logan County near Beaver Lake. Like others before them, the settlers of the Pennsylvania Colony moved to the high plains of North Dakota hoping to homestead on government land. However, the winter of 1886–1887 proved to be one of the most severe on record. Local Native American groups called it the “Plenty Snow Winter.” What followed was a sequence of relentless blizzards that inundated the prairie with more than five feet of snow, driving winds, and subzero temperatures. Man and animal alike suffered at the fury of Mother Nature. By Spring 1887, only a single member of the Pennsylvania Colony remained (Gavett 2009:121). Among the many settlers of Logan County were numerous Ukrainian-Russian migrants that had strong German roots.

Logan County’s first school was built in Napoleon in 1886, and was a two-room, frame structure. By 1894 the county had grown to include 8 schools (Gavett 2009: 122 and 123). On September 20, 1898, the Soo Rail Line arrived at Napoleon. The arrival of the rail line helped stimulate growth for the local economy. By 1906, Napoleon had grown to include “two lumber yards, a grain elevator, three stores, a bank, a new court house, a church, a doctor, a druggist…, a creamery, billiard hall, and a barber shop” (Gavett 2009:125). The railroad only beat the automobile by eleven years, and in 1909 Napoleon witnessed the construction of a Buick dealership that was followed in 1913 by a Krit dealership. The first radio appeared in Napoleon in 1922.

Logan County continued to grow throughout the twentieth century. The area was heavily impacted by the Great Depression and received aid through the WPA for the construction of Beaver Lake State Park. Following the Depression, Logan County answered the country’s call to arms, and in total lost 22 servicemen during World War II. Today, Logan County continues to be a largely rural area that relies heavily on the agriculture industry.

McIntosh County

Established on October 4, 1884, from lands removed from Logan County, McIntosh County is bordered to its north by Logan County, to the east by Dickey County, and to the west by Emmons County. The county’s southern boundary is formed by the North Dakota state line. Following the county’s formation, the town of Hoskins was the only thing resembling a town within its limits, and was therefore chosen to serve as the county seat (Gavett 2009:151). Following the arrival of the Soo Rail Line, and its bypassing of Hoskins in 1887, John Henry Wishek, with the help of others, set about platting the town of Ashley along the lines’ projected route. Due to the railroads growing influence on

the development of McIntosh County, the county seat was relocated to Ashley. During McIntosh County's early days, John H. Wishek played a key role in the platting of Ashley, Wishek, Danzig, Venturia, Artas, and Pollock. "Undeniably, it was through his efforts that the Soo Line Railroad laid its tracks into McIntosh County" (Gavett 2009:151). Originally settled by Americans from the eastern states of Ohio and Michigan, McIntosh County became a destination for German-Russian immigrants hoping to homestead on government land (mcintoshnd.com 2021). Largely comprised of rural family-owned farmsteads, McIntosh County continues to be a largely rural county that supports the area's agricultural industry. "Although livestock and poultry remain an important part of the typical farm, the mainstay continues to be wheat, corn, and barley" (Gavett 2009:153).

V. SURVEY METHODOLOGY

The survey was conducted in accordance with the "Archaeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines" (National Park Service [NPS] 1983). In addition, guidelines offered in the following documents were followed: *National Register Bulletin #24 Guidelines for Local Surveys: A Basis for Preservation Planning* (NPS 1985); and *North Dakota SHPO Guidelines Manual for Cultural Resource Inventory Projects: Revised Edition* (State Historical Society of North Dakota 2020).

Following the completion of Class I literature search, CRA architectural historians completed a Class II reconnaissance inventory of the APE, during which all architectural resources that were 45 years of age or older were documented. Topographic maps and aerial photographs depicting the project APE were referenced to get an initial count and understanding of the locations of architecturally significant resources within the APE.

CRA architectural historians then visited the project APE, field-checked the location and character of all standing structures within the APE and documented all aboveground resources 45 years of age or older. The location of each property was marked on a map and a pin was placed on the property using Google Earth Pro. Each resource was then photographed and described.

In addition to documenting individual properties, CRA also considered the potential for historic districts (including rural historic districts) within the APE. After evaluating the results of the fieldwork, there appears to be no potentially NRHP-eligible districts within the APE of the expansion areas. The APE is comprised primarily of undulating upland prairie defined by cultivated agricultural fields and residential development. The majority of the historic building stock dates to the late nineteenth or early to mid-twentieth century but does not represent a cohesive collection of architectural types or styles. Moreover, the development within the APE reflects that of other rural areas throughout North Dakota.

In total, nine historic architectural resources (Survey Sites 1–9) were documented within the APE. Of these resources, none had been previously surveyed. Sites 1–9 were assessed individually to determine their potential for listing in the NRHP.

In previous consultation with the ND SHPO for the original Badger Wind Project survey in 2021-2022, only those resources that appear to be potentially significant would be documented in detail within the text of the report. Also, the descriptions and evaluations for those resources recommended ineligible for the NRHP would be placed in an Appendix A of the report and include a representative photograph, field survey number, estimated date of construction, resource name, physical address, North Dakota inventory number if previously assigned, style, and brief NRHP assessment. Additional photos of the architectural resources documented during the Class II reconnaissance inventory can be found in Appendix B.

In general, in order for a property to be eligible for listing in the NRHP, it must be at least 50 years old and possess both historic significance and integrity. Significance may be found in four aspects of

American history recognized by the NRHP Criteria: A) association with historic events or activities; B) association with important persons; C) distinctive design or physical characteristics; or D) potential to yield significant information.

NRHP eligibility under Criterion D, which is typically used to assess archaeological sites, was not applied to architectural resources for this project. A resource must meet at least one of these criteria to be eligible for listing in the NRHP. Integrity must also be evident through historic qualities including location, design, setting, materials, workmanship, feeling, and association.

VI. INVENTORY OF HISTORIC RESOURCES

All historic architectural resources (at least 45 years old) within the APE for the expansion areas were documented. Information obtained from the McIntosh County Property Valuation Administration (PVA) office, historic maps, and architectural analysis was used to establish an approximate date of construction for each resource. CRA personnel did not have access to the interior of surveyed resources, unless otherwise noted. No resources appeared to be potentially significant. Resources identified during the survey and not recommended as eligible for listing in the NRHP are summarized in Table 1 found in Appendix A. Table 1 includes a representative photograph, physical address, estimated construction date, inventory number, and brief NRHP assessment for each resource. Additional photographs are included as Appendix B.

VII. CONCLUSIONS

In November and December, 2023, CRA personnel completed a Class I Literature Review and Class II Architectural Reconnaissance Inventory for the expansion of the Badger Wind Project in Logan and McIntosh Counties, North Dakota. The survey was conducted at the request of David De Caro of DNV Energy USA, Inc., on behalf of Badger Wind, LLC.

The purpose of the study was to identify historic architectural resources within the expanded APE for the proposed project and to evaluate each identified resource's eligibility for inclusion in the NRHP. Based on the ND SHPO Guidelines, the APE for wind turbines 400 ft or higher is defined as parcels within the proposed locations of the wind turbines and a two-mile buffer extending outwards from each proposed turbine location.

Prior to initiating fieldwork, personnel initiated a review of records maintained by the ND SHPO, to determine if previously documented architectural resources 45 years of age or older were located in the APE for the proposed project. This review indicated that one aboveground cultural resource has been previously documented within the APE (32MT00038). The review indicated that the previously recorded architectural resource had either not been fully evaluated for listing in the NRHP or was previously determined not eligible for inclusion.

During the field survey, CRA personnel identified a total of nine aboveground resources (Sites 1–9) within the APE, none of which had been previously surveyed. The one cultural resource identified during the records review (32MT00038) was determined to no longer be extant. CRA recommends that Sites 1–9 are not eligible for listing in the NRHP under Criterion A, B, or C. Thus, CRA recommends a finding of No Effect for the proposed areas of the expanded Badger Wind Project.

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APPENDIX A. SURVEYED RESOURCES RECOMMENDED NOT ELIGIBLE

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Table 1. Surveyed Resources Recommended Not Eligible.

	Survey No.	Date	Name	Address	ND Survey #	Style	NRHP Assessment
	1	1925–1952	Farmstead	84th Street SE Wishek, ND 58495	n/a	Residences and agricultural outbuildings	Not eligible. Not an excellent example of a type, period, or method of construction and does not exhibit the works of a master or possess high artistic value. Replacement materials and several additions. The extant agricultural support buildings are a common construction type found throughout North Dakota.
	2	1925–1952	Farmstead	40th Avenue SE Wishek, ND 58495	n/a	Residences and agricultural outbuildings	Not eligible. Not an excellent example of a type, period, or method of construction and does not exhibit the works of a master or possess high artistic value. The extant agricultural support buildings are a common construction type found throughout North Dakota.
	3	1925–1952	Farmstead	41st Avenue SE Wishek, ND 58495	n/a	Residences and agricultural outbuildings	Not eligible. Not an excellent example of a type, period, or method of construction and does not exhibit the works of a master or possess high artistic value. Replacement materials used. The extant agricultural support buildings are a common construction type found throughout North Dakota.

	Survey No.	Date	Name	Address	ND Survey #	Style	NRHP Assessment
	4	1925–1952	Farmstead	38th Avenue SE Wishek, ND 58495	n/a	Residence and agricultural outbuildings	Not eligible. Not an excellent example of a type, period, or method of construction and does not exhibit the works of a master or possess high artistic value. Main residence has been converted into storage. The extant agricultural support buildings are a common construction type found throughout North Dakota.
	5	1952–1975	Farmstead	North Dakota 3 SE Wishek, ND 58495	n/a	Residence and agricultural outbuildings	Not eligible. Not an excellent example of a type, period, or method of construction and does not exhibit the works of a master or possess high artistic value. Replacement materials used. The extant agricultural support buildings are a common construction type found throughout North Dakota.
	6	1925–1952	Farmstead	80th Street SE Wishek, ND 58495	n/a	Residence and agricultural outbuildings	Not Eligible. Not an excellent example of a type, period, or method of construction and does not exhibit the works of a master or possess high artistic value. Residence features replacement materials and several additions. Agricultural outbuildings are common construction types found throughout North Dakota.

	Survey No.	Date	Name	Address	ND Survey #	Style	NRHP Assessment
	7	1952–1975	Farmstead	3055 80th Street SE Wishek, ND 58495	n/a	Residence and agricultural outbuildings	Not Eligible. Not an excellent example of a type, period, or method of construction and does not exhibit the works of a master or possess high artistic value. Residence features replacement materials and several additions. Agricultural outbuildings are common construction types found throughout North Dakota.
	8	1925–1952	Agricultural outbuildings	81st Street SE Wishek, ND 58495	n/a	Barn and agricultural outbuilding	Not Eligible. Due to the demolition of the historic residence, this property no longer has the integrity to convey its significance. Extant agricultural support buildings are a common construction type found throughout North Dakota.
	9	1925–1952	Agricultural outbuildings	81st Street SE Wishek, ND 58495	n/a	Barns and agricultural outbuilding	Not Eligible. Due to the demolition of the historic residence, this property no longer has the integrity to convey its significance. Extant agricultural support buildings are a common construction type found throughout North Dakota.

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APPENDIX B. PHOTOGRAPHS OF SURVEYED RESOURCES RECOMMENDED NOT ELIGIBLE

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Figure B-1. Site 1: Façade (south) and east elevations of residence, facing northwest.



Figure B-2. Site 1: East elevation of residence, east elevation of recently moved building, and windmill, facing northwest.



Figure B-3. Site 1: Modern mobile home, south and east elevations, facing northwest.



Figure B-4. Site 1: Privy, facing north.



Figure B-5. Site 1: Outbuilding, south elevation, facing north.



Figure B-6. Site 1: Garage, south and west elevations, facing north-northeast.



Figure B-7. Site 1: Modern garage, south and east elevations, facing northwest.



Figure B-8. Site 1: Barn No. 1, south elevation, facing north.



Figure B-9. Site 1: Metal building, south and west elevations, facing northeast.



Figure B-10. Site 1: Barn No. 2, south and east elevations, facing northwest.



Figure B-11. Site 1: Grain bin, facing northwest.



Figure B-12. Site 1: Outbuilding, south and west elevations, facing northeast.



Figure B-13. Site 1: Small barn, west and south elevations, facing northeast.



Figure B-14. Site 1: Outbuilding, south elevation, facing north.



Figure B-15. Site 2: North (rear) and west elevations of residence, facing southeast.



Figure B-16. Site 2: Garage, South and west elevations, facing northeast.



Figure B-17. Site 2: Outbuilding, south and west elevations, facing northeast.



Figure B-18. Site 2: Metal outbuilding, south and west elevations, facing northeast.



Figure B-19. Site 2: Animal shelter and outbuilding ruin, south and west elevations, facing northeast.



Figure B-20. Site 3: Façade (south) and east elevations of residence, facing northwest.



Figure B-21. Site 3: Façade (east) and south elevations of second residence, facing northwest.



Figure B-22. Site 3: Metal outbuilding, south and east elevations, facing northwest.



Figure B-23. Site 3: Metal outbuilding, south and east elevations, facing northwest.



Figure B-24. Site 3: Outbuildings, south and east elevations, facing northwest.



Figure B-25. Site 4: Façade (south) and east elevations of residence, facing northwest.



Figure B-26. Site 4: East and north elevations of residence, facing southwest.



Figure B-27. Site 4: Barn, south elevation, facing north.



Figure B-28. Site 4: Quonset hut, south and east elevations and windmill, facing northwest.



Figure B-29. Site 4: Grain bins, facing south.



Figure B-30. Site 5: Façade (east elevation) of the residence, facing west.



Figure B-31. Site 5: Façade (east) and north elevation, facing southwest.



Figure B-32. Site 5: Garage, east elevation, facing west.



Figure B-33. Site 5: Quonset hut, east elevation, facing west.



Figure B-34. Site 5: Metal building, east elevation, facing west.



Figure B-35. Site 5: Outbuilding, east elevation, facing west.



Figure B-36. Site 6: Façade (south) and east elevations of the residence, facing northwest.



Figure B-37. Site 6: Façade (south) and west elevations of the residence, facing northeast.



Figure B-38. Site 6: Outbuilding, south elevation, facing north.



Figure B-39. Site 6: Barn, south and west elevations, facing northeast.



Figure B-40. Site 6: Metal building and grain bins, south and west elevations, facing northeast.



Figure B-41. Site 6: Metal building No. 2, south and west elevations, facing northeast.



Figure B-42. Site 6: Metal building No. 3, south and west elevations, facing northeast.



Figure B-43 Site 7: Façade (south) and west elevations, facing northeast.



Figure B-44. Site 7: Shed, south elevation, facing north.



Figure B-45. Site 7: Grain bins, facing northeast.



Figure B-46. Site 7: Garage, east and south elevations, facing northwest.



Figure B-47. Site 7: Quonset hut, east and south elevations, facing northwest.



Figure B-48. Site 7: Barn, south and east elevations, facing northwest.



Figure B-49. Site 7: Metal building, south and east elevations, facing northwest.



Figure B-50. Site 8: Grain bins and garage, south and east elevations, facing northwest.



Figure B-51. Site 8: Grain bins and outbuilding, south and east elevations, facing northwest.



Figure B-52. Site 8: Modern garage, south and east elevations, facing northwest.



Figure B-53. Site 8: Garage No. 2, west and south elevations, facing northeast.



Figure B-54. Site 8: Animal shelter, south elevation, facing north.



Figure B-55. Site 8: Outbuilding, south and east elevations, facing northwest.



Figure B-56. Site 8: Windmill, facing northwest.



Figure B-57. Site 8: Animal shelter No. 2, south and east elevations, facing northwest.



Figure B-58. Site 9: Grain bins, facing southeast.



Figure B-59. Site 9: Quonset hut, north and east elevations, facing southwest.



Figure B-60. Site 9: Barn No. 1, north and east elevations, facing southwest.



Figure B-61. Site 9: Grain bins, facing southwest.



Figure B-62. Site 9: Barn No. 2, east and north elevations, facing southwest.



Figure B-63. Site 9: Metal building, east and north elevations, facing southwest.



Figure B-64. Site 9: Barn No. 3, east and north elevations, facing west-southwest.

Logs

Log Entry

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Technical	Error Code: 0
Notes	

Return to Logs

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Appendix N
Wetland and Waterbodies Assessment

Badger Wind, LLC
February 2024

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Wetlands and Waterbodies Assessment
Badger Wind Project
Logan and McIntosh Counties, North Dakota

Report



Prepared for:

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January 31, 2024

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REPORT REFERENCE

Chodachek, K. and M. Welsch. 2023. Wetlands and Waterbodies Assessment, Badger Wind Project, Logan and McIntosh Counties, North Dakota. Report. Prepared for Badger Wind, LLC, Chicago, Illinois. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. January 31, 2024.

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ACRONYMS AND ABBREVIATIONS

Atwell	Atwell, LLC
Badger Wind	Badger Wind, LLC
CWA	Clean Water Act
GPS	Global Positioning System
m	meter
MW	megawatt
NHD	National Hydrography Dataset
NWI	National Wetland Inventory
OHWM	Ordinary High Water Mark
PEM	Palustrine Emergent
PFO	Palustrine Forested
PSS	Palustrine Scrub Shrub
Project	Badger Wind Project
USACE	US Army Corps of Engineers
USDA	US Department of Agriculture
USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
WEST.	Western EcoSystems Technology, Inc.
WOTUS	waters of the US

INTRODUCTION

Badger Wind, LLC (Badger Wind) is proposing the Badger Wind Project (Project) in Logan and McIntosh counties, North Dakota. The Project is located approximately two miles (mi) west of Wishek, North Dakota (Figure 1). Previously delineated wetlands and waterbodies within the permitted Project area are included in the Aquatic Resources Delineation Report (Atwell 2022).The objective of the assessment was to identify (desktop review) and delineate (field review) precise boundaries of wetlands (land with presence of hydric soils, hydrology, and hydrophytic vegetation) and waterbodies (any type of perennial, intermittent, or ephemeral waterway or catch basin where water flows, or could flow, or is held), and to assign an informal jurisdictional determination (determination) to delineated features within the 2023 Wetland Survey Area. Due to poor weather and late season conditions, which prevented the full wetland delineation protocol from being adequately performed, wetlands and waterbodies were mapped. This report presents the combined results of the aquatic resources delineation surveys conducted for the Project in 2020, 2021, and 2022 (Atwell 2022) and during 2023 to address changes/updates to the Project since 2022.

SURVEY AREA

The 2023 Wetland Survey Area consisted of newly proposed Project infrastructure or previously surveyed infrastructure that changed locations and their associated survey buffers. The 2023 Wetland Survey Area encompassed approximately 1,819 acres (ac) and lies within the larger Project, which is situated in the Northwestern Glaciated Plains Level III Ecoregion, an ecoregion dominated by mixed-grass prairie (US Environmental Protection Agency 2013). The Project will be sited entirely on private lands. Topography within the Project ranges from relatively flat to rolling hills and elevations range from 2,020 to 2,200 feet (ft). Overall, the Project drains to the southwest and to the north, into South Branch Beaver Creek and Beaver Creek, tributaries to the Missouri River. The Project contains numerous unnamed drainages, a few of which may be intermittent or perennial waterbodies or wetlands (Figures 2 and 3). Primary land uses in the Project include agriculture and livestock grazing.

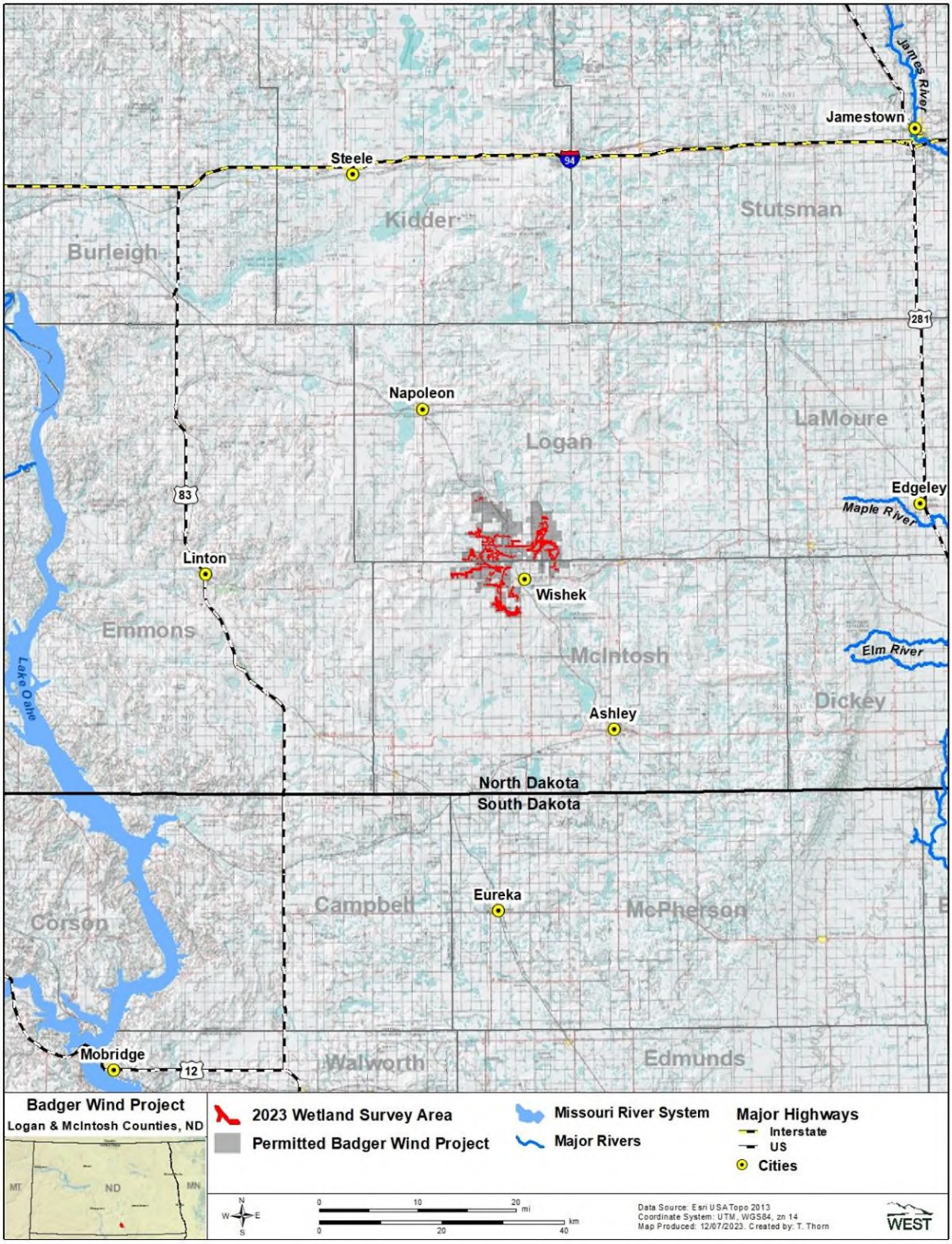

Figure 1. Location of the 2023 Wetland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota.

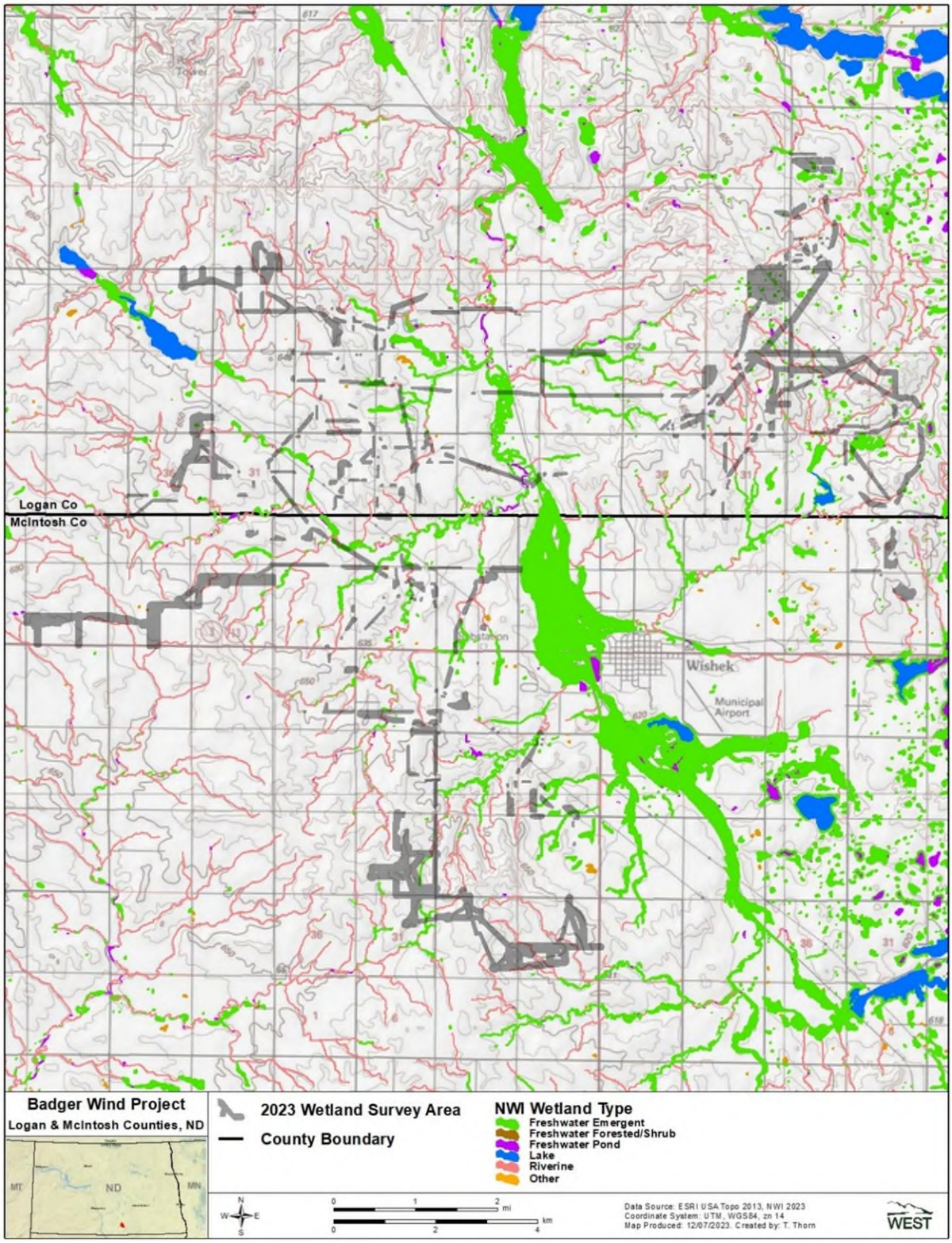

Figure 2. National Wetland Inventory features within the 2023 Wetland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota.

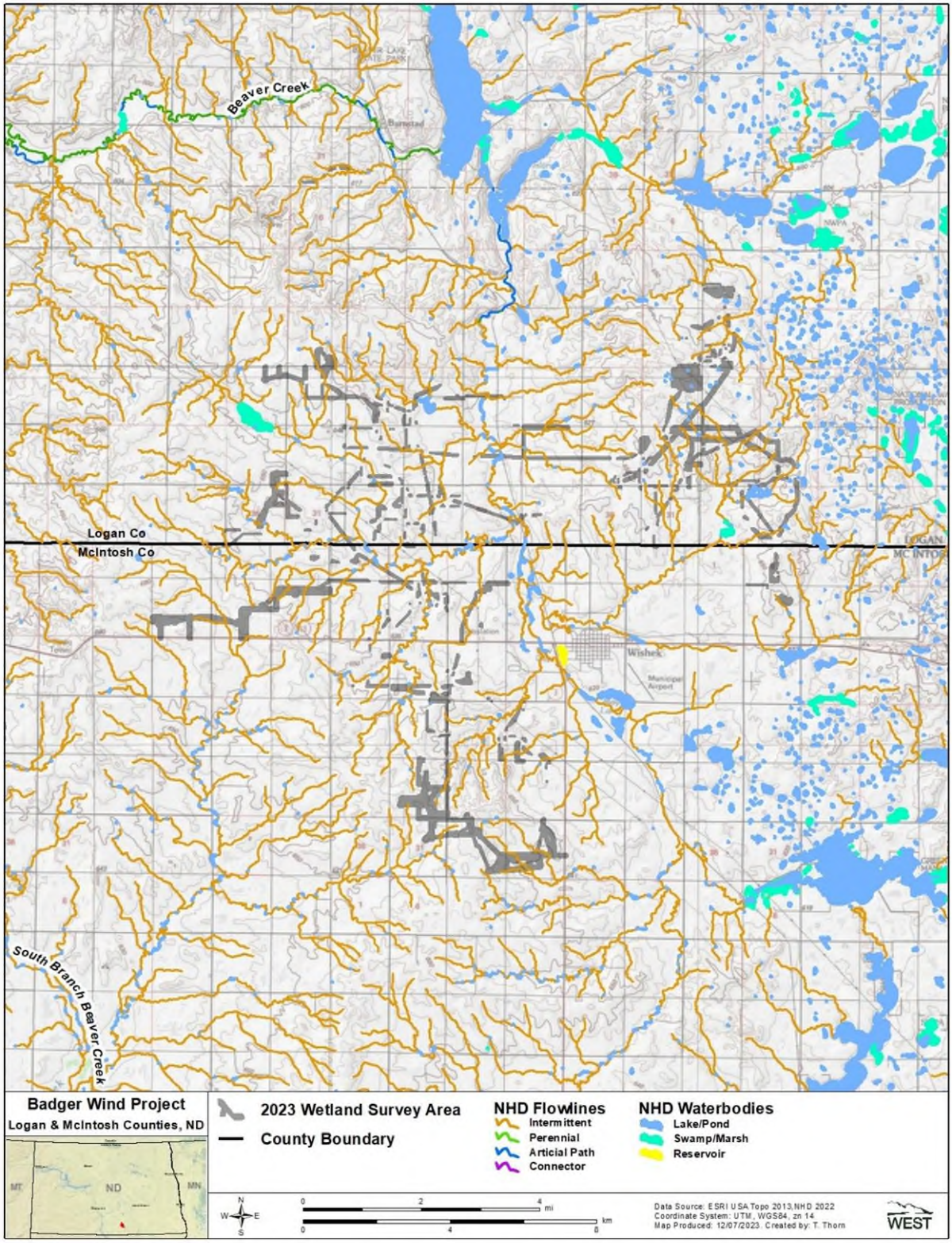

Figure 3. National Hydrologic Dataset features within the 2023 Wetland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota.

REGULATORY BACKGROUND

Waters of the United States

Section 404 of the Clean Water Act (CWA) is the primary federal statute regulating impacts (dredge and fill) to wetlands and waterbodies. Wetlands and waterbodies that are subject to federal jurisdiction under the CWA are referred to as waters of the United States (WOTUS; US Environmental Protection Agency [USEPA] 2023). Under the CWA, it is unlawful to discharge any pollutant from a point source into a WOTUS without a permit.

Waters that have consistently been considered jurisdictional WOTUS by the US Army Corps of Engineers (USACE) include traditional navigable waters (Section 10 waters), interstate waters, territorial seas, and impoundments of these WOTUS. Jurisdictional status of tributaries to these categories of WOTUS and adjacent wetlands continue to be both challenged in courts and clarified by agencies. On August 29, 2023, the US Environmental Protection Agency and USACE jointly released information announcing an Amendment to the definition of Waters of the United States (USEPA 2023). Coordination with the USACE regarding jurisdictional status of wetlands and waterbodies documented in this report will be necessary to evaluate Section 404 permit requirements for the Project.

METHODS

2023 Desktop Assessment

A comprehensive desktop assessment of publicly available wetlands and waterbodies data in the 2023 Wetland Survey Area was completed using United States Department of Agriculture (USDA) National Agriculture Imagery Program (NAIP, NAIP 2021 and 2022), US Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) data (USFWS; 2023), and the US Geological Survey (USGS) National Hydrography Dataset (NHD; USGS NHD 2022). Based on this review, areas identified as potentially being wetlands or WOTUS were targeted for field verification along with the rest of the 2023 Wetland Survey Area.

Using these public data sources, potential wetlands and waterbodies located within the 2023 Wetland Survey Area were identified and mapped in the desktop assessment using Geographic Information Systems (GIS) mapping software. Wetland and waterbody types (i.e. freshwater emergent wetland, freshwater pond, riverine, lake, freshwater forested/shrub wetlands, and rivers and streams) are based on wetland nomenclature used by the USFWS NWI (2023; based on Cowardin et al. 1979) and USGS NHD (2022).

2023 Field Reconnaissance Assessment

The field reconnaissance assessment occurred in two phases. Phase one consisted of wetland delineations and phase two consisted of wetland mapping. Wetland delineations indicated wetland and waterbody type and boundaries based on field observations of hydrophytic

vegetation, hydrology, and presence of hydric soils. Wetland mapping indicated type and boundaries based on field observations of hydrophytic vegetation and hydrology; this phase does not evaluate the presence of hydric soils. The goal of both phases was to identify and confirm the presence or absence and extent of wetlands and waterbodies initially identified during the desktop assessment within the 2023 Wetland Survey Area. Wetlands and waterbodies were mapped in both phases using a tablet with Collector for ArcGIS software (ESRI 2023) coupled with an Arrow Lite global positioning system (GPS) receiver with submeter accuracy. Wetlands and waterbodies observed in the field (i.e., wet or saturated features, hydrophytic vegetation, surface hydrology), but not recorded during the initial desktop assessment, were also mapped.

Proposed infrastructure survey corridors were provided by Badger Wind as a spatial file in October 2023. Project infrastructure and associated buffers located within the 2023 Wetland Survey Area included:

- 250-ft radius centered around turbines
- 300-ft wide corridor for turbine access roads
- 100-ft wide corridor for underground collection lines
- 200-ft wide corridor for aircraft detection and lighting system tower, batch plant, crane walk paths, laydown yard, meteorological tower, operations and maintenance facility, marshaling yard, substation, transmission line, and turning radii locations

Shapefiles depicting the infrastructure and associated buffers were loaded onto the tablet and used in the field to ensure boundaries were accurately identified and included during field surveys. NWI and NHD features were also loaded onto the tablet for accurate field-verification.

Photographs were recorded for wetlands identified within the 2023 Wetland Survey Area. Each delineated/mapped wetland was assigned a unique identification (ID) name consisting of an alphanumeric name in a series, differentiated according to the two observers (e.g. WET001, WET201).

NWI or NHD features that intersected the 2023 Wetland Survey Area but clearly did not meet the definition of a WOTUS were photo documented and a non-WOTUS point was collected on the tablet. Such points were identified with a sequential alphanumeric name differentiated according to the two observers (e.g. 212U, 501U; 701U).

Wetland delineations were conducted on October 24 – 25, 2023 and wetland mapping on October 31, November 1-2, and November 17 and 20, 2023.

Wetland Delineation

Wetlands were delineated in accordance with the 1987 *Corps of Engineers Wetlands Delineation Manual* (US Army Corps of Engineers [USACE] 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains* (Version 2.0; USACE 2010). The 1987 manual outlines a three-parameter approach, which requires presence of hydrophytic plants (dominant vegetative cover), hydric soils, and wetland hydrology. All three parameters must be

present and meet the wetland criteria of each parameter in order for an area to be considered a wetland.

The delineated wetlands were classified according to the classification system outlined in Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1979). Wetland plant indicator status was determined using the most recent version of the National Wetland Plant List (USACE 2020). Paired sample plots (wetland and upland) were established, and USACE regional datasheets were completed for each potential wetland within the 2023 Wetland Survey Area. Wetland sample plots were located in areas that represented the wetland community that was present, utilizing an upland sample plot to characterize the adjoining upland community. A wetland boundary was then established between these points and the boundary was recorded based on the observations made at the paired sample points. Additional sample plots were established in locations where NWI or aerial signatures suggested wetland conditions may be present. Wetlands are typically categorized as one of three common types of wetlands including:

- Palustrine emergent (PEM) wetlands are defined as inland freshwater areas dominated by hydrophytic vascular plants such as rushes, sedges, forbs, and other herbaceous or grass-like plants.

- Palustrine scrub-shrub (PSS) wetlands are defined as inland freshwater areas dominated by woody vegetation less than 20 feet tall, such as buttonbush, alders, and many kinds of saplings.

- Palustrine forested (PFO) wetlands are defined as inland freshwater areas dominated by woody vegetation equal to or over 20 feet tall.

Drainage features (e.g. streams) and other waterbodies (e.g., stock ponds) within the 2023 Wetland Survey Area, including those identified in the NWI and NHD datasets, were examined for inclusion as potential WOTUS. The field assessment was focused on the presence of a definable bed and bank, ordinary high water mark (OHWM), downstream surface connection to a potential WOTUS, evidence of flow, and/or presence of areas that meet the USACE criteria for wetlands. If present, the OHWM of each of these features was recorded with GPS. These features were mapped and documented in a similar manner as wetlands. If detected, each waterbody feature possessing an OHWM would have been assigned its own unique ID, however none were identified during field surveys.

In addition to evaluating the 2023 Wetland Survey Area for features that met wetland and waterbody definitions, the professional judgment of the WEST delineator was used to make an informal determination of jurisdiction. Certain features are jurisdictional based on regulation and do not require further assessments (e.g., territorial seas, traditional navigable waters, interstate waters, and impoundments of these features). As previously noted in the Regulatory Background section, there have recently been both regulatory guidance changes as well as court decisions that are influencing how the USACE determines jurisdiction of wetlands and waterbodies. WEST utilized the best available information from the agencies to make the determinations; however,

the informal jurisdictional determinations in this report are subject to USACE review and final determination.

The WOTUS definition further identifies features that are exempt from jurisdiction, including prior converted croplands, waste treatment systems, ditches (including roadside ditches), artificially irrigated areas, artificial lakes/ponds, artificial reflecting pools, waterfilled depressions, and swales and erosional features.

The delineator assigned a likely, unlikely, or unknown jurisdictional status to the delineated and mapped wetlands and waterbodies based on best professional judgement and experience in the region. Wetland and waterbody determinations included in this report are informal as only the USACE can make a formal jurisdictional determination.

Wetland Mapping

Wetlands were identified based on two parameters: hydrology and wetland vegetation (see above description). The wetland boundary was mapped following wetland/upland vegetation breaks, slope, and other hydrology indicators. A list of plant species observed was recorded in field notes. All other areas not mapped as wetland were considered uplands (i.e., areas containing upland vegetation and lacking hydrological indicators) and recorded as non-wetland ("no") points. An informal jurisdictional determination was not made for mapped resources.

2024 Desktop Assessment

A comprehensive desktop assessment of publicly available wetlands and waterbodies data for areas adjusted for reroutes that were not included in the previous aquatic resources inventory or wetland mapping efforts. The desktop assessment followed methodology as outlined above in the 2023 desktop assessment section. Based on this review, areas identified as potentially being wetlands or WOTUS will be targeted for wetland delineations in spring 2024.

RESULTS

2023 Wetland Delineations

Thirteen wetlands, totaling 11.76 ac, were identified, and delineated during the field reconnaissance (Table 1, Figure 4). Detailed maps of wetland locations are provided in Appendix A. Table 1 provides a summary of wetland classifications and acreages. All the 13 delineated wetlands were classified as Palustrine Emergent (PEM) wetlands. Nine of the wetlands occurred in depressions, two in flat areas, and two along hillslopes. Five of the delineated wetlands appeared to have a downstream connection to WOTUS and were therefore considered potentially or likely jurisdictional. Eight delineated wetlands were apparently isolated and lacked a downstream surface connection to WOTUS and were therefore considered unlikely to be jurisdictional (Table 1). Wetland determination data forms and representative photographs of wetlands are provided in Appendices B and C, respectively.

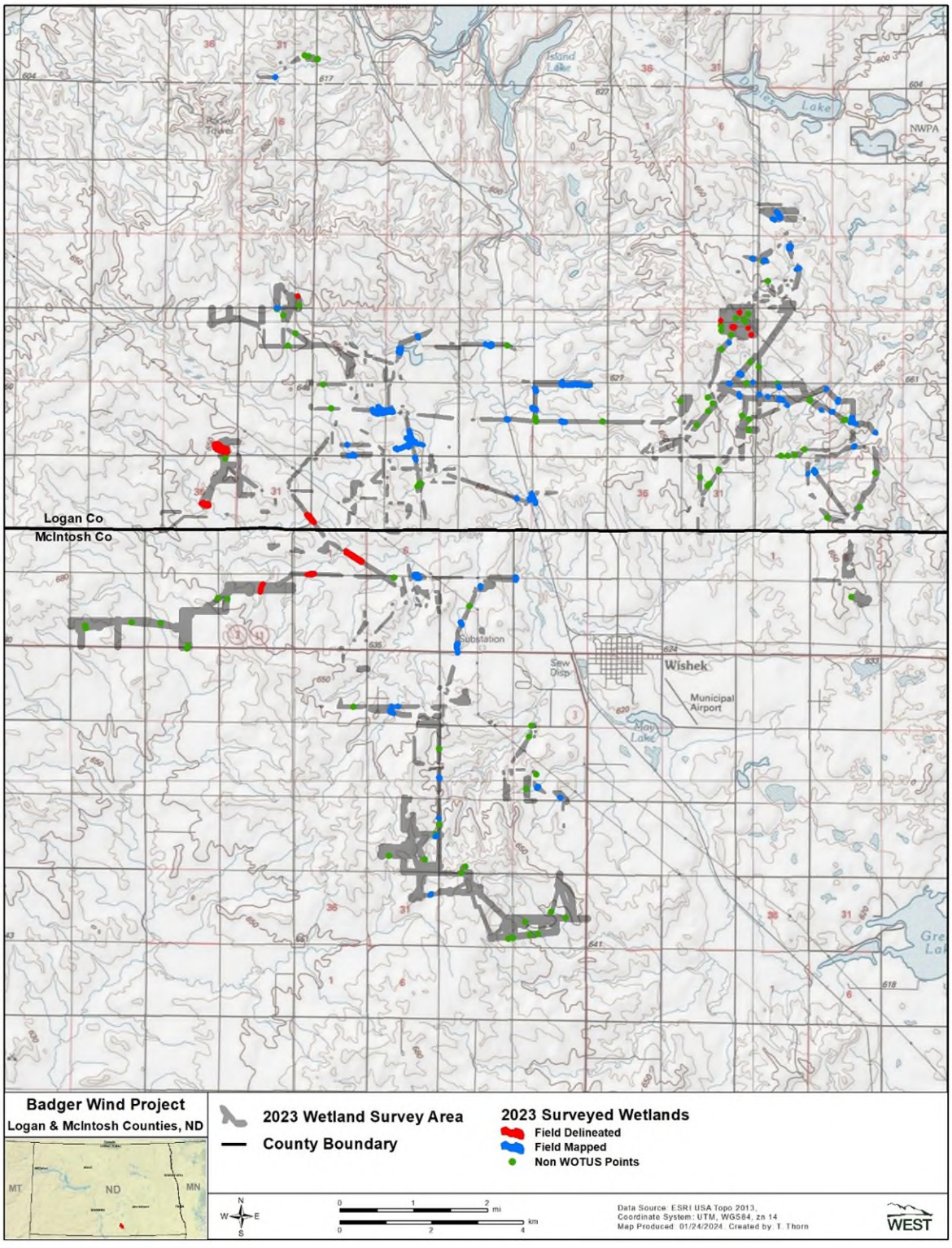

Figure 4. Results of the National Wetland Inventory and National Hydrography Dataset review within the 2023 Wetland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, October 24 – 25 and 31, November 1 – 2, 17, and 20, 2023.

Vegetation

The most common wetland species encountered in the13 delineated wetlands within the 2023 Wetland Survey Area were prairie cordgrass (*Spartina pectinata*), foxtail barley (*Hordeum jubatum*), and cattail (*Typha sp.*).

Hydrology

Hydrology indicators included surface water, high water table, saturation, and inundation visible on aerial imagery. Documented saturation, high water table, and surface water were the primary hydrologic indicators present for wetlands. Other hydrology indicators noted during the field investigation were redox dark surface, algal mat or crust, thin muck surface, salt crust, water-stained leaves, hydrogen sulfide odor, geomorphic position, and FAC-neutral test.

Table 1. Summary of all field delineated wetlands within the 2023 Wetland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, October 24 – 25, 2023.[1]

Feature ID	Acres	Cowardin Classification[2]	Latitude/Longitude[3]	Landform	Informal Jurisdictional Determination[4]
WET001	0.12	PEM	46.321769/-99.520417	Depression	Unlikely
WET003	0.02	PEM	46.323157/-99.521396	Depression	Unlikely
WET004	0.05	PEM	46.326259/-99.523731	Depression	Unlikely
WET005	0.42	PEM	46.323369/-99.525442	Depression	Unlikely
WET006	0.03	PEM	46.324534/-99.529152	Flat fence line	Unlikely
WET007	0.05	PEM	46.328772/-99.648972	Depression	Unlikely
WET008	4.36	PEM	46.297969/-99.668968	Flat	Unlikely
WET009	0.72	PEM	46.287986/-99.675265	Depression	Likely
WET010a	0.65	PEM	46.285454/-99.645177	Depression	Likely
WET010b	0.54	PEM	46.285454/-99.645177	Depression	Likely
WET011	3.65	PEM	46.276730/-99.630194	Hillslope	Likely
WET012	0.78	PEM	46.274184/-99.644255	Hillslope	Likely
WET013	0.37	PEM	46.272032/-99.658492	Depression	Unlikely

[1] Wetlands delineated in 2021 and 2022 are present in Flaig (2021) and Atwell (2022) reports.
[2] PEM = Palustrine emergent wetland
[3] Location from wetland sample plot
[4] Determination based on WEST's professional judgement and subject to change based on USACE review

Soils

Soil colors were predominantly dark (e.g., 10 YR 2/1 and 3/1) and included iron concentrations. The primary field hydric soil indicator used was, redox dark surface. The majority of the soil was clay loams and clay.

Wetland Mapping

Wetlands

Sixty-seven wetlands, totaling 21.93 ac, were identified and mapped during the field assessment (Table 2, Figure 4). Detailed maps of wetland locations are provided in Appendix A. All 67 wetlands were classified as PEM wetlands based on observed vegetation. Landform type was not assessed for mapped wetlands, but generally appeared similar to that of the delineated wetlands. Common wetland species recorded for each mapped wetland were similar to those for delineated wetlands. Hydric soils were not assessed. Photographs of representative wetlands are provided in Appendix C.

Non-wetland Points

Eighty-six NWI/NHD features identified during the desktop assessment as wetlands were evaluated within the 2023 Wetland Survey Area and determined to lack characteristics of WOTUS (Appendix D). These locations were recorded with the tablet with Collector for ArcGIS software coupled with an Arrow Lite GPS as “non-WOTUS” (“no”) points and were photo documented. Fourteen no points were recorded during the wetland delineation field effort (503U – 516U). Specifically, these drainages lacked an OHWM and were composed of upland vegetation. Seventy-two no points were recorded during the wetland mapping field effort, indicating these locations lacked wetland vegetation and hydrology (212U, 517U – 539U, 541U – 554U, 640U, 700U – 711U, 2000U – 2019U, and 5201U). Detailed maps of non-WOTUS points are provided in Appendix A and representative photographs are provided in Appendix C.

Table 2. Summary of all mapped wetlands within the 2023 Wetland Survey Area of the Badger Wind Project in Logan and McIntosh Counties, North Dakota, November 1 – 2, November 17, and November 20, 2023.

Feature ID	Acres	Cowardin Classification[1]
WET014	0.06	PEM
WET015	0.11	PEM
WET016	0.44	PEM
WET017	0.15	PEM
WET018	0.29	PEM
WET019	0.42	PEM
WET020	0.17	PEM
WET021	0.12	PEM
WET023	0.12	PEM
WET024	0.18	PEM
WET025	0.30	PEM
WET027a	0.03	PEM
WET027b	0.35	PEM
WET028	0.17	PEM
WET029	1.43	PEM

Table 2. Summary of all mapped wetlands within the 2023 Wetland Survey Area of the Badger Wind Project in Logan and McIntosh Counties, North Dakota, November 1 – 2, November 17, and November 20, 2023.

