APPLICATION FOR A CERTIFICATE OF SITE COMPATIBILITY

LONGSPUR WIND PROJECT
MORTON COUNTY, NORTH DAKOTA



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1.0 INTRODUCTION

Minnesota Power respectfully submits this application to the North Dakota Public Service Commission (ND PSC) for a Certificate of Site Compatibility (Certificate) to construct the Longspur Wind Project (Project), which will have a nameplate capacity of up to 202.5 megawatts (MW). The Project consists of up to 45 wind turbines, 12 alternative wind turbine locations, access roads, electrical collection lines and communication systems, a Project substation, an Aircraft Detection Lighting System (ADLS) radar tower, an operations and maintenance (O&M) facility, and one permanent meteorological (MET) tower. The Project Area encompasses approximately 26,100 acres in Morton County, North Dakota. Project infrastructure and the Project Area are included on the Figures in this application.

Minnesota Power plans to construct an approximately 2.5-mile-long, 230-kilovolt (kV) transmission line (Transmission Line) to connect the Project's substation to the existing Tri-County 230-kV Substation in Mercer County, which will also serve as the Project's Point of Interconnection. Per ND PSC regulations, a separate application for a Certificate of Corridor Compatibility and Route Permit is required for the transmission line, which Minnesota Power is filing concurrently with this application.

Minnesota Power, an operating division of ALLETE, Inc., requested proposals for up to 400 MW of wind generation. The Project was chosen in an open process of competitive bids in Minnesota Power's 2024 Wind Request for Proposals with the Minnesota Public Utilities Commission.

Interconnection of the Project consists of two Midcontinent Independent System Operator (MISO) interconnection requests (J2097 and J2157) for 100 MW each into Minnesota Power's 230-kV Tri-County Substation. The Project interconnection requests are awaiting MISO Phase 3 results in MISO's 2021-Cycle study group, which will reveal final interconnection costs, and are scheduled to be released in early Q1 2026. Following the Phase 3 results, Minnesota Power will negotiate the Generator Interconnection Agreement (GIA), which is scheduled to be executed by the end of Q2 2026.

Concurrently with this application, Minnesota Power is also filing a Certificate of Corridor Compatibility (Corridor Certificate) and Transmission Facility Route Permit (Route Permit) for the 2.5-mile-long Transmission Line in Morton and Mercer Counties, North Dakota. Pursuant to North Dakota Century Code (N.D.C.C.) Section 49-22-13, Minnesota Power respectfully requests that the hearing on this application for a Certificate of Site Compatibility be consolidated and held on the same date and in conjunction with the hearing on its separately filed application for the Transmission Line's Corridor Certificate and Route Permit.

The Project and Transmission Line will create up to 11 full-time operations and maintenance (O&M) jobs, most of which are expected to reside locally. The Project and Transmission Line will create approximately 350 temporary construction jobs. Minnesota Power estimates that the Project and Transmission Line will provide approximately $33 million in state tax revenue over 35 years and approximately $19 million in sales tax. The Project also will provide approximately $62 million in payments to participating landowners for over 35 years, which will not only benefit those landowners, but also the local economy as that money is reinvested in local goods and services. Minnesota Power estimates that the total cost for the Project and Transmission Line would be approximately $791 million.

Minnesota Power is a Minnesota public utility headquartered in Duluth, Minnesota. Minnesota Power supplies retail electric service to 150,000 retail customers, including some of the nation's

largest industrial customer operations, and wholesale electric service to 14 municipalities in a 26,000-square-mile electric service territory located in northeastern Minnesota. Minnesota Power's transmission network is interconnected with the regional transmission grid to promote reliability. Minnesota Power is a member of MISO and the Midwest Reliability Organization.

Minnesota Power operates a 1,600 MW peak demand system with electric power generation in the form of renewable wind, solar, and hydropower generation facilities, as well as coal, biomass, and natural gas-fired power plants in Minnesota and additional wind facilities in North Dakota. Minnesota Power also purchases electricity from independent power producers and other public utilities. Minnesota Power delivers 550 MW of electricity from North Dakota to Minnesota Power's service area via its 465-mile-long high-voltage direct current +/-250-kV transmission line, with terminals near Center, North Dakota and Hermantown, Minnesota.

1.1 COMPLIANCE WITH THE ENERGY CONVERSION AND TRANSMISSION FACILITY SITING ACT

The North Dakota Energy Conversion and Transmission Facility Siting Act requires that an application for a Certificate demonstrate that the proposed energy conversion facility meets criteria set forth in N.D.C.C. Chapter 49-22 and North Dakota Administrative Code (N.D. Admin. Code) Article 69-06. The applicant must site an energy conversion facility in an orderly manner compatible with environmental preservation and the efficient use of resources (N.D.C.C. Section 49-22-02). This application demonstrates that the Project complies with N.D. Admin. Code Section 69-06-08-01 Exclusion and Avoidance Areas, Selection Criteria, and Policy Criteria. Information regarding Project design, wind resources, and technical information are included in this Application to allow a thorough understanding of the Project and to aid in review by the ND PSC, regulatory agencies, and the public. Table 1.1-1 outlines the requisite information to fulfill the Certificate criteria and the corresponding section in this application if applicable.

TABLE 1.1-1
Certificate Completion Checklist

State Authority and Description	Section Addressed
North Dakota Administrative Code Chapter 69-06-04-01. Application. 2. Contents.	
1. The application must contain:	
a. A description of:	
(1) The type of energy conversion facility proposed	1.3
(2) The gross design capacity	4.1.1
(3) The net design capacity	Not applicable
(4) The estimated thermal efficiency of the energy conversion process and the assumptions upon which the estimate is based	Not applicable
(5) The number of acres that the proposed facility will occupy	1.3,1.5
(6) The anticipated time schedule for:	
(a) Obtaining the certificate of site compatibility	1.6
(b) Completing land acquisition	1.6
(c) Starting construction	1.6
(d) Completing construction	1.6
(e) Testing operations	1.6

TABLE 1.1-1
Certificate Completion Checklist

State Authority and Description			Section Addressed
	(f)	Commencing commercial production	1.6
	(g)	Beginning any expansions or additions	1.7
b.		Copies of any evaluative studies or assessments of the environmental impact of the proposed facility submitted to any federal, regional, state, or local agency.	Appendix B
c.		An analysis of the need for the proposed facility based on present and projected demand for the product or products to be produced by the proposed facility, including the most recent system studies supporting the analysis of the need.	2.0
d.		A description of any feasible alternative methods of serving the need.	2.2
e.		A study area that includes the proposed facility site of sufficient size to enable the ND PSC to evaluate the factors addressed in N.D.C.C. Section 49-22-09.	1.0
f.		A discussion of the utility's policies and commitments to limit the environmental impact of its facilities, including copies of board resolutions and management directives.	6.0
g.		A map identifying the criteria that provides the basis for the specific location of the proposed facility within the study area.	All Figures
h.		A discussion of the criteria evaluated within the study area, including exclusion areas, avoidance areas, selection criteria, policy criteria, design and construction limitations, and economic considerations.	3.0
i.		A discussion of the mitigative measures that the applicant will take to minimize adverse impacts which result from the location, construction, and operation of the proposed facility.	6.0
j.		The qualifications of each person involved in the facility site location study.	9.0
k.		A map of the study area showing the location of the proposed facility and the criteria evaluated.	All Figures
l.		An eight and one-half inch by eleven-inch black and white map suitable for newspaper publication depicting the site area.	Electronically provided
m.		A discussion of present and future natural resource development in the area.	1.8
n.		Map and GIS requirements. The applicant shall provide information that is complete, current, presented clearly and concisely, and supported by appropriate references to technical and other written material available to the ND PSC.	All Figures, GIS provided
North Dakota Century Code 49-22-08. Application for a certificate - Notice of filing - Amendment - Designation of a site or corridor.			
1.		An application for a certificate shall be in such form as the ND PSC may prescribe, containing the following information:	
a.		A description of the size and type of facility.	1.0
b.		A summary of any studies which have been made of the environmental impact of the facility.	6.0
c.		A statement explaining the need for the facility.	2.0
d.		An identification of the location of the preferred site for any energy conversion facility.	1.5
e.		An identification of the location of the preferred corridor for any transmission facility.	Not applicable
f.		A description of the merits and detriments of any location identified and a comprehensive analysis with supporting data showing the reasons why the preferred location is best suited for the facility.	1.0, 2.0, 6.0
g.		A description of mitigative measures that will be taken to minimize all foreseen adverse impacts resulting from the location, construction, and operation of the proposed facility.	6.0
h.		An evaluation of the proposed site or corridor with regard to the applicable considerations set out in section 49-22-09 and the criteria established pursuant to section 49-22-05.1.	3.5, 3.6
i.		Such other information as the applicant may consider relevant, or the ND PSC may require.	Appendix B, Appendix C

TABLE 1.1-1
Certificate Completion Checklist

State Authority and Description			Section Addressed
North Dakota Century Code 49-22-09. Factors to be considered in evaluating applications and designation of sites, corridors, and routes.			
1.	The ND PSC shall be guided by, but is not limited to, the following considerations, where applicable, to aid the evaluation and designation of sites, corridors, and routes:		
	a.	Available research and investigations relating to the effects of the location, construction, and operation of the proposed facility on public health and welfare, natural resources, and the environment.	1.5, 3.0, 5.0, 6.0
	b.	The effects of new electric energy conversion and electric transmission technologies and systems designed to minimize adverse environmental effects.	3.5, 4.0, 5.0, 6.0
	c.	The potential for beneficial uses of waste energy from a proposed electric energy conversion facility.	Not applicable
	d.	Adverse direct and indirect environmental effects that cannot be avoided should the proposed site or route be designated.	6.0
	e.	Alternatives to the proposed site, corridor, or route which are developed during the hearing process, and which minimize adverse effects.	2.2
	f.	Irreversible and irretrievable commitments of natural resources should the proposed site, corridor, or route be designated.	3.5, 6.5, 6.6, 6.7, 6.8
	g.	The direct and indirect economic impacts of the proposed facility	3.5, 6.1
	h.	Existing plans of the state, local government, and private entities for other developments at or in the vicinity of the proposed site, corridor, or route.	1.8, 3.5
	i.	The effect of the proposed site or route on existing scenic areas, historic sites and structures, and paleontological or archaeological sites.	6.4
	j.	The effect of the proposed site or route on areas unique because of biological wealth or because the areas are habitats for rare and endangered species	6.9
	k.	Problems raised by federal agencies, other state agencies, and local entities.	7.0

1.2 SITING FLEXIBILITY

Minnesota Power seeks a Certificate for the Project Area, as opposed to specific infrastructure locations, which facilitates siting flexibility and allows Minnesota Power to modify the Project site plan to constraints as they are identified. If any changes to the Project site plan are made after submission of this application, Minnesota Power will submit to the ND PSC an updated site plan and site plan modification memorandum. A pre-construction conference call will be held with ND PSC staff to ensure that the final Project site plan meets the Certificate requirements. Minnesota Power believes that this siting process is consistent with North Dakota siting rules and provides Minnesota Power with the flexibility necessary to develop a timely, cost-effective project in an environmentally responsible manner.

Minnesota Power is seeking flexibility from the ND PSC to select the most appropriate technology for the Project at the time of construction to ensure optimization of wind and land resources and cost efficiency. Minnesota Power reserves the right to select an alternative turbine model similar to the turbine model analyzed in this application. Regardless of the turbine model selected, the Project will meet all applicable ND PSC and Morton County regulations. If an alternative but comparable turbine model is selected, it would be expected to be consistent with the turbine analysis throughout this application and Minnesota Power will provide the ND PSC with updated turbine specifications and sound and shadow flicker modeling that demonstrates compliance with the applicable siting requirements.

1.3 PROJECT SUMMARY

The Project will be located in Morton County, North Dakota. The planned nameplate capacity for the Project is up to 202.5 MW at the point of interconnection.

The Project's permanent facilities will include:

- Up to 45 4.5 MW wind turbines and associated equipment;
- access roads to wind turbine locations;
- underground electrical collection lines;
- Project substation;
- a 2.5-mile-long 230-kV transmission line (application to be filed separately);
- O&M facility;
- ADLS radar tower; and
- one permanent MET tower.

The Project's temporary facilities will include:

- A laydown area for equipment, materials, and other miscellaneous components and construction management facility;
- intersection improvements to existing roads for transport and access during construction;
- staging areas at the turbine locations to accept the turbine deliveries; and
- crane paths between turbines during construction.

Minnesota Power will own the entire Project and, as a result, will manage the construction of all equipment and associated facilities. Minnesota Power will select a third-party engineering, procurement, and construction (EPC) contractor to manage and complete construction of the Project.

1.4 PROJECT LOCATION

Multiple factors and inputs contributed to the Project Area selection and development. The Project Area must have an optimal wind resource and proximity to an interconnection point to meet the needs. Stakeholder engagement and input, including community support, landowner participation, and agency feedback, are vitally important, as this feedback helped to identify developable and suitable areas. Finally, environmental studies, setback analyses, and N.D. Admin. Code criteria further defined potential constraints and feasibility.

The Project Area is approximately 26,100 acres. Minnesota Power currently holds voluntary wind lease options and easement agreements with approximately 106 landowner partners, which is sufficient acreage to construct the Project (Figures 1 through 4). All facilities are on private land except underground collection and communication cables cross public road rights-of-way. Table 1.4-1 summarizes the Public Land Survey System subdivisions that are included within the Project Area.

TABLE 1.4-1
Project Area Location

County	Township Name	Township	Range	Section(s) [a]
Morton	Morton Unorganized Territory	139 N	87 W	4, 5, 6, 9
			88 W	1, 4, 5
		140 N	87 W	5, 6, 7, 8, 17, 18, 19, 20, 28, 29, 30. 31. 32. 33, 34

TABLE 1.4-1
Project Area Location

	88 W	1, 2, 3, 4, 9 – 33, 36
	89 W	13, 14, 24

[a] Note that locations within the Project Area may be located within the Section but may not encompass the entire section.

1.5 SCHEDULE

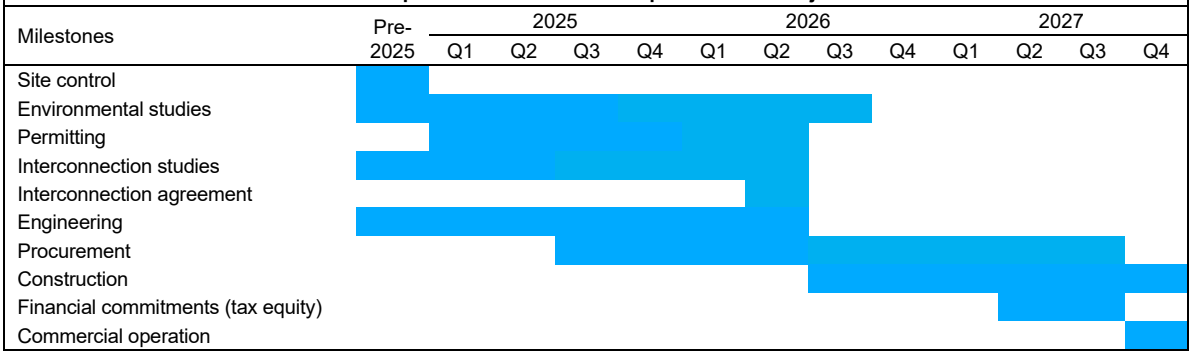
Table 1.5-1 provides a summary of the anticipated time schedule for the Project.

TABLE 1.5-1
Anticipated Time Schedule

Activity	Anticipated Time
Obtaining the Certificate of Site Compatibility	Q2 2026
Completing land acquisition	Complete
Starting construction	Q3 2026
Completing construction	Q4 2027
Testing operations	Q3 – Q4 2027
Commencing commercial operation	Q4 2027

Table 1.5-2 provides an anticipated timeline for development of the Project from pre-2025 to 2027 when the Project is scheduled to commence commercial operations.

TABLE 1.5-2
Anticipated Timeline for Development of the Project



1.6 EXPANSIONS OR ADDITIONS

No additions or expansions have been identified at this time. Should the opportunity arise for expansion or addition to the Project, Minnesota Power would obtain all necessary permits and approvals for any expansion or addition.

1.7 PRESENT AND FUTURE NATURAL RESOURCE DEVELOPMENT

Within the Study Area in Morton and Mercer Counties, publicly known present and future natural resources development projects associated with energy development include surface coal mining, coal fired generation plants, carbon capture facilities, oil exploration, and wind energy development. Publicly known present and future natural resource development projects in Morton

and Mercer Counties and areas near the Study Area are described below and depicted on Figure 5.

Within two miles of the Study Area, there are three abandoned mines. The approximate locations are shown on Figure 5. Two possible coal mines are present within the Study Area. No oil exploration wells are present within the Study Area.

Within Morton and Mercer Counties, SCS Carbon Transport LLC is proposing to develop the Summit Carbon Solutions Midwest Carbon Express, a carbon dioxide (CO_2) pipeline and sequestration project (See Case PU-22-391 Midwest Carbon Express CO_2 Pipeline Project). SCS Carbon Transport LLC is partnering with 57 ethanol plants across a five-state region. The project will transport CO_2 via pipeline from existing ethanol plants to underground injection control facilities where the CO_2 will be permanently stored underground in deep geologic formations.

Within Mercer County, there are a total of seven existing wind turbines associated with the Glen Ullin Energy Center (Clean Energy 1). Within Morton County, there are 36 existing wind turbines associated with the Glen Ullin Energy Center (Clean Energy 1) and 73 associated with the Bison 1 through 3 Wind Projects, which are operated by Minnesota Power. Also within Mercer County is one proposed wind facility, including the Red Butte Wind Energy Center.

2.0 NEED FOR THE FACILITY

2.1 NEED ANALYSIS

This section provides an analysis of the need for the Project based on present and projected demand for wind energy, including the most recent studies supporting the analysis of the need. Demand for wind energy and the Project come from a variety of needs including Minnesota Power's request for proposals and power forecast demands. A more detailed description of each of the needs for the Project is described below.

To address its 2021 Integrated Resource Plan, Minnesota Power requested proposals for up to 400 MW of wind generation to meet future energy needs. The Project will have a nameplate capacity of approximately 202.5 MW, which will help support Minnesota Power's generation needs within Minnesota Power's service territory.

Minnesota Power selected the Project based on the exceptional wind resource available in North Dakota and its ability to deliver cost-effective, reliable energy. Minnesota Power is proposing to invest in infrastructure that will support energy development in North Dakota with the energy generated by the Project generally being exported to Minnesota Power's service territory via a high-voltage direct current transmission line, strengthening system reliability and supporting long-term planning goals.

2.2 ALTERNATIVE METHODS TO SERVICE THE NEED

Due to wind energy's cost effectiveness and Minnesota's goal of adding new wind energy, non-renewable alternatives were not considered. Based on the size, type, and timing of the Project, it is unlikely that an alternative to wind would meet the same need.

2.3 TEN-YEAR PLAN

In accordance with N.D.C.C. Section 49-22-04 and N.D. Admin. Chapter 69-06-02, Minnesota Power's 10-year plan referenced its 2021 Integrated Resource Plan, Case Number PU-24-267. This Project was selected to meet a portion of the 300 to 400 MW of new wind resource requirement referenced in the 2021 Integrated Resource Plan.

3.0 SITE SELECTION CRITERIA

Siting turbines is an iterative process, balancing wind resources, transmission, stakeholder engagement and input, economics, setbacks, and environmental constraints. Minnesota Power evaluated the Project Area to determine the optimal location for Project infrastructure.

Minnesota Power has secured voluntary wind easement agreements with landowners and identified turbine locations based on site inspection, topographic maps, known environmentally sensitive areas, review of North Dakota's energy conversion facility siting exclusion and avoidance areas, review of Morton County and state wind siting requirements, and communications with local, state, and federal agencies. Minnesota Power reviewed the criteria in N.D. Admin. Code Chapter 69-06-08 and has considered these criteria in Project design. These criteria are discussed in this section.

3.1 EXCLUSION AREAS

In accordance with N.D. Admin. Code Section 69-06-08-01(1) the geographical areas identified must be excluded in the consideration of a site for an energy conversion facility and N.D. Admin. Code Section 69-06-08-01(2) lists geographical areas that must be excluded in the consideration of a site for a wind energy conversion facility. The applicability of these exclusion areas is summarized below in Table 3.1-1. Exclusion areas in the Project Area are depicted on Figure 6.

TABLE 3.1-1
Exclusion Areas

Energy Conversion Facility Siting Criteria			Description if Present in or Applicable to the Project	Section Addressed
1.	**Exclusion areas.**			
	a.	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.	Not present	N/A
	b.	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.	Not present.	6.4, 6.5
	c.	County parks and recreational areas; municipal parks; parks owned or administered by other governmental subdivisions; hardwood draws; and enrolled woodlands.	Not present.	6.5
	d.	Areas critical to the life stages of threatened or endangered animal or plant species.	Not present.	6.9
	e.	Areas where animal or plant species that are unique or rare to this state will be irreversibly damaged.	Turbines and infrastructure have been sited to avoid these areas.	6.9
	f.	Areas within 1,200 feet of the geographic center of an intercontinental ballistic missile launch or launch control facility.	Not present.	Not applicable
2.	**Additional exclusion areas for wind energy conversion facilities.**			
	a. (1)	One and one-tenth times the height of the turbine from the nearest edge of an interstate or state roadway right of way.	No turbines will be located within this area.	Figures 1-3
	a. (2)	One and one-tenth times the height of the turbine plus seventy-five feet from the centerline of any county or maintained township roadway.	No turbines will be located within this area.	Figures 1-3
	a. (3)	One and one-tenth times the height of the turbine from the nearest edge of railroad right-of-way.	No turbines will be located within this area.	Figures 1-3
	a. (4)	One and one-tenth times the height of the turbine from the nearest edge of a one hundred fifteen kilovolt or higher transmission line right of way.	No turbines will be located within this area.	Figures 1-3

TABLE 3.1-1
Exclusion Areas

Energy Conversion Facility Siting Criteria			Description if Present in or Applicable to the Project	Section Addressed
	a. (5)	One and one-tenth times the height of the turbine from the property line of a nonparticipating landowner and three times the height of the turbine from an inhabited rural residence of a nonparticipating landowner, unless a variance is granted. A variance 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 all parties' support for a variance to reduce the setback requirement in this subsection. 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 North Dakota Century Code Chapter 17-04.	No turbines will be located within this area.	Figures 1-3

3.2 AVOIDANCE AREAS

In accordance with N.D. Admin. Code Section 69-06-08-01(3) and (4), the geographical areas listed in Table 3.2-1 cannot be approved as a site for an energy conversion facility unless the applicant shows that, under the circumstances, there is no reasonable alternative. In determining whether an avoidance area should be designated for a facility, the ND PSC may consider, among other things: the proposed management of adverse impacts, the orderly siting of facilities, system reliability and integrity, the efficient use of resources, and alternative sites. The area of avoidance must include a buffer zone of a reasonable width to protect the integrity of the area. Avoidance areas are also mapped for the Project Area on Figure 6.

TABLE 3.2-1
Avoidance Areas

Energy Conversion Facility Siting Criteria			Description if Present in the Project Area or Applicable to the Project	Section Addressed
3.	**Avoidance areas.**			
	a.	Historical resources which are not designated as exclusion areas.	There are no historical resources that are not designated as an exclusion area.	6.4
	b.	Areas within the city limits of a city or the boundaries of a military installation.	Not applicable.	Figures 1-3
	c.	Areas within known floodplains as defined by the geographical boundaries of the hundred-year flood.	100-year floodplains are present, which the Project will bore or avoid to the extent possible.	6.7, Figure 6
	d.	Areas that are geologically unstable.	There are no geologically unstable areas within project impacts..	6.6
	e.	Woodlands and wetlands.	Permanent impacts on wetlands will be avoided and minimized as practicable. The Project minimizes impacts on trees/shrubs and unavoidable impacts will comply with the ND PSC's Tree and Shrub Mitigation Specifications.	6.5, 6.7, Figures 9, and 10 Appendix B
	f.	Areas of recreational significance which are not designated as exclusion areas.	Not applicable.	N/A
4.	**Additional avoidance areas for wind energy conversion facilities.**			

TABLE 3.2-1
Avoidance Areas

Energy Conversion Facility Siting Criteria	Description if Present in the Project Area or Applicable to the Project	Section Addressed
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 45 dBA. The sound level avoidance area criteria may be waived in writing by the owner of the occupied residence or the community building.	The Project complies.	6.3, Appendix B.3

3.3 SELECTION CRITERIA

In accordance with N.D. Admin. Code Section 69-06-08-01(5), a site can be approved in an area only when the applicant has demonstrated to the ND PSC that any significant adverse effects resulting from the location, construction, and operation of the facility in that area, as they relate to the criteria listed in Table 3.3-1, will be at an acceptable minimum, or that those effects will be managed and maintained at an acceptable minimum.

TABLE 3.3-1
Selection Criteria

Energy Conversion Facility Siting Criteria	Description if Present in or Applicable to the Project	Section Addressed
5. Selection criteria.		
a. The impact upon agriculture:		
(1) Agricultural production	Negligible/minimal effect anticipated. Landowners will be compensated through an easement payment for loss of agricultural production. Only land needed during operations will be permanently affected. Temporarily disturbed areas will be restored as practicable to preconstruction conditions. The Project is expected to impact up to 96 acres of agriculture land during operation. Disturbed land will be restored and reclaimed to prior land use (including agriculture) following decommissioning of the Project.	5.2, 6.1, 6.2
(2) Family farms and ranches	Negligible/minimal effect anticipated. Wind development is compatible with existing family farms and ranches and will not displace any farms or ranches.	Not applicable
(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	No effect anticipated. Participating landowners have not expressed concerns related to economically suitable irrigation on their land. No irrigation is occurring within the Project Area.	Not applicable
(4) Surface drainage patterns and ground water flow patterns	No effect anticipated. Project infrastructure will be designed in such a manner that runoff from the upper portions of the watershed can flow unrestricted to the lower portion of the watershed.	6.7, Appendix B6
(5) The agricultural quality of the cropland	No effect anticipated. If compaction of soils occurs during construction, Minnesota Power will work with landowners to alleviate the compaction. Soil conservation management practices will be implemented.	6.6, 6.7
b. The impact upon the availability and adequacy of:		
(1) Law enforcement	Positive effect anticipated. The Project will have a positive economic effect on law enforcement due to increased county tax revenue.	Not applicable
(2) School systems and education programs	Positive effect anticipated. The Project will have a positive economic effect on school systems and education programs due to increased county tax revenue.	Not applicable

TABLE 3.3-1
Selection Criteria

Energy Conversion Facility Siting Criteria	Description if Present in or Applicable to the Project	Section Addressed
(3) Governmental services and facilities	Positive effect anticipated. The Project will have a positive economic effect on governmental services and facilities due to increased county tax revenue.	Not applicable
(4) General and mental health care facilities	No effect anticipated.	Not applicable
(5) Recreational programs and facilities	Negligible/minimal effect anticipated. Recreational impacts will be auditory and visual in nature and limited to individuals using land in and near the Project Area for hunting, fishing, or nature observation.	Not applicable
(6) Transportation facilities and networks	Positive effect anticipated. Some local roads will be improved, benefiting local landowners. Vehicle traffic will temporarily increase during construction, but no long-term effects are expected. Project operations will have a negligible effect on transportation facilities and networks.	Not applicable
(7) Retail service facilities	Positive effect anticipated. Local services such as motels, restaurants, and convenience stores are likely to experience an increase in business during Project construction.	Not applicable
(8) Utility services	No effect anticipated. The Project will use station service from one of the local providers, which will suggest appropriate configurations for the electrical system, and Minnesota Power will abide by the recommendations to prevent impacts on the transmission system.	Not applicable
c. The impact upon:		
(1) Local institutions	No effect anticipated.	Not applicable
(2) Noise-sensitive land uses	Negligible/minimal effect anticipated. Acoustic modeling results indicate the predicted sound levels from the Project will not exceed the ND PSC's current sound limit. No effect anticipated based on compliance with sound limits at residences.	6.3, Appendix B.3
(3) Light-sensitive land uses	Negligible/minimal effect anticipated. The Project will include Federal Aviation Administration (FAA) approved Aircraft Detection Lighting System (ADLS), consistent with N.D. Admin. Code Chapter 69-06-11.	4.1.7, Appendix X
(4) Rural residences and businesses	Negligible/minimal effect anticipated. The Project will comply with state and local setbacks.	3.6
(5) Aquifers	No effect anticipated. Based on the small amount of increased impervious surface area, which will be created by Project components, relative to the separation of these components and the size of the entire Project Area, the Project would likely have minimal impacts on regional groundwater recharge.	6.7
(6) Human health and safety	No effect anticipated based on compliance with sound, shadow flicker, and light regulations and standards.	6.3, Appendix B.3 and B.4, 4.1.7
(7) Animal health and safety	No effect anticipated. Minnesota Power will implement measures to avoid and minimize effects on wildlife to the extent practicable Minnesota Power will implement a Wildlife Response and Reporting System once wind turbine construction is complete. Ground and tree clearing are scheduled to occur in the fall after nests are no longer in use.	6.8, 6.9 Appendix B
(8) Plant life	Negligible/minimal effect anticipated. Minimal impact on native plant life due to siting predominantly in cropland and broken grassland. Trees/shrubs will be replaced according to the ND PSC's Tree and Shrub Mitigation Specifications. Temporarily disturbed areas will be restored as practicable.	5.1, 6.5, 6.8, 6.9, Appendix B

TABLE 3.3-1
Selection Criteria

Energy Conversion Facility Siting Criteria	Description if Present in or Applicable to the Project	Section Addressed
(9) Temporary and permanent housing	Positive effect anticipated. Operations staff are likely to live in the region. Existing temporary housing, such as hotels, will be used during construction.	Not applicable
(10) Temporary and permanent skilled and unskilled labor	Positive effect anticipated. The Project will result in up to 11 full-time jobs.	6.1
d. The cumulative effects of the location of the facility in relation to existing and planned facilities and other industrial development.	No effect anticipated. Due to no existing or known planned facilities or industrial development, there are no cumulative effects.	N/A
e. The impact upon military installations, assets, and operations.	Negligible/minimal effect anticipated.	6.3, 7.0, Appendix C

3.4 POLICY CRITERIA

In accordance with N.D. Admin. Code Section 69-06-08-01(6), the ND PSC may give preference to an applicant that will maximize benefits that result from the adoption of the policies and practices listed in Table 3.4-1 and may require the adoption of such policies and practices as appropriate.

TABLE 3.4-1
Policy Criteria

Energy Conversion Facility Siting Criteria	Description if Present in or Applicable to the Project	Section Addressed
6. Policy Criteria		
a. Recycling of the conversion byproducts and effluents.	Not applicable.	Not applicable
b. Energy conservation through location, process, and design.	Minnesota Power designed the Project to optimize wind resources and maximize energy output while maintaining compliance with ND PSC siting criteria.	1.5, 3.0
c. Training and utilization of available labor in this state for the general and specialized skills required.	Minnesota Power has used several local firms in developing the Project and compiling this application.	9.0
d. Use of a primary energy source or raw material located within the state.	The energy generated at the site will use the wind resources in North Dakota.	1.0, 2.0,
e. Not relocating residents.	Not applicable.	N/A
f. The dedication of an area adjacent to the facility to land uses such as recreation, agriculture, or wildlife management.	Not applicable.	N/A
g. Economies of construction and operation.	It is anticipated that 350 construction jobs will be created and up to 11 full-time jobs will be created for operations and maintenance.	6.1
h. Secondary uses of appropriate associated facilities for recreation and the enhancement of wildlife.	Not applicable.	N/A
i Use of citizen coordinating committees.	Not applicable.	N/A
j. A commitment of a portion of the energy produced for use in this state.	The Project was selected by Minnesota Power in response to a request for proposal for generation capacity. The energy produced by the Project will be transmitted along the Transmission Line into the Minnesota Power Tri County Substation. Energy from the Project is then transmitted on the existing grid to Minnesota Power's High Voltage Direct Current transmission line from Center North Dakota to Minnesota Power's service territory.	2
k. Labor relations.	Not applicable.	Not applicable
l. The coordination of facilities.	The Project has been sited with the consideration of existing facilities and facility corridors.	1.0, 3.0

TABLE 3.4-1
Policy Criteria

Energy Conversion Facility Siting Criteria		Description if Present in or Applicable to the Project	Section Addressed
m.	Monitoring of impacts.	The engineering, procurement, and construction contractor will employ best management practices during construction to monitor soil impacts and segregate topsoil. A storm water pollution prevention plan will be prepared for the Project. Minnesota Power will implement a Wildlife Response and Reporting System once wind turbine construction is complete.	6.0
n.	A commitment to installing light mitigation technology for wind energy conversion facilities subject to commercial availability and federal aviation administration approval.	Minnesota Power will install an FAA-approved Aircraft Detection Lighting System, consistent with N.D. Admin. Code Chapter 69-06-11.	4.1.7

3.5 FACTORS TO BE CONSIDERED

The North Dakota Energy Conversion and Transmission Facility Siting Act N.D.C.C. Section 49-22-09 lists the factors in Table 3.5-1 to be considered in evaluating applications and designation of sites.

TABLE 3.5-1
Factors to be Considered

Factors to be Considered		Evaluation	Section Addressed
1.	**The ND PSC shall be guided by, but is not limited to, the following considerations, where applicable, to aid the evaluation and designation of sites, corridors, and routes:**		
a.	Available research and investigations relating to the effects of the location, construction, and operation of the proposed facility on public health and welfare, natural resources, and the environment.	Research and investigations relating to the effects of the location, construction, and operation of the proposed facility on public health and welfare, natural resources, and the environment have been evaluated.	6.0
b.	The effects of new electric energy conversion and electric transmission technologies and systems designed to minimize adverse environmental effects.	Minnesota Power will use best management practices that minimize impacts on the environment. Current wind turbine technologies, including equipment and siting tools, optimize the wind and land resources.	4.0, 6.0
c.	The potential for beneficial uses of waste energy from a proposed electric energy conversion facility.	Not applicable.	Not applicable
d.	Adverse direct and indirect environmental effects that cannot be avoided should the proposed site or route be designated.	The Project is expected to impact up to 111 acres of land during operation, which will not be available for other uses. An additional 714 acres of land will be temporarily affected due to construction.	6.0
e.	Alternatives to the proposed site, corridor, or route which are developed during the hearing process and which minimize adverse effects.	Minnesota Power selected the Project Area based on a variety of factors including suitable wind resource, landowner and agency coordination, site-specific studies, transmission and interconnection availability, and engineering considerations. The Project has been sited to avoid and minimize impacts on the environment and existing land uses. Minnesota Power believes the proposed site represents the best location for the Project.	2.2
f.	Irreversible and irretrievable commitments of natural resources should the proposed site, corridor, or route be designated.	There are few commitments of resources associated with this Project that are irreversible and irretrievable, but these include those resources primarily related to construction.	6.0

TABLE 3.5-1
Factors to be Considered

Factors to be Considered		Evaluation	Section Addressed
g.	The direct and indirect economic impacts of the proposed facility	Primarily positive. Wind energy development removes less total land from agricultural use than other forms of development. Long-term beneficial impacts on the county's tax base as a result of the construction and operation of the wind farm will contribute to improving the local economy in this area of North Dakota.	6.1
h.	Existing plans of the state, local government, and private entities for other developments at or in the vicinity of the proposed site, corridor, or route.	No conflicts are anticipated with existing state and local government and private entities' development plans.	1.8
i.	The effect of the proposed site or route on existing scenic areas, historic sites and structures, and paleontological or archaeological sites.	No effect anticipated. Archaeological sites, as identified through a Class I Literature Search and a Class III Cultural Resources Inventory, and historical sites identified through a Class II Architectural History Inventory are present, and the Project will avoid resources.	6.4
j.	The effect of the proposed site or route on areas unique because of biological wealth or because the areas are habitats for rare and endangered species	No effect anticipated. All rare and endangered species habitats will be avoided.	6.9
k.	Problems raised by federal agencies, other state agencies, and local entities.	No effect anticipated. All problems raised by federal, state, or local entities have been addressed.	7.0

3.6 SETBACKS

The setbacks used in designing the Project comply with or exceed those required by the ND PSC wind energy-specific exclusion area setbacks per N.D. Admin. Code Section 69-06-08-01(2) and N.D.C.C. Section 49-22-05.1, and Morton County Land Use Code. Table 3.6-1 and Table 3.6-2 list the setbacks and buffers used in designing the Project. The turbines will measure 638.2 feet from the base of the tower to the tip of the upright blade. Table 3.6-1 includes the setback distances designated by the ND PSC.

TABLE 3.6-1
Setback Distances as Designated by the North Dakota Public Service Commission

Setback Type	Setback Distance	Setback Distance
Interstate and state road right-of-way	1.1 x height of the turbine	702 feet
Centerline of any county or maintained township roadway	1.1 x height of the turbine plus 75 feet	777 feet
Railroad right-of-way	1.1 x height of the turbine	702 feet
115-kilovolt or higher transmission lines	1.1 x height of the turbine	702 feet
Property line of non-participating landowners	1.1 x height of the turbine [a]	702 feet
Non-participating residences	3 x height of the turbine	1,915 feet
Geographic center of an intercontinental ballistic missile (ICBM) launch or launch control facility	1,200 feet [b]	1,200 feet
Inhabited residence or a 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 feet of an inhabited residence or a community building will exceed 45 dBA [c]	-

[a] Per N.D.C.C. Section 49-22-05.1 - A variance may be granted if an authorized representative or agent of the permittee 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 agreement or a wind easement, as defined in N.D.C.C. 17-04, with the permittee of the wind energy conversion facility.

[b] The nearest turbine to an ICBM launch or launch control facility is approximately 46 nautical miles.

TABLE 3.6-1
Setback Distances as Designated by the North Dakota Public Service Commission

Setback Type	Setback Distance	Setback Distance
[c]	Per N.D. Admin. Code Section 69-06-08-01 - The sound level avoidance area criteria may be waived in writing by the owner of the occupied residence or the community building.	
Note:	dBA = A-weighted decibel.	

Table 3.6-2 includes the setback distances as designated by Morton County.

TABLE 3.6-2
Setback Distances as Designated by Morton County

Setback Type	Setback Distance	Setback Distance
Occupied dwelling from a substation	0.5 mile	0.5 mile
Occupied dwelling, commercial building, publicly used structure or facility, or state and county park	1.25 x height of the turbine or 1,320 feet, whichever is greater	1,320 feet
State park and county park	0.5 mile	0.5 mile
Interstate, state, or county road; or above-ground communication or electrical lines; or railroad right-of-way	1.1 x height of the turbine plus 75 feet from the centerline of the existing right-of-way or object	777 feet
Section lines	Turbine shall be set back 100 feet	100 feet
Setback from the wind energy facility perimeter	1.5 x height of the turbine [a]	957.3 feet

[a] A variance may be granted if an authorized representative or agent of the applicant and those affected parties of adjoining properties with associated wind rights sign a formal and binding agreement expressing all parties' support for a variance that may reduce the setback requirements.

Table 3.6-3 includes the wildlife and environmental setbacks of distances used to design the Project.

TABLE 3.6-3
Wildlife and Environmental Setbacks Distances Used to Design the Project

Setback Type	Setback Distance	Section Addressed
Unbroken grassland	All turbine locations have been sited in agricultural croplands and broken grassland.	Appendix B.5
Occupied bald eagle nests	All turbines are setback at least 1 mile from identified occupied bald eagle nests.	Appendix B.7
Northern long-eared bat habitat	The Project is sited in an area where northern long-eared bats are unlikely to occur beyond patches separated by more than 0.4 mile from the nearest connected suitable habitat.	Appendix B.8
Sharp-tailed grouse potential habitat	The Project is sited in an area that has suitable sharp-tailed grouse. It will be avoided to the extent possible.	Appendix B.9

3.7 WIND CHARACTERISTICS

Minnesota Power used wind data from the previous temporary MET towers located within the Project Area to quantify and analyze the wind resource and determine that the wind resource in this region is optimal.

ReGenerate Consulting was retained by Minnesota Power to evaluate data collected through on-site measurements from previously located temporary met towers and provide an estimate of the energy production for the project. The MET towers have recorded over 12 years of data.

Raw data from the met mast was quality controlled to remove invalid data and analyzed to obtain hub height wind conditions. The review included:

- Long-term wind speed;
- reference period;
- frequency and energy rose;
- wind speed distribution;
- wind shear;
- modeled wind speed; and
- wake impacts from nearby wind developments.

A wind flow model was created at hub height utilizing hub height extrapolated wind speed, temperature, wind direction and turbulence intensity values from the met masts included in the model.

From the wind flow model results, annual energy production of the wind farm layouts has been calculated using a time-series energy capture taking into account wake losses between turbines for each specific layout using a deep array eddy-viscosity model.

3.8 DESIGN AND CONSTRUCTION LIMITATIONS

Key design and construction limitations when building a wind farm are wind resources, landowner easements, regulatory setbacks (local and state), environmental and cultural exclusion and avoidance areas, and available transmission. The wind resource is essential for selecting and designing a wind energy facility. Minnesota Power has conducted an analysis to ensure that the site has ample wind resources for efficient use. Easements allowing the construction of turbine towers and associated infrastructure are also critical to the Project. Minnesota Power has secured voluntary land agreements with landowners necessary to develop the Project.

3.9 ECONOMIC CONSIDERATIONS

Economics were considered when selecting a location for the Project. As discussed above, it is important to select a site with a wind resource capable of generating energy. The Project Area takes advantage of the wind resource in the area, as demonstrated by the presence of several other wind energy generation facilities in Morton, Mercer, and Oliver Counties. The location of the Project also takes advantage of existing substation and transmission facilities, owned by Minnesota Power, which provides additional economic benefits and resource efficiencies for Minnesota Power and the Project Area.

3.10 COUNTY CRITERIA

The Project requires a Special Use Permit (SUP) from Morton County for wind energy facilities located in areas zoned as Agricultural. The following conditions apply to wind energy facilities, based on 5-180 of the Morton County Land Use Code, amended as of October 28, 2025:

(b) Standards: A wind energy facility shall meet the following standards:

(1) Appearance Standards

(A) Turbines shall be installed on tubular, monopole-type towers.

(B) Wind turbines and related towers shall be painted a non-reflective, nonobtrusive color.

(C) Wind turbines and related towers shall not be used for displaying any advertising except for reasonable identification of the manufacturer or operator of the wind energy facility.

(D) The design of buildings and related structures at wind energy facility sites shall, to the extent reasonably possible, use materials colors, textures and

location that will blend the wind energy facility to the natural setting and existing environment.

(E) Wind turbines shall not be artificially lighted, except to the extent required by Federal Aviation Administration (FAA) or other applicable authorities.

(2) Construction and Maintenance Standards

(A) At wind energy facility sites, the location and construction of access roads and other infrastructure shall, to the extent reasonably possible, minimize disruption to farmland, the landscape and agricultural operations within Morton County.

(B) The applicant shall promptly replace or repair all fences or gates removed or damaged during all phases of the wind energy facility's life, unless otherwise negotiated with the affected landowner. When the permittee installs a gate where electric fences are present, the permittee shall provide for continuity in the electric fence circuit.

(C) The applicant shall ensure that, following completion of construction of a wind energy facility, all county roads will be repaired or restored to a condition at least equal to the condition prior to construction of such facility, as inspected and approved by the County Engineer.

(D) The applicant is responsible for abiding by the state and local overweight load permitting process in accordance with NDCC Chapter 39-12. A special use permit issued under this ordinance to erect a wind turbine facility does not negate a hauler's obligation to obtain overweight load permits for hauling.

(E) The applicant shall take into account, avoid, promptly repair or replace all drainage tiles broken or damaged during all phases of project life unless otherwise negotiated with the affected landowner.

(F) The applicant shall minimize the removal of trees and shall not remove groves of trees or shelter belts without the written approval of the affected landowner. Trimming or removal of trees within the public right-of-way to allow for safe construction of power lines shall be allowed.

(G) Laydown yards shall be set back from the nearest occupied dwelling a distance of not less than ½ mile (or 2,640 feet). This setback may be reduced or waived, if stated in writing, by both the owners and the inhabitants (if different from the owners) of the dwelling.

(3) Public Safety Standards

(A) Prior to construction, the applicant shall prepare fire protection and medical emergency plans in consultation with the rural fire district, Sheriff's Department, Emergency Management, and local emergency medical service provider having jurisdiction over the area.

(B) Each wind tower shall be marked with a visible identification number to assist with provision of emergency services, and the permittee shall file with the Morton County Emergency Manager a wind energy facility map identifying wind turbine locations and numbers.

(C) The applicant is encouraged to provide educational material to landowners within the site boundaries and, upon request, to interested persons about the project and any restrictions or dangers associated with the project. The applicant is encouraged to also provide any necessary safety measures, such as warning signs and gates for traffic control or to restrict public access to turbine access roads, substations, and wind turbines. The applicant shall comply with provisions outlined in their public safety plan.

(D) Within twenty-four (24) hours of an occurrence, the applicant shall notify

the Morton County Emergency Manager of any extraordinary event. Extraordinary events include, but shall not be limited to fires, tower collapse, thrown blade, collector or feeder line failure, or injured wind turbine facility worker or private person. The applicant shall, within thirty (30) calendar days of the occurrence, submit a report to the County Emergency Manager describing the cause of the occurrence and the steps taken to avoid future occurrences.

(4) Collector System Standards

(A) The permittee shall place electrical lines, known as collectors, and communication cables underground to a depth of at least four (4) feet when located on private property. Collectors and cables shall also be placed within or adjacent to the land necessary for wind turbine access roads unless otherwise negotiated with the affected landowner. Overhead collection facilities may be permitted where necessary.

(B) The permittee shall not place overhead feeder lines on public road or drainage easement rights-of-way. When placing feeders on private property, the permittee shall place the feeder in accordance with the easement negotiated with the affected landowner. If the permittee cannot place overhead feeder lines on private property a request may be made to place feeder lines on public rights-of-way with approval from the governmental unit responsible for the affected right-of-way.

(C) The applicant shall be responsible for compliance with all federal, state, and local laws applicable to the generation, storage, transportation, clean-up, and disposal of hazardous waste generated during any phase of the project's life.

(D) Substations shall be set back from the nearest occupied dwelling a distance of not less than ½ mile (or 2,640 feet). This setback may be reduced or waived, if stated in writing, by both the owners and the inhabitants (if different from the owners) of the dwelling.

(5) Turbine Setback Standards: Setbacks shall be measured as the horizontal distance between the monopole of the turbine and any object.

(A) Each wind turbine shall be set back from the nearest occupied dwelling, commercial building, or publicly used structure or facility, a distance not less than one and a quarter (1 ¼) times the height of the turbine or 1,320 feet, whichever is greater.

(B) Each wind turbine shall be set back from any state park and any county park a distance not less than ½-mile (or 2,640 feet).

(C) Each wind turbine shall be set back from the nearest interstate, state, or county road or above ground communication or electrical lines or railroad right-of-way a distance not less than 1.1 times the height of the turbine plus seventy-five (75) feet from the centerline of the existing right-of-way or object.

(D) Each wind turbine shall be set back from all section lines a distance not less than one hundred (100) feet.

(E) Each wind turbine shall be set back from the wind energy facility perimeter a distance not less than one and a half (1 ½) times the height of the wind turbine. A variance may be granted if an authorized representative or agent of the applicant and those affected parties of adjoining properties with associated wind rights sign a formal and binding agreement expressing all parties' support for a variance that may reduce the setback requirements.

(F) Morton County has many sensitive sites, and the Board of County Commissioners may ask the permittee to avoid these sites in granting a special use permit.

(c) Minimum Ground Clearance: The blade tip of any wind turbine shall, at its lowest point, have ground clearance of no less than seventy (70) feet.

Minnesota Power has designed the Project in accordance with these conditions and received a Special Use Permit from Morton County on November 25, 2025, under Morton County Land Use Code, amended as of October 28,2025 (Appendix D).

4.0 PROJECT DESIGN

4.1 WIND TURBINE COMPONENTS

4.1.1 Wind Turbine Technology

As previously stated, Minnesota Power is seeking flexibility from the ND PSC to select the most appropriate technology for the Project at the time of construction to ensure optimization of wind and land resources and cost efficiency. The technical specifications of the proposed wind turbine are summarized in Table 4.1-1 and depicted on Figure 7. The wind turbine is designed to operate at medium to low wind speeds.

TABLE 4.1-1
Wind Turbine Technical Specifications

Component	Specification
Power Regulation Operational Data	
Rated output/power	4.5 megawatts
Cut-in wind speed	6.7 mph
Cut-out wind speed	53.7 mph
International Electrotechnical Commission wind class	Class S
Standard operating temperature range	-22°F to 113°F
Rotor	
Rotor diameter	534.8 feet
Swept area	224,610.5 square feet
Aerodynamic brakes	Full blade feathering
Number of blades	3
Tower	
Hub height	370.7 feet
Total Height	
Base to upright blade	638.2 feet

4.1.2 Wind Turbine

The turbine model is a three-bladed, upwind, horizontal axis wind energy generator. The wind turbine features a distributed drive train design consisting of a main shaft bearing, gearbox, and generator. The wind turbine employs a multi-processor control system including active yaw control (designed to steer the machine with respect to the wind direction), active blade pitch control (designed to regulate turbine rotor speed), and a full-scale generator/power electronic converter system. The turbine is equipped with a wind sensing system which can provide the wind speed and wind direction in all weather conditions. It consists of at least one wind sensor combined with different estimators which gives an estimate of the wind in the entire rotor area.

4.1.3 Rotor

The rotor consists of three blades mounted to a rotor hub. The hub is attached to the nacelle, which houses the generator, gearbox, brake, cooling system, and other electrical and mechanical systems. Rotor speed is regulated by a combination of blade pitch angle adjustment and generator/converter torque control. The rotor spins in a clockwise direction under normal operating conditions when viewed from an upwind location. The wind turbine is able to operate the rotor at variable speed and thereby maintain the power output at or near rated power. The rotor is capable of full blade feathering.

4.1.4 Blades

The rotor includes three blades for each wind turbine generator. The blades are controlled by a microprocessor pitch control system. The blades are continuously positioned to optimize the pitch angle. The blades are made of carbon and fiber glass and consist of two airfoil shells bonded to a supporting beam or with embedded structure providing a high lift profile. The blade has a steel tip and each blade is approximately 263 feet in length. The turbine's multiprocessor control system controls noise emissions.

4.1.5 Tower

The tower is a cylindrical/conical tubular steel tower with flange connections. The towers are designed with the majority of internal welded connections replaced by magnet supports to create a predominantly smooth-walled tower. Magnets provide load support in a horizontal direction, while internal components, such as platforms or ladders, are supported vertically (that is, in the gravitational direction) by a mechanical connection. The smooth tower design reduces the required steel thickness, rendering the tower lighter compared to one with all internal components welded to the tower shells. Surfaces are coated for protection against corrosion.

Each turbine can be accessed through a lockable steel door at the entrance platform approximately 9.8 feet above ground level. Access to the top platform in the tower is by a ladder or service lift. Access to the nacelle from the top platform is by ladder. Access to the transformer room in the nacelle is controlled by a lock. Interior lights are factory installed at interval points from the base of the tower to the tower top. The turbine is equipped with lights in the tower, nacelle and hub. The main controller is placed in the tower bottom of the turbine.

4.1.6 Lightning and Ground Protection

Lightning and ground protection for all wind farm equipment is designed and constructed to be compliant with all applicable National Electrical Code and National Electrical Safety Code requirements. Each turbine will be grounded and shielded to protect against lightning. The grounding system will be installed during foundation work, will be designed for local soil conditions, and will be in accordance with local utility or code requirements. The electrical components will also be protected.

Each wind turbine has a lightning protection system (LPS), which helps protect the wind turbine against the physical damage caused by lightning strikes. The LPS consists of five main parts: lightning receptors on blades, down conducting system, protection against overvoltage and overcurrent, and shielding against magnetic and electrical fields.

4.1.7 Lighting

The FAA requires that all structures higher than 499 feet be lighted at night, and that lighting must meet the requirements listed in FAA regulations. The Project will include FAA approved ADLS as required by N.D. Admin. Code Chapter 69-06-11. ADLS is a sensor-based system designed to detect aircraft as they approach an obstruction or group of obstructions. The ADLS will function by monitoring the area near the Project (typically within 3 miles) for aircraft. When an aircraft is detected in proximity to the Project, the FAA lights will automatically turn on until they are no longer needed by the aircraft (e.g., the aircraft clears the area). The components and specific locations of the ADLS will be dependent on FAA's review of turbine technology, terrain, and other factors. The ADLS currently contemplated for the Project includes one ADLS tower that will be up to 110 feet high and will be set within a 1200-square-foot enclosed area. Lighting of ancillary

structures will be minimized, and downward-facing lights and/or motion-sensing lights will be installed, as practicable. The ADLS tower location has been surveyed for environmental and cultural constraints. The location of the ADLS tower is shown on Figures 1 through 3.

4.1.8 Control System

Each turbine tower base will contain a main control system. The turbine is controlled and monitored by a multiprocessor control system comprised of main controller, distributed control nodes, distributed nodes and ethernet switches, and other network equipment. The control system serves the following main functions:

- monitoring and supervision of overall operation;
- synchronizing of the generator to the grid during connection sequence;
- operating the wind turbine during various fault situations;
- automatic yawing of the nacelle;
- blade pitch control;
- reactive power control and variable speed operation;
- noise emission control;
- monitoring of ambient conditions;
- monitoring of the grid; and
- monitoring of the smoke detection system.

The turbine is equipped with a wind sensing system which can provide the wind speed and wind direction in all weather conditions. Additionally, during grid outage, an uninterruptable power supply system will ensure power supply for specific components such as power backup to nacelle and hub control systems, power backup to tower base control systems and protection devices and power backup to internal lights in tower, nacelle and hub.