Feature ID	Acres	Cowardin Classification[1]
WET030	0.01	PEM
WET031	0.13	PEM
WET032	0.15	PEM
WET098	2.39	PEM
WET099	0.13	PEM
WET200	0.64	PEM
WET201	0.23	PEM
WET202	0.02	PEM
WET203	0.08	PEM
WET204	0.06	PEM
WET205	0.42	PEM
WET206	0.06	PEM
WET207	0.04	PEM
WET208	0.15	PEM
WET209	0.15	PEM
WET210	0.42	PEM
WET211	0.08	PEM
WET212	2.91	PEM
WET213	0.13	PEM
WET214	0.21	PEM
WET215	0.26	PEM
WET216	0.26	PEM
WET217	0.69	PEM
WET219	0.25	PEM
WET220	0.11	PEM
WET221	0.26	PEM
WET224	0.09	PEM
WET225	0.59	PEM
WET226	0.13	PEM
WET228	0.47	PEM
WET229	0.14	PEM
WET234	1.42	PEM
WET236	0.81	PEM
WET237	0.13	PEM
WET238	0.09	PEM
WET239	0.07	PEM
WET241	0.06	PEM
WET340	0.39	PEM
WET1002	0.22	PEM
WET1003	0.05	PEM
WET1004	0.01	PEM
WET1005	0.01	PEM
WET1006	0.08	PEM
WET1007	0.00	PEM
WET1008	0.01	PEM
WET1009	1.08	PEM
WET1013	0.70	PEM
WET1014	0.27	PEM
WET1015	0.07	PEM
WET1016	0.12	PEM
WET1017	0.31	PEM

Table 2. Summary of all mapped wetlands within the 2023 Wetland Survey Area of the Badger Wind Project in Logan and McIntosh Counties, North Dakota, November 1 – 2, November 17, and November 20, 2023.

Feature ID	Acres	Cowardin Classification[1]
WET1018	0.03	PEM

[1] PEM = Palustrine emergent wetland

2024 Desktop Assessment

A total of three potential wetlands totaling 0.24 ac were identified for the re-routed survey area (Figure 5).

CONCLUSION

Aquatic resources delineations and wetland mapping were completed in the months of September 2020, October 2020, September 2021, May 2022, October 2023, and November 2023 and a desktop assessment was completed January 2024 for re-routed infrastructure. Further details regarding surveys conducted pre-2023 can be found in the Aquatic Resources Delineation Report (Atwell 2022). A combined total of 193 wetlands were identified through field delineation, comprising 185.11 ac and 64 additional wetlands were mapped, totaling 30.5 ac during surveys (Figure 5). Four waterbody features were delineated, comprising 0.78 ac and seven watercourses were identified, comprising a cumulative total of 5.18 ac. A total of three potential wetlands as identified by the desktop review totaling 0.24 ac were identified for the re-routed survey area (Figure 5).

Areas identified as potentially being wetlands or WOTUS in the 2024 desktop assessment and mapped wetlands from the 2023 field reconnaissance will be targeted for wetland delineations in spring 2024. Informal jurisdictional determinations provided in this report must be verified and/or finalized with USACE. Project activities that impact WOTUS must be authorized by USACE prior to activities occurring.

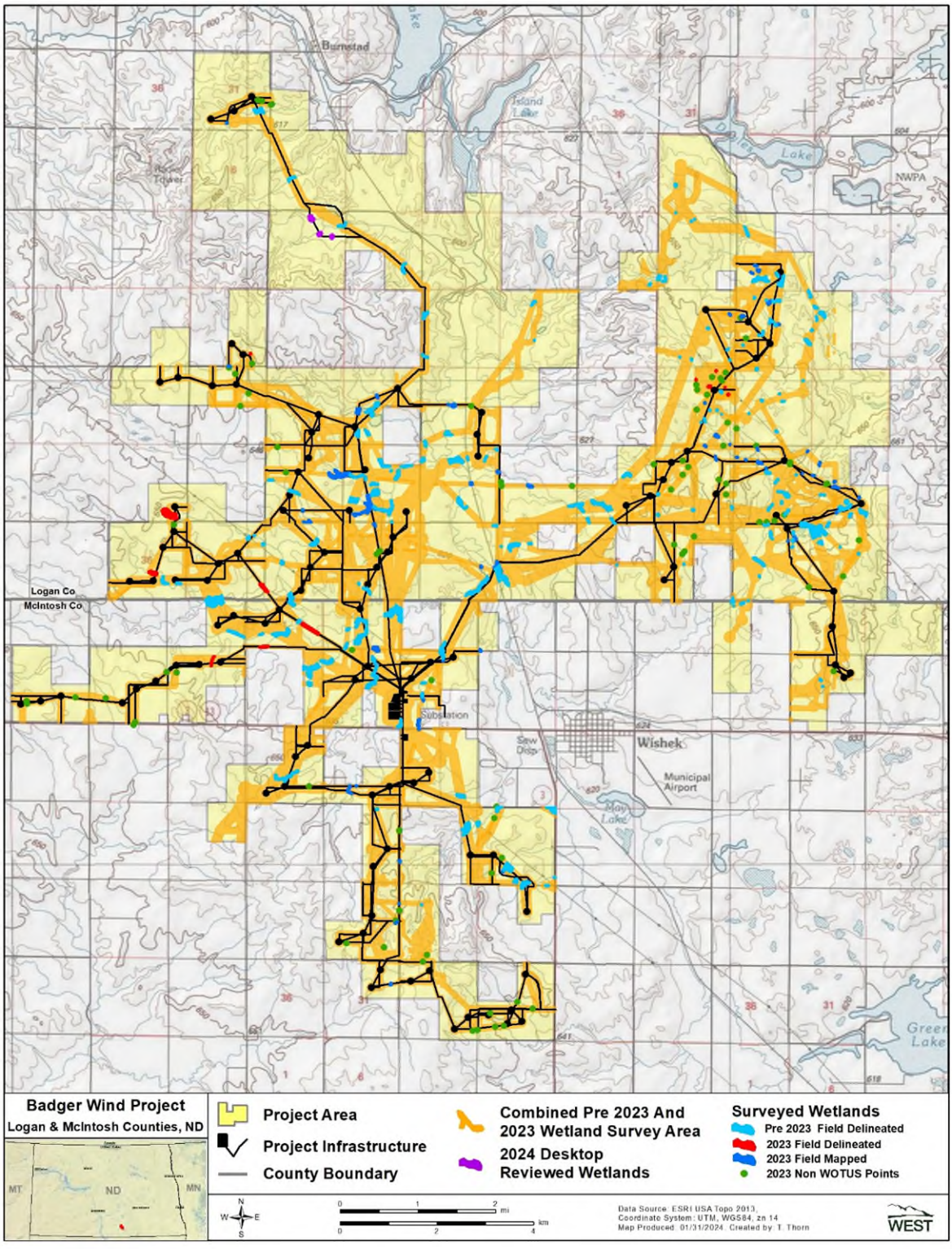

Figure 5. Wetland survey results for field surveys conducted in 2020, 2021, 2022, and 2023, and 2024 desktop review at the Badger Wind Project in Logan and McIntosh counties, North Dakota.

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Appendix A. Field Delineated and Mapped Wetland Locations within the 2023 Wetland Survey Area of the Badger Wind Project in Logan and McIntosh Counties, North Dakota

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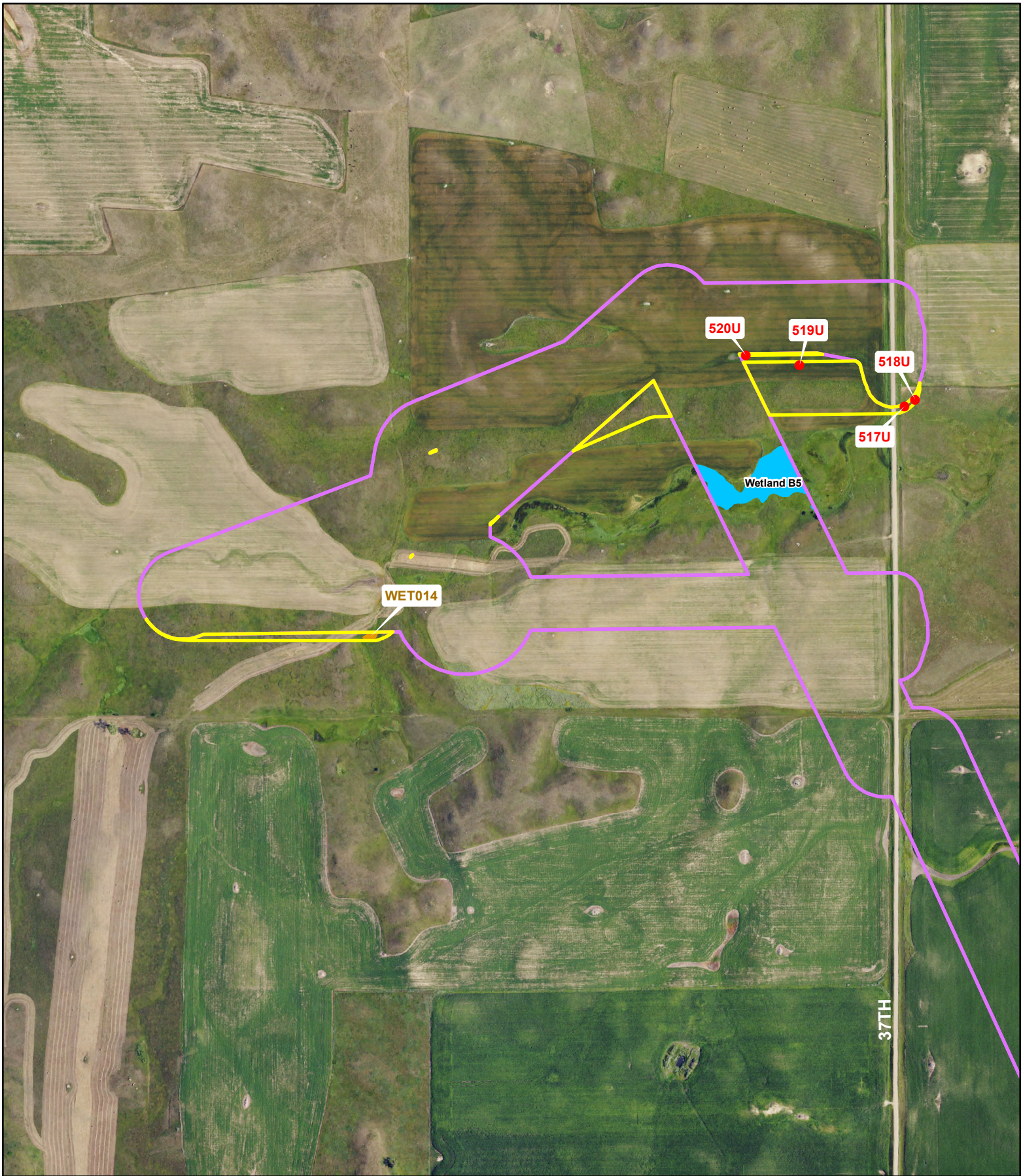
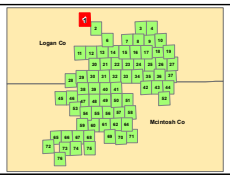


Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

Pre 2023 Wetland Survey Area

County Boundary

State Highway

2023 Surveyed Wetlands

Field Delineated

Field Mapped

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Surveyed Wetlands

Field Delineated

N W E S

0 0.1 0.2 mi

0 0.2 0.4 km

Data Source: NAIP 2023
Coordinate System: UTM, WGS84, zn 14
Map Produced: 01/25/2024. Created by: T. Thorn

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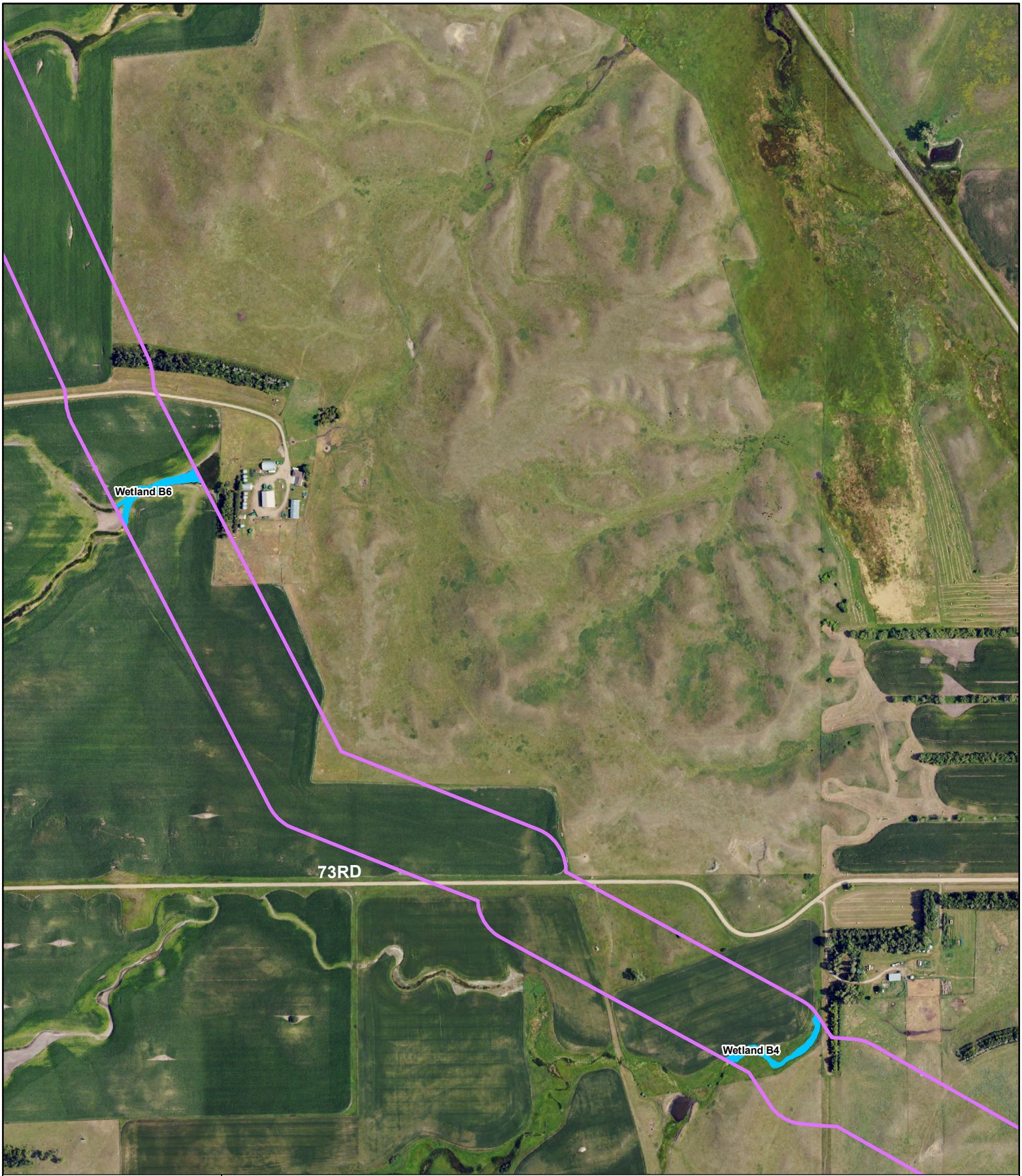
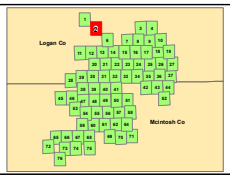


Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

Pre 2023 Wetland Survey Area

County Boundary

State Highway

2023 Surveyed Wetlands

Field Delineated

Field Mapped

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Surveyed Wetlands

Field Delineated

N W E S

0 0.1 0.2 mi

0 0.2 0.4 km

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Map Produced: 01/25/2024. Created by: T. Thorn

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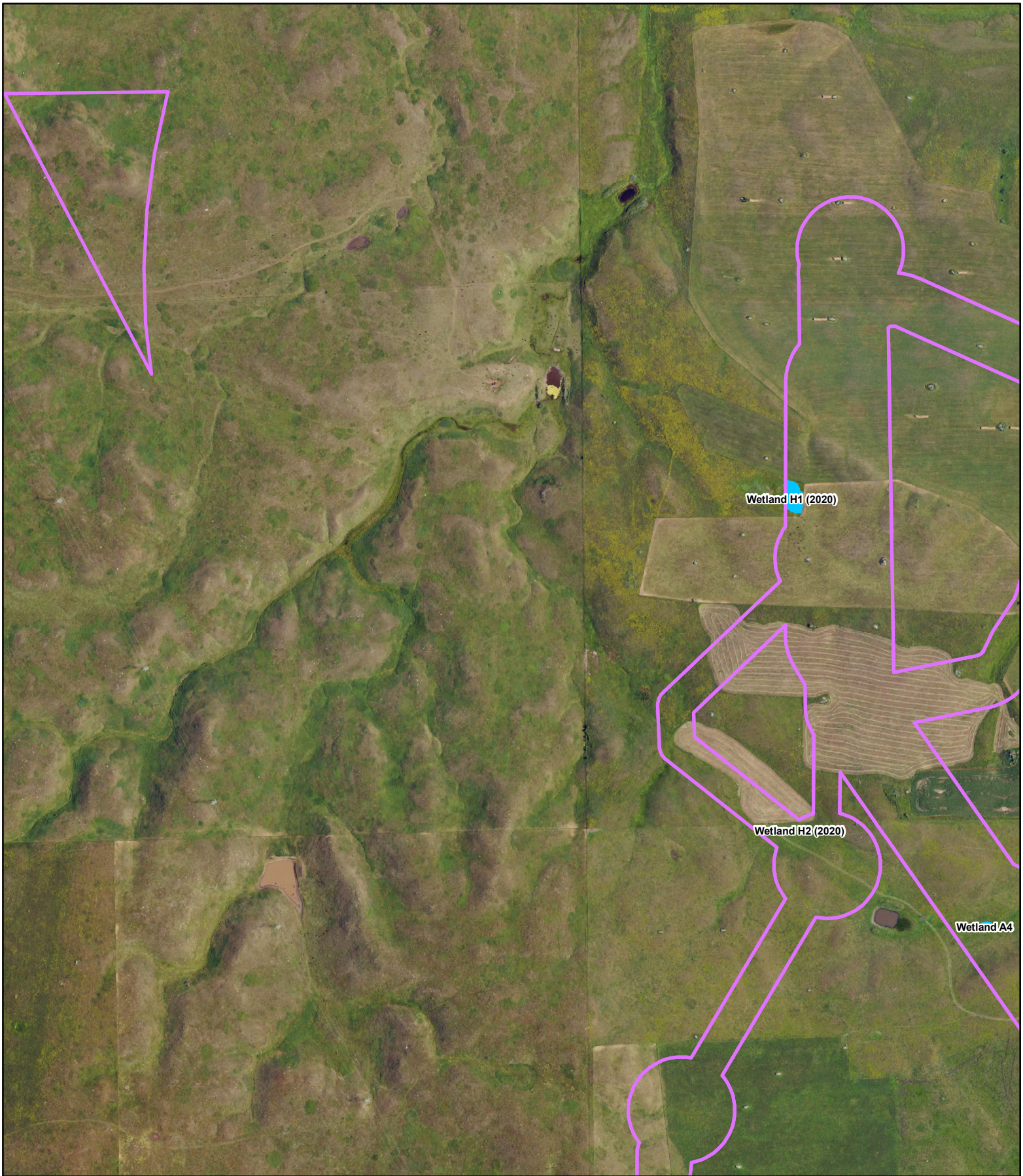
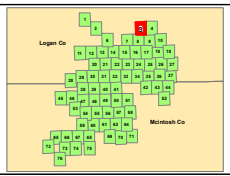


Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

Pre 2023 Wetland Survey Area

County Boundary

State Highway

2023 Surveyed Wetlands

Field Delineated

Field Mapped

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Surveyed Wetlands

Field Delineated

N W E S

0 0.1 0.2 mi

0 0.2 0.4 km

Data Source: NAIP 2023
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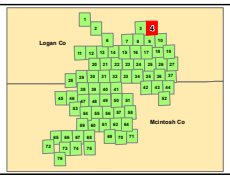
Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

Pre 2023 Wetland Survey Area

County Boundary

State Highway

2023 Surveyed Wetlands

Field Delineated

Field Mapped

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Surveyed Wetlands

Field Delineated

N W E S

0 0.1 0.2 mi

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Data Source: NAIP 2023
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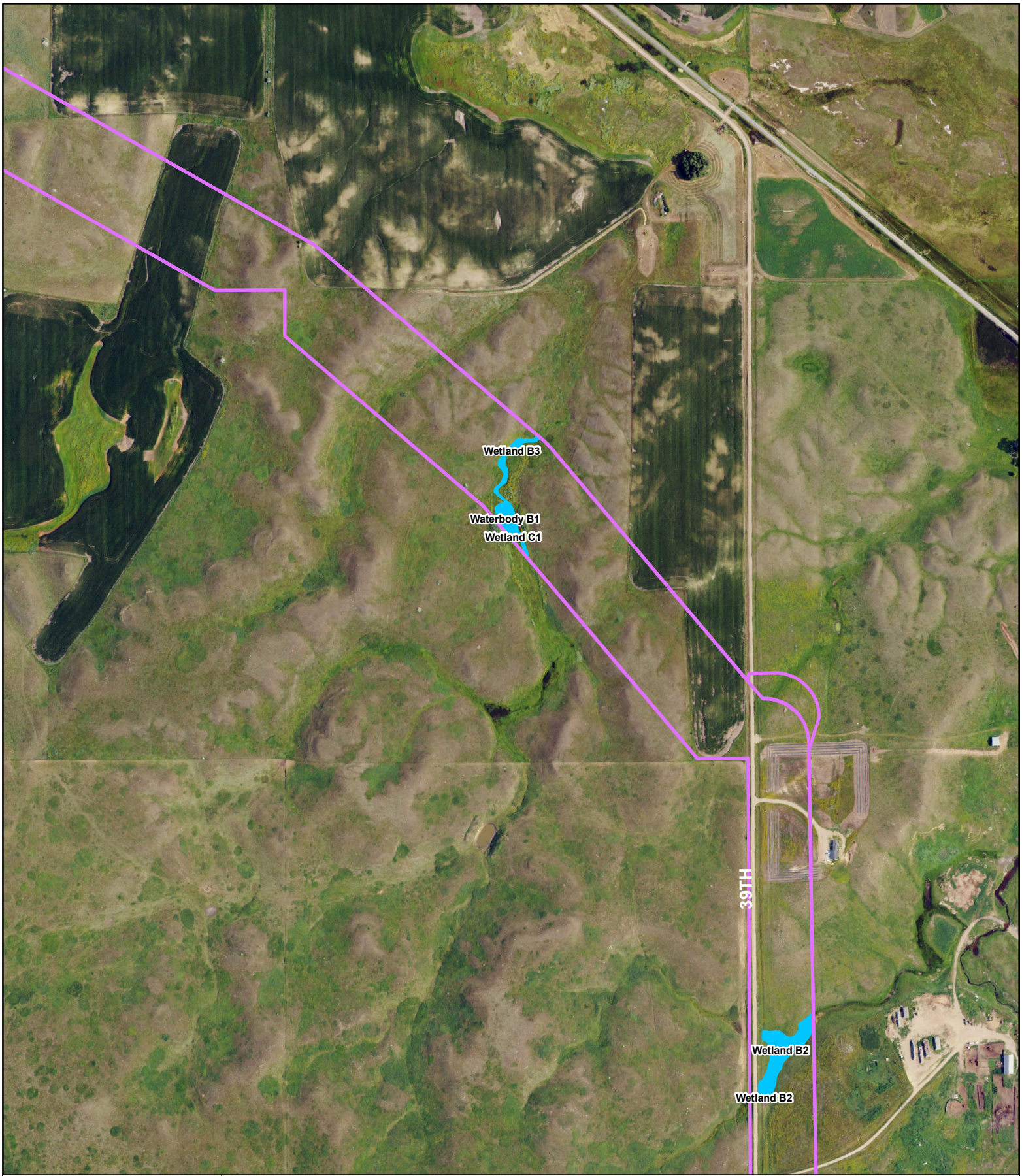
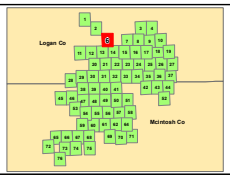


Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

2023 Surveyed Wetlands

Field Delineated Field Mapped

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Wetland Survey Area

Pre 2023 Surveyed Wetlands

Field Delineated

County Boundary

State Highway

N W E S

0 0.1 0.2 mi

0 0.2 0.4 km

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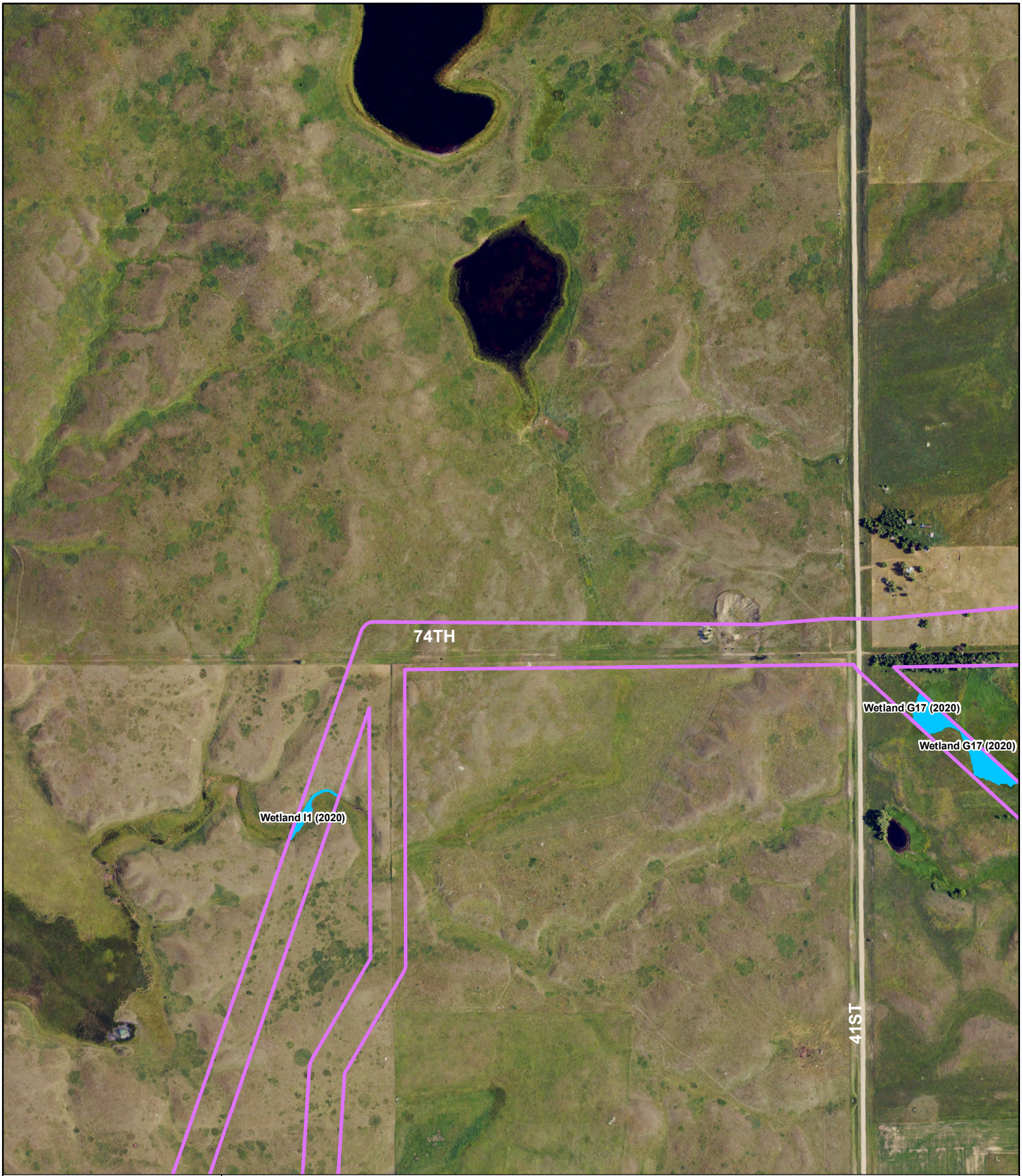
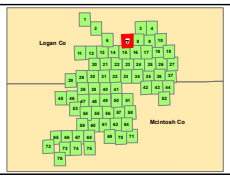


Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

2023 Surveyed Wetlands

Field Delineated

Field Mapped

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Wetland Survey Area

Pre 2023 Surveyed Wetlands

Field Delineated

County Boundary

State Highway

N W E S

0 0.1 0.2 mi

0 0.2 0.4 km

Data Source: NAIP 2023

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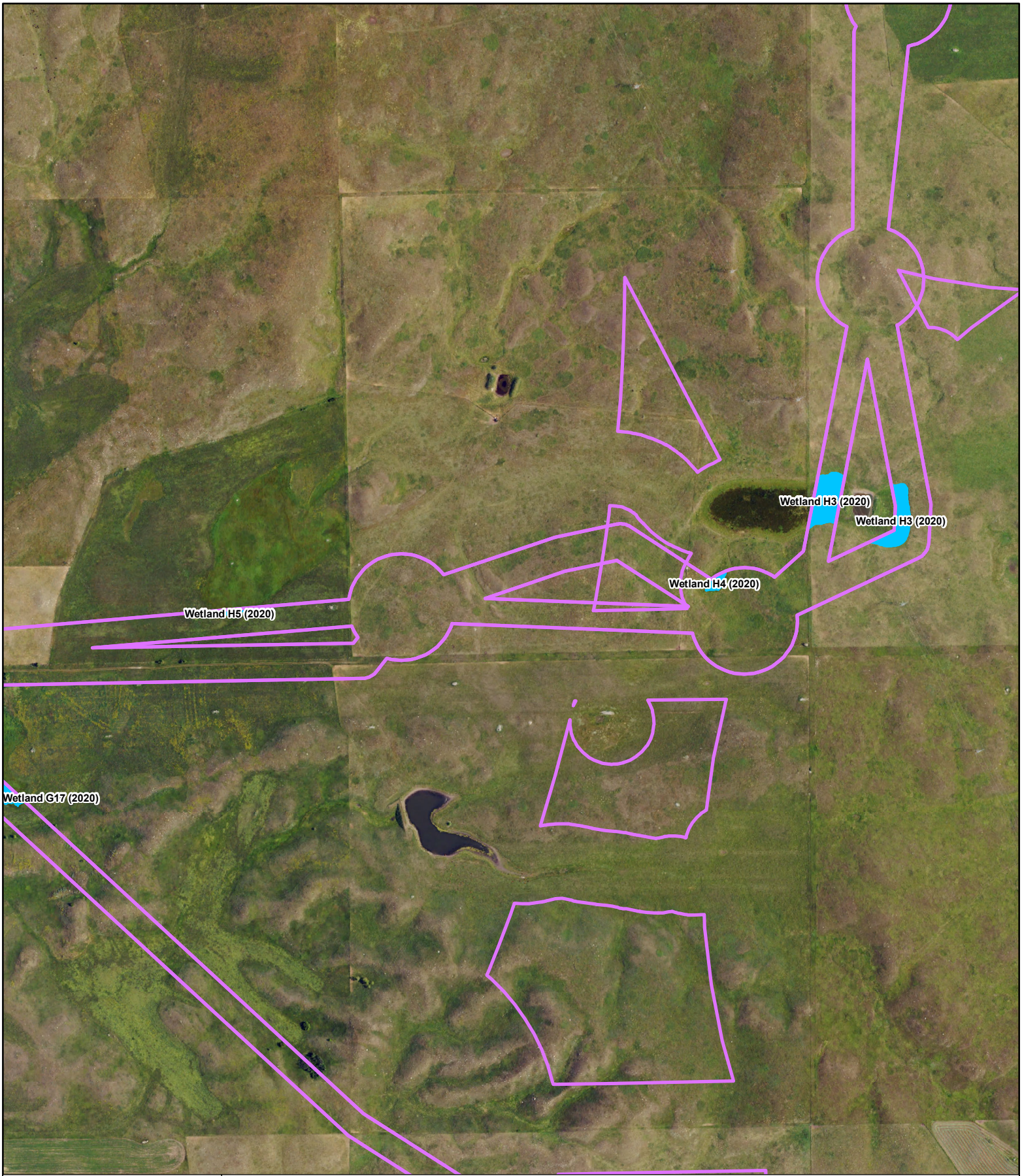
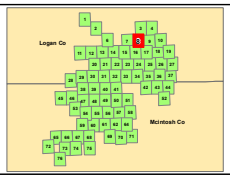


Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

Pre 2023 Wetland Survey Area

County Boundary

State Highway

2023 Surveyed Wetlands

Field Delineated

Field Mapped

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Surveyed Wetlands

Field Delineated

N W E S

0 0.1 0.2 mi

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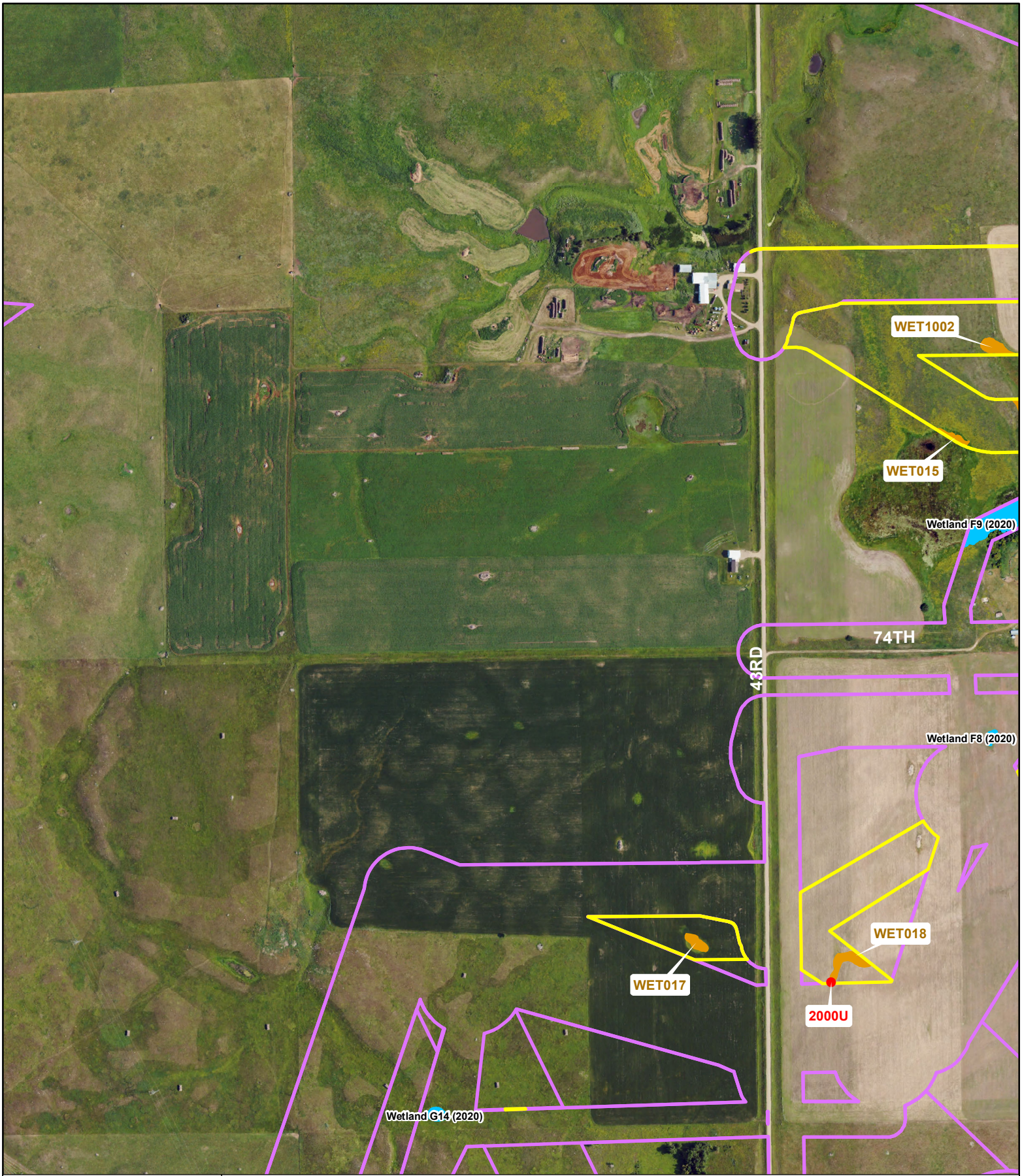
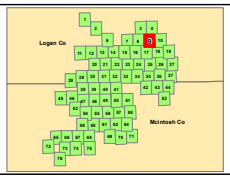


Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

2023 Surveyed Wetlands

Field Delineated Field Mapped

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Wetland Survey Area

Pre 2023 Surveyed Wetlands

Field Delineated

County Boundary

State Highway

N W E S

0 0.1 0.2 mi

0 0.2 0.4 km

Data Source: NAIP 2023
Coordinate System: UTM, WGS84, zn 14
Map Produced: 01/25/2024. Created by: T. Thorn

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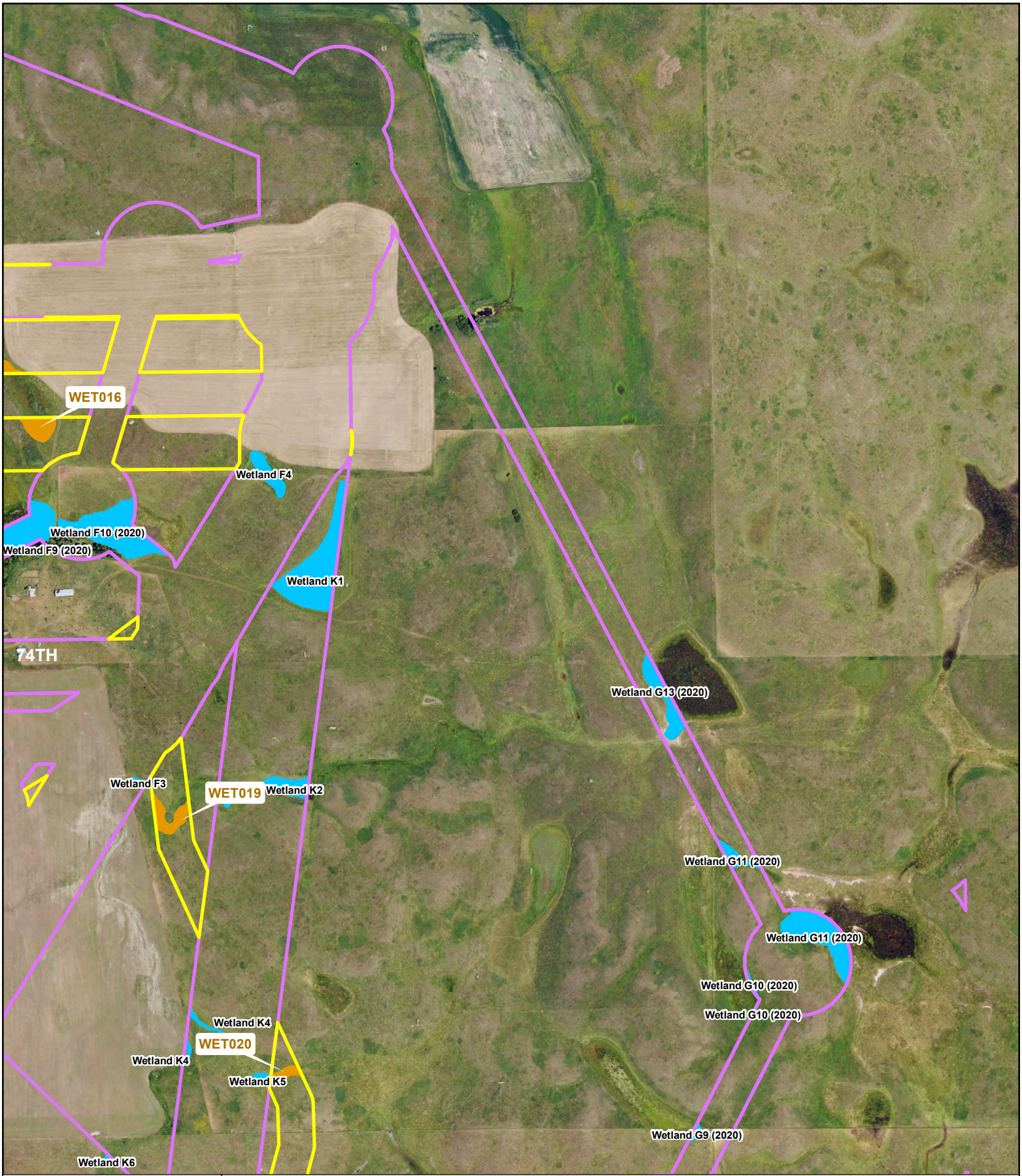
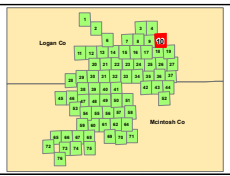


Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

2023 Surveyed Wetlands

Field Delineated

Field Mapped

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Wetland Survey Area

Pre 2023 Surveyed Wetlands

Field Delineated

County Boundary

State Highway

N W E S

0 0.1 0.2 mi

0 0.2 0.4 km

Data Source: NAIP 2023
Coordinate System: UTM, WGS84, zn 14
Map Produced: 01/25/2024. Created by: T. Thorn

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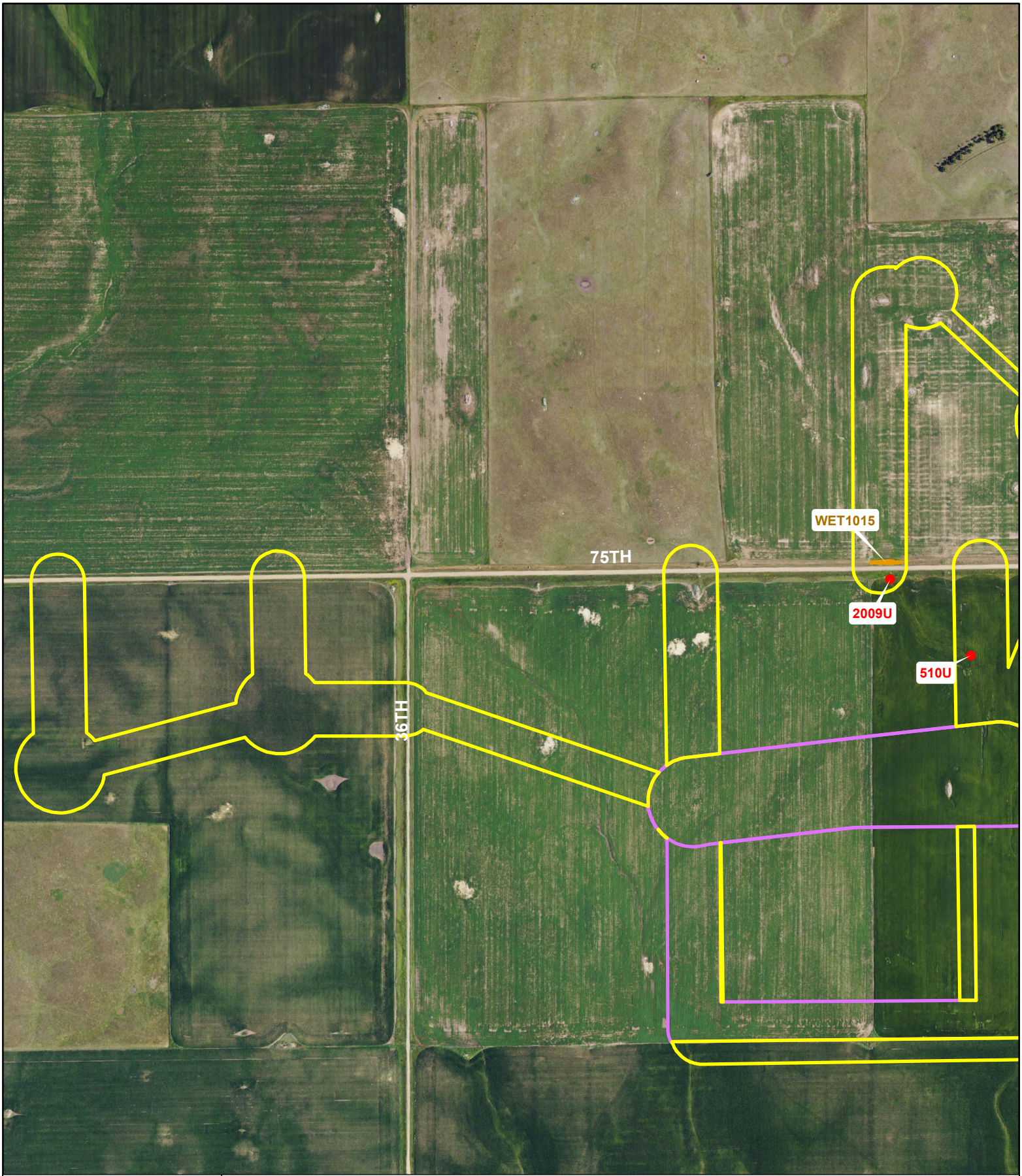
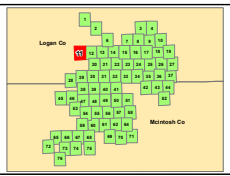


Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

2023 Surveyed Wetlands

Field Delineated

Field Mapped

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Wetland Survey Area

Pre 2023 Surveyed Wetlands

Field Delineated

County Boundary

State Highway

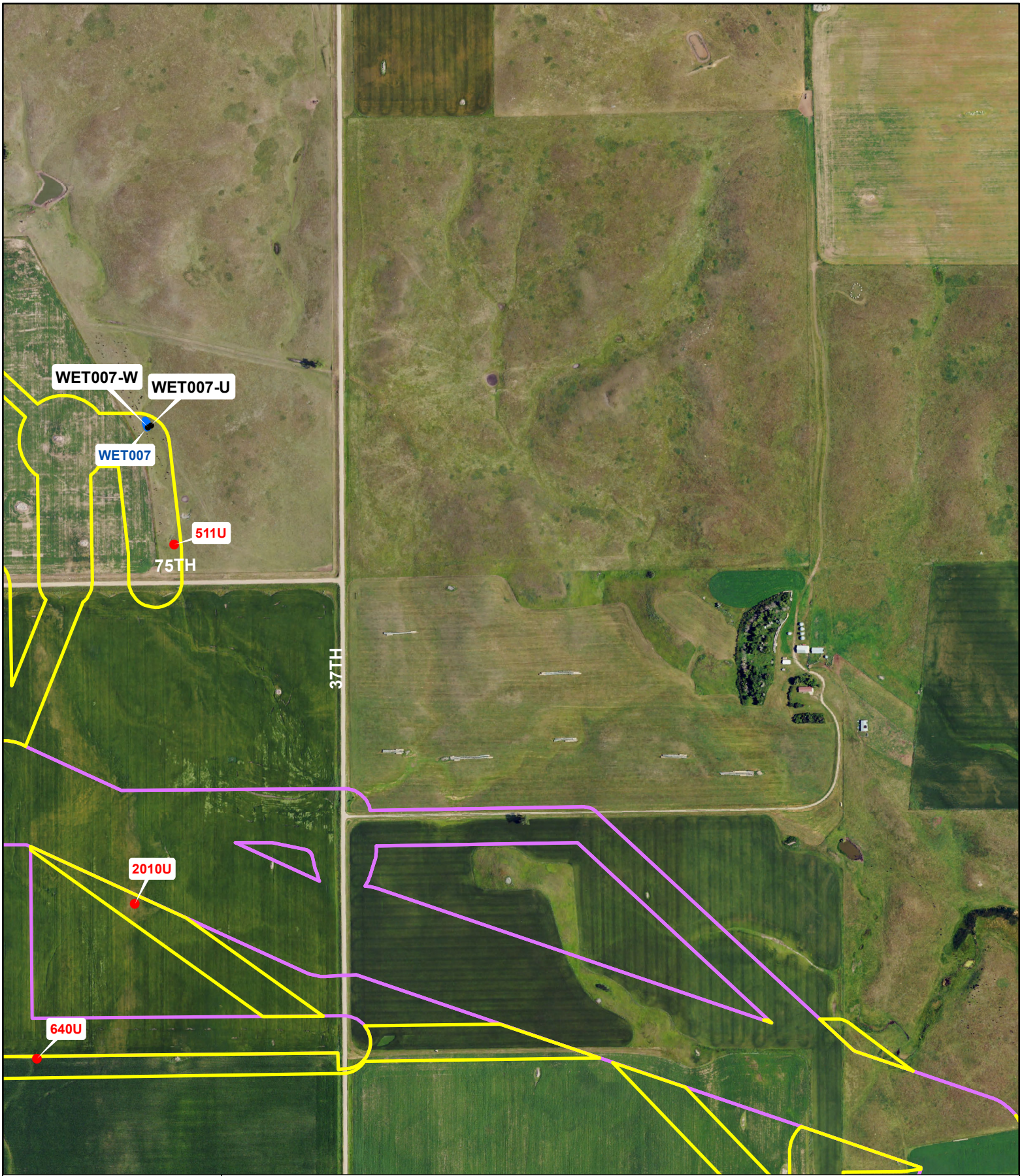
N W E S

0 0.1 0.2 mi

0 0.2 0.4 km

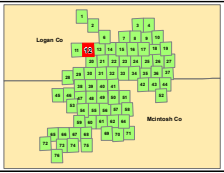
Data Source: NAIP 2023
Coordinate System: UTM, WGS84, zn 14
Map Produced: 01/25/2024. Created by: T. Thorn