4.1.9 Foundation

Each turbine will sit atop a concrete foundation. Foundation designs will be dependent on final turbine selection and the pending geotechnical investigation. The actual foundation dimensions will be established after completion of geotechnical investigations and mechanical loading analysis that will be performed to support final engineering design. The estimated foundation will be approximately 70 to 85 feet in diameter and 12 to 14 feet in depth.

4.2 ASSOCIATED FACILITIES

In addition to wind turbines, the Project includes access roads, an underground electrical collection system, an underground Supervisory Control and Data Acquisitions (SCADA) communication system, a collection substation, an O&M facility, and one permanent MET tower. The turbine-generated electricity is transmitted to a transformer within the nacelle, where it is converted to the 34.5-kV alternate current (AC) collection line voltage. The underground collection line system transmits the electricity to the collection substation. The land for the Project collection substation and O&M building has been purchased or is under an option-to-purchase agreement.

4.2.1 Access Roads

Access to each turbine will be facilitated by a compacted gravel road. Access roads have been sited in consultation with landowners to avoid or minimize impacts on land use and the environment. The access roads will be approximately 16 feet wide (total easement width is

approximately 50 to 60 feet) and constructed with locally sourced gravel, if available. The access roads will support the size and weight of maintenance vehicles.

Access road corridors are included in all Figures in this application and have been surveyed for environmental and cultural constraints. These corridors provide enough area for the final design of the access roads to avoid all environmental and cultural constraints during construction while still meeting design specifications. Following construction, temporarily affected areas around the access roads will be restored to pre-construction conditions, to the extent practicable, and pursuant to landowner agreements.

4.2.2 Electrical Collection System and Communication System

In the nacelle of each turbine, a step-up transformer will convert the voltage to the power collection line voltage of 34.5-kV AC. The power from these transformers will be run through an underground collection system consisting of various sized buried cables. Collection lines will be buried at least 48 inches deep and will not affect farming operations. The wind turbines will be interconnected by underground power collection cables and collocated fiber optic communication cables. The SCADA communication system will be collocated with the collection line system. All the collection system cables will terminate at the Project collection substation. The substation will include power transformers to step up the voltage from 34.5-kV to 230-kV and provide the necessary protection and control for interconnection to the transmission grid.

Collection line corridors are included on the Figures in this application and have been surveyed for environmental and cultural constraints. These corridors provide enough area for the final design of the collection lines to avoid all environmental and cultural constraints during construction while still meeting design specifications. The disturbed area will be reclaimed after installation of the collection lines and normal agricultural practices can continue where applicable.

4.2.3 Meteorological Towers

The Project will include one permanent MET tower that will remain in place for the life of the Project. This permanent MET tower will be as tall as the hub height of the selected wind turbine and will provide data critical to assessing the performance of the Project and aid in short-term forecasting and operation protocols for the Project. The ADLS tower location has been surveyed for environmental and cultural constraints. The location of the MET tower is shown on Figures 1 through 3.

4.2.4 Operations and Maintenance Facility

The O&M facility will provide access and storage for Project O&M as well as for the associated Transmission Line. The footprint of the building and materials yard is anticipated to be approximately 5 acres and will house the equipment to operate and maintain the Project and Transmission Line. The materials yard will store turbine parts, materials, and other miscellaneous components required for the Project and Transmission Line. The O&M facility location has been surveyed for environmental and cultural constraints. The location of the O&M facility is shown on Figures 1 through 3.

4.2.5 Project Substation

The Project’s underground collection system will extend from the turbines to the new Longspur Substation. The Longspur Substation site will be approximately 20 acres in size. The Longspur Substation will be designed to provide voltage step-up from the 34.5-kV collection system to the 230-kV transmission system voltage. The Longspur Substation will house the production

metering, various collection system, and facility isolation and protective functions. The Longspur Substation will be fenced to provide site security and safety. The Longspur Substation location has been surveyed for environmental and cultural constraints. The location of the Longspur Substation is shown on Figures 1 through 3.

4.2.6 Temporary Facilities

Temporary facilities required for the construction phase of the Project include: a construction management facility, laydown yard for storage of materials and components during construction including minor materials, turbine parts, and other miscellaneous components, intersection improvements to existing roads for transport and access during construction, staging areas at the turbine locations to accept the turbine component deliveries, and crane paths between turbines during construction. The temporarily affected areas will be restored to preconstruction conditions, to the extent practicable after construction has been completed, and in accordance with landowner agreements.

5.0 CONSTRUCTION, OPERATION, AND DECOMMISSIONING

Several activities must be completed prior to commercial operations. The majority of the activities include equipment procurement, final design, and construction of the Project. Below is a list of the primary pre-construction and construction activities required for completion of the Project. Some construction activities are managed by Minnesota Power, while others will be the EPC's responsibility:

- Procurement of all necessary components including turbine towers, nacelles, blades, foundations, and transformers;
- Final turbine siting;
- Complete survey of site locations of permanent and temporary facilities;
- Complete soil borings, testing, and analysis for proper foundation design and materials;
- Clearing and grubbing, as necessary;
- Installation of best management practices (BMPs) for erosion and sedimentation control;
- Construction of access roads, to be used for construction and maintenance;
- Constructing underground feeder lines;
- Design and construction of the Longspur Substation;
- Installation of turbine tower foundations;
- Installation of underground and aboveground junction boxes;
- Wind turbine erection;
- Acceptance testing of facility; and
- Commencement of commercial operation

5.1 TURBINE ACCESS ROADS SERVICE CONSTRUCTION, OPERATION, AND MAINTENANCE

Each wind turbine will be accessible via all-weather access roads that will connect with public roads. Typical access roads are 16 feet wide with a total easement width of 50 to 60 feet. Access roads will be constructed of aggregate stone or other impervious materials and will be designed to support the size and weight of maintenance vehicles.

During the construction phase, several types of light, medium, and heavy-duty construction vehicles will travel to and from the site, as well as private vehicles used by construction personnel. Minnesota Power estimates that there will be approximately 600 additional trips per day in the area during peak construction periods. That volume will occur during the peak time when the majority of the road, foundation, and turbine tower assembly are taking place. At the completion of each construction phase, this equipment will be removed from the site or reduced in number.

Post-construction reclamation activities generally include:

- Cleaning up the construction sites, including removing and properly disposing of debris;
- Removing all temporary facilities, including staging areas;
- Installing or removing appropriate erosion control measures; and
- Reseeding and replacing trees and shrubs as necessary in disturbed areas with vegetation similar to vegetation that was removed and restoring the areas to their original condition to the extent practicable. Trees and shrubs will be replaced according to the ND PSC's Tree and Shrub Mitigation Specifications.

5.2 CONSTRUCTION

5.2.1 Construction Management

The EPC contractor will be primarily responsible for construction management. The EPC contractor will utilize local resources, including contractors, union labor and businesses, where possible, to assist with construction. The EPC contractor, in coordination with Minnesota Power and local contractors, will undertake the following activities:

- Securing building, electrical, grading, road, and utility permits;
- Performing detailed civil, structural, and electrical engineering;
- Scheduling and execution of construction activities; and
- Forecasting labor requirements and budgeting.

The EPC contractor will also serve as the primary point of contact and interface for subcontractor coordination. The EPC contractor will oversee the installation of communication (e.g., fiber optics cable, SCADA communications) and power collection lines as well as construction of the Project substation and modifications to the existing Tri-County Substation (installation of ring bus). The EPC contractor will also oversee the installation of roads, concrete foundations, turbine towers, and blades, as well as the coordination of materials receiving, inventory, and distribution. The Project will be constructed under the direct supervision of an on-site construction manager with the assistance of local contractors. Project construction will consist of the following tasks:

- Site development, including roads, stormwater management, erosion and sedimentation controls;
- Foundation excavation;
- Concrete foundation installations;
- All electrical and communications installation;
- Turbine tower assembly and machine erection; and
- System testing.

The construction team will be on site to handle materials purchasing, construction, quality control, testing, and start-up. The EPC contractor will manage subcontractors to complete all aspects of construction. Throughout the construction phase, ongoing coordination will occur between the

development and the construction teams. The on-site construction manager for the EPC contractor will help to coordinate all aspects of the Project, including ongoing communication with local officials, citizens groups, and landowners. Even before the Project becomes fully operational, the Minnesota Power O&M staff will be integrated into the construction phase. The construction manager and the O&M staff manager will work together continuously to facilitate a smooth transition from construction through wind farm commissioning and operations.

5.2.2 Civil Works

Construction will require various types of civil works and physical improvements to the land. These civil works may include the following items.

- Improvement of existing public roads;
- Construction of roads adjacent to the wind turbine strings (turbine access roads) to allow construction and continued servicing of the wind turbines;
- Clearing and grading for wind turbine tower foundation locations;
- Installation of underground electrical collection system for connecting the individual wind turbines;
- Installation of an on-site feeder system for connecting wind turbine strings for delivery to the electricity collection/metering location;
- Installation of site fencing and security where necessary; and
- Restoration and revegetation of disturbed land to pre-construction use (agriculture), contours and characteristics to the extent practicable following completion of construction activities.

Any improvements to existing public access roads will consist of re-grading and filling the surface to allow access in inclement weather. No asphalt or other paving is anticipated. Turbine access roads will be constructed along turbine strings or arrays. These roads will be sited in consultation with local landowners and completed in accordance with local building requirements where these roads intersect with public roads. Turbine access roads will be located to facilitate both construction (such as access for cranes) and continued operation and maintenance. Siting roads in areas with unstable soil will be avoided wherever possible. All roads will include appropriate drainage and culverts while still allowing for the crossing of farm equipment. The roads will be covered with road base designed to allow passage under inclement weather conditions. The roads will consist of graded soil and will be covered with an aggregate surface. Once construction has been completed, the roads will be re-graded and dressed as needed.

5.2.3 Commissioning

The Project will be commissioned after completion of the construction phase. The Project will undergo detailed inspection and testing procedures prior to final turbine commissioning. Inspection and testing will occur for each component of the wind turbines, as well as the communication system, meteorological system, obstruction lighting, high voltage collection and feeder system, and the SCADA system.

5.3 OPERATION AND MAINTENANCE

The Project will create up to 11 full-time O&M jobs. The on-site O&M staff will be responsible for operations and maintenance of the Project on a daily basis. These activities will be accompanied by visual inspections by the on-site operations staff. Operations and maintenance will be carefully planned and consistent with prudent industry practices. An initial inspection of each turbine will be performed after turbine commissioning. Following this initial inspection, each turbine will receive periodic visits that will include inspections of the various systems and components such as the gearbox, generator, brake, pitch, lubricant, structural connections, and transformer.

O&M field duties include performing all scheduled and unscheduled maintenance, including periodic operational checks and tests, regular preventive maintenance on all turbines, related plant facilities and equipment, safety systems, controls, instruments, and machinery, including:

- Maintenance of the wind turbines and of the mechanical, electrical power, and communications system;
- Performance of all routine inspections;
- Maintenance of all oil levels and changing oil filters;
- Maintenance of the control systems, all structures, access roads, drainage systems and other facilities necessary for operation including mowing and weed control;
- Maintenance of all O&M field maintenance manuals, service bulletins, revisions, and documentation;
- Maintenance of all parts, inventory, and computer software;
- Maintenance and operation of substation facilities;
- Provision of all labor, services, consumables, and parts required to perform scheduled and unscheduled maintenance on the wind farm, including repairs and replacement of parts and removal of failed parts;
- Cooperation with avian and other wildlife studies as may be required, to include reporting and monitoring;
- Management of lubricants, solvents, and other hazardous materials as required by local and/or state regulations;
- Maintenance of appropriate levels of spare parts to maintain equipment; order and maintain spare parts inventory;
- Provision of all necessary equipment including industrial cranes for removal, repair, and reinstallation of turbines;
- Hiring, training, and supervision of a workforce necessary to meet the general maintenance requirements;
- Implementation of appropriate security methods; and

- Remote monitoring on a daily basis.

In addition to the on-site O&M staff, remote staff will control, monitor, operate, and maintain the Project by means of a SCADA computer software program and can shut down turbines if necessary. Monitoring of the Project will occur 24 hours a day, 7 days a week. The operation of the entire wind farm, including discrete settings for individual turbines, will be managed by the on-site operations staff and remotely via the SCADA system. For example, in the unlikely scenario on-site staff must evacuate the site or are unable to access the O&M facility, the remote staff can effectively manage system operations.

The SCADA system offers access to wind turbine generation or production data, availability, meteorological, and communications data, as well as alarms and communication error information. Performance data and parameters for each machine (e.g., generator speed, wind speed, power output) can also be viewed, and machine status can be changed. The SCADA communication system will be collocated with the collection line system. The primary functions of the SCADA system are to:

- Monitor wind farm status;
- Allow for autonomous turbine operation;
- Alert operations personnel to wind farm conditions requiring resolution;
- Provide a user/operator interface for controlling and monitoring wind turbines;
- Collect meteorological performance data from turbines;
- Monitor field communications;
- Provide diagnostic capabilities of wind turbine performance for operators and maintenance personnel;
- Collect wind turbine and wind farm material and labor resource information;
- Provide information archive capabilities;
- Provide inventory control capabilities; and
- Provide information reporting on a regular basis.

5.4 ESTIMATED PROJECT IMPACTS

Within the Project Area, permanent impacts are those that are within the final operational Project footprint (e.g., turbine foundations, turbine pads, access roads). Based on the current design, the Project will occupy approximately 116 acres (Table 5.4-1), or less than one percent of the total area within the Project Boundary. These permanent impacts will remain for the life of Project but will be restored to previous conditions when the Project is decommissioned (see Section 5.5). Temporary impacts are those that result from certain construction activities but are restored at the end of construction activities (e.g., laydown and storage areas, underground systems installation). Table 5.4-1 summarizes the assumptions used to calculate Project impacts and the estimated impact of each Project activity during construction, reclamation (i.e., temporary impacts), and operation (i.e., permanent impacts). The Project Area and Project layout are shown on Figures 1-3.

TABLE 5.4-1
Estimated Project Impacts

Project Facility	Impact Type	Total Construction Impacts	Temporary/Reclaimed Impacts	Permanent Operational Impacts [g]
Wind Turbines [a]	Impact Assumption	6 acres per turbine	4.5 acres per turbine	1.5 acres per turbine
	Total Impacts	270 acres	202 acres	68 acres
Access Roads [b]	Impact Assumption	60 feet wide per linear foot of road	44 feet wide per linear foot of road	16 feet wide per linear foot of road
	Total Impacts	144 acres	106 acres	38 acres

TABLE 5.4-1
Estimated Project Impacts

Project Facility	Impact Type	Total Construction Impacts	Temporary/Reclaimed Impacts	Permanent Operational Impacts [g]
Collection Lines [c]	Impact Assumption	15 feet wide per linear foot for a single line	15 feet wider per linear foot minus 10 feet by 10 feet per junction box	10 feet by 10 feet for each junction box
	Total Impacts	94 acres	87.5 acres	0.5 acre
Permanent MET Tower [d]	Impact Assumption	0.5 acre per tower	0.4 acre per tower	0.1 acre
	Total Impacts	0.5 acre	0.4 acre	0.1 acre
Temporary MET Tower	Impact Assumption	0.2 acre per tower	0.2 acre per tower	0 acre
	Total Impacts	0.2 acre	0.2 acre	0 acre
ADLS Radar Tower	Impact Assumption	10,000 square feet	7,500 square feet	2,500 square feet
	Total Impacts	0.3 acre	0.17 acre	0.06 acre
Crane Paths [e]	Impact Assumption	75 feet wide per linear foot	75 feet wide per linear foot	0 acre
	Total Impacts	261 acres	261 acres	0 acre
O&M Building	Impact Assumption	20 acres	15 acres	5 acres
	Total Impacts	20 acres	15 acres	5 acres
Collection Substation	Impact Assumption	20 acres	15 acres	5 acres
	Total Impacts	20 acres	15 acres	5 acres
Construction Laydown Area	Impact Assumption	10 acres	10 acres	0 acre
	Total Impacts	10 acres	10 acres	0 acre
PROJECT	Total Impacts	820 acres	697 acres	116 acres

[a] Construction impacts assumed a 290-foot construction radius around the turbine, which equates to approximately 6 acres per turbine. Assumes 45 turbines times 6 acres of ground disturbance during construction: 1.5 acre/turbine of that remaining as permanent. Six alternate turbine locations have been identified to allow siting flexibility but were not included in the calculation; calculations for associated roads and collection lines included all roads and collection lines shown in the layout because these facilities may be needed to access the proposed turbine locations. Impacts during operation account for a 290-foot diameter turbine base with a 577-foot buffer for the gravel pad, or 5.9 acres per turbine.

[b] Easement width necessary for construction based on turbine types. Temporary and permanent impacts represent a conservative estimate of disturbance. Access road impacts also assume all proposed roads are new access roads and do not consider improvements to existing roads separately. Assumes a 60-foot-wide disturbance for roads during construction; 16 feet of that remaining during operation. Roads required to support crane access to turbines during construction and operation would only be temporary in nature. Assumes a total of approximately 27.5 linear miles of service roads. The overlapping areas for turbines were excluded from the road impact calculations to avoid double counting the same footprint.

[c] 45 feet is the width needed for a single collection line. The overlapping areas between the collection line corridor buffer and the turbine and access road buffers were removed from impact calculation to avoid double counting the same footprint. The layout includes approximately 52.2 miles of collection lines. Junction boxes will be located on the ground throughout the Project Area and will each require approximately 10 feet by 10 feet. An approximate total of 69 junction boxes are required.

[d] Once installed, the tower has a negligible one square-foot base plate.

[e] The overlapping areas between the crane path buffer and turbines, access roads, and collection line corridor impact buffers were removed from the impact calculation to avoid double counting the same footprint.

[f] Permanent disturbance during the life of the Project; following decommissioning all areas will be reclaimed per landowner preference and ND PSC requirements.

5.5 DECOMMISSIONING AND RESTORATION

Minnesota Power will develop a Decommissioning Plan in accordance with the requirements set forth in N.D. Admin. Code Chapter 69-09-09 and file the plan with the ND PSC for approval prior to commercial operations as required by N.D. Admin. Code Section 69-09-09-06. Consistent with the ND PSC's requirements, Minnesota Power will engage a North Dakota-licensed engineer to develop a Decommissioning Plan that, at the end of the Project's useful life, provides for dismantling and removal of all towers, turbine generators, transformers, and overhead cables; removal of underground cables to a depth of 48 inches (4 feet); removal of foundations, buildings, and ancillary equipment to a depth of 48 inches (4 feet); restoration and reclamation of disturbed land to prior land use (including agriculture), to the approximate original topography that existed prior to construction of the Project to the extent practicable with topsoil respread over the disturbed

areas at a depth similar to adjacent lands; and grading and topsoil of areas disturbed by the Project, and coordinate with local Natural Resources Conservation Service staff to revegetate non-cropland and pasture areas, as required by N.D. Admin. Code Section 69-09-09-05. Minnesota Power will also submit to the ND PSC financial assurance sufficient to ensure decommissioning, as required by N.D. Admin. Code Section 69-09-09-08. Minnesota Power will provide a financial assurance for the construction period prior to commencement of construction, as required by N.D. Admin. Code Section 69-09-09-08(1).

In addition to meeting the ND PSC's decommissioning requirements, Minnesota Power has a contractual obligation to the landowners to remove the wind facilities, including foundations to a depth of 48 inches (4 feet) below ground surface at the end of the life of the Project, and to restore the area to the same physical condition that existed immediately before the construction of the Project. Minnesota Power also reserves the right to explore alternatives regarding decommissioning at the end of the Project's term. For example, retrofitting the turbines and power system with upgrades based on new technology may allow the wind farm to produce efficiently and successfully for many more years.

6.0 ENVIRONMENTAL ANALYSIS

6.1 LOCAL ECONOMICS

6.1.1 Description of Resources

According to Job Service North Dakota Labor Market Information Center and the US Census Bureau, Morton County's 2024 resident population was 34,194, a one-year numeric change of +147 or a change of +0.4 percent. The unemployment rate for Morton County in May 2025 was 2.0 percent. One year prior, the unemployment rate was 2.0 percent. There were 311 job openings in Morton County in June 2025. On average in Q4 (October through December) 2024, the private industry in Morton County employing the largest number of workers was health care and social assistance. The private industry with the highest average weekly wage in Q4 2024 was utilities (NDLMI, 2025; U.S. Census Bureau 2024).

In Morton County, agriculture is an important part of the economy with 688 farms located in the county (USDA, NASS 2022a). According to the 2022 Census of Agriculture, total market value of agricultural products produced in Morton County was $255,364,000 of which 58 percent was from crops and 42 percent from livestock. The principal crops include wheat, forage, corn, soybeans, and sunflowers, and the primary livestock is cattle (USDA, NASS 2022b).

6.1.2 Impacts/Mitigation

The Project will have positive economic impacts for the local population, including lease and royalty payments for participating landowners, employment, and county and state property and sales tax revenue. Economic losses to farmers from the permanent conversion of farmland to Project uses are anticipated to be minimal in comparison to the additional income provided by the Project.

Minnesota Power estimates that the Project and Transmission Line will provide approximately $33 million in state tax revenue over 35 years and approximately $19 million in sales tax. The Project and the Transmission Line also will provide approximately $62 million in payments to participating landowners for over 35 years, which will not only benefit those landowners, but also the local economy as that money is reinvested in local goods and services.

The Project will create up to 11 full-time O&M jobs. Most of these employees are expected to reside locally. Additionally, the Project and the Transmission Line will create approximately 350 temporary construction jobs during the construction period.

Landowner compensation has been established under individual lease agreements and includes compensation for crop damage during surveys and construction. In an environment of uncertain and often declining agricultural prices and yields, the supplemental income provided to farmers and ranchers from wind energy leases is expected to provide stability to farm and ranch incomes and thus will help assure the continued viability of agriculture in the Project Area. Project construction will not cause additional impacts on leading industries within the Project Area.

To the extent that local contractors are used for portions of the construction, wages and salaries paid to contractors and workers in Morton and Mercer counties will contribute to the total personal income of the region. Additional personal income will be generated for residents in the counties as well as the state by circulation and recirculation of dollars paid out by the applicant as business expenditures and state and local taxes. Expenditures made on equipment, energy, fuel, operating supplies, and other products and services will benefit businesses in the counties and the state.

It is likely that general skilled labor is available either in the county or the state to serve the basic infrastructure and site development needs. Specialized labor will be required for certain components of wind farm development. It is likely that this labor will be imported from other areas of the state or from other states, as the relatively short duration of construction does not warrant special training of local or regional labor. Balancing the use of local contractors and imported specialized contractors will likely alleviate any labor relations issues.

No effects on permanent housing are anticipated. During construction, out-of-town laborers will likely use lodging facilities in and around the Project area. Sufficient permanent housing is available within Morton and Mercer Counties to accommodate full-time O&M employees.

Long-term beneficial impacts on Morton and Mercer Counties' tax bases will contribute to the local economy as a result of the construction and operation of the Project. The development of wind projects in the region has spurred the development of wind-related businesses in the area and contributes to the economic growth in the region.

6.2 PUBLIC SERVICES

6.2.1 Description of Resources

Local Government Services

Within the Project Area, there is a network of established roads and utilities that serve the local communities, homesteads, and farms. There are no incorporated or unincorporated cities within the Project Area. The closest city, Glen Ullin, North Dakota, is located approximately 9 miles south of the Project Area.

Electrical Service

Mor-Gran-Sou Electric provides rural electrical service in the Project Area.

Roads

Roads located within the Project Area include North Dakota Highway 49, county roads, township roads, section lines, and private roads. The Project Area is within the North Dakota Department of Transportation (NDDOT) District Boundary of Bismark North Dakota.

Traffic

Existing daily traffic volumes for state highways, county roads, and township roads that are located within and in close proximity to the Project Area are documented in Table 6.2.1-1. In general, the NDDOT indicates that roads with vehicle counts under 100 annual average daily traffic are rarely counted, and roads with no count data are likely lower than those with count data.

TABLE 6.2.1-1
Existing Daily Traffic Levels

Roadway Segment	Average Daily Traffic (vehicles)	Average Daily Truck Traffic (vehicles)	Year
U.S. Highway I94, east of intersection with ND Highway 49	8,490	2,120	2023
38th Street, east of intersection with ND Highway 49	5	0	2014
ND Highway 49, north of U.S. Highway I94	1,665	315	2014
ND Highway 49, north of 33rd Street	1,630	250	2014

TABLE 6.2.1-1
Existing Daily Traffic Levels

Roadway Segment	Average Daily Traffic (vehicles)	Average Daily Truck Traffic (vehicles)	Year
33rd Street, east of ND Highway 49	30	0	2014
30th Street, east of ND Highway 49	45	10	2014
County Road 87, north of U.S. Highway I94	80	-	1993

Source: NDDOT's Transportation Information Map (NDDOT, 2024).

Communications

Comsearch analyzed the potential impacts of wind turbines within the Project Area on licensed, proposed and applied-for non-federal government microwave systems (Appendix B1). The analysis identified three microwave paths intersecting the Project Area.

Comsearch analyzed AM and FM radio broadcast stations whose service could potentially be affected by the Project (Appendix B2). The analysis concluded that no licensed and operational AM or FM broadcast stations were identified within 30 kilometers of the Project Area.

6.2.2 Impacts/Mitigation

Local Government Services

No impact on local government services is anticipated, and no mitigation is required.

Electrical Service

The Project will use station service from one of the local providers, which will suggest appropriate configurations for the electrical system, and Minnesota Power will abide by the recommendations to prevent impacts on the transmission system, and no mitigation is required.

Roads

Minnesota Power is working closely with local landowners to design access roads to minimize land-use disruptions to the extent possible. Additionally, lease agreements allow landowners to use access roads, which can be beneficial for agriculture operations by providing access to fields. The Director of the Office of Project Development for the NDDOT responded to correspondence initiated by Minesota Power and indicated that the Project, as proposed, would have no adverse impacts on NDDOT highways.

During Project operation, access roads will be used by operation and maintenance crews while inspecting and servicing the wind turbines. The access roads will be designed to allow for adequate crane access during construction. One road will be required for each string of turbines. Although the access road construction easement is 50 to 60 feet wide on average, the final permanent access roads will primarily be 16 feet wide with a low profile to allow cross-travel by farm equipment. No mitigation is required.

Prior to construction, the Project will make satisfactory arrangements (including obtaining permits) for road use, access roads, intersections, maintenance and repair of damages with the governmental jurisdiction with authority over each road. The Project will notify the County Engineer of such arrangements upon request.

Traffic

There will be a temporary increase in vehicular traffic during construction activities. The maximum construction workforce is expected to generate approximately 600 additional vehicle trips per day on each road within the Project Area. Approximately 75 concrete trucks will be required to pour the foundation for each turbine. This is typically completed in 2 days per foundation. While there may be some noticeable increase in heavy vehicle traffic in discrete locations for limited amounts of time, any transportation disruptions to the traveling public will be negligible as any combination of state and county highways and other township roads will be used. Specific truck routes will be dictated by delivery location. Additional operating permits will be issued by the state or county for over-sized truck movements. The capacity of any route and level of service to the traveling public will not be affected, and as such, no mitigation is necessary.

Communications

There will be no impacts on the three identified microwave paths located within the Project Area. Minnesota Power shall not operate the wind turbine facility so as to cause microwave, television, radio, telecommunications or navigation interference.

Federally operated communications systems can be identified through consultation with the National Telecommunications and Information Administration (NTIA). On October 4, 2024, NTIA indicated that they provided the plans for the Project to the federal agencies represented in the Interdepartmental Radio Advisory Committee. One agency, the Department of Energy, had "concerning issues" with the designated build areas. Based on their review, the Project Area is 67.7 kilometers west of KBIS Bismarck, North Dakota Next Generation Weather Radar (NEXRAD) and is within the notification zone of that radar. However, there will be low impact and only the lowest elevation angle can be contaminated. Further contact was requested only if the Project Area changes or the turbine heights increase by 32.81 feet (10 meters) or more. Minnesota Power followed up with Department of Commerce regarding the placement and height of the turbines on December 8, 2025.

Since no licensed and operational AM or FM broadcast stations were identified within 18.64 miles (30 kilometers) of the Project Area, which is an adequate separation to avoid radiation pattern distortion, no mitigation is required.

Collection and telecommunication lines will be buried underground. An underground utilities locator company will be contacted prior to construction to locate and avoid underground facilities. To the extent Project facilities cross or otherwise affect existing communications systems, Minnesota Power will enter into agreements with service providers as necessary to avoid interference with their facilities.

6.3 PUBLIC HEALTH, WELFARE, AND SAFETY

6.3.1 Description of Resources

Aerospace and Military Operations

Minnesota Power and its representatives have notified the required aerospace and military operations organizations to notify them of the Project and solicit feedback concerning the development of the Project. The notified aerospace and military operations organizations include the FAA, North Dakota Aeronautics Commission, Grand Forks Air Force Base, Minot Air Force Base, 91st Missile Maintenance Squadron, and U.S. Department of Defense. Responses from

the aerospace and military operations organizations are summarized in Section 7.0 and correspondence is included in Appendix C.

The nearest intercontinental ballistic missile (ICBM) launch or launch control facility is approximately 46 miles north of the Project Area.

There are no public airports or private airports/airstrips within the Project Area. The nearest airport certified for commercial carrier operations is the Glen Ullin Regional Airport located approximately 5.45 miles southwest of the nearest turbine. Existing public and private airports within approximately 10 miles of turbines are documented in Table 6.3.1-1.

TABLE 6.3.1-1
Public and Private Airports

Airport (Local ID)	Type	Distance from Nearest Turbine	Direction from the Project
Glen Ullin Regional (D57)	Public	5.5 miles	South
Chase Airstrip (6NA5)	Private	6.0 miles	West
Fitterer's Strip (06ND)	Private	8.5 miles	South

Source: North Dakota GIS Hub Data Portal (ND GIS Hub), 2022.

The North Dakota Aeronautics Commission (NDAC), which monitors the airspace surrounding public airports in North Dakota and studies any possible obstructions or structures that could pose a safety risk to pilots navigating the surrounding airspace, responded to the Project introduction letter. NDAC reviewed the Project and informed Minnesota Power that they had no concerns with the Project and stated that there are no dangers or obstructions to any protected surfaces at nearby airports. As suggested by NDAC, Minnesota Power reached out to the Glen Ullin Regional Airport, Beulah Municipal Airport, Mercer County Regional Airport, and the FAA on July 26, 2025, to inform them of the Project and invite comments (see Appendix C2).

Sound

The existing acoustic environment is defined primarily by distant traffic sounds from the nearby arterial highways, intermittent aircraft overflights, and agricultural operations. In addition to anthropogenic sound sources, the windy conditions in the area define a somewhat elevated ambient sound level, which increases with wind speed. Windy conditions can generate sound caused by the rustling of grass and tree leaves and wind interaction with natural or man-made formations/structures.

Shadow Flicker

Residents in the Project area may experience a shadow effect from passing clouds, intermittent aircraft overflights, trees, or tall human-made structures such as barns and grain silos. In addition, several wind turbines are in operation near the Project that will cast shadows during daylight hours with adequate sunshine.

Electromagnetic Fields

Power frequency electric and magnetic fields (EMF) are created wherever electricity flows, which includes the wiring in our homes and schools, power lines, and the electrical equipment and devices we use at work and home. Leading U.S. and international scientific organizations, such as the National Cancer Institute and the World Health Organization, have conducted or evaluated EMF research. These organizations generally conclude that overall, the body of scientific

research does not show that exposure to EMF causes or contributes to any type of cancer or any other disease or illness (National Institute of Environmental Health Sciences [NIEHS], 1999).

Hazardous Materials/Hazardous Waste

Hazardous waste from large industrial or commercial activities is not likely to be present in the Project Area. Potential hazards may exist in rural areas from farm dumps and agricultural chemicals. According to the North Dakota Department of Environmental Quality - Spill Investigation Program, there have been no reported environmental incidents within the Project Area (North Dakota Department of Environmental Quality [NDDEQ], 2022). A Phase I Environmental Site Assessment (Phase I ESA) will be conducted in the Project Area prior to construction to identify any Recognized Environmental Conditions that may exist.

Security

The Project Area is located in an area that has low population density. Construction and operation of the Project will have minimal impact on the security and safety of the local communities.

6.3.2 Impacts/Mitigation

Aerospace and Military Operations

The installation of wind turbines creates a potential for air traffic collision. The wind turbines and the MET towers will have lighting and markings that comply with FAA requirements and the FAA's review will include the evaluation of any potential interference with air traffic. Minnesota Power has submitted a Notice of Construction or Alteration (FAA Form 7460-1) for a preliminary turbine array to the FAA. The response from the FAA for turbine placement have been approved and can be provided upon request. Minnesota Power will install an FAA-approved ADLS that is consistent with the ND PSC's requirements in N.D. Admin. Code Chapter 69-06-11.

Sound

The ND PSC's rules (N.D. Admin. Code Section 69-06-08-01(4)) specify that sound levels from a wind facility may not exceed 45 A-weighted decibels (dBA) within 100 feet of an inhabited residence or a community building, unless waived in writing by the owner. Wind turbine generators produce sound through a number of different mechanisms roughly grouped into mechanical and aerodynamic sources. Modern wind turbines include design features that minimize sound emission from mechanical sources. The interaction of air and the turbine blades produce aerodynamic sound through a variety of processes as air passes over and past the blades. Unlike other sound sources, wind turbines generally radiate more sound as wind speed increases. However, at elevated wind speeds the wind tends to generate significant background sound by moving trees and grasses, which can create a masking effect and may aid in reducing the audibility of wind turbine sound.

An acoustic engineering analysis was developed to assess potential sound levels resulting from wind turbine operations (Appendix B3). For the purposes of the analysis, 57 turbine positions were modeled, including 12 alternates. Some of the turbines were sound optimized to limit noise impacts to residences. This mitigation strategy shows the Project would be able to meet the ND PSC's current sound limit of 45 dBA within 100 feet of an inhabited residence or community building. It should be noted that the sound optimization mitigation may not be necessary for the final layout, based on which locations will ultimately be selected.

Project construction may cause short-term, but unavoidable, sound impacts. The sound levels resulting from construction activities vary significantly depending on several factors, such as the type and age of equipment, the specific equipment manufacturer and model, the operations being performed, and the overall condition of the equipment and exhaust system mufflers. Sounds generated by construction activities are typically exempt from state and local sound oversight provided that they occur within weekday, daytime periods as may be specified under local zoning or legal codes. Reasonable efforts will be made to minimize the impact of sound resulting from construction activities.

Construction activity will generate traffic having potential sound effects, such as trucks traveling to and from the site on public roads. At the early stage of the construction phase, equipment and materials, such as hydraulic excavators and associated spreading and compacting equipment needed to form access roads and foundation platforms for each turbine, will be delivered to the site. Once the access roads are constructed, equipment for lifting the towers and turbine components will arrive. Traffic sound is categorized into two categories: (1) the sound that will occur during the initial temporary traffic movements related to turbine delivery, haulage of components, and remaining construction; and (2) maintenance and ongoing traffic from staff and contractors, which is expected to be minor.

Shadow Flicker

A wind turbine's moving blades can cast a moving shadow on locations within a certain distance of a turbine. These moving shadows are called shadow flicker and can be a temporary occurrence experienced by people at nearby residences or public gathering places. The impact area depends on the time of year and time of day (which determines the sun's azimuth and altitude angles) and the wind turbine's physical characteristics (height, rotor diameter, blade width, and orientation of the rotor blades). Shadow flicker generally occurs during low angle sunlight conditions, typically during sunrise and sunset times of the day.

Shadow flicker is not directly regulated by county, state, or federal laws, and there is no codified permitting threshold regarding hours per year of anticipated shadow flicker on a receptor from a wind energy project. The wind power generation industry has generally accepted a voluntary target of less than thirty hours per year of shadow flicker at an occupied residential structure. This 30-hour-per-year threshold has been used by the ND PSC as a permitting standard.

An analysis of potential shadow flicker impacts from the Project turbine layout was conducted using the WindPro software package (Appendix B4). The WindPro analysis was conducted to determine shadow flicker impacts under realistic sunshine conditions (the analysis accounts for historical sunshine probability). This analysis calculated the total amount of time (hours and minutes per year) that shadow flicker could occur at receptors.

The analysis assumes that the receptors all have a direct in-line view of the incoming shadow flicker sunlight and does not account for trees or other obstructions which may block sunlight. In reality, the windows of many houses will not face the sun directly to be affected by the key shadow flicker impact times. Additionally, the analysis did not account for maintenance time or low wind speeds. Project compliance was assessed at a total of 61 receptors in and near the Project Area (for the 45 planned and 12 alternate turbine locations). The predicted shadow flicker impacts are less than 30 hours per year at all but 4 receptors (the model includes both primary and alternative turbine locations). Mitigation techniques will be utilized to reduce the shadow flicker on those 4 receptors to less than 30 hours per year. Common techniques include planting vegetation, awning installation, and/or reduced turbine operation via curtailment. A final Shadow Flicker analysis will be provided prior to construction.

Electromagnetic Fields

Low-level power frequency EMF will occur around the wind turbine generators (in the nacelles), around the generator step-up transformers, along the collector lines, and at the Project substations. All Project facilities will be set back from residences as required by state and county regulation. At these distances, EMF levels will not be above background levels. The only exposure will be brief exposure to maintenance workers, primarily at the substations. Based on the above, no significant adverse impacts are anticipated.

Hazardous Materials/Hazardous Waste

All petroleum fluids will be contained within the wind turbines and electrical equipment. Potentially hazardous materials associated with the Project include fluids found in association with turbines and substation/transformer equipment. There will be three types of fluids used in the operation of the wind turbines, all of which are petroleum products. These fluids are necessary for the operation of each turbine and include gear box oil, hydraulic fluid, and gear grease. The transformers contain mineral oil. Any petroleum waste generated will be handled and disposed of in accordance with local, state, and federal regulations.

Significant findings are not anticipated due to the known historic uses in the Project Area. As with any construction activity, there is the possibility of accidentally spilling fuel, hydraulic fluid, or other hazardous substances during construction of the Project. The potential of such events will be minimized through implementation of a Spill Prevention, Control, and Countermeasures Plan, which will include the following:

- Construction equipment will be equipped with spill cleanup kits;
- Equipment refueling will take place at secure areas, away from wetlands or drainages; and
- Workers will be trained in spill clean-up and the use of the spill cleanup kits.

These measures will ensure that surface and groundwater quality will not be degraded through inadvertent spillage of contaminants.

Security

Project construction and operation will have minimal impacts on the security and safety of the local communities. The following security measures will be taken to reduce the chance of physical and property damage, as well as personal injury, at the site:

- Security measures will be taken during the construction and operation of the Project, including temporary and permanent (safety) fencing, warning signs, and locks on equipment and wind power facilities.

- Turbines will sit on solid steel-enclosed tubular towers in which all electrical equipment will be located. Access to the tower is only through a steel door that will be locked when not in use.

- Where necessary or requested by landowners, Minnesota Power will construct gates and/or fences such as those around the collection substation.

- Minnesota Power will provide educational materials to landowners within the site boundaries and upon request to interested persons about the Project.

6.4 CULTURAL RESOURCES

6.4.1 Description of Resources

A Class I file search of the Project Area and a 1-mile buffer, which is referred to as the Class I Study Area, was completed in August 2024, with an update in January 2025. Records in the North Dakota Archaeology and Historic Preservation Files identify 45 cultural resources in the Study Area (Tables 6.4.1-1 and 6.4.1-2 below). This sample includes archaeological sites, site leads (probable site locations), isolated finds, and architectural buildings or structures. Precontact period Native American cultural resources include 15 archaeological sites and 11 occurrences of isolated artifacts. Historical Euro-American resources include five architectural properties, six archaeological sites, two multicomponent localities with both archaeology and standing buildings or structures, and seven site leads.

TABLE 6.4.1-1
Summary of Previously Recorded Cultural Resources in the Study Area

Property Class	Property Type	Isolated Find	Site	Site Lead	Total
Architectural	Barn		2		2
Architectural	Bridge		1		1
Architectural	Church		1		1
Architectural	Habitation		1		1
Historic	Artifact scatter		1		1
Historic	Camp site			1	1
Historic	Habitation		4		4
Historic	Habitation/school			1	1
Historic	Mill			1	1
Historic	Mine			3	3
Historic	Post office			1	1
Historic	Road		1		1
Multicomponent Historic	Habitation		2		2
Precontact	Cairn		7		7
Precontact	Cairn with lithic scatter		1		1
Precontact	Flaked stone scatter	11	2		13
Precontact	Stone feature(s)		3		3
Precontact	Stone feature(s) with lithic scatter		2		2

TABLE 6.4.1-1
Summary of Previously Recorded Cultural Resources in the Study Area

Property Class	Property Type	Isolated Find	Site	Site Lead	Total
TOTAL		**11**	**27**	**7**	**45**

Native American components are characterized by occurrences of flaked stone artifacts and/or stone feature sites. Seventeen precontact components included flaked stone artifacts as isolates and scatters with the most common site being a lithic isolate (n=11). There are two lithic scatter sites, and there is flaked stone associated with rock features at three other locations. There are eight rock cairn sites, one of which includes flaked stone. Five other archaeological sites are characterized by stone circles or features, and two of these have lithic artifacts. Generally speaking, Native American components in the Project and Study areas are low-duration and low-intensity occupations representing isolated, limited, and specialized activities, and perhaps temporary habitations. Some of these lands remain unbroken by mechanized agriculture, and the preservation of surface features like cairns and stone circles indicate that some of the Project Area sites retain their integrity. Cairns may be specialized features related to hunting, marking trails, communicating information, or denoting other important spots on the landscape, and the stone circles could represent campsites and ephemeral structure locations.

Particularly with the archaeological sites, few precontact Native American components have been evaluated for their National Register eligibility. Eleven occurrences of isolated lithic artifacts have been determined or are recommended as not meeting the eligibility requirements of the National Register of Historic Places (NRHP). Four precontact archaeological sites have been recommended or determined as eligible and 11 precontact cultural resources are unevaluated. The four sites that are eligible for the NRHP include three cairn sites (one with associated lithics) and a stone circle locality. Preservation of integrity is important to support the eligibility of Native American sites in the region, and agriculture can have a deleterious effect on historic significance. The small sample of previously documented sites in the Study Area are probably representative of the types of Native American sites that are currently undetected in the Project Area.

Historic period Euro-American components in the Study Area include architectural properties and archaeological sites. There are five resources with historical buildings or structures, six archaeological sites, seven site leads (possible sites), and two localities with both standing architecture and archaeological remains. Including architectural and archaeological components, the sample of previously recorded sites include five habitation sites as residences, homesteads, or farmsteads. Two barns in the Study area are complementary, and there are three coal mines and two multi-component architectural and archaeological sites. With a single example each, other site types in the Study area include a road (Bismarck and Fort Keogh Stage Road), church (St. Clement Oratory), post office, mill, camp site, an artifact scatter, a bridge, and a one-room schoolhouse foundation (also associated with a house foundation).

About half of the historical resources in the Study Area have been evaluated for the NRHP, and the remainder are unevaluated. Two sites, a barn and St. Clement Oratory, have been determined or recommended as meeting eligibility requirements of the NRHP, and eight resources have been evaluated as not eligible. Historical architecture is common in the Study area, but most of these properties do not meet eligibility requirements of the NRHP, likely due to decades of refurbishment and remodeling that has affected their integrity and historic character. The significance of 10 historical resources has not been evaluated. One of these, the Bismark and Fort Keogh Stage Road, crosses the Project Area, and this feature would likely be an eligible property if evaluated, comprised of contributing and non-contributing segments depending on preservation and integrity.

Within the Project Area there are a total of 15 previously recorded sites, site leads, and isolated finds (Table 6.4.1-2). Five sites consist of a historic stagecoach road, a historic farm site, an architectural house site, a church, and a precontact stone circle. Three of the sites are unevaluated regarding eligibility for listing in the NRHP. One site, a church, has been recommended as eligible for listing in the NRHP. One site, a historic archaeological farm site and material scatter, has been recommended as not eligible for listing in the NRHP. There are four previously recorded site leads within the Project Area. The site consists of a camp site, a post office, and two coal mines. All site leads are unevaluated regarding eligibility for listing in the NRHP. Lastly, there are six previously recorded precontact isolated finds that are all chipped stone. All isolated finds have been recommended as not eligible for listing in the NRHP.

TABLE 6.4.1-2
Previously Recorded Sites Within the 1-Mile Study Area

Site ID	Type	Affiliation	Site Type	NRHP Status
32MO189*	Site	Architectural	St. Clement Church	Eligible
32MO214	Site	Precontact	Lithic Scatter	Unevaluated
32MO233*	Site	Historic	Stagecoach Road- Abandoned Fort Keogh to Fort Lincoln	Unevaluated
32MO284	Site	Precontact	Stone Circles, Lithic Scatter	Unevaluated
32MO346*	Site	Precontact	Stone Circle	Unevaluated
32MO1389	Site	Architectural	Barn	Unevaluated (Potentially Eligible)
32MO1393*	Site	Architectural	House-Earthen Brick	Unevaluated
32MO1397	Site	Precontact	Cairn	Unevaluated
32MO1398	Site	Precontact	Cairn	Unevaluated
32MO1400	Site	Precontact	Cairn	Unevaluated
32MO1401	Site	Precontact	Stone Circle	Unevaluated
32MO1402	Site	Precontact	Lithic Scatter	Unevaluated
32MO1403	Site	Precontact	Cairn	Unevaluated
32MO1447*	Site	Historic	Farmstead, Cultural Material Scatter	Not Eligible
32MO1515	Site	Multi-Component (Architectural, Historical)	Farmstead, Cultural Material Scatter	Not Eligible
32MO1516	Site	Historic	Cultural Material Scatter	Not Eligible
32MO1517	Site	Historic	Foundations, Cultural Material Scatter	Not Eligible
32MO1596	Site	Architectural	Bridge- Bridge #30-123-05.0	Not Eligible
32MOX102*	Site Lead	Historic	Coal Mine- Richter Mine	Unevaluated
32MOX132*	Site Lead	Historic	“Camp 5”	Unevaluated
32MOX134*	Site Lead	Historic	Post Office- Haymarsh Post Office	Unevaluated
32MOX225	Site Lead	Historic	Mill – Geck Brothers Mill	Unevaluated
32MOX253	Site Lead	Historic	House and One Room School Foundations	Not Eligible
32MOX348	Site Lead	Historic	Coal Mine	Unevaluated
32MOX349*	Site Lead	Historic	Coal Mine	Unevaluated
32MOX569	Isolated Find	Precontact	Chipped Stone	Not Eligible

TABLE 6.4.1-2
Previously Recorded Sites Within the 1-Mile Study Area

Site ID	Type	Affiliation	Site Type	NRHP Status
32MOX576*	Isolated Find	Precontact	Chipped Stone	Not Eligible
32MOX577*	Isolated Find	Precontact	Chipped Stone	Not Eligible
32MOX579*	Isolated Find	Precontact	Chipped Stone	Not Eligible
32MOX580*	Isolated Find	Precontact	Chipped Stone	Not Eligible
32MOX581*	Isolated Find	Precontact	Chipped Stone	Not Eligible
32MOX583	Isolated Find	Precontact	Chipped Stone	Not Eligible
32MOX629*	Isolated Find	Precontact	Chipped Stone	Not Eligible
32OL666	Site	Architectural	Barn	Eligible
32OL671	Site	Precontact	Stone Circles	Eligible
32OL672	Site	Precontact	Cairn, Lithic Scatter	Eligible
32OL673	Site	Precontact	Cairn	Eligible
32OL674	Site	Precontact	Cairn	Unevaluated
32OL690	Site	Precontact	Cairn	Eligible
32OL691	Site	Historic	Foundations, Depressions	Not Eligible
32OL710	Site	Precontact	Stone Features, Lithic Scatter	Unevaluated
32OLX263	Isolated Find	Precontact	Chipped Stone	Not Eligible
32OLX268	Isolated Find	Precontact	Chipped Stone	Not Eligible
32ME2404	Site	Multi-Component (Architectural, Historic)	Farmstead, Cultural Material Scatter	Not Eligible
32MEX788	Isolated Find	Precontact	Chipped Stone	Not Eligible

* Sites Within the Project Area.

Previous Surveys Within the Study Area

Records curated with the State Historical Society of North Dakota (SHSND) Archaeology and Historic Preservation Files, document 30 previously completed cultural resources projects within the Project Area and 1-mile Study Area. Conducted between 1983 and 2021, almost all the previous investigations are linear and small block surveys associated with infrastructure development (Table 6.4.1-3 below). About three-quarters of the previous projects are contemporary and were completed after 2010. A total of 14 previous surveys cross within the proposed Project Area (Table 6.4.1-3 below).

TABLE 6.4.1-3
Previous Survey Manuscripts Within the 1-Mile Study Area

MS Number	Report Title	Authors	Report Year
3347*	Cultural Resource Surveys: Billings Microwave System in Golden Valley, Morton, Oliver, Mercer, Slope, Stark, & Billings Co., ND	(Phillips, Ben – Primary Author)	1983
6509	North Dakota Department of Transportation Material Source Projects Cultural Resource Review 1989-1994	(Borchert, Jeani L. – Primary Author)	1995
6880*	Safety Project Cultural Resource Review 1996	(Borchert, Jeani L. – Primary Author)	1997
7159*	Southwest Pipeline Phase II Cultural Resources Investigations in Portions of the Hebron-Glen Ullin Service Area, Morton and Stark Counties, ND UW #2036	(Klinner, Duane G. – Primary Author)	1998
7306	Interstate Engineering, Inc. Winkler Bridge Replacement (Morton County Bridge #122-03.03): A Class III Cultural Resource Inventory and Limited Testing, Morton County, ND	(Morrison, John G. – Primary Author)	1998
9126	Bridge 30-122-04.0 Replacement Project: A Class III Cultural Resource Inventory in Morton Co., ND	(Klinner, Duane G. – Primary Author); (Morrison, John G. – Contributing Author)	2005
10860	Kroh Gravel Pit: A Class III Cultural Resource Inventory in Morton Co., ND	(Stine, Edward – Primary Author)	2009
12568*	Bison 3 Wind Project: A Class III Cultural Resource Inventory, Oliver and Morton Cos, ND	(Burns, Christina G. – Primary Author)	2011
12901	Class III Cultural Resource Inventory for the Allete Energy 230kV Transmission Line Project in Mercer, Morton, and Oliver Counties, North Dakota	(Burns, Christina G. – Primary Author)	2012
13914	ND Highway 49, From Beulah to the Morton County Line: A Class III Cultural Resource Inventory, Mercer County, North Dakota- NDDOT Project Number: 5-049(014)082 PCN: 18686	(Morrison, John G. – Primary Author)	2012
14223	Bison 4 Wind Energy Center: A Class III Cultural Resource Inventory, Oliver, Morton, and Mercer Counties, North Dakota	(Burns, Chirstina G. – Primary Author)	2013
14356	West Substation Location Survey: A Class III Intensive Cultural Resource Inventory in Mercer County, North Dakota	(Brooks, Brittany – Primary Author)	2013
14424	Blickensdorfer Field Clearing Piles: A Class III Intensive Cultural Resource Inventory in Hettinger County, North Dakota	Lillestrand, Eric – Primary Author)	2013
14976*	2013 Survey Report Addendum: Center Service Area Rural Distribution Lines Supplemental Class II-III Cultural Resources Inventory Southwest Water Pipeline Project Mercer, Morton, and Oliver Counties, North Dakota SWPP Contract 7-9E	(Jackson, Michael A. – Primary Author); (Rokke, Nathan J. – Contributing Author); (Toom, Dennis L. – Contributing Author)	2014
15062*	Addendum to Bison 4 Wind Energy Center Access Roads and Borrow Areas: A Class III Intensive Cultural Resource Inventory in Mercer and Oliver Counties, North Dakota	(Brooks, Brittany – Primary Author)	2014
15174	Addendum to Bison 4 Wind Energy Center Crane Paths: A Class III Intensive Cultural Resource Inventory in Oliver County, North Dakota	(Brooks, Brittany – Primary Author)	2014

TABLE 6.4.1-3
Previous Survey Manuscripts Within the 1-Mile Study Area

MS Number	Report Title	Authors	Report Year
15491*	Addendum to Bison 4 Wind Energy Center Crane Path Reroutes II: A Class III Intensive Cultural Resource Inventory in Oliver County, North Dakota	(Brooks, Brittany – Primary Author)	2014
15636*	ND Highway 49 From Road Point 67 Near Glen Ullin North to the Morton County Line: A Class III Cultural Resource Inventory, Morton County, North Dakota	(Morrison, John G. – Primary Author)	2014
15938*	Dakota Access, LLC Dakota Access Pipeline Project (ND) 2014 Dakota Access Class II/III Cultural Resources Inventory	(Mueller, Andrew C. - Primary Author); (Picka, Craig M. - Contributing Author); (Sather, Dean T. - Contributing Author); (Terry, Matthew - Contributing Author)	2015
16475	MO-1057 Class III Inventory Report	(Wermers, Greg L. – Primary Author)	2016
16476*	MO-1055 and MO-1056 Class III Inventory Report	(Wermers, Greg L. – Primary Author)	2016
16512*	Dakota Access, LLC, Dakota Access Pipeline Project (ND) Volume 1, 2015 Dakota Access Class II/III Cultural Resources Inventory	(Mueller, Andrew C. - Primary Author); (Picka, Craig M. - Contributing Author); (Sather, Dean T. - Contributing Author); (Terry, Matthew - Contributing Author)	2015
17092*	2015 Survey Report Addendum: Center Service Area Rural Distribution Lines Supplemental Class II and Class III Cultural Resources Inventories for the Southwest Water Pipeline Project, Oliver, Mercer, and Morton Counties, North Dakota, SWPP Contract 7-9E	(Cox, Matthew A. – Contributing Author); (Kromarek, Nicole – Primary Author)	2016
17305	Dan Feser Watershed Survey: A Class III Intensive Cultural Resources Inventory in Morton County, North Dakota	(Hanley, Raina – Primary Author)	2017
18093*	Addendum to the Clean Energy I Wind Farm: A Class III Intensive Cultural Resource Inventory in Morton and Mercer Counties, North Dakota	(Atkinson, Alex – Primary Author)	2018
18192*	Addendum II to the Clean Energy I Wind Farm: A Class III Intensive Cultural Resource Inventory in Morton and Mercer Counties, North Dakota	(Brooks, Brittany – Primary Author)	2018
18200	Class III Cultural Resource Inventories for the Border States Paving, Inc. 2017 Material Source Areas in McKenzie, Morton, and Richland Counties, North Dakota	(Beavers, Matthew – Primary Author); (Neumiller, Alex – Contributing Author)	2018
18351	Addendum III to the Clean Energy I Wind Farm: A Class III Intensive Cultural Resource Inventory in Morton and Mercer Counties, North Dakota	(Abbott, Melody – Primary Author)	2019

TABLE 6.4.1-3
Previous Survey Manuscripts Within the 1-Mile Study Area

MS Number	Report Title	Authors	Report Year
18533	Addendum IV to the Glen Ullin Energy Center: A Class III Intensive Cultural Resource Inventory in Morton and Mercer Counties, North Dakota	(Reich, Arielle – Primary Author)	2019
19389	A Class III Cultural Resource Inventory for the Bison & Glen Ullin Wind Project Radar Stations in Morton and Oliver Counties, North Dakota	(Altieri, Irene – Primary Author)	2021

* Surveys Within the Proposed Project Area.