WEST



Badger Wind Project

Logan & McIntosh Counties, ND



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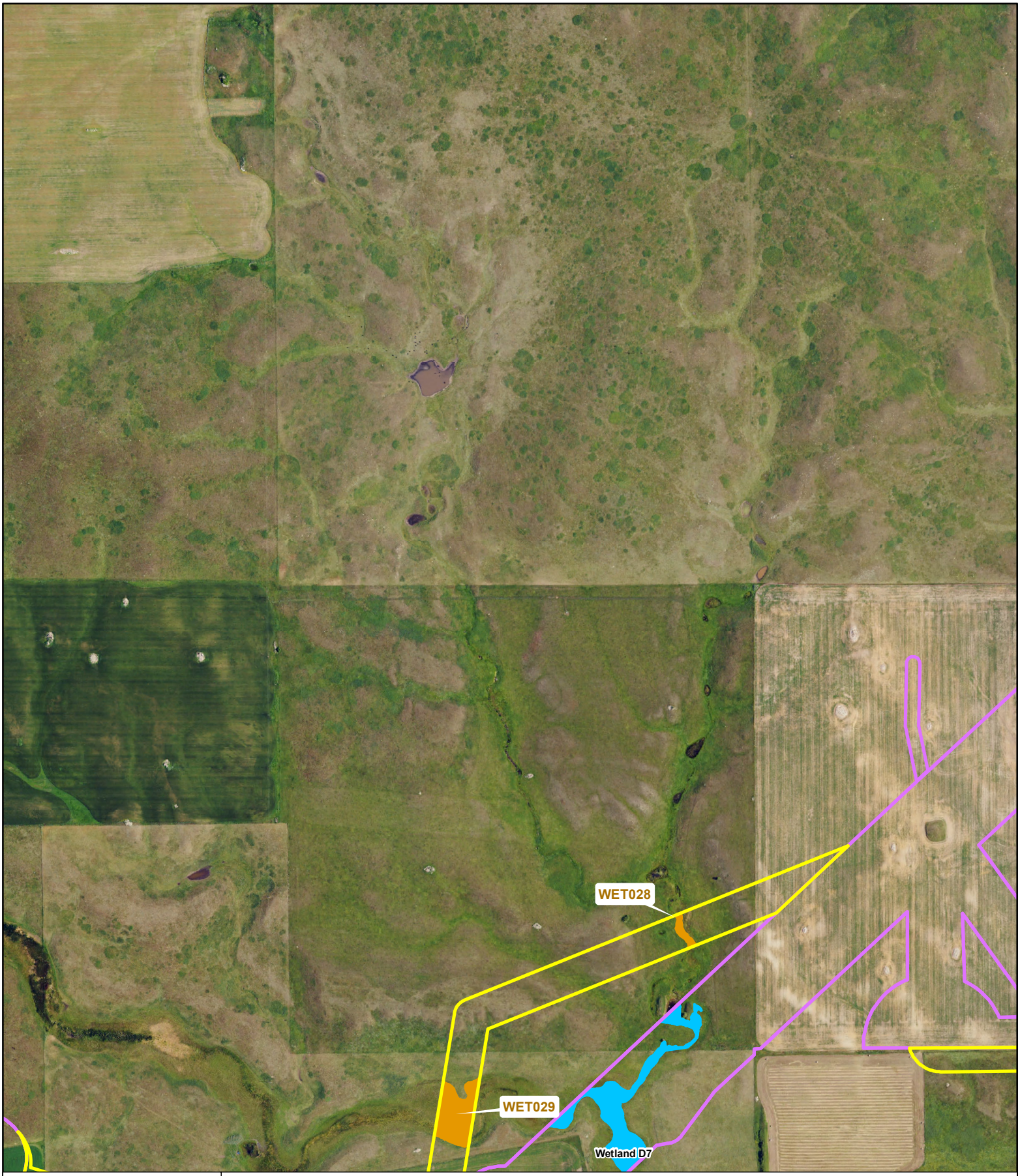
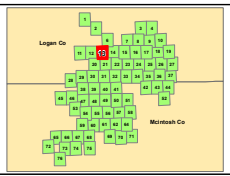


Badger Wind Project

Logan & McIntosh Counties, ND



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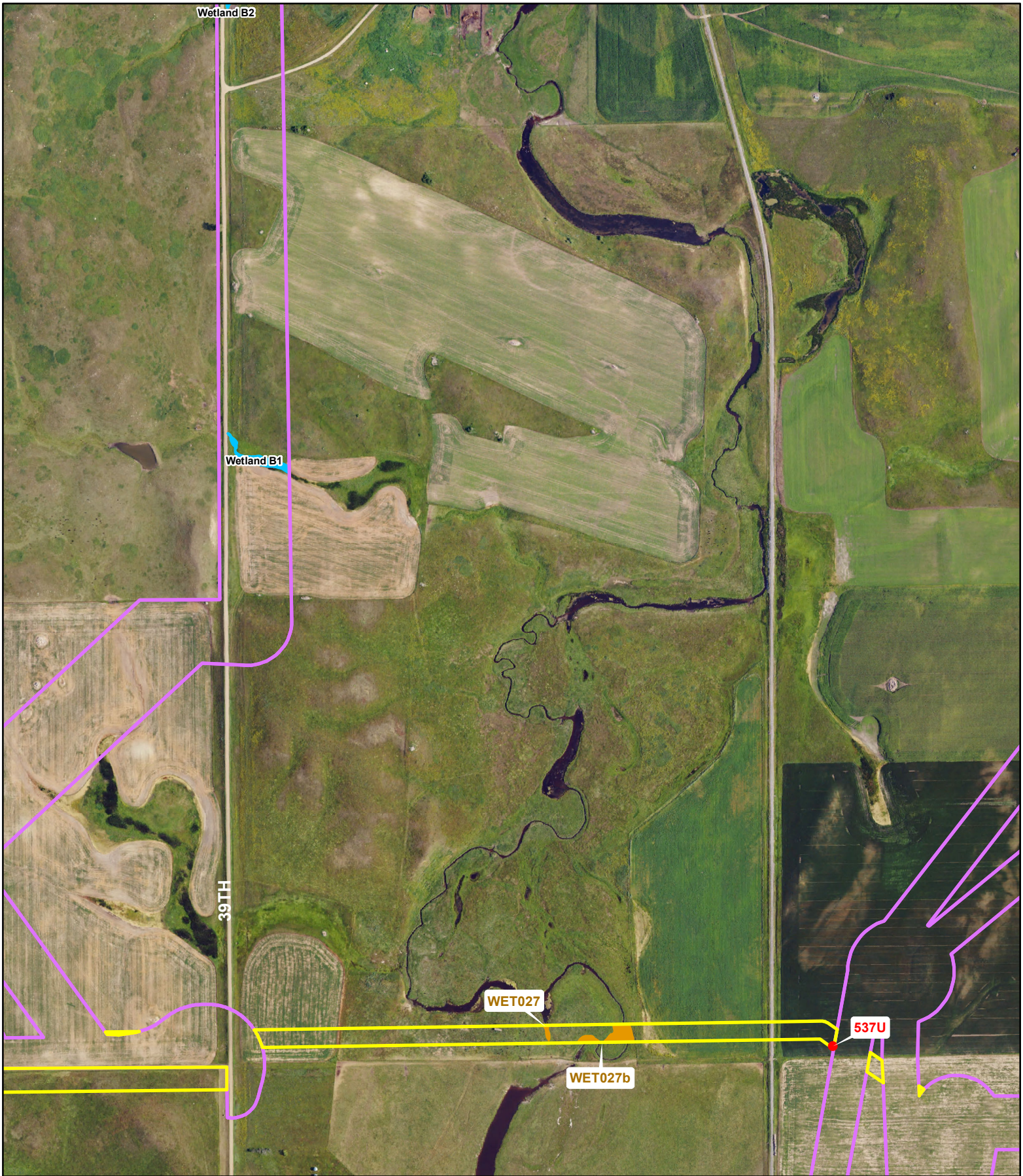
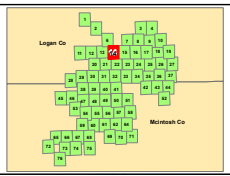


Badger Wind Project

Logan & McIntosh Counties, ND



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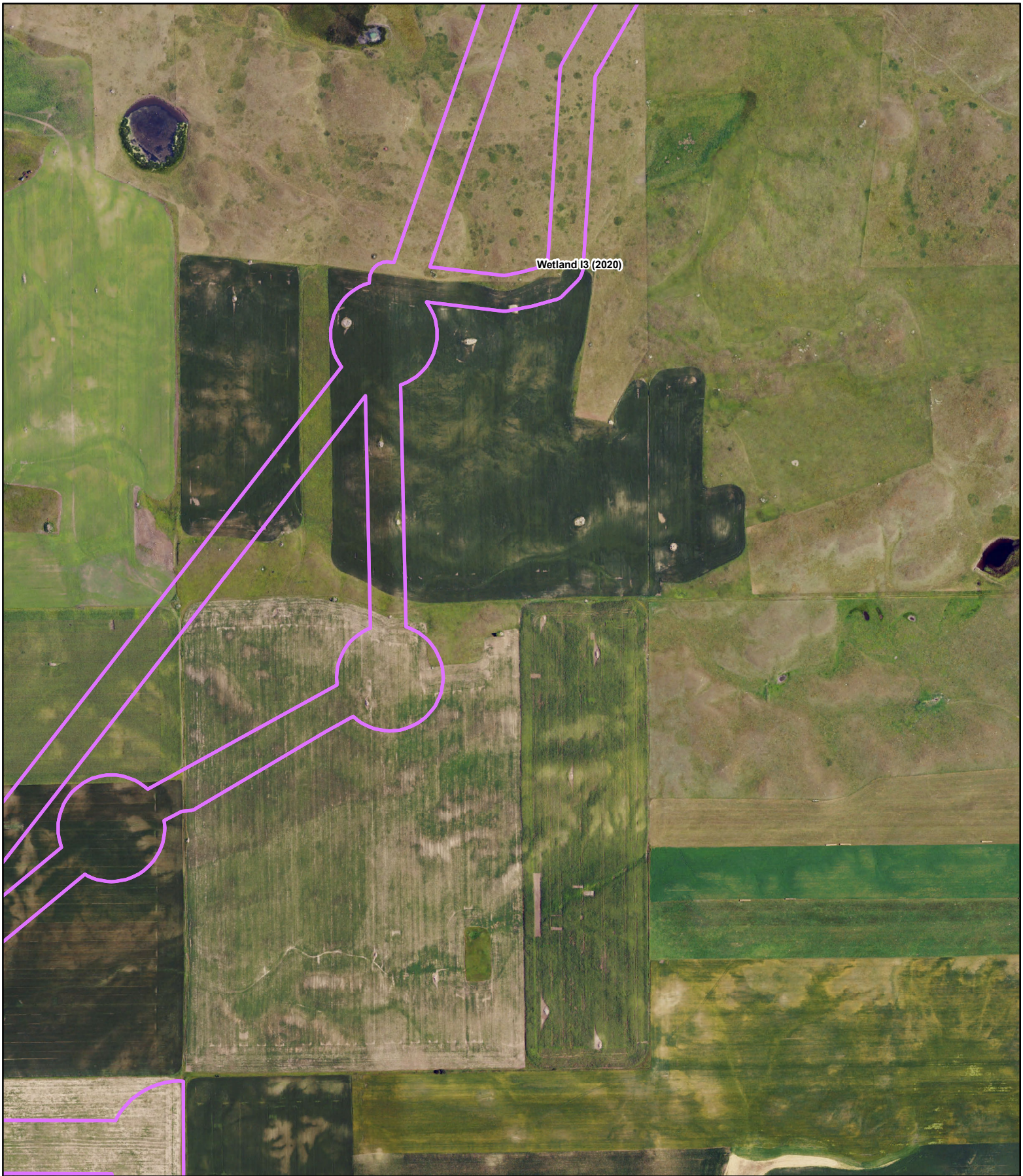
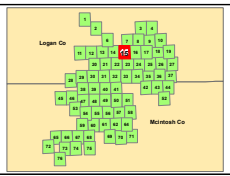


Badger Wind Project

Logan & McIntosh Counties, ND



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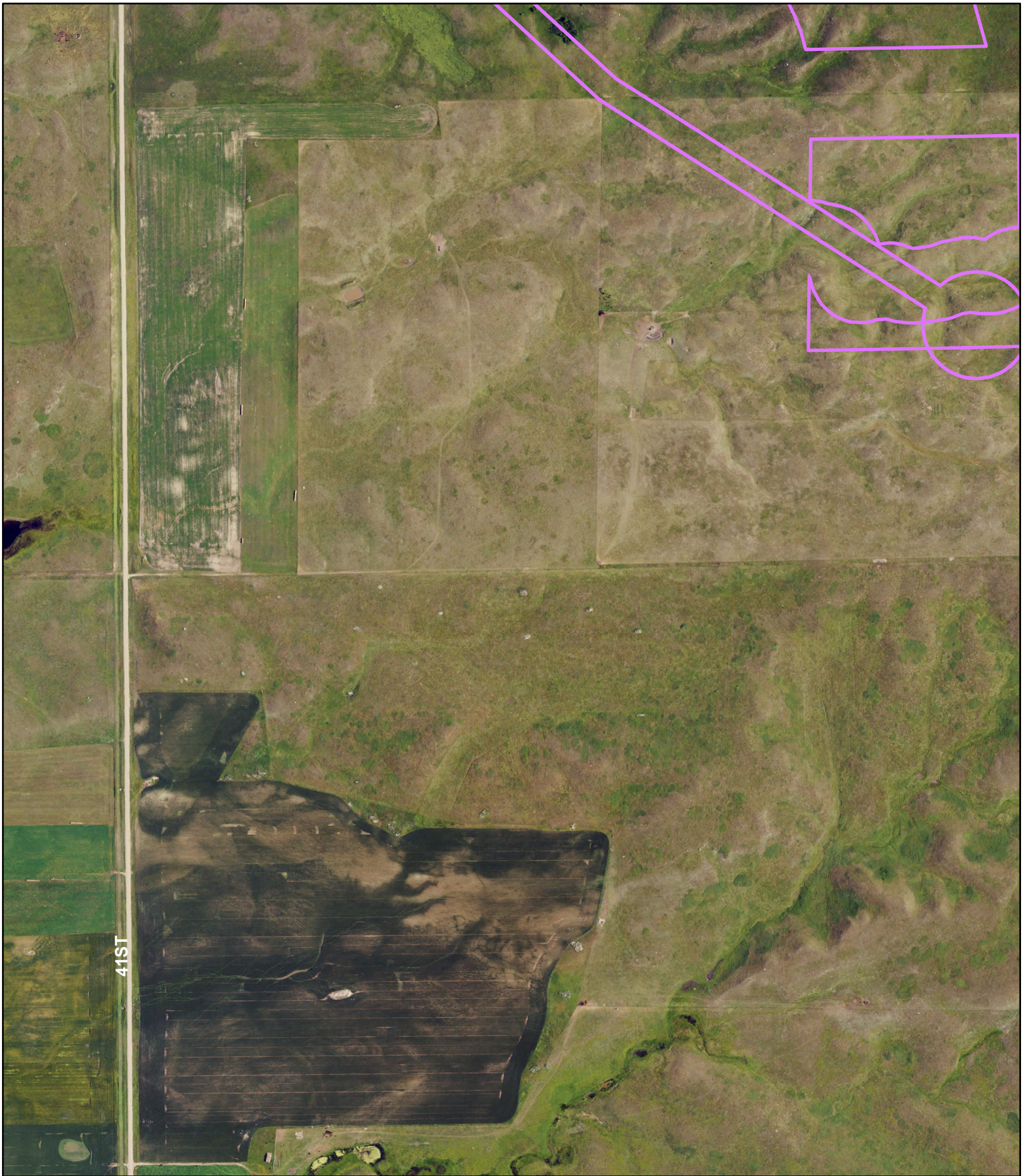

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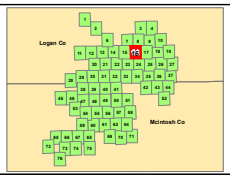
Logan & McIntosh Counties, ND



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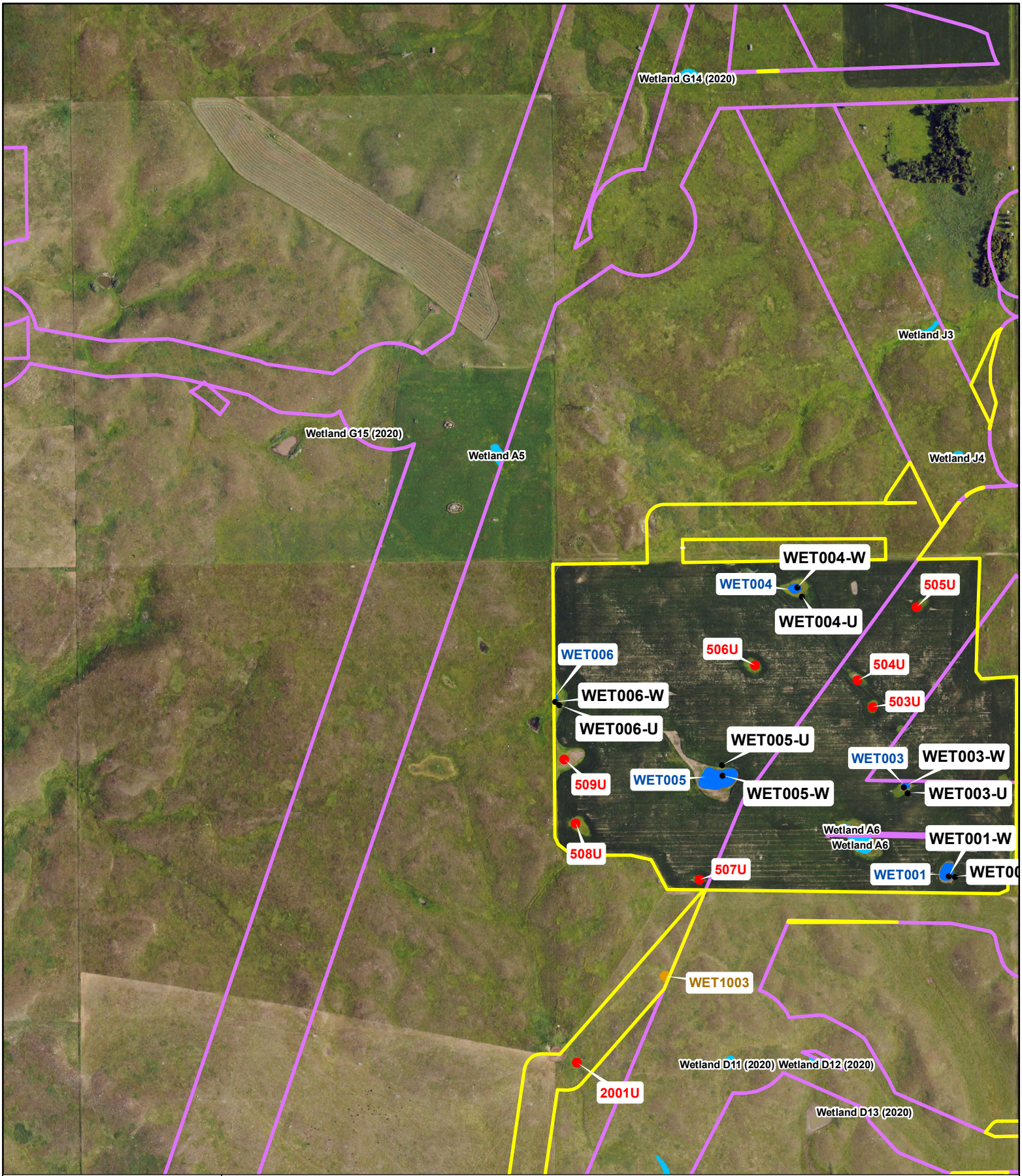

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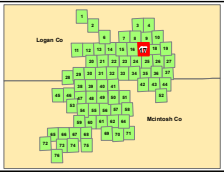
Logan & McIntosh Counties, ND



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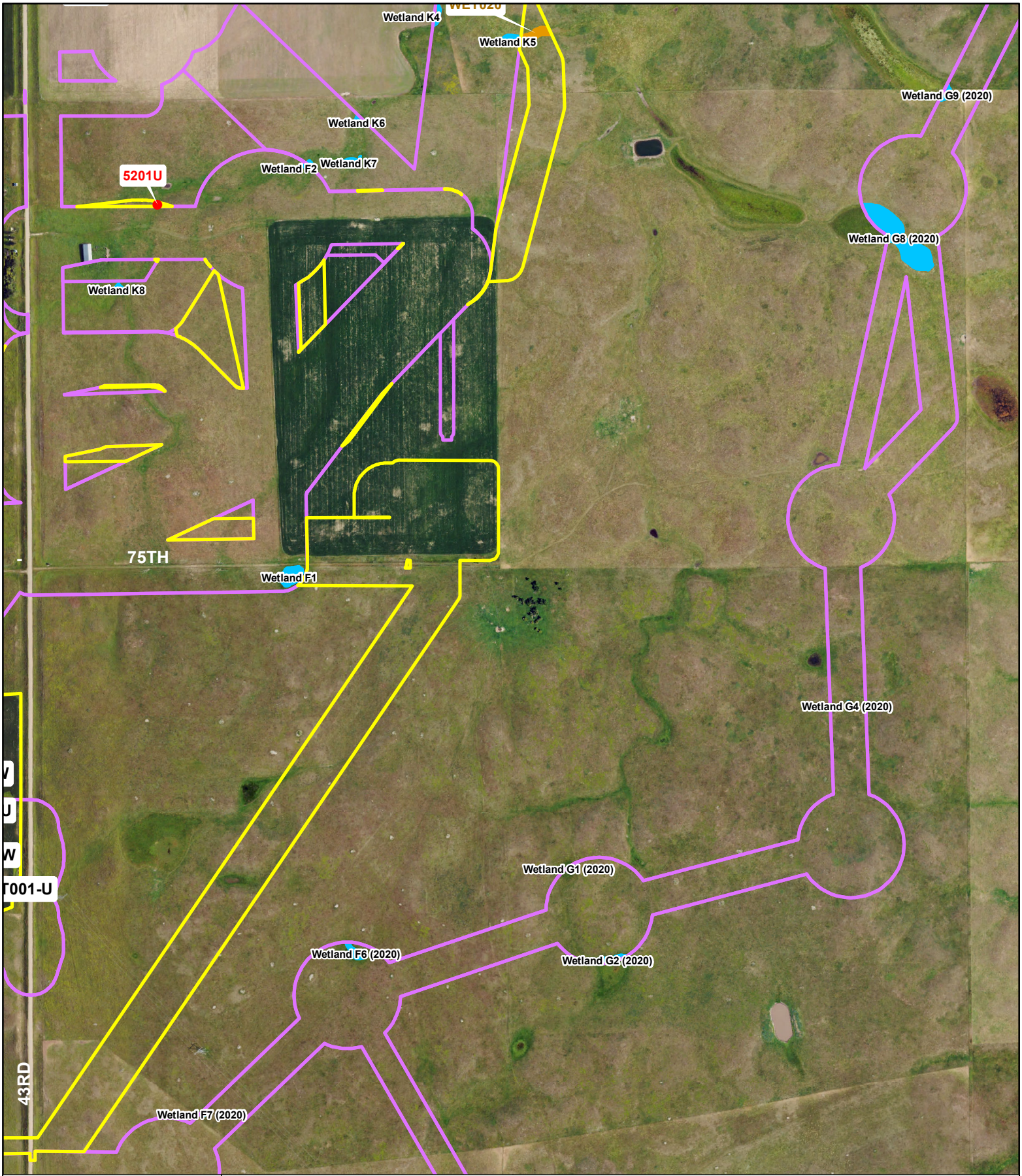

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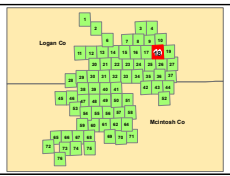

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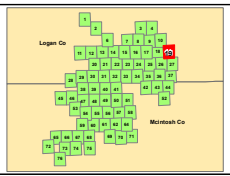

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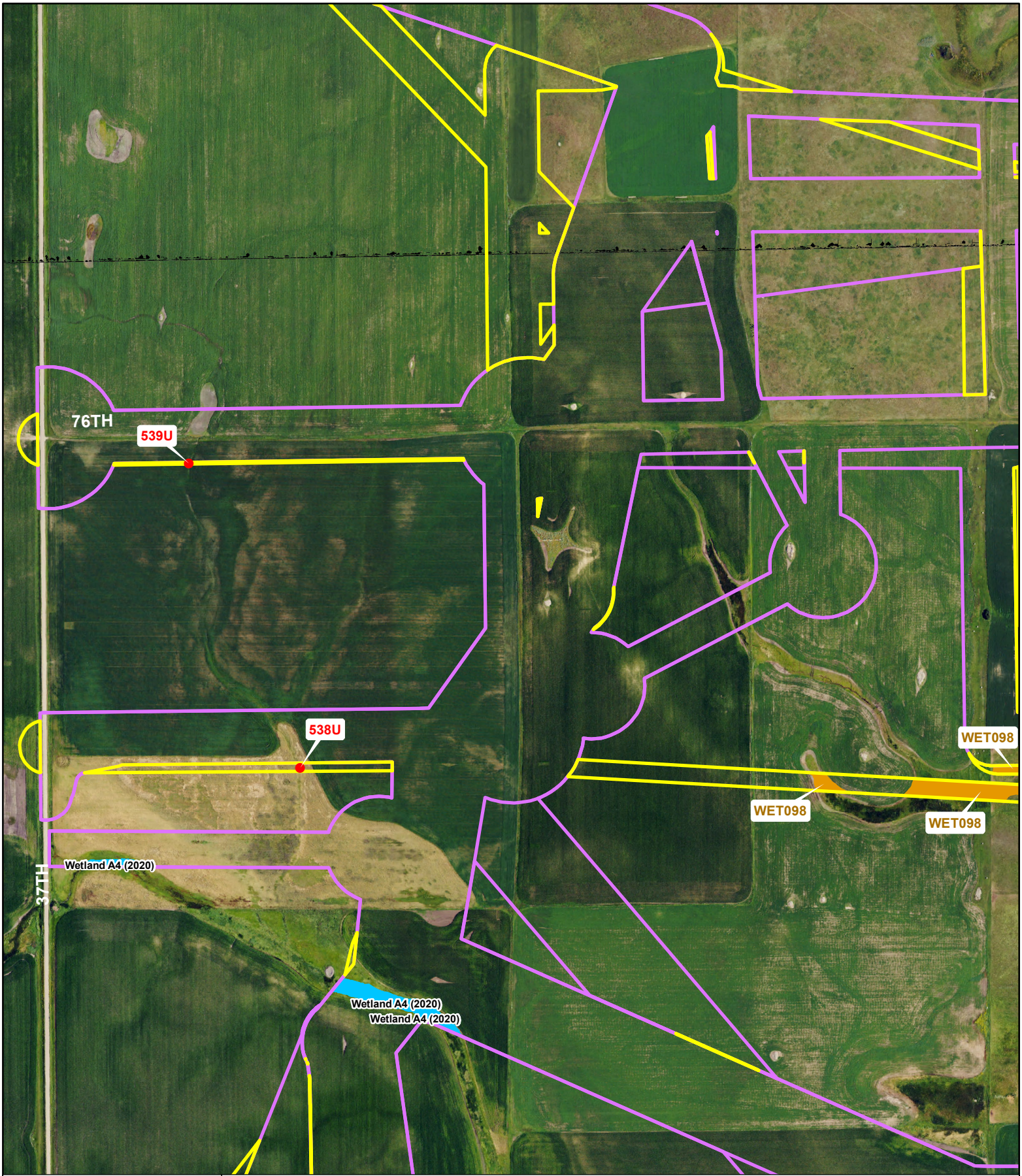

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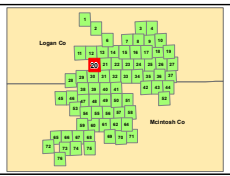

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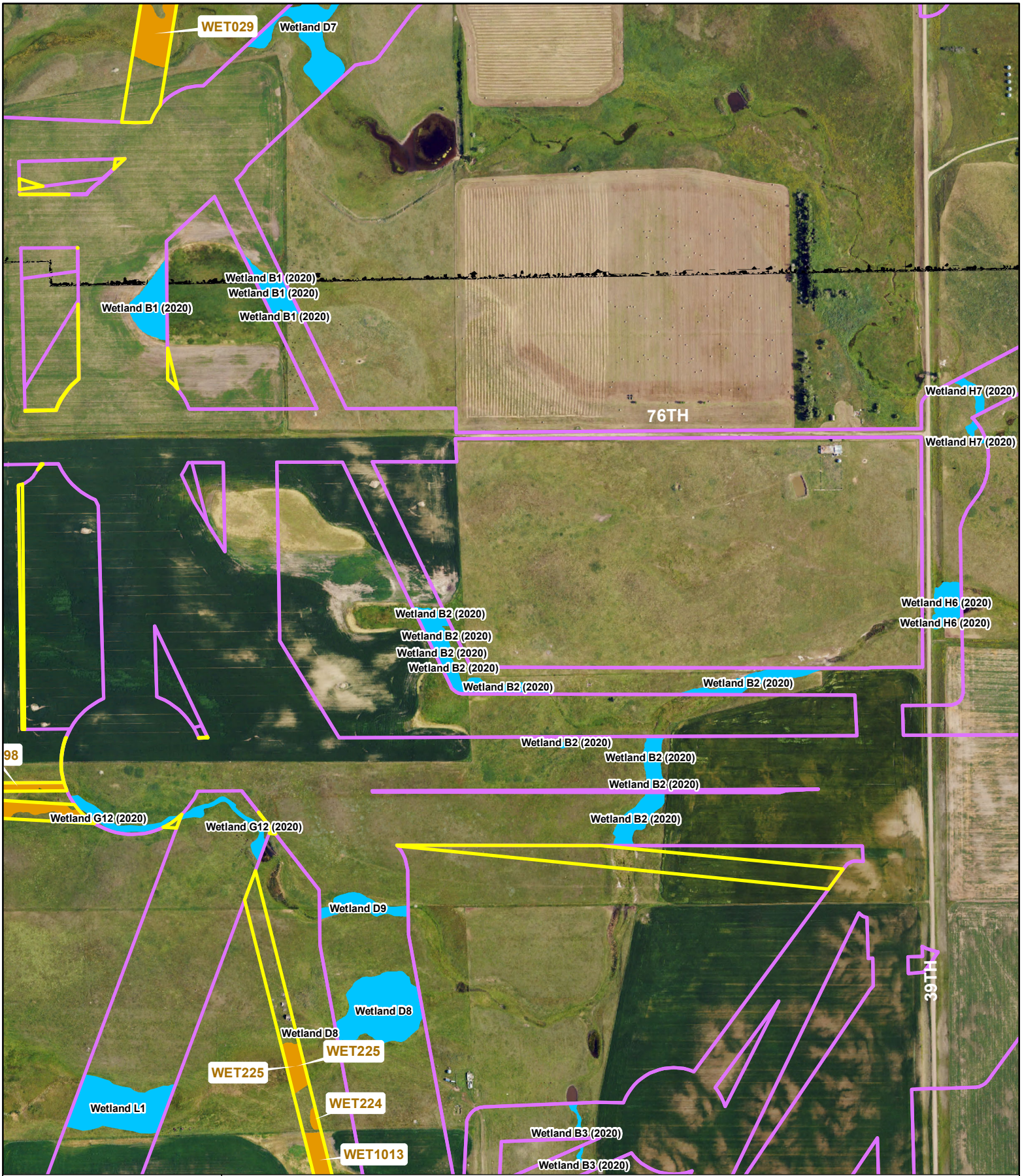

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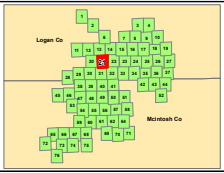
Logan & McIntosh Counties, ND



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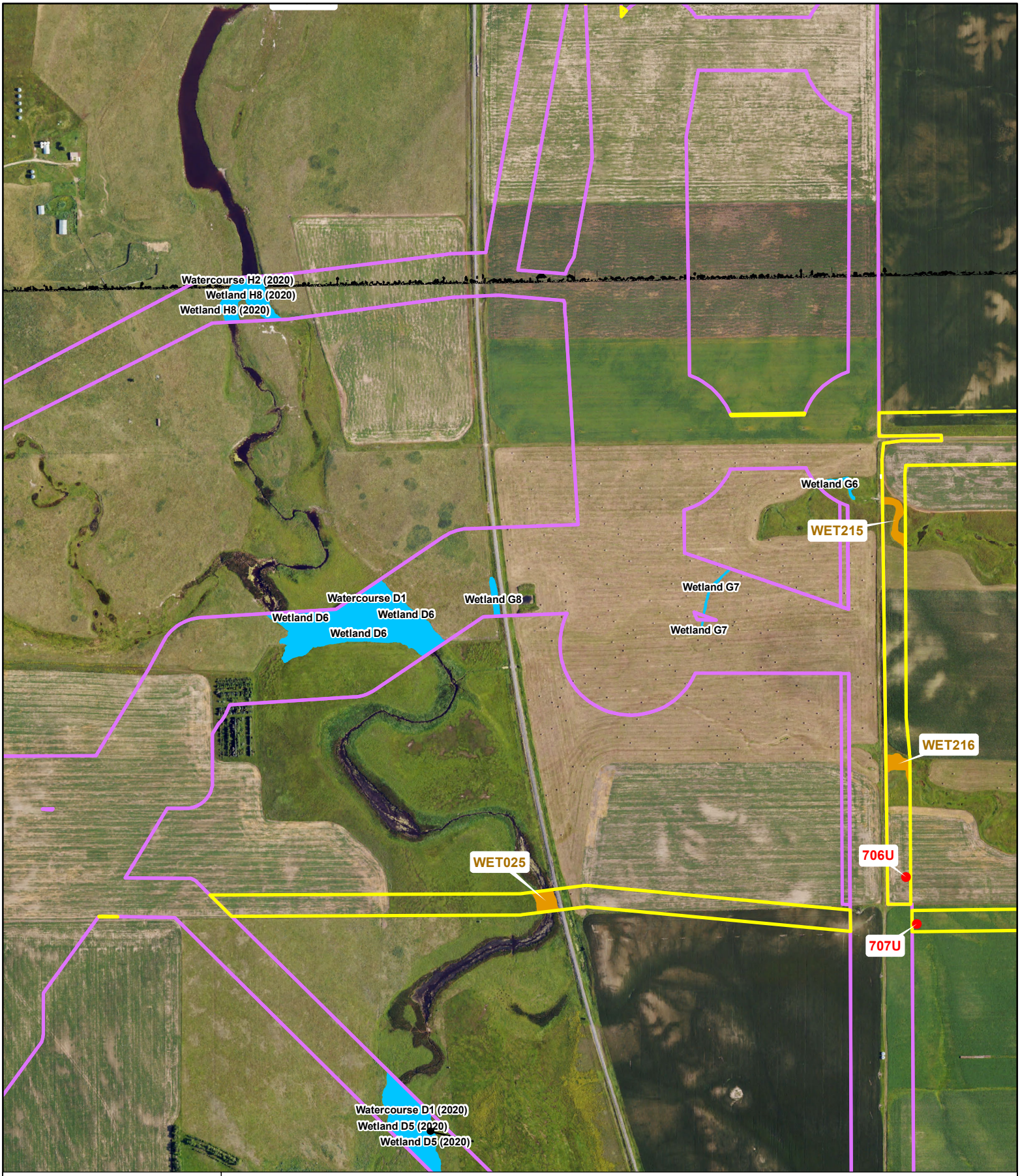

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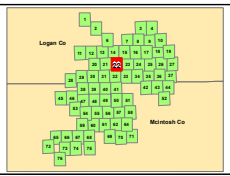

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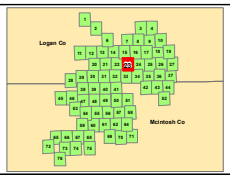
Logan & McIntosh Counties, ND



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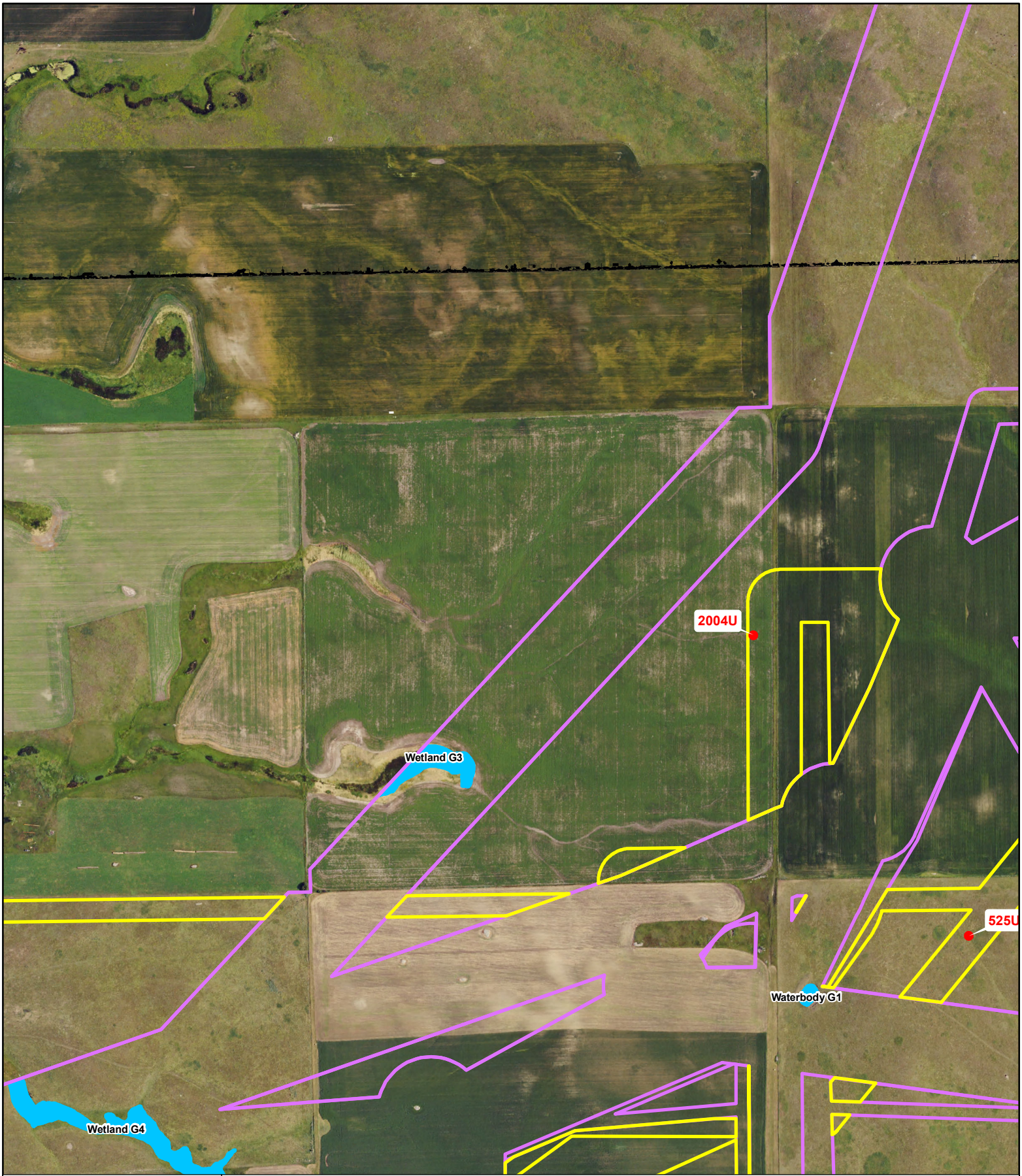

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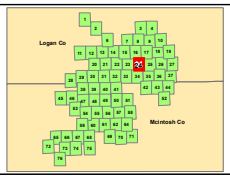

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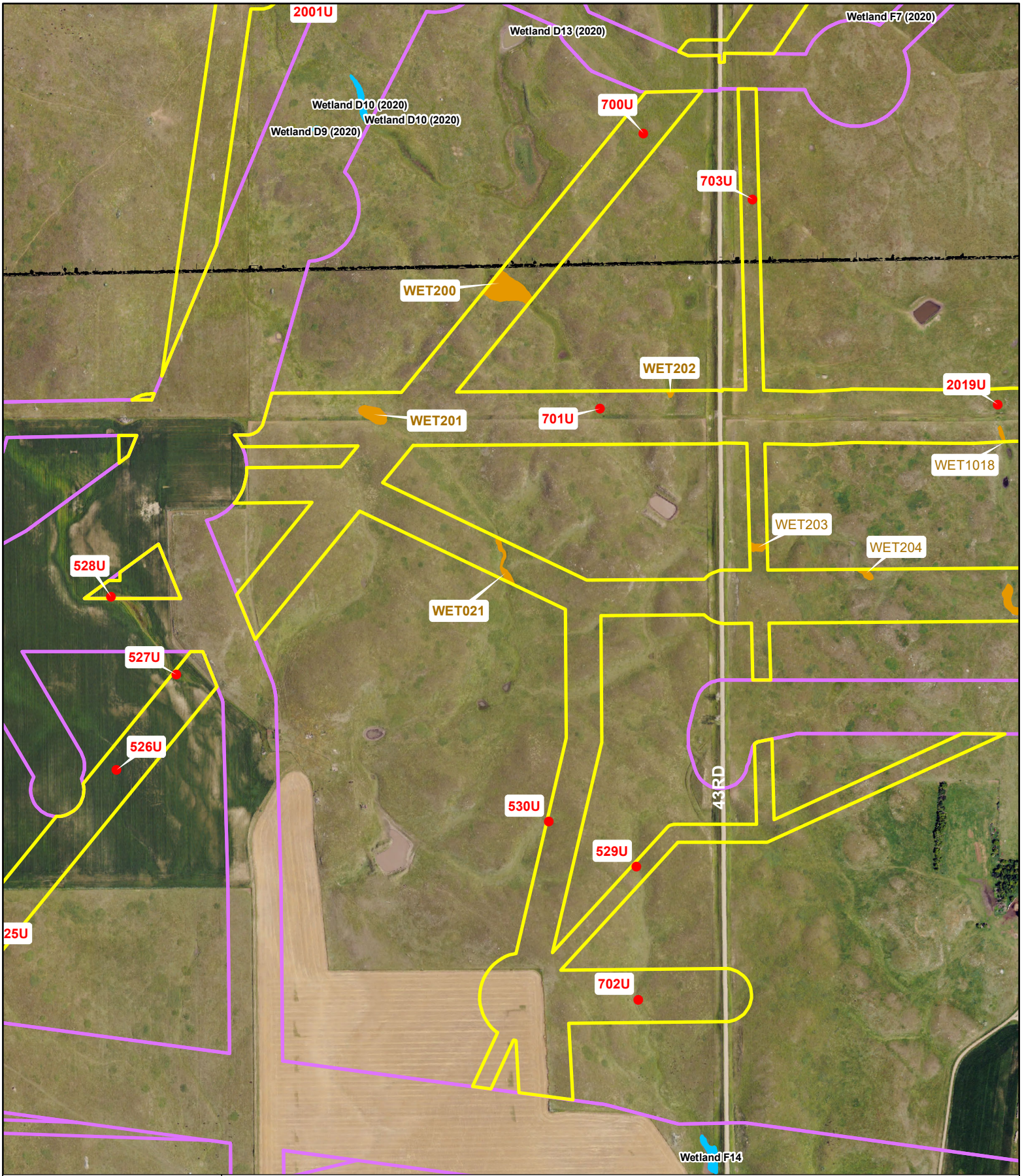

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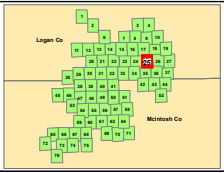
Logan & McIntosh Counties, ND



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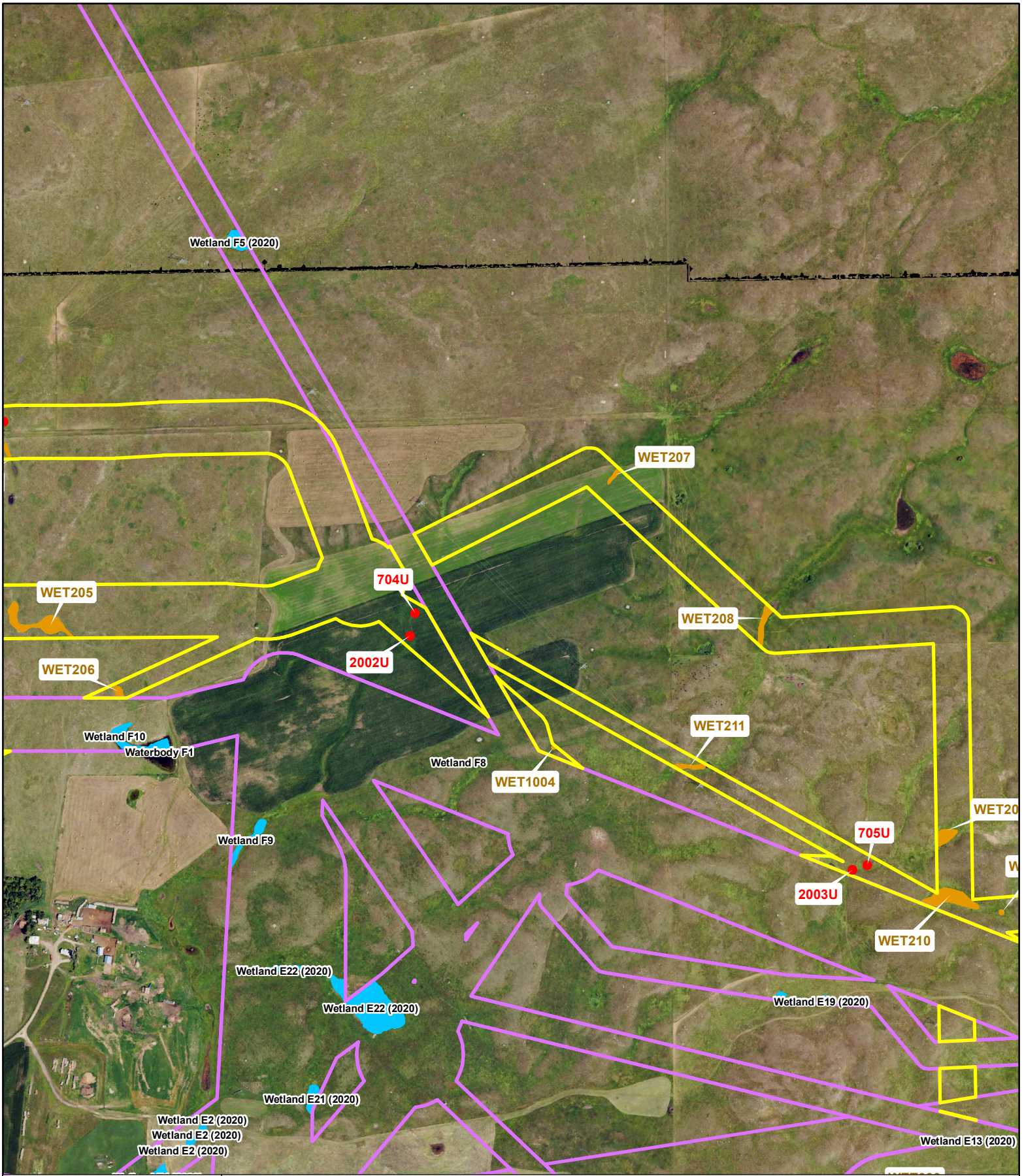

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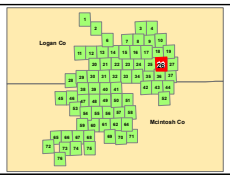

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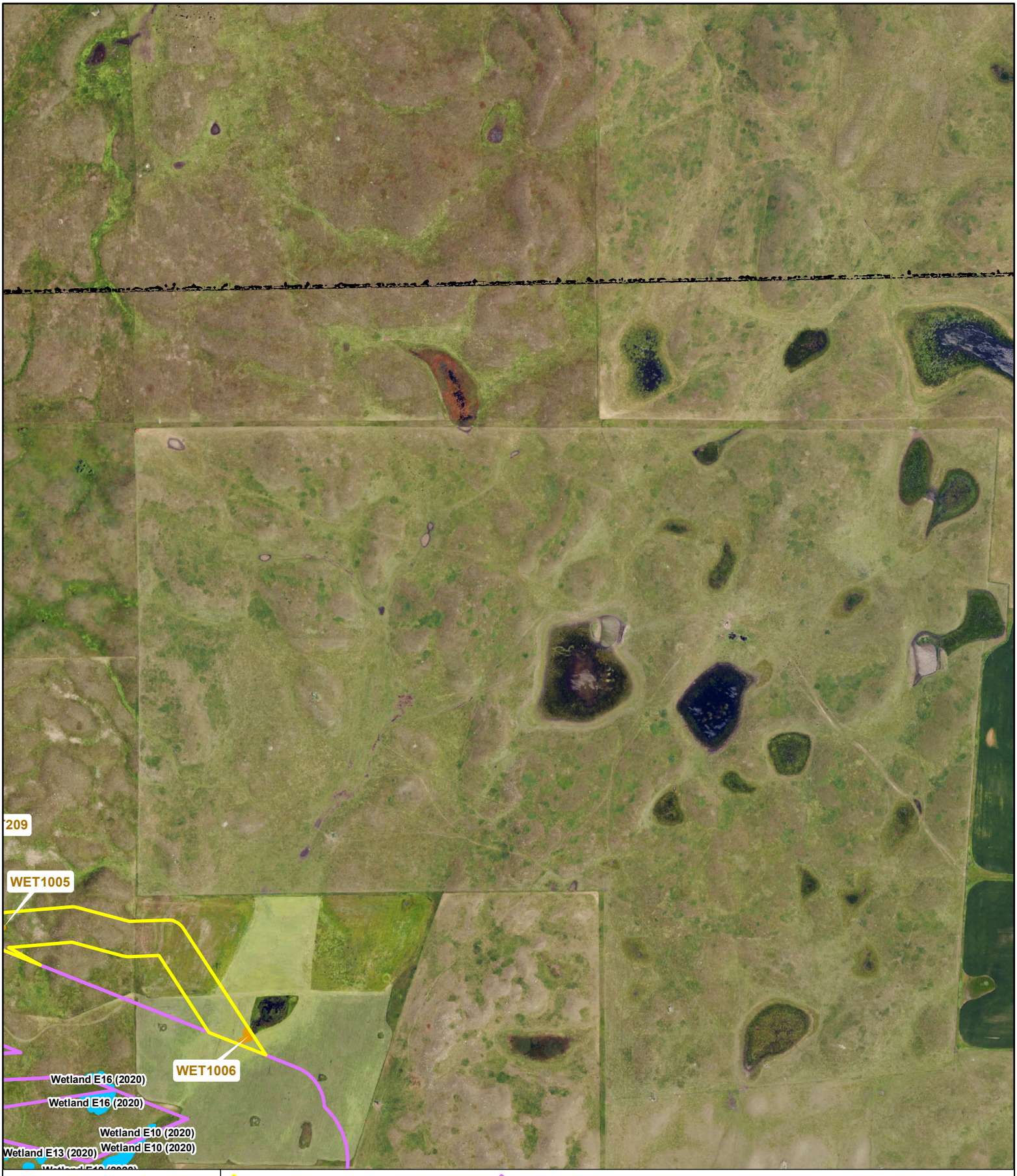

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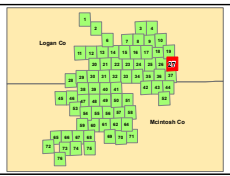

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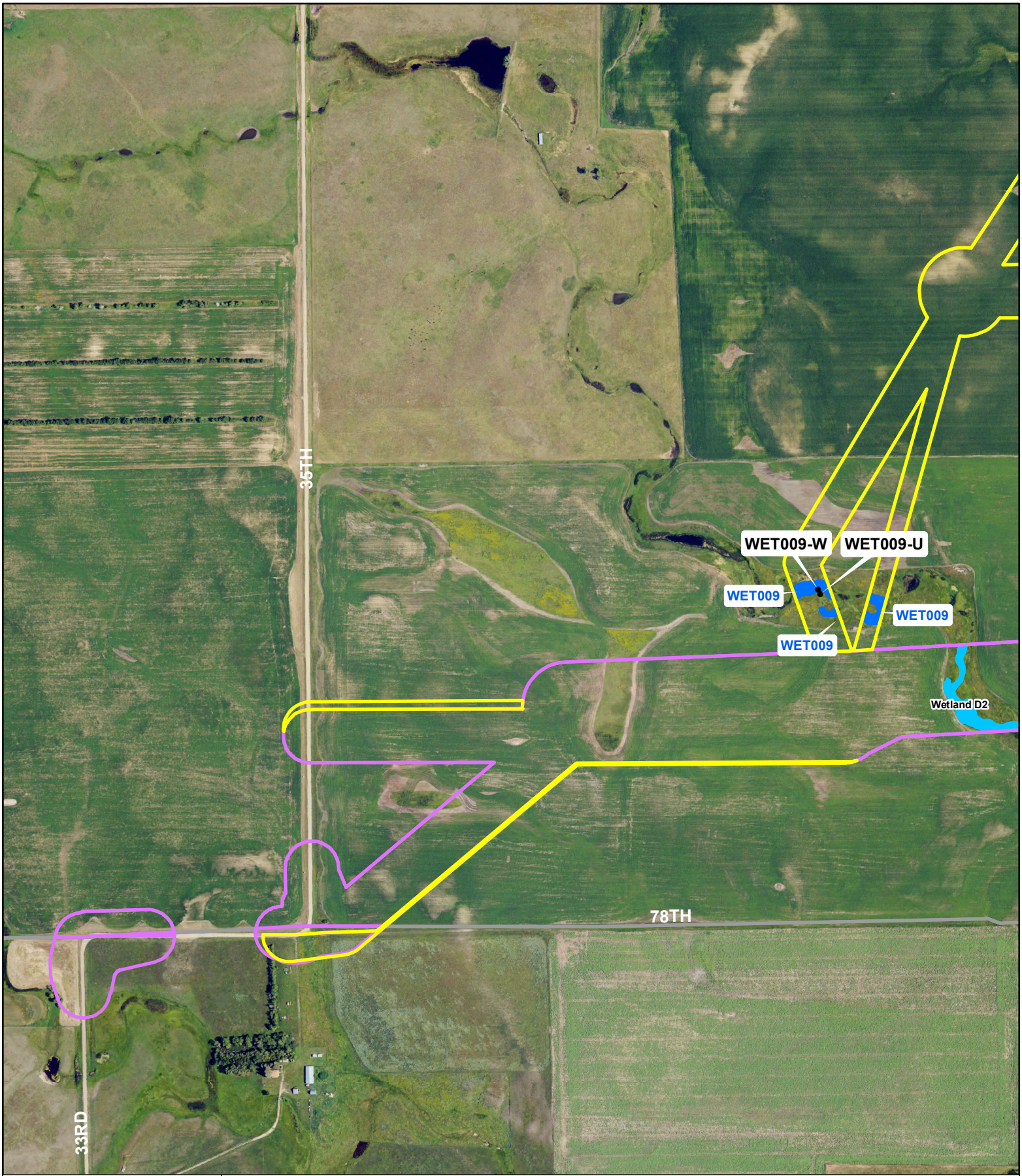

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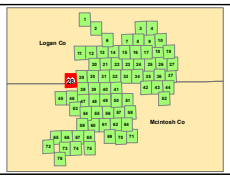

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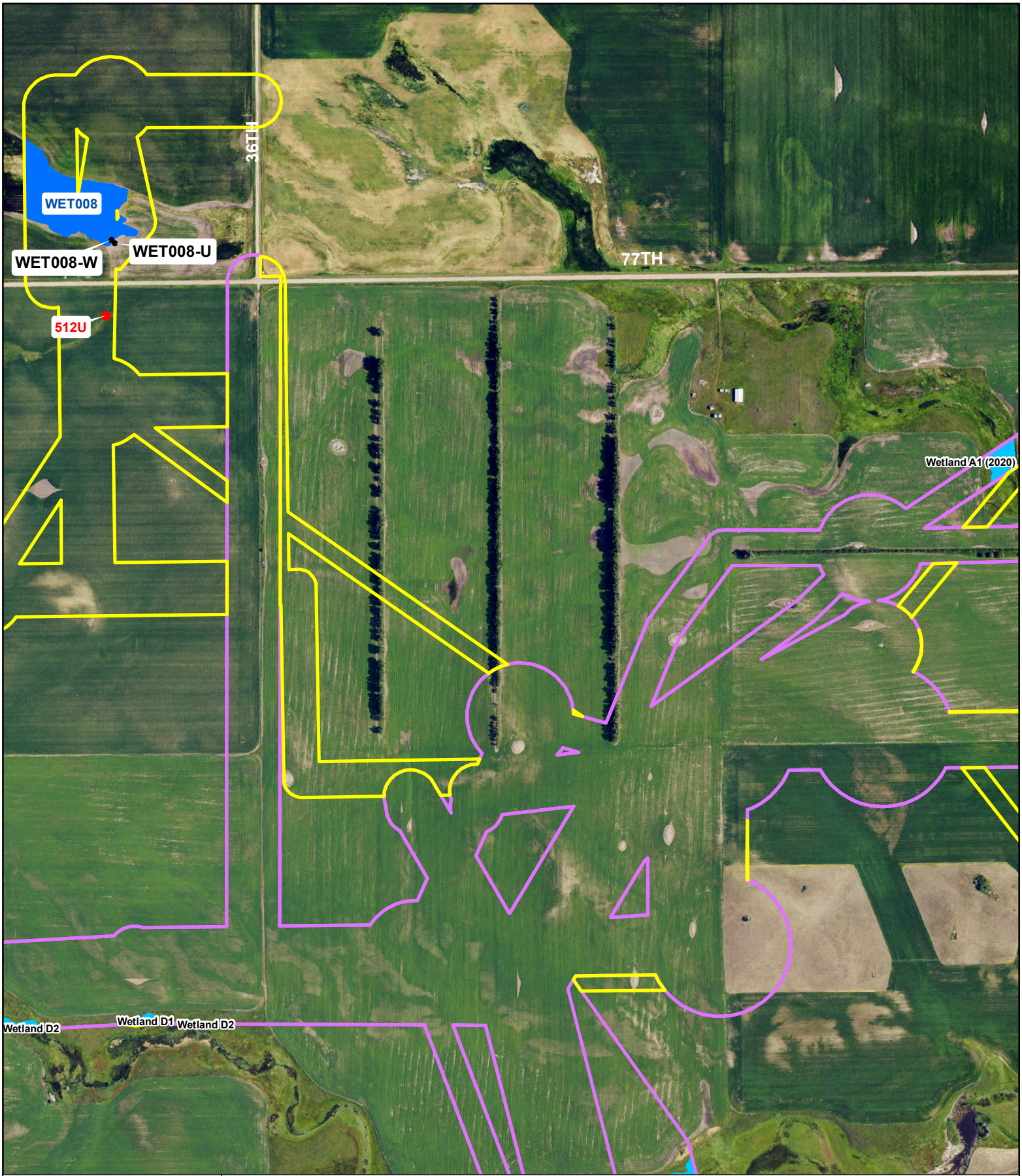

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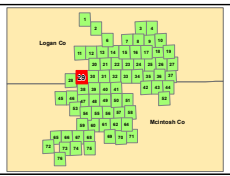

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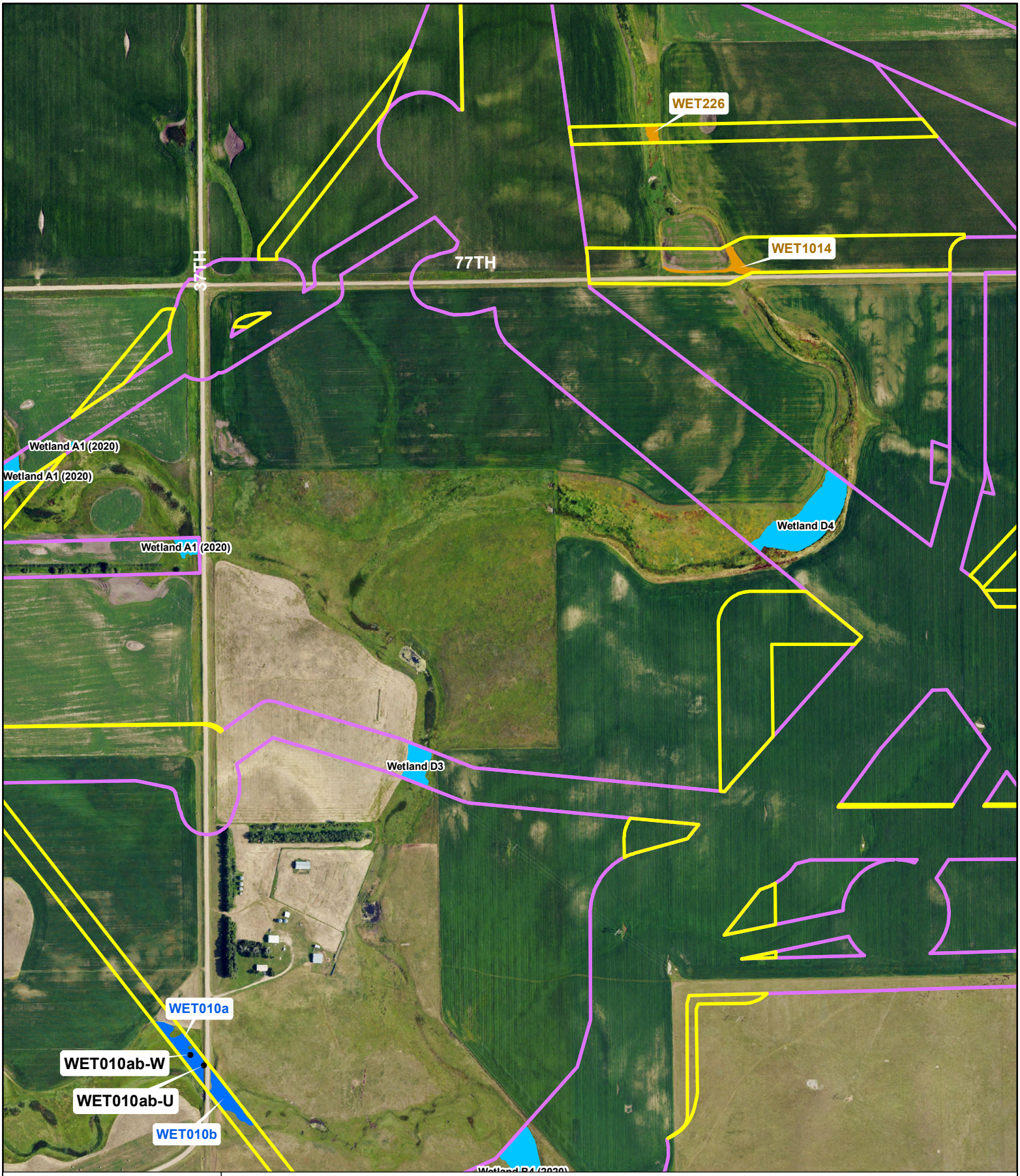
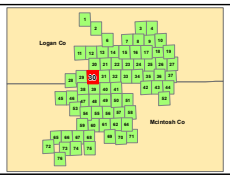


Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

Pre 2023 Wetland Survey Area

County Boundary

State Highway

2023 Surveyed Wetlands

Field Delineated

Field Mapped

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Surveyed Wetlands

Field Delineated

N W E S

0 0.1 0.2 mi

0 0.2 0.4 km

Data Source: NAIP 2023
Coordinate System: UTM, WGS84, zn 14
Map Produced: 01/25/2024. Created by: T. Thorn

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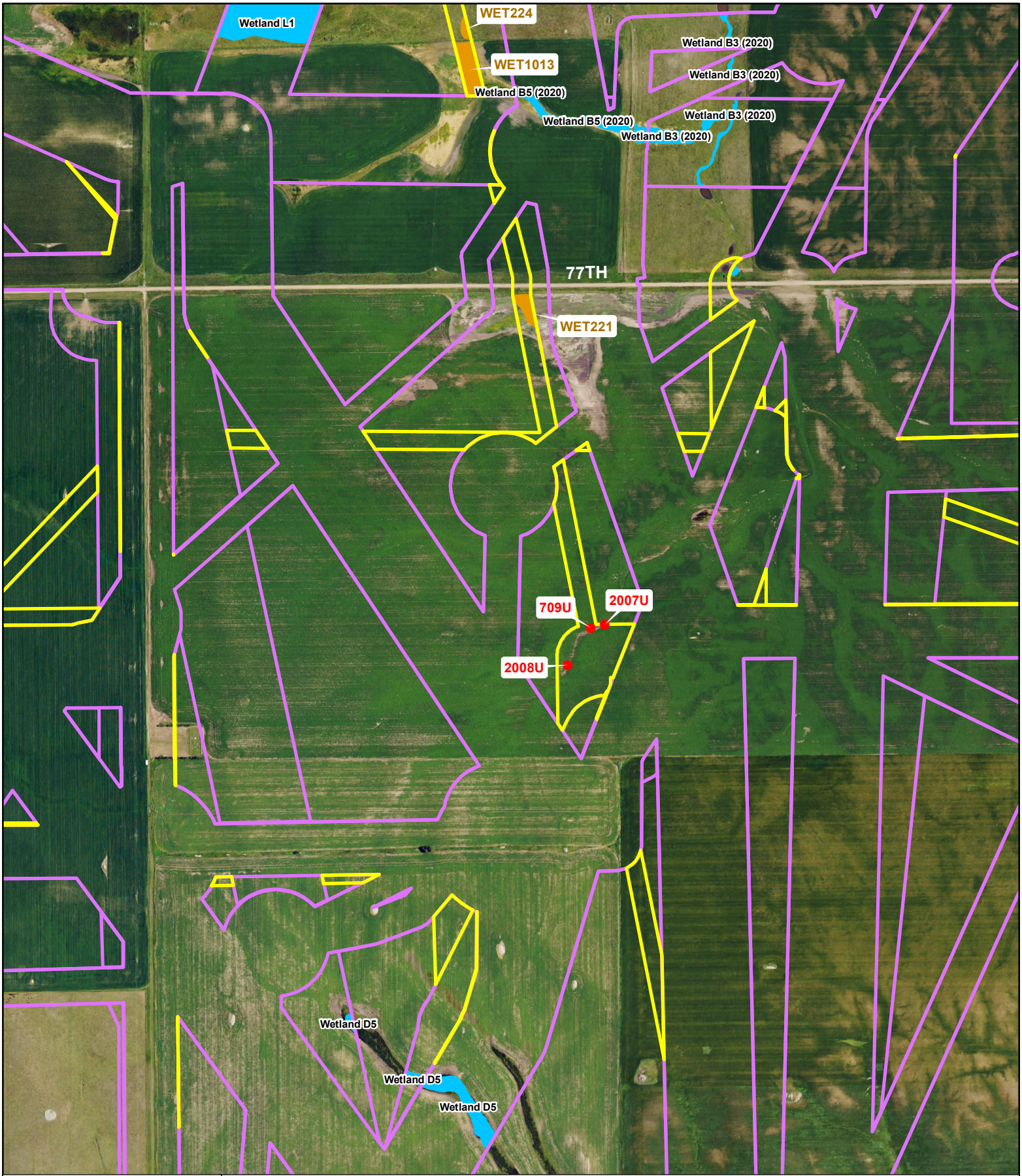
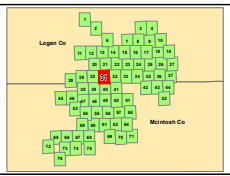


Badger Wind Project

Logan & McIntosh Counties, ND



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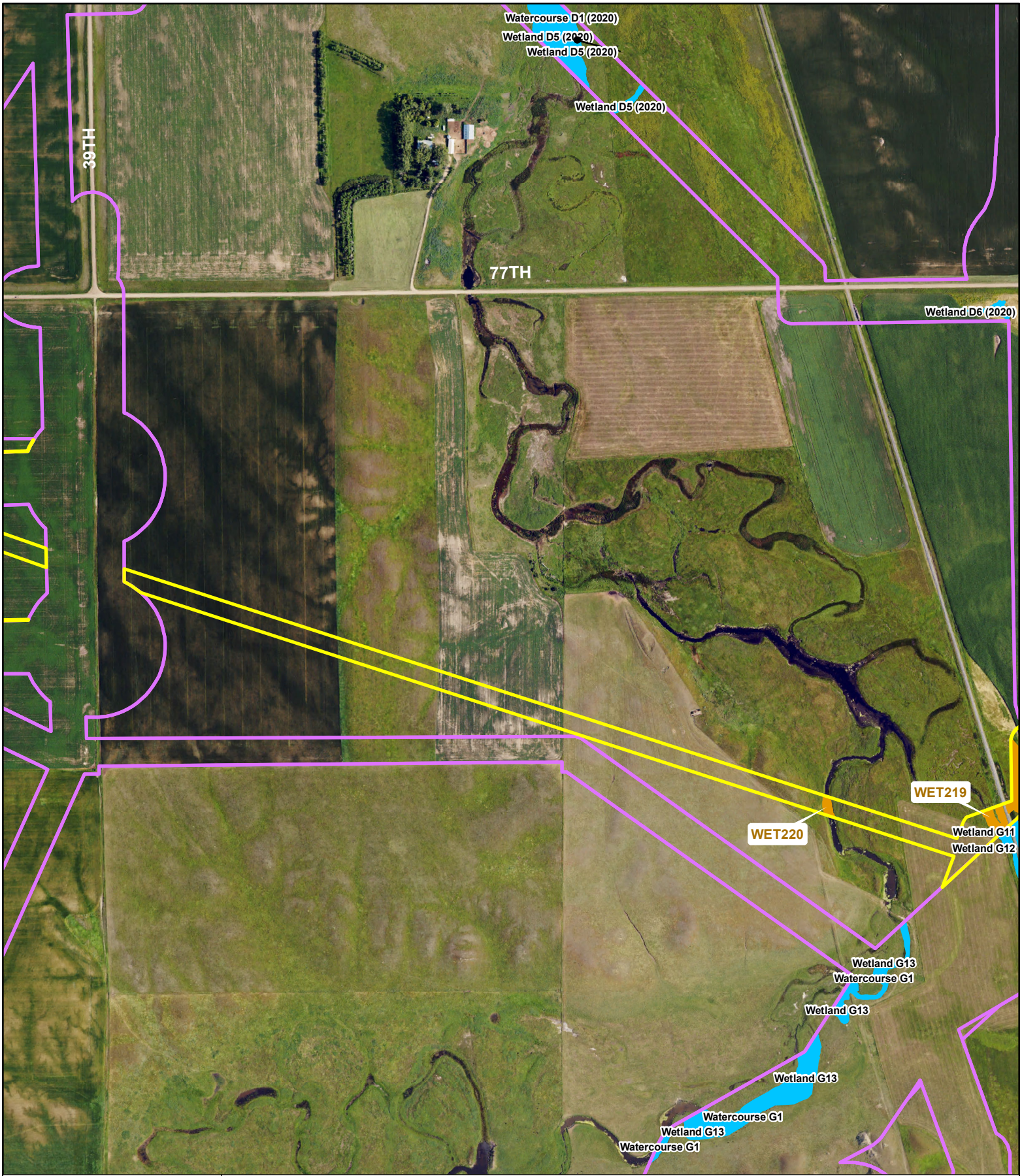
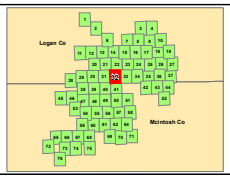


Badger Wind Project

Logan & McIntosh Counties, ND



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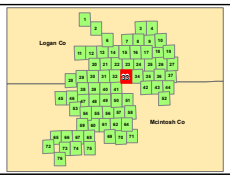
Badger Wind Project

Logan & McIntosh Counties, ND



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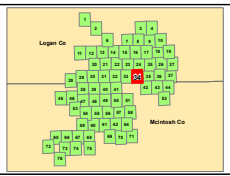
Badger Wind Project

Logan & McIntosh Counties, ND



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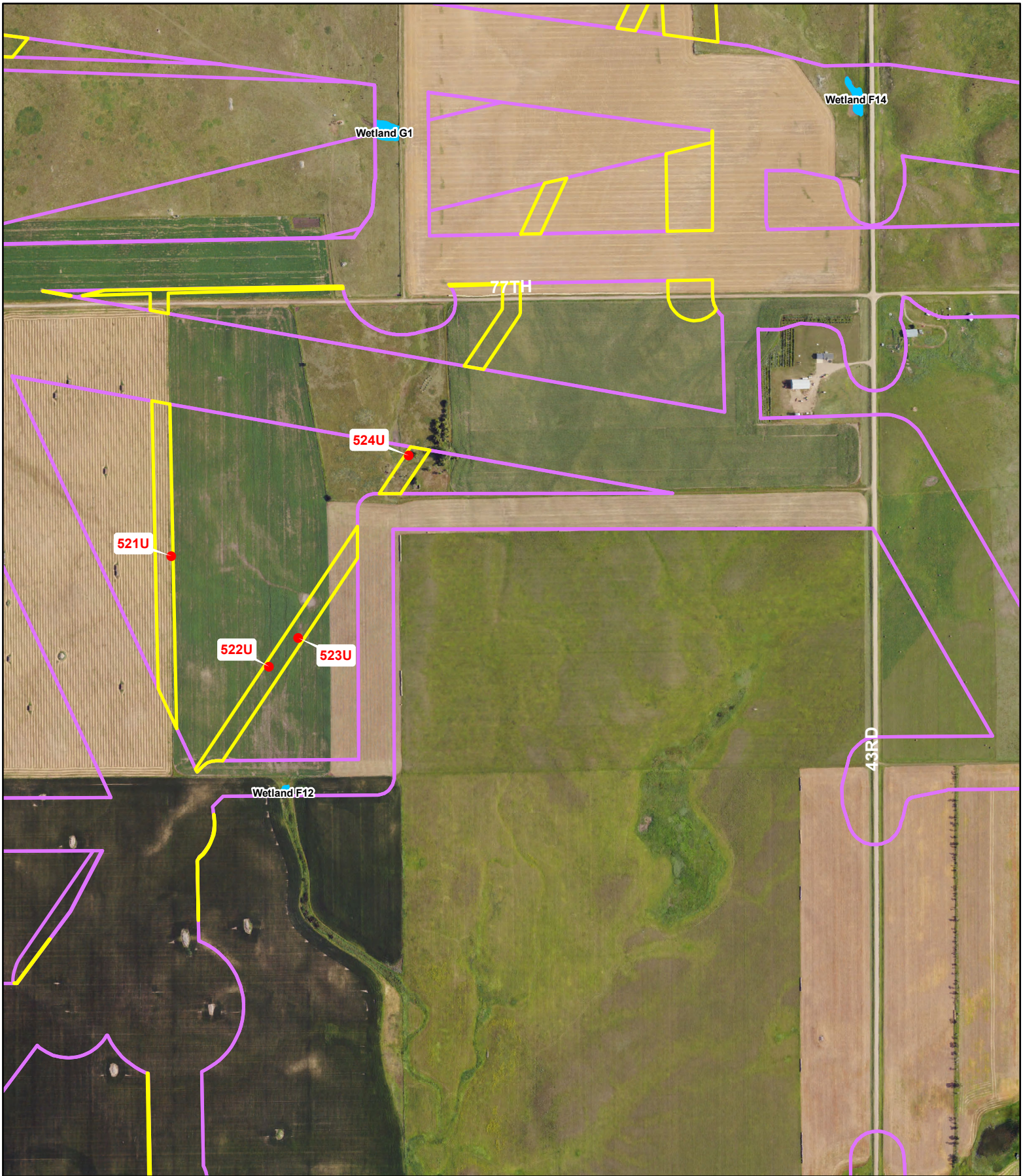
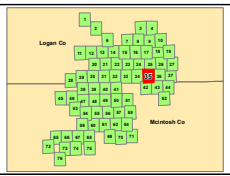


Badger Wind Project

Logan & McIntosh Counties, ND



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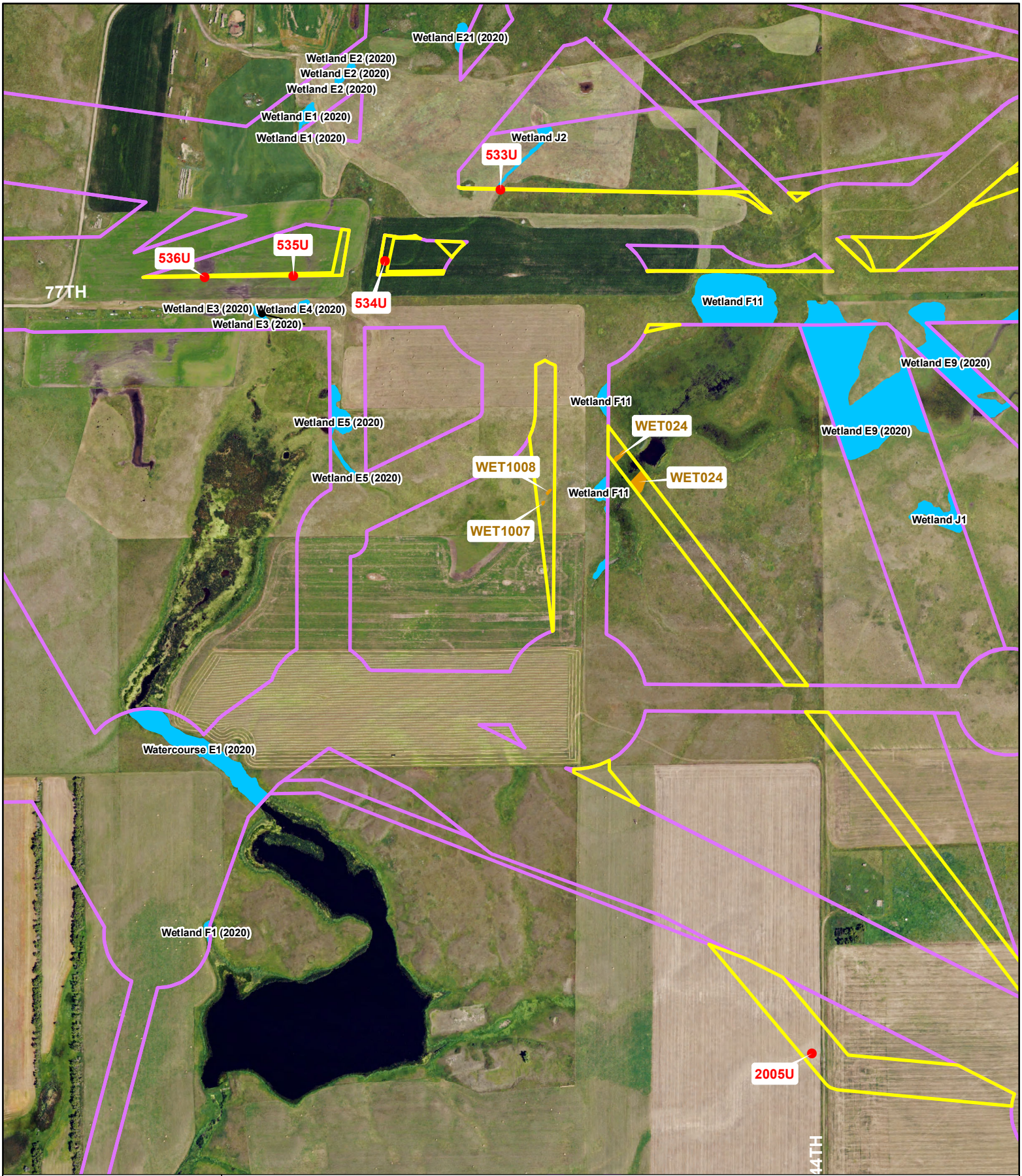
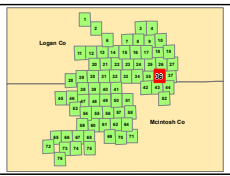


Badger Wind Project

Logan & McIntosh Counties, ND



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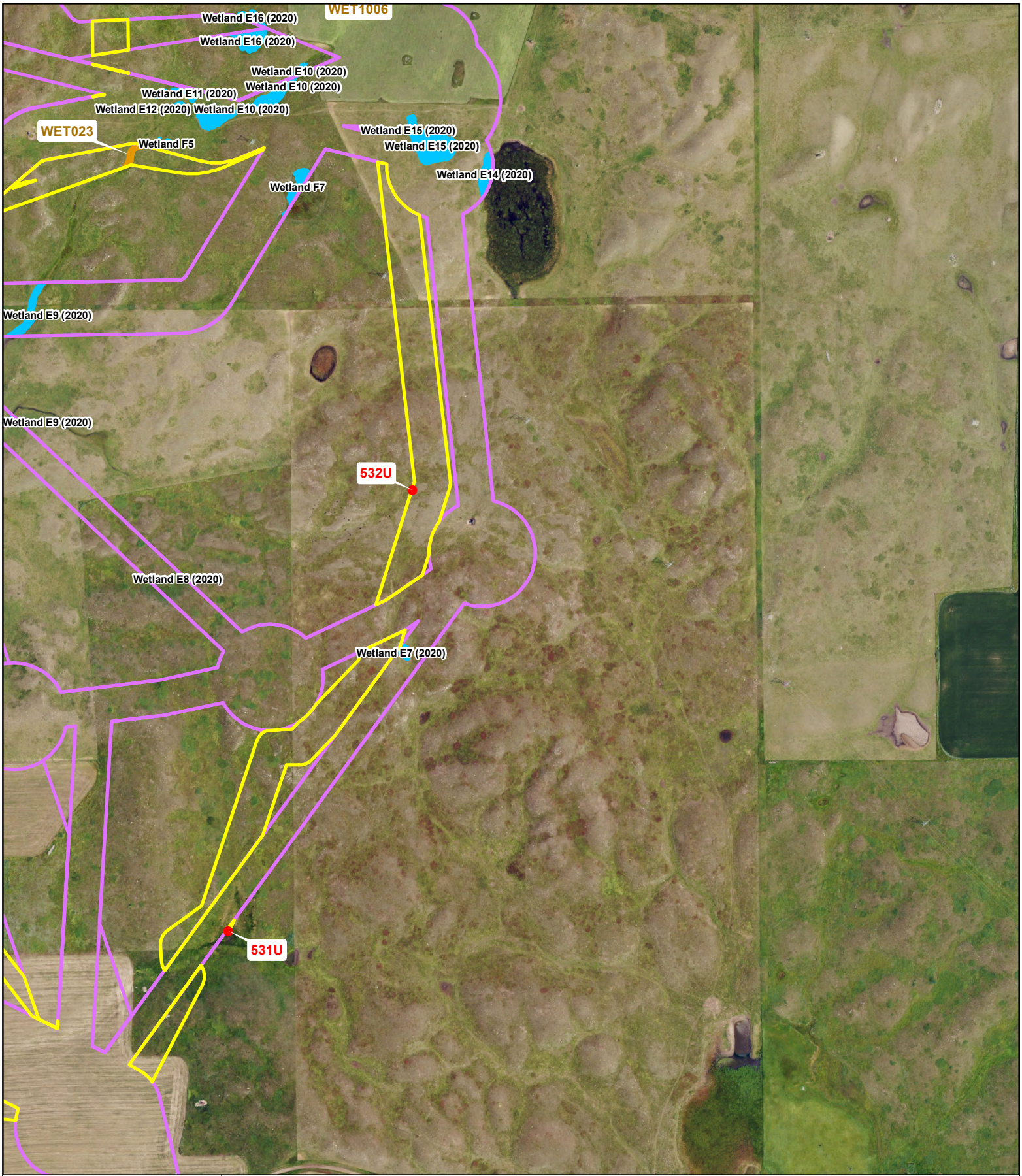
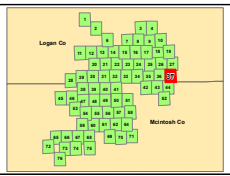


Badger Wind Project

Logan & McIntosh Counties, ND



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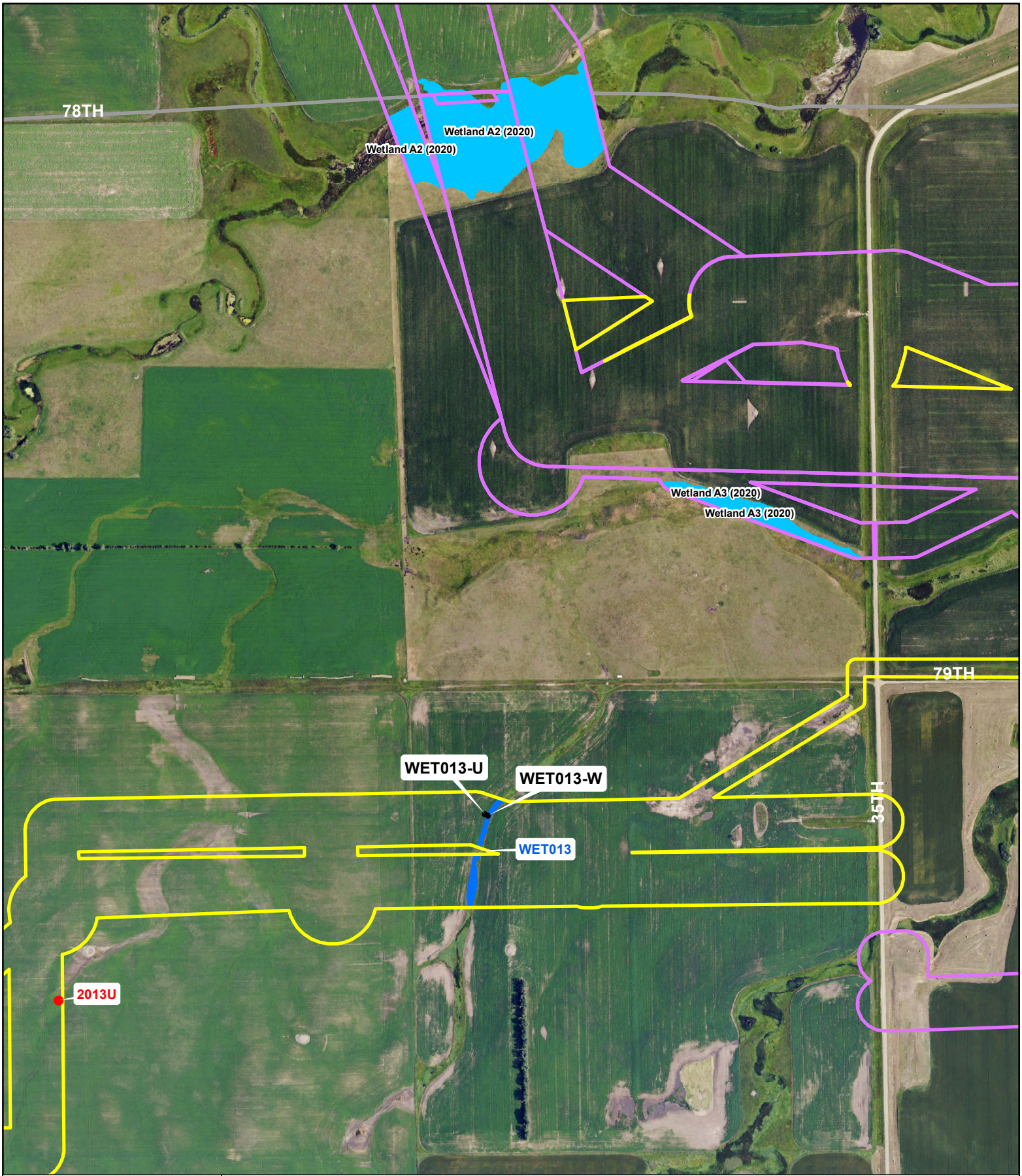
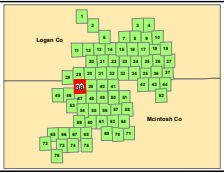


Badger Wind Project

Logan & McIntosh Counties, ND



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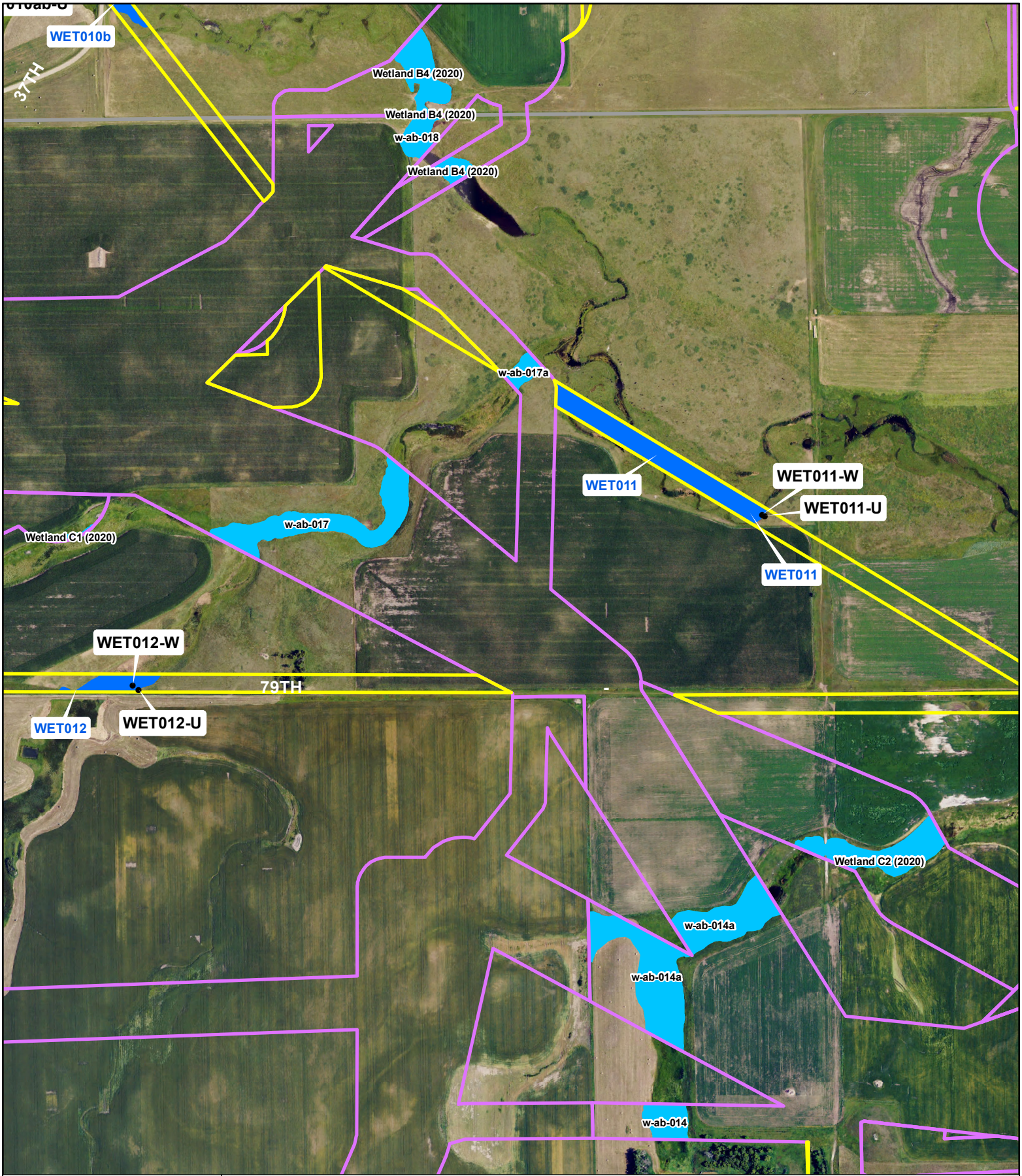
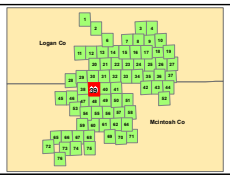


Badger Wind Project

Logan & McIntosh Counties, ND



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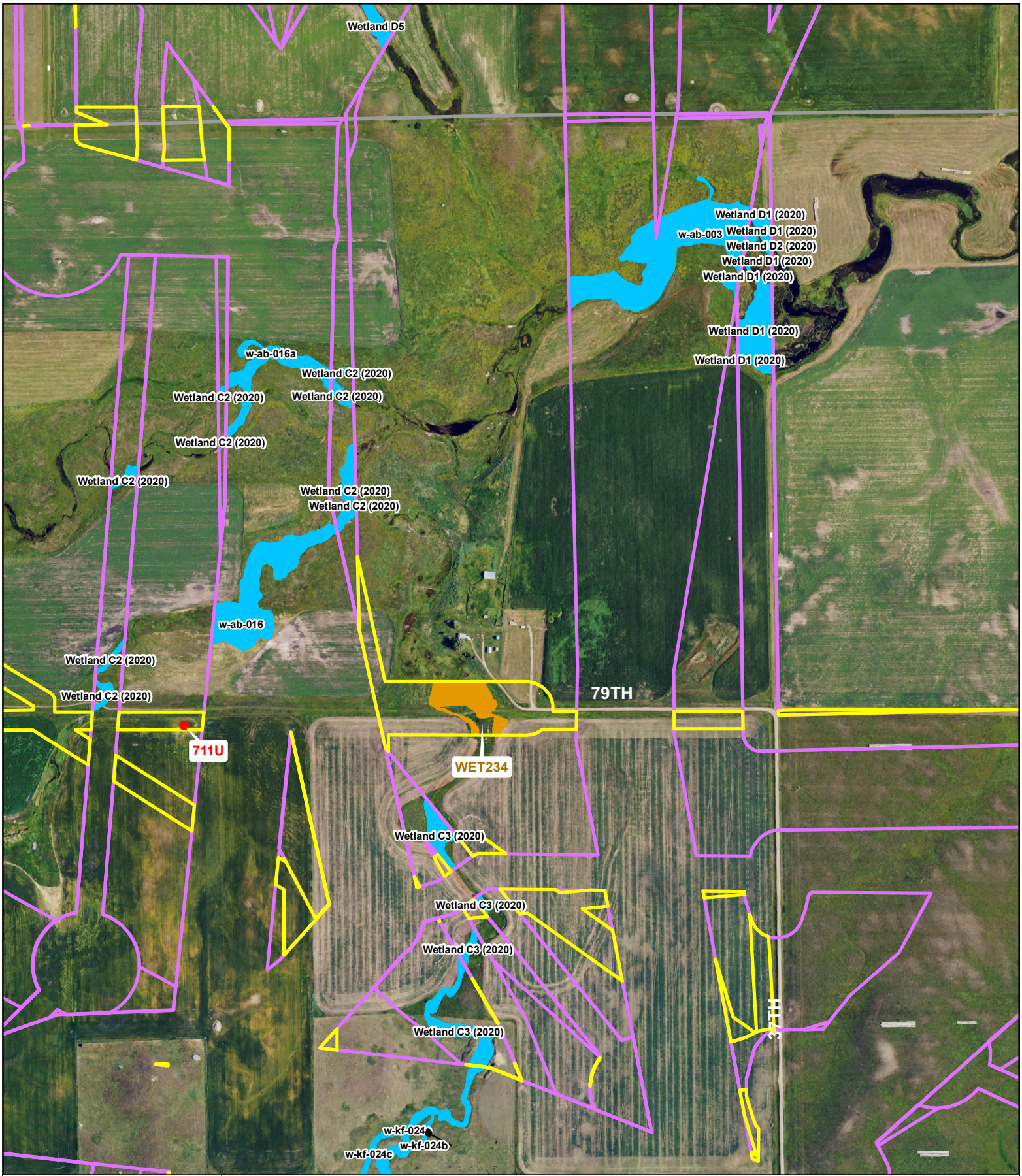
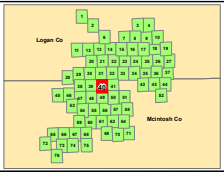