Archaeological Resources

The Class III pedestrian survey was completed on January 31, 2025, March 5 through 14, 2025, April 9, 2025, April 14 through 18, 2025, April 23, 2025, and May 26, 2025. During the survey, two new historic sites, two new precontact sites, and five new isolated finds were identified. Of the new sites, isolated finds, and previously identified sites, four are recommended as unevaluated or potentially eligible for listing on the NRHP. Merjent recommends avoidance of four of the nine new resources. Merjent searched for site lead 32MOX132, a historic camp site, but no evidence of past activity was identified during the survey for a proposed access road, which is an existing crowned and ditched county road; therefore, no further work is recommended for the resource in this area. Similarly, site 32MO233, a segment of stagecoach line, was originally noted as being covered in this area by a modern crowned and ditched county road. No evidence of past activity was identified during the survey for proposed O&M work areas to the north of the existing road. No further work is recommended for the resources in this area. The other 10 sites and isolated finds are recommended as not eligible for listing. No further work or avoidance is recommended for those resources. Merjent recommends that no historic properties will be affected by the proposed Project provided there is implementation of the above-mentioned avoidance measures. No further archaeological work is recommended for the Project as planned.

Merjent completed a Class III report, which included the results of pedestrian surveys for turbine locations, access roads, O&M locations, ALDS and MET tower locations, and limited shovel testing. The report was submitted to the SHSND, and comments were received on October 22, 2025. Revisions to the report were made and an updated copy was submitted for review on November 19, 2025. Additional Class III surveys of crane paths, collector lines, access roads, workspaces and laydown yards were conducted from October 21 to November 14, 2025. During the additional surveys, five precontact sites and two historic sites were identified, along with eleven precontact isolated finds/site leads. One previously recorded historic site, one previously recorded historic site lead, and one previously recorded precontact isolated find were revisited. Merjent recommends that all new resources remain unevaluated in regard to eligibility for listing in the NRHP, and the sites be avoided pending additional evaluative work. Merjent recommends that no further work is needed for all three of the previously recorded sites that were revisited during the additional survey. Table 6.4.1-4 includes a summary of NRHP and management recommendation by resources. A report of the findings and associated site forms is in preparation and will be submitted to the SHSND in December 2025.

TABLE 6.4.1-4
Summary of NRHP and Management Recommendations by Resource

SITS No.	Cultural Affiliation	Resource Type	NRHP Recommendation	Management Recommendation

32MO233	Historic	Stagecoach Road	Unevaluated	No Further Work (Not in APE)
32MOX132	Historic	Camp	Unevaluated	No Further Work (Not in APE)
32MOX577	Precontact – Unknown	Lithic Scatter	Not Eligible	No Further Work
32MOX579	Precontact – Unknown	Isolated Find	Not Eligible	No Further Work
32MOX580	Precontact – Unknown	Isolated Find	Not Eligible	No Further Work
32MO1719	Precontact – Unknown	Lithic Scatter	Unevaluated	Avoidance or Further Work
32MO1720	Historic	Farmstead	Unevaluated	Avoidance or Further Work
32MO1721	Historic	Farmstead	Unevaluated	Avoidance or Further Work
32MO1722	Precontact – Unknown	Lithic Scatter	Unevaluated	Avoidance or Further Work
32MOX804	Precontact – Unknown	Isolated Find	Not Eligible	No Further Work
32MOX802	Precontact – Unknown	Isolated Find	Not Eligible	No Further Work
32MOX803	Precontact – Unknown	Isolated Find	Not Eligible	No Further Work
32MOX805	Precontact – Unknown	Isolated Find	Not Eligible	No Further Work
32MOX806	Precontact – Unknown	Isolated Find	Not Eligible	No Further Work

NOTE: APE = area of potential effect.

Architectural Resources

A desktop survey of architectural resources was conducted from August 18 through 25, 2025, to identify structures within the 2-mile buffer (Architectural Resource Study Area) around the Project Boundary. Within the Project Boundary there were eight previously identified properties. Two properties, 32MO189 (St. Clement's Church) and 32OL666, were previously evaluated and determined to be eligible for listing to the NRHP. Two properties were previously determined to be potentially eligible for listing on the NRHP, 32MO1388, and 32MO1389. Four properties, 32MO387, 32MO1515, 32MO1596 and 32ME2404, were previously evaluated and determined to be not eligible for listing on the NRHP. One property, 32MO1393, was unevaluated for eligibility.

An intensive desktop aerial survey was conducted to identify all structures within the Project Area and Architectural Resource Study Area for architectural history. During the desktop survey of the architectural history study area, 105 sites were identified within the 2-mile buffer. Within those 105 sites, there are approximately 391 structures. Most of those are agricultural outbuildings.

Some of those identified sites did not meet the 50-year threshold for NRHP eligibility consideration. Views of the sites during desktop analysis were limited to aerial imagery, and age was not able to be determined. From September 24 through 26, 2025, photographs were taken of the 105 identified sites. Some of those sites were clustered together in single properties.

Seventy-nine properties were photographed. Of those 79 properties, 39 meet the 50-year threshold for NRHP eligibility consideration and will require North Dakota SHPO site forms. Two sites associated with St. Clement Catholic Church, including the church and the cemetery, have been previously recorded and are potentially eligible for listing on the NRHP. Five sites were not able to be photographed from the ROW due to access or vegetation blocking view. The remaining 38 sites were modern and did not meet the 50-year threshold for NRHP eligibility.

Initial review of the sites and their location to proposed Project infrastructure suggests that only one site would be potentially affected by the Project. St. Clement Church and Cemetery is potentially eligible; however, there is already a cluster of wind turbines located 0.6-mile northeast of the church and cemetery. The turbines are visible from the cemetery, but the church is shielded by mature trees to the northeast and south. The newly proposed wind turbines to the southeast would be blocked from view at the church by mature trees to the south; however, there may be a partial view of the turbines south from the cemetery. All other sites are either already in view of other wind

projects, or do not meet minimum NRHP eligibility requirements to be considered for effects. Sites that were determined to be at least 45 years of age were photographed, and site forms are in the process of being prepared for each site. The surveyed properties will be evaluated by a Secretary of the Interior-qualified architectural historian for effects on the properties, along with the completion of a viewshed analysis, which will be submitted to the SHSND for review in December 2025.

6.4.2 Impacts/Mitigation

Archaeological sites will be avoided during construction in accordance with input from the SHSND.

Cultural sites that are recommended for avoidance by the SHSND will be fenced to reduce the potential for inadvertent disturbance. An Unanticipated Discoveries Plan has been prepared and will outline the procedure utilized to address any unanticipated discoveries of cultural resources, including possible human remains. In the event that unanticipated discoveries are made during construction, the Unanticipated Discoveries Plan will provide directions to on-site personnel and their consultants regarding proper procedures for addressing the discoveries. In the event that burials are discovered during construction, construction would stop within 100 feet of the site, and the site will be protected until the Morton County Sheriff's office has been contacted. The Sheriff will contact the North Dakota State Forensic Examiner to determine if the remains are associated with a crime scene. If the remains are determined not to be part of an active crime scene or investigation, the North Dakota Chief Archaeologist will be contacted to coordinate how to proceed. Therefore, no significant impacts on cultural resources are anticipated.

Archaeological Resources

Minnesota Power uses an avoidance strategy and will avoid newly documented sites and previously documented archaeological sites that are recommended for avoidance by the SHSND. Because several archaeological leads in the Project Area are mapped at the quarter section (160 acres) level, identification of lead locations based on available historic information was not possible. However, Class III cultural resources inventories were conducted to identify any features within the archaeological survey area that are associated with archaeological leads. Merjent created avoidance buffers for unevaluated or eligible archaeological sites. The buffers will be delineated prior to construction to ensure avoidance of archaeological resources. The pedestrian survey and shovel testing associated with the Class III Cultural Resources Inventory was completed between January and May of 2025 with additional survey being conducted between October and November 2025. The resulting cultural resources report from the January to May survey was submitted to the SHSND for review and concurrence, with an addendum report anticipated for submittal in December 2025, whereupon a management summary will be submitted to the ND PSC.

Architectural Resources

An architectural historian conducted a survey of architectural resources within the Project Area. The Project is designed to avoid direct impacts on these properties. Minnesota Power is coordinating with SHSND to determine whether the Project will have indirect impacts on these resources and if so, what mitigation will be requested. The Class II Architectural Inventory Report will be submitted to the SHSND for review and concurrence, and a management summary will be submitted to the ND PSC.

Historical resources which are not designated as exclusion areas such as historic farmsteads and cemeteries are present within the Project Area. Minnesota Power will avoid impacts on historic resources.

6.5 LAND USE RESOURCES

6.5.1 Description of Resources

The Project Area is located in rural North Dakota, an area predominantly comprised of cultivated land. Accordingly, much of the Project Area is used for agricultural purposes and most of the Project Area has been converted to commercial crops. Wooded areas within the Project Area are limited to shelterbelts between fields, windbreaks surrounding farmsteads, and along drainages. No economically important forestry resources are found within or around the Project Area.

Public Lands

There are no designated public lands such as municipal, state or federal parks, surface tracts of school trust lands, National Wildlife Refuges, Waterfowl Production Areas, Wildlife Management Areas, or designated scenic trails within the Project Area (Figure 8).

Easements and Agreements

Private landowners hold voluntary agreements with North Dakota Game and Fish Department (NDGFD) as part of the Private Land Open to Sportsmen (PLOTS) program, which allows walk-in public hunting access to otherwise private land. The landowner is allowed to conduct normal farming and ranching activities, and the PLOTS agreements are subject to change on an annual basis at the private landowner's discretion should land use change. No PLOTS parcels are present within the Project Area.

The U.S. Fish and Wildlife Service (USFWS) manages lands including their easements within the Project Area (Figure 8). These easements are agreements between landowners and the USFWS to protect wetlands and grasslands that are vital to wildlife habitat. The USFWS owns the perpetual rights to certain wetland basins within wetland easements that cannot be burned, drained, filled, or leveled without authorization under a Special Use Permit from the USFWS. The upland portions of wetland easements may be developed without a permit as long as the wetland basins are avoided. USFWS easements were provided from the USFWS for the Project Area. Within the Project Area there are no USFWS wetlands easements and no USFWS grassland easements. There is one privately owned USFWS conservation easement.

Conservation Reserve Program (CRP) lands administered by the Farm Service Agency (FSA) through the USDA have the potential to occur in the Project Area. In exchange for yearly compensation, CRP lands are removed from agriculture production and planted with species that will improve environmental quality and health, with a long-term goal of establishing valuable land cover to improve water quality, prevent soil erosion, and reduce the loss of wildlife habitat (USDA FSA, 2025). Specific CRP acres are subject to privacy laws between each landowner and the FSA.

Grasslands

Western EcoSystems Technology, Inc. (WEST) conducted a grassland habitat assessment. including categorization of unbroken/broken sod status, to support development of the Project. Unbroken grasslands, defined in the NDGFD's *KeyWind 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" (Piorkowski et al., 2024, Appendix B5).

The objective of the assessment was to identify unbroken and broken grasslands within the Project Area. This effort verified and updated previous grassland surveys conducted at the Project in 2020 (Brazeal and Piorkowski, 2021) using current data and refreshed field verification for the Project Area. A desktop review identified grassland parcels and categorized the sod type of each parcel as either unbroken or broken. Field surveys were then conducted to verify the current land cover status of all identified grasslands within the Project Area, including those grasslands previously verified in 2020. Results from this assessment can help inform siting of facilities and guide decisions regarding future survey needs at the Project.

Broken sod was identified based on features such as rock piles indicating extensive mechanized rock clearing; presence and amount or height of trees and shrubs; field edge changes; absence of scattered rocks; straight line features indicating plowing, disking, harvesting, or planting; or any other features indicating human disturbance. Unbroken sod was identified based on the lack of these disturbance features.

Grassland sod types are presented on Figure 9. Table 6.5.1-1 provides impacts on grassland associated with turbines.

TABLE 6.5.1-1
Acres of Impact to Grassland

Impact Type	Land Use	
	Broken Grassland	Unbroken Grassland
Temporary	0.7	0
Permanent	0.0	0.0

Table 6.5.1-2 summarizes the grassland sod type including the percentage and acreage within the Project Area.

TABLE 6.5.1-2
Grassland Sod Type within the Project Area

Land Cover	Survey Type	Acres
Broken Grassland	Field Verified	7,773
	Desktop Review	40
Unbroken Grassland	Field Verified	1,189
	Desktop Review	63

[a] Rounded to the nearest whole number.

6.5.2 Impacts/Mitigation

Minnesota Power will work with landowners to minimize impacts on their land. Where feasible, turbine and access road locations were positioned along section lines and field edges to lessen the fragmentation of land. Once construction activities have been completed, temporary construction areas will be able to go back to their previous use.

The development of the Project will not result in a significant change in land use within the Project Area. Construction of the Project will permanently take approximately 116 acres (0.44 percent of the Project Area) and temporarily take approximately 551 acres (2.11 percent of the Project Area) of cropland out of production.

Minnesota Power proposes the following mitigation measures:

- Develop and implement a Noxious Weed Management and Control Plan to eliminate the spread of weeds during construction and to implement prescribed treatments to eliminate, to the maximum extent possible, the invasion of weeds from surrounding lands. Minnesota Power will provide a Noxious Weed Management Control Plan to the Morton County Weed Board.

- Provide contractors with static constraint maps and facilitate compliance through onsite environmental construction monitoring.

- Protect existing trees and shrubs by avoiding tree removal for turbines, access roads, and underground collector lines, or if removal is necessary, replace consistent with the ND PSC's Tree and Shrub Mitigation Specifications.

- Coordinate with local Natural Resources Conservation Service staff to revegetate non-cropland and pasture areas temporarily disturbed during construction or operation of the wind facility with locally sourced native seed mixes appropriate to the region.

- Reseed temporarily disturbed areas or restore to crop, based on the conditions of the area prior to construction and based on landowner preference.

BMPs will be employed, including the use of erosion and sediment control devices during and after construction; noxious weed control; segregating topsoil from subsurface materials; reseeding of disturbed areas; the use of construction equipment appropriately sized to the scope and scale of the Project; ensuring access road grades fit closely with the natural terrain; properly disposing of on-site soil cuttings from foundation construction; and maintaining proper drainage. Perimeter sediment controls will be used in areas under construction as needed to control erosion and storm water runoff. Surface flows will be directed away from cut-and-fill slopes and into ditches that discharge to natural drainages. Mitigation is not anticipated.

Public Lands

According to North Dakota Parks and Recreation, the Project does not appear to affect properties owned, leased, or managed by North Dakota Parks and Recreation and does not appear to affect any properties protected under Section 6(f) of the Land and Water Conservation Fund (Appendix C).

No public lands will be directly impacted as no public lands occur in the Project Area.

Easements and Agreements

No PLOTS land is present within the Project Aera; therefore, impacts are not anticipated (Figure 8).

Minnesota Power will not place infrastructure on any USFWS wetland easement basins. There are no USFWS grassland easements within the Project Area.

Any land taken out of CRP will be negotiated between the individual landowner and the FSA.

Grasslands

No unbroken grassland will be permanently taken out of use. Table 6.5.2-1 summarizes the grassland sod type permanently impacted by Project infrastructure.

TABLE 6.5.2-1
Grassland Sod Type Permanently Impacted by Project Infrastructure

Land Cover	Acres Permanently Impacted by Project Infrastructure
Non-Grassland	0
Broken Grassland	0
Unbroken Grassland	0

6.6 GEOLOGICAL AND SOIL RESOURCES

6.6.1 Description of Resources

Geology and Soils

The surficial geology in the Project Area mainly consists of silt and sand that are described as river, lake, and swamp sediments. They are part of the Sentinel Butte formation of the Paleocene Epoch and are noted as having a maximum thickness of 200 meters. A small area in the southwest corner of the Project Area consists of clay and sand that are described as river sediment; obscurely bedded overbank sediment, generally overlaying cross-bedded channel sediment. Those sediments are part of the Oahe formation of the Quaternary Period and are noted as having a maximum thickness of 10 meters. A small area in the north-central portion of the Project Area consists of mica sandstone and sand that is described as having an upper member of fluvial sediments and a lower member that is a zone of weathering of the underlying geologic unit. Those sediments are part of the Golden Valley formation of the Tertiary period and are noted as having a maximum thickness of 20 meters. (NDGS – Surficial Soils)

The bedrock geology in the Project Area mainly consists of the Sentinel Butte Formation of the Tertiary Period that is described as grayish-brown silt, sand, clay, sandstone, and lignite; river, lake, and swamp sediment. A small area in the southwest portion of the Project Area consists of the Bullion Creek Formation of the Tertiary Period that is described as yellowish-brown silt, sand, clay, sandstone, and lignite; river, lake, and swamp sediment. (NDGS – Bedrock Geology)

Based on data from the North Dakota Geological Survey, several landslide deposits have been identified in the southeastern portion of the Project Area, and a few have also been identified in the western portion of the Project Area (Figure 6). They generally are found adjacent to waterways such as creeks. (Anderson, et al., 2023)

A geotechnical evaluation of the Project Area will be conducted in areas with permanent impact. Once completed, a report summarizing the findings will be available under separate cover.

Mining and Mineral Interests

Within the Project Area there are non-active sand and gravel mines and no active sand or gravel mines (Google Earth, 2022; ND GIS Hub, 2022). Within the Project Area there are two dry, non-active oil & gas wells and no active oil and gas wells (North Dakota Department of Mineral Resources [NDDMR], 2022). Within the Project Area there are no abandoned coal mines and no active coal mines (ND GIS Hub, 2022).

There are mineral interests managed by the North Dakota Department of Trust Lands on behalf of the Board of University and School Lands located beneath the Project Area (Appendix C).

6.6.2 Impacts/Mitigation

Impacts on geological and soil resources will be limited to areas removed from their current use by the occupancy of Project infrastructure. Soil disturbance activities including grading for the roads, turbine pads, and associated facilities, and excavation activities for turbine foundations and underground utilities have the potential to contribute to soil erosion through the exposure of soils that were previously vegetated and stable.

Minnesota Power proposes the following mitigative measures:

- Utilize the Project Storm Water Pollution Prevention Plan (SWPPP) during construction to mitigate disturbed soils and prevent erosion.
- Maintain appropriate water and soil conservation practices during construction through the implementation of BMPs. These practices include silt fencing, temporary reseeding, permanent seeding, mulching, filter strips, erosion blankets, grassed waterways and sod stabilization, and separation of topsoil and subsoil.
- Implement a 25-mph speed limit on Project roads to minimize dust.
- Alleviate compaction of soils if it occurs during construction.
- Avoid impacts on mineral trusts.

6.7 SURFACE WATER AND GROUNDWATER RESOURCES

6.7.1 Description of Resources

Groundwater

The Study Area is located within the Missouri Slope Geological Region, an unglaciated region of North Dakota comprised of sandstone and shale layers. Natural wetlands and waterbodies are less abundant in this region than in the eastern part of the state and are more scattered, seasonal, and drought sensitive. Wetlands are typically found in small depressions or in riparian areas along stream channels (USFWS, 1996).

The Project Area contains both bedrock and surficial aquifers. Bedrock aquifers are typically over one hundred feet to more than one mile below the surface; as such, Project infrastructure will not impact bedrock aquifers. The Elm Creek surficial aquifer, as noted in correspondence from the NDDEQ, runs along the southwest edge of the Project Boundary, and is avoided by Project infrastructure. The Study Area does not overlap with source water protection areas or sensitive groundwater areas (NDDEQ, 2025).

Water wells that draw water from aquifers or groundwater are located within the Project Area, but do not directly intersect with Project infrastructure. The nearest well is more than 0.35 mile from infrastructure and wells are not likely to be impacted by construction or operation of the Project (NDDWR, 2025).

Surface Waters

Intermittent streams are located within the Project Area. The southwest portion of the Project Area drains to the Haymarsh Creek HUC10 watershed. The northeast portion of the Project Area drains to the Muddy Creek HUC10 watershed. A small, north-central portion of the Project Area drains to the Brush Creek-Knife River HUC10 watershed.

Based on correspondence with the NDDEQ, the central portion of the Project Area is located in the Wilson Creek HUC12 subwatershed where impairments for E. coli are found. The eastern portion of the Project Area is located in the Hailstone Creek HUC12 subwatershed where impairments for E. coli are found within the stream system that is labeled as the Danzig Dam watershed. The NDDEQ also identified the Elm Creek HUC12 subwatershed for fecal coliform impairments; however, this location does not overlap with the Project Area.

Merjent delineated wetlands and other waters in support of the Project (Appendix B6). Other waters can include, but are not limited to, streams, ponds, impoundments, prairie potholes, and lakes. Field surveys occurred in May, October, and November 2025 within the survey area. The survey area is any location where potential Project infrastructure could be sited within the Project Area. Wetlands and other waters delineations followed methodology from the U.S. Army Corps of Engineers (USACE) Wetlands Delineation Manual (Environmental Laboratory, 1987) and Regional Supplement to the USACE Wetland Delineation Manual: Great Plains Region (Version 2.0) (USACE, 2010). The USFWS National Wetlands Inventory and U.S Geological Survey (USGS) National Hydrography Dataset were used to identify potential surface waters within the Study Area (USGS, 2025, Figure 10). This data served as a precursor for field delineations. Wetlands and other waters delineated in support of the Project are shown on Figure 10.

Floodplains

North Dakota Department of Water Resources (NDDWR) Risk Assessment Map Service (NDRAM, 2025) and Federal Emergency Management Agency (FEMA) provide floodplain information for the Study Area. The NDRAM base level engineering (BLE) flood data indicates that 100-year (1 percent Annual Chance) and 500-year (0.2 percent Annual Chance) floodplains are located along stream corridors within the Project Area. FEMA did not identify floodplains within the Project Area. A 2025 comment letter received from the NDDWR confirmed that there are no FEMA National Flood Insurance Program (NFIP) floodplains identified or mapped where the proposed project is to take place. In addition, the letter also confirmed that flood risk has been identified through the North Dakota Risk Assessment Map service and BLE.

Review of the Flood Insurance Rate Maps shows that the Project Area is mapped as Flood Zone D. Flood Zone D indicates that flooding may be possible in some areas, but studies and mapping have not been conducted for the area. The NDRAM BLE indicates a 100-year floodplain is located within the Project Area.

6.7.2 Impacts/Mitigation

Groundwater

If shallow groundwater is disturbed by construction, it is anticipated that it would resume its natural course of flow upon construction completion and would not be significantly impacted. Based on the relatively small amount of permanent infrastructure at each structure location, the Project would not contribute to significant impacts on groundwater flow or recharge.

Surface Waters

The Project will not require appropriation of surface water or permanent dewatering. Temporary dewatering of groundwater (e.g., locally lowering groundwater levels in the vicinity of the excavation) may be required during construction of turbine foundations.

The Project has been designed to minimize impacts on wetlands and other waters to the extent practicable. Turbines have been sited to avoid temporary and permanent impacts on wetlands and waterbodies, all collector lines will be bored beneath wetlands, avoiding all wetland impacts, and the substation and O&M building have been sited to avoid wetlands.

Minnesota Power has adjusted the Project's proposed crane paths to avoid wetlands and waterbodies to the extent practicable. However, as shown in Table 6.7.2-1, 1.46 acres of wetlands may be temporarily impacted by crane paths. No permanent impacts to wetlands from crane paths are anticipated. Minnesota Power provides an explanation for why there are no reasonable alternatives to the temporary wetland impacts described below.

- The crane path associated with Turbines 07 and 52 will cross farmed wetlands, which will not be jurisdictional to the USACE. In addition, these wetlands are linear features and cannot be avoided without a significant reroute of the crane path.

- The crane path associated with Turbine 10 is necessary because the bridge along the existing road is not sufficiently sized to accommodate large construction equipment, including cranes.

- The crane path associated with Turbine 50 cannot avoid the waterbody without going all the way north to 33rd St. SW.

- The crane path associated with Turbine 36 is unavailable as the only possible way to access this turbine crosses two waterbodies.

- The crane path to Turbine 29 cannot shift out of the northern wetland because there is a transmission line to the east and a homestead to the west.

- The crane path associated with Turbine 15 is surrounded by wetlands to the north and to the south; therefore, impacts cannot be avoided.

- The crane path associated with Turbines 08 and 10 crosses a wetland that spans northwest to southeast and is unavailable.

- The crane path associated with Turbine 31 crosses a wetland that spans northwest to southeast and is unavailable.

- The crane path to Turbines 05 and 06 cannot use the bridge along the existing road because it is not sufficiently sized to accommodate large construction equipment, including cranes.

- The crane path to Turbines 44 and 36 crosses a wetland that is oriented in a north/south direction and cannot be avoided.

- The crane path to Turbine 47 has wetlands to the east and a stream to the east and cannot be avoided.

- The crane path to Turbines 65, 66, and 69 crosses a wetland that is oriented in a north/south direction and cannot be avoided.

Minnesota Power has designed the proposed access roads to avoid impacts on wetlands and waterbodies to the extent possible. However, as shown in Table 6.7.2-1, 0.76 acres of wetlands may be temporarily impacted and 0.27 acres may be permanently impacted by access roads. Minnesota Power provides an explanation for why there are no reasonable alternatives below.

- The access road to Turbine 13 cannot go to the north because the curve in the existing road is too large to accommodate construction equipment.

- The access road to Turbine 24 crosses a farmed wetland, which will not be jurisdictional to the USACE. In addition, this is the most direct path from the existing county road, which minimizes impacts and stays within the survey corridor.

- The access road to Turbines 48 and 50 is the only option to access the turbines due to changes in topography, a creek to the north, and a non-participating landowner to the south.

- The access road to Turbine 15 will require the installation of a box culvert, which will require some in-water work; however, it will be minimized to the extent possible and the existing flow within the waterbody will be maintained. This is the only option due to the presence of non-participating landowners or the access road would have to be located in the front yard of a participating landowner. In addition, the proposed crossing is located at the narrowest part of the wetland, thus minimizing impacts.

Minnesota Power will work with the applicable agencies, including the USACE, to determine and apply for applicable permits. Further, Minnesota Power will work with the USACE to further minimize impacts with the use of construction mats.

TABLE 6.7.2-1
Surface Waters Impact Summary (acres)

Project Facility	Wetland Permanent	Wetland Temporary	Waterbody Permanent	Waterbody Temporary
Access Road	0.27	0.76	-	-
Collector Line	-	-	-	-
Crane Path	-	1.46	-	0.13
O&M Footprint	-	-	-	-
Substation	-	-	-	-
Turbine	-	-	-	-
Grand Total	**0.27**	**2.22**	**-**	**0.13**

If dewatering of excavations is necessary during foundation construction and as long as the water is known to be uncontaminated, all water would be discharged according to conditions outlined in the SWPPP. If discharge water is suspected to be contaminated, an application for a temporary discharge permit (NDG-070000) will be submitted to the NDDEQ. Minnesota Power proposes the following measures:

- Minimize impacts on wetlands and other waters to the extent practicable.

- Employ boring where necessary to avoid permanent impacts on wetlands and other waters from collection line trenching.

- The Project will be built to allow stormwater runoff to flow unrestricted.

- Wetlands will be delineated and flagged prior to construction when in close proximity to Project features.

- Maintain appropriate water and soil conservation practices during construction through the implementation of BMPs outlined in the SWPPP. These practices include silt fencing, temporary reseeding, permanent seeding, mulching, filter strips, erosion blankets, grassed waterways, and sod stabilization.

- Coverage under the NDDEQ's National Pollutant Discharge Elimination System general construction permit will be obtained prior to the start of construction.

- Provide contractors with static constraint maps and ensure compliance through onsite environmental construction monitoring.

The central and eastern portions of Project Area overlap with waters listed as impaired for E. coli. Appropriate practices will take place to prevent the Project from contributing to the impairment.

Floodplains

Floodplains are located within the Project Area as mapped by the BLE. The Project may permanently impact up to 2.17 acres of 100-year floodplains and 0.14 acre of 500-year floodplains. In addition, the Project may temporarily impact up to 12.2 acres of 100-year floodplains and 6.65 acres of 500-year floodplains. Table 6.7.2-1 summarizes the impacts. As noted in the 2025 NDDWR comment letter, "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." Minnesota Power will work directly with the local floodplain administrators of the zoning authorities to determine and apply for required permits.

As shown in Table 6.7.2-2, 100-year floodplains may be temporarily and permanently impacted; however, impacts are anticipated to be negligible. Minnesota Power has sited the Project to avoid impacts to 100-year floodplains to the extent possible. Minnesota Power provides an explanation of the information presented in Table 6.7.2-2, and why there are no reasonable alternatives to the impacts identified below.

- Collector lines: Minnesota Power will bore all collector lines beneath 100-year floodplains, avoiding all impacts.

- O&M building: In addition, Minnesota Power has avoided all 100-year floodplain impacts, associated with the O&M building, the O&M footprint, and the met tower to the extent possible. The O&M building was sited based on participating landowners and to minimize line loss, to the extent possible, by avoiding lengthy collection lines which would result in additional impacts. The O&M building cannot be resized or reduced in size to further minimize impacts.

- MET tower: Minnesota Power has sited the met tower to minimize impacts to 100-year floodplains to the extent possible. Negligible permanent impacts of 0.03 acres from the MET tower are anticipated. The met tower was sited based on county setback requirements, landowner preference, and to be centrally located within the Project Area to gather information and reduce the need for an additional met tower, which would result in additional environmental impact.

- Turbines: Minnesota Power has sited turbines to avoid impacts to 100-year floodplains to the extent possible. Negligible permanent impacts of 1.31 acres from turbine locations are anticipated. Temporary construction footprints have been adjusted to avoid 100-year floodplains which resulted in an irregular construction footprint. Minnesota Power has also completed geotechnical studies for the turbine locations and these locations, while located in a 100-year floodplain, are suitable for construction and operation of a wind turbine. The 100-year floodplain associated with Turbine 61 is isolated and cannot be avoided since that turbine was sited based on landowner preference, to avoid known cultural resource sites, and it has been positioned relative to other turbines to avoid wake and maximize the energy output. The 100-year floodplain associated with Turbine 5 cannot be avoided as there is a road to the west, it complies with the required county setbacks, most of the impacts are temporary in nature, and the construction footprint has been adjusted to avoid as many floodplains as possible.

- Access roads and crane paths: Minnesota Power has designed the proposed access roads and crane paths to avoid impacts on 100-year floodplains to the extent possible. No permanent impacts from crane paths are anticipated. Negligible permanent impacts of 0.3 acres from access roads are anticipated. The 100-year floodplains within the Project Area are dispersed rather than concentrated, making complete avoidance impractical. In many instances, these floodplains occur as linear features that extend across potential construction corridors, or as clusters of smaller floodplains that cannot be bypassed. All access roads were sited according to landowner preferences, environmental survey results, and agency feedback to minimize impacts on wetlands, sensitive habitats, grasslands, and nesting birds.

TABLE 6.7.2-2
Floodplain Impact Summary (acres)

Project Facility	100-year Floodplain		500-year Floodplain	
	Permanent	Temporary	Permanent	Temporary
Access Road	0.30	1.19	0.06	0.64
Collector Line	-	-	-	2.45
Crane Path	-	8.52	-	3.22
Met Tower	0.03	0.22	-	-
O&M Building	0.38	-	-	-
O&M Footprint	-	0.22	-	-
Substation	0.15	0.07	-	-
Turbine	1.31	2.0	0.09	0.34
Grand Total	**2.17**	**12.2**	**0.14**	**6.65**

6.8 WILDLIFE RESOURCES

Minnesota Power conducted numerous wildlife studies to evaluate, avoid and minimize potential impacts on species of concern from Project development and operation. Wildlife surveys were conducted in coordination with USFWS and NDGFD. The voluntary USFWS 2012 Final Land-Based Wind Energy Guidelines (WEG) (USFWS, 2012), Stage 1 of the *Eagle Conservation Plan Guidance: Module 1 – Land-based Wind Energy, Version 2* (USFWS, 2013a), and the *Wind Energy Development in North Dakota Best Management Practices* (ND BMPs; NDGFD, 2021) served as the basis for the approach taken to document wildlife habitat and use within the Project Area. The following desktop assessments and field studies were conducted with respect to the WEG to document wildlife habitat and use.

- Avian use surveys were completed from September 2024 – August 2025 (Appendix B13). A second year of Avian use surveys are being completed from September 2025 – August 2026.

- Sharp-tailed grouse (*Tympanuchus phasianellus*) lek surveys were completed in April and May 2024 (Appendix B9) and March – May 2025 (Appendix B9).

- Eagle and raptor nest surveys were completed in September 2025 (Appendix B7).

- Eagle nest surveys were completed in April 2024 (Appendix B7). See Section 6.9 for a discussion on eagles.

- Desktop whooping crane (*Grus americana*) habitat review was completed in Feburary2025 (Appendix B10).

- Northern long-eared bat (*Myotis septentrionalis*) presence/absence surveys and bat activity surveys were completed in November 2025 (Appendix B11).

- Dakota skipper (*Hesperia dacotae*) habitat assessment was completed during August through October 2025. Dakota Skipper habitat will be avoided, if habitat cannot be avoided presence/absence surveys will be completed. See Section 6.9 for a discussion on Dakota skippers (Appendix B12).

- Desktop and parcel-level identification of unbroken grassland tracts completed in 2020 and were updated throughout field surveys until December 2024 (Appendix B5).

6.8.1 Description of Resources

USFWS Land-Based WEG served as a basis for the approach taken to document wildlife habitat and use within the Project Area. Minnesota Power coordinated with both the USFWS and NDGFD on the approach taken regarding studies and requested information regarding known species near the Project from both agencies.

Species that are typically found near the Project Area include numerous species of birds, often associated with the Missouri River; however, one area to the west of the Project area, Haymarsh Slough, has at least 77 recorded species. These records include waterfowl, raptors, songbirds, shorebirds, and upland birds (eBird, 2025). There are 17 species of reptiles and amphibians found in Morton County, such as western tiger salamander (*Ambystoma mavortium*), plains spadefoot (*Spea bombifrons*), and spiny softshell (*Apalone sipifera)* (HerpMapper, 2025). Game species such as white-tailed deer *(Odocoileus virginianus),* mule deer *(Odocoileus hemionus),* and pronghorn *(Antilocapra americana*) are commonly found. Other mammals such as black-tailed prairie dogs *(Cynomys ludovicianus),* badgers *(Taxidea taxus),* and coyotes *(Canis latrans)* are also common within the area.

As discussed further in Section 7.0 Minnesota Power coordinated with USFWS and NDGFD regarding the Project. Species-specific recommendations by these agencies are provided in Section 6.9.

Avian Species

WEST completed an avian use survey to characterize species composition and seasonal and spatial use of the Project Area by birds, with particular focus on eagles and sensitive species in

August 2025. A second year of surveys began in September 2025, and Minnesota Power will provide the results upon request, when complete. WEST is also preparing a Wildlife Conservation Plan (WCP) that can be provided upon request, when complete.

WEST completed a survey for sharp-tailed grouse ([STGR] *Tympanuchus phasianellus*) in accordance with survey protocol described in NDGFD *Management Plan and Conservation Strategies for Greater Sage-grouse in North Dakota* (Robinson, 2014) and recommendations described in *Wind Energy Development in North Dakota: Best Management Practices* (NDGFD, 2021).

The objectives of the STGR survey were to document the status of known leks, search for new lek locations, and estimate the maximum number of individuals present at each detected lek. Surveys were conducted in 2024 and 2025 (Piorkowski and Wilson, 2024: Wilson and Piorkowski, 2025).

In 2024, there were 13 active leks detected during ground-based surveys, including six previously known leks and seven newly discovered leks within the Project Area and a 2-mile buffer. Within the Project Area, six active leks were observed, with the majority (four) located along the eastern edge of the Project Area. The majority (11) of the active leks within the Study Area were located within grasslands. No activity was observed at historic Lek ID 5. The average number of STGR observed at active leks during the 2024 survey season was 6.8 individuals. No other observations STGR were recorded during surveys.

In 2025, a total of 22 active leks were detected during ground-based surveys, including 9 historical lek locations and 13 newly discovered leks. Four active leks were located within the Project Area, and 18 were outside of the Project Area in the surrounding Study Area. No activity was observed at five previously known leks.

The four active leks within the Project Area were documented in the southern half of the Project Area, with two located in National Land Cover Database (NLCD) grasslands. The majority (12) of the active leks outside of the Project Area but within the Study Area were located within NLCD grasslands. The average number of STGR observed at active leks during the 2025 survey season was approximately seven individuals.

Whooping Cranes

Minnesota Power completed a desktop assessment for whooping crane habitat for the Project. For this analysis, WEST used the Relative Probability of Occurrence Model (hereafter Niemuth Model) and the Decile Model, developed specifically for North and South Dakota (Niemuth et al., 2018), for assessing potentially suitable whooping crane stopover habitat within the Project Area and separately for 5-kilometer (km) and 20-km analysis areas (Piorkowski, M. and A. Burmester, 2025a).

The Project Area is located within the migration corridor that contains 50% of the whooping crane (WHCR) sightings. No WHCR have been recorded within the Project Area; however, they have been recorded in the vicinity based on USFWS telemetry data and observation data. The Project Area contains potentially suitable stopover habitat for WHCR, including cultivated cropland cover and herbaceous/grassland with interspersed creeks, ponds, and wetlands. An analysis of suitable WHCR habitat was conducted using two models specifically developed for North and South Dakota and recommended by NDGFD: relative probability of occurrence Niemuth Model and the resulting Decile Model. These models were developed through the USFWS's Habitat and Populations Evaluation Team.

Both the Niemuth Model and the Decile Model were used to summarize predicted WHCR use. Three independent areas were compared for analyses: Project Area, a surrounding 5-km buffer, and a surrounding 20-km buffer. Using the Niemuth Model, predicted WHCR habitat use within the Project Area ranged from 0.0025–0.0602 on a scale of 0–1.0. The 5-km buffer ranged from 0.0015-0.0809, and the 20-km buffer ranged from 0.005-0.1294. The upper range of predicted use for the Project Area was lower than both the 5-km and 20-km upper predicted ranges, indicating a relatively low predicted probability of habitat use by WHCR within the Project Area. Evaluating the Decile Model, results indicated that a higher proportion of higher use deciles were represented within the Project Area than the 5-km or 20-km buffers. However, from the Project Area, lower use deciles were found to the west of the Project Area and higher use deciles were identified east of the Project Area, especially east of the Missouri River.

Bat Species

Eleven bat species are found in North Dakota (Nelson et al., 2015). Northern long-eared bats (NLEB) have not been documented in the vicinity of the Project, based on Information for Planning and Conservation (IPaC); however, they may still be present on the landscape. WEST completed an NLEB habitat assessment to identify potentially suitable summer habitat for NLEB within the Project Area and a 1,000-foot buffer (O'Neil and Piorkowski, 2025). NLEBs prefer summer maternity habitat located in intact, interior forests with late successional characteristics (Carter and Feldhamer, 2005; Timpone et al., 2010); however, this species can also use relatively small forest patches connected by shelterbelts (Henderson and Broders, 2008). NLEBs generally use roosts with a higher percentage (usually 56 to 84 percent) of canopy cover and typically greater density of understory than other similar bat species (Carter and Feldhamer, 2005; Lacki and Schwierjohann, 2001; Timpone et al., 2010). NLEBs also tend to stay relatively close to forest features while foraging (Henderson and Broders, 2008), generally preferring to forage in upland, mature forests above or below the canopy, but also using forest clearings, riparian forests, forested ponds, and forested flyways (Amelon and Burhans, 2006; Foster and Kurta, 1999).

Based on a synthesis of ecological studies, the USFWS defines suitable NLEB roost trees as trees with a diameter at breast height of 3.0 inches (7.6 centimeters) or greater, with exfoliating bark, cracks, crevices, or cavities.

For the purposes of this assessment, NLEB potentially suitable summer habitat was defined as forest patches 5.0 acres; (2.0 hectares) or greater in size and any forested areas within 1,000 feet of these patches. Linear forest features, isolated trees, smaller forest stands (i.e., less than 5 acres in size), and loose assemblages of trees with variable amounts of canopy closure and shelterbelts located more than 1,000 feet from potentially suitable forested habitat were considered unsuitable habitat. The desktop assessment delineated two areas totaling 21.0 acres (8.5 hectares) of potentially suitable NLEB summer habitat (Appendix B8). Of this, 13.0 acres (5.3 hectares) occurred within the Project Area and 8.0 acres (3.2 hectares) occurred outside the Project Area (Figure 11). There is little suitable roosting or foraging habitat in the Project Area and no known hibernacula in North Dakota for the NLEB. Occurrence of the species in North Dakota is expected to be uncommon or rare (USFWS, 2013b). Due to the limited amount of forested habitat within the Project Area, the NLEB's likelihood of occurrence within the Project Area is low.

6.8.2 Impacts/Mitigation

Avian Species

Potential impacts from the Project on avian species include direct impacts, such as collisions with wind turbines, and indirect impacts, such as displacement or habitat loss and fragmentation. Project infrastructure located in identified suitable habitats have the potential to impact the local sharp-tailed grouse population through habitat loss and reduced connectivity between key habitats (e.g., breeding areas).

Raptor nests will be avoided to the extent practicable and disturbance minimized during nesting season. Vegetative removal will be conducted outside of this March through July period to the extent practicable to avoid impacts on previously undetected nests. Any tree removal needed from March through July will be preceded by a visual check of the trees for any raptor nests. No raptor nests with eggs or chicks will be removed at any time.

Whooping Cranes

Based on the desktop habitat assessment, it is expected that the habitat within the Project will have a maximum of 8 percent and 12 percent probability of occurrence of whooping cranes during migration. Therefore, impacts are possible but are expected to be limited and short term.

Bat Species

Potential impacts from the Project on bat species include direct impacts, such as collisions with wind turbines, and indirect impacts, such as displacement or habitat loss and fragmentation. Potential bat roosting habitat within the Project Area and Study Area is limited to patches of trees along riparian corridors and homesteads, scattered trees, and abandoned buildings (O'Neil and Piorkowski, 2025 [Figure 11]). Forested land cover within the Project Area includes 29 acres (0.1 percent) and 121 acres (0.2 percent) when including the Study Area. Based on the limited habitat available and the range of the bat species, potential impacts from the Project are not unlikely but may likely be minimal.

WEST conducted a presence/probable absence mist-net survey to determine if NLEB occurred in the Project area during the 2025 summer maternity season. Mist-net surveys were conducted following methods described in the USFWS *2024 Range-Wide Indiana Bat and Northern Long-eared Bat Survey Guidelines* and surveys were conducted from July 12 through 17, 2025 (WEST, 2025a) with 2 to 4 net-sets deployed per night, for a total of 12 net-nights. However, surveys on the night of July 14 were considered invalid due to persistent lightning. Therefore, a total of 10 valid net-nights were completed, meeting the minimum level of effort required for the Project.

No bats (including federally threatened or endangered species) were captured during the survey period. These results indicated that NLEB were likely absent from the Project area.

To minimize potential impacts on the NLEB and its roosting habitat during the active season, restrictions on tree removal will be in effect within a 3-mile conservation buffer around NLEB positive locations that intersect the Study Area from April 1 to October 31. Consequently, trees considered suitable roosting habitat, including both alive and standing dead trees with a diameter of over three inches at breast height and possessing exfoliating bark, cracks, crevices, and/or cavities, will be retained and not removed within the designated conservation buffer during that time. If trees considered suitable roosting habitat require removal for construction between April 1 to October 31, an emergence survey will be completed for each tree to ensure bats are not

roosting in trees during removal. This survey protocol will follow standard USFWS survey guidelines (USFWS, 2024d).

Mitigation

Minnesota Power conducted desktop assessments and field studies and consulted with the NDGFD and USFWS on appropriate avoidance, minimization, and offset measures so that the Project would have minimal wildlife impacts. Based on the above the following measures will be used, to the extent practicable, by Minnesota Power:

- Turbine locations have been sited in agricultural croplands and broken grassland, thus minimizing native habitat fragmentation and loss. Design utility lines according to Avian Power Line Interaction Committee (APLIC) guidelines to prevent bird collision, as practicable.

- Prepare a Bird and Bat WCP that will provide framework for identifying and implementing actions to conserve birds and bats during construction, operation, maintenance, and decommissioning of the Project.

- Site turbines at least 0.25 mile from active raptor nests and 0.2 mile from leks.

- Implement pad-mounted transformers to reduce risk of bird electrocution.

- Construct wind turbines using tubular, monopole towers as opposed to a lattice structure, to minimize perching opportunities for raptors and other birds.

- Implement a 25-mile per hour speed limit on Project roads to minimize wildlife collisions.

- Bury collection lines from the turbines to the collection substation to avoid collision risk in accordance with the APLIC suggested practices.

- Minimize construction activities to the extent practicable within 0.2 mile of known sharp-tailed grouse lek locations during the lekking and breeding season

- Avoid construction to the extent practicable with 0.25 mile of active raptor nest locations during the nesting season.

- If any raptor nest is discovered during construction, the nest will be monitored to determine if there is a change in the nest activity status to avoid impacts that might have the potential to precipitate nest abandonment.

- Conduct one year of Tier 4 post-construction monitoring to better understand bird and bat impacts that are attributable to operations.

- Once turbine construction is completed, implement a Wildlife Response and Reporting System (WRRS). The WRRS will include reporting protocols to report and document bird and bat mortality during routine maintenance activities. If a dead or injured bird or bat is found, its location will be marked and reported to the Plant Lead/Site Supervisor. The dead or injured bird or bat will not be removed from the location it was found.

- Minnesota Power will execute an agreement with the North Dakota Department of Agriculture (NDDA) to provide voluntary offsets for indirect waterfowl and grassland bird displacement.

- Educate construction contractors about threatened and endangered species and associated mitigative measures being implemented for each respective species.

- Provide contractors with static constraint maps and ensure compliance through onsite environmental construction monitoring.

6.9 RARE AND UNIQUE RESOURCES

6.9.1 Description of Resources

The USFWS administers the Endangered Species Act (ESA), which mandates protection of species federally listed as threatened and endangered and their designated critical habitat. An endangered species is a species that is in danger of extinction throughout all or a significant portion of its range. A threatened species is a species that is likely to become endangered in the foreseeable future. Critical habitat for these species can be designated if that habitat includes specific areas that are occupied by a species at the time of listing or unoccupied areas that are considered essential to the conservation of a species. Candidate species receive no statutory protection from the USFWS unless they are formally listed.

North Dakota does not have a state threatened and endangered species list; however, it recognizes those federally listed under the ESA, of which twelve federally listed species occur in North Dakota. Despite not having state listed species, the North Dakota Wildlife Action Plan does include Species of Conservation Priority, categorized into three levels according to declining status, available funding, and whether their breeding ranges occur in the state. Level 1 are those species (n=36) that have the highest level of conservation priority. Level 2 are those species (n=44) that have a moderate level of conservation priority, but do not have funding available to obtain more information on them. Level 3 are those species (n=35) that also have a moderate level of conservation priority, but North Dakota is believed to be a part of the non-breeding range for these species (NDGFD, 2015).

Seven federally listed species are believed or known to occur in North Dakota; however, the USFWS IPaC tool indicated that four legally protected species and three proposed species have been previously documented within the Project Area and are listed in Table 6.9.1-1 (USFWS, 2025b). As of July 27, 2025, according to IPaC, solar and wind projects are currently not eligible to utilize the IPaC website (per the July 15, 2025, Department of Interior memo titled, “Departmental Review Procedures for Decisions, Actions, Consultations, and other Undertakings Related to Wind and Solar Energy Facilities”); however, in light of better sources of information, Minnesota Power evaluated the list from IPaC.

TABLE 6.9.1-1
Threatened and Endangered Species

Common Name	Scientific Name	Status	Designated Critical Habitat
Whooping crane	*Grus americana*	Endangered	The Project is outside the designated critical habitat
Piping plover	*Charadrius melodus*	Threatened	The Project is outside the designated critical habitat

TABLE 6.9.1-1
Threatened and Endangered Species

Common Name	Scientific Name	Status	Designated Critical Habitat
Red knot	*Calidris canutus rufa*	Threatened	The Project is outside the designated critical habitat
Monarch butterfly	*Danaus plexippus*	Proposed Threatened	No designated critical habitat
Dakota skipper	*Hesperia dacotae*	Threatened	The Project is outside the designated critical habitat
Western regal fritillary	*Argynnis idalia occidentalis*	Proposed Endangered	The Project is outside the designated critical habitat
Suckley's cuckoo bumblebee	*Bombus suckleyi*	Proposed Endangered	The Project is outside the designated critical habitat

Source: USFWS Information for Planning and Conservation (USFWS, 2025b).

Bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) are protected throughout their range in the United States under the Bald and Golden Eagle Protection Act (BGEPA). Although it does not designate critical habitat, BGEPA protects individual eagles and nests from disturbance.

North Dakota Parks and Recreation reviewed the North Dakota Natural Heritage biological conservation database to determine if any current or historical plant or animal species of concern or other significant ecological communities are known to occur within an approximate 1-mile radius of the Project. The review indicated that one animal species of concern, the Sprague's pipit (*Anthus spragueii*), was documented within the Project Area in 1976.

Whooping Crane

The whooping crane, a federally endangered species and North Dakota species of greatest conservation need (SGCN), is a migrant in North Dakota from April to mid-May and September to early November (NDGFD, 2019). The whooping crane population that migrates through North Dakota, the Aransas-Wood Buffalo population, migrates from breeding grounds in northern Canada to wintering grounds on the Texas coast (Canadian Wildlife Services and USFWS, 2007). During migration, whooping cranes require stopover sites to rest and forage for one or more nights. While at these stopover sites, whooping cranes roost in wetlands and forage within a variety of habitats including croplands, grasslands, and wetlands (Austin and Richert, 2005; Niemuth et al., 2018). Specifically, whooping cranes typically utilize shallow wetlands and marshes, the edges and sandbars of shallow rivers, and agricultural fields near a water source during migration (Urbanek and Lewis, 2020). The Aransas-Wood Buffalo whooping cranes are the only self-sustaining wild population of whooping cranes, with the most recent survey (winter 2022–2023) estimating 536 individuals (McAbee and Conklin, 2025).

The Aransas-Wood Buffalo whooping crane migration occurs in both spring and fall, with 95 percent of whooping crane sightings occurring within a 183-mile wide corridor (Pearse et al., 2018). The Project is located within the 50 percent migration corridor. To date, no whooping crane observations have been reported within the Project Area. However, three whooping crane observations have been reported in the Study Area along with four telemetry locations, and numerous sightings and telemetry locations have been reported surrounding the Study Area (USFWS, 2024a).

The Project Area and Study Area are within the primary range of the whooping crane (NDGFD, 2019). As evidenced during the site reconnaissance visit, the Project and Study areas provide potentially suitable stopover habitat for whooping cranes, including cultivated cropland cover and herbaceous/grassland with interspersed creeks, ponds, and wetlands. Based on confirmed sightings and telemetry locations, whooping cranes occur in the Study Area and are likely to occur in the Project Area.

Piping Plover

The piping plover is a small migratory shorebird that breeds in three locations in North America: the shorelines of the Great Lakes, the shores of rivers and lakes in the Northern Great Plains, and along the Atlantic Coast (USFWS, 2016). In North Dakota, the species arrive on their breeding grounds from mid-March through mid-May. Nesting generally begins by the end of April, and they will typically be present until mid-August. The preferred breeding habitat includes wide shorelines that are sparsely vegetated and have gravel, sand, or pebbles. In North Dakota, these areas can be found along alkali lakes, sub-saline semi-permanent lakes, ponds, and rivers. These areas are also where the piping plover will forage for beetles, crustaceans, mollusks, and other small animals found along the shoreline (Dyke et al., 2015).

Federally designated critical habitat (DCH) for the piping plover occurs throughout the shores of the Missouri River and within the Alkali Lakes Core Area. The nearest DCH is located approximately 29 miles east of the Project along the Missouri River. The Project is within the range of the piping plover, but not within the primary range. Suitable habitat consisting of sandy, gravelly beaches, sandbars, wetlands, or lakes were not found during a desktop review. With the absence of preferred nesting habitat and the distance from the Project area to a site of preferred habitat, it is unlikely that piping plover would occur at the Project location.