Badger Wind Project

Logan & McIntosh Counties, ND



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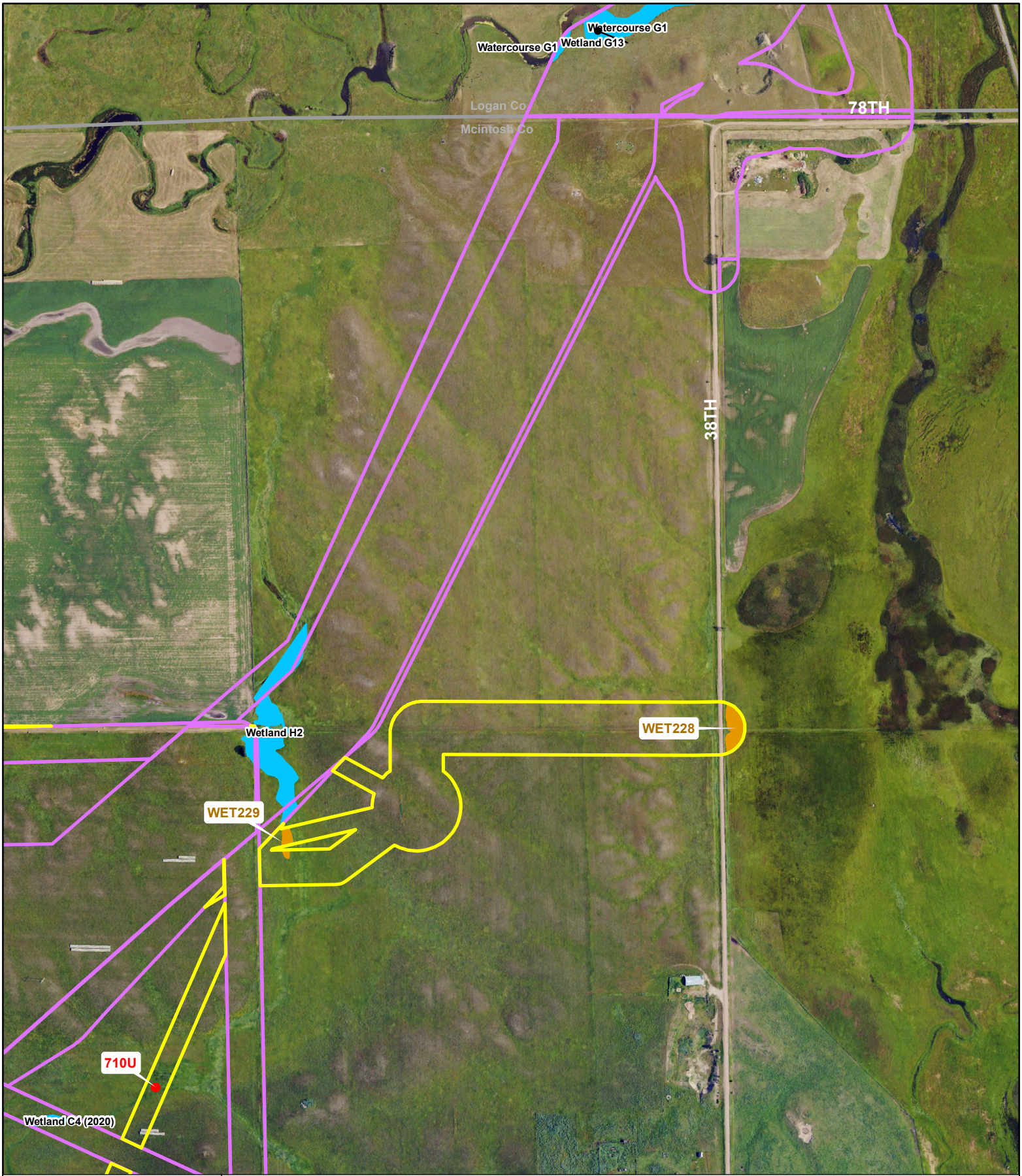

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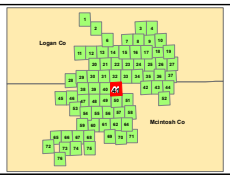
Logan & McIntosh Counties, ND



2023 Wetland Survey Area

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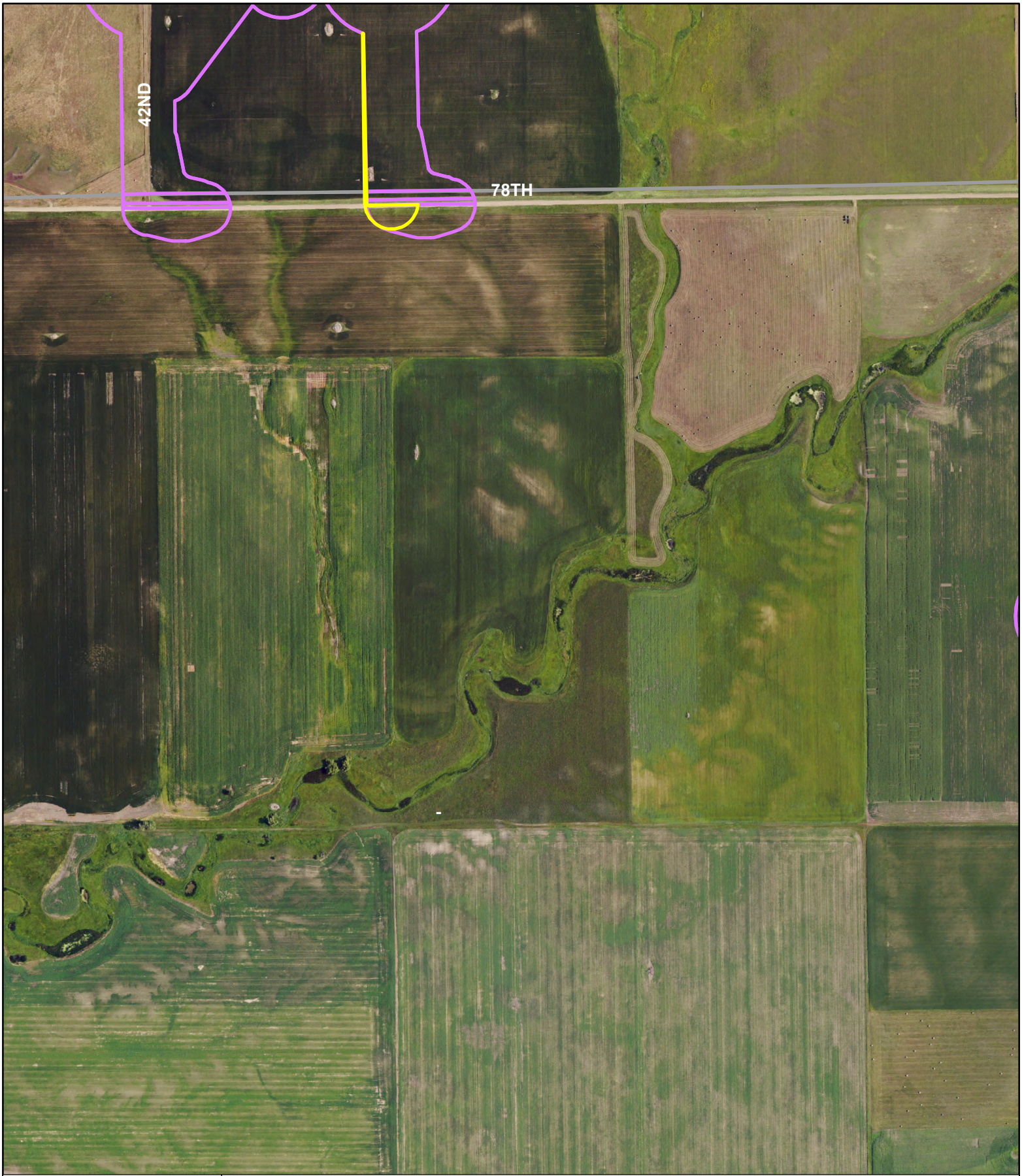
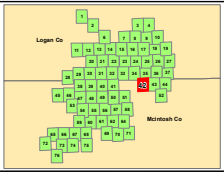


Badger Wind Project

Logan & McIntosh Counties, ND



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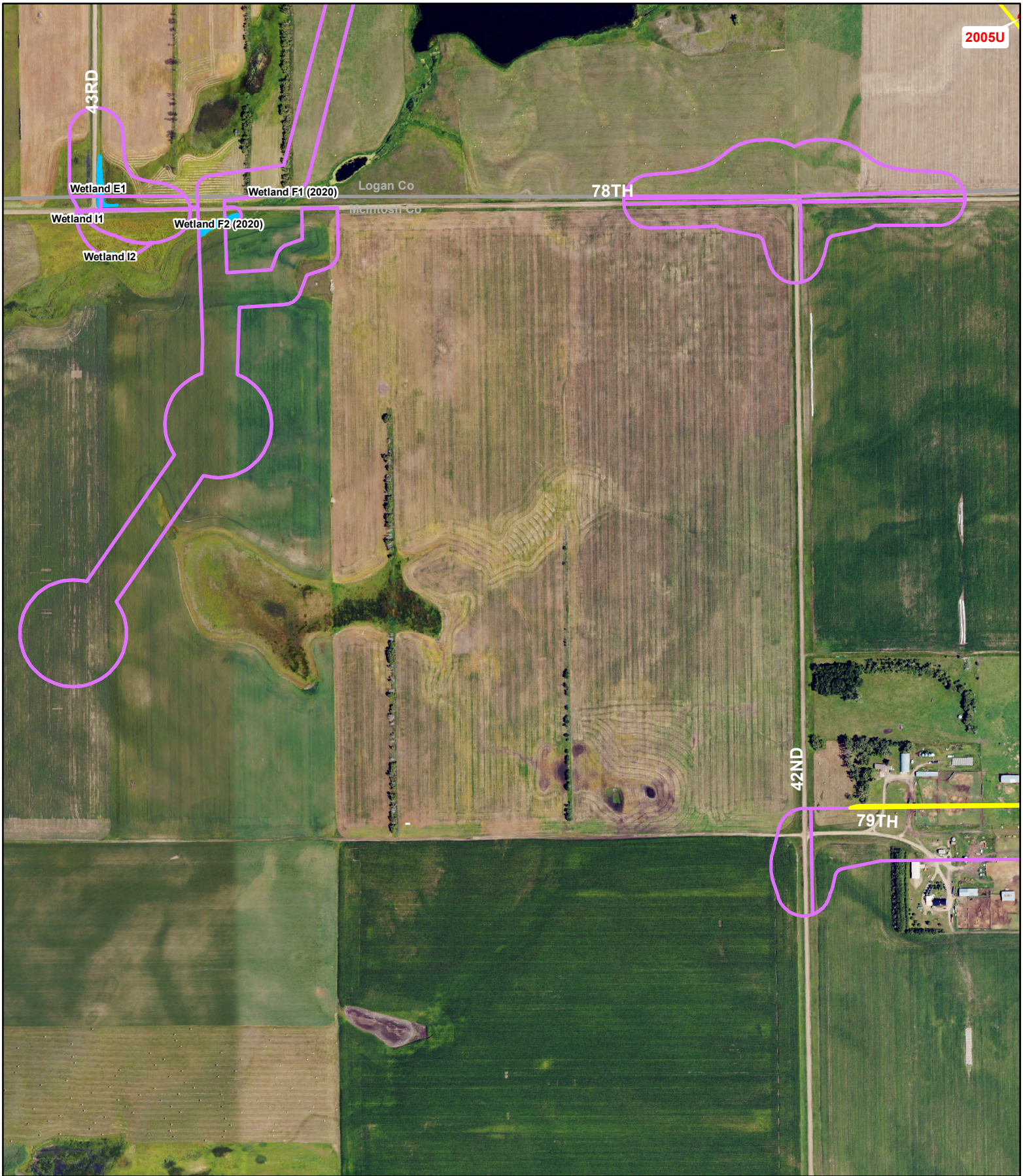

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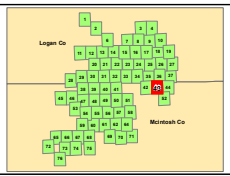

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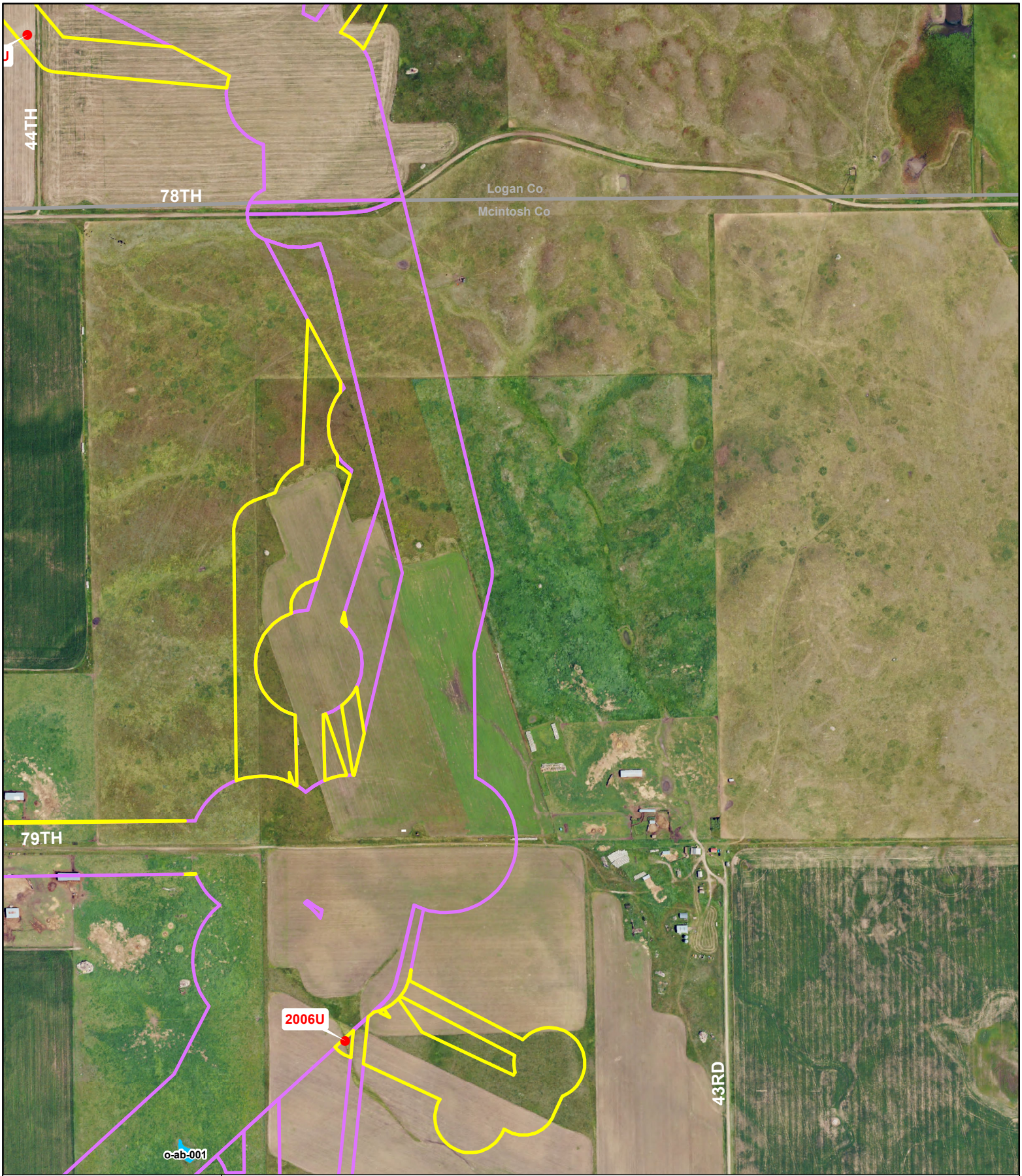

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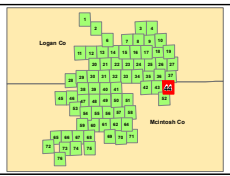
Logan & McIntosh Counties, ND



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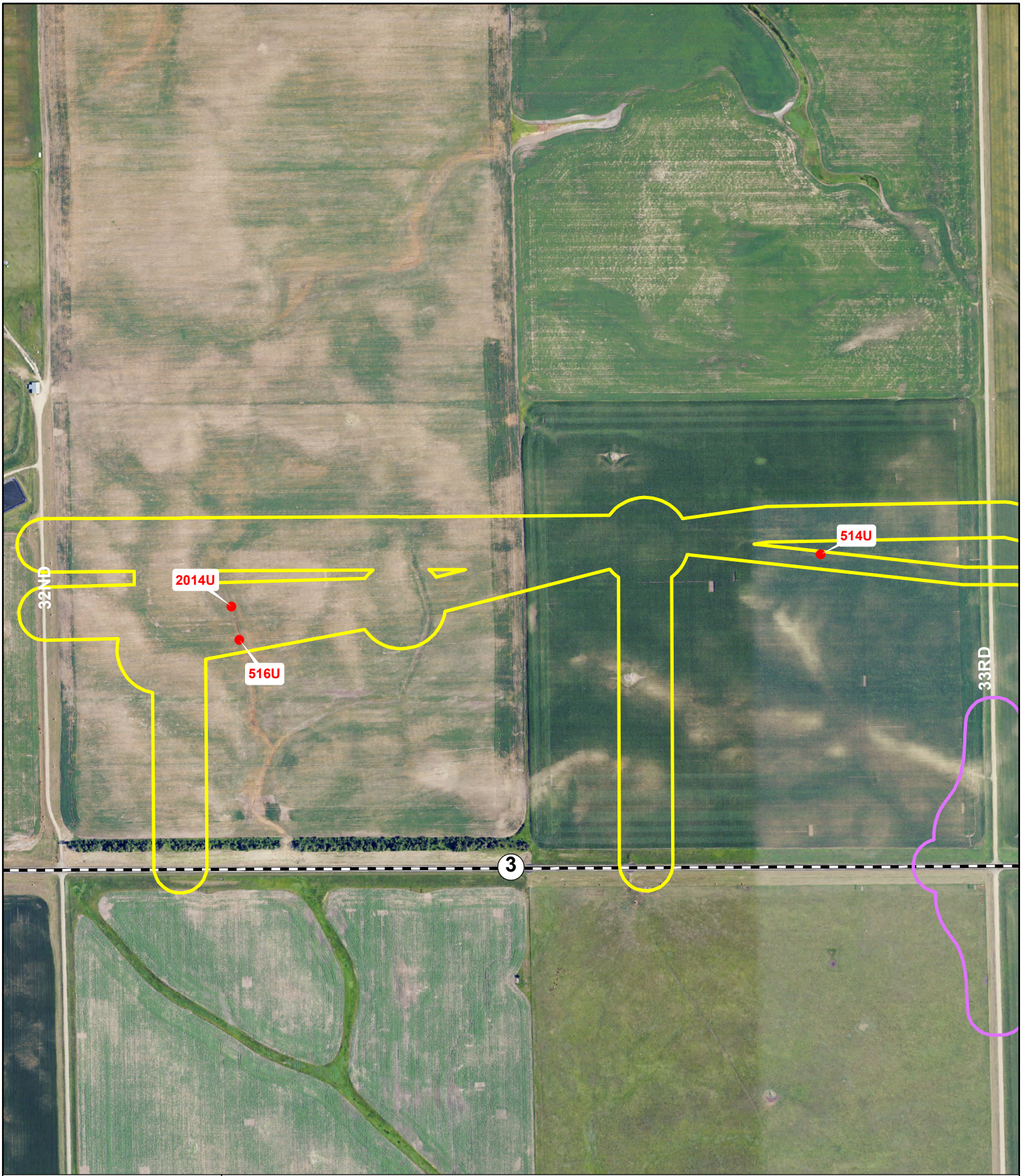
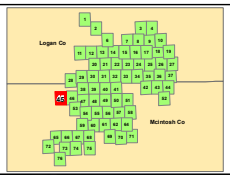


Badger Wind Project

Logan & McIntosh Counties, ND



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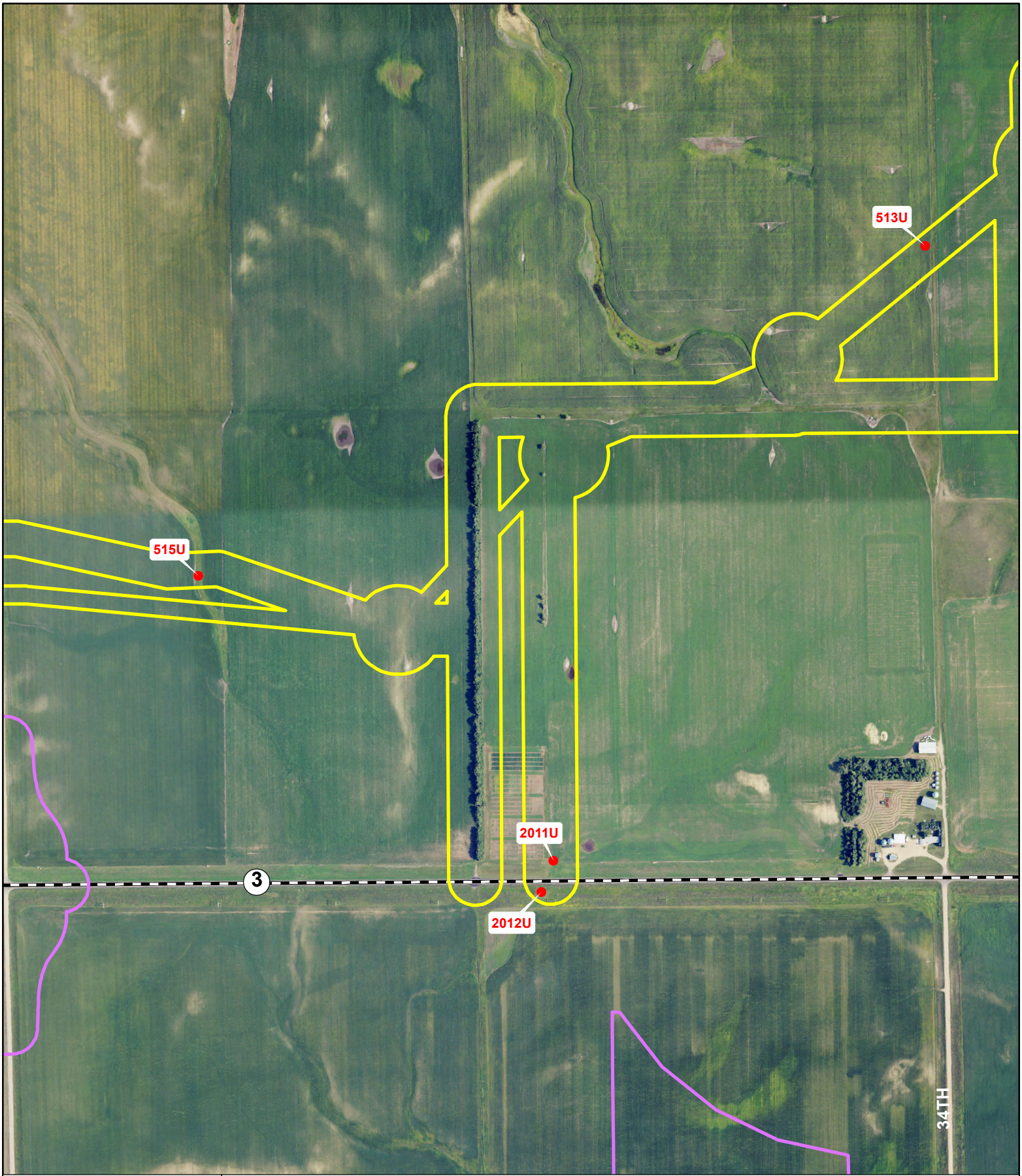

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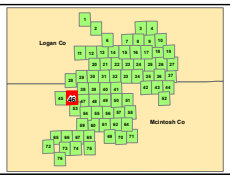

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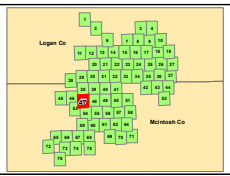

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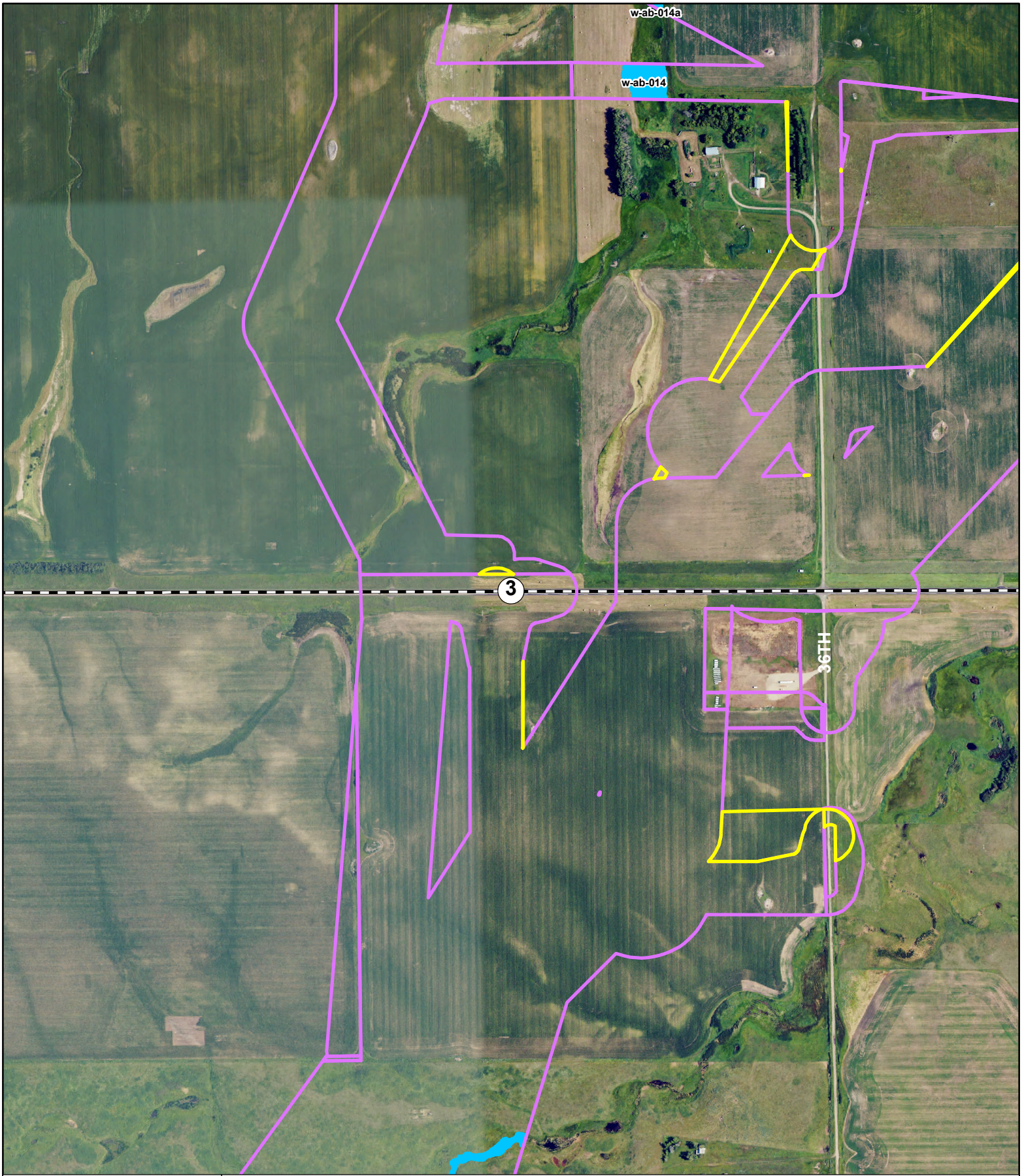

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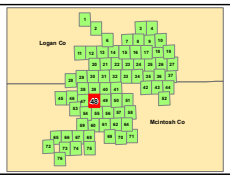

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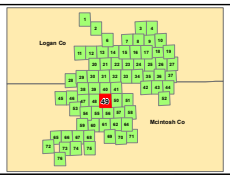
Logan & McIntosh Counties, ND



2023 Wetland Survey Area

2023 Surveyed Wetlands

Field Delineated

Field Mapped

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Wetland Survey Area

Pre 2023 Surveyed Wetlands

Field Delineated

County Boundary

State Highway

N W E S

0 0.1 0.2 mi

0 0.2 0.4 km

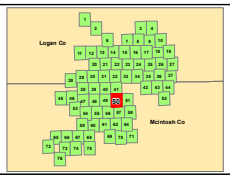
Data Source: NAIP 2023
Coordinate System: UTM, WGS84, zn 14
Map Produced: 01/25/2024. Created by: T. Thorn

WEST



Badger Wind Project

Logan & McIntosh Counties, ND



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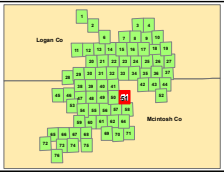

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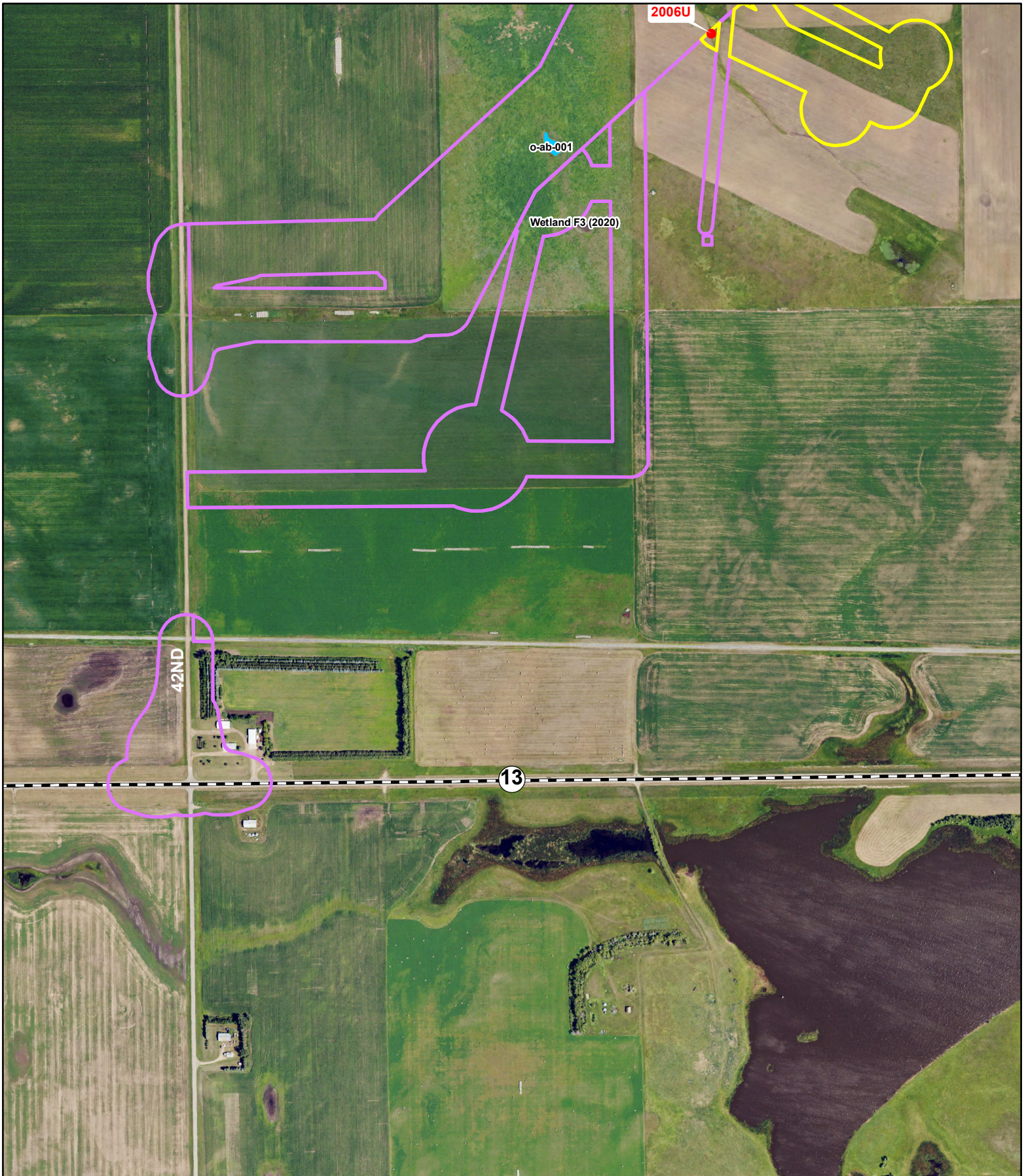
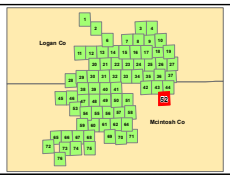


Badger Wind Project

Logan & McIntosh Counties, ND



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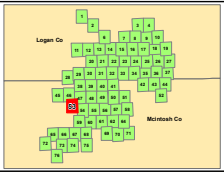

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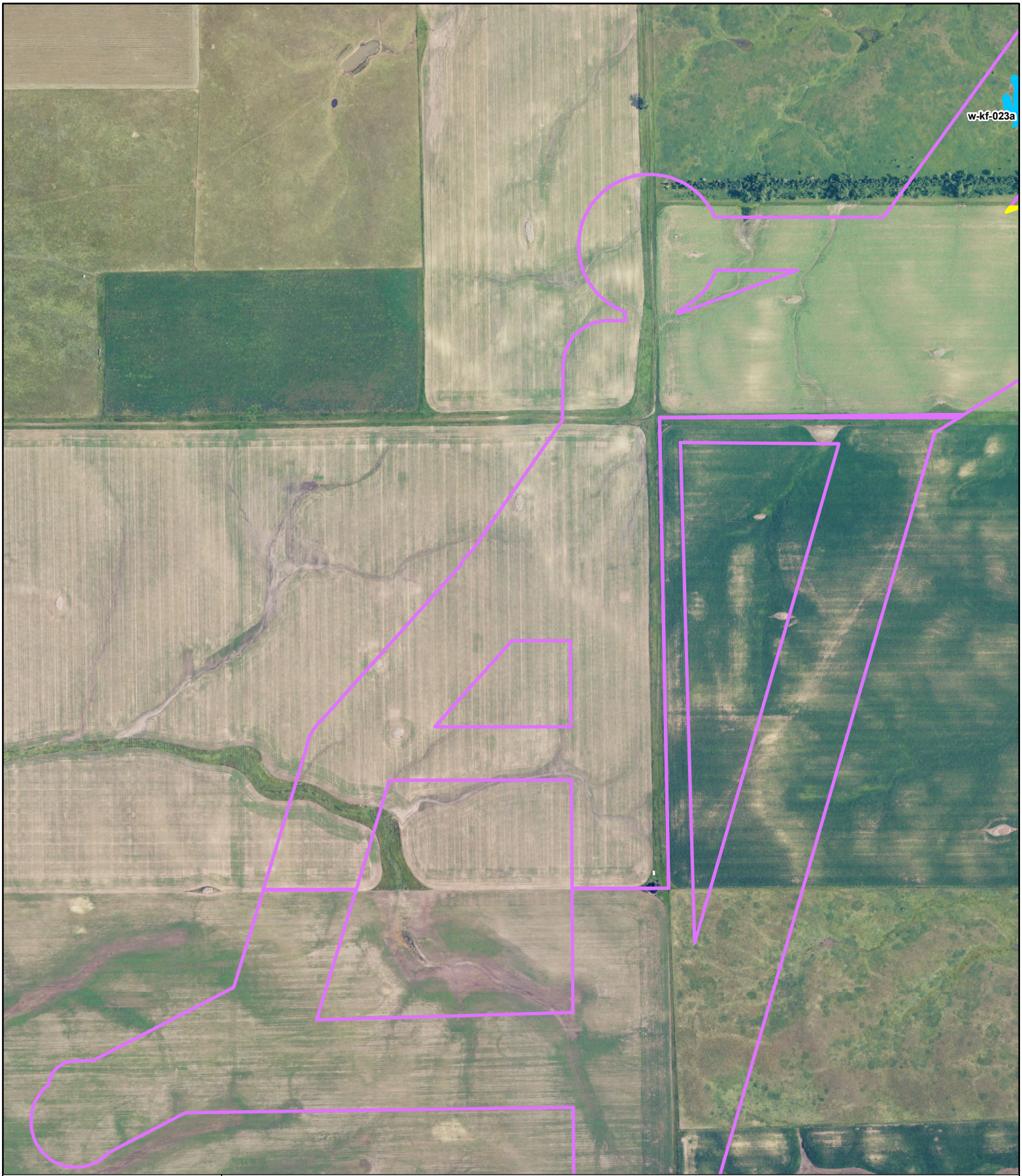

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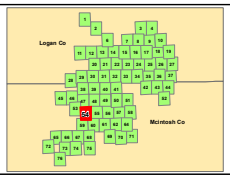
Logan & McIntosh Counties, ND



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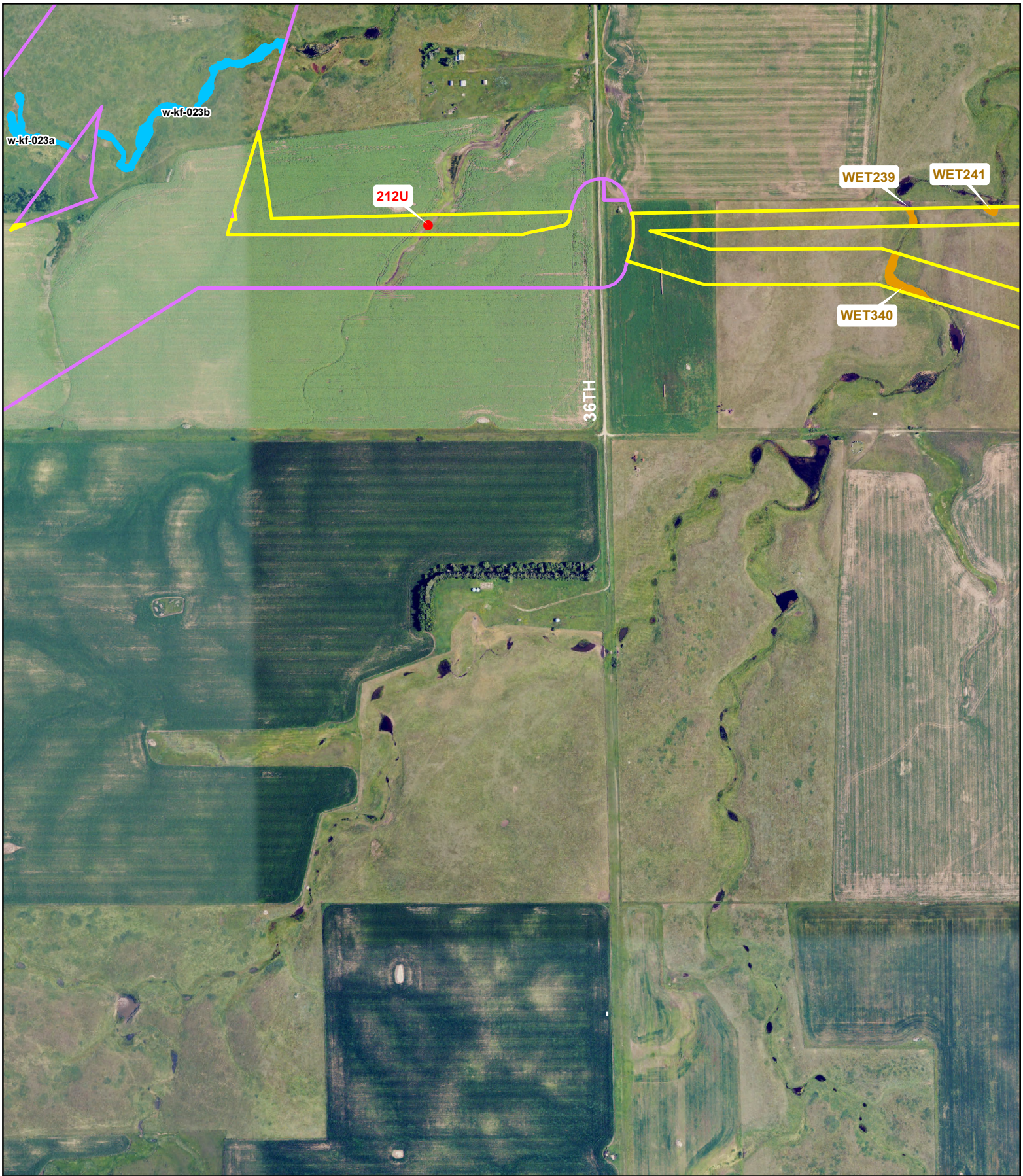

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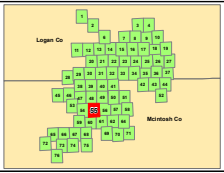
Logan & McIntosh Counties, ND



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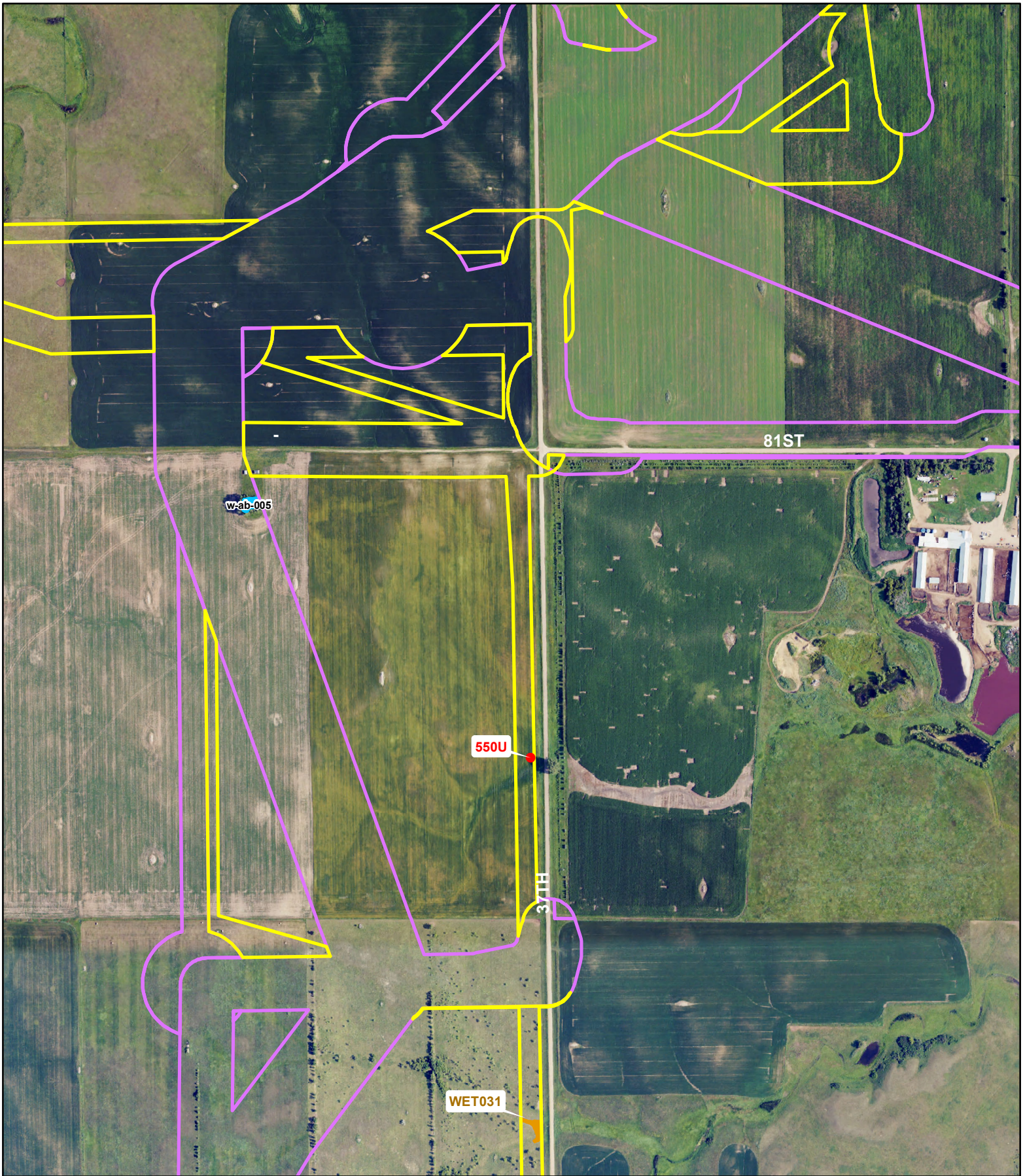

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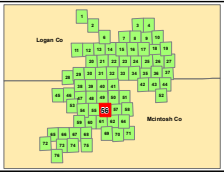
Logan & McIntosh Counties, ND



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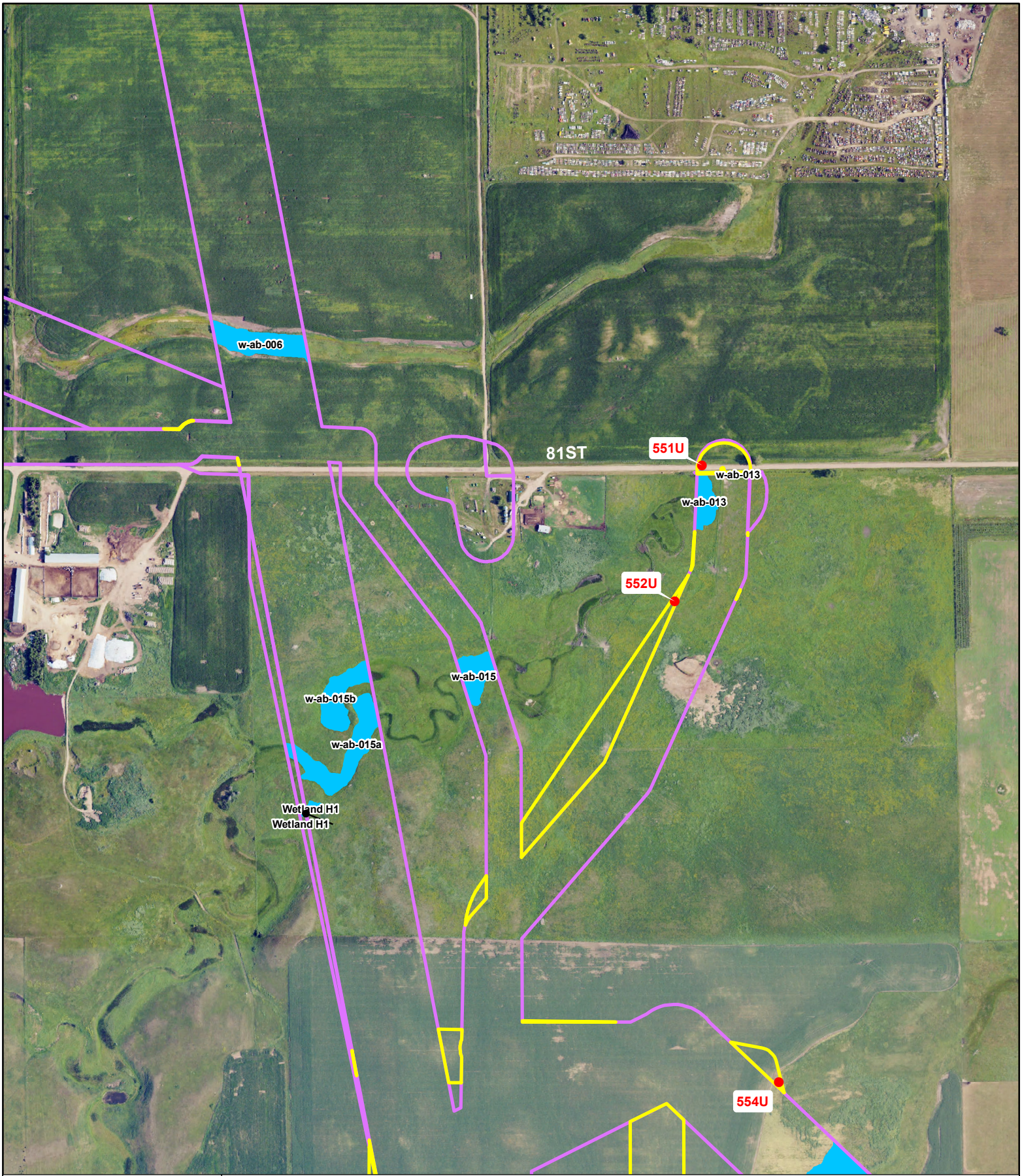

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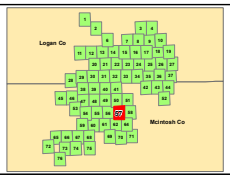

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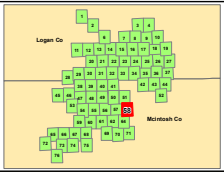

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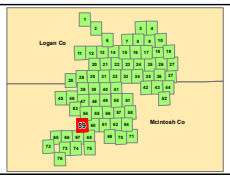