Red Knot

The rufa red knot is a large sandpiper known for its long-distance migration between breeding grounds in the Canadian Arctic and several wintering areas in the southern hemisphere. In North Dakota, the species is a rare migrant, travelling annually between its northern breeding and nesting grounds and several wintering regions, including the southeast United States, the northeast Gulf of Mexico, northern Brazil, and Tierra del Fuego at the southern tip of South America. The species does not breed in North Dakota (Dyke et al., 2015).

Federally designated critical habitat has been proposed for the red knot; however, North Dakota is not a part of those proposed locations (USFWS, 2021). Although red knots are found primarily in intertidal habitats, especially near coastal inlets, estuaries, and bays, they have been observed in both alkaline and freshwater lakes of North Dakota during migration as well as within the Missouri River drainage system, sewage lagoons, and large permanent freshwater wetlands (Dyke et al., 2015). Observations have been scattered throughout the state without consistent stopover sites being observed. Suitable habitat consisting of coastal marine and estuarine areas, or freshwater lakes were not found during a desktop review. With the absence of preferred nesting and foraging habitat, it is unlikely that the rufa red knot would occur at the Project location.

Monarch Butterfly

The monarch butterfly is well-known for the species' long-distance migration throughout North America. There are two populations, located east and west of the Rocky Mountains. Primary drivers affecting the monarch include loss and degradation of habitat, exposure to insecticides, and climate change. The species can be found in a wide variety of habitats including prairies, grasslands, urban gardens, road ditches, and agricultural fields, if there are a healthy and

abundant milkweed supply and a diversity of nectar resources. Milkweed is the sole host plant for oviposition and for the larvae to feed on until the larvae pupates into a butterfly. Most adults only live approximately two to five weeks; however, some overwintering adults live six to nine months as they undergo reproductive diapause (USFWS, 2024b).

On December 12, 2024, USFWS published a proposed rule listing the monarch butterfly as federally threatened with a 4(d) rule under the ESA. A final rule is expected to be published to the federal register in 12 months, and the listing made effective 30 to 60 days later (i.e., January or February 2026). Proposed species are not protected under the ESA, and as such, a determination of effect is not applicable. However, federal agencies are required to confer with the USFWS on agency actions that may be likely to jeopardize the continued existence of a proposed species. This refers to an action that would reasonably be expected to directly or indirectly appreciably reduce the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of said species.

Suitable habitat is present in the Project's workspace and Project actions will have temporary impacts on native vegetation serving as a food source to monarch butterflies. If, during the course of the Project, monarch butterfly becomes federally listed under the ESA, Minnesota Power will coordinate or consult with the US Fish and Wildlife Service as appropriate.

Dakota Skipper

The Dakota skipper, a federally threatened and North Dakota SGCN whose range includes Morton, Oliver, and Mercer Counties, may be found year-round in two types of high-quality native prairie habitat in North Dakota (USFWS, 2024c). One habitat type ('Type A') is composed of moist areas with little topographic relief and is dominated by bluestem grass species, with three wildflower species indicative of the habitat (i.e., wood lily [*Lilium philadelphicum*], harebell [*Campanula rotundifolia*], and smooth camas [*Zygadenus elegans*]). The second habitat type ('Type B') is composed of mesic upland prairie, often found on ridges and hillsides where bluestem grasses and needlegrasses dominate the prairies; purple coneflower (*Echinacea angustifolia*) is typically found at these sites (USFWS, 2018, 2024c). Dakota skippers spend the majority of their life cycle as larvae, feeding on and sheltering at the base of native bunchgrasses. During their flight period, approximately 13 to 19 days and generally occurring between June 10 and July 25, Dakota skippers rely on a variety of native flowering forbs for nectar sources (USFWS, 2024c). Dakota skipper habitat is generally defined as reproductive (larval) or dispersal habitat. Reproductive habitat contains all elements needed to complete breeding, feeding/foraging, and/or sheltering behaviors, while dispersal habitat is generally defined as grassland areas that lack components (e.g., nectar sources, bunchgrasses) necessary for reproduction. Dakota skippers can disperse up to 0.6 mile per year using connected, suitable habitat patches (USFWS, 2002).

Since the time of listing, research and monitoring has shown that the Dakota skipper's range is more widespread than formerly thought. Occupancy surveys have found new populations in areas not previously surveyed and/or not previously considered, and the discovery of additional populations is expected in areas with suitable habitat characteristics (USFWS, 2019). The USFWS Dakota skipper species distribution model shows the relative probability of Dakota skipper occurrence in North Dakota based on known occupied sites identified through surveys (50 Code of Federal Regulations § 402.02 [1986]; Barnes et al., 2023). Although the Project is on the edge of the Dakota skipper primary range (USFWS, 2024c), patches of native prairie with a probability of occurrence greater than 50 percent occur in the western portion of the Project Area and the northwest portion of the Study Area.

WEST conducted a Dakota skipper habitat survey in 2025 (WEST, 2025b) and approximately 7,813 acres of native, unbroken grasslands were previously identified during the grassland habitat

assessment. Of these, 2,965 ac were identified as potential Dakota skipper habitat (Type B) that were surveyed during August and October 2025. An estimated 2,692 acres were surveyed via pedestrian surveys while 273 acres were surveyed from public roads due to access restrictions. There were 17 individual patches of suitable Dakota skipper habitat identified, resulting in 20.96 acres within the surveyed grasslands. No suitable Dakota skipper habitat was identified in grasslands visually surveyed from public roads. The Project is avoiding Dakota Skipper habitat.

Suckley's Cuckoo Bumble Bee

Suckley's cuckoo bumble bees' (Suckley's) range spans from the Yukon south to Arizona and as far as Newfoundland in a widely distributed range of elevations. Suckley's are obligatory social parasites and cannot successfully reproduce without the availability of a suitable host colony of other *Bombus* species. Host bumble bee nests are often found in abandoned underground holes in a variety of habitat types including meadows, fallow fields, croplands, urban areas, and forests. When female Suckley's emerge from hibernation, they take over the nest of a suitable host colony (most notably, western bumble bees and Nevada bumble bees) and the host workers provide for the Suckley's young. Once developed, all Suckley's adults are reproductive and leave the nest to mate. The males die after mating, but the females continue to feed on nectar and pollen prior to overwintering in areas separate from nesting habitat, likely using loose substrates such as leaf litter, duff, or rotting logs. A generalist, adult females, eggs, larvae, male drone, and new females all require a diversity of native floral resources for pollen and nectar. The species is found in a variety of habitats, including prairies, grasslands, farmsteads, woodlands, boreal forests, active and fallow agricultural fields, and urban areas (USFWS, 2025a).

On December 17, 2024, USFWS published a proposed rule listing the Suckley's cuckoo bumble bee as federally endangered under the ESA. A final rule is expected to be published to the federal register in 12 months, and the listing made effective 30 to 60 days later (i.e., January or February 2026). Proposed species are not protected under the ESA, and as such, a determination of effect is not applicable. However, federal agencies are required to confer with the USFWS on agency actions that may be likely to jeopardize the continued existence of a proposed species. This refers to an action that would reasonably be expected directly or indirectly to appreciably reduce the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of said species.

Suitable habitat is present in the Project's workspace and Project actions will have temporary impacts on native vegetation serving as a food source to Suckley's cuckoo bumble bee. If, during the course of the Project, Suckley's cuckoo bumble bee becomes federally listed under the ESA, Minnesota Power will coordinate or consult with the USFWS as appropriate.

Western Regal Fritillary

The regal fritillary is a strong-flying, non-migratory butterfly with a wingspan up to four inches. The forewing is orange with black markings, while the hindwing is mostly black with a row of white spots across the middle. The spots on the outer margin of the hindwing are white in females and orange in males. The caterpillars are velvety black, yellow, or deep orange, with orange or red stripes, and yellow-white branching spines with black tips (USFWS, 2023).

The species is found in native tallgrass prairie habitats and was once commonly found in 32 states extending north in New England, south to Oklahoma, and west to Colorado. Today, the eastern subspecies is restricted to the Fort Indiantown Gap National Guard Training Center in Pennsylvania. The western subspecies is found in portions of Arkansas, Colorado, Illinois, Indiana, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota, Wisconsin, and Wyoming. Regal fritillaries can range widely with females potentially traveling up

to 100 miles searching for three main habitat components: violet hostplants for larvae, nectar plants for adults, and native grasses to provide protection throughout the life cycle. Adults can be found foraging in both upland and wet prairie habitats; however, habitat can only be considered suitable for all life stages if violet species are present to provide shelter and forage for larvae. The density of violets seems to correlate positively to the number of butterflies within a given area. Habitat alteration has reduced the species' range and abundance (USFWS, 2023).

Adults mate once annually in mid to late summer; however, females undergo reproductive diapause until fall. Eggs hatch in about 3 to 4 weeks and then larvae quickly seek duff material where they overwinter. When active in spring, larvae begin feeding on young violets. Mortality is high during the larvae stage. After a 2 to 4-week pupae stage in late spring, adults emerge in early summer. Dispersal of adults may be driven by localized threats or poor habitat conditions and success is dependent upon connectivity of suitable habitat, availability of nectar sources, and habitat patch sizes among other factors.

On August 6, 2024, the USFWS published a proposed rule listing the western regal fritillary as federally threatened under the ESA. Proposed species are not protected under the ESA, and as such, a determination of effect is not applicable. However, federal agencies are required to confer with the USFWS on agency actions that may be likely to jeopardize the continued existence of a proposed species. This refers to an action that would reasonably be expected directly or indirectly to appreciably reduce the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of said species.

Suitable habitat is present in the Project's workspace and Project actions will have temporary impacts on native vegetation serving as habitat for the western regal fritillary. If, during the course of the Project, western regal fritillary becomes federally listed under the ESA, Minnesota Power will coordinate or consult with the USFWS as appropriate.

Bald Eagle

Bald eagles, a species protected under the BGEPA, are year-round residents of North Dakota with increased numbers from migratory individuals during spring and fall seasons. The bald eagle prefers large, mature trees near permanent bodies of water (e.g., lakes, rivers, reservoirs) with an abundant prey source for their nesting, roosting, and foraging activities (NDGFD, 2016a). Bald eagles typically feed on fish but eat a variety of foods, including carrion, depending on prey availability (All About Birds, 2024a). Bald eagles may be found away from major rivers if a sufficient food source is available. During the site reconnaissance, suitable nesting habitat was identified within the Project and Study Areas, including wooded areas, tree lines and shelterbelts around homesteads, scattered unnamed drainages, and wetlands. Additional foraging habitat within herbaceous cover types is present throughout the Project and Study areas.

The Project Area and Study Area are located in the bald eagles' secondary range (NDGFD, 2016a) and not along a major river system; however, year-round observations of this species have been recorded in the Study Area and adjacent landscape (eBird, 2024). During a raptor nest survey conducted in April 2024, two active bald eagle nests, including one historic nest, were observed outside of the Project Area but within the Study Area (Piorkowski and Burmester, 2024). Additionally, NDGFD provided the location of a historical bald eagle nest within the Study Area. No bald eagles were observed during the site reconnaissance visit.

WEST conducted eagle nest surveys in 2025 and observed two historical bald eagle nests and did not note any new eagle nests. Both nests were considered occupied; however, based on subsequent surveys, nest success was determined to be zero for both eagle nests (Piorkowski

and Burmester, 2025b). Based on the distribution of the species and presence of nesting and foraging habitats, bald eagles occur in the Study Area and are likely within the Project Area.

Golden Eagle

Golden eagles, a North Dakota SGCN protected under the BGEPA, are generally found in western North Dakota year-round (NDGFD, 2016b). Their primary range includes the rugged terrain of the Badlands; however, they can also be found in association with open grasslands, large bodies of water, and prairie dog colonies (NDGFD, 2016b). Golden eagles commonly forage in open habitats (Kochert and Steenhof, 2002) with herbaceous land cover types (Watson and Whalen, 2004), feeding mainly on small- and medium-sized mammals, including prairie dogs, and on birds and large mammals, including domestic livestock, taking their prey live or as carrion (All About Birds, 2024b). Golden eagles prefer establishing nests and breeding territories on cliffs and rocky outcrops, but may also nest in large trees, anthropogenic structures, and occasionally on the ground (Katzner et al., 2020). During the site reconnaissance, suitable golden eagle nesting habitat was not identified within the Project and Study Areas. However, suitable foraging areas, including herbaceous, hay/pasture, and shrub/scrub land cover types, were located throughout.

The Project Area and Study Area are located in the golden eagles' secondary range (NDGFD, 2016b); however, year-round golden eagle use within Morton, Mercer, and Oliver Counties occurs based on records (eBird, 2024). Based on the distribution of the species, presence of foraging habitats, and sightings, golden eagles occur in the Study Area and may occur in the Project Area.

6.9.2 Impacts/Mitigation

To minimize impacts on threatened and endangered species, Minnesota Power will implement mitigation measures in addition to the list below if requested by USFWS. No irreversible damage to rare or unique animal or plant species is anticipated. Individual species are discussed below. Minnesota Power will implement the following mitigation measures for the Project:

- If construction is to occur during the breeding season for raptors (February 1 through August 15), prior to construction activities, raptor breeding surveys will be conducted by a qualified biologist through areas of suitable nesting habitat to identify any active nest sites within 0.5 mile (1.0 mile for bald eagles) from the Project Area. If applicable, appropriate protection measures, including seasonal constraints and establishment of buffer areas, will be implemented at active nest sites until the young have fledged and have dispersed from the nest area. These measures will be implemented on a site-specific and species-specific basis, in coordination with applicable state and federal agencies.

Whooping Crane

The primary concerns related to the development of wind facilities in potential whooping crane habitat include loss of wetland habitat, direct mortality from turbines, and increased potential for mortalities from additional above-ground powerline development. Whooping cranes are unlikely to collide with wind turbines during migration because flight altitudes are well above turbine height at 1,000 to 5,000 feet (Stehn, 1998), but they may fly at turbine height when ascending and descending during takeoff and landing, or when migrating in poor weather. No sandhill cranes or whooping cranes were found as fatalities at five wind energy facilities searched daily for crane mortalities during migration in North Dakota and South Dakota for up to three years (Derby et al., 2012). Impacts on whooping cranes are not anticipated.

Piping Plover

There were no piping plovers observed during the avian use surveys conducted for the Longspur Wind Project (O'Neil and Piorkowski, 2025c). The Project is within the range of the piping plover, but not within the primary range. Suitable habitat consisting of sandy, gravelly beaches, sandbars, wetlands, or lakes were not found during a desktop review. With the absence of preferred nesting habitat and the distance from the Project area to a site of preferred habitat, it is unlikely that piping plover would occur at the Project location; therefore, impacts are not anticipated.

Red Knot

There were no red knots observed during the avian use surveys conducted for the Longspur Wind Project (O'Neil and Piorkowski 2025c). Suitable habitat consisting of coastal marine and estuarine areas, or freshwater lakes were not found during a desktop review. With the absence of preferred nesting and foraging habitat, it is unlikely that the rufa red knot would occur at the Project location; therefore, impacts are not anticipated.

Monarch Butterfly

Project infrastructure has been sited in agricultural croplands and broken grassland to minimize potential impacts on suitable monarch butterfly habitat. Although the monarch butterfly is not currently listed under the ESA, Minnesota Power recognizes its conservation importance and will take proactive steps to avoid and minimize disturbance; therefore, impacts are not anticipated.

Dakota Skipper

Project infrastructure has been sited in agricultural croplands and broken grassland to minimize potential impacts on suitable Dakota skipper habitat. No ground disturbing activities will occur within occupied Dakota skipper habitat. Occupied Dakota skipper habitat boundaries will be marked during construction to restrict entry by construction equipment; therefore, impacts are not anticipated.

Suckley's Cuckoo Bumble Bee

Project infrastructure has been sited in agricultural croplands and broken grassland to minimize potential impacts on suitable Suckley's cuckoo bumble bee habitat. Although the species is not currently listed under the Endangered Species Act, Minnesota Power recognizes its conservation importance and will take proactive steps to avoid and minimize disturbance; therefore, impacts are not anticipated.

Western Regal Fritillary

Project infrastructure has been sited in agricultural croplands and broken grassland to minimize potential impacts on suitable western regal fritillary habitat. Although the species is not currently listed under the ESA, Minnesota Power recognizes its conservation importance and will take proactive steps to avoid and minimize disturbance; therefore, impacts are not anticipated.

Bald and Golden Eagle

The Project is burying all collection lines thereby eliminating risk from impact with large raptors such as eagles. Two eagle nests were noted in the 2024 and 2025 eagle nest survey, historically occupied by bald eagles. Additionally, no eagle nests are located within 1.5 miles of a turbine. Therefore, the impacts of the Project on eagles are likely to be low.

7.0 PUBLIC AND AGENCY COORDINATION

Throughout the development of the Project, Minnesota Power has coordinated with landowner stakeholders through a combination of in-person meetings, mailers, and phone calls. Landowner meetings occurred throughout development with landowner meetings for infrastructure, providing an opportunity for open communication and feedback from landowners. Minnesota Power is committed to maintaining coordination with landowner stakeholders throughout the development and lifetime of the Project.

In June 2025, Minnesota Power and its representatives distributed Project notification letters to key local, state, and federal agencies, organizations, and groups and agencies per Section 69-06-01-05 of the N.D. Admin. Code. The Project notification letters included a description of the Project and a map of a study area. Table 7.0-1 summarizes the agency notification letter responses and correspondence. Appendix C includes agency notification letters, emails, and correspondence received as of December 2025. Table 7.0-1 and Appendix C are organized by the order in which the agency appears in Section 69-06-01-05 of the N.D. Admin. Code and are generally organized with the earliest correspondence date first.

Table 7.0-1
Summary of Agency Comments

Agency	Comment Date	Comment Summary	Section Addressed
North Dakota Aeronautics Commission (NDAC)	July 8, 2025	On July 8, 2025, Grant Erwin, an airport planner with the North Dakota Aeronautics Commission responded and indicated that they currently have no comments regarding the proposed project. The closest public airport to the project area is Glen Ullin Regional Airport (D57). The closest boundary of the study area is approximately 3.7 nautical miles from the airfield. At this distance, there are no dangers or obstructions to any protected surfaces at the airport. Other airports near to the project area are Beulah Municipal (95D), and Mercer County Regional (KHZE) airports. At distances of approximately 15.7 nautical miles and 19.4 nautical miles respectively, NDAC has no concerns regarding the airspace & protected surfaces for these airports. The NDAC recommends contacting the three airport authorities and the FAA. On July 26, 2025, Minnesota Power sent project introduction letters to the Glen Ullin Regional Airport, the Beulah Municipal Airport, and the Mercer County Regional Airport.	6.3
North Dakota Attorney General	N/A	No response	N/A
North Dakota Department of Agriculture	June 26, 2025	Minnesota Power met with the NDDA on October 31, 2025, to discuss compensatory mitigation for grasslands on the Project. Minnesota Power has provided the NDDA its proposed mitigation on December 4, 2025. On June 26, 2025, J.P. Bialke, a General Counsel/Senior Policy Advisor with the North Dakota Department of Agriculture, responded with information related to new laws for mitigating or offsetting potential project direct or indirect adverse environmental impacts from energy facility construction and operation. Mr. Bialke included the North Dakota Mitigation Program statutes (amended March 2025), and the North Dakota Environmental Impact Mitigation Program administrative rules (July 2024). The NDDA is required to 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 and offered future assistance if needed.	6,8

Table 7.0-1
Summary of Agency Comments

Agency	Comment Date	Comment Summary	Section Addressed
North Dakota Department of Health	N/A	No response	N/A
North Dakota Department of Human Services	N/A	No response	N/A
North Dakota Department of Labor and Human Rights	N/A	No response	N/A
North Dakota Department of Career and Technical Education	N/A	No response	N/A
North Dakota Department of Commerce	N/A	No response	N/A
Energy Infrastructure and Impact Office	N/A	No response	N/A
North Dakota Game and Fish Department (NDGFD)	Letter dated June 29, 2025	On December 4, 2024 Minnesota Power met with the North Dakota Game and Fish Department to review the Project. In attendance was Bruce Kreft Chief Conservation and Communications Division of the North Dakota Game and Fish Department and Elisha Mueller Conservation Biologist. NDGFD discussed habitat conservation priorities, stressing avoidance of grasslands within two miles of sharp-tailed grouse leks and requesting avian habitat offset analysis using site-specific data. They raised cumulative impact considerations, grassland conversion rates, and mitigation funding strategies with NDDA. NDGFD asked for turbine layout details and early access to study results for comment 30 days before the PSC hearing . On June 29, 2025, Bruce Kreft, Chief Conservation and Communications Division of the North Dakota Game and Fish Department, responded and emphasized the importance of native prairie and wetland habitat. Mr. Kreft also noted the need for lek surveys for the sharp-tailed grouse, acoustic surveys for bats, and use of the USFWS Habitat and Population Evaluation Team model for the whooping crane, and recommended surveys for raptor nests during breeding season. Mr. Kreft requested a Wildlife Conservation Strategy and any voluntary offsets 100 days prior to the hearing date.	6.8
North Dakota Industrial Commission	N/A	No response	N/A
Office of Governor Kelly Armstrong	N/A	No response	N/A
North Dakota Department of Transportation (NDDOT)	July 14, 2025	On July 14, 2025, Jon Ketterling, Director of the Office of Project Development for the North Dakota Department of Transportation, responded and indicated that the project, as proposed, would have no adverse impacts on North Dakota Department of Transportation highways.	6.2

Table 7.0-1
Summary of Agency Comments

Agency	Comment Date	Comment Summary	Section Addressed
State Historical Society of North Dakota	July 8, 2025	On July 8, 2025, William Peterson, Director of the State Historical Society of North Dakota, responded and recommended the following cultural resources surveys: a current Class I literature search for previously recorded cultural resources in the project area and a Class III intensive archaeology survey of all areas (unless recently surveyed) of direct impacts including crane paths, met towers, access roads, turbine locations, and staging areas. Mr. Peterson also recommended a Class II and Class III survey by a permitted architectural historian for standing buildings and structures over 45 years old in the visual APE and within a two-mile radius of individual turbine locations for eligibility to the National Register of Historic Places or the State Historic Sites Registry.	6.4
North Dakota Indian Affairs Commission	N/A	No response	N/A
Job Service North Dakota	N/A	No response	N/A
North Dakota Department of Trust Lands	N/A	No response	N/A
North Dakota Parks and Recreation Department (NDPRD)	July 10, 2025	On July 10, 2025, Kathy Duttenhefner, Natural Resources Division Chief for the North Dakota Parks and Recreation Department, responded and noted that the project does not appear to affect any properties NDPRD owns, leases, or manages; or any properties protected under Section 6(f) of the LWCF. Ms. Duttenhefner included a map and details related to one animal species of concern (*Anthus spragueii*, Sprague's Pipit) known to occur within an approximate one-mile radius of the project area.	6.9
Natural Resources Conservation Service	July 2, 2025	On July 2, 2025, Susan Samson-Liebig, Acting State Soil Scientist for the Bismark State Office of the Natural Resources Conservation Service, responded that due to the involvement of no federal funding with the project, the Farmland Protection Policy Act does not apply. Ms. Samson-Liebig recommended impacts on wetlands be avoided but also provided requirements for installation of permanent structures where wetlands occur in order that the impacts would be considered minimal.	6.7
North Dakota Department of Water Resources	Letter dated July 15 and emailed on July 25, 2025	Kyle Yrkoski, a planner with the North Dakota Department of Water Resources, responded and noted that while there are no FEMA National Flood Insurance Program floodplains in the project area, the North Dakota Risk Assessment MapService and Base Level Engineering data show a risk for flood.	6.7
United States Department of Defense	N/A	No response	N/A
United States Fish and Wildlife Service	N/A	On December 4, 2024 Minnesota Power met with the United States Fish and Wildlife Service to review the Project. In attendance was Hannah Edens Fish and Wildlife Biologist. USFWS participated in discussions on survey design and species considerations. They emphasized including species of greatest conservation need in the Site Characterization Study and adding regal fritillary to grassland and Dakota skipper assessments. Guidance was provided on northern long-eared bat habitat, noting smaller roosting trees may be suitable, and on bat acoustic survey design. USFWS requested study plans for presence/probable absence surveys and timely delivery of wildlife results and the Wildlife Conservation Strategy 100 days before the PSC hearing	6.9

Table 7.0-1
Summary of Agency Comments

Agency	Comment Date	Comment Summary	Section Addressed
United States Army Corps of Engineers (USACE)	N/A	No response	N/A
Federal Aviation Administration (FAA)	N/A	Minnesota Power filled project information for a 7460-1 form for Determination of No Hazard.	N/A
Grand Forks County	N/A	No response	N/A
Nelson County	N/A	No response	N/A
North Dakota Transmission Authority	N/A	No response	N/A
North Dakota Pipeline Authority	N/A	No response	N/A
North Dakota Department of Environmental Quality (NDDEQ)	July 21, 2025	On July 21, 2025, Karl Rockeman, Deputy Director of the North Dakota Department of Environmental Quality, responded and stated the Department owns no land in or adjacent to the project and the proposed activities are consistent with the State Implementation Plan for the Control of Air Pollution for North Dakota. Mr. Rockeman noted the project overlies the Elm Creek aquifer and there is a TMDL allocation for fecal coliform in the Elm Creek watershed. Impairments for *E. coli* are found in the Wilson Creek watershed and in Hailstone Creek in the Danzig Dam watershed. Mr. Rockeman attached NDDEQ construction and environmental disturbance requirements related to the project.	6.5
North Dakota Geological Survey	June 26, 2025	On June 26, 2025, Fred Anderson, Surface Geology Section Manager for the North Dakota Geological Survey, responded and noted there are several landslide areas mapped in the study area. Most are located in the southeastern portion of the study area, with several concentrated along Wilson Creek in northwestern Morton County. Mr. Anderson recommended avoiding landslide areas whenever possible for potential locations for structures or towers. A link to landslide maps and data sets was provided.	6.6
North Dakota Forest Service	N/A	No response	N/A
Bureau of Land Management (BLM)	N/A	No response	N/A
Military Aviation and Installation Assurance Siting Clearinghouse (Clearinghouse)	N/A	No response	N/A
91st Missile Maintenance Squadron	N/A	No response	N/A
Minot Air Force Base (AFB)	N/A	No response	N/A
Grand Forks AFB	N/A	No response	N/A

Table 7.0-1
Summary of Agency Comments

Agency	Comment Date	Comment Summary	Section Addressed
National Telecommunications and Information Administration (NTIA)	10/4/2024	On October 4, 2024, John McFall, Deputy Chief of Spectrum Services Division, responded to Frank O'Brien's (Comsearch), stating that the Project plans were provided to the federal agencies represented in the Interdepartmental Radio Advisory Committee. Mr. McFall noted the DOE had concerns with the wind Project Area being 67.7 kilometers west of KBIS Bismark, North Dakota NEXRAD and within the notification zone of that radar. The DOE added there will be low impact and only the lowest elevation angle can be contaminated and provided a contact for notification if the Project Area changes or the turbine heights increases by 10 meters or more. Mr. McFall also noted the Project has the potential to impact Western Area Power Administration (WAPA) operations and requested Comsearch coordination with WAPA.	6.2

8.0 POTENTIAL PERMITS/APPROVALS

Table 8.0-1 outlines the federal, state, and county permits or approvals that have been identified as potentially required for the construction and operation of the Project. Permits dependent on the final Project layout will be applied for after receiving ND PSC approval, but prior to construction.

TABLE 8.0-1
Potential Permits and Approvals Required for Construction and Operation

Agency	Permit or Approval	Status [a]	Need
Federal Approvals			
United States Army Corps of Engineers	Section 404 CWA Permit	3	Required if dredging or filling waters of the U.S.
	Section 10 Rivers and Harbors Act Permit	N/A	Required for work in or affecting Section 10 waters
U.S. Fish and Wildlife Service	Section 7, Endangered Species Act	3	Required if the Project has a federal nexus. Consultation is the responsibility of the lead federal agency.
U.S. Fish and Wildlife Service	Section 9, Endangered Species Act	3	Compliance with Section 9 of the ESA is mandatory. Without a federal nexus, no "unauthorized take" can occur without a Habitat Conservation Plan.
State Historical Society of North Dakota	Section 106, National Historic Preservation Act (NHPA) Compliance	3	Required for any projects that receive federal funding, permits, or approvals
Federal Aviation Administration	Form 7460-1, Notice of Proposed Construction	1	Notice and approval are required for structures over 200 feet above ground level, structures near airports, or siting within line of sight of radar of an air defense facility.
U.S. Environmental Protection Agency	Spill Prevention, Control, and Countermeasure Plan	N/A	Required for aboveground oil storage with 1,320 gallons
U.S. Fish and Wildlife Service (USFWS)	Special Use Permit	N/A	Not required as no USFWS easements are present.
State of North Dakota			
North Dakota Public Service Commission	Certificate of Site Compatibility	2	The North Dakota Energy Conversion and Transmission Facility Siting Act requires that an application for a Certificate demonstrate that the proposed energy conversion facility meets criteria set forth in N.D.C.C. Chapter 49-22 and North Dakota Administrative Code (N.D. Admin. Code) Article 69-0
State Historical Society of North Dakota (SHSND)	Concurrence with Effect Determinations	3	Reports for the Class III Cultural Resources Inventory have been submitted to SHSND for review.
North Dakota Department of Environmental Quality	National Pollutant Discharge Elimination System Permit: General Construction Storm Water	3	Required for disturbance of over one acre of land and a stormwater pollution prevention plan must be prepared.
North Dakota Department of Environmental Quality	401 Water Quality Certification	3	Required in conjunction with Section 404 permit for filling jurisdictional waters of the U.S.. Coverage is automatic under Nationwide permits
North Dakota Highway Patrol	Oversized/Overweight Permit	3	Required for hauling oversized/overweight loads on State Highways.
North Dakota Department of Transportation	Road Approach/Access Permit	3	Required for construction of access roads from State Highways.
	Utility Permit/Risk Management Documents	3	Required for utility crossings on State Highway right-of-way.

TABLE 8.0-1
Potential Permits and Approvals Required for Construction and Operation

Agency	Permit or Approval	Status [a]	Need
North Dakota Department of Water Resources	Drainage Permit	N/A	The Project will not drain a pond, slough, lake or sheetwater, or any series thereof, that has a watershed area (*i.e.*, drainage area) of 80 acres or more.
	Conditional or Temporary Permit for water appropriation	N/A	No water appropriation required.
	Water Permit	3	Required if drilling a well.
Morton County			
Morton County	Special Use Permit	1	Morton County Land Use Code Article 5, Section 5-180 states: A wind energy facility may be permitted in an Agricultural (A) District and an Estate (E) District with a special use permit, subject to additional standards in this section.
Morton County	Building Permit	3	Morton County Land Use Code, Article 9 Section 9-010 states: The erection, construction, enlargement, alteration, repair, moving, removal, demolition, conversion, occupancy, equipment, uses, height, area and maintenance of buildings or structures in Morton County shall meet with the provisions of the rules and regulations of the North Dakota State Building Code, which includes the International Building Code, and any future updates and amendments to that code, one copy of which is on file with the County Building Inspector and is hereby made part of this article by reference, and Morton County hereby adopts the North Dakota State Building Code.
Morton County	Stormwater Management Plan	3	Morton County Land Use Code Article 8, Section 8-030 states: Every applicant for a building permit, subdivision approval, special use permit, or a permit to allow land disturbing activities shall submit a stormwater management plan to the County Engineer, unless deemed to be exempt by the provisions of this section. No building permit, subdivision approval, special use permit, or permit to allow land disturbing activities shall be issued until approval of the stormwater management plan or a waiver of the approval requirement has been obtained

[a] Status Explanation: 1 = Completed and approved, 2 = Applied and/or decision pending, 3 = Will apply for prior to construction as applicable.

9.0 QUALIFICATIONS OF CONTRIBUTORS

The qualifications of each significant contributor involved in the facility site location study and this application are provided below in Table 9.0-1.

TABLE 9.0-1
Qualifications of Contributors

Name and Project Role	Education and Professional Experience
Daniel Flo Project Manager Merjent, Inc	Mr. Flo has over 20 years of experience with regulatory compliance, environmental review, and site and route permitting for a variety of energy development projects including renewable energy generation, electric transmission, oil and gas transmission, and refinery upgrades. Mr. Flo manages teams of specialists performing agency consultations, environmental field surveys, site and route permitting, environmental review, and construction compliance. Mr. Flo has a JD from Lewis & Clark Law School in Portland, Oregon and a BS in Geography from Minnesota State University, Mankato.
Mandy Bohnenblust Deputy Project Manager Merjent, Inc	Ms. Bohnenblust has over 15 years of experience providing environmental consulting services to energy companies, focusing on project management, local, state, and federal permitting, construction compliance, surveys and consultations for biological resources and protected species. Ms. Bohnenblust routinely works on power-related projects, including transmission lines, throughout the Midwest. She is trained in Section 7 consultation and consults with state and federal agencies to comply with endangered species laws. Ms. Bohnenblust has a Master of Science in Environmental Pollution from Penn State and Bachelor of Science in biology from Truman State University.
Damien Reinhardt Cultural Resources Merjent, Inc.	Mr. Reinhart is an Environmental Consultant with 18 years of experience in consulting and working for federal agencies, focusing on cultural and natural resource management. His expertise includes all facets of cultural resource management, natural resource project management with experience in all levels of NEPA analysis, paleontological services; and project permitting with state and federal agencies. Mr. Reinhart has worked on oil and gas, wind, transmission, fiber optics, and mining projects in North Dakota, South Dakota, Montana, Minnesota, Wisconsin, Iowa, and Nebraska. Mr. Reinhart has nearly a decade of experience working for federal agencies, where he excelled at consultation with Native American tribes, stakeholders, other state and federal agencies, municipalities, and the public regarding compliance with cultural resources, natural resources, land management and recreation laws and standards. He holds a Master of Arts degree in Anthropology from the University of Minnesota, Twin Cities, a Bachelor of Arts in Anthropology from North Dakota State University, an Associate of Arts degree in History from Bismarck State College.
Mitchell Bettenhausen Project Manager Minnesota Power	Mr.Bettenhausen has 11 years of experience in the energy sector building a strong foundation in renewable energy, specializing in wind energy operations and project management. His expertise includes managing operating wind facilities, implementing safety and regulatory compliance, and leading large-scale renewable energy projects from development through execution. He has successfully overseen the operations and maintenance of multiple wind farms in North Dakota, ensuring optimal performance, regulatory compliance, and alignment with organizational goals. His work involves managing the lifecycle of wind energy projects, including site development, permitting, construction, and ongoing operations, while collaborating with cross-functional teams to optimize energy production and improve operational efficiency. He holds an Associate in Applied Science in Energy Services and Renewable Technology from Bismarck State College, Bachelor of Science in Energy Management from Bismarck State College, and a Master's in Business with a specialization in Organizational Leadership from University of Mary.
Alexander Luman Environmental Compliance Specialist Minnesota Power	Mr. Luman is an Environmental Compliance Specialist with two years of experience supporting permitting and environmental review for renewable energy and electric transmission projects. His work includes regulatory coordination and documentation preparation to support federal, state, and local permitting processes. Mr. Luman has contributed to habitat assessments, endangered species consultations, and mitigation planning, including work on wind energy projects in North Dakota and Iowa, additionally transmission line projects in Minnesota. He holds a Bachelor of Science in Environmental Science from Northern Michigan University.
Martin Piorkowski Senior Biologist, Project Manager Western EcoSystems Technology	Mr. Piorkowski is a Senior Biologist and Project Manager in the Western EcoSystems Technology (WEST) office in Bismarck, North Dakota. Martin provides oversight and support for renewable energy projects in the Upper Great Plains. Martin's focus is on wildlife and renewable energy interactions and has extensive experience in designing and implementing landscape-scale surveys and monitoring projects. He has received a BS in Biology from The Pennsylvania State University and a master's in Zoology from Oklahoma State University.

TABLE 9.0-1
Qualifications of Contributors

Name and Project Role	Education and Professional Experience
Aaron Anderson PE, Senior Managing Director Burns & McDonnell	Mr. Anderson is the Senior Managing Director of the Energy Consulting team at 1898 & Co., part of Burns & McDonnell. He leads a team of consulting engineers in the power generation industry, including wind, solar, storage, thermal, asset management, and utility finance. He has nearly two decades of experience consulting in the power industry and has directly managed thousands of megawatts of wind energy development throughout the world.
Brandon Storm PhD, Wind Offering Director Burns & McDonnell	Dr. Storm has over 18 years of renewable energy experience, now leading 1898 & Co.'s wind consulting services. Dr. Storm has an extensive background in wind energy development and construction across multiple disciplines, with nearly 8 years working for a wind developer and owner/operator independent power producer. Dr. Storm has sited and analyzed energy production used for investment decisions for numerous wind farms now operating across the country. Dr. Storm's experience also includes testifying in front of several regulatory agencies for sound and shadow flicker impacts. Dr. Storm now leads a team that assists developers and utilities to site, design and construct wind projects with efficiencies and excellence.
Gabe Weger Section Manager Burns & McDonnell	Mr. Weger is the Section Manager for the Acoustics and Noise Control practice at Burns & McDonnell. He is an elected member of the Institute of Noise Control Engineering (INCE) and specializes in providing acoustic compliance solutions for industrial and utility clients. As the Section Manager for Acoustics with Burns & McDonnell, Gabriel leads a team of acoustic consultants who focus on industrial and utility environmental noise control projects. Gabriel has worked with various state and regulatory agencies assisting clients with sensitive noise control issues. He provides services including the design of unique compliance solutions with targeted mitigation strategies for specific sound sources. Gabriel often provides expert testimony for acoustic design projects that require testimony for regulatory agencies.
Kelsey Nagel Project Manager Burns & McDonnell	Ms. Nagel has over 5 years of experience in the renewable energy industry and currently works at 1898 & Co., part of Burns & McDonnell. She has experience in wind and solar development and evaluations, including preliminary design, design review, request for proposal services, bid evaluations, support on energy legislation, component inspections, technical and economic due diligence reviews, commercial contract support, siting studies, shadow flicker studies, specification packages, transaction advisory, energy production estimates, and cost estimates. She has a Bachelor of Science in mechanical engineering from the University of Arkansas.

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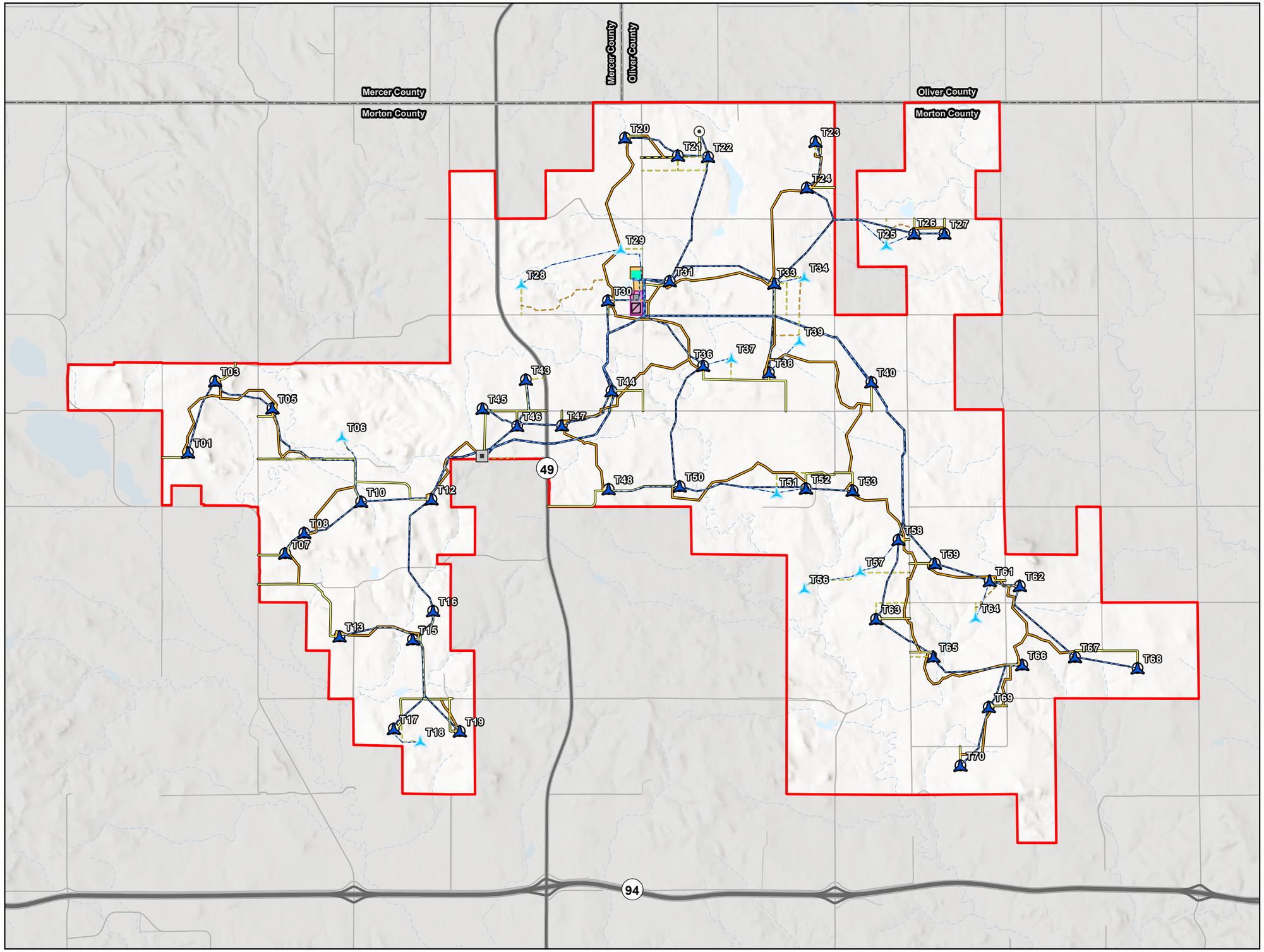
11.0 ACRONYMS AND ABBREVIATIONS

AC	alternate current
ADLS	Aircraft Detection Lighting System
AFB	Air Force Base
APE	area of potential effect
APLIC	Avian Power Line Interaction Committee
BGEPA	Bald and Golden Eagle Protection Act
BLE	base level engineering
BMPs	Best Management Practices
Certificate	Certificate of Site Compatibility
CO_2	carbon dioxide
Corridor Certificate	Certificate of Corridor Compatibility
CRP	Conservation Reserve Program
dBA	decibel, A-weighted
DCH	designated critical habitat
EMF	electromagnetic fields
EPC	engineering, procurement, and construction
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FSA	Farm Service Agency
GIA	Generator Interconnection Agreement
ICBM	intercontinental ballistic missile
IPaC	Information for Planning and Consultation
kV	kilovolt
LPS	lightning protection system
Merjent	Merjent, Inc.
MET	meteorological tower
MISO	Midcontinent Independent System Operator
mph	miles per hour
MW	megawatt
NASS	National Agricultural Statistics Service
N.D. Admin. Code	North Dakota Administrative Code
N.D.C.C.	North Dakota Century Code
ND GIS Hub	North Dakota GIS Hub Data Portal
ND PSC	North Dakota Public Service Commission
NDAC	North Dakota Aeronautics Commission
NDDA	North Dakota Department of Agriculture
NDDEQ	North Dakota Department of Environmental Quality
NDDMR	North Dakota Department of Mineral Resources
NDDOT	North Dakota Department of Transportation
NDDWR	North Dakota Department of Water Resources
NDGFD	North Dakota Game and Fish Department
NDPRD	North Dakota Parks and Recreation Department
NFIP	National Flood Insurance Program
NIEHS	National Institute of Environmental Health Sciences
NLCD	National Land Cover Database
NLEB	northern long-eared bat
NRHP	National Register of Historic Places
NTIA	National Telecommunications and Information Administration
O&M	operations and maintenance

Phase I ESA	Phase I Environmental Site Assessment
PLOTS	Private Land Open to Sportsmen
Project	Longspur Wind Project
Relative Probability of Occurrence Model	Niemuth Model
Route Permit	Transmission Facility Route Permit
Transmission Line	Minnesota Power's proposed 2.5-mile-long, 230-kilovolt (kV)
SCADA	Supervisory Control and Data Acquisitions
SGCN	species of greatest conservation need
SHSND	State Historical Society of North Dakota
STGR	sharp-tailed grouse
Suckley's	Suckley's cuckoo bumble bee
SUP	Special Use Permit
SWPPP	Storm Water Pollution Prevention Plan
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEIA	U.S. Energy Information Administration
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WAPA	Western Area Power Administration
WCP	Wildlife Conservation Plan
WEG	Wind Energy Guidelines
WEST	Western EcoSystems Technology, Inc.
WRRS	Wildlife Response and Reporting System

Figures





0 0.5 1 Miles

1:60,000

N
W E
S

- Project Area
- Construction Easement
- Substation Yard
- Substation Facility
- O&M Yard
- O&M Building
- Construction Laydown Yard
- Primary Turbine
- Alternate Turbine
- ADLS Radar Tower
- Met Tower
- Primary Access Road
- Alternate Access Road
- Primary Crane Path
- Alternate Crane Path
- Collection Line

Figure 1: Project Area and Facilities Layout/Site Plan (Street)

Longspur Wind Energy Center

Morton County, North Dakota

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For Environmental Review Purposes Only

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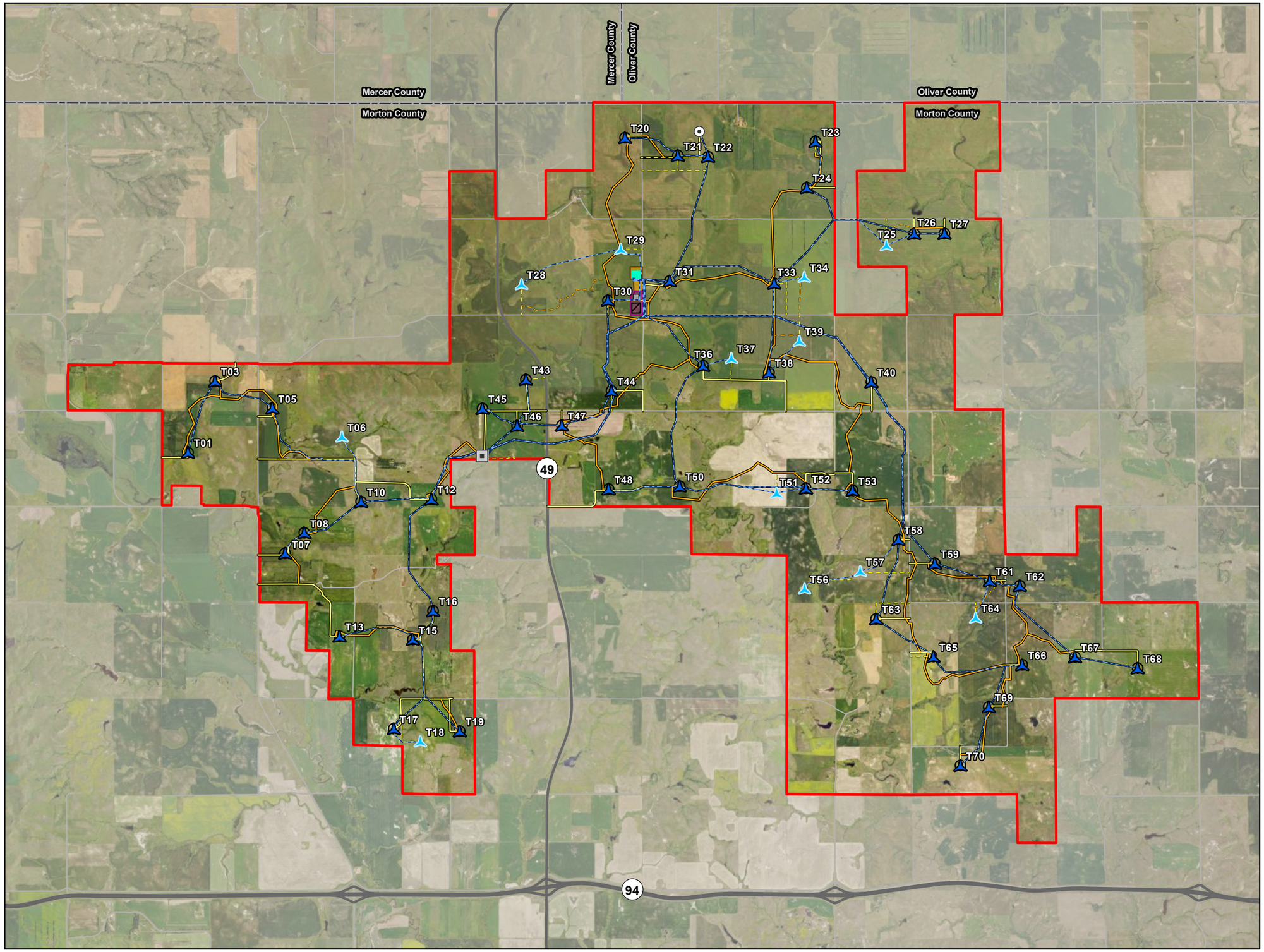



0 0.5 1 Miles

1:60,000

N W E S

- Project Area
- Construction Easement
- Substation Yard
- Substation Facility
- O&M Yard
- O&M Building
- Construction Laydown Yard
- Primary Turbine
- Alternate Turbine
- ADLS Radar Tower
- Met Tower
- Primary Access Road
- Alternate Access Road
- Primary Crane Path
- Alternate Crane Path
- Collection Line

Figure 2:
Project Area and Facilities Layout/Site Plan (Aerial)

Longspur Wind Energy Center

Morton County, North Dakota

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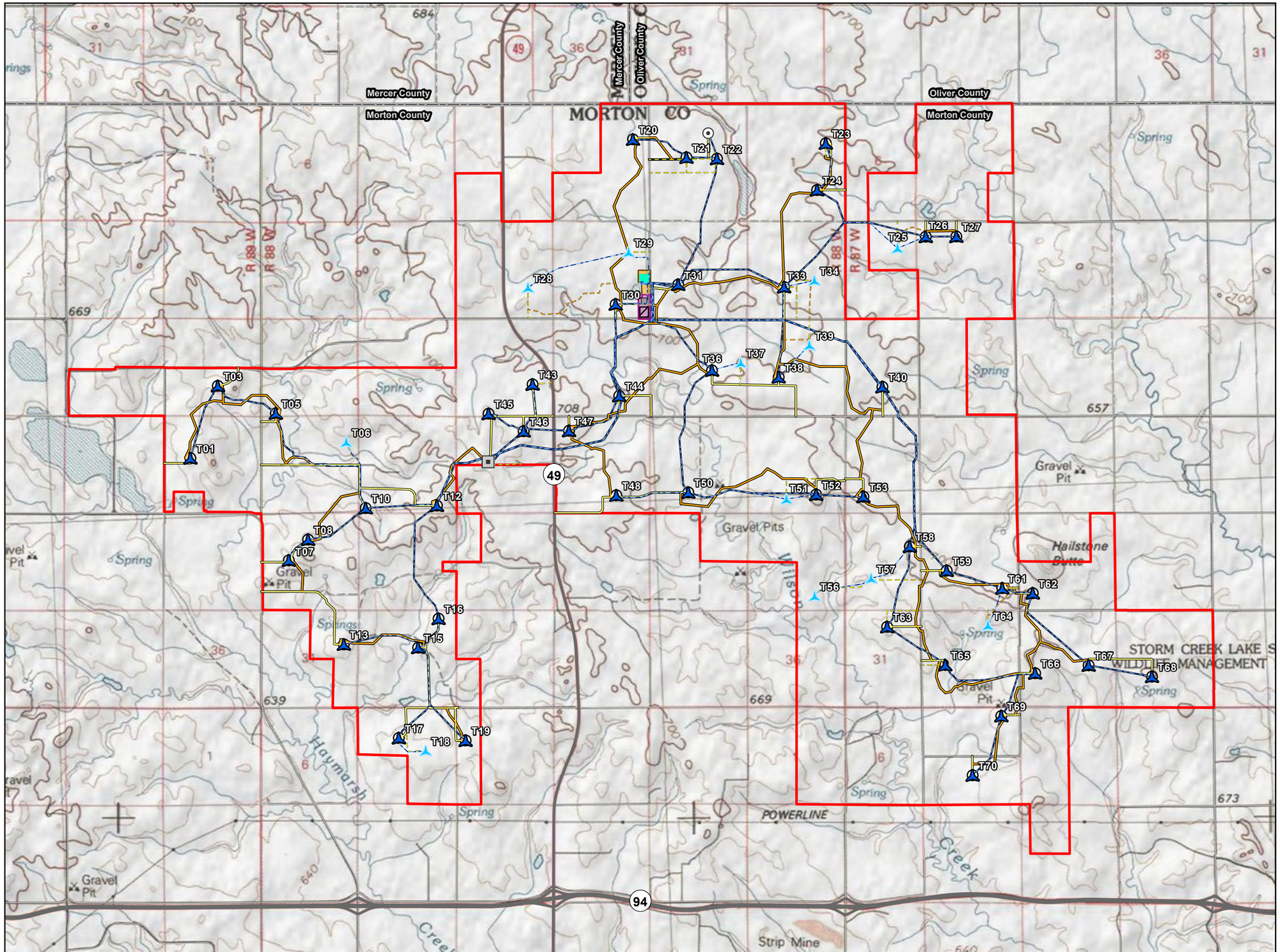