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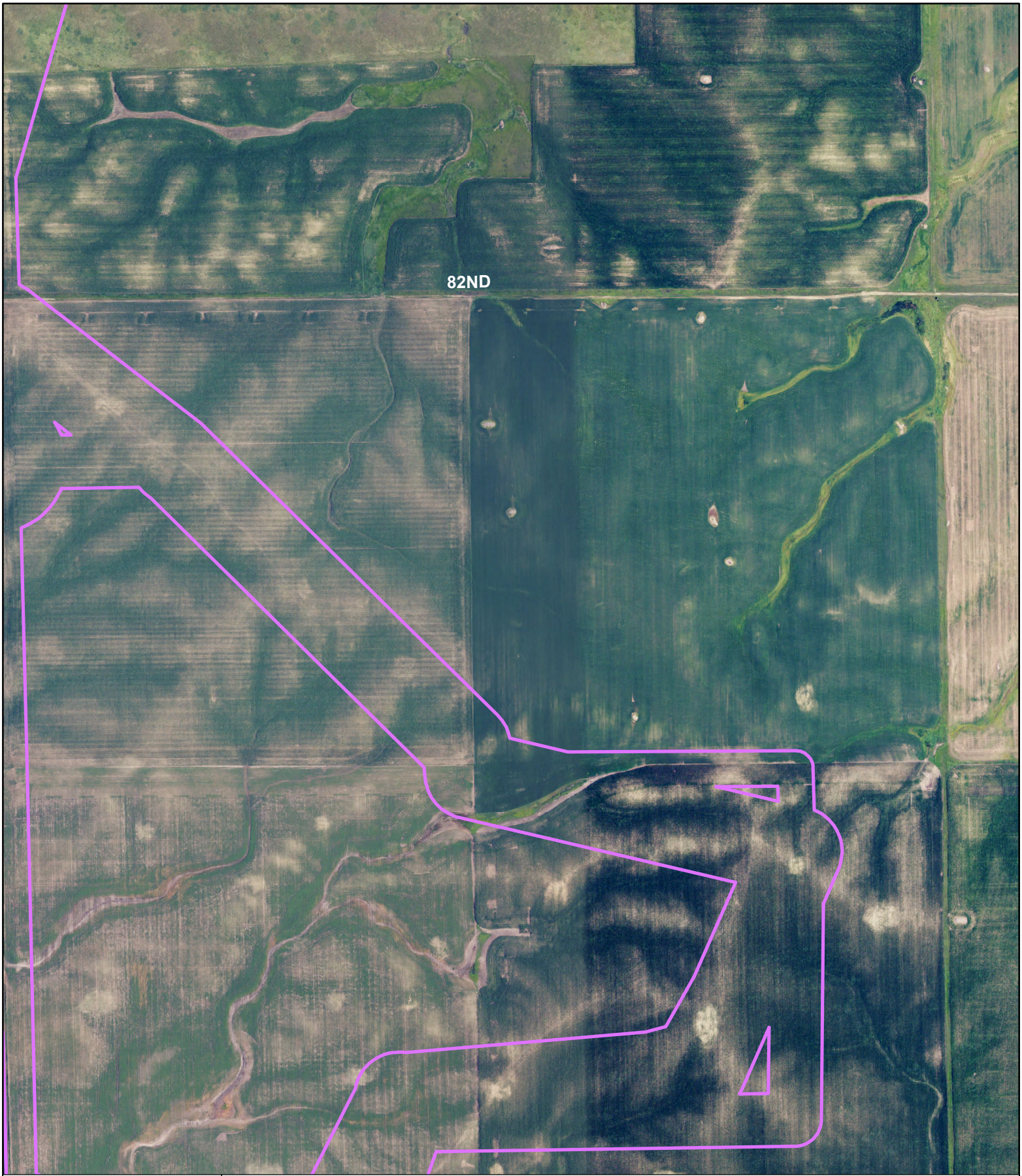

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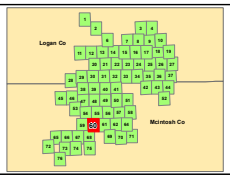
Logan & McIntosh Counties, ND



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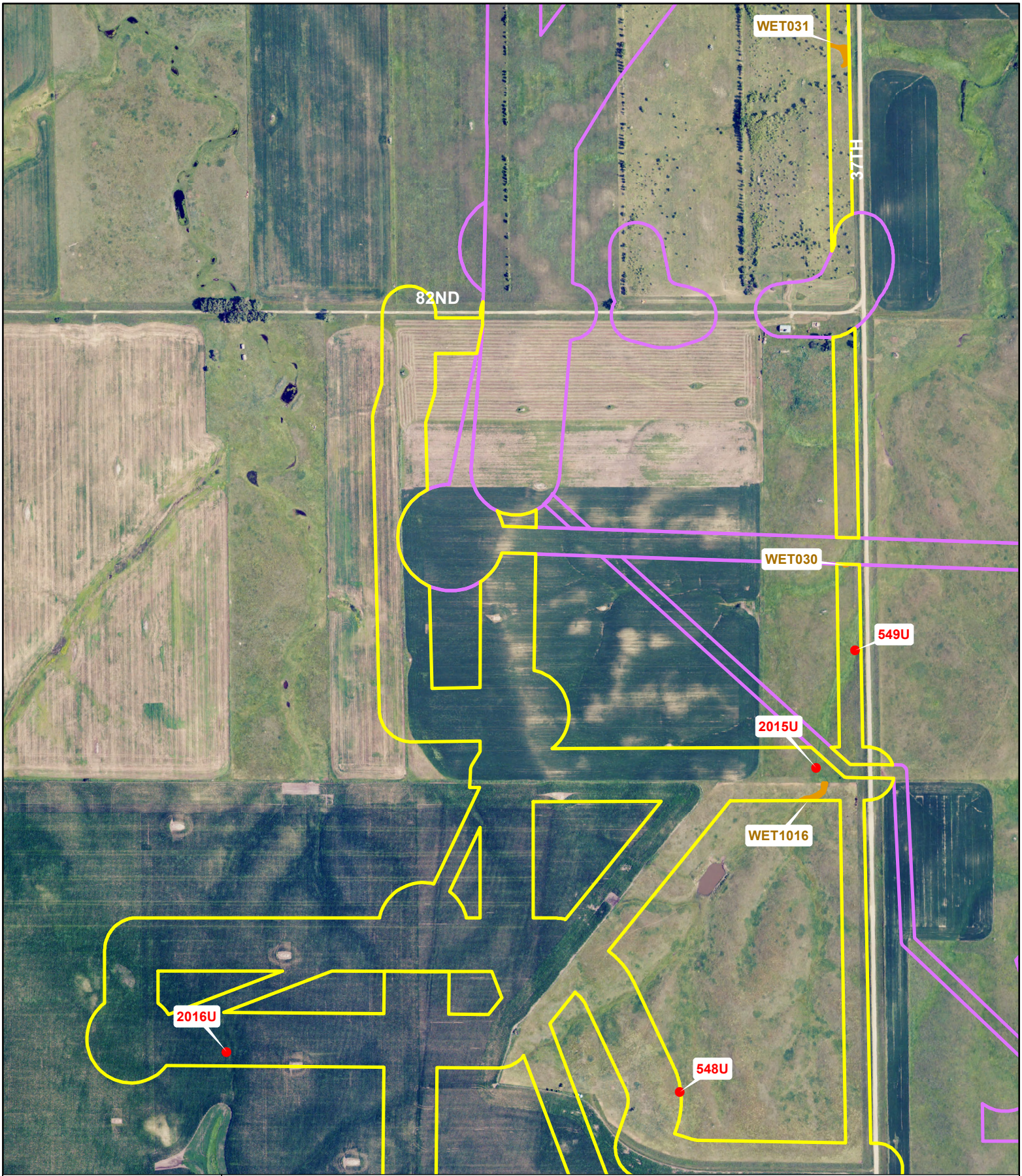

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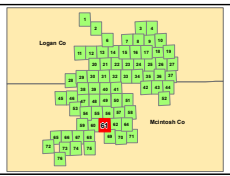

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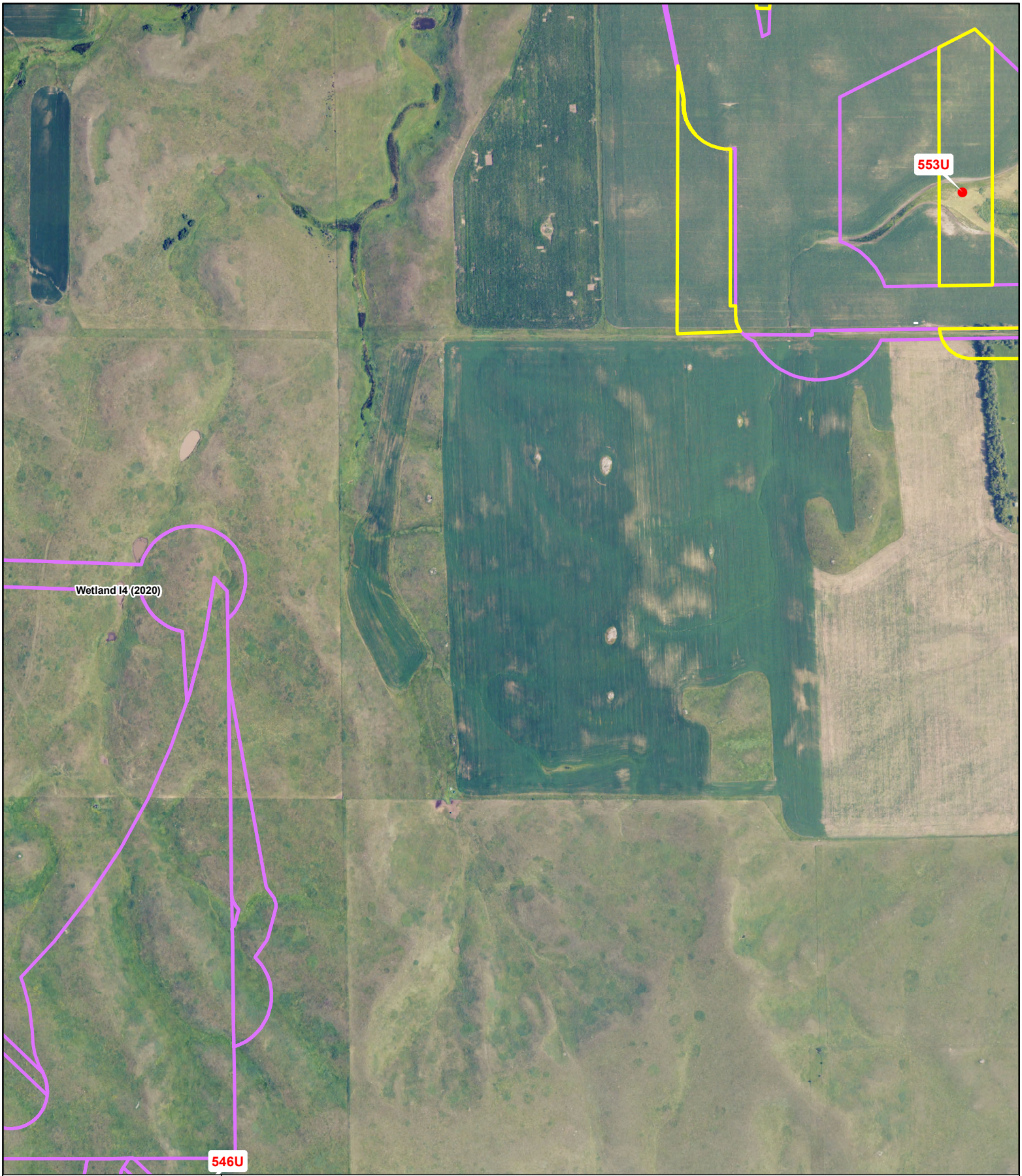

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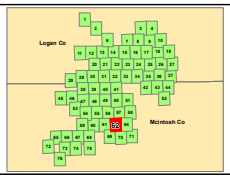

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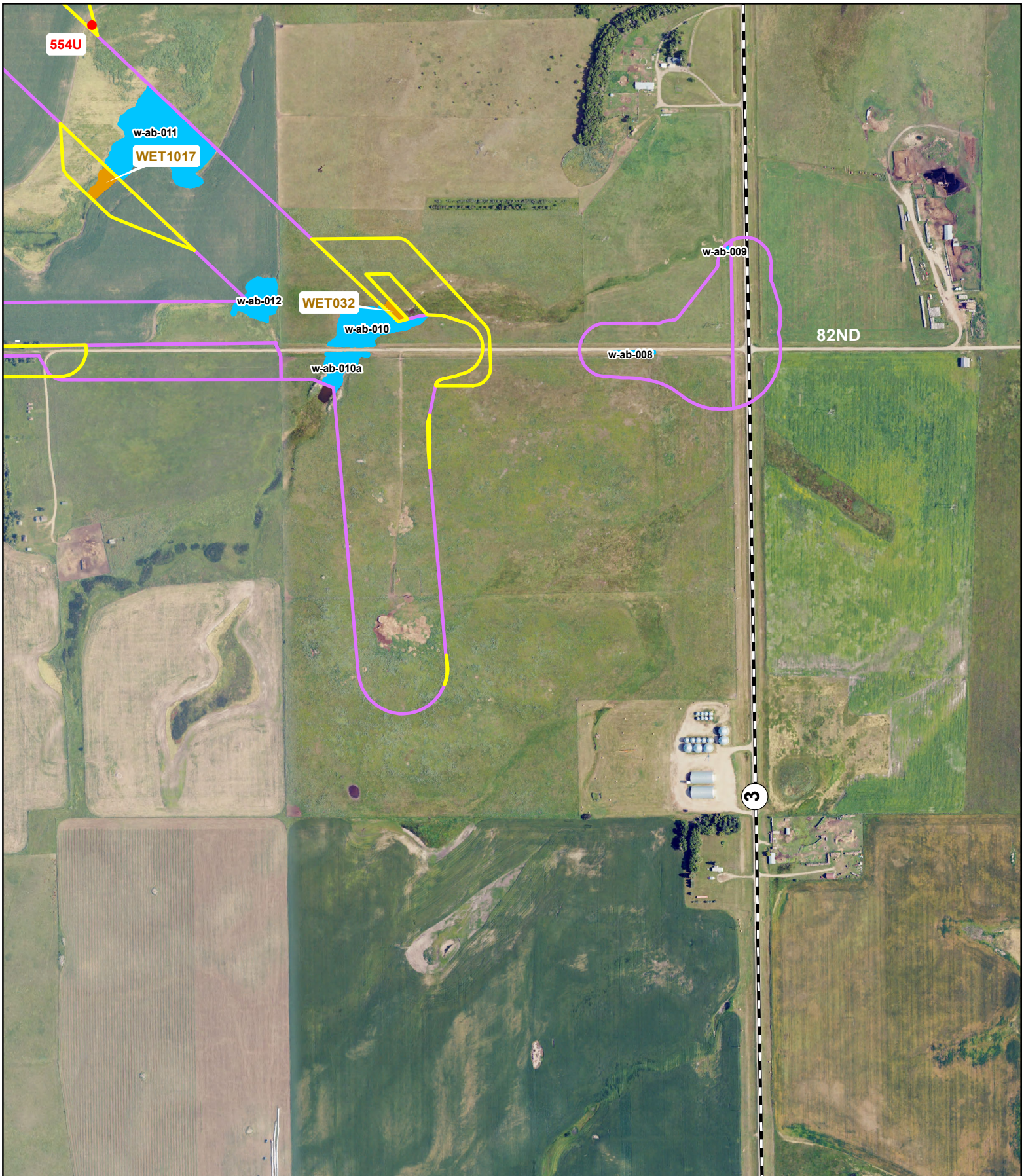

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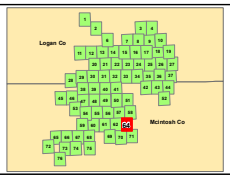

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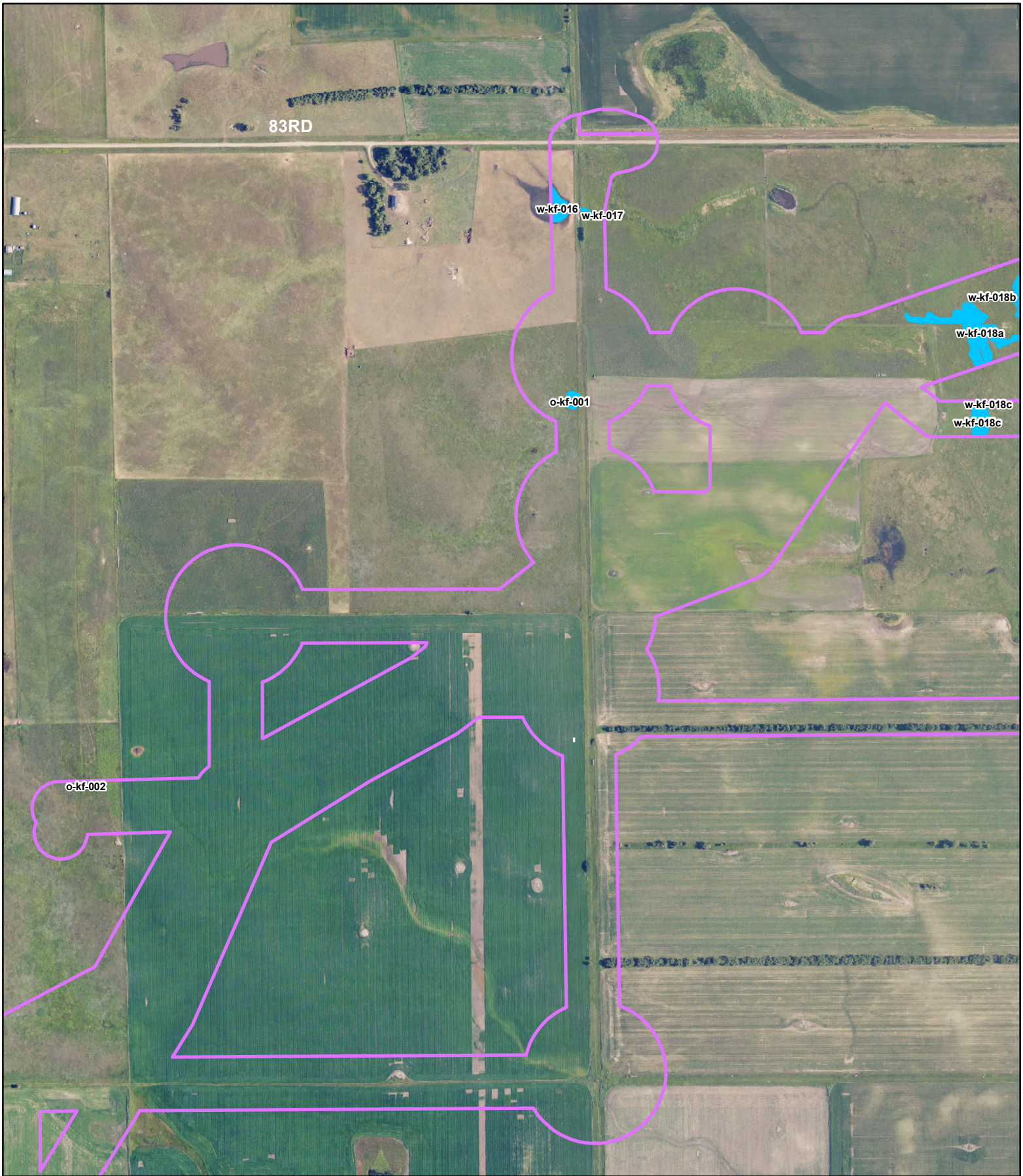

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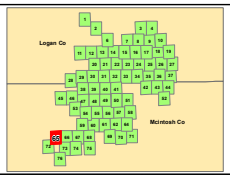

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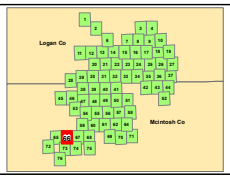

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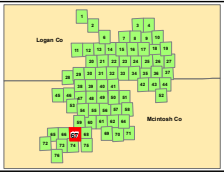

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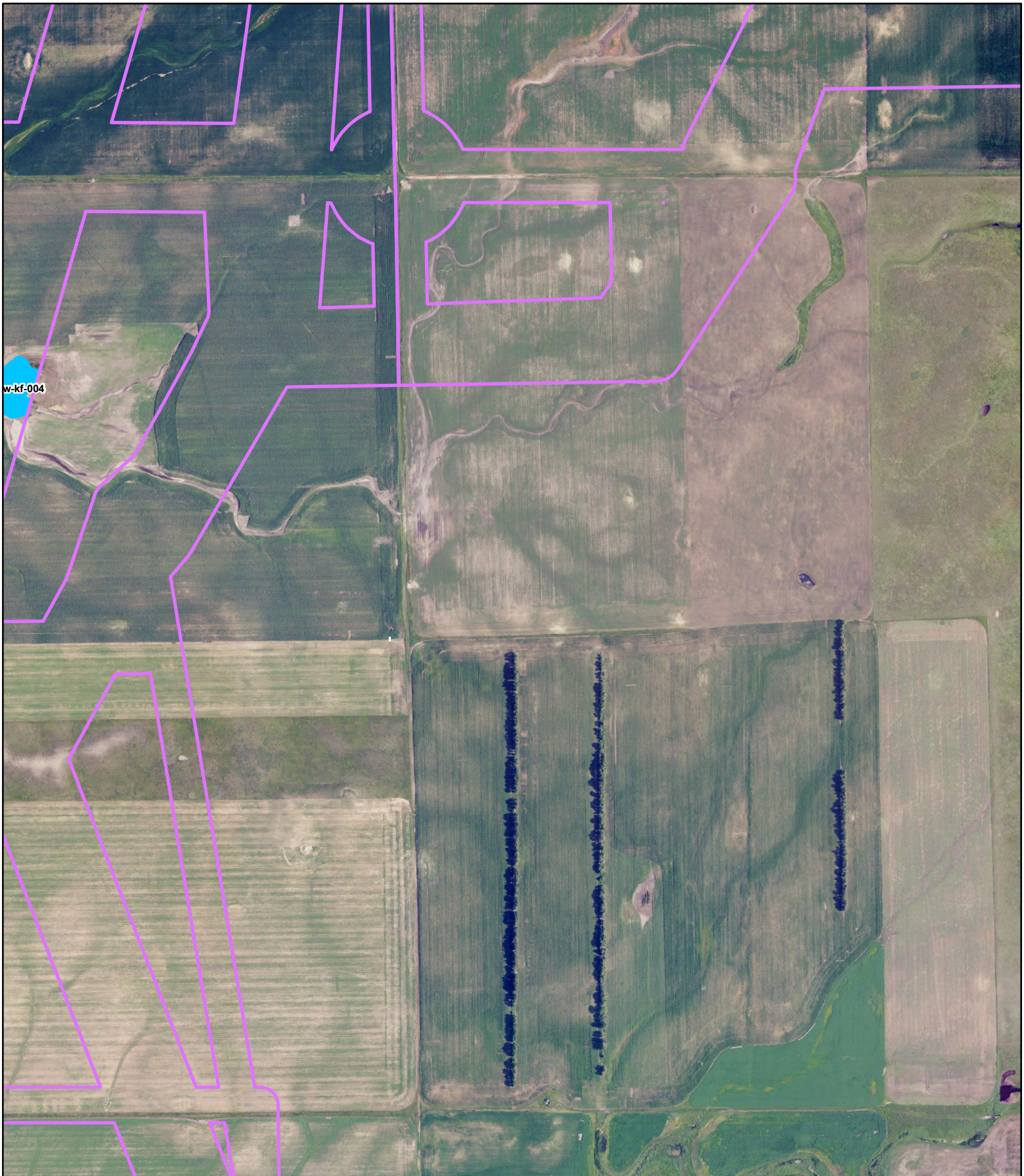

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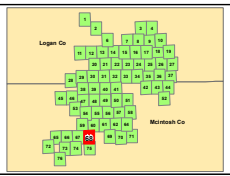

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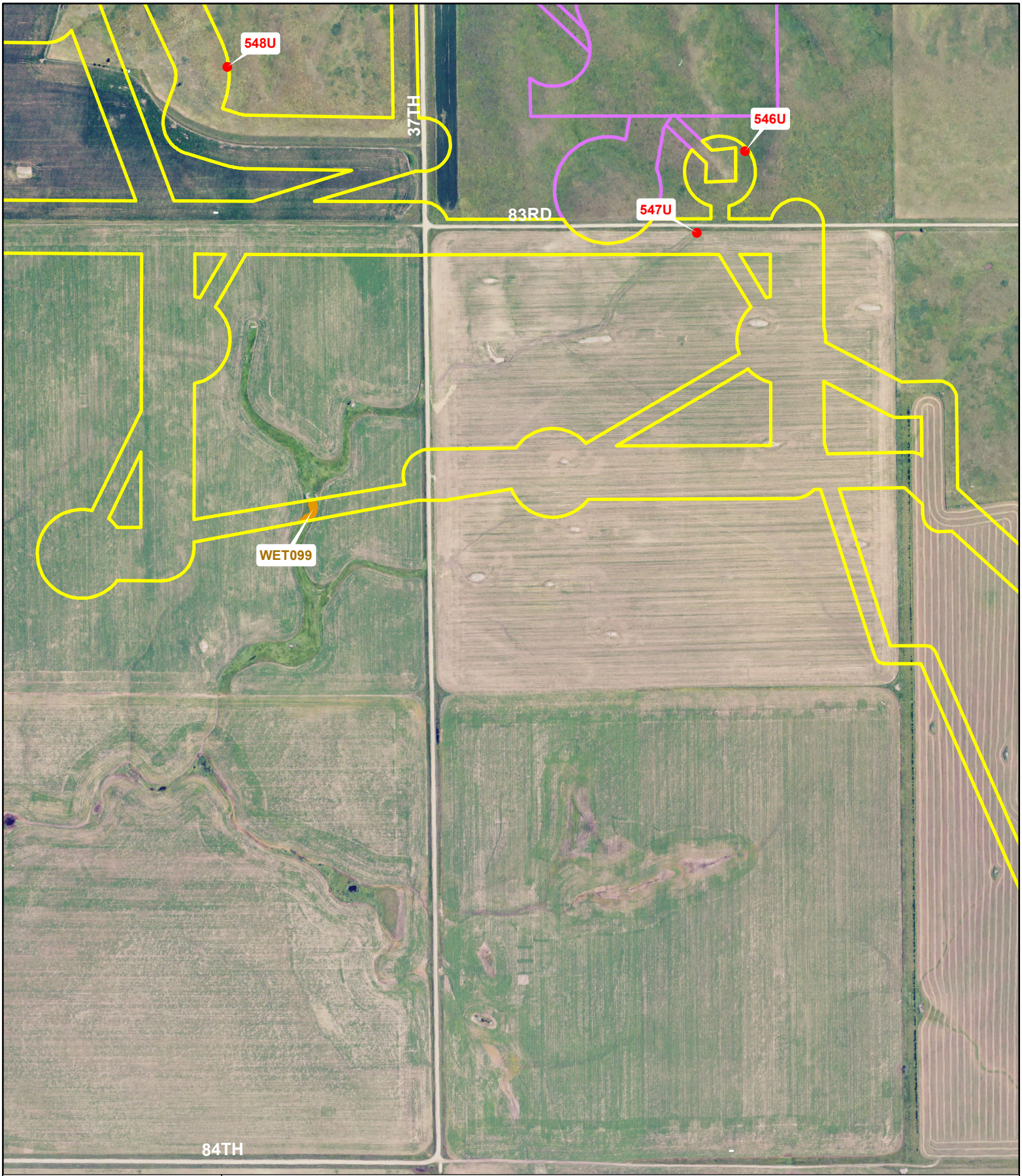

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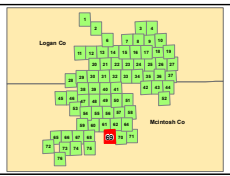
Logan & McIntosh Counties, ND



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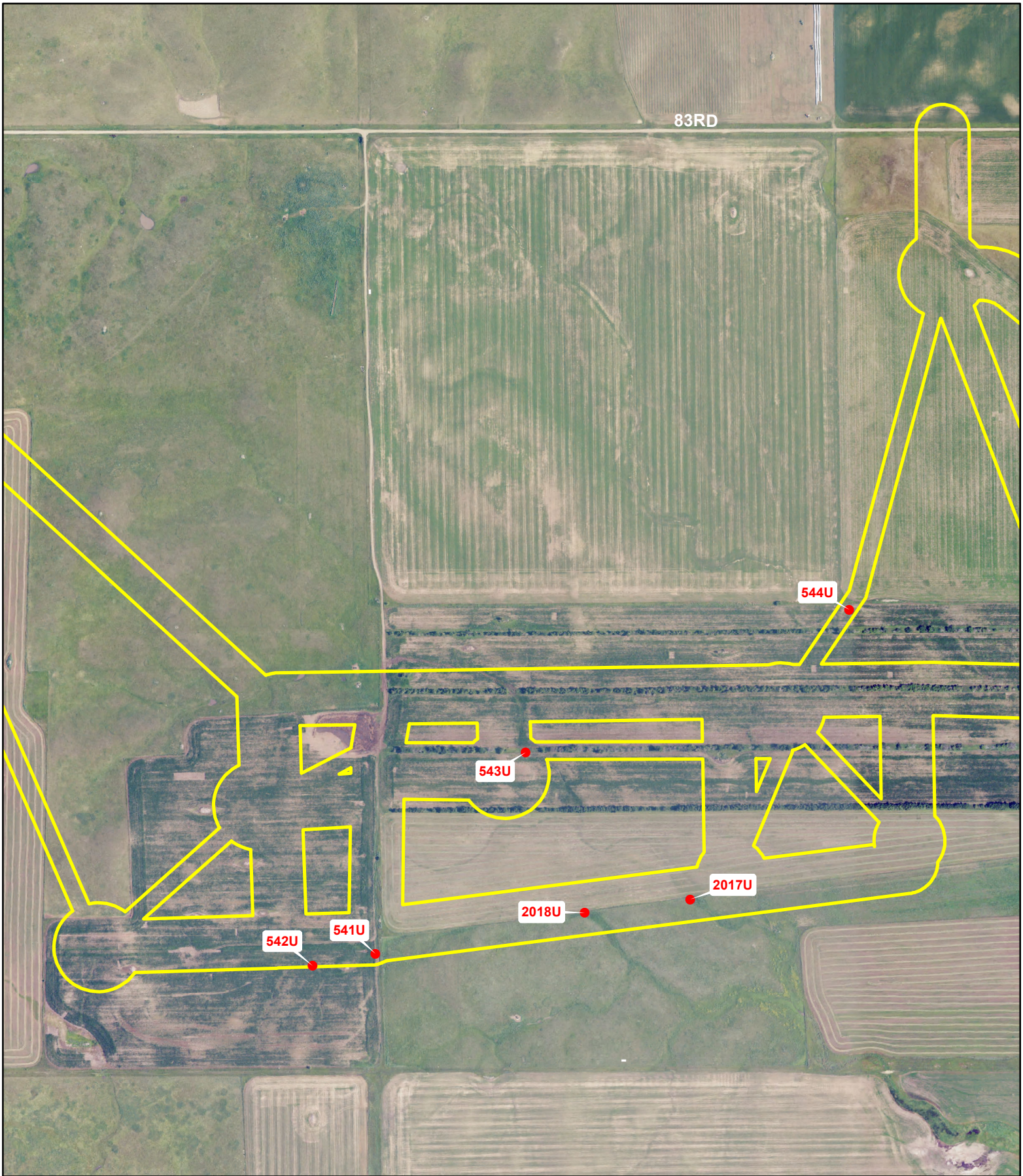

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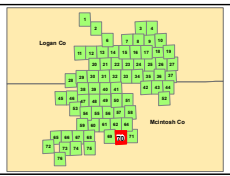

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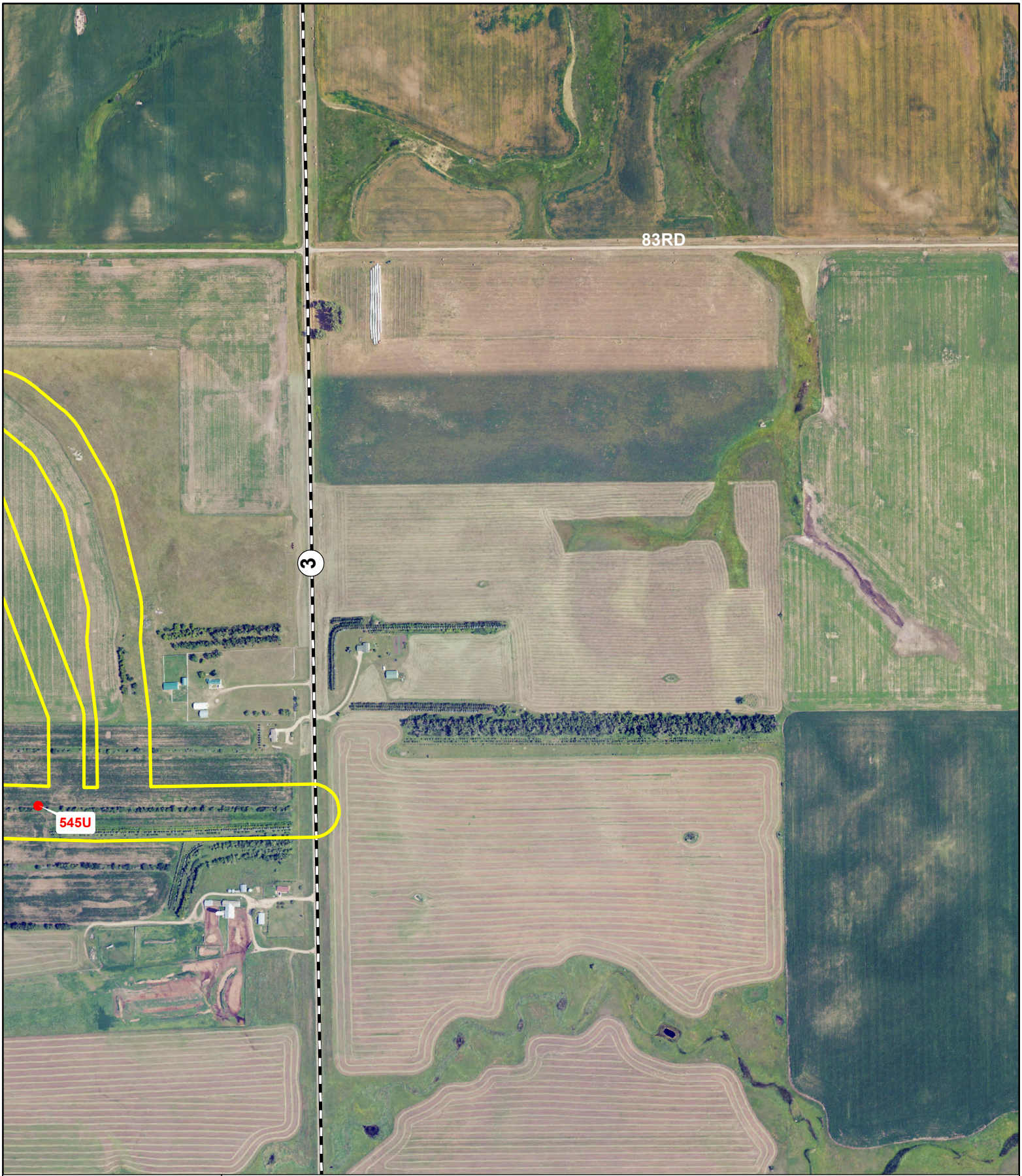
0 0.1 0.2 mi

0 0.2 0.4 km

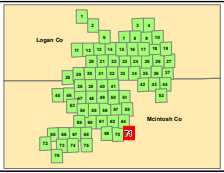
Data Source: NAIP 2023
Coordinate System: UTM, WGS84, zn 14
Map Produced: 01/25/2024. Created by: T. Thorn

WEST



Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

2023 Surveyed Wetlands

Field Delineated

Field Mapped

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Wetland Survey Area

Pre 2023 Surveyed Wetlands

Field Delineated

County Boundary

State Highway

N W E S

0 0.1 0.2 mi

0 0.2 0.4 km

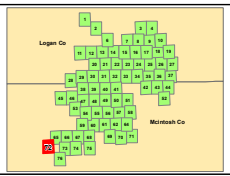
Data Source: NAIP 2023
Coordinate System: UTM, WGS84, zn 14
Map Produced: 01/25/2024. Created by: T. Thorn

WEST



Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

2023 Surveyed Wetlands

Field Delineated

Field Mapped

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Wetland Survey Area

Pre 2023 Surveyed Wetlands

Field Delineated

County Boundary

State Highway

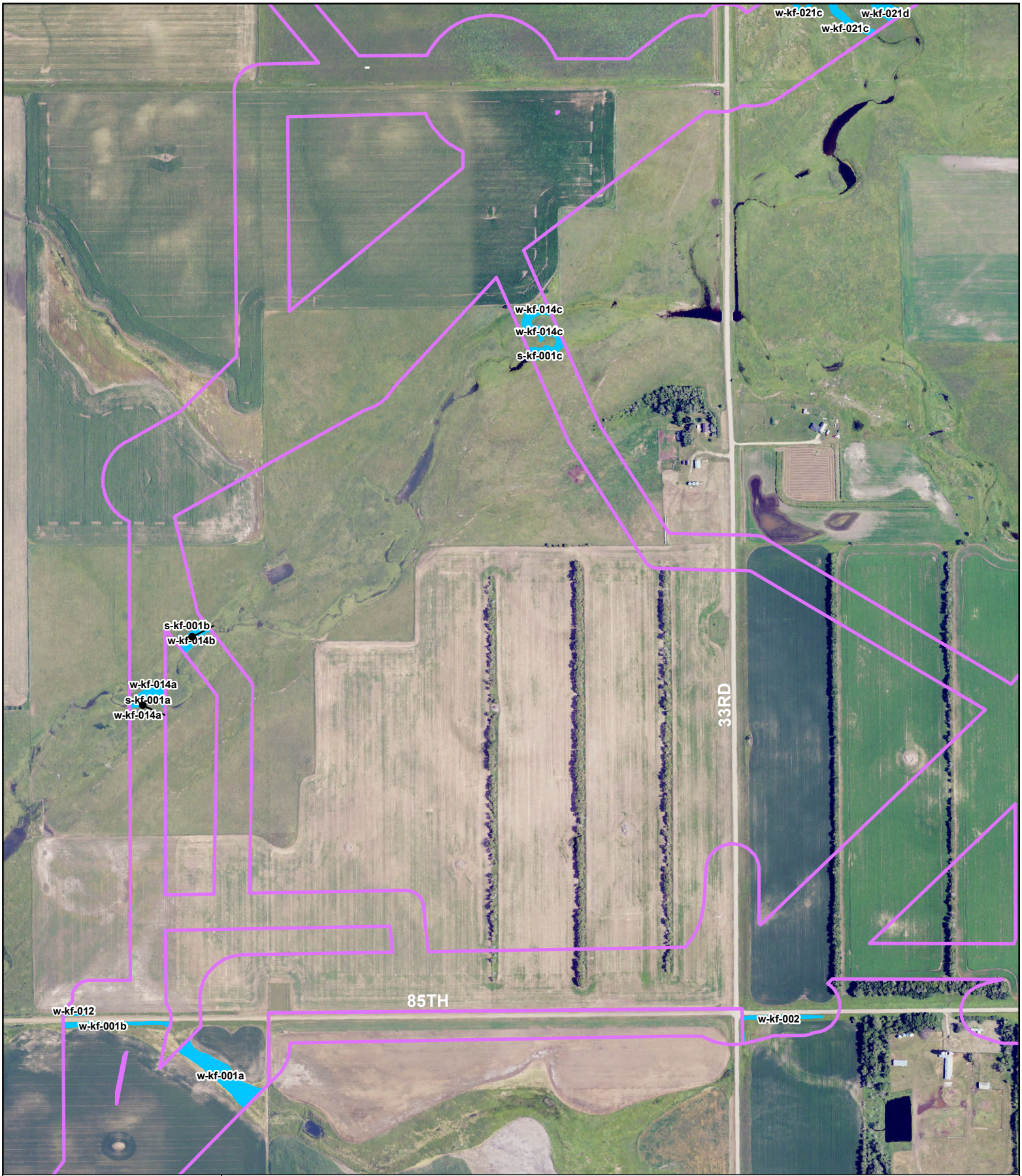
N W E S

0 0.1 0.2 mi

0 0.2 0.4 km

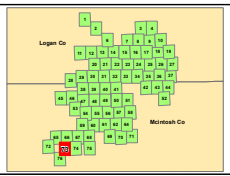
Data Source: NAIP 2023
Coordinate System: UTM, WGS84, zn 14
Map Produced: 01/25/2024. Created by: T. Thorn

WEST



Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

Pre 2023 Wetland Survey Area

County Boundary

State Highway

2023 Surveyed Wetlands

Field Delineated

Field Mapped

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Surveyed Wetlands

Field Delineated

N W E S

0 0.1 0.2 mi

0 0.2 0.4 km

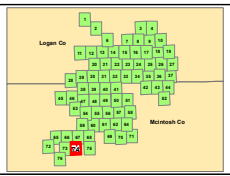
Data Source: NAIP 2023
Coordinate System: UTM, WGS84, zn 14
Map Produced: 01/25/2024. Created by: T. Thorn

WEST



Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

2023 Surveyed Wetlands

Field Delineated

Field Mapped

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Wetland Survey Area

Pre 2023 Surveyed Wetlands

Field Delineated

County Boundary

State Highway

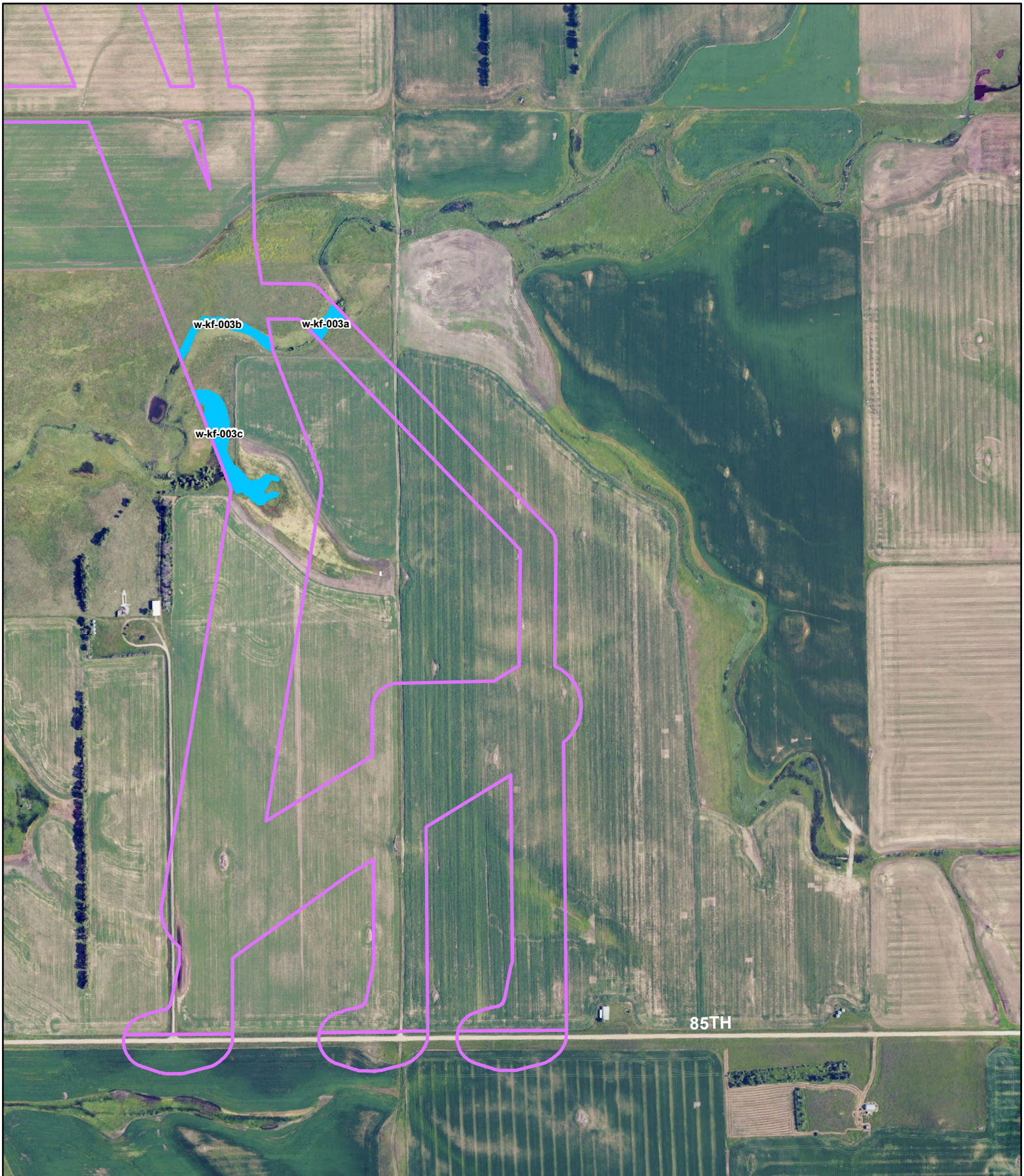
N W E S

0 0.1 0.2 mi

0 0.2 0.4 km

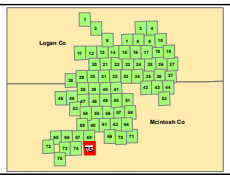
Data Source: NAIP 2023
Coordinate System: UTM, WGS84, zn 14
Map Produced: 01/25/2024. Created by: T. Thorn

WEST



Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

2023 Surveyed Wetlands

Field Delineated **Field Mapped**

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Wetland Survey Area

Pre 2023 Surveyed Wetlands

Field Delineated

County Boundary

State Highway

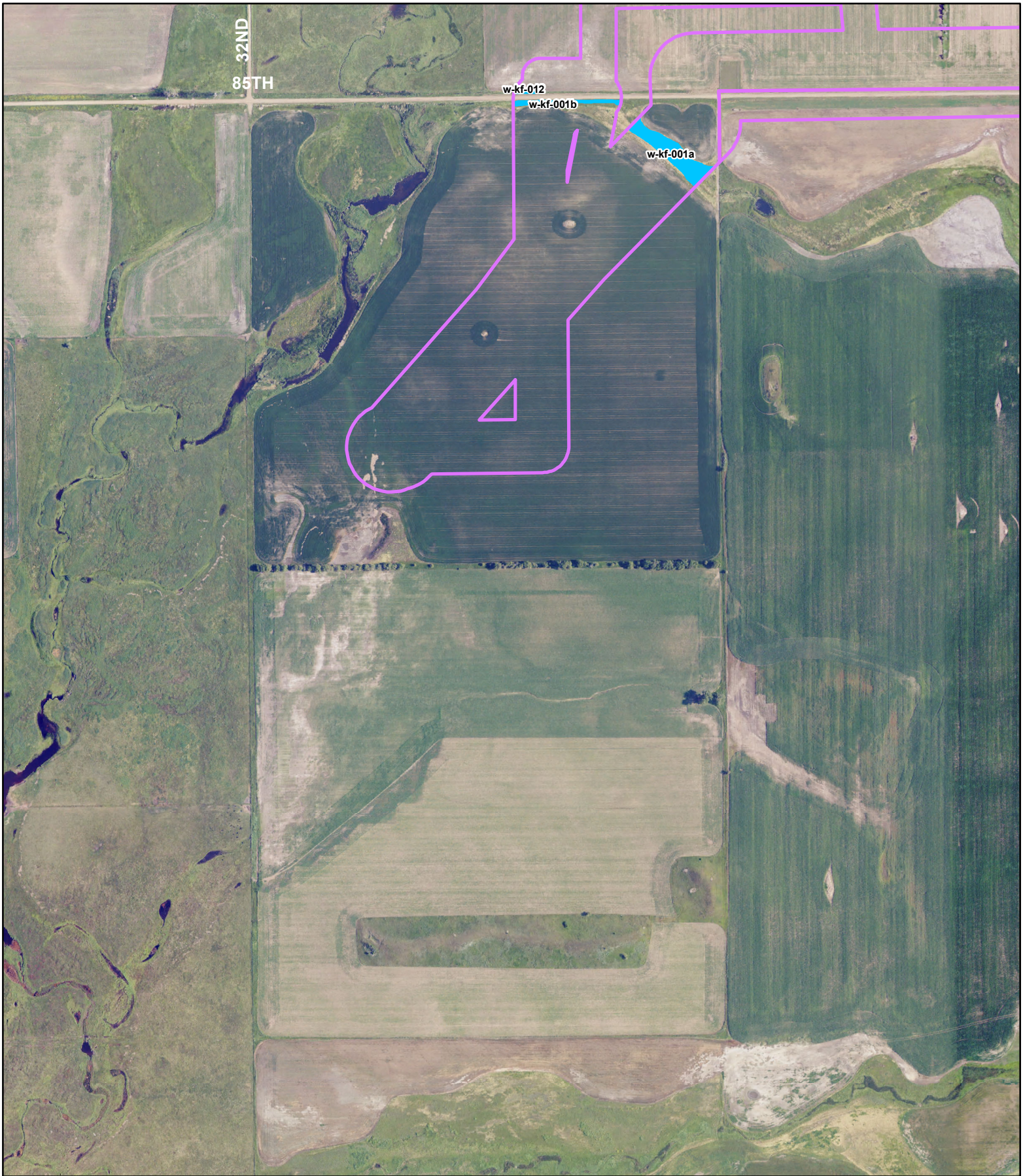
N W E S

0 0.1 0.2 mi

0 0.2 0.4 km

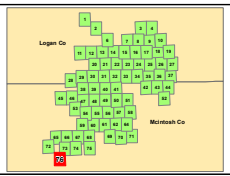
Data Source: NAIP 2023
Coordinate System: UTM, WGS84, zn 14
Map Produced: 01/25/2024. Created by: T. Thorn