0 0.5 1 Miles

1:60,000

N S E W

- Project Area
- Construction Easement
- Substation Yard
- Substation Facility
- O&M Yard
- O&M Building
- Construction Laydown Yard
- Primary Turbine
- Alternate Turbine
- ADLS Radar Tower
- Met Tower
- Primary Access Road
- Alternate Access Road
- Primary Crane Path
- Alternate Crane Path
- Collection Line

Figure 3: Project Area and Facilities Layout/Site Plan (Topographic)

Longspur Wind Energy Center

Morton County, North Dakota

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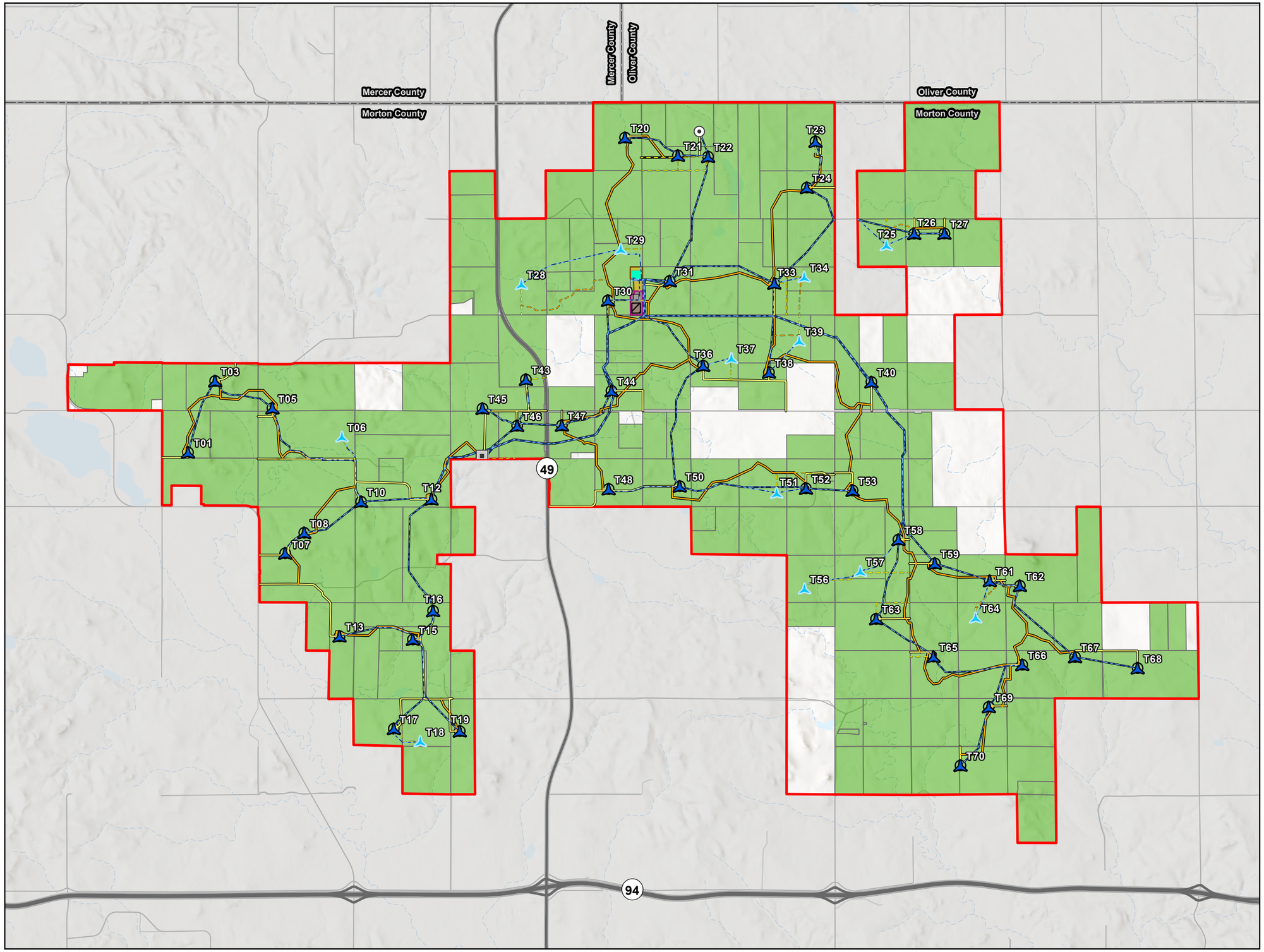



0 0.5 1 Miles

1:60,000

N W E S

- Project Area
- Construction Easement
- Substation Yard
- Substation Facility
- O&M Yard
- O&M Building
- Construction Laydown Yard
- Primary Turbine
- Alternate Turbine
- ADLS Radar Tower
- Met Tower
- Primary Access Road
- Alternate Access Road
- Primary Crane Path
- Alternate Crane Path
- Collection Line
- Participating Landowner

Figure 4: Participating Landowners

Longspur Wind Energy Center

Morton County, North Dakota

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For Environmental Review Purposes Only

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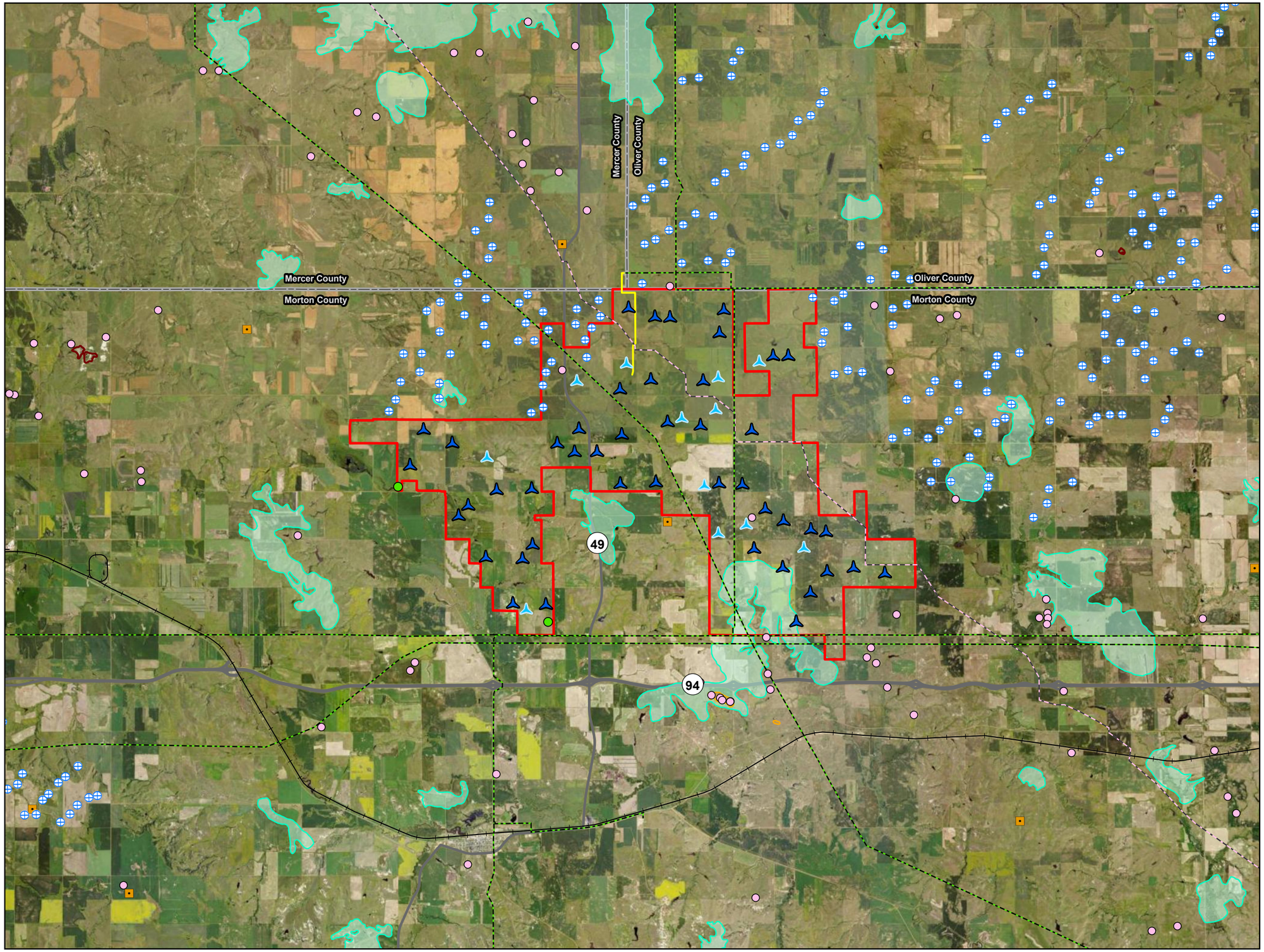

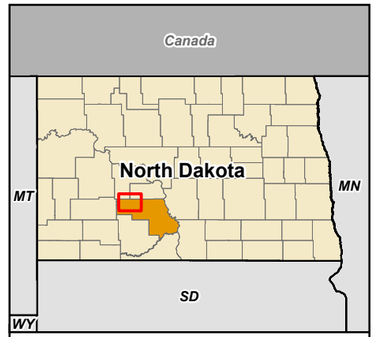

0 1 2 Miles

1:120,000

N
W E
S

Existing Development

- Existing Wind Turbine
- Exploration Well
- Potential Coal Mine
- Abandoned Mine
- DAPL Pipeline
- Transmission Line
- Railroad
- Lignite Reserve
- Previously Mined Land (NDGS 2007)
- Previously Mined Land (USDA 2023)

Proposed Development

- Primary Turbine
- Alternate Turbine
- Longspur Wind 230kV Transmission Line
- Longspur Wind Energy Center Project Area

Figure 5: Present and Future Natural Resources Development

Longspur Wind Energy Center

Morton County, North Dakota

Source: Z:\Clients\M_P\MN_PowerLongspur_Wind\ArcGIS\Permitting\PSC\Longspur_Wind_PSC_Application.aprx

Date: (12/12/2025)

For Environmental Review Purposes Only

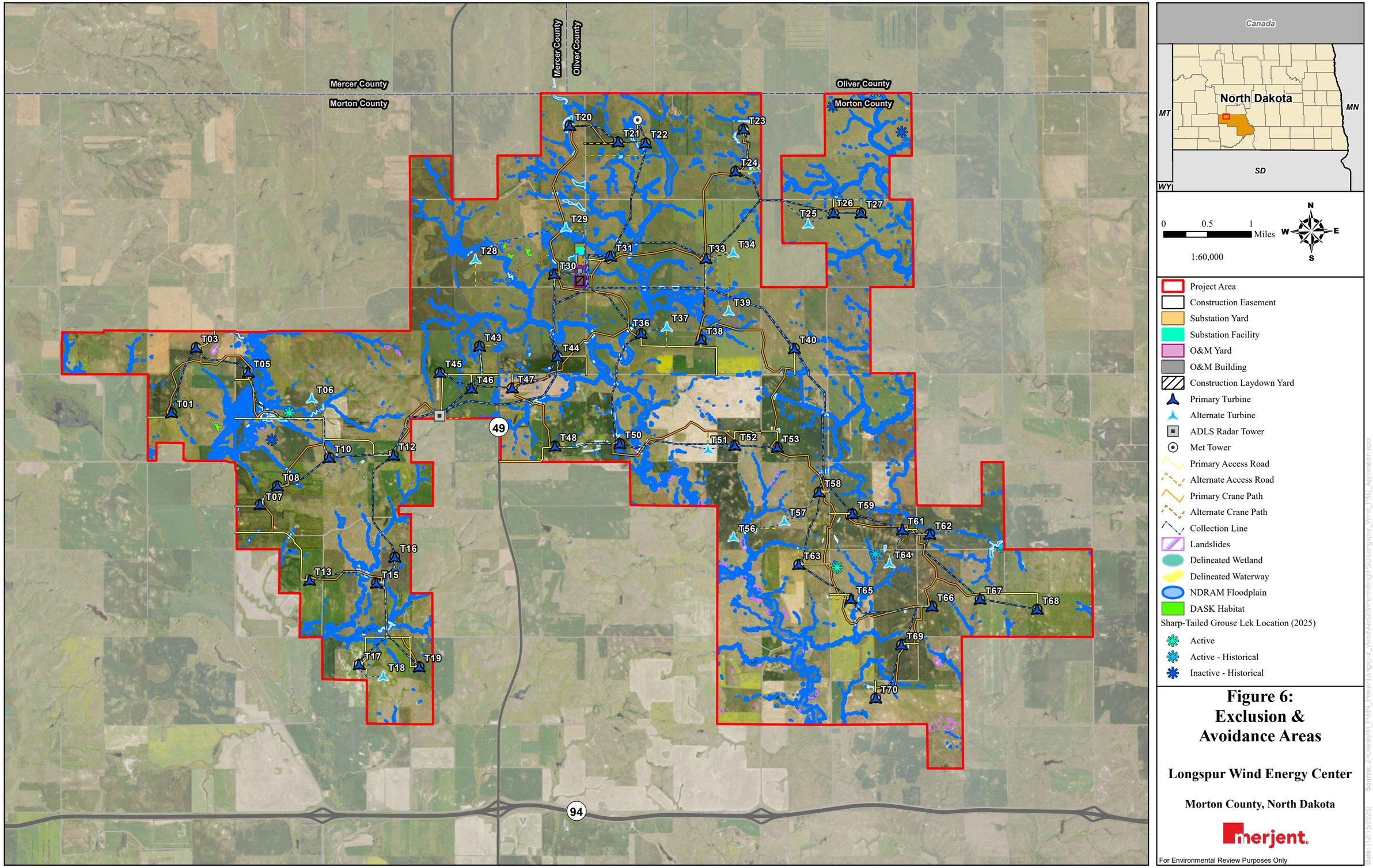

Figure 6: Exclusion & Avoidance Areas

Longspur Wind Energy Center

Morton County, North Dakota

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Source: Z:\Clients\M_P\MN_Power\Longspur_Wind\ArcGIS\Permitting\PSC\Longspur_Wind_PSC_Application.aprx

Date: (12/15/2025)

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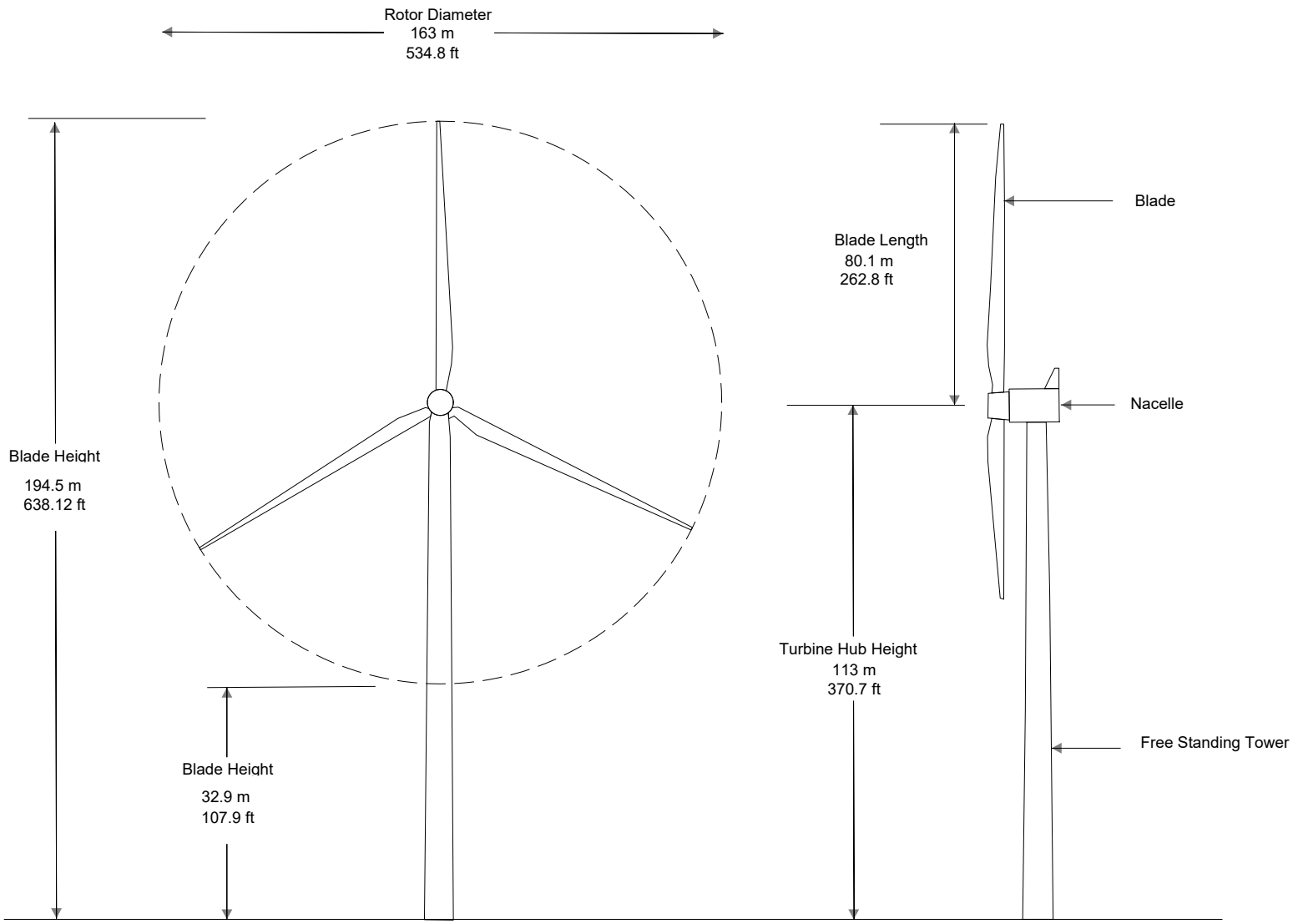

NOT TO SCALE

minnesota power
AN ALLETE COMPANY

Figure 7
Typical Turbine Detail
Minnesota Power

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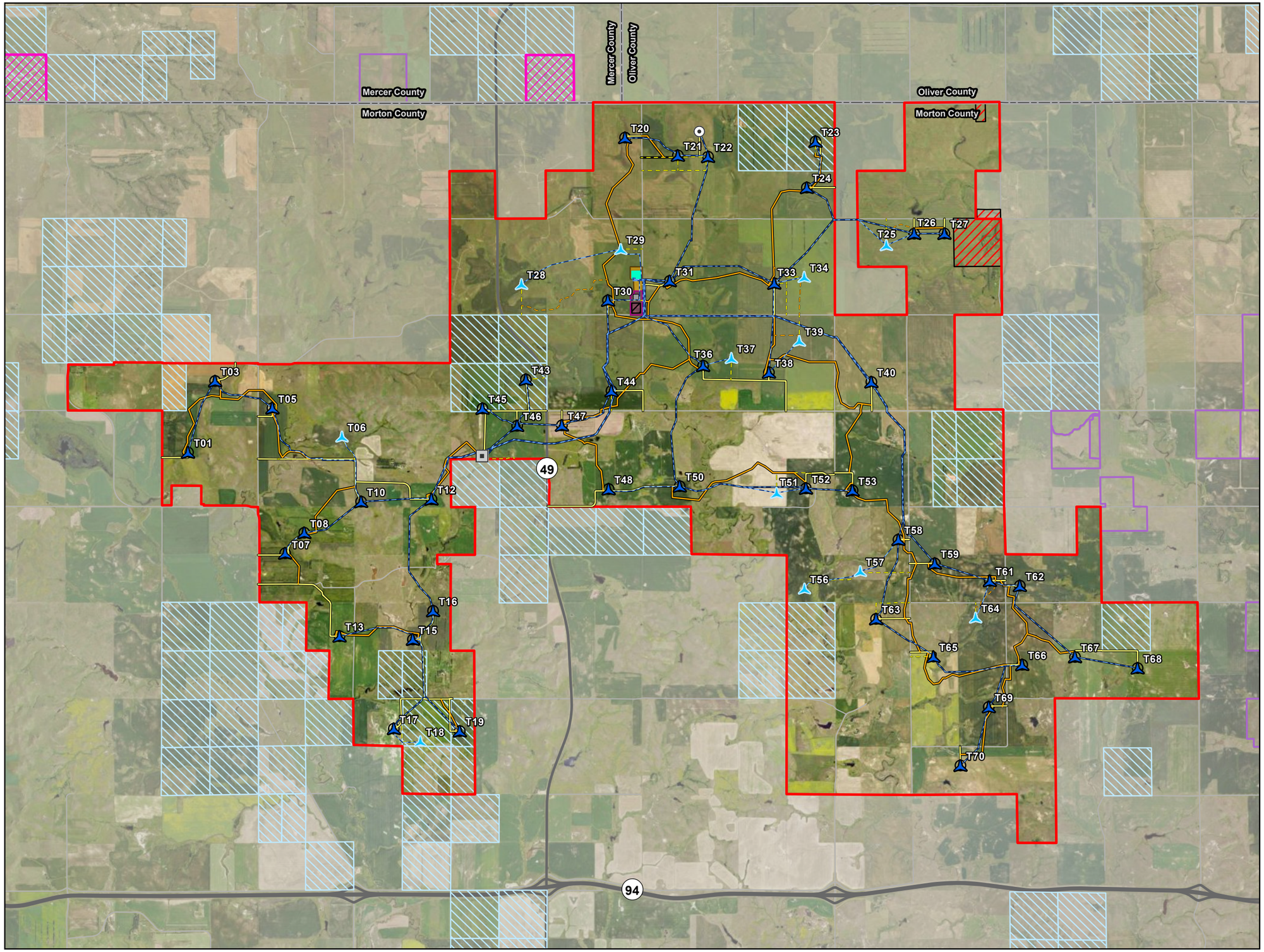

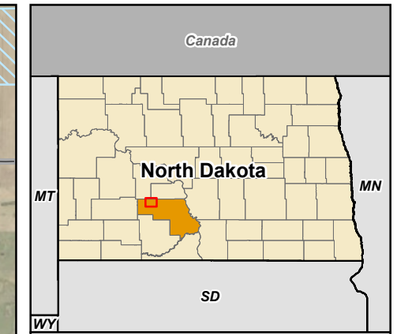

0 0.5 1 Miles

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N S E W

- Project Area
- Construction Easement
- Substation Yard
- Substation Facility
- O&M Yard
- O&M Building
- Construction Laydown Yard
- Primary Turbine
- Alternate Turbine
- ADLS Radar Tower
- Met Tower
- Primary Access Road
- Alternate Access Road
- Primary Crane Path
- Alternate Crane Path
- Collection Line
- USFWS Conservation Easement (Closed Access)
- Private Land Open to Sportsmen Agreement
- Surface Trust Land
- Mineral Trust Land

Figure 8: Public Lands, Easements, & Agreements

Longspur Wind Energy Center

Morton County, North Dakota

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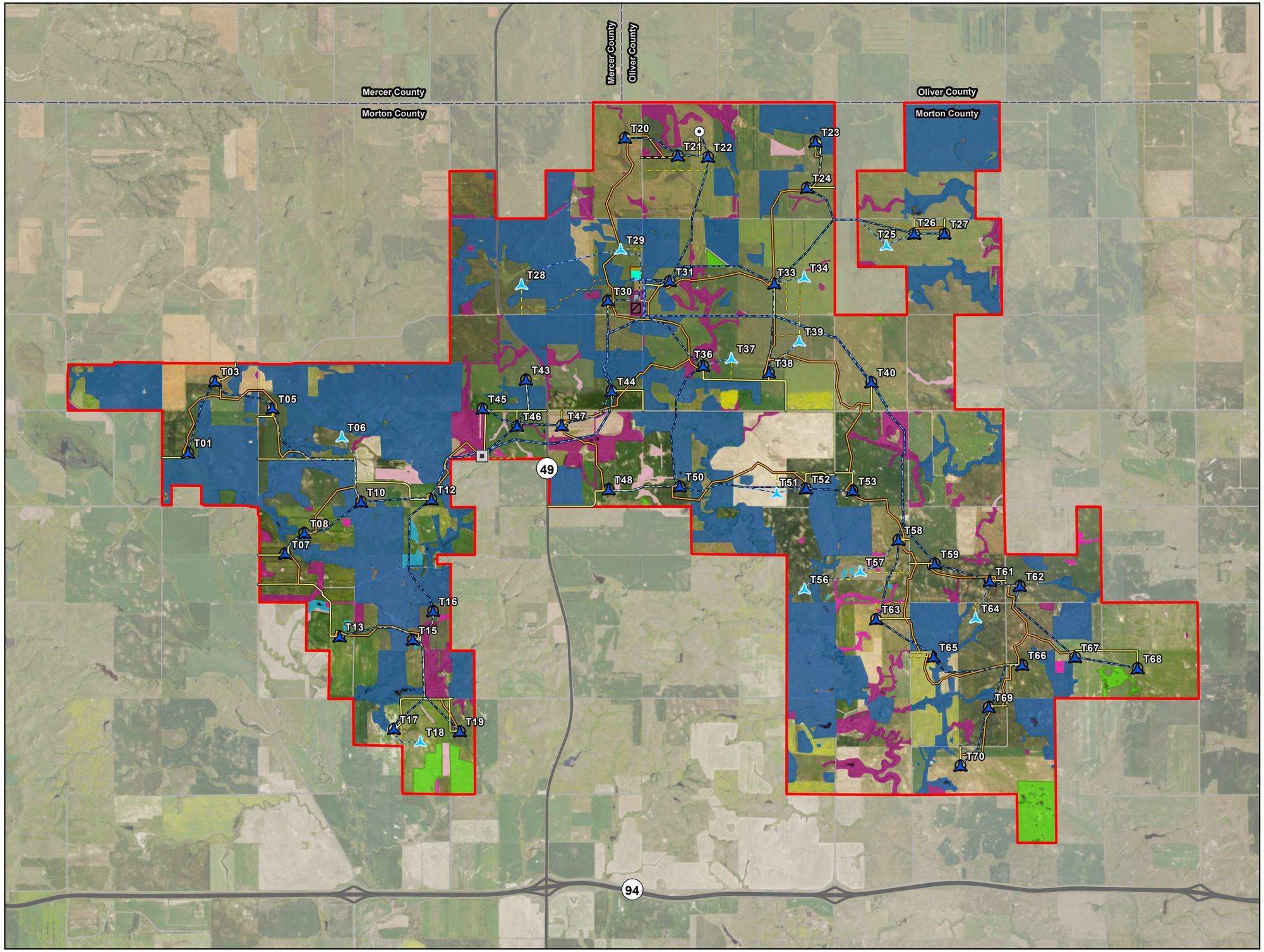
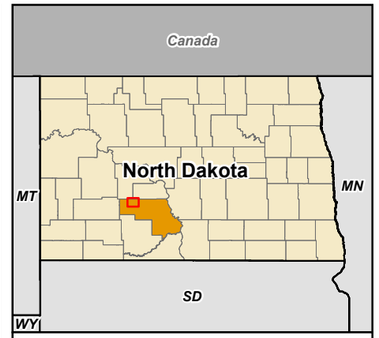
Date: (12/15/2025)





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N
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- Project Area
- Construction Easement
- Substation Yard
- Substation Facility
- O&M Yard
- O&M Building
- Construction Laydown Yard
- Primary Turbine
- Alternate Turbine
- ADLS Radar Tower
- Met Tower
- Primary Access Road
- Alternate Access Road
- Primary Crane Path
- Alternate Crane Path
- Collection Line

Grassland Sod Type

- Broken
- Broken-Desktop
- Broken-Previous Survey
- Unbroken
- Unbroken-Desktop
- Unbroken-Previous Survey

Figure 9: Grassland Sod Types

Longspur Wind Energy Center

Morton County, North Dakota

Source: Z:\Clients\NJ_PMN_PowerLongspur_Wind\ArcGIS\Permitting\PSC\Longspur_Wind_PSC_Application.aprx
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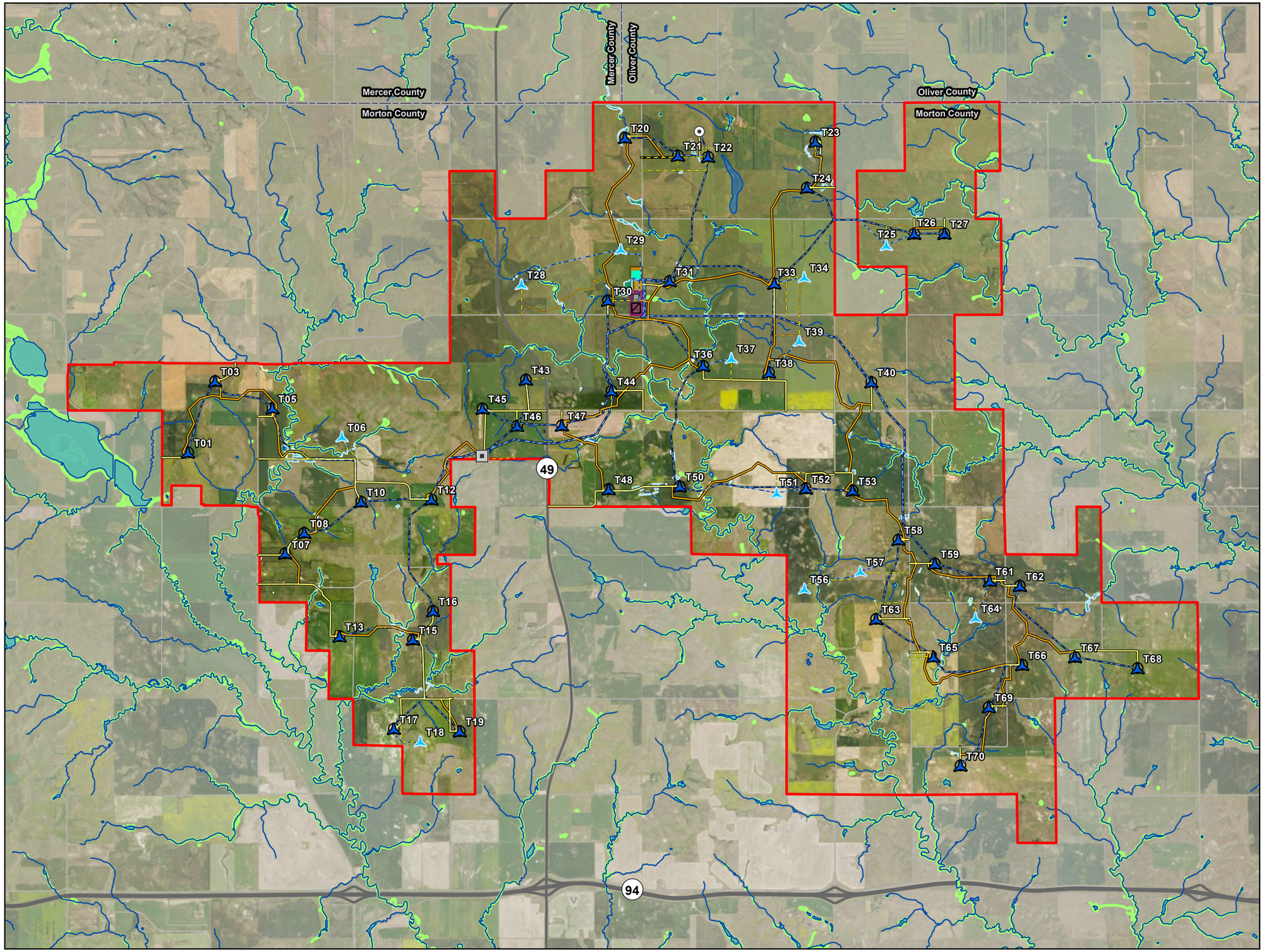

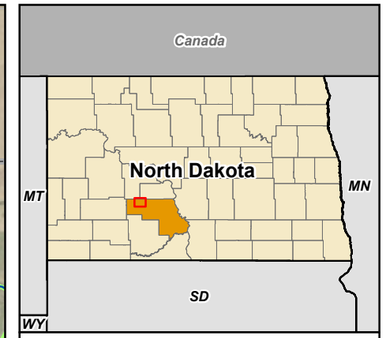

0 0.5 1 Miles

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N
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- Project Area
- Construction Easement
- Substation Yard
- Substation Facility
- O&M Yard
- O&M Building
- Construction Laydown Yard
- Primary Turbine
- Alternate Turbine
- ADLS Radar Tower
- Met Tower
- Primary Access Road
- Alternate Access Road
- Primary Crane Path
- Alternate Crane Path
- Collection Line

Wetlands/Waterbodies

- Delineated Waterway
- Delineated Wetland
- NHD Waterbody
- NHD Waterway
- NWI Wetland

Figure 10: Surface Waters

Longspur Wind Energy Center

Morton County, North Dakota

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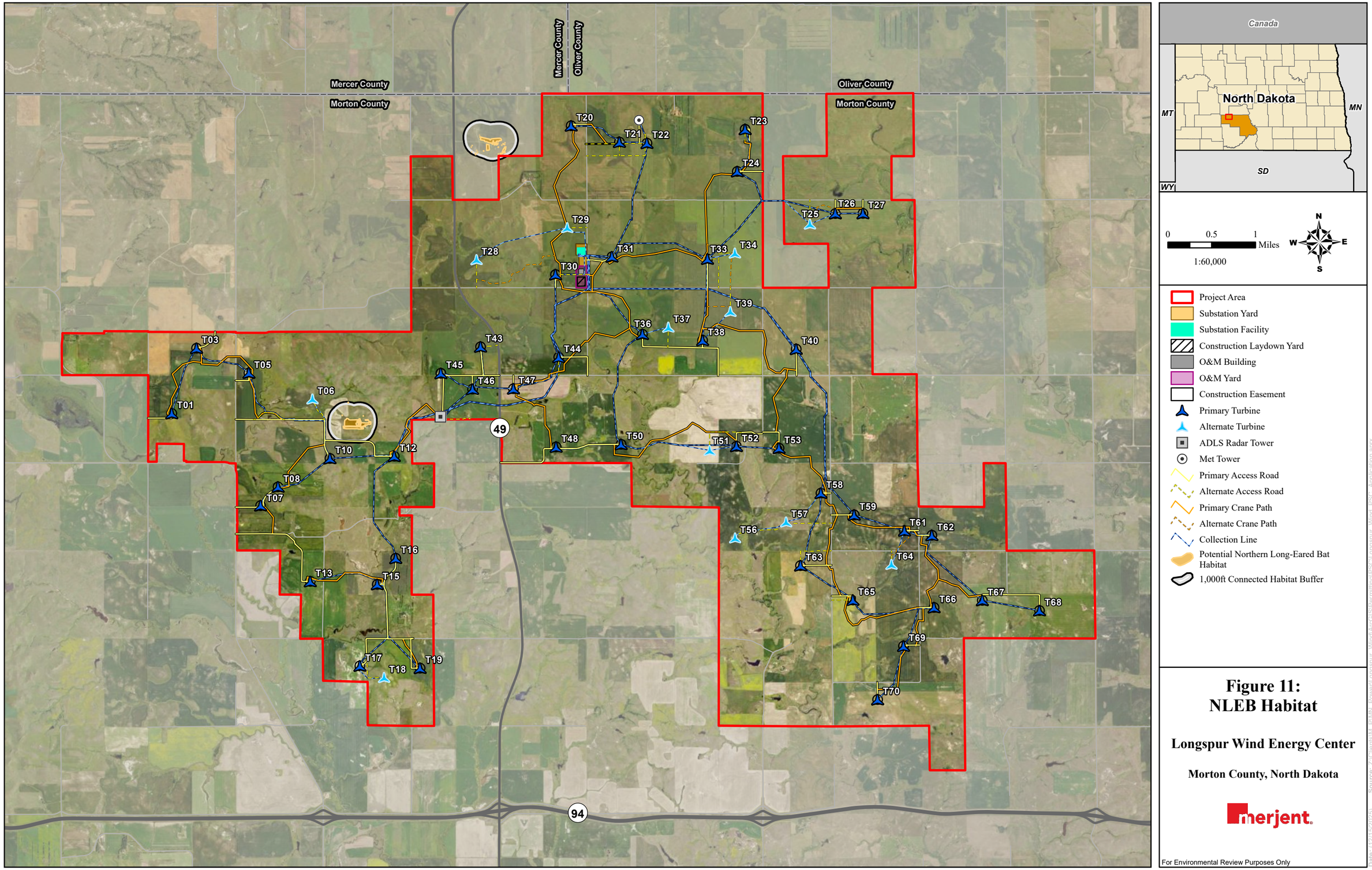

Figure 11:
NLEB Habitat

Longspur Wind Energy Center

Morton County, North Dakota

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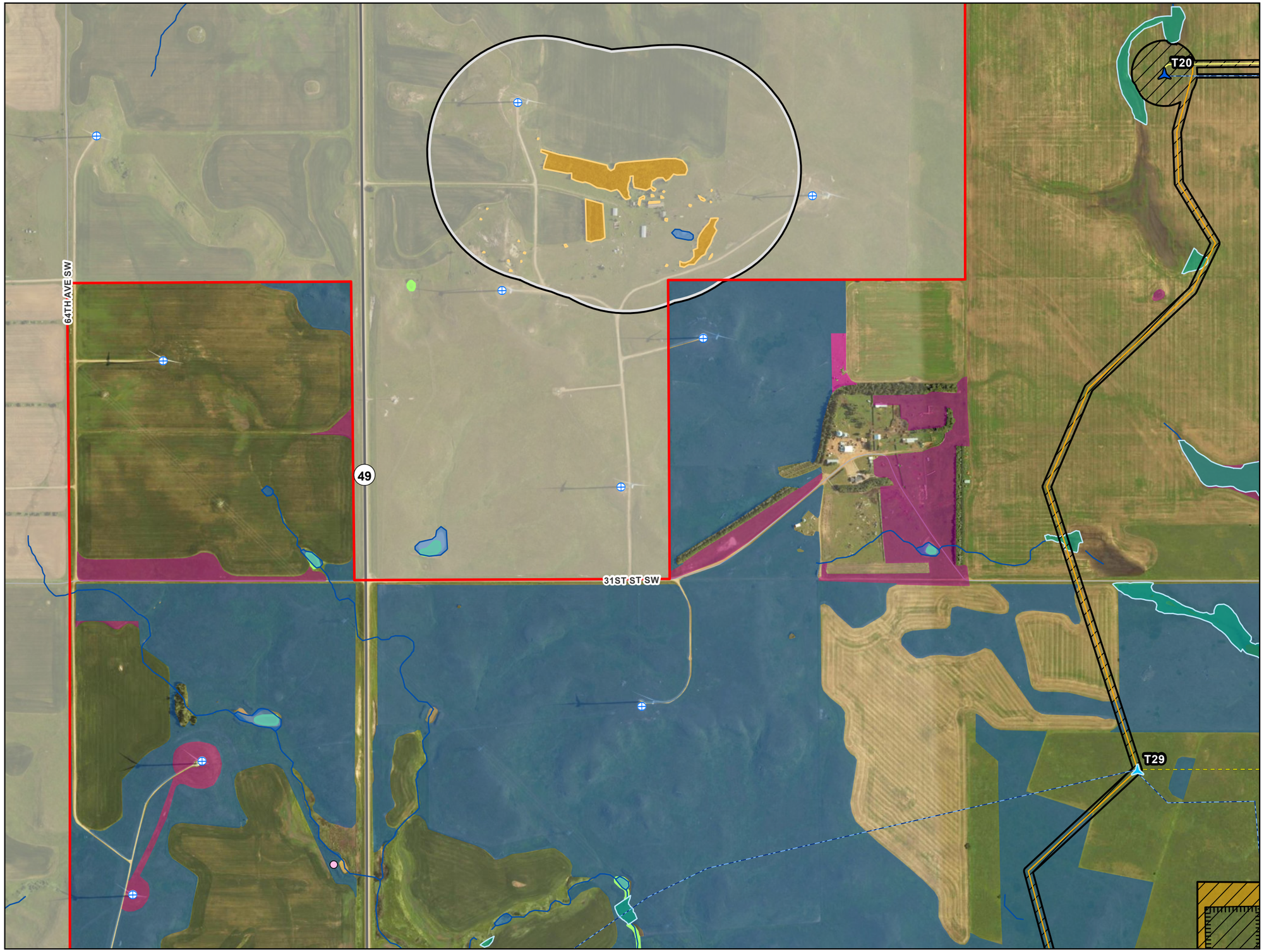

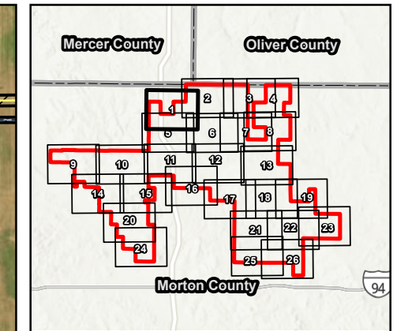

0 450 900 Feet

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N W E S

Project Area
Substation Yard
Substation Facility
Construction Easement
Primary Turbine
Alternate Turbine
Primary Access Road
Alternate Access Road
Primary Crane Path
Collection Line

Existing Wind Turbine
Abandoned Mine
Potential Northern Long-Eared Bat Habitat
1,000ft Connected Habitat Buffer

Wetlands/Waterbodies

Delineated Waterway
Delineated Wetland
NWI Wetland
NHD Waterway
NHD Waterbody

Grassland Sod Type

Broken Grassland
Broken Grassland (Desktop)
Unbroken Grassland

Figure 12: Site Plan Detail

Longspur Wind Energy Center

Morton County, North Dakota

Page 1 of 26

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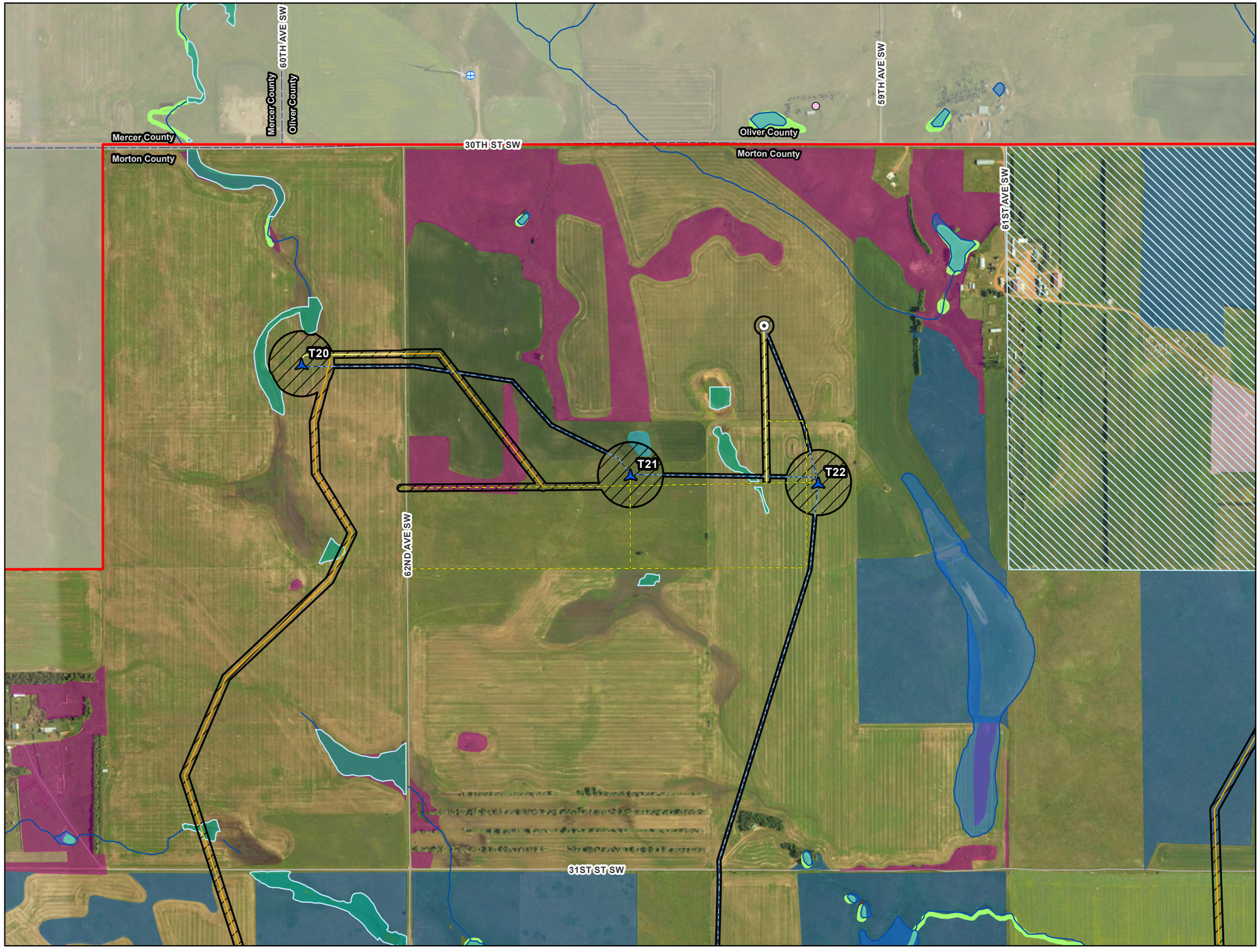

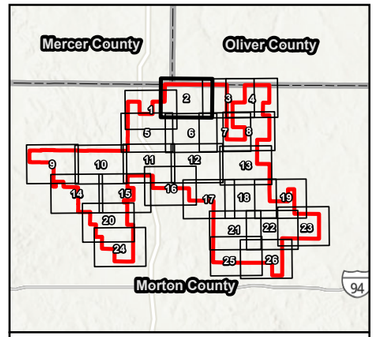

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N
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- Project Area
- Construction Easement
- Primary Turbine
- Met Tower
- Primary Access Road
- Alternate Access Road
- Primary Crane Path
- Collection Line

- Existing Wind Turbine
- Abandoned Mine
- Mineral Trust Land

Wetlands/Waterbodies

- Delineated Waterway
- Delineated Wetland
- NWI Wetland
- NHD Waterway
- NHD Waterbody

Grassland Sod Type

- Broken Grassland
- Broken Grassland (Previous Survey)
- Unbroken Grassland
- Unbroken Grassland (Desktop)

Figure 12: Site Plan Detail

Longspur Wind Energy Center

Morton County, North Dakota

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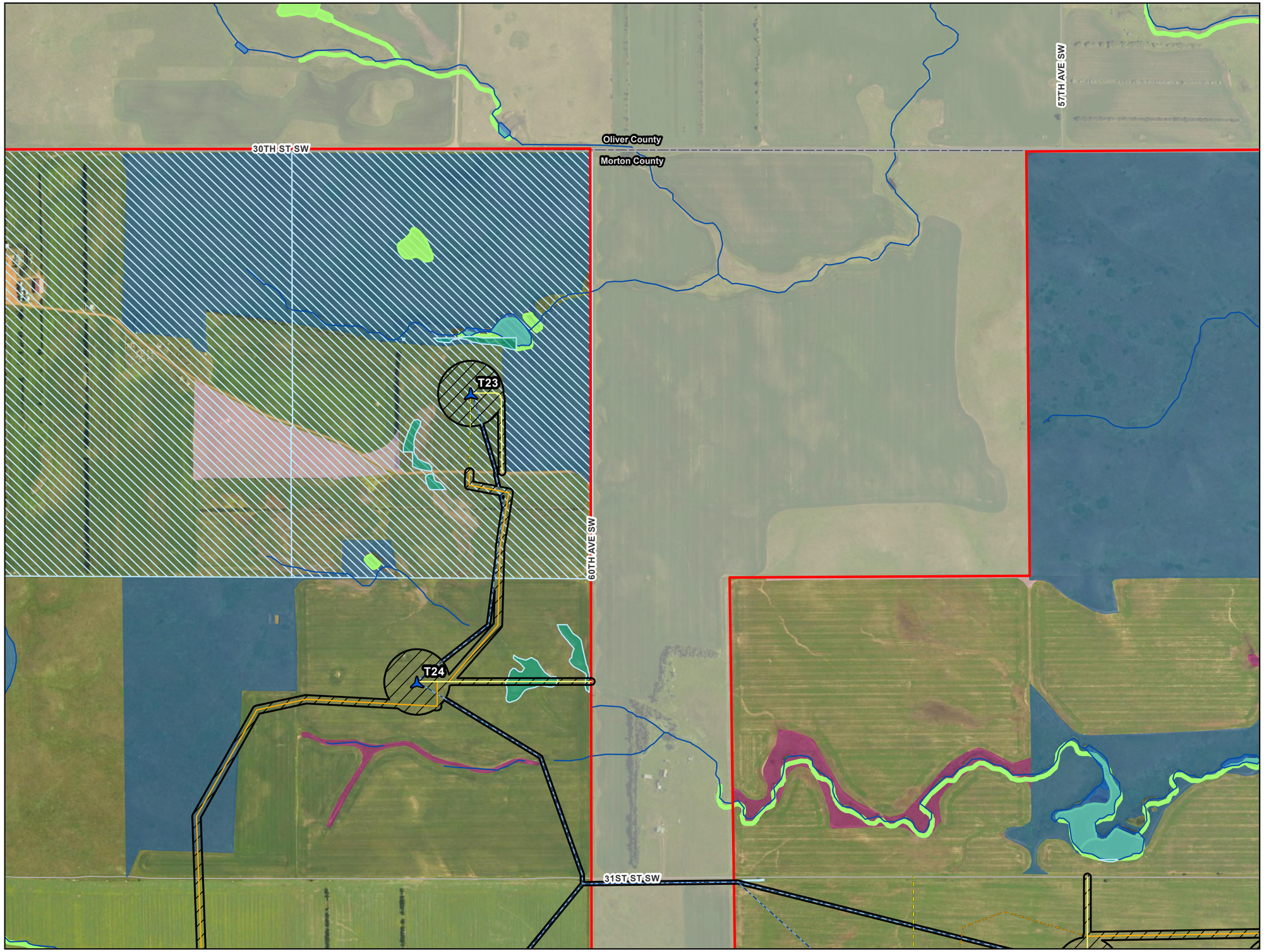

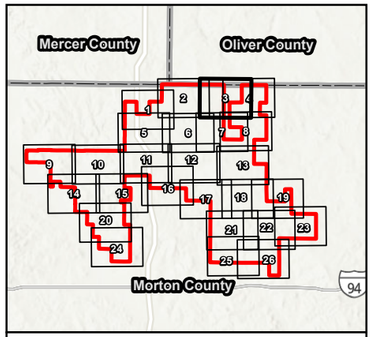

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N
W E
S

- Project Area
- Construction Easement
- Primary Turbine
- Primary Access Road
- Alternate Access Road
- Primary Crane Path
- Alternate Crane Path
- Collection Line
- Mineral Trust Land

Wetlands/Waterbodies

- Delineated Waterway
- Delineated Wetland
- NWI Wetland
- NHD Waterway
- NHD Waterbody

Grassland Sod Type

- Broken Grassland
- Broken Grassland (Previous Survey)
- Unbroken Grassland

Figure 12: Site Plan Detail

Longspur Wind Energy Center

Morton County, North Dakota

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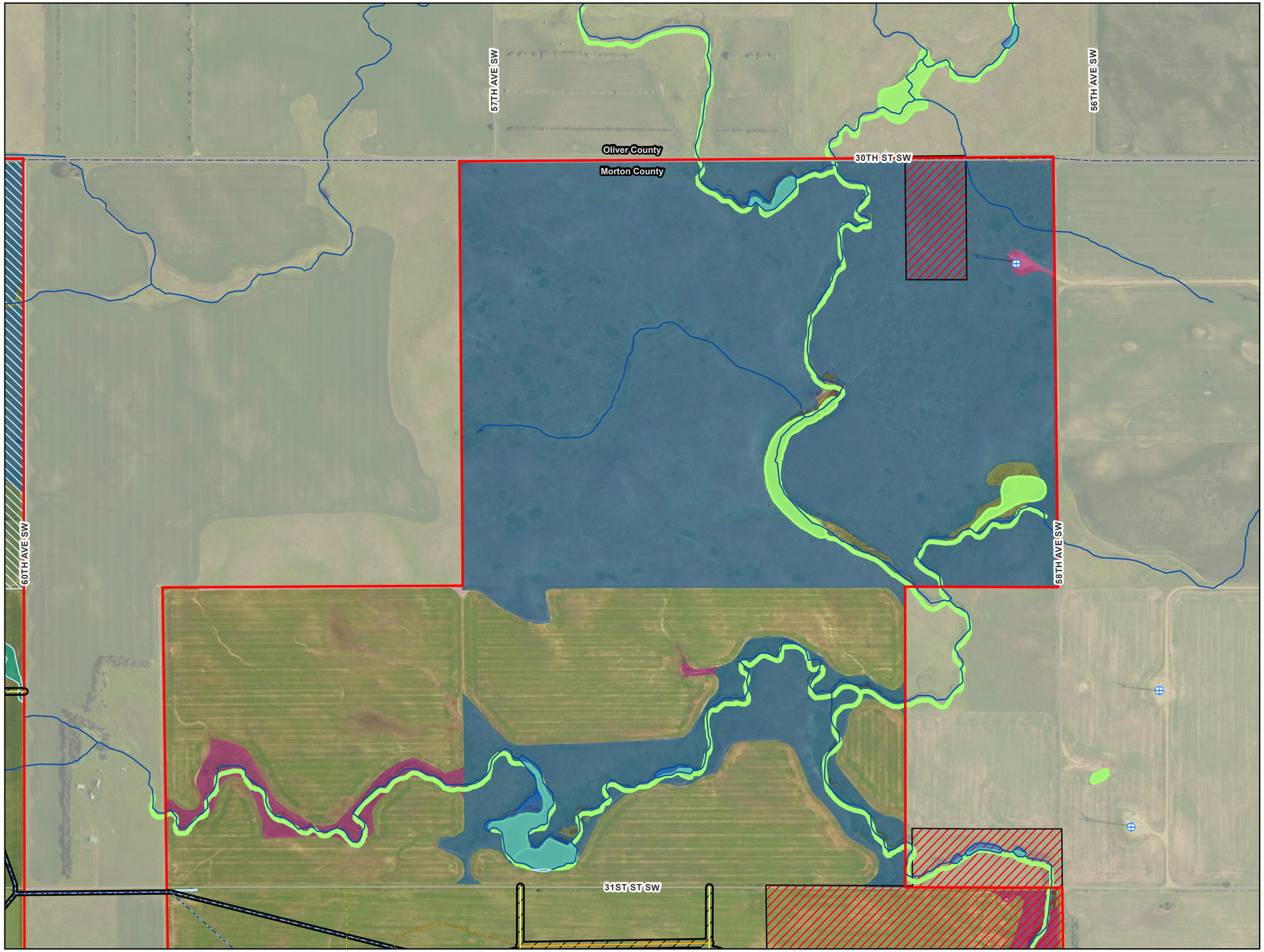

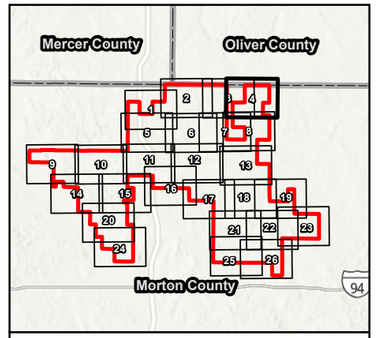

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N
W E
S

- Project Area
- Construction Easement
- Primary Access Road
- Alternate Access Road
- Primary Crane Path
- Alternate Crane Path
- Collection Line
- Existing Wind Turbine
- USFWS Conservation Easement (Closed Access)
- Mineral Trust Land

Wetlands/Waterbodies

- Delineated Waterway
- Delineated Wetland
- NWI Wetland
- NHD Waterway
- NHD Waterbody

Grassland Sod Type

- Broken Grassland
- Broken Grassland (Previous Survey)
- Unbroken Grassland

Figure 12: Site Plan Detail

Longspur Wind Energy Center

Morton County, North Dakota

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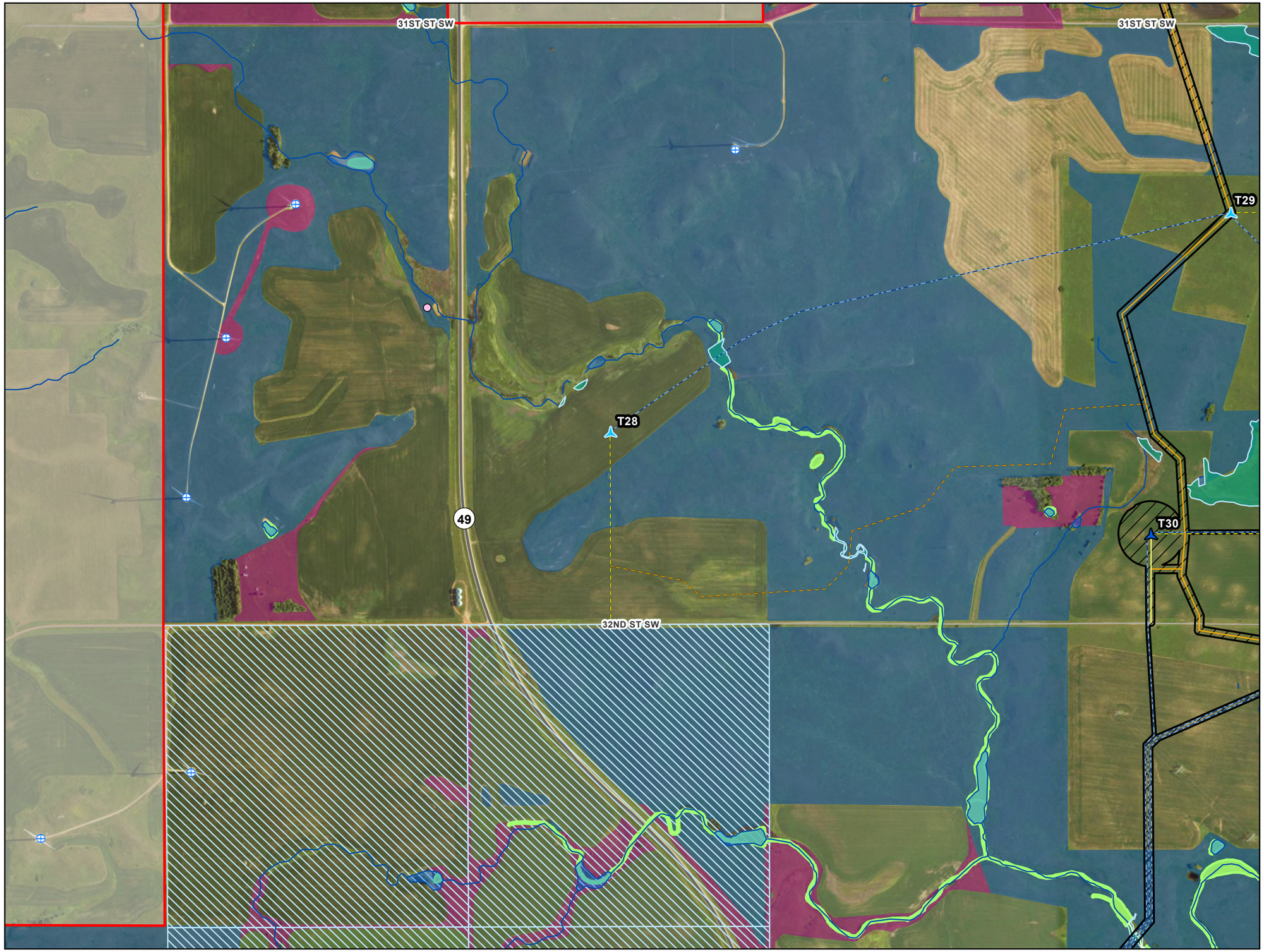

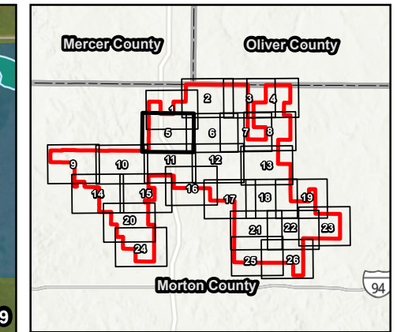

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N W E S

Project Area
Construction Easement
Primary Turbine
Alternate Turbine
Primary Access Road
Alternate Access Road
Primary Crane Path
Alternate Crane Path
Collection Line

Existing Wind Turbine
Abandoned Mine
Mineral Trust Land

Wetlands/Waterbodies

Delineated Waterway
Delineated Wetland
NWI Wetland
NHD Waterway
NHD Waterbody

Grassland Sod Type

Broken Grassland
Broken Grassland (Previous Survey)
Unbroken Grassland

Figure 12: Site Plan Detail

Longspur Wind Energy Center

Morton County, North Dakota

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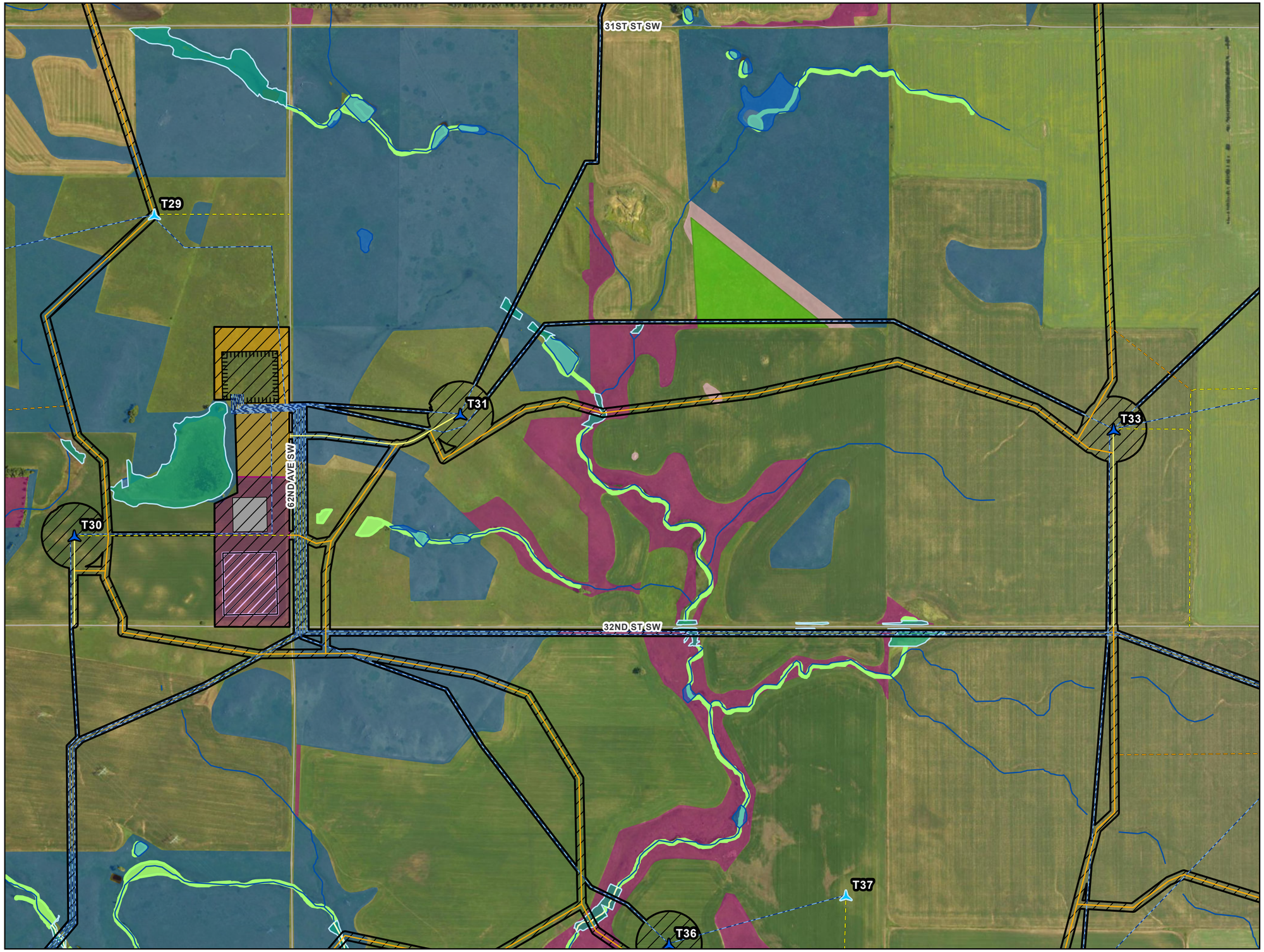

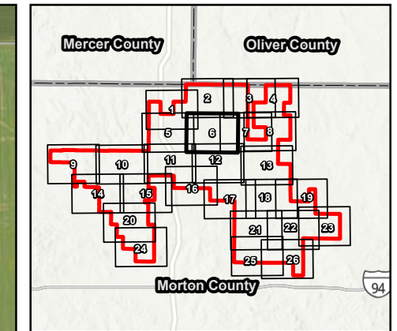

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N W E S

Project Area
Substation Yard
Substation Facility
Construction Laydown Yard
O&M Building
O&M Yard
Construction Easement
Primary Turbine
Alternate Turbine
Primary Access Road
Alternate Access Road
Primary Crane Path
Alternate Crane Path
Collection Line

Wetlands/Waterbodies

Delineated Waterway
Delineated Wetland
NWI Wetland
NHD Waterway
NHD Waterbody

Grassland Sod Type

Broken Grassland
Broken Grassland (Previous Survey)
Unbroken Grassland
Unbroken Grassland (Previous Survey)

Figure 12: Site Plan Detail

Longspur Wind Energy Center

Morton County, North Dakota

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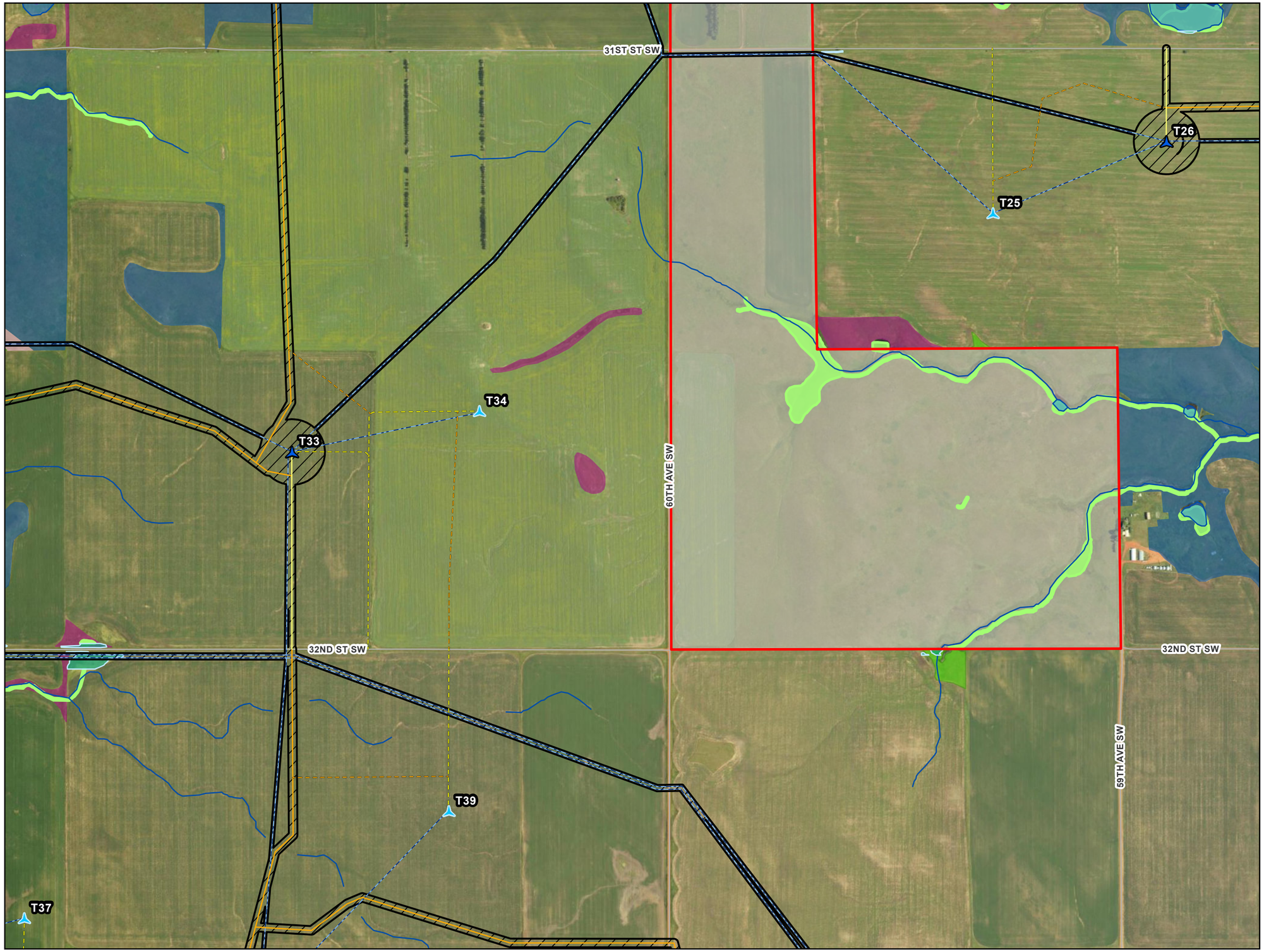
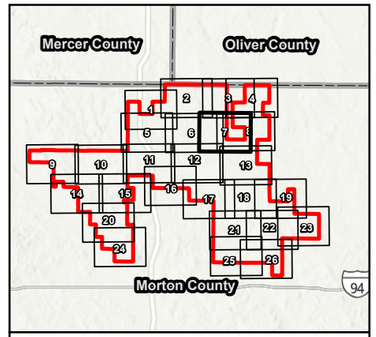
Date: (12/15/2025) Source: Z:\Clients\M_P\MN_Power\Longspur_Wind\ArcGIS\Permitting\PSC\Longspur_Wind_PSC_Application.aprx





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N
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- Project Area
- Construction Easement
- Primary Turbine
- Alternate Turbine
- Primary Access Road
- Alternate Access Road
- Primary Crane Path
- Alternate Crane Path
- Collection Line

Wetlands/Waterbodies

- Delineated Waterway
- Delineated Wetland
- NWI Wetland
- NHD Waterway
- NHD Waterbody

Grassland Sod Type

- Broken Grassland
- Broken Grassland (Previous Survey)
- Unbroken Grassland
- Unbroken Grassland (Previous Survey)

Figure 12:
Site Plan Detail

Longspur Wind Energy Center

Morton County, North Dakota

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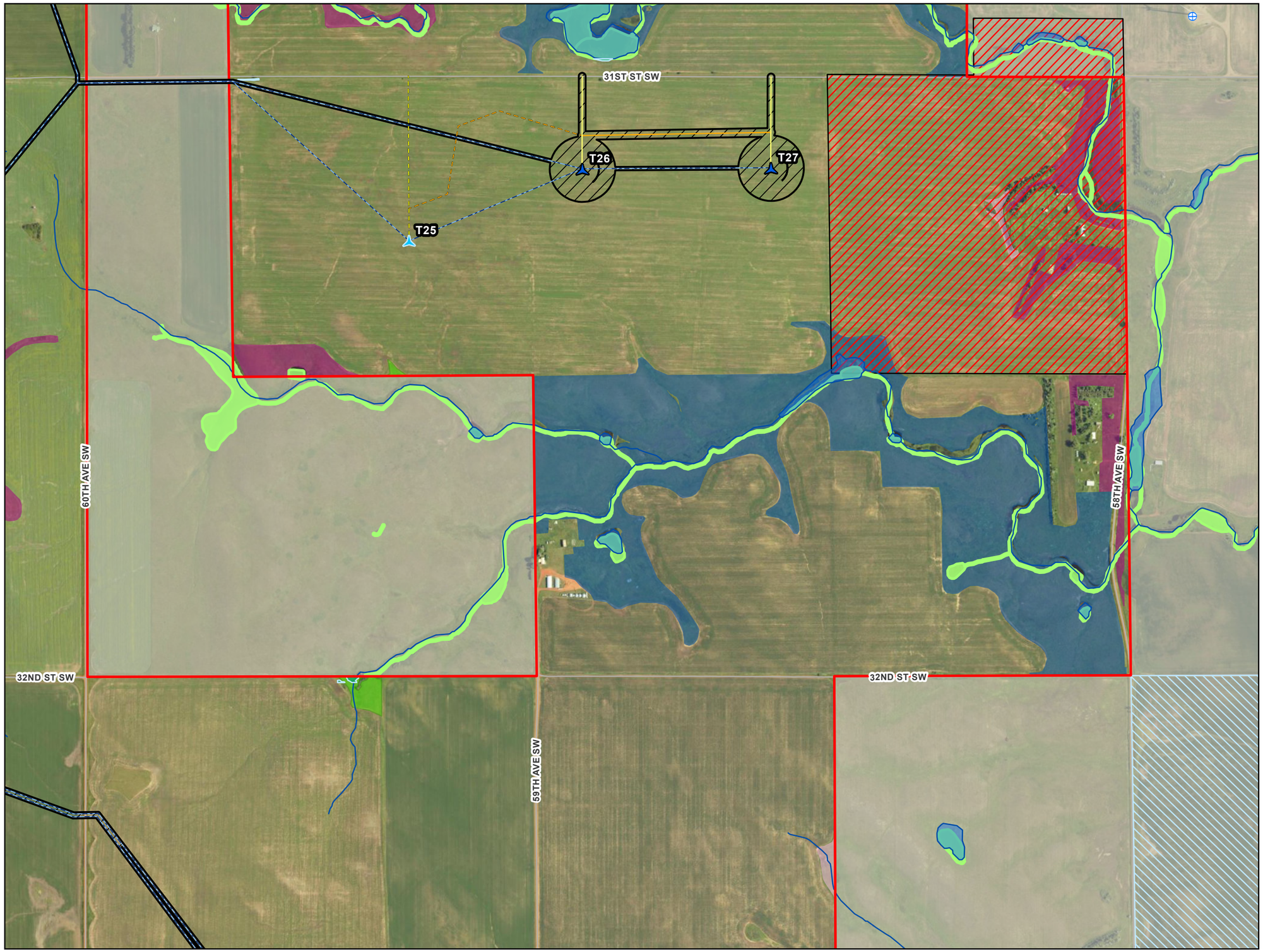
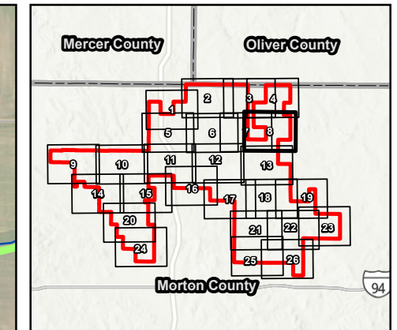
Date: (12/15/2025)





0 450 900 Feet

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N E S W

Project Area
Construction Easement
Primary Turbine
Alternate Turbine
Primary Access Road
Alternate Access Road
Primary Crane Path
Alternate Crane Path
Collection Line

Existing Wind Turbine
USFWS Conservation Easement (Closed Access)
Mineral Trust Land

Wetlands/Waterbodies

Delineated Waterway
Delineated Wetland
NWI Wetland
NHD Waterway
NHD Waterbody

Grassland Sod Type

Broken Grassland
Broken Grassland (Previous Survey)
Unbroken Grassland
Unbroken Grassland (Previous Survey)

Figure 12: Site Plan Detail

Longspur Wind Energy Center

Morton County, North Dakota

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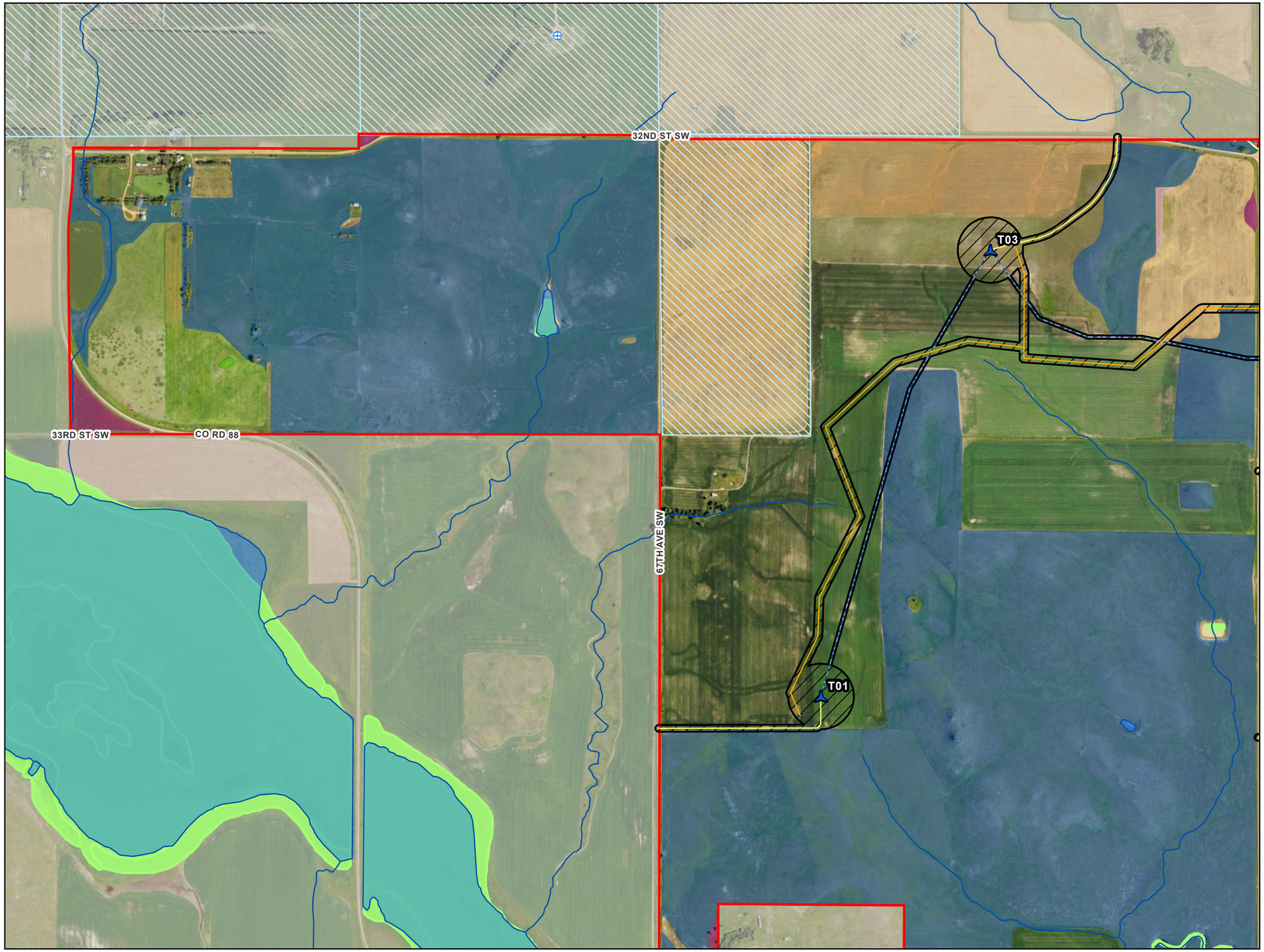

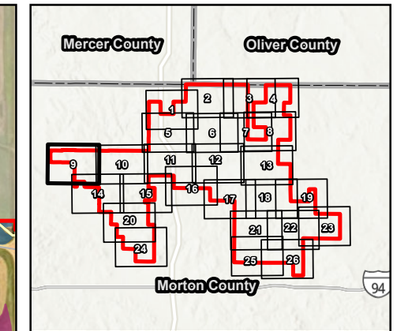

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N W E S

Project Area
Construction Easement
Primary Turbine
Primary Access Road
Primary Crane Path
Collection Line

Existing Wind Turbine
Mineral Trust Land

Wetlands/Waterbodies

Delineated Waterway
Delineated Wetland
NWI Wetland
NHD Waterway
NHD Waterbody

Grassland Sod Type

Broken Grassland
Broken Grassland (Previous Survey)
Unbroken Grassland
Unbroken Grassland (Previous Survey)

Figure 12: Site Plan Detail

Longspur Wind Energy Center

Morton County, North Dakota

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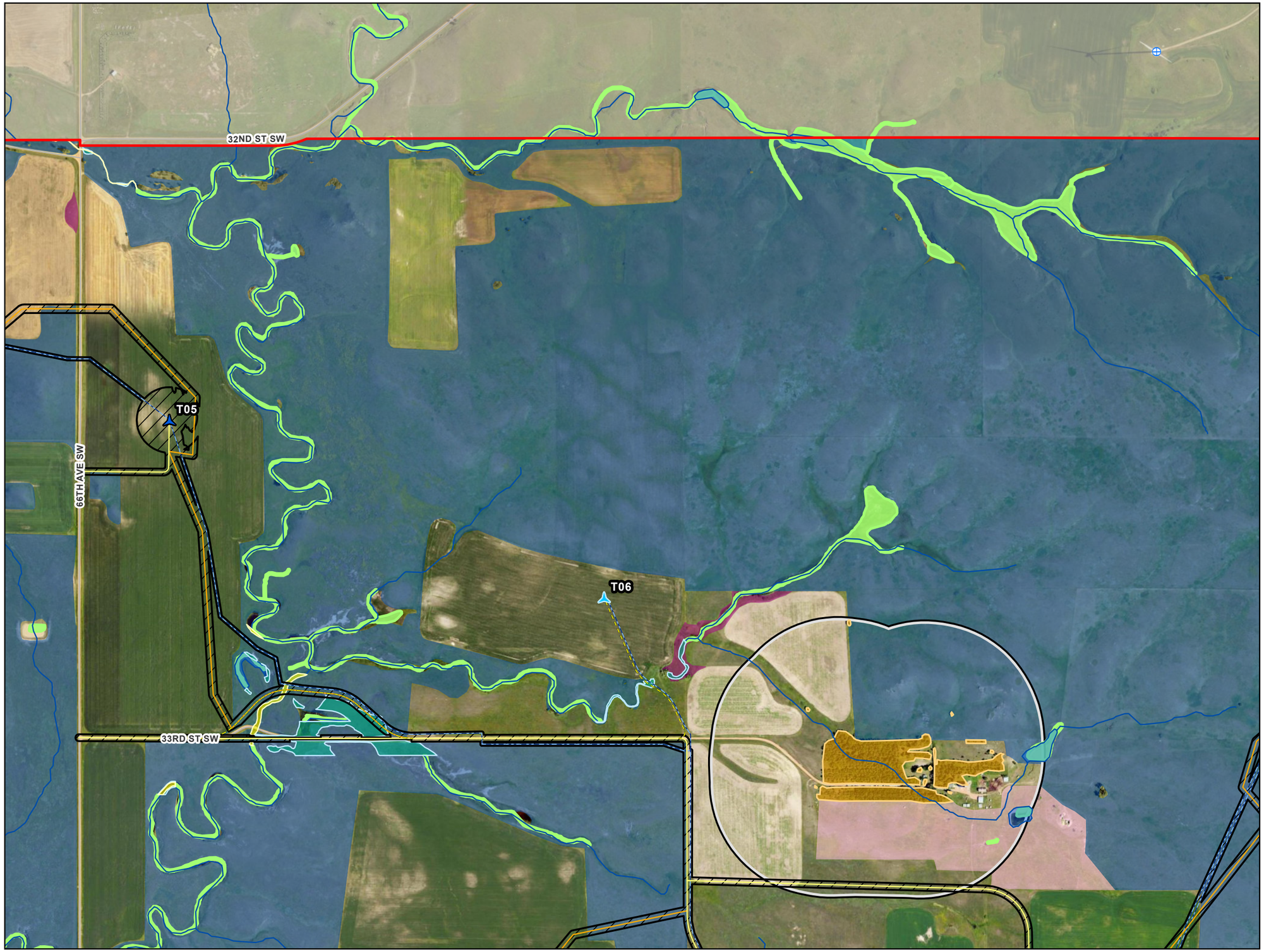

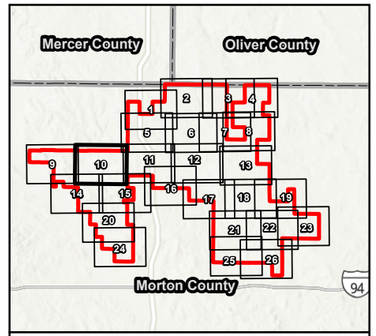

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- Project Area
- Construction Easement
- Primary Turbine
- Alternate Turbine
- Primary Access Road
- Alternate Access Road
- Primary Crane Path
- Collection Line
- Existing Wind Turbine
- Potential Northern Long-Eared Bat Habitat
- 1,000ft Connected Habitat Buffer

Wetlands/Waterbodies

- Delineated Waterway
- Delineated Wetland
- NWI Wetland
- NHD Waterway
- NHD Waterbody

Grassland Sod Type

- Broken Grassland
- Broken Grassland (Previous Survey)
- Unbroken Grassland
- Unbroken Grassland (Desktop)

Figure 12: Site Plan Detail

Longspur Wind Energy Center

Morton County, North Dakota

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Source: Z:\Clients\M_P\MN_PowerLongspur_Wind\Arcgis\Permitting\PSC\Longspur_Wind_PSC_Application.aprx
Date: (10/15/2025)

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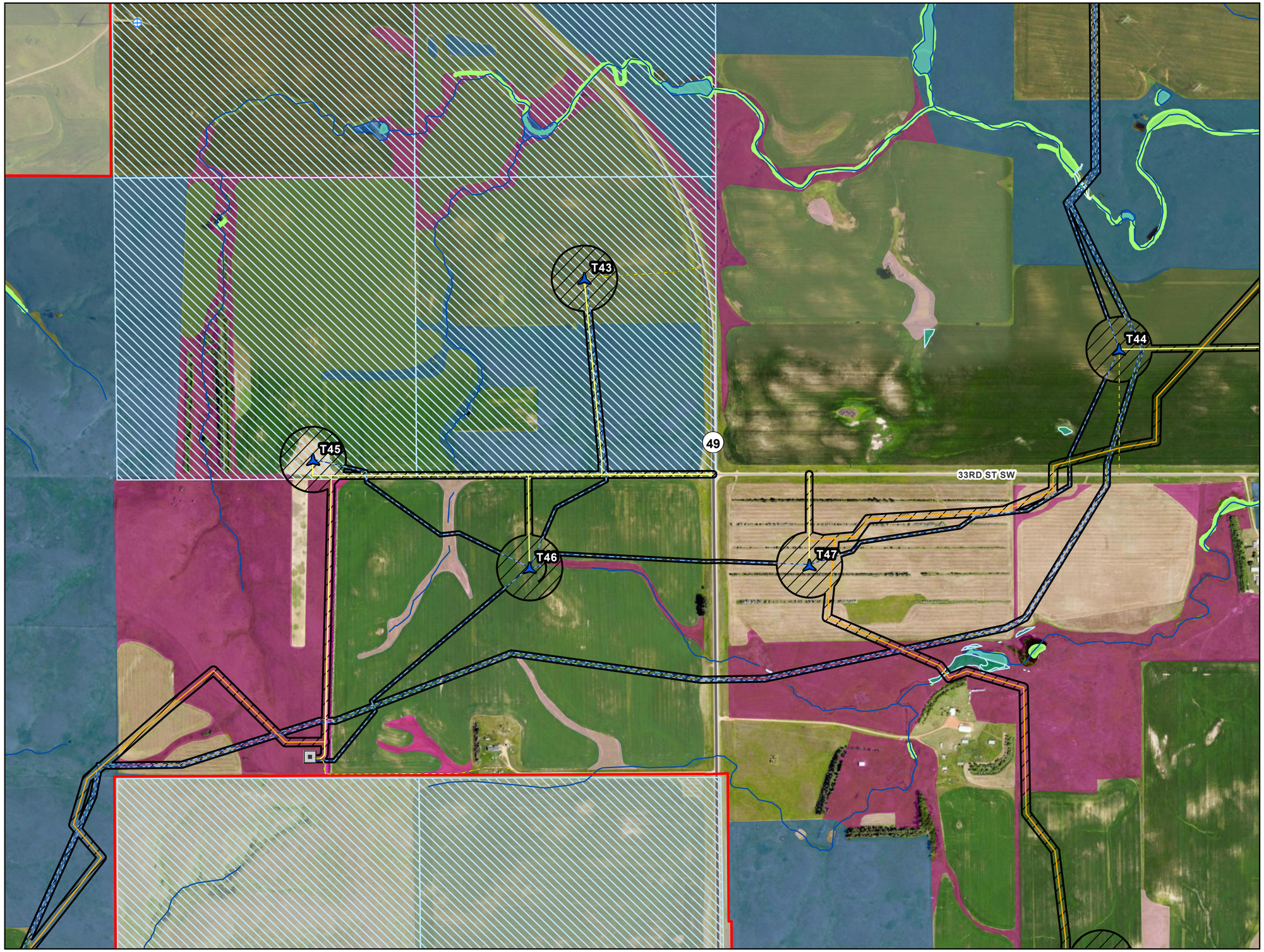

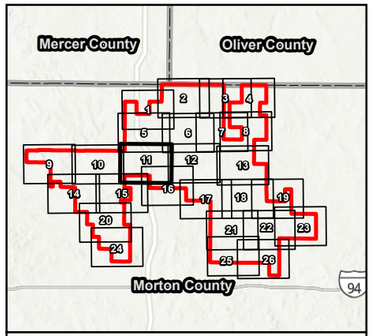

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N
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S

- Project Area
- Construction Easement
- Primary Turbine
- ADLS Radar Tower
- Primary Access Road
- Alternate Access Road
- Primary Crane Path
- Collection Line
- Existing Wind Turbine
- Mineral Trust Land

Wetlands/Waterbodies

- Delineated Waterway
- Delineated Wetland
- NWI Wetland
- NHD Waterway
- NHD Waterbody

Grassland Sod Type

- Broken Grassland
- Broken Grassland (Desktop)
- Broken Grassland (Previous Survey)
- Unbroken Grassland
- Unbroken Grassland (Desktop)

Figure 12:
Site Plan Detail

Longspur Wind Energy Center

Morton County, North Dakota

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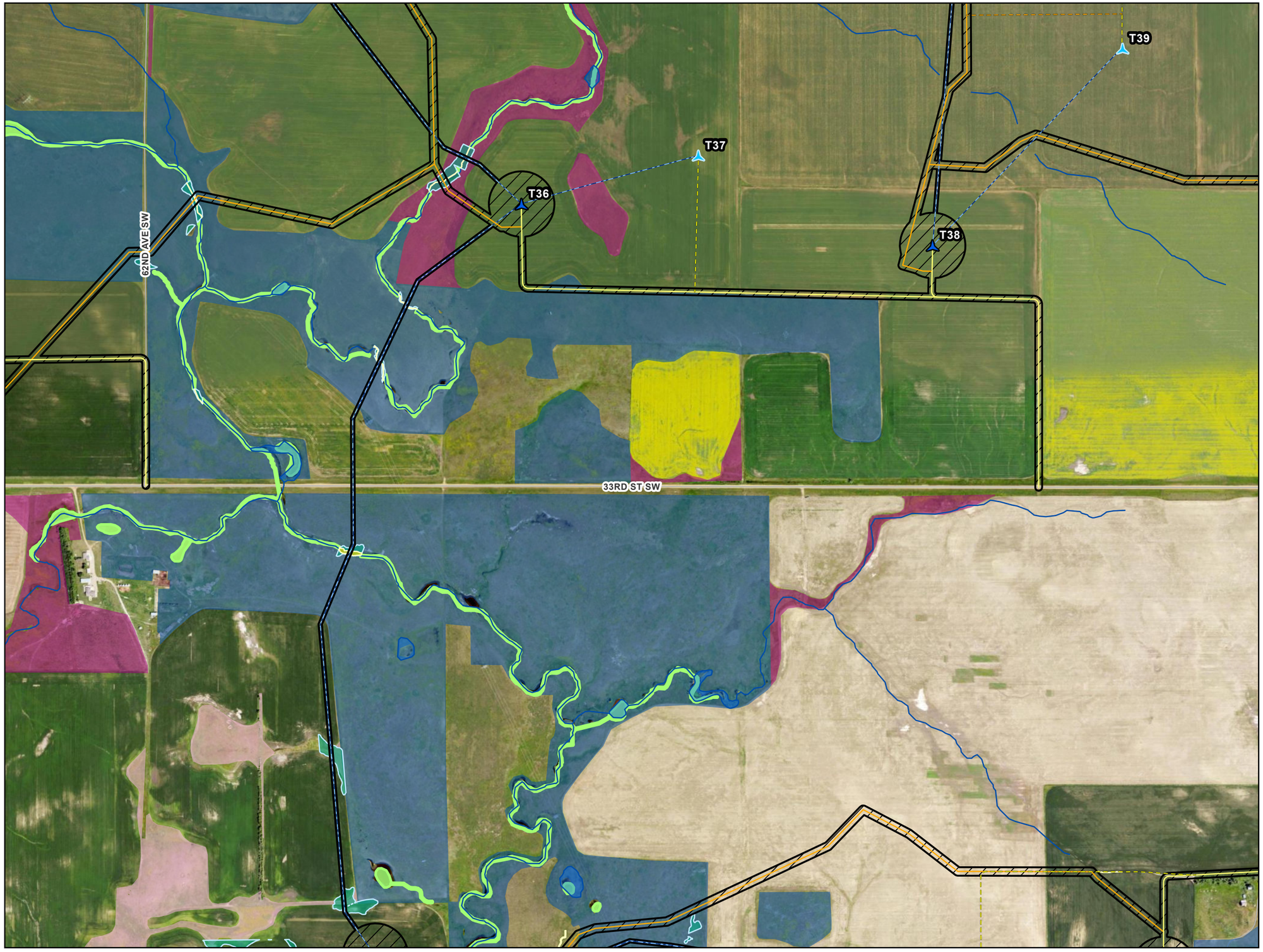

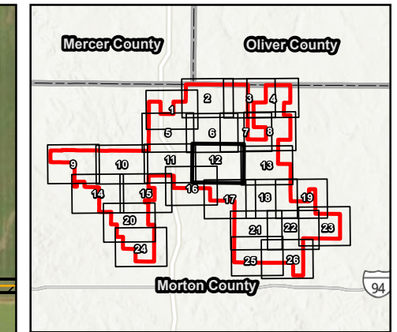

0 450 900 Feet

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N W E S

Project Area
Construction Easement
Primary Turbine
Alternate Turbine
Primary Access Road
Alternate Access Road
Primary Crane Path
Alternate Crane Path
Collection Line

Wetlands/Waterbodies

Delineated Waterway
Delineated Wetland
NWI Wetland
NHD Waterway
NHD Waterbody

Grassland Sod Type

Broken Grassland
Broken Grassland (Previous Survey)
Unbroken Grassland
Unbroken Grassland (Previous Survey)

Figure 12: Site Plan Detail

Longspur Wind Energy Center

Morton County, North Dakota

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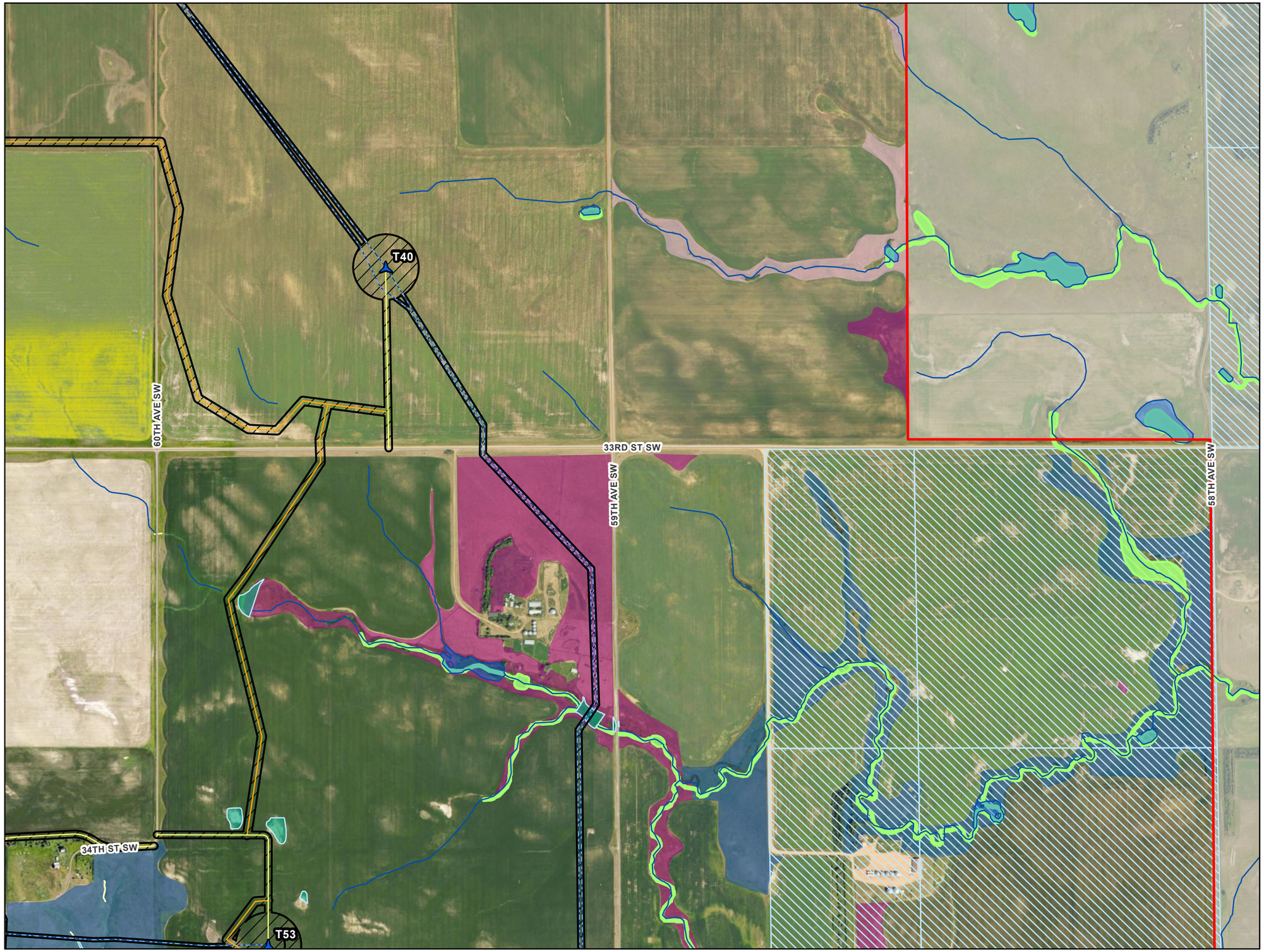

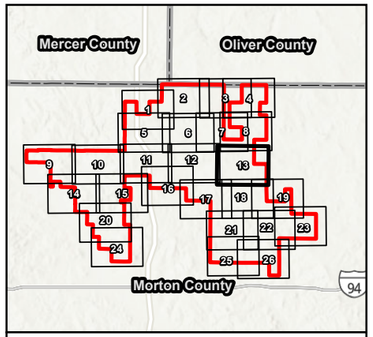

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N
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- Project Area
- Construction Easement
- Primary Turbine
- Primary Access Road
- Alternate Access Road
- Primary Crane Path
- Collection Line
- Mineral Trust Land

Wetlands/Waterbodies

- Delineated Waterway
- Delineated Wetland
- NWI Wetland
- NHD Waterway
- NHD Waterbody

Grassland Sod Type

- Broken Grassland
- Broken Grassland (Previous Survey)
- Unbroken Grassland

Figure 12:
Site Plan Detail

Longspur Wind Energy Center

Morton County, North Dakota

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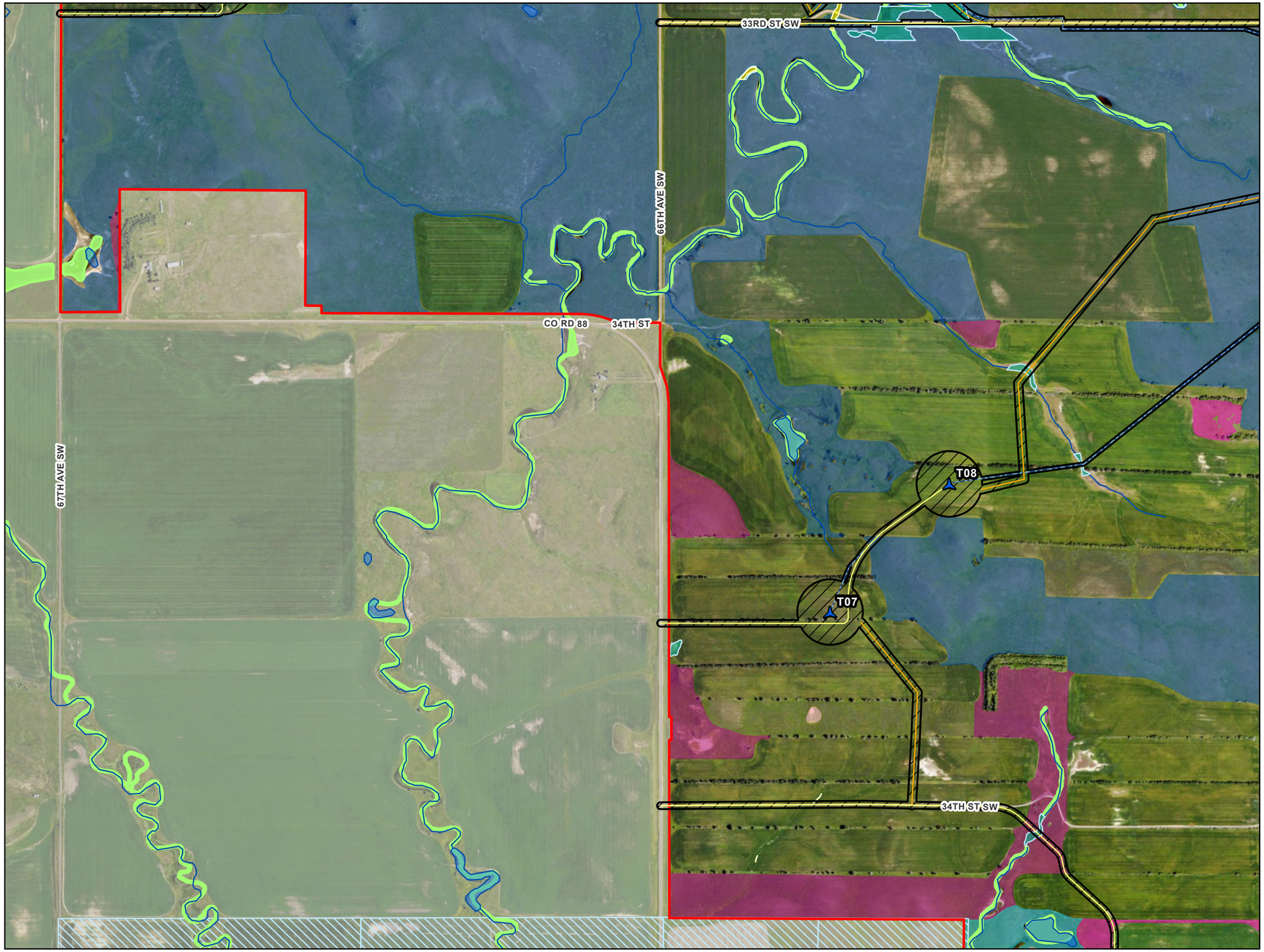

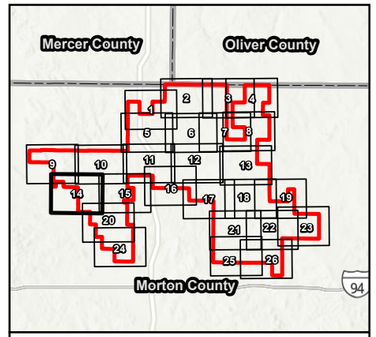

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N
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- Project Area
- Construction Easement
- Primary Turbine
- Primary Access Road
- Alternate Access Road
- Primary Crane Path
- Collection Line
- Abandoned Mine
- Mineral Trust Land

Wetlands/Waterbodies

- Delineated Waterway
- Delineated Wetland
- NWI Wetland
- NHD Waterway
- NHD Waterbody

Grassland Sod Type

- Broken Grassland
- Broken Grassland (Desktop)
- Broken Grassland (Previous Survey)
- Unbroken Grassland
- Unbroken Grassland (Desktop)

Figure 12: Site Plan Detail

Longspur Wind Energy Center

Morton County, North Dakota

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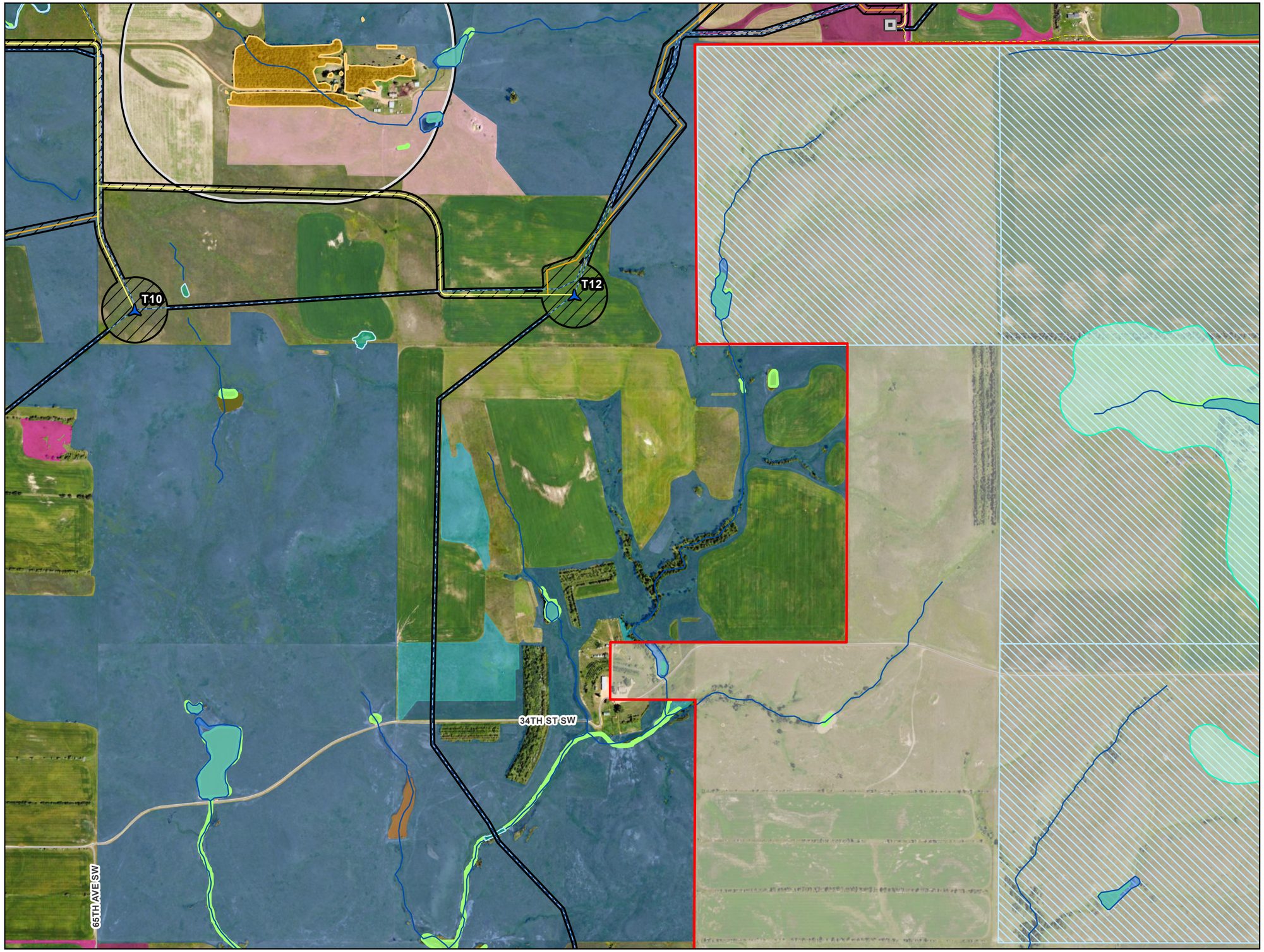