WEST



Badger Wind Project

Logan & McIntosh Counties, ND



2023 Wetland Survey Area

2023 Surveyed Wetlands

Field Delineated

Field Mapped

Non WOTUS Points

Wetland/Upland Sample Points

Pre 2023 Wetland Survey Area

Pre 2023 Surveyed Wetlands

Field Delineated

County Boundary

State Highway

N W E S

0 0.1 0.2 mi

0 0.2 0.4 km

Data Source: NAIP 2023
Coordinate System: UTM, WGS84, zn 14
Map Produced: 01/25/2024. Created by: T. Thorn

WEST

Appendix B. US Army Corps of Engineers Great Plains Region Datasheets for Wetland Delineation within the 2023 Wetland Survey Area of the Badger Wind Project in Logan and McIntosh Counties, North Dakota

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WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-24-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: OOT W
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R70W, Section 19
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 2
Subregion (LRR): LRRF Lat: 46.3217693S Long: -99.62041749 Datum: NAD83
Soil Map Unit Name: Zahl-Williams-Zahill complex, 6-9% slopes NWI Classification: PEMA
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation X, Soil ____, or Hydrology X significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Juncus spp.	2	NO	OBL
2. Echinochloa crusgalli	50	YES	FAC
3. Amaranthus spp.	10	NO	FAC
4. Setaria pumila	18	NO	FAC
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 20

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	2	x 1 =	2
FACW species	0	x 2 =	0
FAC species	78	x 3 =	234
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	80 (A)		236 (B)

Prevalence Index = B/A = 2.95

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-24-2023
Applicant/Owner: Badger Wind, LLC State: ND Sampling Point: 001 U
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T113N, R70W, Sec. 19
Landform (hillslope, terrace, etc.): Flat field Local relief (concave, convex, none): none Slope (%): 0
Subregion (LRR): LRRF Lat: 46.32176470 Long: -99.52027913 Datum: NAD83
Soil Map Unit Name: Zahill-Williams-Zahill complex, 6-9% slopes NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation X, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X
Hydric Soil Present? Yes ____ No X
Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Triticum spp.	100	Yes	NI
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test is >50%
____ 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (if observed, list morphological adaptations below).
Cultivated crop

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-24-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 002 W
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R70W, Sec. 19
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 2
Subregion (LRR): LRRF Lat: 46.32232562 Long: -99.52211948 Datum: NAD83
Soil Map Unit Name: Zahl-Williams-Zahill complex, 6-9% slopes NWI Classification: PEMF
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation X, Soil ____, or Hydrology X significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Spartina pectinata	30	yes	FACW
2. Cicuta spp.	25	NO	OBL
3. Juncus spp.	1	No	OBL
4. Echinochloa crusgalli	30	Yes	FAC
5. Setaria pumila	14	NO	FAC
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 15

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	26	x 1 =	26
FACW species	30	x 2 =	60
FAC species	44	x 3 =	132
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		218 (B)

Prevalence Index = B/A = 2.18

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-24-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 002 U
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R70W, Sec. 19
Landform (hillslope, terrace, etc.): Flat Field Local relief (concave, convex, none): none Slope (%): 0
Subregion (LRR): LRRF Lat: 46.32236180 Long: -99.52198079 Datum: NAD83
Soil Map Unit Name: Zahl-Williams-Zahill complex, 6-9% slopes NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation N, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes N No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No N
Hydric Soil Present? Yes ____ No N
Wetland Hydrology Present? Yes ____ No N

Is the Sampled Area within a Wetland? Yes ____ No N

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Triticum spp.	100	Yes	NI
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test is >50%
____ 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes ____ No N

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-24-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 003W
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R70W, Sec 19
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 1
Subregion (LRR): LRRF Lat: 46.323157440 Long: -99.521395940 Datum: NAD83
Soil Map Unit Name: Williams-Zahl loams, 3-6% NWI Classification: PEMA
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation X, Soil ____, or Hydrology X significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Echinochloa crusgalli	55	Yes	FAC
2. Setaria pumila	14	NO	FAC
3. Juncus spp.	1	NO	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	____ = Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum 30

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 % (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	1	x 1 =	1
FACW species	0	x 2 =	0
FAC species	69	x 3 =	207
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	70 (A)		208 (B)

Prevalence Index = B/A = 2.97

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-24-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 0034
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R70W, Sec. 19
Landform (hillslope, terrace, etc.): Flat Field Local relief (concave, convex, none): None Slope (%): 0
Subregion (LRR): LRRF Lat: 46.32306620 Long: -99.52131209 Datum: NAD83
Soil Map Unit Name: Williams-Zahl loams, 3-6% NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation X, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X
Hydric Soil Present? Yes ____ No X
Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Triticum spp.	100	Yes	NI
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test is >50%
____ 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-24-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 004W
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R70W, Sec 19
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 1
Subregion (LRR): LRRF Lat: 46.32625942 Long: -99.52373076 Datum: NAD83
Soil Map Unit Name: Williams-Zahl loams, 3-6% NWI Classification: PEMA
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation X, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Artemisia biennis	3	No	FAC
2. Echinochloa crusgalli	50	Yes	FAC
3. Setaria pumila	22	No	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 20

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	75	x 3 =	225
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	75 (A)		225 (B)

Prevalence Index = B/A = 3

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (if observed, list morphological adaptations below).
Grazed by cattle

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-24-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 0040
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R70W, Sec. 19
Landform (hillslope, terrace, etc.): Flat Field Local relief (concave, convex, none): none Slope (%): 0
Subregion (LRR): LRRF Lat: 46.32611807 Long: -99.52362385 Datum: NAD83
Soil Map Unit Name: Williams-Zahl loams, 3-6% NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation N, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 5 ft.)			
1. Triticum spp.	100	Yes	NI
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
= Total Cover			
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test is >50%
____ 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (if observed, list morphological adaptations below).
Harvested crop

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-24-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 005W
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R70W, Sec. 19
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 0
Subregion (LRR): LRRF Lat: 46.3233693 8 Long: -99.52544168 Datum: NAD83
Soil Map Unit Name: Williams-Bowbells loams, 3-6% NWI Classification: PEMC
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Typha spp.	2	NO	OBL
2. Persicaria spp.	30	Yes	OBL
3. Cirsium spp.	30	Yes	OBL
4. Carex spp.	3	No	OBL
5. Setaria pumila	25	NO	FAC
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 10

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 % (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	65	x 1 =	65
FACW species	0	x 2 =	0
FAC species	25	x 3 =	75
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	90 (A)		140 (B)

Prevalence Index = B/A = 1.56

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (if observed, list morphological adaptations below).
Grazed and mowed over

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-24-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 005U
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R70W, Sec. 19
Landform (hillslope, terrace, etc.): Flat Field Local relief (concave, convex, none): none Slope (%): 0
Subregion (LRR): LRRF Lat: 46.32362727 Long: -99.52624849 Datum: NAD83
Soil Map Unit Name: Williams-Bowbells loams, 3-6% NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation X, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 5 ft.)			
1. Triticum spp.	100	Yes	NI
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
= Total Cover			
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test is >50%
____ 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (if observed, list morphological adaptations below).

Harvested crop

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-24-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: C006W
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R70W, Sec. 19
Landform (hillslope, terrace, etc.): Flat Fence line Local relief (concave, convex, none): none Slope (%): 0
Subregion (LRR): LRRF Lat: 46.32453405 Long: -99.52915189 Datum: NAD83
Soil Map Unit Name: Williams-Bowbells loams, 3-6% NWI Classification: PEMC
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Spartina pectinata	95	Yes	FACW
2. Hordeum jubatum	5	No	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	100	x 2 =	200
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		200 (B)

Prevalence Index = B/A = 2

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (if observed, list morphological adaptations below).
Fenceline

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-24-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 0064
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R70W, Sec. 19
Landform (hillslope, terrace, etc.): Flat field Local relief (concave, convex, none): none Slope (%): 0
Subregion (LRR): LRRF Lat: 46.324148236 Long: -99.529062218 Datum: NAD83
Soil Map Unit Name: Williams-Bowbells loams, 3-6% NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X
Hydric Soil Present? Yes ____ No X
Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Triticum spp.	100	Yes	NI
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test is >50%
____ 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-25-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 007W
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R71W, Sec. 18
Landform (hillslope, terrace, etc.): depression Local relief (concave, convex, none): concave Slope (%): 3
Subregion (LRR): LRRF Lat: 46.32877191 Long: -99.64897192 Datum: NAD83
Soil Map Unit Name: Reeder-Farnuf loams, 3-6% NWI Classification: PEMC
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 5 ft.)			
1. Echinochloa crusgalli	35	Yes	FAC
2. Hordeum jubatum	10	No	FACW
3. Carex spp.	25	Yes	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
= Total Cover			
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 30

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	25	x 1 =	25
FACW species	10	x 2 =	20
FAC species	35	x 3 =	105
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	70	(A)	150 (B)

Prevalence Index = B/A = 2.14

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-25-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 007U
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R71W, Sec. 18
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 2
Subregion (LRR): LRRF Lat: 46.32880252 Long: -99.64890498 Datum: NAD83
Soil Map Unit Name: Beader-Farnuf loams, 3-6% NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X
Hydric Soil Present? Yes ____ No X
Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 30 ft.)	Absolute % cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Poa palustris	70	Yes	FACU
2. Trifolium spp.	10	NO	NI
3. Artemisia campestris	5	NO	UPL
4. Nassella viridula	15	NO	NI
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	70	x 4 =	280
UPL species	0	x 5 =	0
Column Totals:	70	(A)	280 (B)

Prevalence Index = B/A = 4

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test is >50%
____ 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-25-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 008W
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R72W, Sec. 25
Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): none Slope (%): 0
Subregion (LRR): LRRF Lat: 46.29796946 Long: -99.66896850 Datum: NAD83
Soil Map Unit Name: Reeder-Arnegard loams, 3-6% NWI Classification: PEMF
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Typha spp.	50	Yes	OBL
2. Hordeum jubatum	40	Yes	FACW
3. Artemisia biennis	5	No	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 5

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	50	x 1 =	50
FACW species	45	x 2 =	90
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	95 (A)		140 (B)

Prevalence Index = B/A = 1.47

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤ 3.0[1]
___ 4 - Morphological Adaptations[1] (Explain)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-25-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 0080
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R72W, Sec. 25
Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): none Slope (%): 0
Subregion (LRR): LRRF Lat: 46.29791306 Long: -99.16889156 Datum: NAD83
Soil Map Unit Name: Reeder-Arnegard loams, 3-6% NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 30 ft.)	Absolute % cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Glycine max	90	Yes	NI
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	____ = Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum 80

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test is >50%
____ 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (if observed, list morphological adaptations below).

Harvested crop

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-25-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 009W
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R72W, Sec. 36
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 2
Subregion (LRR): LRRF Lat: 46.28798563 Long: -99.67526475 Datum: NAD83
Soil Map Unit Name: Bowdle-Lehr loams, 0-2% NWI Classification: PEMF
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation X, Soil X, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Spartina pectinata	60	Yes	FACW
2. Rumex crispus	10	NO	FAC
3. Typha spp.	27	Yes	OBL
4. Hordeum jubatum	3	NO	FACW
5.			
6.			
7.			
8.			
9.			
10.			
	____ = Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	27	x 1 =	27
FACW species	63	x 2 =	126
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100	(A)	183 (B)

Prevalence Index = B/A = 1.83

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤ 3.0[1]
___ 4 - Morphological Adaptations[1] (Explain)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (if observed, list morphological adaptations below).

Farmer mowed over wetland

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-25-2023
Applicant/Owner: Badger Wind, LLC State: ND Sampling Point: 009U
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R72W, Sec. 36
Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): none Slope (%): 2
Subregion (LRR): LRRF Lat: 46.28791195 Long: -99.67521006 Datum: NAD83
Soil Map Unit Name: Bowbells-Lehr loams, 0-2% NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation X, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X
Hydric Soil Present? Yes ____ No X
Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 5 ft.)			
1. Bromus inermis	100	Yes	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
= Total Cover			
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	100	x 5 =	500
Column Totals:	100 (A)		500 (B)

Prevalence Index = B/A = 5

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test is >50%
____ 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (if observed, list morphological adaptations below).

Mowed over

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-25-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 010W
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R71W, Sec 33
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): concave Slope (%): 1
Subregion (LRR): LRRF Lat: 46.285415409 Long: -99.64517727 Datum: NAD83
Soil Map Unit Name: Lowe loam, 0-2%, occasionally flooded NWI Classification: PEMF
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation X, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Spartina pectinata	90	Yes	FACW
2. Polygonaceae	5	No	UI
3. Hordeum jubatum	5	No	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	____ = Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	95	x 2 =	190
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	95 (A)		190 (B)

Prevalence Index = B/A = 2

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤ 3.0[1]
___ 4 - Morphological Adaptations[1] (Explain)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (if observed, list morphological adaptations below).

Mowed over

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: Logan Sampling Date: 10-25-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: d10 U
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T133N, R71W, Sec 33
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 8
Subregion (LRR): LRRF Lat: 46.28528442 Long: -99.64487937 Datum: NAD83
Soil Map Unit Name: Lowe loam, 0-2%, occasionally flooded NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation X, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X
Hydric Soil Present? Yes ____ No X
Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 30 ft.)	Absolute % cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Bromus inermis	95	Yes	UPL
2. Solidago spp.	5	No	UPL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	100	x 5 =	500
Column Totals:	100 (A)		500 (B)

Prevalence Index = B/A = 5

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤ 3.0[1]
___ 4 - Morphological Adaptations[1] (Explain)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (if observed, list morphological adaptations below).

Mowed over

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: McIntosh Sampling Date: 10-25-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 011W
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T132N, R72W, Sec. 1
Landform (hillslope, terrace, etc.): Hill slope Local relief (concave, convex, none): Convex Slope (%): 8
Subregion (LRR): LRRF Lat: 46.27673024 Long: -99.63019379 Datum: NAD83
Soil Map Unit Name: Harriet loam, 0-2% NWI Classification: PEMC
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Spartina pectinata	80	Yes	FACW
2. Hordeum jubatum	3	No	FACW
3. Typha spp.	17	No	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	17	x 1 =	17
FACW species	83	x 2 =	166
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		183 (B)

Prevalence Index = B/A = 1.83

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤ 3.0[1]
___ 4 - Morphological Adaptations[1] (Explain)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: McIntosh Sampling Date: 10-25-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 011U
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T132N, R72W, Sec. 1
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): Convex Slope (%): 4
Subregion (LRR): LRRF Lat: 46.27671052 Long: -99.63013720 Datum: NAD83
Soil Map Unit Name: Harriet loams, 0-2% NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X
Hydric Soil Present? Yes ____ No X
Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1. Symphoricarpos occidentalis	5	NO	UPL
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 5 ft.)			
1. Bromus inermis	80	Yes	UPL
2. Grindelia squarrosa	5	NO	UPL
3. Melilotus spp.	10	NO	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
= Total Cover			
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	10	x 4 =	40
UPL species	90	x 5 =	450
Column Totals:	100 (A)		490 (B)

Prevalence Index = B/A = 4.9

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test is >50%
____ 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: McIntosh Sampling Date: 10-25-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 01xW
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T132N, R72W, Sec. 1
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 2
Subregion (LRR): LRRF Lat: 46.27418414 Long: -99.64426503 Datum: NAD83
Soil Map Unit Name: Lowe loam, 0-2%, occasionally flooded NWI Classification: PEMC
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Spartina pectinata	90	Yes	FACW
2. Hordeum jubatum	5	No	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 5

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	95	x 2 =	190
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	95 (A)		190 (B)

Prevalence Index = B/A = 2

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: McIntosh Sampling Date: 10-25-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 012U
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T132N, R72W, Sec 1
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 5
Subregion (LRR): LRRF Lat: 46.27411408 Long: -99.64412278 Datum: NAD83
Soil Map Unit Name: Lowe loam, 0-2%, occasionally flooded NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X
Hydric Soil Present? Yes ____ No X
Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks:
Photos:

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1. Symphoricarpos occidentalis	5	No	UPL
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 5 ft.)			
1. Bromus inermis	95	Yes	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
= Total Cover			
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	100	x 5 =	500
Column Totals:	100 (A)		500 (B)

Prevalence Index = B/A = 5

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test is >50%
____ 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: McIntosh Sampling Date: 10-25-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 013W
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T132N, R72W, Sec 11
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope (%): 2
Subregion (LRR): LRRF Lat: 46.27203170 Long: -99.65849247 Datum: NAD83
Soil Map Unit Name: Daglum-Belfield complex, 0-2% NWI Classification: PEMC
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____
Hydric Soil Present? Yes X No ____
Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks:
Photos:
Harvested crop boarders wetland

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Typha spp.	40	Yes	OBL
2. Rumex crispus	3	No	FAC
3. Artemisia ludoviciana	2	No	FAC
4. Hordeum jubatum	10	No	FACW
5. Spartina pectinata	25	Yes	FACW
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 20

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	40	x 1 =	40
FACW species	35	x 2 =	70
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	80 (A)		125 (B)

Prevalence Index = B/A = 1.56

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (if observed, list morphological adaptations below).

WETLAND DETERMINATION DATA FORM - Great Plains Region

Project/Site: Badger Wind Farm County: McIntosh Sampling Date: 10-25-2023
Applicant/Owner: Badger Wind LLC State: ND Sampling Point: 013 U
Investigator(s): H. Beckert and A. Blunt Section, Township, Range: T132N, R72W, Sec 11
Landform (hillslope, terrace, etc.): hillside Local relief (concave, convex, none): Concave Slope (%): 1
Subregion (LRR): LRRF Lat: 46.27205480 Long: -99.65855912 Datum: NAD83
Soil Map Unit Name: Daglum - Belfield complex, 0-2% NWI Classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
Are Vegetation X, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ____ No X
Hydric Soil Present? Yes ____ No X
Wetland Hydrology Present? Yes ____ No X

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks:
Photos:
Harvested crop

VEGETATION - Use scientific names of plants.

	Absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft.)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft.)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft.)			
1. Glycine max	90	Yes	NI
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		
Woody Vine Stratum (Plot size: 30 ft.)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 10

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	0 (A)		0 (B)

Prevalence Index = B/A = 0

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test is >50%
____ 3 - Prevalence Index is ≤ 3.0[1]
____ 4 - Morphological Adaptations[1] (Explain)
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Provide supporting data in Remarks.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (if observed, list morphological adaptations below).

Appendix C. Wetland, Waterbody, and Non-WOTUS Wetlands Photographs within the 2023 Wetland Survey Area of the Badger Wind Project in Logan and McIntosh Counties, North Dakota

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Appendix C1. WET005



Appendix C2. WET012



Appendix C3. WET219



Appendix C4. WET220



Appendix C5. WET225



Appendix C6. WET234



Appendix C7. WET241



Appendix C8. WET1015



Appendix C9. WET1016



Appendix C10. WET1017



Appendix C11. 505U



Appendix C12. 511U



Appendix C13. 2014U

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Appendix D. Summary of Non-Wetland and Non-Waterbody Points Recorded within the 2023 Wetland Survey Area of the Badger Wind Project in Logan and McIntosh Counties, North Dakota

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Appendix D. Summary of all non-wetland and non-waterbody points recorded within the Survey Area of the Badger Wind Expansion Project in Logan and McIntosh counties, North Dakota.[1]

Non-wetland ID	Type[1]	Latitude	Longitude
212U	Non-wetland	46.248238	-99.632207
503U[2]	Non-wetland	46.324398	-99.522076
504U[2]	Non-wetland	46.324810	-99.522404
505U[2]	Non-wetland	46.325938	-99.521074
506U[2]	Non-wetland	46.325062	-99.524693
507U[2]	Non-wetland	46.321761	-99.525981
508U[2]	Non-wetland	46.322657	-99.528729
509U[2]	Non-wetland	46.323641	-99.528960
510U[2]	Non-wetland	46.324982	-99.652904
511U[2]	Non-wetland	46.326950	-99.648413
512U[2]	Non-wetland	46.296798	-99.669109
513U[2]	Non-wetland	46.269339	-99.670745
514U[2]	Non-wetland	46.264433	-99.695189
515U[2]	Non-wetland	46.264345	-99.687006
516U[2]	Non-wetland	46.263189	-99.708153
517U	Non-wetland	46.375233	-99.643976
518U	Non-wetland	46.375338	-99.643734
519U	Non-wetland	46.375883	-99.646309
520U	Non-wetland	46.376048	-99.647504
521U	Non-wetland	46.293770	-99.534573
522U	Non-wetland	46.292048	-99.532430
523U	Non-wetland	46.292488	-99.531764
524U	Non-wetland	46.295282	-99.529267
525U	Non-wetland	46.304049	-99.535540
526U	Non-wetland	46.306795	-99.532380
527U	Non-wetland	46.308261	-99.531019
528U	Non-wetland	46.309474	-99.532457
529U	Non-wetland	46.305217	-99.520812
530U	Non-wetland	46.305929	-99.522755
531U	Non-wetland	46.288057	-99.489138
532U	Non-wetland	46.294834	-99.484909
533U	Non-wetland	46.299418	-99.505084
534U	Non-wetland	46.298329	-99.507672
535U	Non-wetland	46.298123	-99.509717
536U	Non-wetland	46.298117	-99.511690
537U	Non-wetland	46.319381	-99.589391
538U	Non-wetland	46.306730	-99.639082
539U	Non-wetland	46.311446	-99.641497
541U	Non-wetland	46.203083	-99.586475
542U	Non-wetland	46.202901	-99.587869
543U	Non-wetland	46.206166	-99.583090
544U	Non-wetland	46.208319	-99.575860
545U	Non-wetland	46.207135	-99.571718
546U	Non-wetland	46.216998	-99.600213
547U	Non-wetland	46.215742	-99.601298
548U	Non-wetland	46.218380	-99.611711

Appendix D. Summary of all non-wetland and non-waterbody points recorded within the Survey Area of the Badger Wind Expansion Project in Logan and McIntosh counties, North Dakota.[1]

Non-wetland ID	Type[1]	Latitude	Longitude
549U	Non-wetland	46.225177	-99.607710
550U	Non-wetland	46.240128	-99.607870
551U	Non-wetland	46.244729	-99.581818
552U	Non-wetland	46.242626	-99.582459
553U	Non-wetland	46.232353	-99.583064
554U	Non-wetland	46.235181	-99.580250
640U	Non-wetland	46.319031	-99.651576
700U	Non-wetland	46.316545	-99.520476
701U	Non-wetland	46.312300	-99.521517
702U	Non-wetland	46.303161	-99.520795
703U	Non-wetland	46.315506	-99.518062
704U	Non-wetland	46.309264	-99.503520
705U	Non-wetland	46.305298	-99.493500
706U	Non-wetland	46.305231	-99.581317
707U	Non-wetland	46.304505	-99.581081
708U	Non-wetland	46.304590	-99.562212
709U	Non-wetland	46.292144	-99.613974
710U	Non-wetland	46.268199	-99.599594
711U	Non-wetland	46.273671	-99.620989
2000U	Non-wetland	46.336155	-99.517174
2001U	Non-wetland	46.318950	-99.528759
2002U	Non-wetland	46.308915	-99.503638
2003U	Non-wetland	46.305223	-99.493825
2004U	Non-wetland	46.308736	-99.540264
2005U	Non-wetland	46.286017	-99.498350
2006U	Non-wetland	46.270418	-99.491510
2007U	Non-wetland	46.292183	-99.613666
2008U	Non-wetland	46.291569	-99.614496
2009U	Non-wetland	46.326168	-99.654687
2010U	Non-wetland	46.321404	-99.649365
2011U	Non-wetland	46.259893	-99.679147
2012U	Non-wetland	46.259415	-99.679424
2013U	Non-wetland	46.269236	-99.668095
2014U	Non-wetland	46.263709	-99.708323
2015U	Non-wetland	46.223366	-99.608607
2016U	Non-wetland	46.219068	-99.621789
2017U	Non-wetland	46.203872	-99.579459
2018U	Non-wetland	46.203683	-99.581808
2019U	Non-wetland	46.312297	-99.512643
5201U	Non-wetland	46.332374	-99.515691

[1] Wetlands delineated in 2020, 2021, and 2022 are presented in Atwell (2022) and Flaig (2021) reports.

"Non-WOTUS" ("no") points that lacked wetland or waterbody characteristics and were composed of upland vegetation.

[2] Documented during wetland delineation field effort; other "no" points in table were documented during wetland mapping effort.

Appendix O
Updated Grassland Habitat Assessment

Badger Wind, LLC
February 2024

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Grassland Habitat Assessment

Badger Wind Project

Logan and McIntosh Counties, North Dakota



Prepared for:

Badger Wind, LLC

401 North Michigan Avenue, Suite 501
Chicago, Illinois 60611

Prepared by:

Kristen Chodachek and Martin Piorkowski

Western EcoSystems Technology, Inc.
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January 19, 2024

WEST

STUDY PARTICIPANTS

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Joshua Zalewski	Technical Editor

REPORT REFERENCE

Chodachek, K. and M. Piorkowski. 2024. Grassland Habitat Assessment, Badger Wind Project, Logan and McIntosh Counties, North Dakota. Prepared for Badger Wind, LLC, Chicago, Illinois. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. January 19, 2024.

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Figure 2. Results of the desktop review and field assessment of potential grassland habitat within the 2021 and 2023 Grassland Survey Areas of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021 and August 17 – 18, 2023. 5

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Appendix A. Representative Photographs of Grassland Habitats within the 2021 and 2023 Grassland Survey Areas of the Badger Wind Project in Logan and McIntosh Counties, North Dakota, from September 29 – October 2, 2021 and August 17 – 18, 2023.
Appendix B. Results of the desktop review and field assessment of potential grassland habitat within the Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021 and August 17 – 18, 2023.

INTRODUCTION

Badger Wind, LLC (Badger Wind) is proposing the Badger Wind Project (Project) in Logan and McIntosh counties, North Dakota. Badger Wind contracted Western EcoSystems Technology, Inc. (WEST) to complete a grassland habitat assessment, including characterization of grassland sod types as broken/unbroken, to inform development of the Project. Unbroken grasslands, defined in the North Dakota Game and Fish Department's (NDGFD) *Wind Energy Development in North Dakota, Best Management Practices* (NDGFD 2021) as "grasslands that have not been tilled or otherwise broken," are considered key habitat for the "health and long-term survival of many of North Dakota's native wildlife."

The objective of this study was to identify grassland parcels within the Project and categorize the sod type of each parcel as either broken or unbroken grasslands. This report presents the combined results of grassland assessments conducted for the Project during 2021 (Arellano and Piorkowski 2021) and during 2023 to cover changes/updates to the Project since2021, which include the expanded project boundary and design modifications. Results from this assessment can help inform siting of facilities and guide decisions regarding future survey needs within the area.

PROJECT AND SURVEY AREAS

The Project Area encompasses approximately 35,227 acres (ac; 14,256 hectares [ha]) in Logan and McIntosh counties, North Dakota (Figure 1). The primary land cover within the Project is predominantly herbaceous (47.4%) and cultivated crops (42.4%; National Land Cover Database [NLCD] 2019). The Project Area lies within the Northwestern Glaciated Plains Level III Ecoregion, an ecoregion dominated by mixed-grass prairie (US Environmental Protection Agency 2013). Topography within the Project Area ranges from relatively flat to rolling hills and elevations range from 1,963 to 2,200 feet (598 to 610 meters).

The 2021 Grassland Survey Area was not buffered and encompassed 52,305 ac (21,657 ha) within Logan and McIntosh counties, North Dakota (Figure 1). The 2023 Grassland Survey Area included recently leased lands buffered by one mile (1.6 kilometers) that were located outside of the 2021 Grassland Survey Area (Figure 1). The 2023 Survey Area encompassed 7704.5ac (3,117.9 ha).

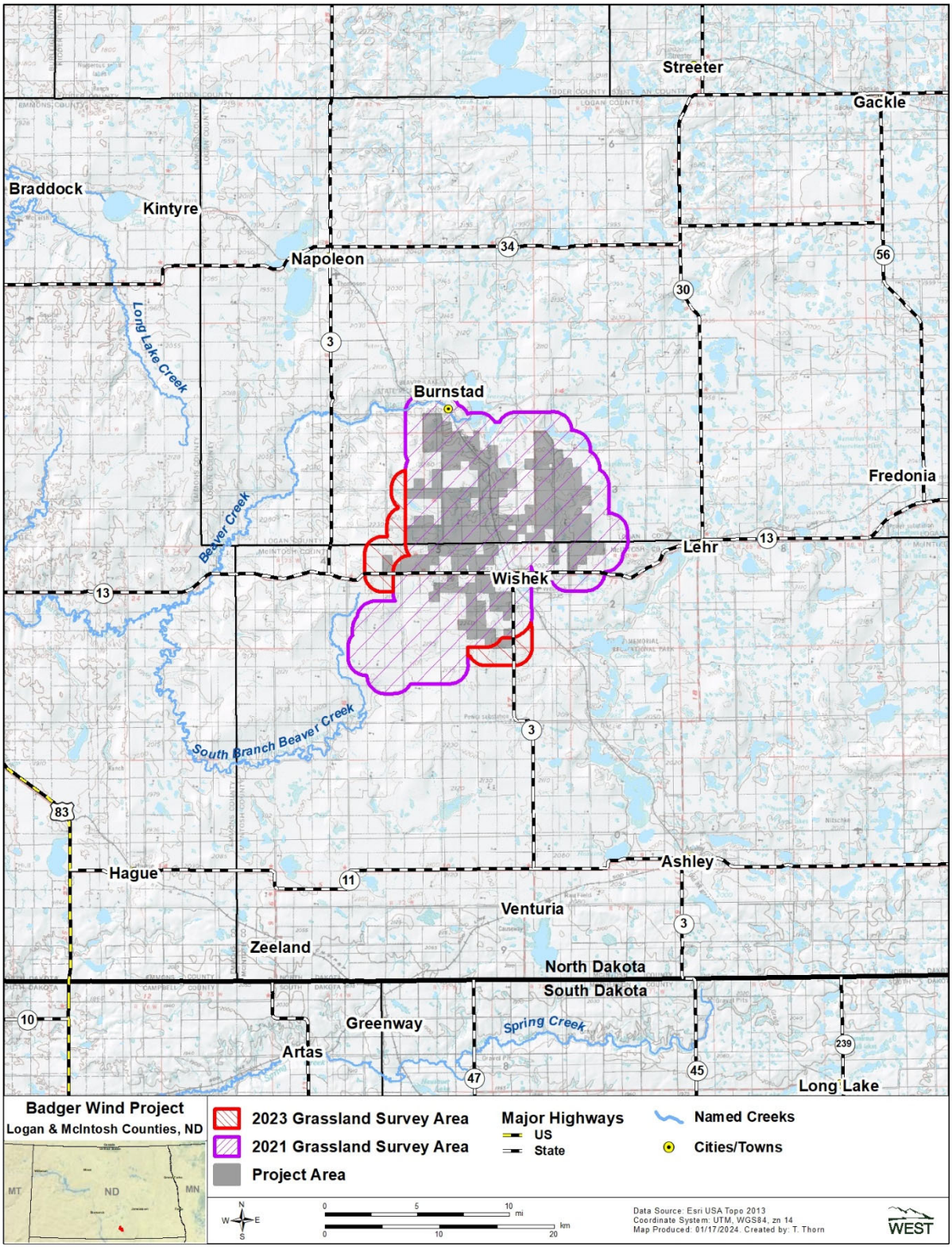

Figure 1. Location of the 2021 and 2023 Grassland Survey Areas and the Badger Wind Project in Logan and McIntosh counties, North Dakota.

METHODS

Desktop Review

Prior to field surveys, WEST completed a desktop review of existing land cover features within the 2021 and 2023 Survey Areas using current aerial photography (US Department of Agriculture [USDA] National Agriculture Imagery Program [NAIP] 2019, 2020, 2021, and 2022), ESRI imagery (larger scale/higher resolution; ESRI 2021), existing land cover (NLCD 2016 and 2019), 2021 Project grasslands data layer (Arellano and Piorkowski 2021), and the NDGFD Native Habitat layer (NDGFD 2014). This review, conducted using Esri software (ArcGIS 10.8.1), resulted in a digital data layer of polygons delineating grassland cover.

Delineated grassland polygons were further examined using a series of historical USDA NAIP aerial photography and USDA North Dakota statewide historical imagery from 1957–1962 (USDA 2017) to establish a preliminary classification of grassland type (broken or unbroken). Broken grassland was identified based on features such as rock piles indicating extensive mechanized rock clearing; presence and number of trees and shrubs; field edge changes; absence of scattered rocks; straight line features indicating plowing, discing, harvesting, or planting; or any other features indicating human disturbance. Unbroken grassland was identified based on the lack of these disturbance features.

The desktop analysis resulted in creation of a digital data layer of polygons classified as "grassland" or "other" (i.e., non-grass areas such as cultivated cropland, roads, barren areas, development, wetlands, forests, and shrub/scrub). Each grassland polygon was defined by visual changes in the landscape (e.g., grassland to cropland or forest edges) and was further categorized as broken or unbroken and given a unique identifier (Grassland ID) used on maps and datasheets. The geographical information system specialist provided maps showing all grassland polygons, Grassland ID, roads, cities, and land access information for the field survey effort.

In November 2023, WEST received a revised NDGFD Native Habitat layer (NDGFD 2022). All areas classified as grasslands in this spatial file were previously reviewed during the desktop review and evaluated during field surveys. This layer is included in the results for reference.

Field Survey

Field surveys were completed from September 29 – October 2, 2021 and August 17 – 18, 2023 to verify the results of the desktop review. A qualified WEST biologist experienced with grassland plant identification and habitat assessments completed both pedestrian surveys and ocular surveys from publicly accessible roadsides for these efforts. Grassland polygons created from the desktop review were confirmed as broken or unbroken, and dominant grass and forb species were recorded as indicators of quality. Photographs were taken to document the condition of the grassland polygons (Appendix A).

Data Management

WEST implemented quality assurance and quality control (QA/QC) measures at all stages of the grassland habitat assessment, including during the desktop review, in the field, during data entry, and during report writing. Data were reviewed by the WEST field biologist before the field data were submitted for data entry; WEST data entry staff were trained on proper data entry procedures, which included an independent review of the field data. If any errors, omissions, or problems were identified, follow-up QA/QC measures were implemented including discussions and review of field data with field staff and/or Project Manager. Upon completion of field surveys, the digital data layer created during the desktop review was updated, as needed.

RESULTS

The combined desktop and field survey resulted in 3,188.7 ac (1,290.4 ha) of grasslands classified as broken and 18,463.0 ac (7,471.7 ha) of unbroken grasslands within the 2021 Grassland Survey Area (Table 1; Figure 2; Appendix B1). The 2023 Grassland Survey Area resulted in 2,265.8 ac (916.92 ha) of grasslands classified as broken and 5,804.6 ac (2,349.05 ha) classified as unbroken within the 2023 Grassland Survey Area (Table 1; Figure 2; Appendix B2).

Table 1. Results of the grassland habitat survey conducted within the 2021 and 2023 Grassland Survey Areas of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021 and August 17 – 18, 2023.

	2021 Grassland Survey Area		2023 Grassland Survey Area	
Grassland Sod Type	**Acres**	**Percentage of Total**	**Acres**	**Percentage of Total**
Broken	3,188.7	14.7	2,265.8	28.1
Unbroken	18,463.0	85.3	5,804.6	71.9
Total	**21,651.7**	**100**	**8,070.4**	**100**

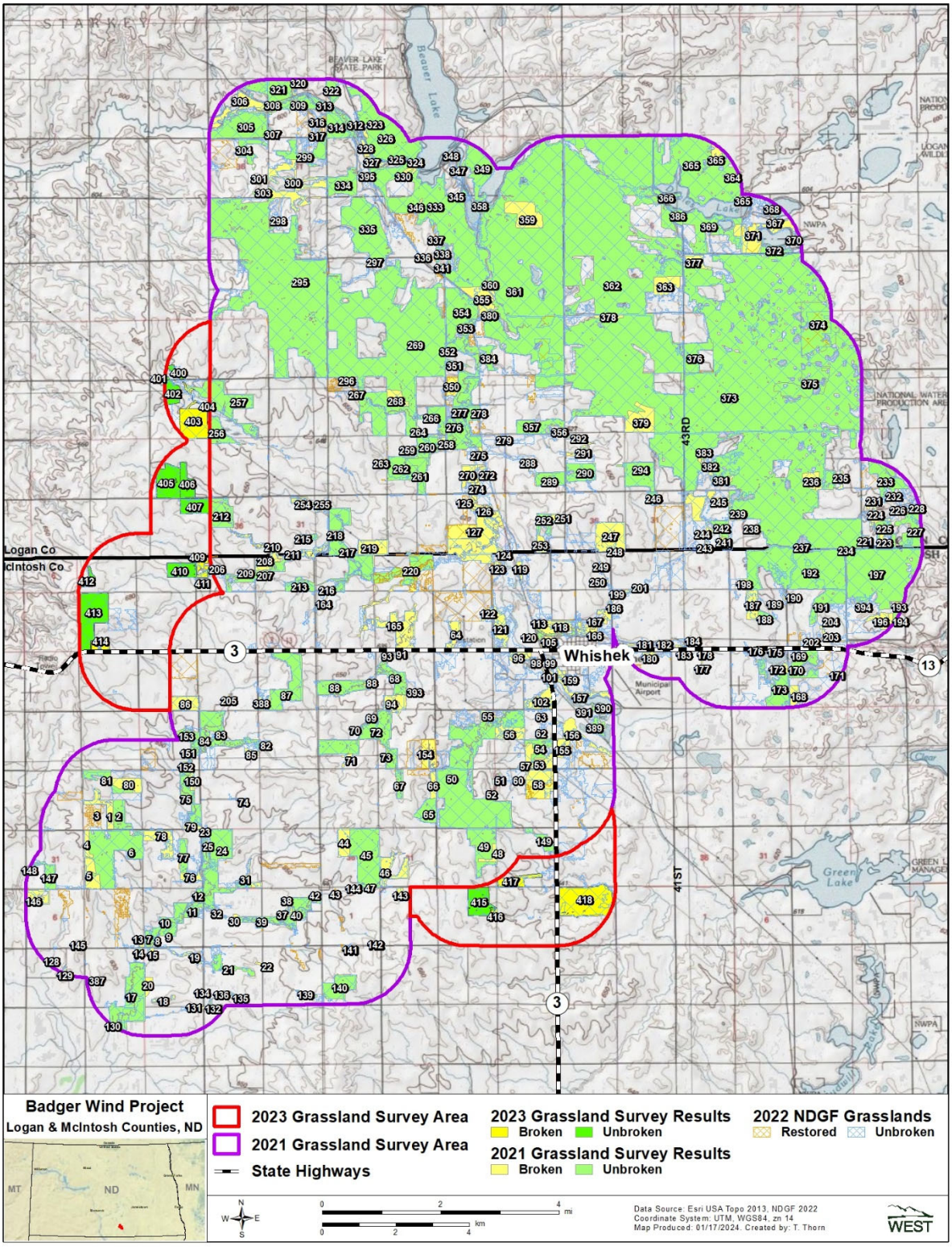

Figure 2. Results of the desktop review and field assessment of potential grassland habitat within the 2021 and 2023 Grassland Survey Areas of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021 and August 17 – 18, 2023.

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Appendix A. Representative Photographs of Grassland Habitats within the 2021 and 2023 Grassland Survey Areas of the Badger Wind Project in Logan and McIntosh Counties, North Dakota, from September 29 – October 2, 2021 and August 17 – 18, 2023.

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Appendix A1. Representative photo of broken grasslands within the 2021 Grassland Survey Area of the Badger Wind Farm, Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021.



Appendix A2. Representative photo of broken grasslands within the 2021 Grassland Survey Area of the Badger Wind Farm, Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021.



Appendix A3. Representative photo of unbroken grasslands within the 2021 Grassland Survey Area of the Badger Wind Farm, Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021.



Appendix A4. Representative photo of unbroken grasslands within the 2021 Grassland Survey Area of the Badger Wind Farm, Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021.



Appendix A5. Representative photo of broken grassland within the 2023 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from August 17 – 18, 2023.



Appendix A6. Representative photo of broken grasslands within the 2023 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from August 17 – 18, 2023.



Appendix A7. Representative photo of unbroken grassland within the 2023 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from August 17 – 18, 2023.



Appendix A8. Representative photo of unbroken grassland within the 2023 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from August 17 – 18, 2023.

Appendix B. Results of the desktop review and field assessment of potential grassland habitat within the Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021 and August 17 – 18, 2023.

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Appendix B1. Results of the desktop review and field assessment of potential grassland habitat within the 2021 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021.

Grassland ID	Classification
1	Broken
2	Unbroken
3	Broken
4	Broken
5	Broken
6	Unbroken
7	Unbroken
8	Broken
9	Unbroken
10	Unbroken
11	Unbroken
12	Unbroken
13	Broken
14	Broken
15	Broken
16	Broken
17	Unbroken
18	Broken
19	Broken
20	Broken
21	Unbroken
22	Broken
23	Unbroken
24	Unbroken
25	Unbroken
26	Unbroken
27	Unbroken
28	Unbroken
29	Unbroken
30	Unbroken
31	Broken
32	Broken
33	Broken
34	Unbroken
35	Unbroken
36	Unbroken
37	Broken
38	Broken
39	Unbroken
40	Unbroken
41	Broken
42	Broken
43	Broken
44	Broken
45	Unbroken
46	Broken
47	Unbroken
48	Broken
49	Unbroken

Appendix B1. Results of the desktop review and field assessment of potential grassland habitat within the 2021 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021.

Grassland ID	Classification
50	Unbroken
51	Unbroken
52	Unbroken
53	Broken
54	Unbroken
55	Broken
56	Broken
57	Broken
58	Broken
59	Unbroken
60	Unbroken
61	Unbroken
62	Unbroken
63	Unbroken
64	Broken
65	Unbroken
66	Broken
67	Unbroken
68	Unbroken
69	Broken
70	Broken
71	Broken
72	Unbroken
73	Broken
74	Broken
75	Unbroken
76	Broken
77	Unbroken
78	Broken
79	Broken
80	Broken
81	Unbroken
82	Broken
83	Unbroken
84	Unbroken
85	Broken
86	Broken
87	Unbroken
88	Unbroken
88	Broken
89	Broken
90	Broken
91	Broken
92	Broken
93	Broken
94	Broken
96	Broken
97	Broken
98	Broken
99	Broken

Appendix B1. Results of the desktop review and field assessment of potential grassland habitat within the 2021 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021.

Grassland ID	Classification
100	Broken
101	Broken
102	Broken
104	Broken
105	Broken
106	Broken
107	Broken
108	Unbroken
109	Broken
110	Broken
111	Unbroken
112	Unbroken
113	Unbroken
114	Unbroken
115	Unbroken
116	Unbroken
118	Broken
119	Broken
120	Unbroken
121	Broken
122	Broken
123	Broken
124	Broken
125	Broken
126	Broken
127	Broken
128	Broken
129	Broken
130	Unbroken
131	Broken
132	Broken
133	Broken
134	Broken
135	Broken
136	Broken
137	Broken
138	Broken
139	Unbroken
140	Unbroken
141	Broken
142	Broken
143	Broken
144	Broken
145	Broken
146	Broken
147	Unbroken
148	Broken
149	Unbroken
150	Broken
151	Unbroken

Appendix B1. Results of the desktop review and field assessment of potential grassland habitat within the 2021 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021.

Grassland ID	Classification
152	Unbroken
153	Unbroken
154	Broken
155	Broken
156	Broken
157	Broken
158	Broken
159	Broken
164	Broken
165	Broken
166	Broken
167	Broken
168	Broken
169	Broken
170	Unbroken
171	Broken
172	Broken
173	Unbroken
174	Broken
175	Broken
176	Broken
177	Broken
178	Broken
179	Broken
180	Broken
181	Broken
182	Broken
183	Broken
184	Broken
185	Broken
186	Broken
187	Broken
188	Unbroken
189	Unbroken
190	Broken
191	Broken
192	Unbroken
193	Broken
194	Broken
195	Unbroken
196	Broken
197	Unbroken
198	Broken
199	Broken
200	Broken
201	Broken
202	Broken
203	Broken
204	Unbroken
205	Broken

Appendix B1. Results of the desktop review and field assessment of potential grassland habitat within the 2021 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021.

Grassland ID	Classification
206	Unbroken
207	Unbroken
208	Broken
209	Unbroken
210	Broken
211	Broken
212	Unbroken
213	Unbroken
214	Unbroken
215	Broken
216	Broken
217	Unbroken
218	Broken
219	Broken
220	Unbroken
221	Broken
222	Unbroken
223	Broken
224	Broken
225	Unbroken
226	Broken
227	Unbroken
228	Broken
229	Broken
230	Unbroken
231	Broken
232	Unbroken
233	Unbroken
234	Broken
235	Broken
236	Broken
237	Unbroken
238	Broken
239	Broken
240	Broken
241	Broken
242	Unbroken
243	Broken
244	Broken
245	Broken
246	Unbroken
247	Broken
248	Broken
249	Broken
250	Broken
251	Broken
252	Unbroken
253	Broken
254	Broken
255	Broken

Appendix B1. Results of the desktop review and field assessment of potential grassland habitat within the 2021 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021.

Grassland ID	Classification
256	Unbroken
257	Unbroken
258	Broken
259	Broken
260	Unbroken
261	Unbroken
262	Unbroken
263	Broken
264	Broken
265	Broken
266	Unbroken
267	Broken
268	Broken
269	Unbroken
270	Broken
272	Broken
273	Broken
274	Broken
275	Broken
276	Broken
277	Unbroken
278	Unbroken
279	Broken
280	Broken
288	Broken
289	Unbroken
290	Unbroken
291	Broken
292	Broken
293	Broken
294	Unbroken
295	Unbroken
296	Broken
297	Broken
298	Unbroken
299	Unbroken
300	Broken
301	Unbroken
302	Unbroken
303	Unbroken
304	Unbroken
305	Unbroken
306	Broken
307	Unbroken
308	Unbroken
309	Unbroken
310	Unbroken
311	Unbroken
312	Unbroken
313	Unbroken

Appendix B1. Results of the desktop review and field assessment of potential grassland habitat within the 2021 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021.

Grassland ID	Classification
314	Unbroken
315	Broken
316	Broken
317	Broken
318	Unbroken
319	Unbroken
320	Broken
321	Unbroken
322	Unbroken
323	Broken
324	Broken
325	Broken
326	Unbroken
327	Broken
328	Broken
329	Broken
330	Broken
331	Unbroken
332	Unbroken
333	Unbroken
334	Unbroken
335	Unbroken
335	Broken
336	Unbroken
337	Unbroken
338	Unbroken
339	Unbroken
340	Unbroken
341	Unbroken
342	Unbroken
343	Unbroken
345	Unbroken
346	Broken
347	Unbroken
348	Broken
349	Unbroken
350	Broken
351	Unbroken
352	Broken
353	Unbroken
354	Unbroken
355	Broken
356	Broken
357	Unbroken
358	Unbroken
359	Broken
360	Broken
361	Unbroken
362	Unbroken
363	Broken

Appendix B1. Results of the desktop review and field assessment of potential grassland habitat within the 2021 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from September 29 – October 2, 2021.