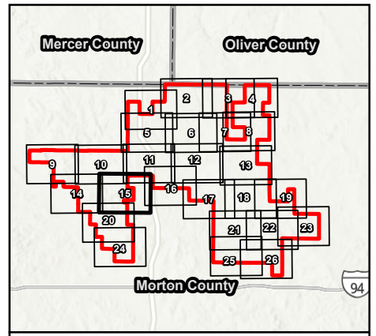

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N
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- Project Area
- Construction Easement
- Primary Turbine
- ADLS Radar Tower
- Primary Access Road
- Alternate Access Road
- Primary Crane Path
- Collection Line

- Lignite Reserve
- Potential Northern Long-Eared Bat Habitat
- 1,000ft Connected Habitat Buffer
- Mineral Trust Land

Wetlands/Waterbodies

- Delineated Waterway
- Delineated Wetland
- NWI Wetland
- NHD Waterway
- NHD Waterbody

Grassland Sod Type

- Broken Grassland
- Broken Grassland (Desktop)
- Broken Grassland (Previous Survey)
- Unbroken Grassland
- Unbroken Grassland (Desktop)

Figure 12: Site Plan Detail

Longspur Wind Energy Center

Morton County, North Dakota

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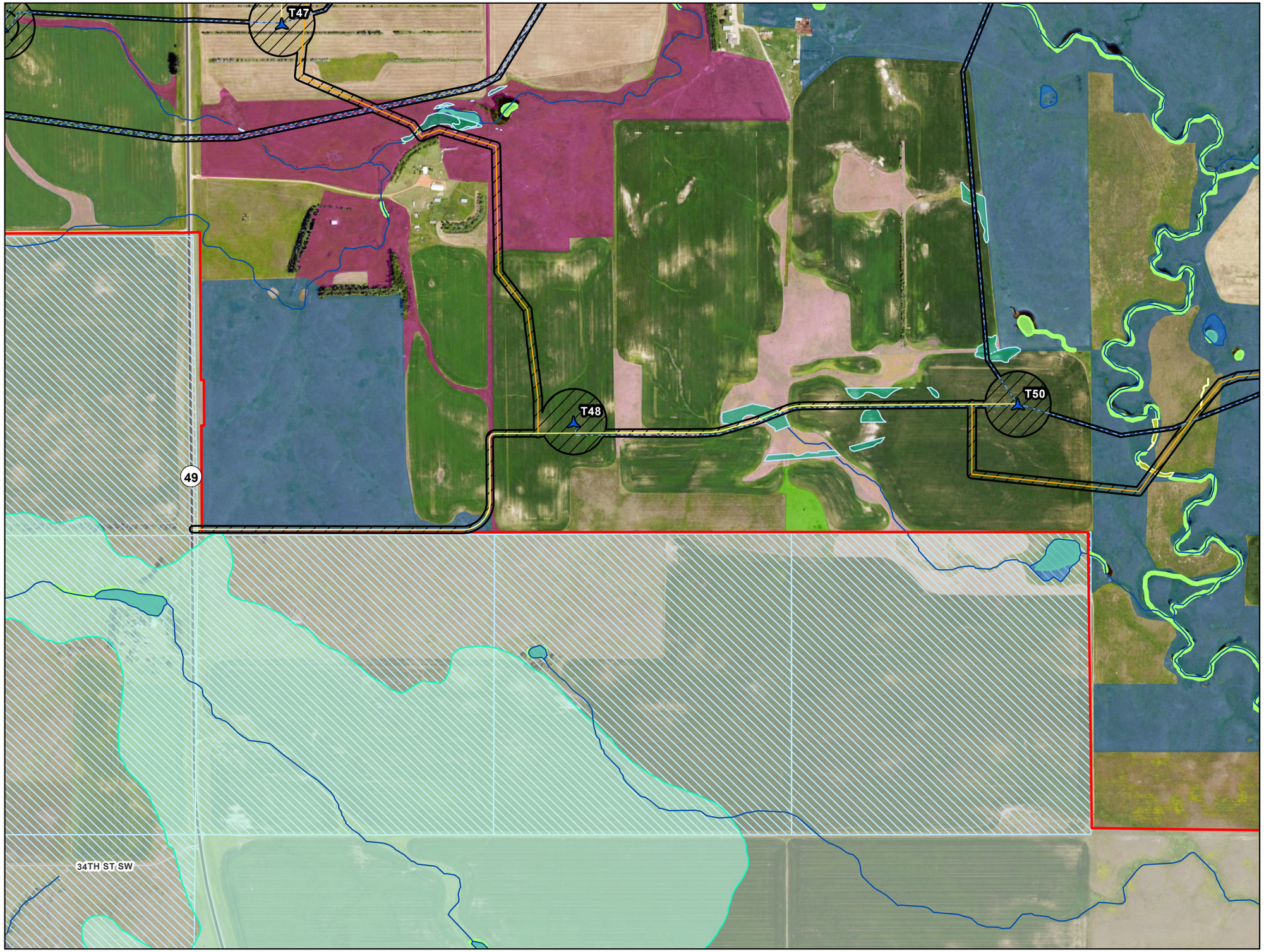

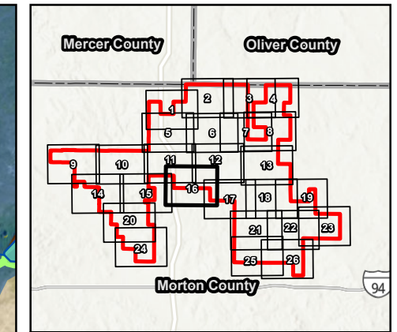

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N W E S

Project Area
Construction Easement
Primary Turbine
Primary Access Road
Primary Crane Path
Collection Line

Lignite Reserve
Mineral Trust Land

Wetlands/Waterbodies

Delineated Waterway
Delineated Wetland
NWI Wetland
NHD Waterway
NHD Waterbody

Grassland Sod Type

Broken Grassland
Broken Grassland (Previous Survey)
Unbroken Grassland
Unbroken Grassland (Previous Survey)

Figure 12: Site Plan Detail

Longspur Wind Energy Center

Morton County, North Dakota

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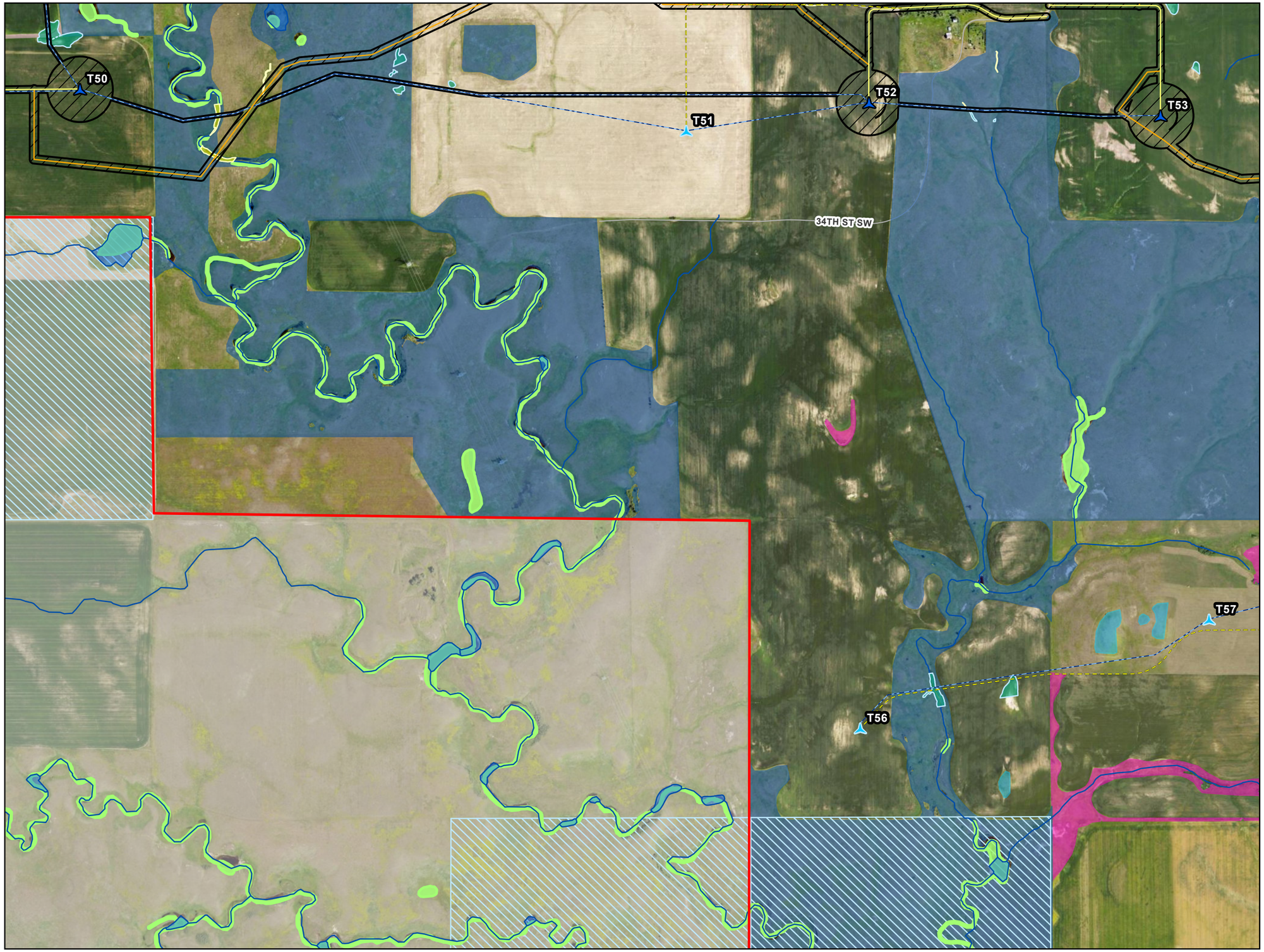

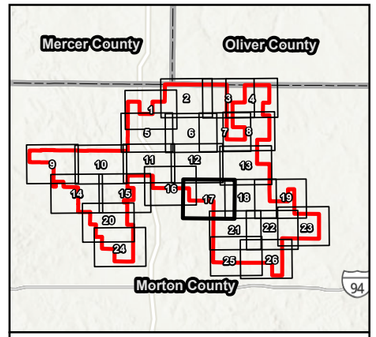

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N
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- Project Area
- Construction Easement
- Primary Turbine
- Alternate Turbine
- Primary Access Road
- Alternate Access Road
- Primary Crane Path
- Collection Line
- Mineral Trust Land

Wetlands/Waterbodies

- Delineated Waterway
- Delineated Wetland
- NWI Wetland
- NHD Waterway
- NHD Waterbody

Grassland Sod Type

- Broken Grassland (Desktop)
- Broken Grassland (Previous Survey)
- Unbroken Grassland
- Unbroken Grassland (Desktop)

Figure 12: Site Plan Detail

Longspur Wind Energy Center

Morton County, North Dakota

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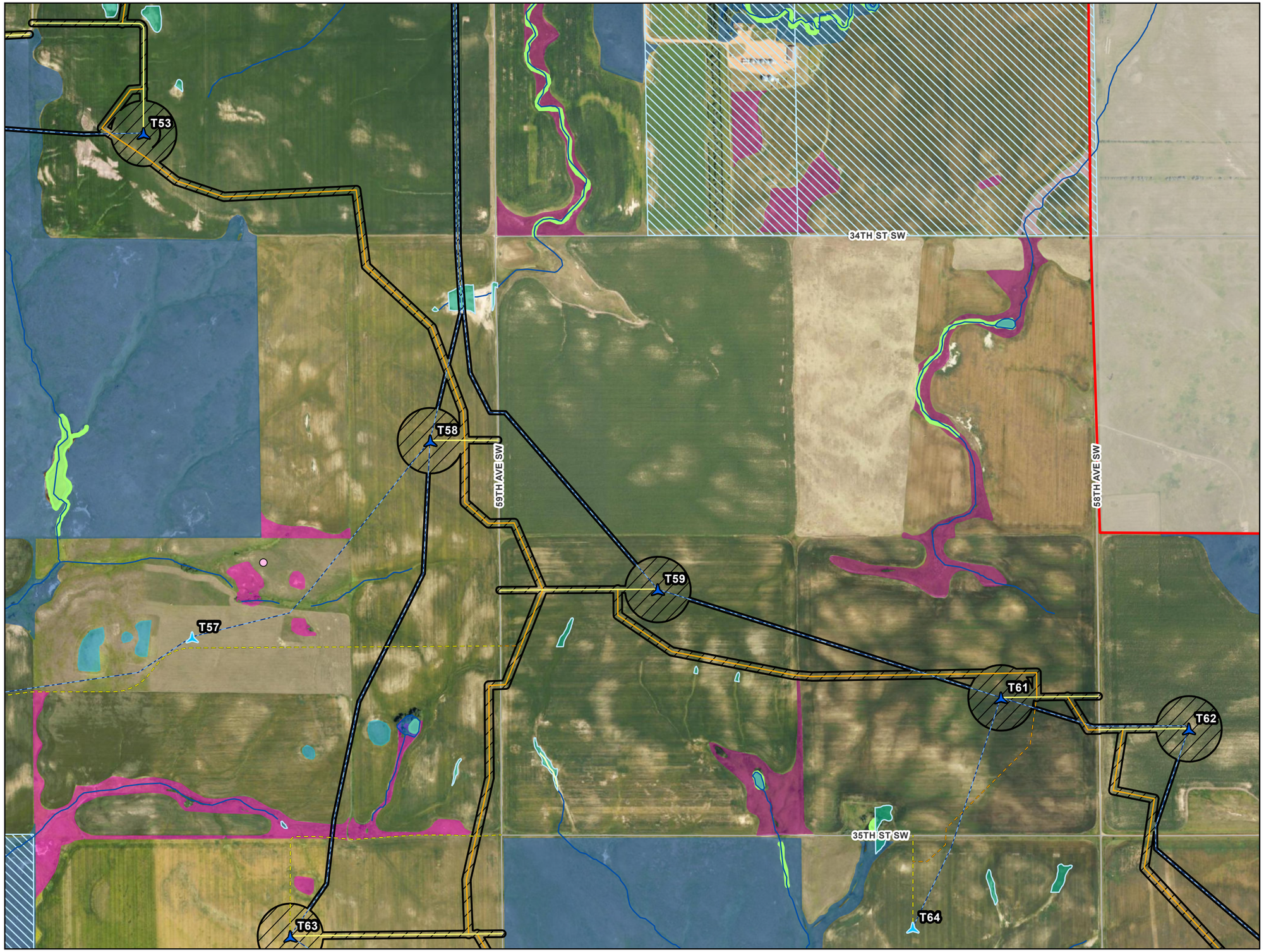

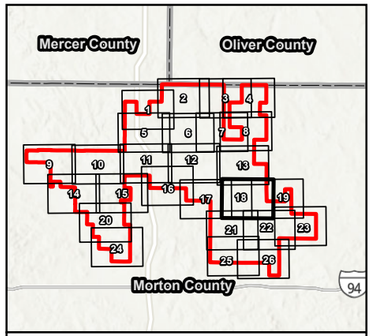

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N
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- Project Area
- Construction Easement
- Primary Turbine
- Alternate Turbine
- Primary Access Road
- Alternate Access Road
- Primary Crane Path
- Alternate Crane Path
- Collection Line
- Abandoned Mine
- Mineral Trust Land

Wetlands/Waterbodies

- Delineated Waterway
- Delineated Wetland
- NWI Wetland
- NHD Waterway
- NHD Waterbody

Grassland Sod Type

- Broken Grassland
- Broken Grassland (Desktop)
- Broken Grassland (Previous Survey)
- Unbroken Grassland
- Unbroken Grassland (Desktop)

Figure 12: Site Plan Detail

Longspur Wind Energy Center

Morton County, North Dakota

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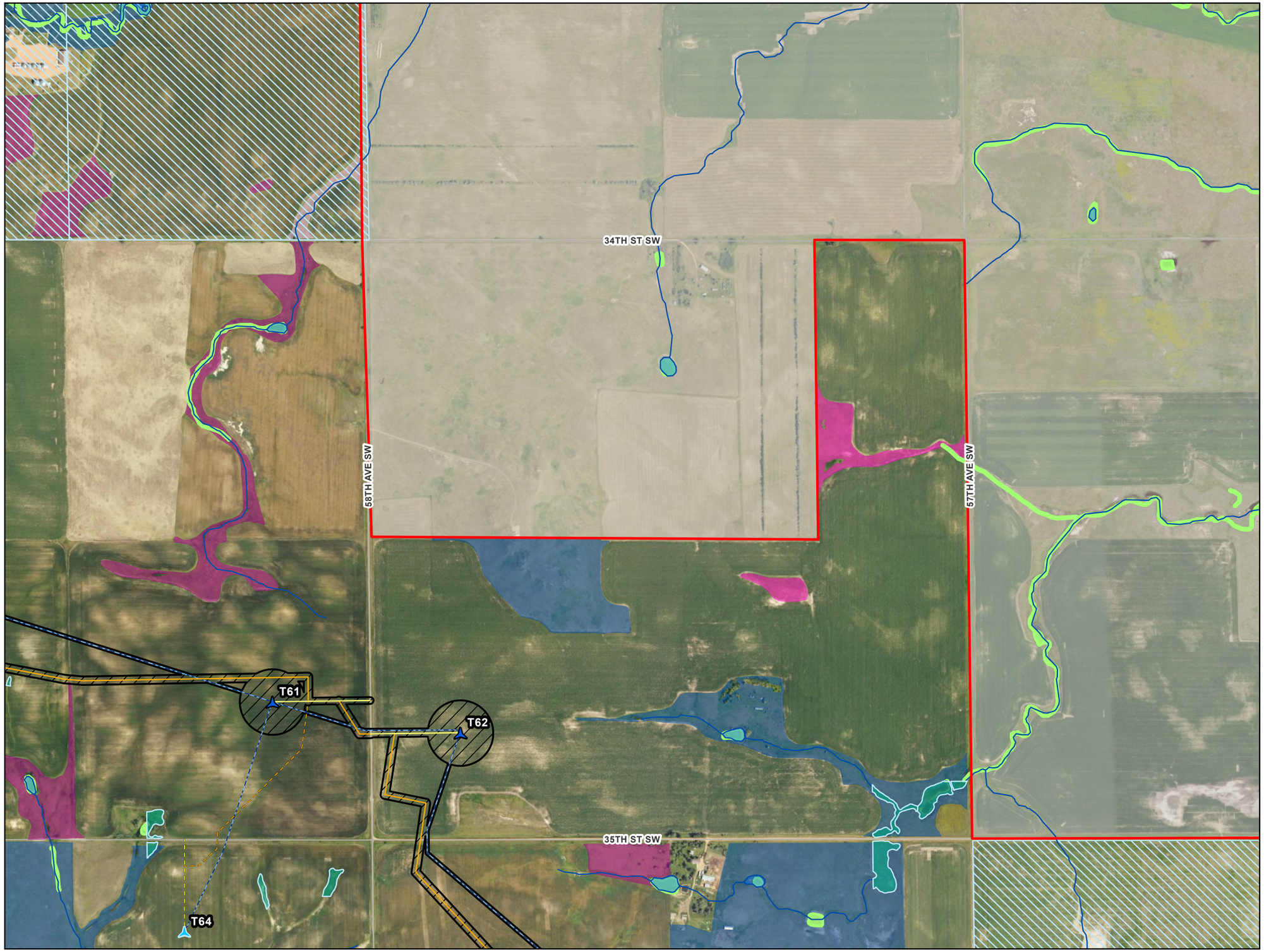

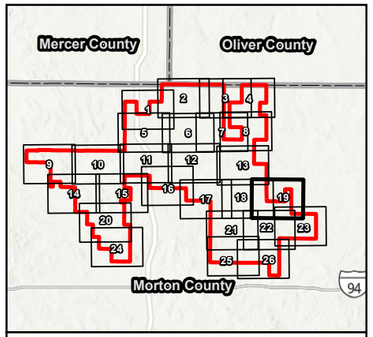

0 450 900 Feet

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N
W E
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- Project Area
- Construction Easement
- Primary Turbine
- Alternate Turbine
- Primary Access Road
- Alternate Access Road
- Primary Crane Path
- Alternate Crane Path
- Collection Line
- Mineral Trust Land

Wetlands/Waterbodies

- Delineated Waterway
- Delineated Wetland
- NWI Wetland
- NHD Waterway
- NHD Waterbody

Grassland Sod Type

- Broken Grassland
- Broken Grassland (Desktop)
- Broken Grassland (Previous Survey)
- Unbroken Grassland

Figure 12:
Site Plan Detail

Longspur Wind Energy Center

Morton County, North Dakota

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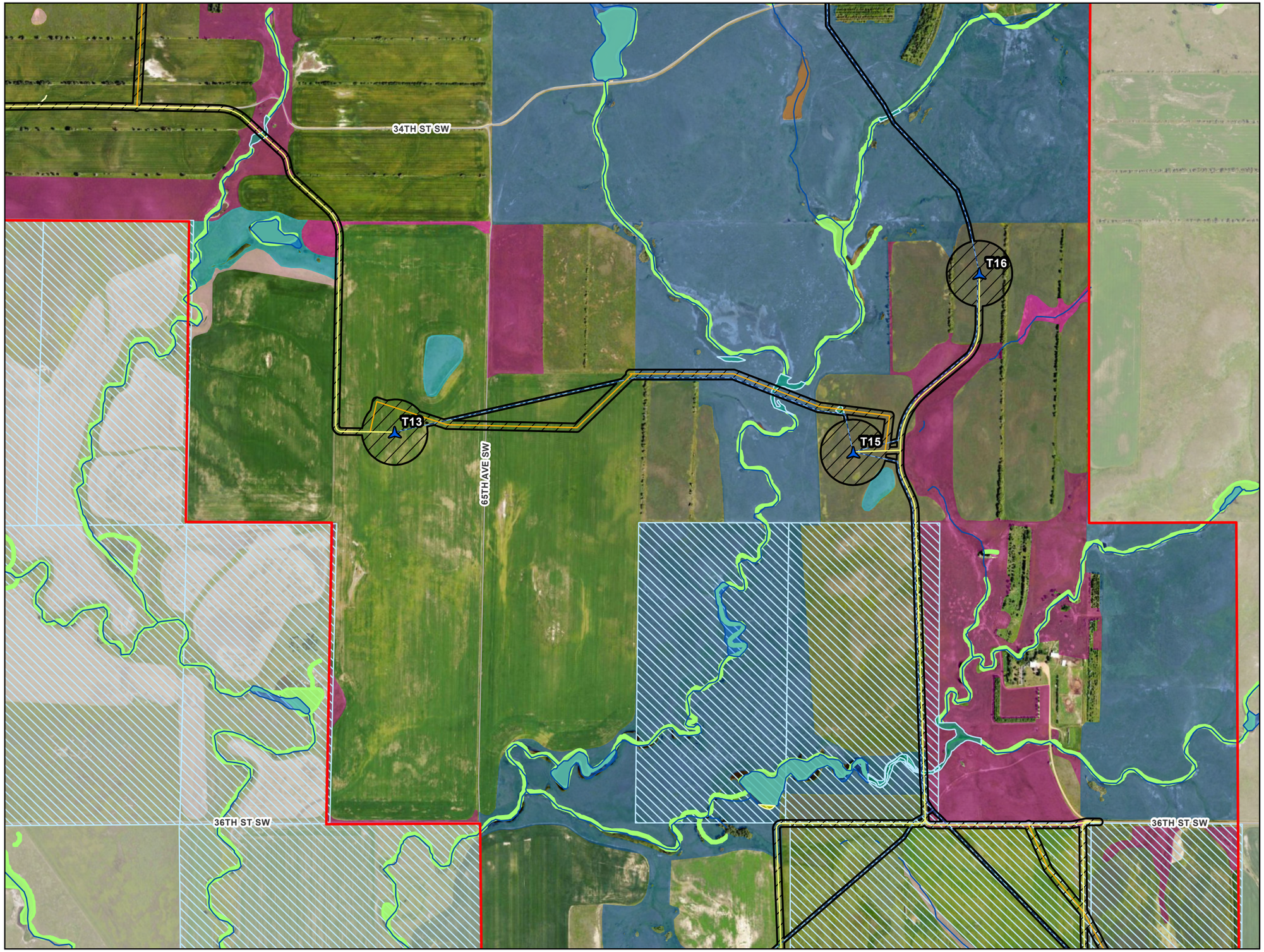

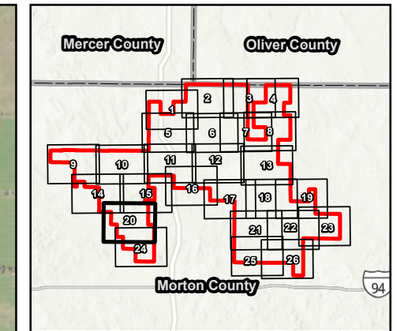

0 450 900 Feet

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N W E S

Project Area
Construction Easement
Primary Turbine
Primary Access Road
Primary Crane Path
Collection Line

Mineral Trust Land

Wetlands/Waterbodies

Delineated Waterway
Delineated Wetland
NWI Wetland
NHD Waterway
NHD Waterbody

Grassland Sod Type

Broken Grassland
Broken Grassland (Desktop)
Broken Grassland (Previous Survey)
Unbroken Grassland
Unbroken Grassland (Desktop)

Figure 12: Site Plan Detail

Longspur Wind Energy Center

Morton County, North Dakota

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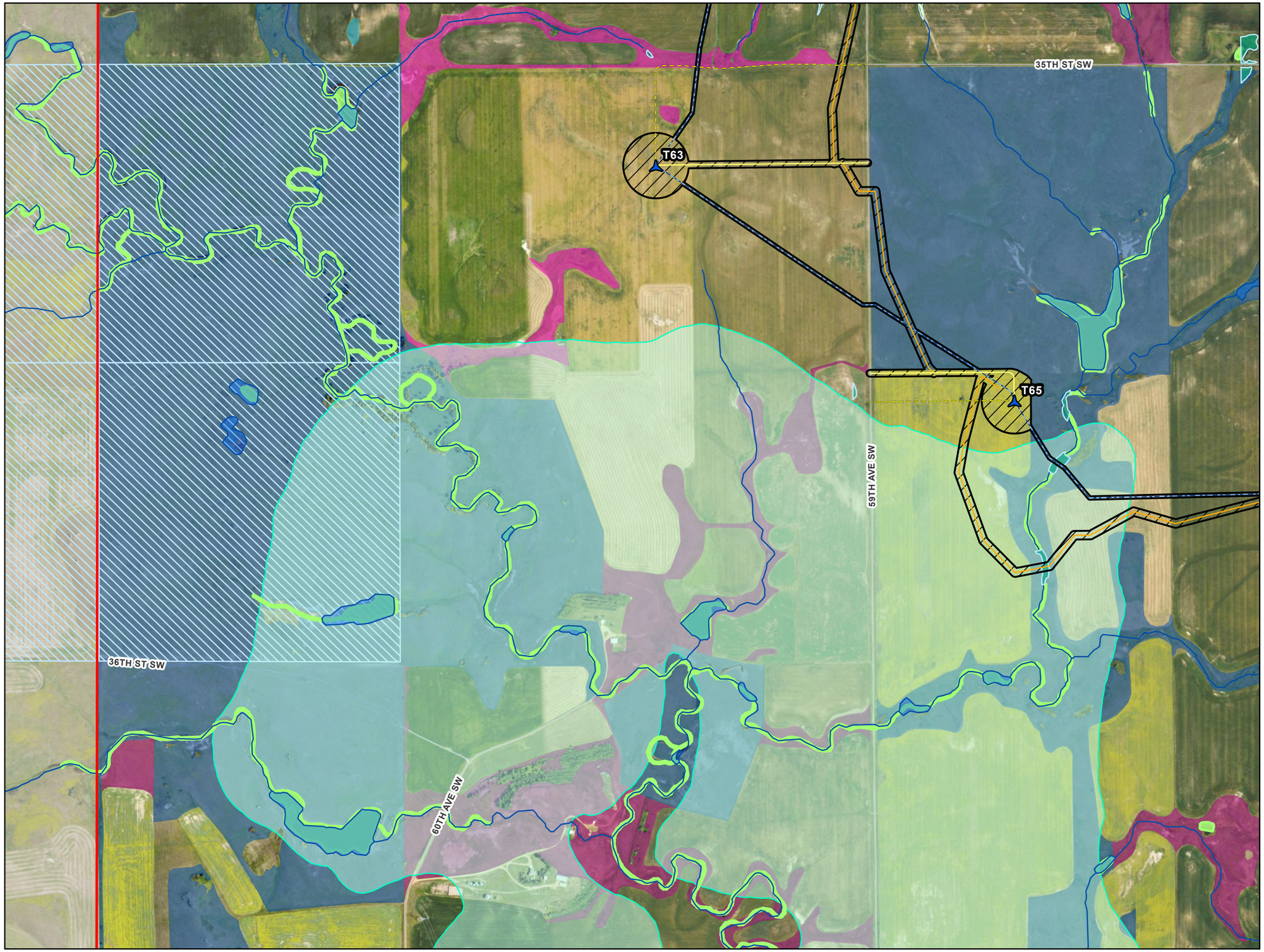

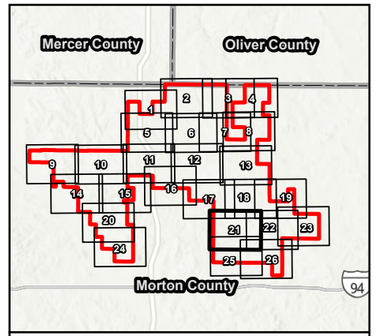

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- Project Area
- Construction Easement
- Primary Turbine
- Primary Access Road
- Alternate Access Road
- Primary Crane Path
- Collection Line
- Lignite Reserve
- Mineral Trust Land

Wetlands/Waterbodies

- Delineated Waterway
- Delineated Wetland
- NWI Wetland
- NHD Waterway
- NHD Waterbody

Grassland Sod Type

- Broken Grassland
- Broken Grassland (Desktop)
- Unbroken Grassland
- Unbroken Grassland (Desktop)

Figure 12:
Site Plan Detail

Longspur Wind Energy Center

Morton County, North Dakota

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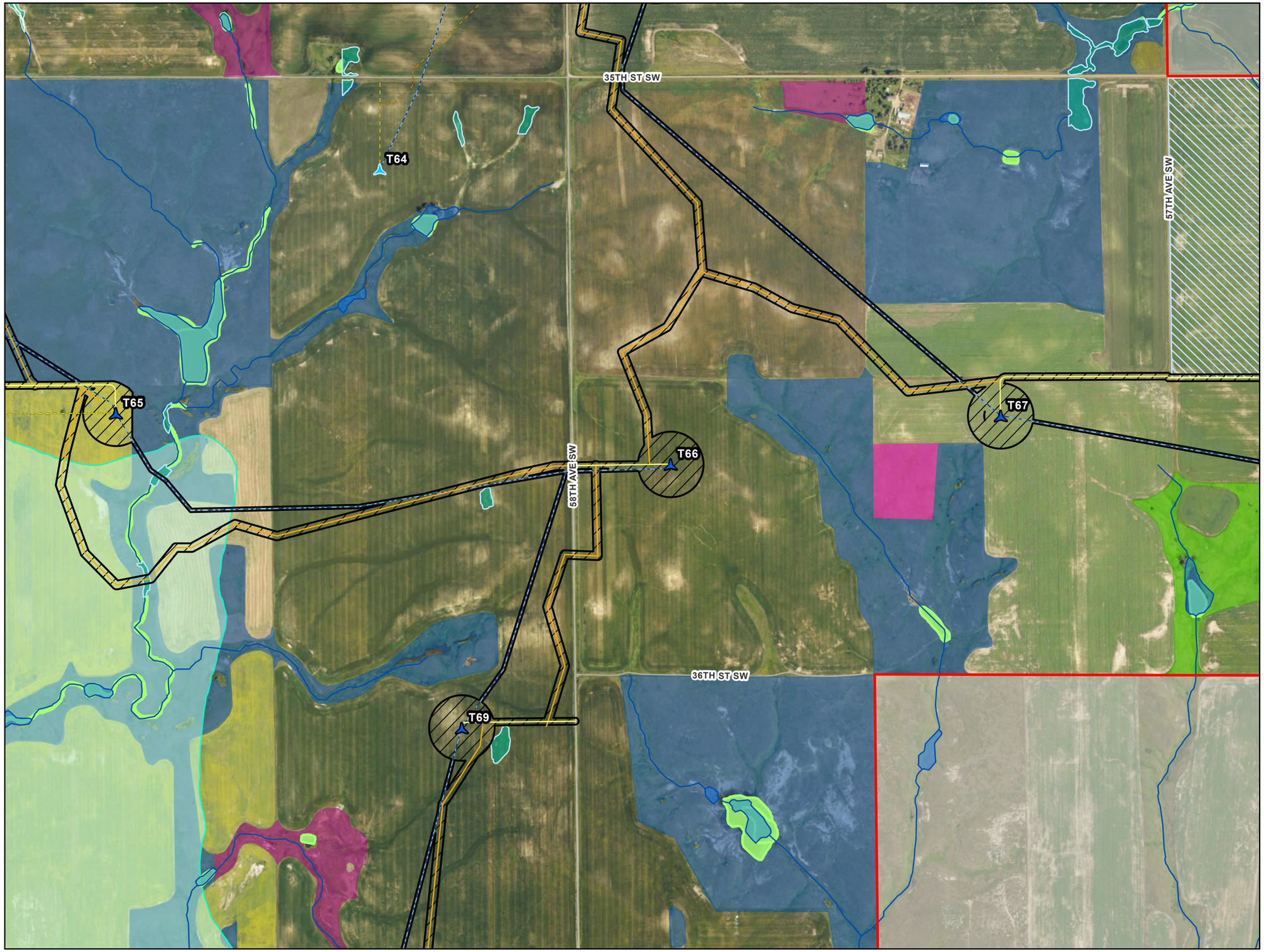

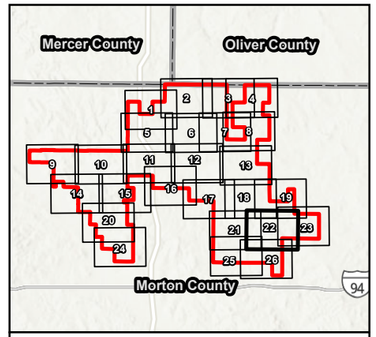

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N
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- Project Area
- Construction Easement
- Primary Turbine
- Alternate Turbine
- Primary Access Road
- Alternate Access Road
- Primary Crane Path
- Alternate Crane Path
- Collection Line

- Lignite Reserve
- Mineral Trust Land

Wetlands/Waterbodies

- Delineated Waterway
- Delineated Wetland
- NWI Wetland
- NHD Waterway
- NHD Waterbody

Grassland Sod Type

- Broken Grassland
- Broken Grassland (Desktop)
- Unbroken Grassland
- Unbroken Grassland (Previous Survey)

Figure 12: Site Plan Detail

Longspur Wind Energy Center

Morton County, North Dakota

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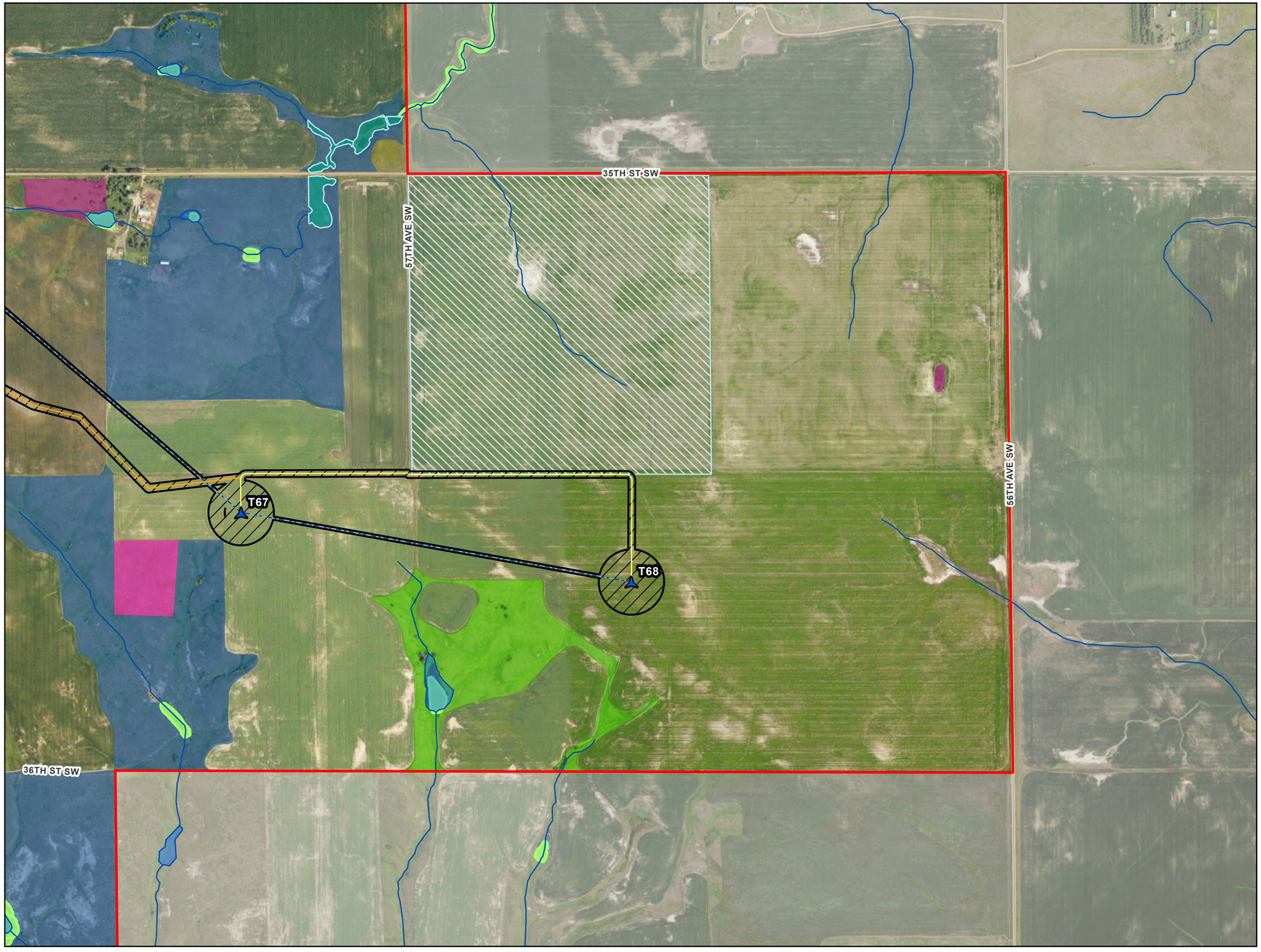

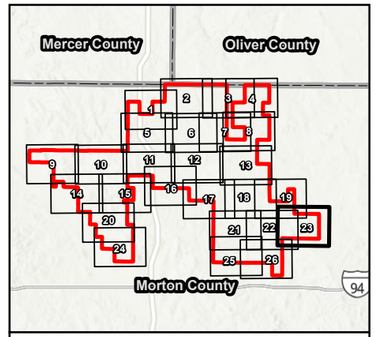

0 450 900 Feet

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N
W E
S

- Project Area
- Construction Easement
- Primary Turbine
- Primary Access Road
- Primary Crane Path
- Collection Line
- Mineral Trust Land

Wetlands/Waterbodies

- Delineated Waterway
- Delineated Wetland
- NWI Wetland
- NHD Waterway
- NHD Waterbody

Grassland Sod Type

- Broken Grassland
- Broken Grassland (Desktop)
- Unbroken Grassland
- Unbroken Grassland (Previous Survey)

Figure 12:
Site Plan Detail

Longspur Wind Energy Center

Morton County, North Dakota

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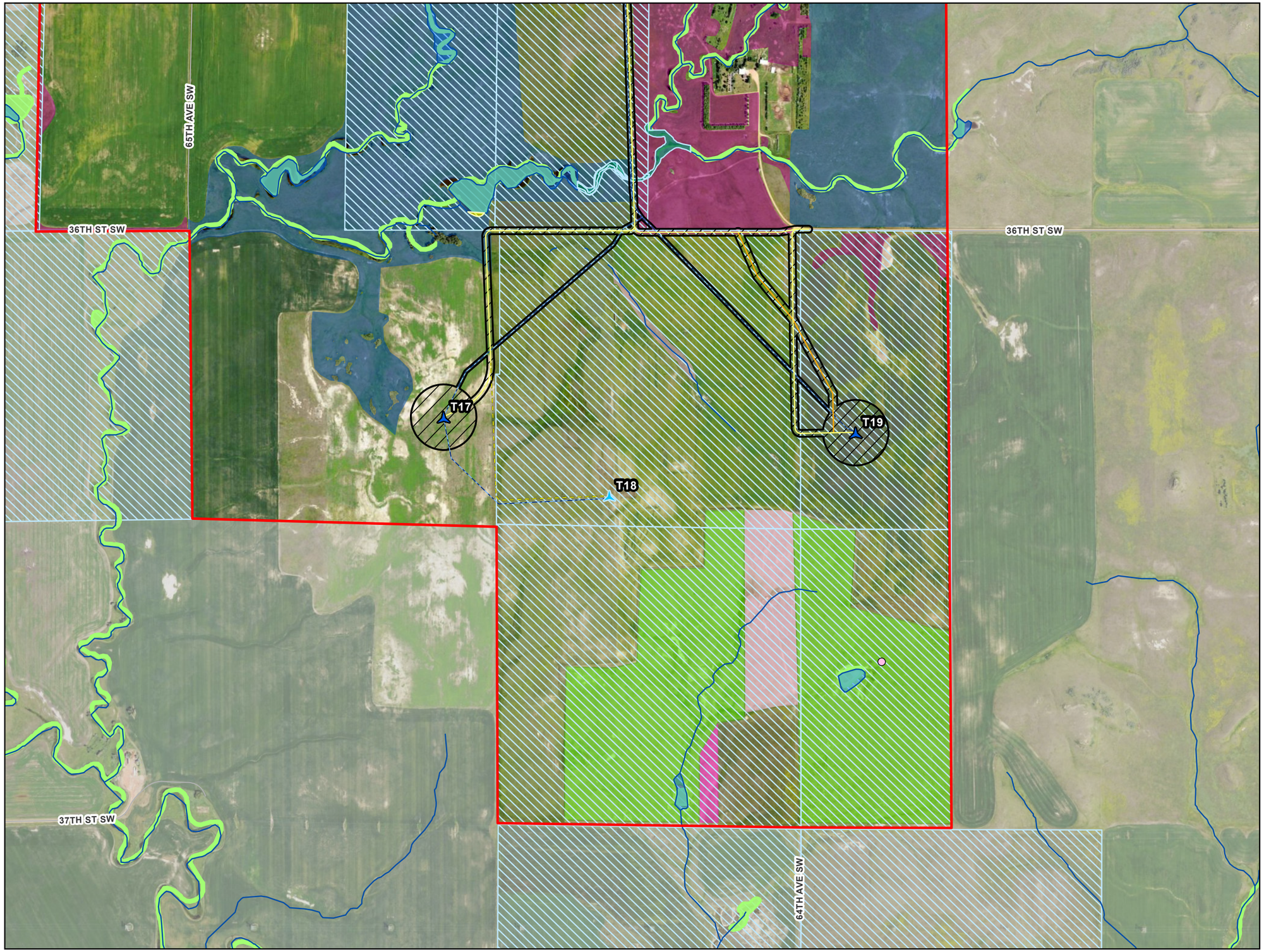

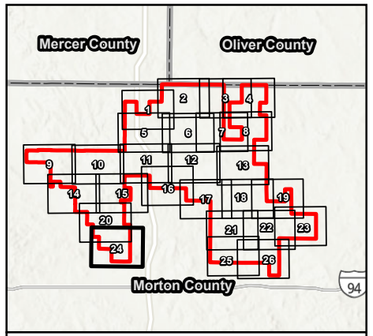

0 450 900 Feet

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N
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- Project Area
- Construction Easement
- Primary Turbine
- Alternate Turbine
- Primary Access Road
- Alternate Access Road
- Primary Crane Path
- Collection Line

- Abandoned Mine
- Mineral Trust Land

Wetlands/Waterbodies

- Delineated Waterway
- Delineated Wetland
- NWI Wetland
- NHD Waterway
- NHD Waterbody

Grassland Sod Type

- Broken Grassland
- Broken Grassland (Desktop)
- Broken Grassland (Previous Survey)
- Unbroken Grassland
- Unbroken Grassland (Previous Survey)

Figure 12:
Site Plan Detail

Longspur Wind Energy Center

Morton County, North Dakota

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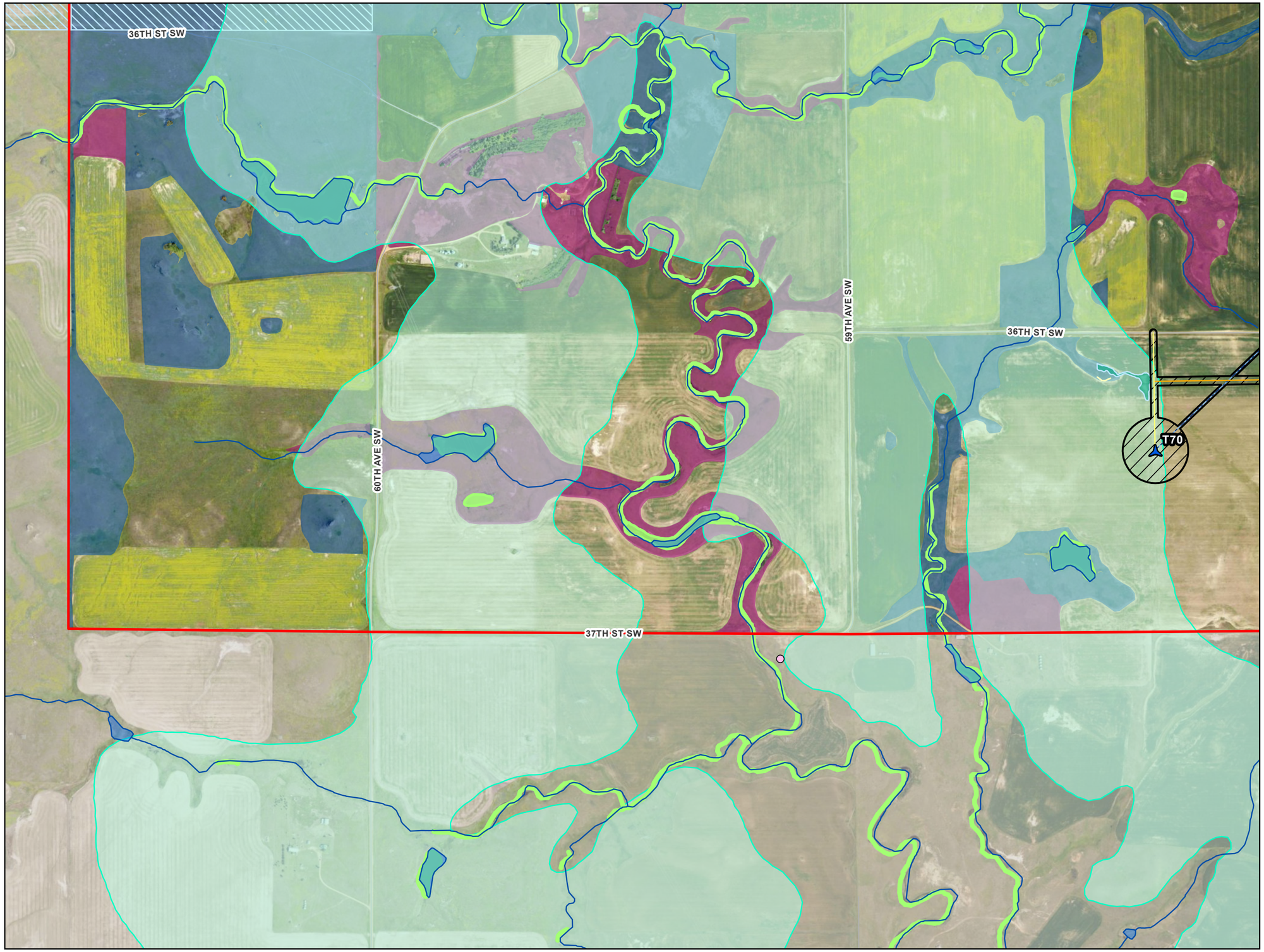

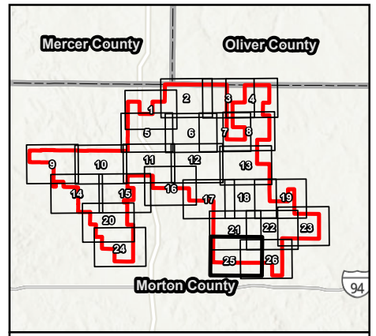

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N
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- Project Area
- Construction Easement
- Primary Turbine
- Primary Access Road
- Primary Crane Path
- Collection Line
- Abandoned Mine
- Lignite Reserve
- Mineral Trust Land

Wetlands/Waterbodies

- Delineated Waterway
- Delineated Wetland
- NWI Wetland
- NHD Waterway
- NHD Waterbody

Grassland Sod Type

- Broken Grassland
- Unbroken Grassland

Figure 12: Site Plan Detail

Longspur Wind Energy Center

Morton County, North Dakota

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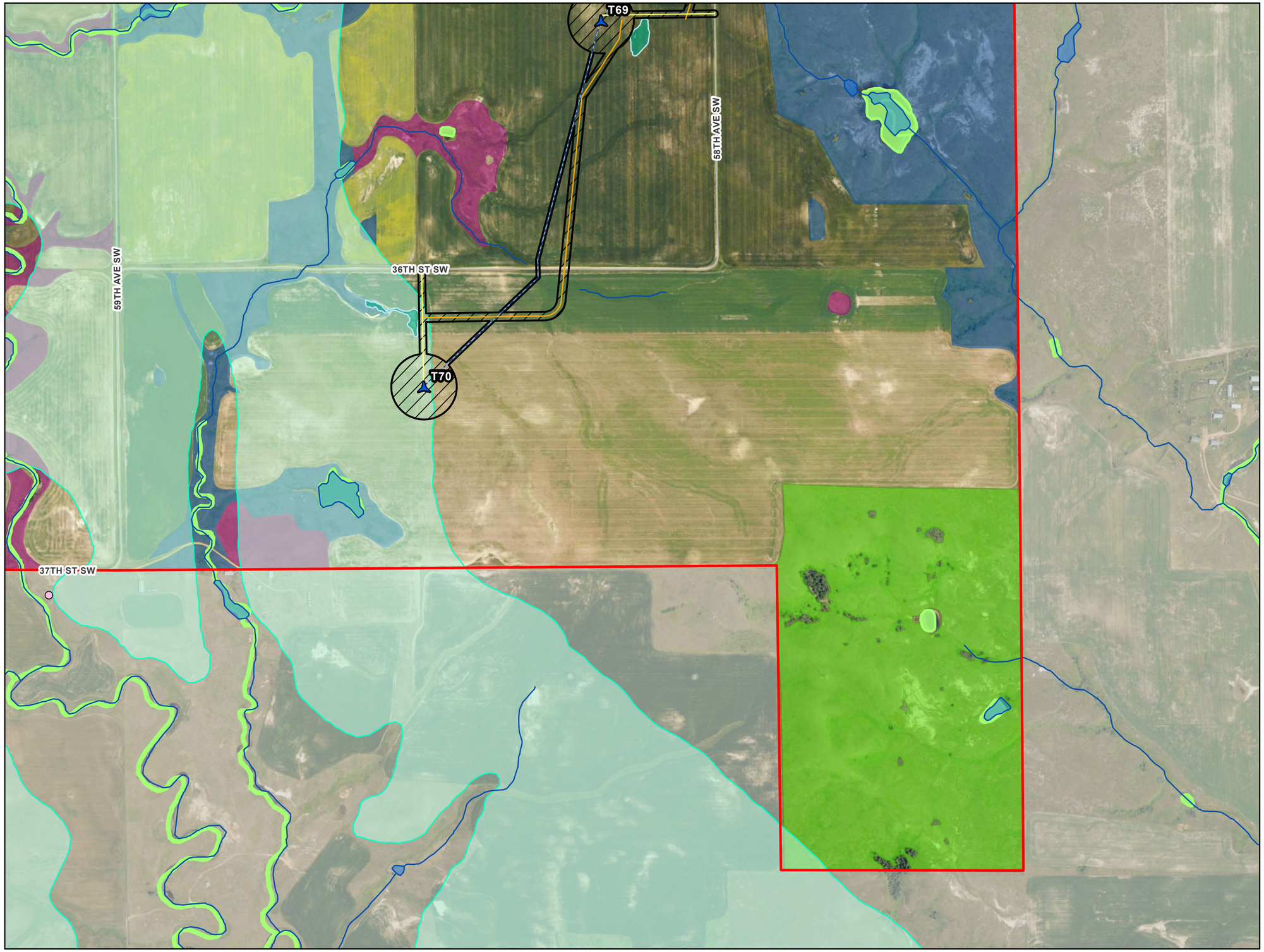

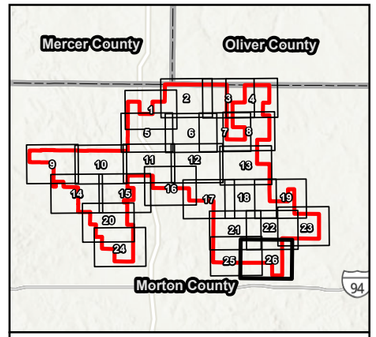

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N
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S

- Project Area
- Construction Easement
- Primary Turbine
- Primary Access Road
- Primary Crane Path
- Collection Line
- Abandoned Mine
- Lignite Reserve

Wetlands/Waterbodies

- Delineated Waterway
- Delineated Wetland
- NWI Wetland
- NHD Waterway
- NHD Waterbody

Grassland Sod Type

- Broken Grassland
- Unbroken Grassland
- Unbroken Grassland (Previous Survey)

Figure 12:
Site Plan Detail

Longspur Wind Energy Center

Morton County, North Dakota

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Date: (12/15/2025)

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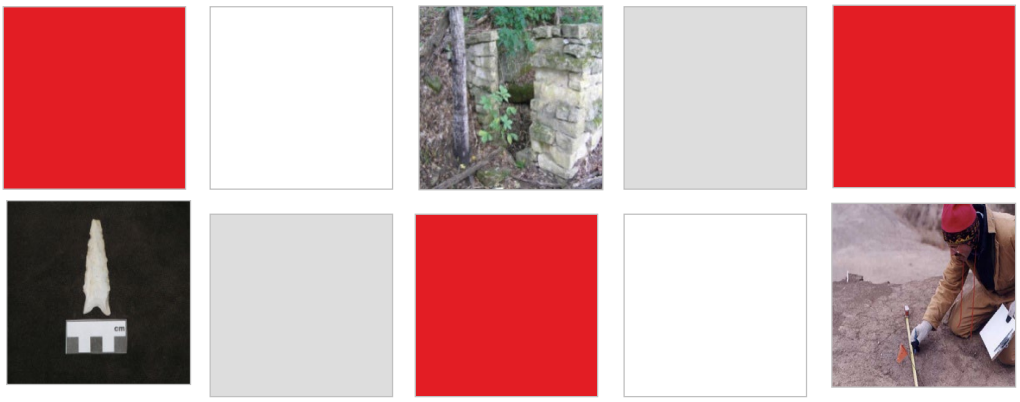
APPENDIX A
Unanticipated Discovery Plan



Minnesota Power

Unanticipated Discovery Plan for the Longspur Wind Project
Morton County, North Dakota

PREPARED BY

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December 2025

merjent®

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ACRONYMS AND ABBREVIATIONS

m	meter
Merjent	Merjent, Inc.
NDAC	North Dakota Administrative Code
NDCC	North Dakota Century Code
NRHP	National Register of Historic Places
O&M	operations and maintenance
Plan	Unanticipated Discovery Plan
Project	Longspur Wind Project
SHSND	State Historical Society of North Dakota

1.0 INTRODUCTION

This Unanticipated Discovery Plan (Plan) documents the procedures to be implemented in the event that cultural resources are discovered during construction of the Longspur Wind Project (Project). Minnesota Power is proposing a Project located on privately owned lands in Morton County, North Dakota. Minnesota Power retained Merjent, Inc. (Merjent) to complete this Plan in support of the North Dakota Public Service Commission's Combined Certificate of Corridor Compatibility and Route Permit application.