Grassland ID	Classification
364	Broken
365	Unbroken
365	Broken
365	Broken
366	Unbroken
367	Unbroken
368	Unbroken
369	Unbroken
370	Unbroken
371	Broken
372	Unbroken
373	Unbroken
374	Unbroken
375	Unbroken
376	Unbroken
377	Broken
378	Broken
379	Broken
380	Unbroken
381	Broken
382	Broken
383	Broken
384	Unbroken
384	Broken
385	Unbroken
386	Unbroken
387	Broken
388	Broken
389	Unbroken
390	Unbroken
391	Unbroken
392	Unbroken
393	Unbroken
394	Broken
395	Broken

Appendix B2. Results of the desktop review and field assessment of potential grassland habitat within the 2023 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from August 17 – 18, 2023.

Grassland ID	Classification	Vegetation	Comments
400	Unbroken	*Bouteloua gracilis, Bromus inermis, Poa pratensis, Grindelia squarrosa, Artemisia ludoviciana, Artemisia absinthium,* and *Rumex spp.*	
401	Unbroken	*Bouteloua gracilis, Bromus inermis, Poa pratensis, Grindelia squarrosa, Artemisia ludoviciana, Artemisia absinthium,* and *Rumex spp.*	
402	Unbroken	*Bouteloua gracilis, Bromus inermis,* and *Poa pratensis*	Heavy grazing
403	Broken	*Bouteloua gracilis, Bromus inermis, Poa pratensis,* and *Artemisia ludoviciana*	
404	Broken	*Bouteloua gracilis, Bromus inermis, Poa pratensis,* and *Artemisia ludoviciana*	
405	Unbroken	*Bouteloua gracilis, Bromus inermis, Grindelia squarrosa, Liatris ligulistylis, Taraxacum officinale, artemisia ludoviciana, Rumex spp.,* and *Symphoricaros occidentalis*	
406	Unbroken	*Bromus inermis, Poa pratensis, Grindelia squarrosa, Artemisia ludoviciana, Symphoricarpos occident,* and *Melilotus officinalis*	
407	Unbroken	*Bromus inermis, Poa pratensis, Grindelia squarrosa, Artemisia ludoviciana, Symphoricarpos occident,* and *Melilotus officinalis*	
409	Broken	*Bromus inermis, Poa pratensis, Medicago sativa, Artemisia ludoviciana,* and *Melilotus officinalis*	Planted, straight line features
410	Broken	*Bouteloua gracilis, Spartina pectinate, Bromus inermis, Poa pratensis, Taraxacum officinale,* and *Symphoricarpos occident*	Cattle grazing
411	Broken	*Bromus inermis, Poa pratensis, Medicago sativa, Artemisia ludoviciana,* and *Melilotus officinalis*	Planted, straight line features
412	Unbroken	*Bromus inermis, Grindelia squarrosa, Artemisia ludoviciana, Sonchus spp., Pediomelum argophyllum,* and *Symphoricarpos occident*	Cattle grazing
413	Unbroken	*Bromus inermis, Grindelia squarrosa, Artemisia ludoviciana, Sonchus spp., Pediomelum argophyllum,* and *Symphoricarpos occident*	Cattle grazing
414	Broken	*Bromus inermis, Poa pratensis, Grindelia squarrosa, Artemisia ludoviciana, Sonchus spp., Taraxacum*	Extensive rock clearing, straight line features, farm equipment

Appendix B2. Results of the desktop review and field assessment of potential grassland habitat within the 2023 Grassland Survey Area of the Badger Wind Project in Logan and McIntosh counties, North Dakota, from August 17 – 18, 2023.

Grassland ID	Classification	Vegetation	Comments
		officinale, and *Symphoricarpos occident*	
415	Unbroken	*Bouteloua gracilis, Bromus inermis, Poa pratensis, Agropyron cristatum, Grindelia squarrosa, Solidago spp., Artemisia absinthium,* and *Symphoricarpos occident*	Cattle grazing
416	Broken	*Bromus inermis, Agropyron cristatum, Rosa spp., Echninacea, Medicago sativa, Grindelia squarrosa,* and *Fraxinus*	Extensive rock clearing, Abandoned farmyard
417	Broken	*Bromus inermis, Poa pratensis, Liatris ligulistylis, Artemisia absinthium, Bassia scoparia,* and *Melilotus officinalis*	Extensive rock clearing
418	Broken	*Artemisia absinthium, Sonchus spp.,* and *Symphoricarpos occident*	Extensive rock clearing

Appendix P
Ørsted Emergency Response Plan

Badger Wind, LLC
February 2024

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Emergency Action Plan

Badger Wind, LLC (RE); Eleven Mile Solar Center, LLC (RE); Ford County Wind, LLC (RE); Haystack Wind Project, LLC (RE); Lincoln Land Wind, LLC (RE); Muscle Shoals Solar, LLC; Plum Creek Wind, LLC (RE); Sunflower Energy Center, LLC (RE); Willow Creek Wind Power, LLC (RE);

This Revision of the Emergency Action Plan supersedes all previous revisions as of the approval date below.

Approval:

Signature	Tommy Gage
Title	Director of Operations - Central
Date	1/22/2024

Document Change Log

Revision	Section Revised	Comments	Effective Date
0	All	Transition to a combined Emergency Action Plan	8/31/23
1	Attach 4	Added Badger Wind, LLC	1/22/24

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1. Introduction

The purpose of Orsted's Emergency Action Plan is to address how Orsted will respond to an emergency. The first priority in responding to an emergency is to ensure the health, safety and well-being of employees and members of the public and to mitigate any potential environmental impacts. Our next priority is ensuring reliable operation to support continuity of electric service. In the event of a major disaster, the Emergency Action Plan describes the responsibilities and initial actions which will occur.

2. Scope of Application

It is a requirement that each employee review the Emergency Action Plan upon initial assignment and when the plan changes, those parts of the plan that the employee must know to protect themselves in the event of an emergency. In addition, the written plan shall be made available for employees to review and plan for their evacuation at all times.

3. Maintenance and Implementation

The following individuals will be responsible for maintenance and implementation of the Emergency Action Plan:

- The Regional Director, Asset Operations is responsible for maintaining the Emergency Action Plan for all sites within the region of responsibility.
- The Regional Director, Asset Operations and Asset Managers are allowed to modify the Emergency Action Plan.
- The Plant Manager at the affected site is responsible for implementing the Emergency Action Plan with the support of the Asset Manager and Regional Director, Asset Operations.

4. Legislative & Regulatory

The Occupational Safety and Health Administration established a requirement for employers to provide an Emergency Action Plan (29 CFR 1910.38).

5. Definitions & Acronyms

Cybersecurity Incident - A malicious or suspicious act that compromises or disrupts a computer network or system that could foreseeably jeopardize the reliability or integrity of the ISO's System or ISO's ability to perform the functions of an independent organization under the Public Utility Regulatory Act (PURA).

EAP – Emergency Action Plan

Emergency Assembly Area – Predetermined area employees should meet after an emergency evacuation of the building.

Inputs – Documents and information specifically for the site which the Emergency Action Plan is developed for.

Muster Point – Designated area where all employees, guests, or visitors on the work site, or a large crowd can assemble in case of an emergency.

Operations Center – Center which is manned on a 24/7 basis and serves as a 24-hour point of contact for all site emergencies, especially those which may occur outside of

normal operating hours. Responsible for remote operation of facility in the event that the site cannot be physically staffed due to emergency conditions.

Outputs – Activities, documents to aid in maintaining the Emergency Action Plan up to date.

Plant Manager – Refers to the Orsted appointed on-site representative responsible for overseeing activities of the OEM Site Manager.

OEM Site Manager – Refers to the individual responsible for maintaining reliability of wind turbines and balance of plant.

Regional Operations Manager – Refers to the Orsted appointed manager responsible for all operational oversight outside the state of Texas.

Scheduling Entity (QSE) – Refers to the Real-time desk that serves as the primary point of contact with the Reliability Coordinator and Balancing Authority.

Site Map – Document which can contain information such as evacuation routes, color coding, legend, handicapped accessible exit locations, fire extinguisher locations, fire alarm locations, first aid kits, oxygen tanks, PPE locations, AED locations, spill kit location, severe weather safe rooms, emergency phone numbers, and muster point.

6. Overview

6.1 Objective

It is impossible to provide specific information for all situations and there is no guarantee implied by this plan that a perfect response to disaster emergency incidents will be practical or possible. Therefore, this plan is meant to only be a guide for employees and a document to help them to familiarize themselves with basic emergency planning, response, and evacuation.

6.2 Inputs

- Site Map
- Emergency contact numbers
- Emergency response facilities
- Site emergency response team

6.3 Outputs

- Notification to emergency management services
- Documented coordinated simulations
- Notification to supervisor
- Emergency Events Checklist

7. Planning

7.1 Pre-Planning

Proper planning and preparation will increase the margin of safety in an emergency. To evacuate successfully, the site shall ensure the following:

- Record and maintain a daily log of all site visitors and site personnel
- Train employees on EAP and actions to take when assisting others
- Inform employees about how/who to communicate with in case of an onsite emergency
- Identify employees with specific needs

- Employees should know evacuation routes from every room. The following information should be marked on the evacuation maps.
  - Emergency and accessible exits
  - Evacuation routes
  - Location of fire extinguishers
  - Fire alarm pull station location
  - Inclement severe weather shelter location
  - Location of Emergency Assembly Area
- Ensure all site personnel are retrained on Emergency Action Plan revisions.
- Plan training exercises to test evacuation plan annually.
- Designate a Site Emergency Response Team.
- Ensure adequate supplies are available for emergency response.

7.2 Communication

In the event of an emergency, the following communications guidelines will be observed:

- Regional Operations Manager will be responsible for coordinating communications with the media, as well as any remote offsite entities, including but not limited to: the state utility commission, local and state governmental entities, officials, and emergency operations centers.
- Plant Manager will be responsible for coordinating communications with any local onsite entities, including but not limited to: the state utility commission, local and state governmental entities, officials, and emergency operations centers.

7.3 Staffing and Responsibilities

- The Operations Center will be responsible for the following:
  - Monitoring turbine and BOP reliability
  - Troubleshooting and recovering faulted turbines or faulted inverters as necessary
  - Notifying the OEM Site Manager of any observed reliability events
- The Plant Manager will be responsible for the following:
  - Oversight of all contractors and plant personnel
  - Coordinating the recovery of generating capacity, in the following order:
    - Recovery of any impacted BOP and substation facilities
    - Recovery of any impacted communications
    - Recovery of any individually faulted wind turbines or faulted inverters
- The Site Emergency Response Team will be responsible for the following:
  - Instructing personnel on their duties
  - Assessing nature and extent of all emergencies
  - Assuming initial control of all emergency actions until local emergency personnel arrive
  - Directing all initial emergency actions
  - Assigning tasks to personnel to carry out specific actions
  - Ordering evacuation, if deemed necessary

<u>Site Emergency Response Team:</u>

Primary Emergency Manager:	Plant Manager
Emergency Response Team Member:	Regional Operations Manager

7.4 Inventory of Emergency Supplies

- On a quarterly basis, Plant Managers will complete inventories of emergency supplies using Attachment 2, Emergency Supply Checklist, and guidance from FEMA or other applicable state or federal agencies.

7.5 Training and Drills

- Assigned personnel shall be trained on how to assist others in the proper evacuation of the building.
- Employees shall be informed on the Emergency Action Plan.
- Annual drills will be performed to test the Emergency Action Plan.

7.6 Disabilities

An employee with a disability is responsible for informing his/her immediate supervisor that he/she will require assistance during an evacuation. It is important not to assume that persons with obvious disabilities need assistance, or to assume what type of assistance they may need.

7.7 Evacuations

- A map of evacuation routes will be displayed throughout site buildings. Each map will show the way to the exit, depending on where employees are located. It will be the responsibility of the Emergency Manager to inform employees of these evacuation routes. The Emergency Manager shall verify that maps are in place and up to date during site inspections.
- Muster Points will be established to account for individuals (See Attachment 4)
- The Emergency Manager will contact all visitors listed in the Visitors Log and Contractors Managers/Leaders to ensure all personnel are accounted for.
- In the event an employee is unaccounted for and cannot be reached via radio or cell phone, Emergency Medical Services and the Local Sheriff's Department must be notified immediately.

7.8 Restoration of Service

In the event that a generation resource fails to start or trips offline due to a hazard or threat, the below process will be used to return to normal operations:

- The operations center will call the OEM Site Manager and the Plant Manager.
  - The QSE will notify ISO/RTO and TOP.
- The OEM Site Manager will notify the HV team and investigate the event:
  - Determine whether there is a hazard or threat present on site.
  - Pull event files to supplement investigation
    - If a hazard or threat is present on site, event files will be pulled remotely
- OEM Site Manager will determine whether it is safe to close breakers based on investigation (breakers cannot be closed from remote location).
- In the event that there is damaged equipment in the substation, further investigation into long term recovery will continue.
- If a hazard or threat is present, the OEM Site Manager and all associated personnel will remain offsite until the hazard is gone.

8. Event Response

8.1 Medical Emergencies

See Attachment 4 for First Aid Kit locations.

8.1.1 Injury or Illness on the Ground

- In the event of an injury/illness requiring medical treatment, employees shall contact the Emergency Manager immediately and describe the location and severity of the injury.
- The Emergency Manager shall dial **911** and coordinate rendezvous points with Ambulance service and site personnel. Rendezvous points shall generally be at the site of the injury. However, if Emergency Responders are unable to locate the site, the O&M Building will serve as a rendezvous point. (Note: multiple personnel may be required to lead both EMT first responders and then follow-on emergency vehicles to the injured location.)
- Call an onsite person trained in CPR and First Aid to provide the assistance prior to the arrival of the professional medical help.
- In rendering assistance to personnel exposed to hazardous materials, consult the Safety Data Sheet and wear the appropriate personal protective equipment. Attempt first aid ONLY if trained and qualified. Call **911** and refer to Hazardous Substance Section of this document.
- Document treatment and event using Attachment 1, Emergency Events Checklist.

8.2 Rescue Plan – Working at Heights

The rescue plan must be reviewed and included in any job safety analysis or pre-task planning for activities that require working at heights. The rescue plan shall provide for prompt rescue of personnel in the event of a fall or shall assure that they are able to rescue themselves.

8.2.1 Self-Rescue

If the person working at heights has been properly selected and trained on their fall protection equipment, at minimum, the following steps should be performed:

- The rescue and descent device will be secured to an anchor that is rated for at least 5,000 lbs.
- Individual will be capable of controlling descent speed with descender which is attached to chest D ring.
- In the case of a fall event:
  - Remove all components of fall arrest system impacted by the fall event from service,
  - Document (bag and tag) the components with name, date and activity at time of fall, and
  - Provide equipment to management.

8.2.2 Assisted rescue with mechanically-aided system

If self-rescue is not possible, then an Assisted Self-Rescue will be needed. The following guidelines should be used during a mechanically aided rescue:

- The rescue and descent device will be secured to an anchor that is rated for at least 5,000 lbs.
- The haul line may be swung over or lowered to the fallen worker, who will grab the rescue lifeline snap hook and secure it to the appropriate D-ring on his body support. A positive connection to the D-ring must be verified by one of the rescue team members.
- The rescue team will raise or lower the fallen employee to the appropriate work platform or ground and provide medical aid.
- Remove all components of fall arrest system impacted by the fall event from service and document (bag and tag) the components with name, date, and activity at time of fall, and provide equipment to management.

8.2.3 Fully-Assisted Rescue

If the worker's injuries prevent the worker from attaching to the rescue system, both self-rescue and assisted self-rescue are not options, and a fully assisted rescue is necessary:

- The rescue and descent device will be secured to an anchor that is rated for at least 5,000 lbs.
- A rescue team member must attach the haul line to the worker's fall arrest system. This can be performed by accessing the fallen worker and then attaching the rescue system directly to a D-ring on the worker's harness, or by using a rescue pole for the attachment. The rescue team could also attach a rescue grab to the lanyard or vertical lifeline.
- The rescue team must raise or lower the fallen worker to the appropriate work platform or ground and provide medical aid as required by OSHA.
- Remove all components of fall arrest system impacted by the fall event from service and document (bag and tag) the components with name, date, and activity at time of fall and provide equipment to management.

8.3 Fire Procedures

8.3.1 Building Fire

- Verbally warn employees in the immediate area and activate alarm (if not an automatic alarm) upon discovery of smoke or fire. The signal for a building wide evacuation will be the sound of the fire alarm. All employees are required to evacuate the building.
- Dial **911** to report the fire to the authorities.
- Give your name, address with closest major intersection and type of emergency.
- Stay on the line with dispatcher until all necessary information has been given.

- Before opening a door, touch it near the top to see if it is hot. A fire on the other side could blast through the smallest opening with tremendous force and heat. **DO NOT OPEN A HOT DOOR.**
- Use stairways. When out, move away from the building to the **PRIMARY MUSTER POINT (secondary if primary is compromised)** for a head count. You should be at least as far out from the building as it is high. Leave walks and drives open for fire and emergency responders.
- Notify firefighters if you suspect someone may be trapped inside the building.

8.3.2 Grass, Brush Fires

- In the event of an unattended grass, brush, or field fire, employees shall contact the Emergency Manager with the exact location and size of the fire.
- The Emergency Manager shall dial **911** or local emergency response and coordinate with the notifying employee to lead firefighting equipment to the fire.
- All areas within the vicinity or downwind of the fire must be evacuated immediately of all personnel, to avoid entrapment, vehicle damage and smoke inhalation injuries.
- Employees will be notified by radio or cell phone of the plant entrance at which to rendezvous with the fire department, if needed.
- The Emergency Manager will assist the Fire Department in contacting homeowners in the area, if necessary.
- Employees shall, at no time, attempt to extinguish or "fight" a large brush or grass fire. The employee's role is to notify the Emergency Manager and lead Fire Department to the scene.

8.3.3 Turbine Fire

- The circuit must be de-energized as soon as possible if the fire is suspected of being caused by the electrical system.
- Do not allow any personnel within the vicinity of the fire.
- If fire should occur while employees are present, employees shall abandon all tools and equipment and immediately evacuate the area.

8.3.4 Substation and Electrical Facilities Fire

- In the event of a fire inside a substation, employees shall notify the Emergency Manager with the location and source of the fire.
- The Emergency Manager shall dial **911** or local emergency contacts and coordinate with the reporting employees to lead firefighting equipment to the location of the substation.
- If requested, the Emergency Manager will assist the Fire Department in requesting landowners that live near or downwind of the fire to evacuate until an all clear is given.
- The site should be shut down immediately and all substation breakers open to de-energize the substation.
- Contact the Transmission Operator to notify them of the Emergency Outage and request de-energization of any incoming power to the substation.

- Once a Clearance and Lockout Tagout (LOTO) has been established, EMS should be briefed on the dangers of exploding equipment and toxic fumes from batteries.
- For a BESS fire, refer to Attachment 3 for the BESS Emergency Response Plan.
- Transformers and capacitors contain flammable combustible material. All personnel must remain in safe areas away from these explosive sources and upwind to avoid smoke exposure.

8.4 Cybersecurity Incidents

Site personnel shall use the Ørsted Cyber Security Incident Response and CIP Exceptional Circumstance Procedure when responding to a Cybersecurity incident. Steps to address cybersecurity incidents in the Cyber Security Incident Response and CIP Exceptional Circumstance Procedure include:

- Taking safety actions as necessary (e.g., alert on-site personnel, contact law enforcement)
- Escalating to internal technical personnel to investigate and remediate the incident
- Coordinating operational actions with Reliability Coordinator and Transmission Operator
- Coordinating with appropriate internal parties to classify incident and complete required incident reporting
- Coordinating with appropriate internal parties to identify next steps for containing and mitigating the Cybersecurity Incident

8.5 Physical Security Incidents

Site personnel shall use the Ørsted Cyber Security Incident Response and CIP Exceptional Circumstance Procedure when responding to a physical security incident. Steps to address physical security incidents in the Cyber Security Incident Response and CIP Exceptional Circumstance Procedure include:

- Taking safety actions as necessary (e.g., alert on-site personnel, contact law enforcement)
- Coordinating operational actions with the Reliability Coordinator and Transmission Operator
- Coordinating with appropriate internal parties to classify the incident and complete required incident reporting
- Evaluating if the physical security incident resulted in a Cybersecurity Incident

8.6 Pandemic and Epidemic

Defined as outbreak (local or widespread) of virulently communicable disease which threatens the ability of the company to operate at acceptable levels.

Orsted personnel shall follow Orsted's COVID-19 Standard Operating Procedure that contains guidance to ensure safe and healthy workplace. The Standard Operating Procedure includes guidance and requirements for office access, site access, and isolation and quarantine.

8.6.1 Emerging Pandemic and Epidemic Threats

On-Site Response Teams: Each Orsted location or facility shall have an on-site Emergency Response Team that has initial responsibility for responding to emergencies and potential crises that occur at Orsted

locations and, determining whether the situation warrants designation as a crisis and notification of the Crisis Management Team. On-Site Emergency Response Team members are listed in Section 7.3 of this Plan.

Below are examples of a few scenarios Orsted could ask you to assess:

- Significant reduction in staff
- Primary location compromised or unavailable
- Supply chain challenges
- Products and customers
- Collaboration and travel

8.7 Biological, Radiological, Explosive, Chemical (BREC) Threat

The threat that a bomb/BREC has been planted is usually made via telephone. In the majority of cases, these threats have been proven to be false and no device or material was located. However, the potential for loss of human life and property is so great that each situation must be pursued and evaluated. A calm response to the bomb threat caller could result in obtaining additional information.

- **Telephone Threat**
  - Remain Calm
  - Attempt to keep the caller on the line as long as possible by asking the caller to repeat the message. Record words spoken (as many words as possible) by the person and use the telephone threat checklist below:
    - Ask for the exact location where threat has been or is going to be planted.
    - Get as much information as possible about the caller (i.e., vocal characteristics, sex, group affiliation, reason)
    - Listen for clues from background noises which might indicate caller's location or area which call was placed.
  - Immediately after the caller hangs up, report the threat to **911** and your supervisor.
    - Remain available as law enforcement personnel will want to interview you.
    - Wait for further direction from your supervisor.
    - Do not spread rumors.

- **Written Threat**
  - Remain calm.
  - Avoid unnecessary handling in order to preserve possible fingerprint(s), handwriting or typewriting paper, and postal marks. These will prove essential in tracing the threat and identifying the writer.
  - While written messages are usually associated with generalized threats and extortion attempts, a written warning of a specific device may occasionally be received, it should never be ignored.
  - Immediately contact local authorities and report to immediate supervisor.
  - Wait for further instructions.
  - Do not spread rumors.

- **Suspicious Package:**
  - If a suspicious package or device is found, immediately notify the appropriate law enforcement authorities.
  - Do not shake or empty contents of any suspicious package or envelope.
  - Put the package or envelope down on a stable surface, do not sniff, touch, taste or look closely at it or at any contents that may have spilled.
  - Alert others in the area but DO NOT use the fire alarm.
  - Leave the area. Close any doors and assemble outside the room's entrance.
  - Do not allow anyone to reenter the area.
  - Wash hands with soap and water to prevent spreading potentially infectious material to face or skin.
  - If possible, create a list of persons who were in the room or area when the suspicious letter or package was recognized and a list of persons who also may have handled it.

- **Hazardous Substance**
  See Attachment 4 for the location of Spill Containment Equipment, Safety Data Sheets, and the SPCC Plan.

  A separate Spill Prevention, Control and Countermeasures Plan (SPCC) has been developed to address spills in detail. Refer to the SPCC for more detailed instructions regarding spill prevention and response.

  Should the spill be too extensive to be resolved using the available spill kit, then the spill should be contained as far as is practicable and the site's environmental contract should be contacted to resolve the situation.

  The spill should be reported to the National Response Center (NRC) and the State:

  NRC: 1-800-424-8802

  State: See SPCC Plan for reporting requirements.

  The following information will be required when reporting the incident:

  - Clear identification of the location of the spill.
  - Substance involved in spill
  - Approximate quantity spilled
  - Approximate concentration of the spilled material, if appropriate
  - The source of the spill
  - Individuals cleaning the spill
  - Any damaged resources, if applicable
  - Contact information
  - If spill left site or reached any water

9. Severe Weather Response

9.1 Severe Weather Event Identification

Severe weather warnings are commonly forecasted days in advance by the National Weather Service. Orsted will monitor forecasted severe weather in

relation to its generation Facilities to identify potential impacts to personnel safety and operational reliability.

9.2 Emergency Action Plan Activation

If Orsted identifies any potential impacts to personnel safety or operational reliability due to severe weather, the Site Emergency Response Team will coordinate to determine if and when the Emergency Action Plan should be activated. The Emergency Response Team is responsible for activating the Emergency Action Plan and communicating activation status to site personnel and the Asset Manager.

9.3 Tornado or Severe Thunderstorm Procedures

- **Severe weather events may have negative impacts on equipment and BOP facilities**. Safeguards against severe weather include:
  - Lightning arresters to ground lightning strikes in substations
  - Lightning protection systems in solar arrays to ground strikes and protect integrity of the equipment
  - Lightning protection systems in wind turbine blades to ground strikes and protect integrity of the blade
  - High wind speed cut-out parameters, allowing the turbine to pitch blades and yaw the nacelle out of the wind in the event that wind speeds meet or exceed 25 m/s.

- **Prevention and practice before the storm**: Turn on local TV, radio or NOAA Weather Radio and stay alert for warnings.
  - Tornado or Thunderstorm Watch: Weather conditions are favorable for the possible development of tornados or severe thunderstorms. Continue normal activities and have someone monitor the situation and notify others if conditions deteriorate.
  - Tornado or Thunderstorm Warning: A tornado or thunderstorm is occurring or sighted in the area. In addition to dark clouds and/or hail, the emergency siren may sound.
  - Ensure personnel are aware of the location of tornado shelters. See Attachment 4 for Tornado Shelters.

- **Know the warning signs of a tornado**: Weather forecasting science is not perfect, and some tornadoes do occur without a tornado warning. There is no substitute for staying alert to the sky. Besides an obviously visible tornado, here are some things to look and listen for:
  - Strong, persistent rotation in the cloud base.
  - Whirling debris on the ground under a cloud base. Note, tornadoes do not always have a funnel.
  - Hail or heavy rain followed by either dead calm or a fast, intense wind shift. Many tornadoes are wrapped in heavy precipitation and cannot be seen.
  - Day or night – Loud continuous roar or rumble
  - Night – Small, bright, blue-green to white flashes at ground level near a thunderstorm (as opposed to silvery lightning up in the clouds). These mean power lines are being snapped by very strong wind, maybe a tornado.

- Night – Persistent lowering from the cloud base, illuminated or silhouetted by lightning – especially if it is on the ground or there is a blue-green-white power flash underneath.

- **Turbines**: Employees working in turbine nacelles, upon issuance of a tornado watch or warning within the outer ring shall descend and exit the turbine immediately or seek shelter in the base of the tower as appropriate. If any of the tornado warning signs are observed, employees shall take cover in low lying areas and not attempt to drive to a building.

After a tornado has passed through the area and an all clear has been given, employees shall regroup at the Primary Shelter Location.

- **Inside a building:**
  Go immediately to the Tornado Shelter. Go to the basement, lowest floor, small center room (like a bathroom or closet), under a stairwell, or in an interior hallway or room with no windows. Go to the center of the room. Stay away from corners because they tend to attract debris.

- **If you are in a vehicle:** Park the car as quickly and safely as possible – out of the traffic lanes. Get out and seek shelter in a sturdy building. If in the open country, run to low ground away from any cars (which may roll over on you). Lie flat and face down, protecting the back of your head with your arms. Avoid seeking shelter under bridges, which can create deadly traffic hazards while offering little protection against flying debris.

- **In the open outdoors**: If possible, seek shelter in a sturdy building. If not, lie flat and face down on low ground, protecting the back of your head with your arms. Get as far away from trees and cars as you can; they may be blown onto you in a tornado.

- **After a Tornado:** Wait for emergency personnel to arrive. Carefully render aid to those who are injured. Stay away from power lines and puddles with wires in them as they may still be conducting electricity. Watch your step to avoid broken glass, nails, and other sharp objects. Stay out of any heavily damaged houses or buildings as they could collapse at any time. Do not use matches or lighters, in case of leaking natural gas pipes or fuel tanks nearby. Remain calm and alert and listen for information and instructions from emergency crews or local officials.

9.4 Lightning

- No personnel are permitted in or near a turbine during and after a lightning storm, until an all clear has been given by the Emergency Manager.
- An automated warning will be issued to the site when the lightning is detected within the outer ring. All crews, contractors and visitors will be notified that lightning has been detected within the outer ring and a tower evacuation may be required.
- If the storm is fast moving and the site is in the path of the storm, the evacuation should begin immediately.

- Each crew must acknowledge the warning by radio or cell phone. Also, crews should monitor the area themselves upon notification because many lightning strikes go undetected by the monitoring services.
- A stand down notification will be issued when lightning is detected within the inner ring of the site. Upon notification, crews will stop work, acknowledge the notification by radio or cell phone, evacuate the turbine and return to the O&M Building.
- The stand down will remain in effect until the site has received an "All Clear".
- All site personnel must notify the Emergency Manager of any lightning in the area.

9.5 Extreme Cold or Hot Weather

9.5.1 Extreme Cold or Hot Weather Operational Response

- In the event that the Reliability Coordinator or Balancing Authority issues a Weather Advisory (SPP); Operating Condition Notice (ERCOT); or Hot Weather, Cold Weather or Severe Weather Alert (MISO) related to extreme cold or hot weather conditions, the following guidance will be applied:
  - Conduct an all-hands meeting with relevant site personnel prior to the weather arriving.
  - Evaluate ongoing outages to determine if the resource can be returned to service for the weather event.
  - Evaluate scheduled outages to determine if planned work can be deferred and the outage rescheduled until after the weather event.
  - Confirm 24/7 availability of the operations center to monitor and remote troubleshoot turbines for the duration of the event.
  - Emphasize to operations center the need to monitor turbine and inverter performance and communicate derates in an expeditious manner.
  - A site evacuation should be issued if conditions could restrict travel from the site. Get personnel home before dangerous travel conditions are present (extreme cold weather).
  - Ensure backup generators are tested and filled with fuel where generators are in use.
  - Verify no HVAC related alarms present in control house or BESS Facilities, as applicable to the site.
  - Verify location and response time for high-voltage personnel to respond to any events in the substation.
- Document completion of activities using the checklist in Attachment 5. Record any identified issues to be included as lessons learned for future events.

9.5.2 Site Personnel Safety (Hot Weather)

- Hot weather can present various risks; therefore, the following guidance will be applied:
  - If indoors:
    - Stay indoors as much as possible while site maintenance does not necessitate outdoor work.

- Eat and drink. Salty foods and fluids prevent dehydration, cramping, and heat-related illness. Water or sports drinks are better than caffeinated beverages.
- Wear loose-fitting, lightweight, moisture-wicking clothing, if available.

- If outdoors:
  - Cover all exposed parts of the body to avoid sun overexposure/burn.
  - Notify someone of your current position and estimated time of arrival.
  - If confusion or disorientation occurs, seek shade, fluids, and medical attention as those are the initial signs of heat exhaustion.
  - If in a vehicle:
    - Notify someone of your location and status.
    - Idling motor may lead to fire risk given that extreme hot weather generally coincides with dry grasses.
    - Stay hydrated – before leaving buildings, ensure there is plenty of drinking water available in vehicle.

9.5.3 Site Personnel Safety (Cold Weather)

- In the event that site personnel are not able to evacuate, the following guidance will be applied:
  - If indoors:
    - Stay indoors and do not attempt travel.
    - Stay calm and await instructions from the National Weather Service.
    - Eat and drink. Food provides the body with energy and heat. Fluids prevent dehydration.
    - Wear layers of loose-fitting, lightweight, warm clothing, if available.
  - If outdoors:
    - Find a dry shelter. Cover all exposed parts of the body.
    - Use caution while driving in low visibility. Notify someone of your current position and estimated time of arrival.
    - If stranded in a vehicle:
      - Stay in car or truck.
      - Notify someone of your location and status.
      - Run motor to turn heater on 10 minutes out of every hour and make sure to open the window a little for fresh air.
      - Check the tailpipe before turning on heater – a blocked tailpipe can send carbon monoxide into the vehicle and cause death.
      - Make yourself noticeable to rescuers (hazard lights or honk horn).
      - Stay hydrated – if no water is available, melt snow and drink.
      - Exercise to keep blood circulating and to keep warm.

- Icing Conditions
  - If there are concerns of icing conditions at the beginning of the work shift, an overview of the weather and possible icing conditions shall be discussed and shared to all personnel.
  - If shedding of ice is observed in the area, personnel should not attempt to work on equipment. Personnel should remain in a safe location and contact site management immediately.
  - Work will be halted if equipment has any ice attached.
  - All site personnel are responsible for notifying the Site Manager of possible icing on the equipment in the scheduled work area.

9.6 Blizzard

If a Blizzard is imminent and visibility is expected to be impacted, a site evacuation should be issued. Get personnel home before the storm begin.

- **If indoors:**
  - Stay indoors, and do not attempt travel.
  - Stay calm and await instructions from National Weather Service.
  - Eat and drink. Food provides the body with energy and heat. Fluids prevent dehydration.
  - Wear layers of loose-fitting, lightweight, warm clothing, if available.
- **If outdoors:**
  - Find a dry shelter. Cover all exposed parts of the body.
  - Use caution while driving in low visibility. Notify someone of your current position and estimated time of arrival.
  - If stranded in a vehicle:
    - Stay in car or truck.
    - Notify someone of your location and status.
    - Run motor to turn heater on 10 minutes out of every hour and make sure to open the window a little for fresh air.
    - Check the tailpipe before turning on heater – a blocked tailpipe can send carbon monoxide into the vehicle and cause death.
    - Make yourself noticeable to rescuers (hazard lights or honk horn).
    - Stay hydrated – if no water is available, melt snow and drink.
    - Exercise to keep blood circulating and to keep warm.

- **Prevention and practice before the storm:** Turn on local TV, radio or NOAA Weather Radio and stay alert for warnings.
  - Hurricane Advisory: Information released approximately every 6-12 hours when a hurricane exists providing current hurricane location, strength of storm, and expected direction of travel.
  - Hurricane Watch: Communication from NOAA issued when a hurricane is between 24 and 48 hours from making landfall on the US coast.
  - Hurricane Warning: Communication from NOAA issued when a hurricane is between 12 to 24 hours from making landfall on the US coast and is issued to areas approximately 50 miles to either side of the expected location of impact. The warning may also describe where high water, floods, or high waves can be expected.
  - Tie down all trailers and connexes, board up windows, check operation of and fuel supply for portable generators, and secure or store any loose equipment on site. Expect low-lying areas to flood and plan accordingly.

  - Boom down any cranes on site in anticipation of high winds.
  - Should a warning be issued indicating the hurricane path will likely involve the facility, plan to evacuate farther inland away from the coast. See Attachment 6 for Hurricane Evacuation Routes (Old 300 Solar).

- **Know the warning signs of a hurricane**: While hurricane path predictions are not perfect, sufficient warning is normally provided to allow for at least 72 hours of preparation and planning should an evacuation become necessary.
  - Know the difference between hurricane watch and hurricane warning
  - Note the increasing severity in hurricane categorization (1 to 5) equating to increasing wind speeds (74 to 155+ mph winds).
  - Hail or heavy rain followed by either dead calm or a fast, intense wind shift may occur. Most hurricanes are wrapped in heavy precipitation and involved massive amounts of debris being lifted airborne.
  - At night, be aware of small, bright, blue green to white flashes at ground level (as opposed to silvery lightning up in the clouds). These mean power lines are being snapped by very strong winds.

- **Turbines**: Employees working in turbines, upon issuance of a hurricane watch, shall exit the turbine and confirm site plans/instructions for hurricane preparedness of the equipment.

- **Solar arrays**: Employees working in solar arrays, upon issuance of a hurricane watch, shall exist the solar arrays and confirm site plan/instructions for hurricane preparedness of the equipment.

- **Inside a building (if evacuation is not possible):**
  Go to the Tornado Shelter. Go to the basement, lowest floor, small center room (like a bathroom or closet), under a stairwell, or in an interior hallway with no windows. Go to the center of the room. Stay away from corners because they tend to attract debris. Be aware of water potentially entering the structure and should that occur, move to higher point within the building to avoid flooding.

- **After a Hurricane:** Wait for emergency personnel to arrive. Carefully render aid to any who may be injured. Stay away from power lines and standing water with wires in it as they may still be conducting electricity. Watch your step to avoid broken glass, nails, and other sharp objects. Stay out of any heavily damaged houses or buildings as they could collapse at any time. Do not use matches or lighters, in case of leaking natural gas pipes or fuel tanks nearby. Remain calm and alert and listen for information and instructions from emergency crews or local officials. Flooded areas should be avoided as the unknown depths of the water could pose a drowning risk.

- **Re-entry Following a Hurricane**: Due to the immense size of hurricanes, it may be several days following an evacuation before re-entry is possible. Prior to attempting to re-enter evacuated areas, sufficient supplies of drinking water, non-perishable food items, and fuel should be sourced and

transported into the area as these items are likely to be scarce. Plant personnel should check with local officials and news sources to determine whether road access is possible, being careful to avoid any flooding areas due to the risk of drowning in unknown depths. Downed power lines in or near standing water should also be avoided as they may still be conducting electricity. When on site and on foot, personnel should be aware of storm debris, being careful to avoid broken glass, nails, and other sharp objects. Personnel should also expect animal displacement and the increased potential presence of dangerous animals including snakes and spiders. Stay out of any heavily damaged hours or buildings as they could collapse at any time. Do not use matches or lighters, in case of leaking natural gas pipes or fuel tanks nearby. Remain calm and alert and listen for information and instructions from emergency crews or local officials.

9.7 Flooding

Flooding can occur as a result of either long-term, sustained participation or short-term intense weather events.

- **If ordered to evacuate:**
  - Time permitting, turn off the gas, electricity, and water and move vital materials and equipment to higher ground.
  - Disconnect appliances to prevent electrical shock when power is restored.
  - DO NOT attempt to drive or walk across creeks or flooded roads.

- **Driving Flood Facts:**
  - Six inches of water will reach the bottom of most passenger cars causing loss of control and possible stalling.
  - A foot of water will float many vehicles.
  - Two feet of rushing water can carry away most vehicles including sport utility vehicles (SUVs) and pickups.

- **After a Flood:**
  - Listen for news reports to learn whether the community's water supply is safe to drink.
  - Avoid floodwaters; water may be contaminated by oil, gasoline, or raw sewage. Water may also be electrically charged from underground or downed power lines.
  - Avoid moving water.
  - Be aware of areas where floodwaters have receded. Roads may have weakened and could collapse under the weight of a car.
  - Stay away from downed power lines and report them to the power company.
  - Return home only when authorities indicate it is safe.
  - Stay out of any building if it is surrounded by floodwaters.
  - Use extreme caution when entering buildings; there may be hidden damage, particularly in foundations.
  - Service damaged septic tanks, cesspools, pits, and leaching systems as soon as possible. Damaged sewage systems are seriously health hazards.
  - Clean and disinfect everything that got wet. Mud left from floodwater can contain sewage and chemicals.

- Drive site roads to evaluate any damage and schedule repairs.

9.8 Earthquake

An earthquake usually occurs without any type of warning. Due to the suddenness, all personnel should attempt to get under a table or desk. After the earthquake has stopped, initiate the following procedure:

- **Indoor Safety:**
  - If an earthquake strikes, you may be able to take cover under a heavy desk or table. It can provide you with air space if the building collapses. If you get under a table and it moves, try to move with it.
  - Inner walls or door frames are the least likely to collapse and may also shield against falling objects. If other cover is not available, go to an inner corner or doorway, away from windows or glass panels.
  - Stay away from glass, hanging objects, cabinets with doors that could swing open, bookcases, or other large furniture that could fail.
  - Grab something to shield your head and face from falling debris and broken glass.
  - If the lights go out, use a battery-operated flashlight. Don't use candles, matches, or lighters during or after the earthquake. If there is a gas leak, an explosion could result.
  - If you are in the kitchen, quickly turn off the stove and take cover at the first sign of shaking.

- **Performing work in a wind turbine:**
  - Stay inside the turbine but avoid standing below openings where objects could fall from above. Move away from the front of any open electrical panels.
  - Quickly take a look around the work area for heavy equipment, construction or maintenance in process, as materials may fall, tip over, or collapse in the area. Stay clear.
  - Immediately move away from electrical hardware or panels, or
  - If outside in a wind plant during an earthquake and closely adjacent to overhead objects such as turbines or met towers, immediately move farther away if possible and be cognizant of the need to avoid falling objects.

- **Performing work in the field:**
  - Stay clear of equipment but avoid standing below openings where objects could fall from above. Move away from the front of any electrical panels.
  - Quickly take a look around the work area for heavy equipment, construction or maintenance in process, as materials may fall, tip over, or collapse in the area. Stay clear.
  - If outside during an earthquake and closely adjacent to overhead objects, immediately move farther away if possible and be cognizant of the need to avoid falling objects.

- **Automobiles:**
  - If you are in a moving automobile, stop as quickly and safely as possible and move over to the shoulder or curb, away from utility poles, overhead wires, and under overpasses.

- Stay in the vehicle, set the parking brake, and turn on the radio for emergency broadcast information.
- A car may jiggle violently on its springs, but it is a good place to stay until the shaking stops.

- **After the Earthquake:**
  Once the initial shock is over, calmly walk out of the area to the site's Emergency Assembly Area. Be prepared for additional earth movements called "aftershocks". Although most of these are smaller than the main earthquake, some may be large enough to cause additional damage or bring down weakened structures.

  - **Checking Utilities:** An earthquake may break gas, electrical, and water lines. If you smell gas:
    - Open windows
    - Shut off the main gas valve
    - Do not turn any electrical appliances or lights on or off
    - Go outside
    - Report the leak to authorities
    - Do not reenter the building until a utility official says it is safe to do so.

  - **Other Precautions:**
    - Check to see if sewage lines are intact before using bathrooms or plumbing.
    - Do not touch downed power lines or objects in contact with drowned lines. Report electrical hazards to the authorities.
    - Immediately clean up spilled medicines, drugs, flammable liquids, and other potentially hazardous materials.
    - Stay off all telephones except to report an emergency. Replace telephone receivers that may have been knocked off by the earthquake.
    - Cooperate fully with public safety officials. Respond to requests for volunteer assistance from police, firefighters, emergency management officials, and relief organizations, but do not go into damaged areas unless assistance has been requested.

9.9 Water Shortage

The purpose of this section is to help develop short-term water shortage response plans. A water shortage can be any situation in which water supply is inadequate to meet demand. Causes of water shortages are:

- Drought
- Water contamination
- Inadequate planning to meet demand
- Shallow wells
- Inadequate pumping equipment
- Water waste
- Water outage due to loss of power or major service disruption

The frequency or cause of a water shortage may indicate the best way to overcome it. Droughts are temporary, but often recur. Thus, depending upon

drought frequency, a solution to the problems created by drought may be reducing demand or augmenting supply.

Water contamination can put a water supply out of commission permanently. In this case, a new source of supply may be warranted.

Step 1: Problem Assessment

a. Assess your demand and supply situation.
b. Determine if you are likely to have a water shortage.

Step 2: Options for Dealing with a Water Shortage

a. Develop and clarify policies regarding ways to address potential water shortages.
b. Consider a wide range of options for dealing with a water shortage (including demand reduction and supply augmentation options.)
c. Evaluate and select a course of action that is consistent with your policies.

Step 3: Plan Implementation

a. Establish a schedule for implementation of your program.
b. Determine the total cost of your program.
c. Monitor the effectiveness of your program.

10. Attachments

10.1 Emergency Events Checklist
10.2 Emergency Supply Checklist
10.3 BESS Emergency Response Plan
10.4 Emergency Locations
10.5 Extreme Hot or Cold Weather Response Checklist

Attachment 1 – Emergency Events Checklist

Emergency Events Checklist	
Site	Date
Job description	
Contacts	**Rescue Equipment (if applicable)**
Rescue Team	Respirators: Fire extinguisher: Communication devices: Rescue/descent kit:
Emergency Contacts	
EMS	First Aid Kit AED
Fire Dept	Spec pak
	Additional information
Emergency Manager	
SSC	

Attachment 2 – Emergency Supply Checklist

Date
Performed By

Inventory No.	Item Description	Quantity	Location	Satisfactory
1	Cot	3		Y ☐ N ☐
2	Cot blankets	3		Y ☐ N ☐
3	Flashlight	2		Y ☐ N ☐
4	MREs	3 packs of 12		Y ☐ N ☐
5	AAA batteries	1		Y ☐ N ☐
6	Commercial tote	2		Y ☐ N ☐
7	Current evacuation maps	Throughout Site Buildings		Y ☐ N ☐
8	Current Emergency Action Plan (Hardcopy)	1		Y ☐ N ☐
9	Current Cyber Security Incident Response Plan (Hardcopy)	1		Y ☐ N ☐
10	Current Event Reporting Operating Plan (Hardcopy)	1		Y ☐ N ☐

Signature

Attachment 3 – BESS Emergency Response Plan

To be developed prior to Eleven Mile Solar Center operation.

Attachment 4 – Emergency Locations

Muster Points

	Primary	Secondary	Inclement Weather
Badger	TBD	TBD	TBD
Eleven Mile	TBD	TBD	TBD
Ford County	O&M main parking lot	O&M warehouse lot	Severe weather shelter
Haystack	Outside main O&M gate	In front of substation	N/A
Lincoln Land	O&M main parking lot	O&M warehouse lot	Severe weather shelter
Muscle Shoals	Outside main O&M gate	In front of substation	N/A
Plum Creek	Outside main O&M gate	In front of substation	N/A
Sunflower	Outside main O&M gate	In front of substation	N/A
Willow Creek	Outside main O&M gate	In front of substation	N/A

Tornado Shelters

	Primary	Secondary
Badger	TBD	TBD
Eleven Mile	TBD	TBD
Ford County	North side of O&M	O&M restrooms
Haystack	Next to O&M front gate	N/A
Lincoln Land	South side of O&M	O&M restrooms
Muscle Shoals	In front of O&M Building	N/A
Plum Creek	Northeast corner of O&M Yard	Winside Fire Dept.
Sunflower	Southeast corner of lot behind the O&M Building	N/A
Willow Creek	In front of O&M Building	N/A

First Aid Kit Locations

Badger	TBD
Eleven Mile	TBD
Ford County	O&M Warehouse
Haystack	O&M Building, Substation, Site Vehicles
Lincoln Land	Main office hall & warehouse
Muscle Shoals	Main Office Building
Plum Creek	O&M Building, Substation, Site Vehicles
Sunflower	O&M Building
Willow Creek	O&M Building, Substation, Site Vehicles

Hazardous Substance Equipment / Documentation

Facility	Spill Containment Equipment	Safety Data Sheets	SPCC Plan
Badger	TBD	TBD	TBD
Eleven Mile	TBD	TBD	TBD
Ford County	Warehouse	Warehouse	O&M Building
Haystack	O&M Building	O&M Building	O&M Building
Lincoln Land	Warehouse	Warehouse	O&M Building
Muscle Shoals	Warehouse	O&M Building	O&M Building
Plum Creek	O&M Building	O&M Building	O&M Building
Sunflower	O&M Building	O&M Building	O&M Building
Willow Creek	O&M Building	O&M Building	O&M Building

Attachment 5 – Extreme Hot or Cold Weather Response Checklist

Plant Manager		
Applicable Sites		
Activity	**Event Applicability**	**Date Completed**
Conduct an all-hands meeting with relevant site personnel prior to the weather arriving.	Extreme Hot and Cold Weather	
Evaluate ongoing outages to determine if the resource can be returned to service for the weather event.	Extreme Hot and Cold Weather	
Evaluate scheduled outages to determine if planned work can be deferred and the outage rescheduled until after the weather event.	Extreme Hot and Cold Weather	
Confirm 24/7 availability to monitor and remote troubleshoot turbines for the duration of the event.	Extreme Hot and Cold Weather	
Emphasize to operations center the need to monitor turbine and inverter performance and communicate derates in an expeditious manner.	Extreme Hot and Cold Weather	
A site evacuation should be issued if conditions could restrict travel from the site. Get personnel home before dangerous travel conditions are present.	Extreme Cold Weather	
Ensure backup generators are tested and filled with fuel where generators are in use.	Extreme Hot and Cold Weather	
Verify no HVAC related alarms present in control house or BESS Facilities, as applicable to the site.	Extreme Hot and Cold Weather	
Verify location and response time for high-voltage personnel to respond to any events in the substation.	Extreme Hot and Cold Weather	
Comments/Issues:		