Significant historical or archaeological artifacts or sites located on lands under the jurisdiction of the State of North Dakota or its political subdivisions are protected under Section 55-02-07 of the North Dakota Century Code (NDCC). Furthermore, NDCC Section 23-06-27 and North Dakota Administrative Code (NDAC) Section 40-02-03 provide special protection of human burial sites, human remains, and burial goods. In accordance with applicable North Dakota laws and regulations, this Plan contains procedures for addressing cultural resource discoveries identified by construction personnel during construction of the Project, including procedures for the initial treatment of discoveries, the evaluation and treatment of discoveries, and the treatment of human remains.

A Class I and Class III cultural resource inventory was performed for the Project area (Reinhart and Cox 2025). The Class III pedestrian survey of the Project was completed on January 31, 2025, March 5 through 14, 2025, April 9, 2025, April 14 through 18, 2025, April 23, 2025, and May 26, 2025. During the survey, two new historic sites, two new precontact sites, and five new isolated finds were identified. Of the new sites, isolated finds, and previously identified sites, four are recommended as unevaluated or potentially eligible for listing on the National Register of Historic Places (NRHP). Merjent recommends avoidance of four of the nine new resources. Merjent searched for a previously recorded historic site lead, but no evidence of past activity was identified during the survey for a proposed access road, which is an existing crowned and ditched county road; therefore, no further work is recommended for the resource in this area. Similarly, a previously recorded historic site was originally noted as being covered in this area by a modern crowned and ditched county road. No evidence of past activity was identified during the survey for proposed operations and maintenance (O&M) work areas to the north of the existing road. No further work is recommended for the resources in this area. The other 10 sites and isolated finds are recommended as not eligible for listing. No further work or avoidance is recommended for those resources. Merjent recommends that no significant sites will be affected by the proposed Project provided there is implementation of the above-mentioned avoidance measures. No further archaeological work is recommended for the Project as planned.

Merjent completed a Class III report, which included the results of pedestrian surveys for turbine locations, access roads, O&M locations, Aircraft Detection Lighting System radar and meteorological evaluation tower locations, and limited shovel testing. The report was submitted to the State Historical Society of North Dakota (SHSND), and comments were received on October 22, 2025. Revisions to the report were made and an updated copy was submitted for review on November 19, 2025 (Reinhart and Cox 2025). Additional Class III surveys of crane paths, collector lines, access roads, workspaces and laydown yards were conducted from October 21st to November 14, 2025. During the additional surveys, five precontact sites and two historic sites were identified, along with eleven precontact isolated finds/site leads. One previously recorded historic site, one previously recorded historic site lead, and one previously recorded precontact isolated find were revisited. Merjent recommends that all new resources remain unevaluated in regard to eligibility for listing in

the NRHP, and the sites be avoided pending additional evaluative work. Merjent recommends that no further work is needed for all three of the previously recorded sites that were revisited during the additional survey and that no significant sites will be affected. A report of the findings and associated site forms is in preparation and will be submitted to the SHSND in December 2025.

This Plan has been prepared because the potential exists for exposure of previously unidentified or buried cultural material within the project route during mechanical excavation.

2.0 QUALIFICATIONS

2.1 CONSTRUCTION PERSONNEL

Training is necessary to ensure construction personnel recognize potential archaeological resources. All Minnesota Power responsible parties and construction personnel will meet with Minnesota Power representatives for basic training prior to participating in construction. This training will provide orientation regarding recognition of cultural resources as well as a general overview of the culture history of the region, so that construction personnel are familiar with the types of archaeological resources that may be encountered during construction. The training will also outline the steps to be followed in the event of a significant archaeological discovery during construction (e.g., the discovery of human remains). The following items will be reviewed during the training program.

- Definition of a discovery and examples of discoveries.
- Steps towards discovery protection until such time as they can be properly evaluated by a qualified archaeologist.
- Proper notification of the appropriate Minnesota Power personnel.
- The necessity of reporting discoveries in a timely manner and complying with the other stipulations provided in this Plan.
- The need to treat any human skeletal remains that are encountered with dignity and respect.
- Penalties for failure to report discoveries or to comply with the procedures outlined in this Plan.

3.0 DISCOVERY DEFINITION

Archaeological discoveries consist of evidence of human activity that is more than 50 years old with potential to yield data pertinent to regional history and prehistory. Prehistoric discoveries include, but are not limited to, features (e.g., small hearth features, house pit features, storage features), artifact concentrations, and activity areas. Historic discoveries include, but are not limited to, features (e.g., historic hearths, trash deposits, structures, old canals, roads), artifact concentrations, and activity areas. Small concentrations of non-human bone will not be considered discoveries.

4.0 PROCEDURES FOR ADDRESSING DISCOVERIES IDENTIFIED BY CONSTRUCTION PERSONNEL

The following procedures will be initiated in the event unanticipated cultural resources are discovered. A flow chart presenting an abbreviated version of the procedures is provided in Appendix A. When a discovery is encountered, the construction activity that resulted in the exposure of the discovery will be immediately halted and the construction manager will be notified. The construction manager in turn will notify the Minnesota Power project manager.

Minnesota Power's responsible party involved in unanticipated discoveries of archaeological materials will order construction contractors to suspend ground-disturbing activities adjacent to the discovery. Cessation of ground-disturbing activity will encompass a sufficient area to protect the discovery and provide a buffer zone for adequate and safe investigation of the discovery and any associated features or artifacts. A recommended guideline for the buffer zone is at least 100 feet (30 meters [m]) around the discovery, but its size can be adjusted to protect the discovery adequately without unnecessary hindrance to construction. Visual barriers such as temporary fencing will be placed around the discovery area to protect it from further disturbance. Vehicle traffic within the vicinity may need to be limited or halted until the discovery is inspected.

Minnesota Power's responsible party will then notify and consult an archaeologist qualified under NDAC Section 40-02-02 to review the discovery. In the event a qualified archaeologist is not immediately available, photographs of the discovery may be transmitted to the archaeologist for review, at which time the archaeologist will determine if a field visit is required. During the review phase, suspension of all work and vehicle traffic in the buffered area is required. If the archaeologist determines that the discovery is non-cultural, Minnesota Power will be notified and the halted construction activity can resume.

If the discovery is deemed cultural and a field visit is required, the archaeologist will be scheduled for an on-site visit as soon as possible. In the meantime, Minnesota Power's responsible party will notify the construction manager to suspend work within the buffered discovery area until the field visit by the archaeologist occurs. During the field visit, the archaeologist will determine whether the discovery is potentially significant.

5.0 TREATMENT OF DISCOVERIES BY ARCHAEOLOGICAL PERSONNEL

When a discovery is reviewed by an archaeologist, the discovery will be fully recorded according to approved standards. The initial treatment of any discovery will consist of recording the location of the discovery; recording summary data concerning the feature(s) and/or other remains (including dimensions, qualitative characteristics, and associated remains); photographing the discovery and the overall context of the exposed material; and profiling trench walls containing cultural features or strata (where safe and prudent). The feature(s) will then be excavated and a sample or all feature fill will be collected for laboratory analysis including pollen studies, flotation, and carbon dating as appropriate. Feature plans and profiles will be drawn. Features will be photographed. Uncollected feature fill will be screened using 0.25-inch mesh. If necessary, additional horizontal exposure of sediments/deposits around the feature may be investigated to evaluate the feature context.

When appropriate, the location around the discovered cultural material will be tested to determine the extent of the cultural material. Testing can include, but is not limited to, excavation of controlled units over and around the feature area or placement of test units

and/or auger probes. Testing will be designed to identify the nature and extent of the discovery and any associated activity area(s) or other features, if present. Collection of a discovery will occur when appropriate.

6.0 AGENCY NOTIFICATION AND REPORTING

If a discovery is deemed potentially significant, Minnesota Power and the archaeologist will consult and coordinate with a Principal Investigator to determine the next course of action. If necessary, the Principal Investigator will coordinate with the SHSND to propose procedures for further treatment of the discovery, while minimizing impacts to the construction schedule to the extent possible. Suspended construction activities in the discovery area may not proceed until approval has been obtained from the SHSND and other involved agencies and parties.

A report detailing all cultural resources identified, recorded, tested, and/or excavated during the construction phase of the Project, regardless of significance, will be prepared by the archaeologist and submitted to the SHSND for review.

7.0 SPECIAL PROCEDURES FOR DISCOVERIES OF HUMAN REMAINS

Should human remains be encountered during construction of the Project, per the protocol outlined above, all work will be immediately halted at the general location of the discovery. This location will be immediately secured, including a buffer zone of 100 feet (30 m) surrounding the discovery. Construction personnel and vehicles will promptly vacate the buffer zone. Vehicle traffic within the buffer zone will be limited to that necessary to remove vehicles and equipment from the buffer zone. Care will be taken to prevent any disturbance of the potential human remains during removal of vehicles and equipment. Until appropriate consultation has occurred, the discovery will remain protected from any disturbance, such that no remains or associated artifacts are touched, moved, or collected.

Following notification of the construction manager and Minnesota Power project manager, Minnesota Power will immediately notify local law enforcement, the county coroner, and the SHSND. Contact information for relevant parties is listed in Table 7.0-1.

TABLE 7.0-1
Contact Information

Contact/Agency	Telephone	Address
County Sheriff's Office, Morton County, North Dakota	701.667.3330	205 1st Ave NW, Mandan, ND 58554
Coroner, Morton County Medical Examiner and Coroner, Mandan, North Dakota	701.667.1000	2008 Twin City Drive, Mandan, ND 58554
Chief Archaeologist (Andrew Robinson), Archaeology and Historic Preservation Division, State Historical Society of North Dakota	701.328.2666	612 East Boulevard Avenue Bismarck, North Dakota 58505 arobinson@nd.gov

The coroner and local law enforcement will make the official ruling on the nature of the remains, being either forensic or archaeological. The subsequent treatment of the discovery, including custody of the remains, will follow guidelines set forth in the NDCC Chapter 23-06 and NDAC Section 40-02-03, as follows.

- If the remains are deemed forensic (non-archaeological), the county coroner will retain custody of the remains and determine the plan of action.

- If the remains are deemed to be archaeological (historic or prehistoric) in nature, within 24 hours of notification, the SHSND will send a staff member to evaluate the remains and determine the race and age of the remains, if possible. The subsequent plan of action will depend on the race of the burial.
    - If human remains are determined to be non-Native American, the SHSND will retain custody of the burial and, following consultation with appropriate parties, determine a plan of action.
    - If the human remains are determined to be Native American or of unknown race, the remains will be left in place and protected from any form of disturbance until a plan for their protection or removal can be generated. The SHSND will contact and consult with the North Dakota Intertribal Reinterment Committee to determine the subsequent plan of action.

A flow chart presenting an abbreviated version of the procedures to be followed should human remains be encountered is provided in Appendix B.

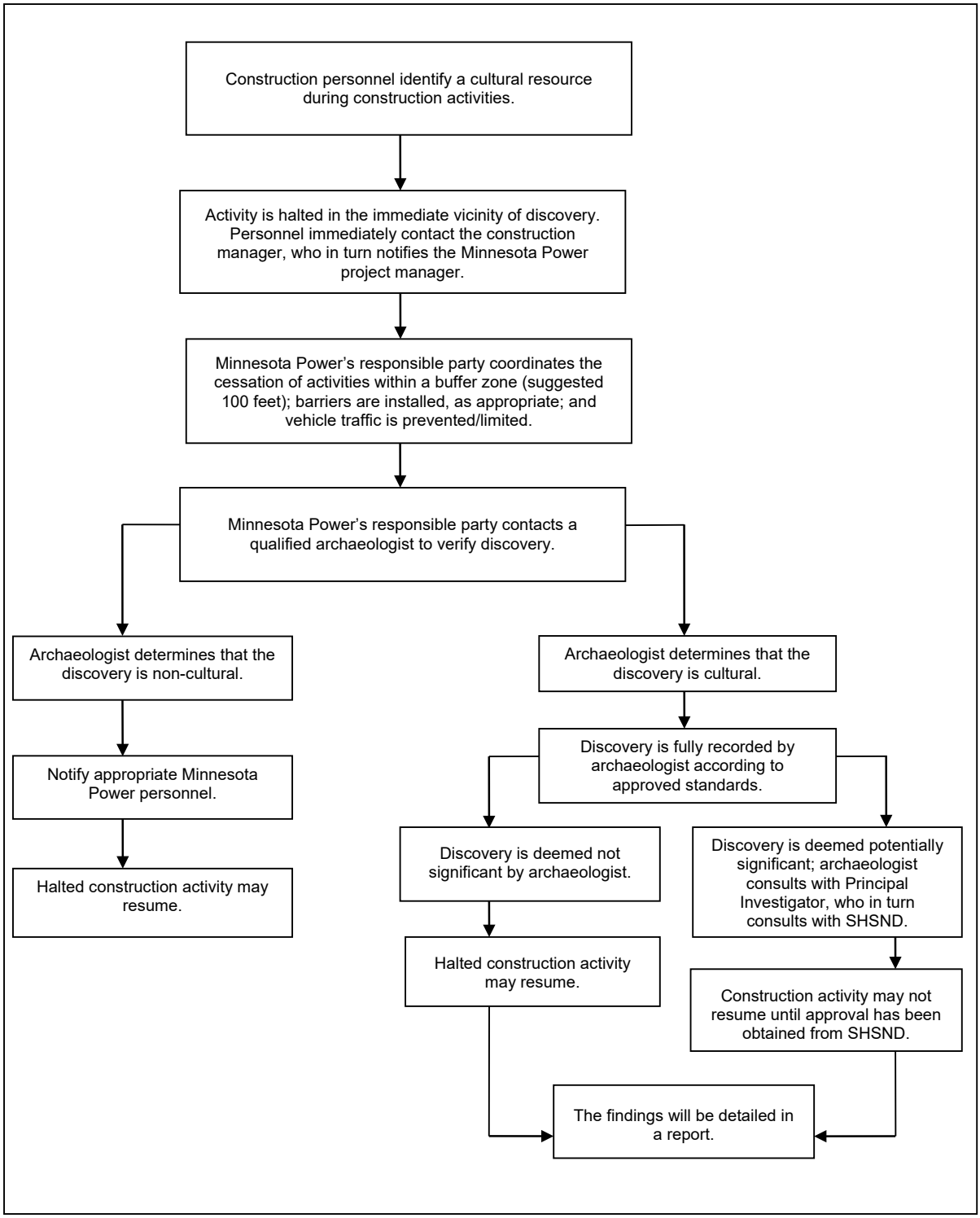
8.0 REFERENCES CITED

Reinhart, Damien and Matthew Cox. 2025. *A Class I and III Cultural Resources Inventory of the Minnesota Power Longspur Windfarm Project, Morton and Mercer Counties, North Dakota*. Submitted to the State Historical Society of North Dakota by Merjent, Inc. Minneapolis, MN.

APPENDIX A

Procedures for Addressing Cultural Resource Discoveries by Construction Personnel

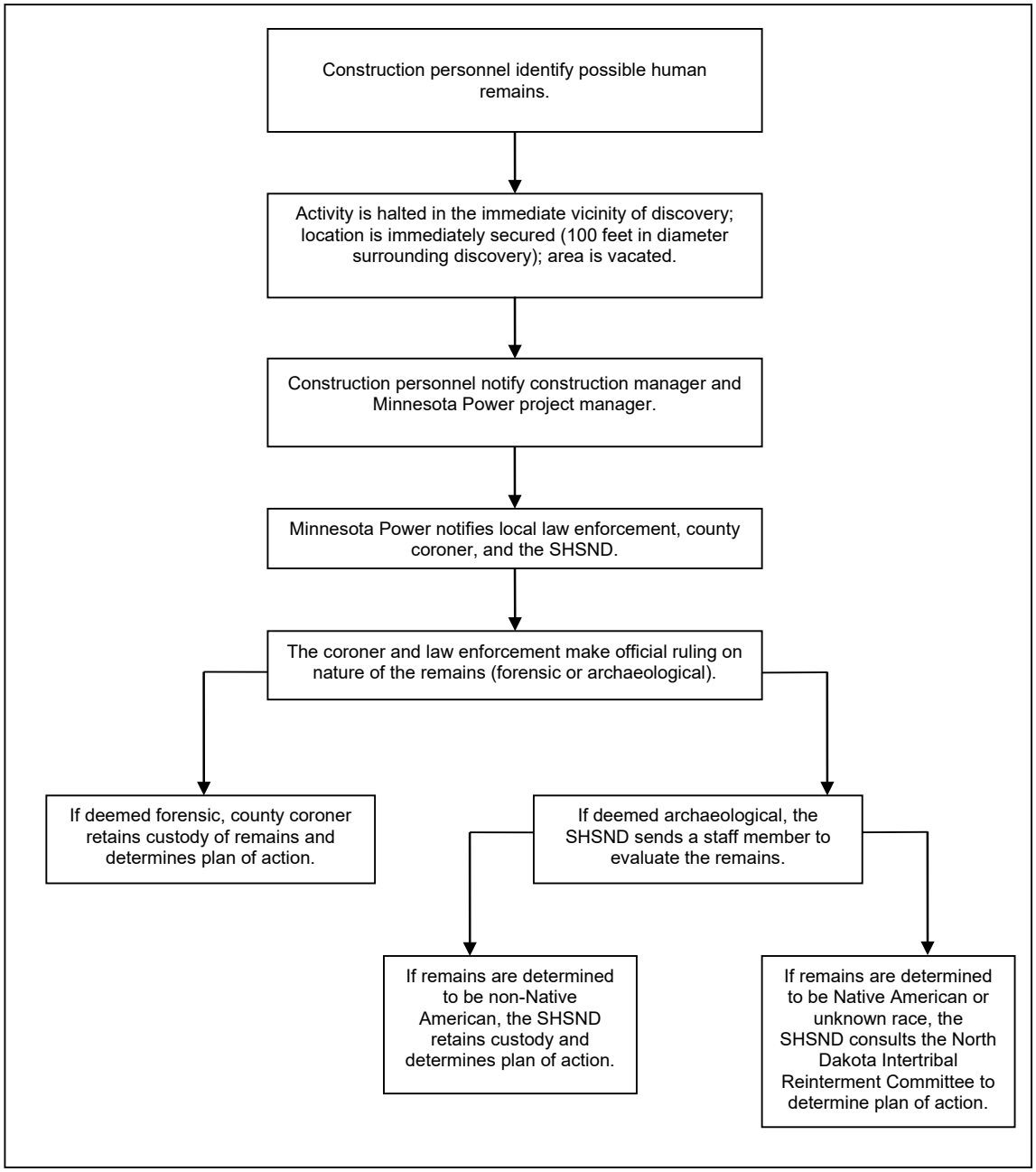
Procedures for Addressing Cultural Resource Discoveries by Construction Personnel



APPENDIX B

Procedures for the Treatment of Unanticipated Discovery of Human Remains

Procedures for the Treatment of Unanticipated Discovery of Human Remains



APPENDIX B
Studies and Assessments

Studies and Assessments

B1. Microwave Study

Wind Power GeoPlanner™

Microwave Study

Longspur



Prepared on Behalf of
ALLETE

August 13, 2024

COMSEARCH
A CommScope Company

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1. Introduction

Microwave bands that may be affected by the installation of wind turbine facilities operate over a wide frequency range (900 MHz – 23 GHz). Comsearch has developed and maintains comprehensive technical databases containing information on licensed microwave networks throughout the United States. These systems are the telecommunication backbone of the country, providing long-distance and local telephone service, backhaul for cellular and personal communication service, data interconnects for mainframe computers and the Internet, network controls for utilities and railroads, and various video services. This report focuses on the potential impact of wind turbines on licensed, proposed and applied non-federal government microwave systems.

2. Project Overview

Project Information

Name: Longspur
County: Morton
State: North Dakota

Number of Turbines: TBD
Blade Diameter: TBD
Tip Height: 192 meters



Figure 1: Area of Interest

3. Fresnel Zone Analysis

Methodology

Our obstruction analysis was performed using Comsearch's proprietary microwave database, which contains all non-government licensed, proposed and applied paths from 0.9 - 23 GHz[1]. First, we determined all microwave paths that intersect the area of interest[2] and listed them in Table 1. These paths and the area of interest that encompasses the planned turbine locations are shown in Figure 2.

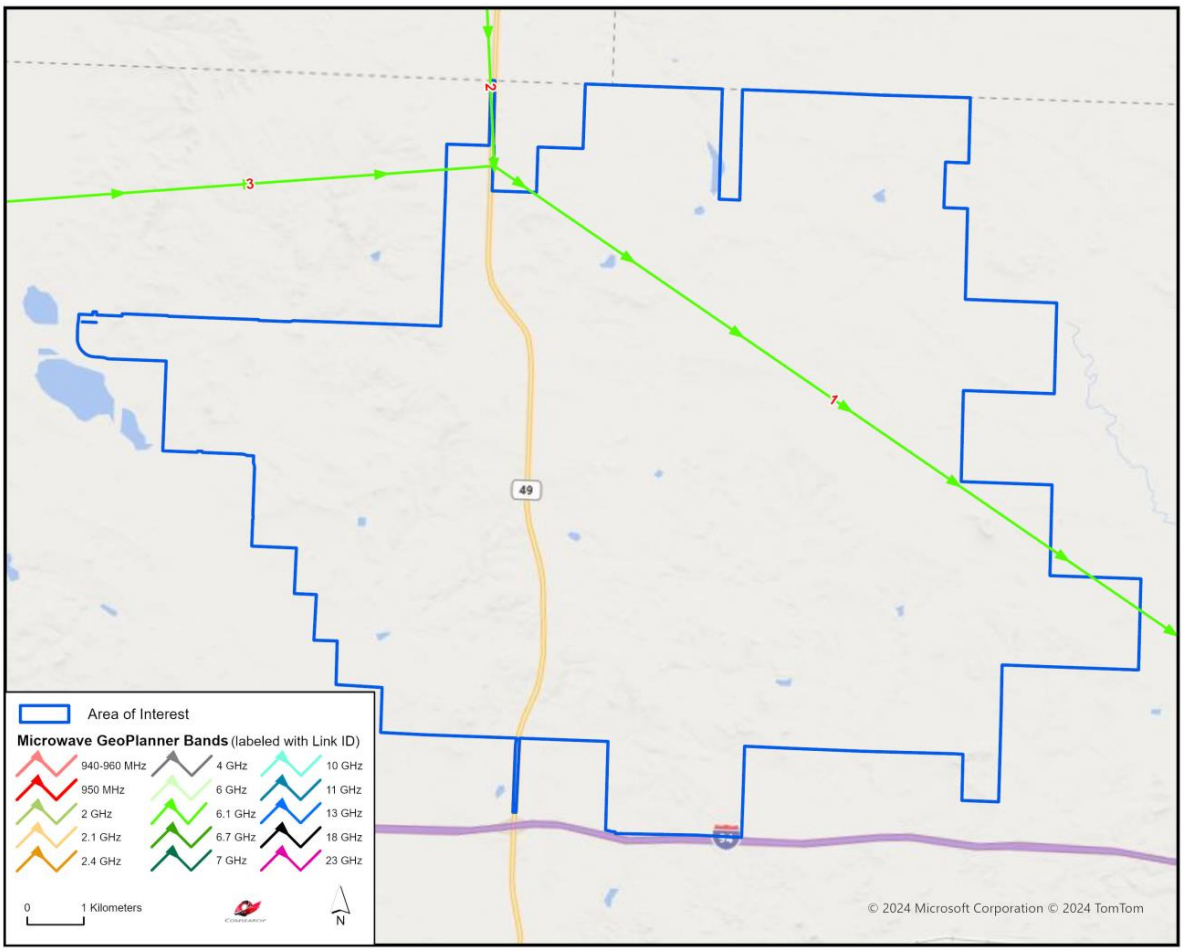


Figure 2: Microwave Paths that Intersect the Area of Interest

[1] Please note that this analysis does not include unlicensed microwave paths or federal government paths that are not registered with the FCC.

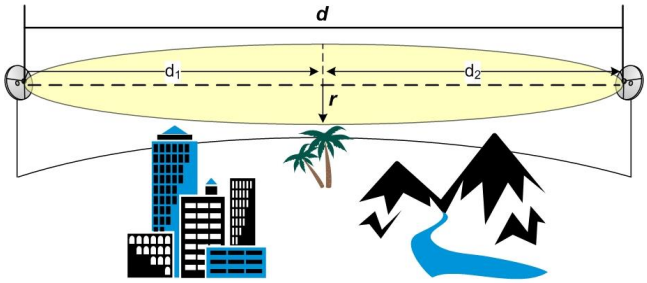
[2] We use FCC-licensed coordinates to determine which paths intersect the area of interest. It is possible that as-built coordinates may differ slightly from those on the FCC license.

ID	Status	Callsign 1	Callsign 2	Band	Path Length (km)	Licensee
1	Licensed	WEH426	WEH428	6.1 GHz	34.89	Basin Electric Power Cooperative
2	Licensed	WEH427P	WEH426	6.1 GHz	44.83	Basin Electric Power Cooperative
3	Licensed	WHJ617	WEH426	6.1 GHz	46.80	Basin Electric Power Cooperative

Table 1: Summary of Microwave Paths that Intersect the Area of Interest
(See enclosed mw_geopl.xlsx for more information and
GP_dict_matrix_description.xls for detailed field descriptions)

Next, we calculated a Fresnel Zone for each path based on the following formula:

$$r \cong 17.3\sqrt{\frac{n}{F_{GHz}}\left(\frac{d_1 d_2}{d_1 + d_2}\right)}$$



Where,

r	=	Fresnel Zone radius at a specific point in the microwave path, meters
n	=	Fresnel Zone number, 1
F_{GHz}	=	Frequency of microwave system, GHz
d_1	=	Distance from antenna 1 to a specific point in the microwave path, kilometers
d_2	=	Distance from antenna 2 to a specific point in the microwave path, kilometers

The calculated Fresnel Zone shows the narrow area of signal swath and is calculated for each microwave path in the project area. In general, this is the area where the planned wind turbines should be avoided, if possible. Likewise, Comsearch recommends that an area directly in front of each microwave antenna should be avoided. This corresponds to the Consultation Zone which measures 1 kilometer along the main beam of the antenna and 24 ft (7.3 meters) wide. A depiction of the individual Fresnel and Consultation Zones is shown in Figure 3, and is also included in the shapefiles[3,4].

[3] The ESRI® shapefiles enclosed are in NAD 83 UTM Zone 14 projected coordinate system.

[4] Comsearch makes no warranty as to the accuracy of the data included in this report beyond the date of the report. The data provided in this report is governed by Comsearch's data license notification and agreement located at http://www.comsearch.com/files/data_license.pdf.

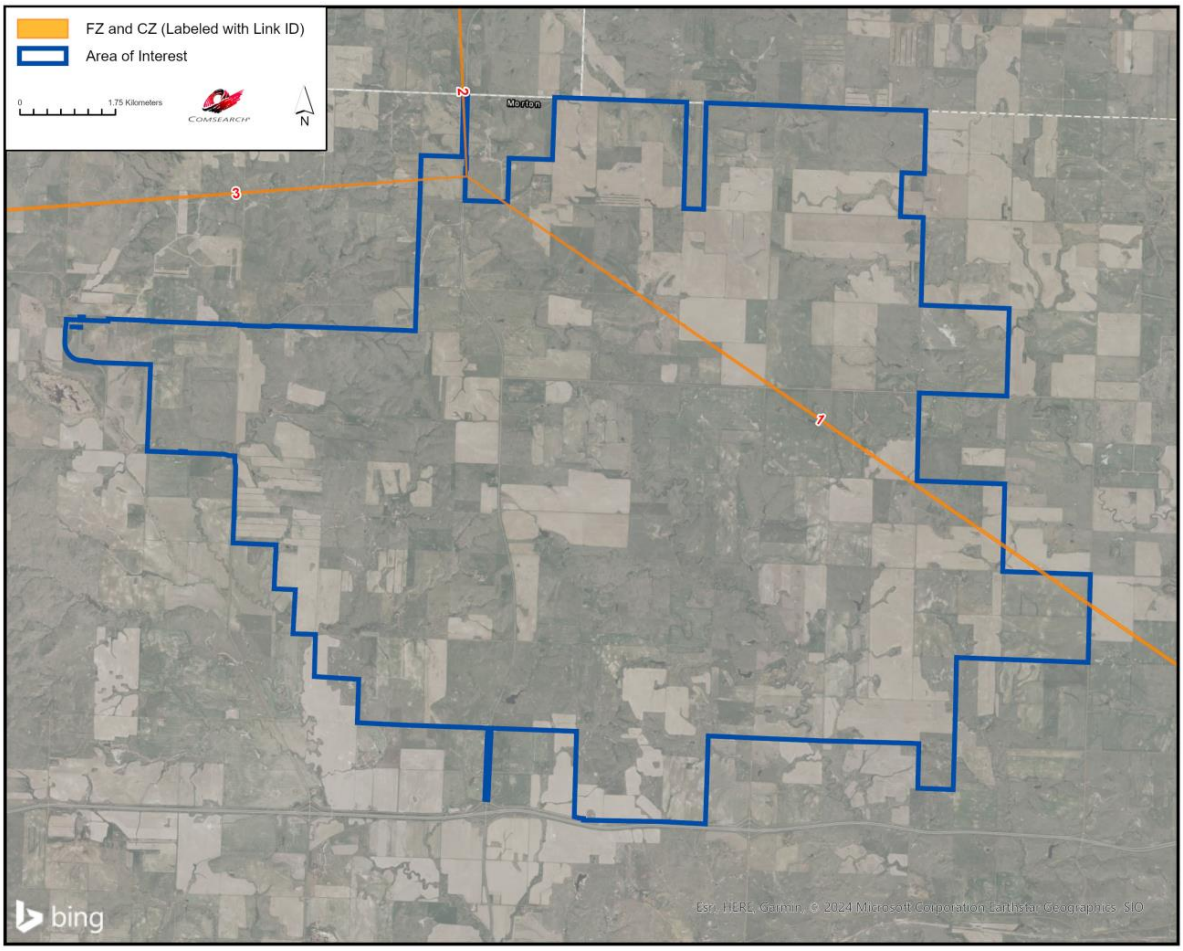


Figure 3: Fresnel and Consultation Zones in the Area of Interest

Discussion of Potential Obstructions

Total Microwave Paths	Paths with Affected Fresnel Zones	Total Turbines	Turbines intersecting Fresnel Zones
3	N/A	N/A	N/A

For this project, turbine locations were not provided; thus we could not determine if any potential obstructions exist between the planned wind turbines and the incumbent microwave paths. If the latitude and longitude values for turbine locations are provided, Comsearch can identify where a potential conflict might exist.

4. Conclusion

Our study identified three microwave paths intersecting the Longspur project area. The Fresnel and Consultation Zones for these microwave paths were calculated and mapped. We recommend that all turbines be sited in locations that will not encroach on these exclusion zones.

5. Contact

For questions or information regarding the Microwave Study, please contact:

Contact person: David Meyer
Title: Senior Manager
Company: Comsearch
Address: 21515 Ridgetop Circle, Suite 300, Sterling, VA 20166
Telephone: 703-726-5656
Fax: 703-726-5595
Email: David.Meyer@CommScope.com
Web site: www.comsearch.com

Studies and Assessments

B2. AM and FM Radio Report

Wind Power GeoPlanner™

AM and FM Radio Report

Longspur



Prepared on Behalf of
ALLETE

August 14, 2024

COMSEARCH
A CommScope Company

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1. Introduction

Comsearch analyzed AM and FM radio broadcast stations whose service could potentially be affected by the proposed Longspur Wind Project in Morton County, North Dakota

2. Summary of Results

Project Information

Name: Longspur
County: Morton
State: North Dakota

Number of Turbines: TBD
Blade Diameter: TBD
Tip Height: 192 meters



Figure 1: Area of Interest

AM Radio Analysis
Comsearch found no database records[1] for AM stations within approximately 30 kilometers of the project.

FM Radio Analysis
Comsearch found no database records[2] for FM stations within approximately 30 kilometers of the project.

[1] Comsearch makes no warranty as to the accuracy of the data included in this report beyond the date of the report. The data presented in this report is derived from the AM/FM station's FCC license and governed by Comsearch's data license notification and agreement located at http://www.comsearch.com/files/data_license.pdf.

[2] Comsearch makes no warranty as to the accuracy of the data included in this report beyond the date of the report. The data presented in this report is derived from the AM/FM station's FCC license and governed by Comsearch's data license notification and agreement located at http://www.comsearch.com/files/data_license.pdf.

3. Impact Assessment

The exclusion distance for AM broadcast stations varies as a function of the antenna type and broadcast frequency. For directional antennas, the exclusion distance is calculated by taking the lesser of 10 wavelengths or 3 kilometers. For non-directional antennas, the exclusion distance is simply equal to 1 wavelength. Potential problems with AM broadcast coverage are only anticipated when AM broadcast stations are located within their respective exclusion distance limit from wind turbine towers. A search radius of 30 km found no AM station records. As there were no stations found within 3 kilometers of the project, which is the maximum possible exclusion distance based on a directional AM antenna broadcasting at 1000 KHz or less, the project should not impact the coverage of local AM stations.

The coverage of FM stations is generally not sensitive to interference due to wind turbines, especially when large objects (e.g., wind turbines) are located in the far field region of the radiating antenna to avoid the risk of distorting its radiation pattern. A search radius of 30 km found no FM station records. At this distance there should be adequate separation to avoid radiation pattern distortion.

4. Recommendations

Since no impact on licensed and operational AM or FM broadcast stations was identified in our analysis, no recommendations or mitigation techniques are required for this project.

5. Contact

For questions or information regarding the AM and FM Radio Report, please contact:

Contact person:	David Meyer
Title:	Senior Manager
Company:	Comsearch
Address:	21515 Ridgetop Circle, Suite 300, Sterling, VA 20166
Telephone:	703-726-5656
Fax:	703-726-5595
Email:	David.Meyer@CommScope.com
Web site:	www.comsearch.com

Studies and Assessments

B3. Acoustic Assessment

BURNS McDONNELL

MINNESOTA POWER

Sound Study

Longspur Wind

PROJECT NO. 154125
REVISION 2
DECEMBER 16, 2025

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List of Abbreviations

Abbreviation	Term/Phrase/Name
ACP	American Clean Power Association
ANSI	American National Standards Institute
CadnaA	Computer Aided Noise Abatement
dB	decibel
dBA	A-weighted decibels
DEM	Digital Elevation Model
Developer	Minnesota Power
Hz	hertz
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
L_{90}	90th-percentile exceedance sound level
L_{eq}	equivalent-continuous sound level
MW	megawatt
Project	Longspur Wind Project
PWL	sound power level
SO	Sound Optimized
SPL	sound pressure level
Study	sound study for the proposed Longspur Wind Project
USGS	U.S. Geological Survey
WTG	Wind Turbine Generator

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Longspur Wind 000168



1.0 Introduction

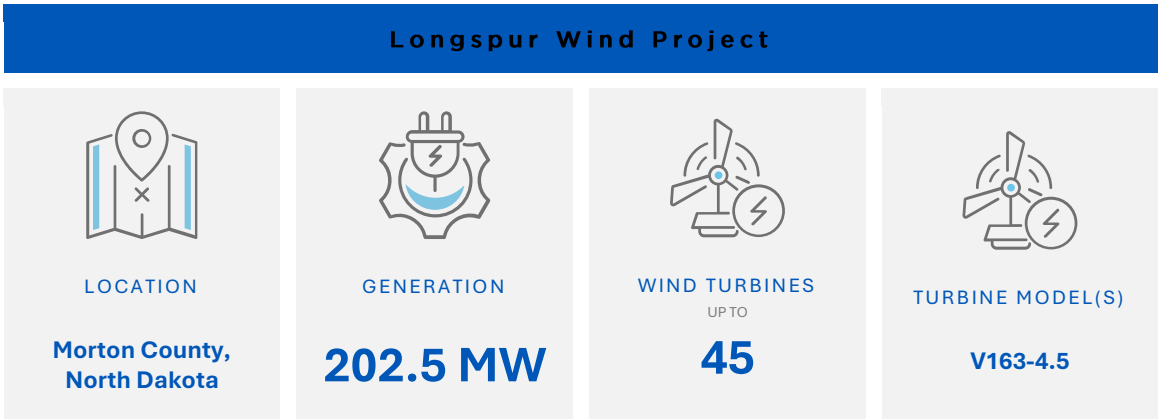
1.1 Study Overview

Burns & McDonnell was retained by Minnesota Power, a division of ALLETE, Inc. ("Minnesota Power") to conduct a sound study (the "Study") for the proposed Longspur Wind Project (the "Project"). The objectives of the Study were to identify applicable sound regulations and model Project-generated sound level impacts on neighboring occupied residences.

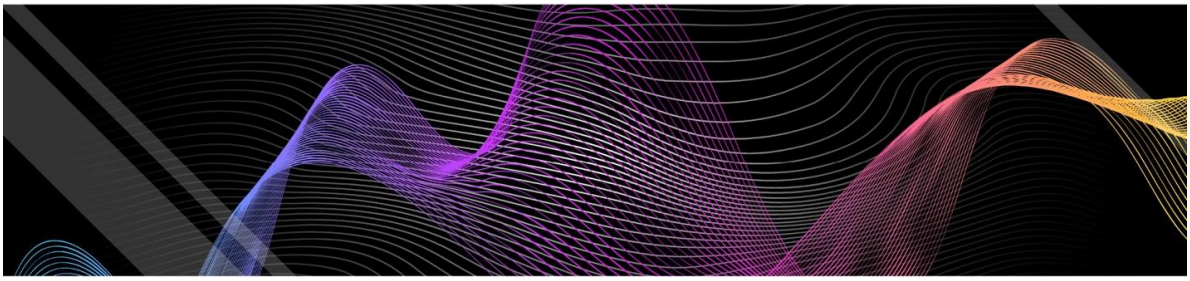
1.2 Project Overview

The proposed Project will be located in Morton County, North Dakota, approximately five (5) miles north of the city of Glen Ullin. The Project will include a quantity of up to 45 Vestas V163-4.5 wind turbine generators ("WTG") at a 113-meter hub height with an aggregate nameplate capacity of approximately 202.5 megawatts ("MW").

For purposes of this Study, a total of 57 turbine positions were evaluated (including 12 alternates), although only up to 45 turbines are expected to be installed. All 12 alternate turbines were modeled as the V163-4.5 turbine model. Some of the turbines were applied sound optimized ("SO") modes to limit noise impacts to residences near the Project. This mitigation strategy shows the Project would be able to meet the limits with any configuration of 45 WTGs at the 57 potential WTG positions. It should be noted that the SO mitigation may not be necessary for the final layout based on which turbine locations are ultimately selected to be built. A final noise model will be completed for the final layout to confirm compliance and the need for SO modes, if any.



Longspur Wind 000169



2.0 Acoustic Terminology

The term “sound level” is often used to describe two different sound characteristics: sound power and sound pressure. Every source that produces sound has a sound power level (“PWL”). The PWL is the acoustic energy emitted by a sound source and is an absolute number that is not affected by the surrounding environment. The acoustic energy produced by a source propagates through media as pressure fluctuations. These pressure fluctuations, also called sound pressure levels (“SPL”), are what human ears hear and microphones measure.

Sound is physically characterized by amplitude and frequency. The amplitude of sound is measured in decibels (“dB”) as the logarithmic ratio of a sound pressure to a reference sound pressure (20 micropascals). The reference sound pressure corresponds to the typical threshold of human hearing. To the average listener, a 3-dB change in a continuous broadband sound is generally considered “just barely perceptible”; a 5-dB change is generally considered “clearly noticeable”; and a 10-dB change is generally considered a doubling (or halving, if the sound is decreasing) of the apparent loudness.

Sound waves can occur at many different wavelengths, also known as the frequency. Frequency is measured in hertz (“Hz”) and is the number of wave cycles per second that occur. The typical human ear can hear frequencies ranging from approximately 20 to 20,000 Hz. Normally, the human ear is most sensitive to sounds in the middle frequencies (1,000 to 8,000 Hz) and is less sensitive to sounds in the lower and higher frequencies. As such, the A-weighting scale was developed to simulate the frequency response of the human ear to sounds at typical environmental levels. The A-weighting scale emphasizes sounds in the middle frequencies and de-emphasizes sounds in the low and high frequencies. Any sound level to which the A-weighting scale has been applied is expressed in A-weighted decibels, or dBA. For reference, the A-weighted sound pressure level and subjective loudness associated with some common sound sources are listed in Table 2-1.

Sound in the environment is constantly fluctuating, as when a car drives by, a dog barks, or a plane passes overhead. Therefore, sound metrics have been developed to quantify fluctuating environmental sound levels. These metrics include the exceedance sound level. The exceedance sound level is the sound level exceeded during “x” percent of the sampling period and is also referred to as a statistical sound level. Common exceedance sound level values are the 10-, 50-,90-percentile exceedance sound levels, denoted by L_{10}, L_{50}, and L_{90}. The equivalent-continuous sound level (“L_{eq}”) is the arithmetic average of the varying sound over a given time period and is the most common metric used to describe sound.

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Table 2-1: Typical Sound Pressure Levels Associated with Common Sound Sources

Sound Pressure Level (dBA)	Subjective Evaluation	Environment
140	Deafening	Jet aircraft at 75 feet
130	Threshold of pain	Jet aircraft during takeoff at a distance of 300 feet
120	Threshold of feeling	Elevated train
110	Very loud	Jet flyover at 1,000 feet
100		Motorcycle at 25 feet
90	Moderately loud	Propeller plane flyover at 1,000 feet
80		Diesel truck (40 mph) at 50 feet
70	Loud	B-757 cabin during flight
60	Moderate	Air-conditioner condenser at 15 feet
50	Quiet	Private Office
40		Farm field with light breeze, birdcalls
30	Very quiet	Quiet residential neighborhood
20		Rustling leaves
10	Just audible	--
0	Threshold of hearing	--

Sources:
(1) Adapted from *Architectural Acoustics*, *M. David Egan, 1988*
(2) *Architectural Graphic Standards*, Ramsey and Sleeper, 1994



3.0 Applicable Regulations

Federal, State, and county regulations and guidelines were reviewed to determine the applicable overall sound level limits for the Project.

3.1 State of North Dakota

Chapter 69-06-08-01 in the North Dakota Public Service Commissions states, “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”.

3.2 Morton County

Morton County Land Use Code Section 2-100(d)(6) states, “With the exception of temporary construction equipment, noises produced shall neither exceed 65 decibels between the hours of 7:00 am and 11:00 pm nor 60 decibels between the hours of 11:00 pm and 7:00 am, as measured at or beyond any of the property lines from which the noise is emanating.”.

3.3 Regulation Summary

The North Dakota Public Service Commissions are more restrictive than the county limits. Therefore, the Project will be compared to the State of North Dakota 45-dBA sound level limit at locations within one hundred feet of an inhabited residence. If sound levels are predicted to exceed the sound level limit, the sound level avoidance area criteria may be waived in writing by the owner of the occupied residence.

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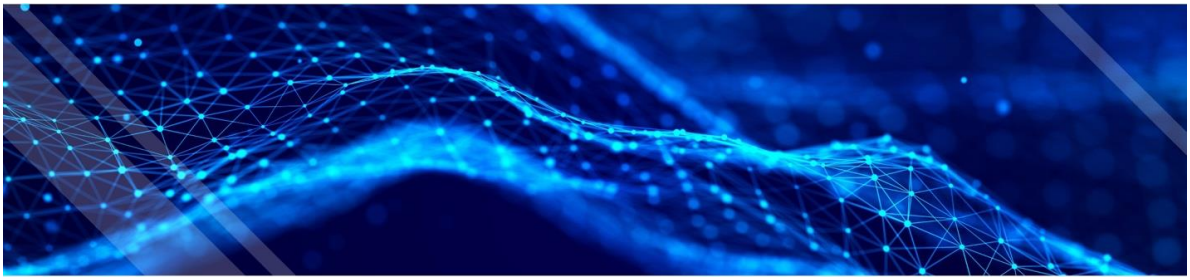

4.0 Modeling Parameters and Inputs

Industry-accepted sound modeling software, CadnaA (Version 2026, published by DataKustik, Ltd., Munich, Germany) was used to estimate expected sound levels from the Project. The model inputs and assumptions are described in this section.

4.1 Wind Turbine Sound Characteristics

The sound commonly associated with a wind turbine is described as a rhythmic "whoosh" caused by aerodynamic processes. This sound is created as air flow interacts with the surface of rotor blades. As air flows over the rotor blade, turbulent eddies form in the surface boundary layer and wake of the blade. These eddies are where most of the "whooshing" sound is formed. Additional sound is generated from vortex shedding produced by the tip of the rotor blade. Air flowing past the rotor tip creates alternating low-pressure vortices on the downstream side of the tip causing sound generation to occur. Older wind turbines, built with rotors which operate downwind of the tower (downwind turbines), often have higher aerodynamic impulse sound levels. This is caused by the interaction between the aerodynamic lift created on the rotor blades and the turbulent wake vortices produced by the tower. Modern wind turbine rotors are mostly built to operate upwind of the tower (upwind turbines). Upwind turbines are not impacted by wake vortices generated by the tower and, therefore, overall sound levels can be as much as 10 dBA less for similarly sized turbines. The rhythmic fluctuations of the overall sound level are less perceivable farther from the turbine. Additionally, multiple turbines operating at the same time will create the whooshing sound at different times. These non-synchronized sounds will blend together to create a more constant sound to an observer at most distances from the turbines. Another phenomenon that reduces perceivable noise from turbines is the wind itself. Higher wind speed produces noise that tends to mask (or drown out) the sounds created by wind turbines.

Advancement in wind turbine technology has reduced pure tonal emissions of modern wind turbines. Manufacturers have reduced distinct tonal sounds by reshaping turbine blades and adjusting the angle at which air contacts the blade. Pitching technology allows the angle of the blade to adjust when the maximum rotational speed is achieved, which allows the turbine to maintain a constant rotational velocity. Therefore, sound emission levels remain constant as the velocity remains the same.

Wind turbines can create noise in other ways as well. Wind turbines have a nacelle where the mechanical portions of the turbine are housed. The current generation of wind turbines use multiple techniques to reduce the noise from this portion of the turbine: vibration isolating mounts, special gears, and acoustic insulation. In general, all moving parts and the housing of the current generation wind turbines have been designed to minimize the noise they generate.

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4.2 Model Inputs and Settings

The CadnaA program is a scaled, three-dimensional program that takes into account air absorption, terrain, ground absorption, and ground reflection for each piece of noise-emitting equipment and predicts downwind sound pressure levels. The model calculates sound propagation based on International Organization for Standardization ("ISO") 9613-2:2024, General Method of Calculation. ISO 9613, and therefore CadnaA, assesses the sound pressure levels based on the octave-band center-frequency range from 31.5 to 8,000 Hz. Predicted compliance with the regulations for all turbines operating implies predicted compliance for any combination of the turbines operating.

4.2.1 Project Layout

The Project layout includes up to 57 potential WTG locations. The predictive models for the Vestas V163-4.5 WTGs were completed using the proposed layout with all 57 WTGs modeled shown in Figure A-1 of Appendix A. The WTGs were modeled at a hub height of 113 meters with each serrated trailing edge blades included on each WTG. The turbine coordinates, turbine type, and hub height for each modeled WTG are listed in the tables provided in Appendix A.

4.2.2 Receptors

A quantity of 61 receptors were modeled surrounding the Project. The Developer-provided coordinates of each receptor are provided in Appendix B. Burns & McDonnell did not provide an independent verification of the location or occupied status of these receptors.

4.2.3 ANSI / ACP 111-1 (2022)

In an effort to standardize the calculation methodology for wind turbine sound levels, the American Clean Power Association ("ACP") developed a standard, recognized by the American National Standards Institute ("ANSI"), which outlines preferred modeling methods for predicting future sound levels from wind turbine generating projects. These methods, along with the wind turbine model-specific sound power levels (determined in accordance with International Electrotechnical Commission, IEC 61400-11), are to be used with ISO 9613 calculations and are expected to yield a conservative, worst-case condition with wind turbines operating at their highest rated sound power levels.

The standard, ACP 111-1-2022, provides two options for modeling parameters which are to be implemented into the modeling software/calculations. Both options are expected to yield nearly identical results, per the standard. The Option 1 modeling parameters were selected for this study and are shown in Table 4-1 below.

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Table 4-1: ANSI / ACP 111-1 (2022) Modeling Parameters

Model Parameter	Value
Ground Factor (G)	0
Receptor Height	1.5 meters
Turbine Source Height	Vendor Provided Hub-height
Model Adjustments	None
Temperature	50 °F
Humidity	70%

4.2.4 Terrain and Vegetation

Terrain and attenuation from ground absorption and scattering can have a significant impact on sound transmission. U.S. Geological Survey ("USGS") Digital Elevation Model ("DEM") contours were imported into the model to account for topographic variations around the Project. The terrain around the proposed Project is mostly rural with minor changes in elevation.

4.2.5 Sound Propagation and Directivity

CadnaA calculates downwind sound propagation using ISO 9613 standards, which use omni-directional downwind sound propagation and worst-case directivity factors. In other words, the model assumes that each turbine propagates its maximum sound level in all directions at all times. This will likely over-predict upwind sound levels.

4.2.6 Sound Emission Data

Acoustic modeling was conducted for the Project using the expected loudest sound power levels for the Vestas V163-4.5 with serrated trailing edge blades. The sound emissions data was developed using the International Electrotechnical Commission ("IEC") 61400-11 acoustic measurement standards. IEC 61400-11 is used to determine the max sound power level of the overall turbine assembly. Overall sound power levels were provided by the manufacturer at various wind speeds. The expected sound power levels for the Vestas V163-4.5 are displayed in Table 4-2.

Table 4-2: Maximum Sound Power Levels

WTG Model	Octave Band Frequency (Hz) Sound Pressure Level (dBA)									Total Sound Level (dBA)
	31.5	63	125	250	500	1000	2000	4000	8000	
V163-4.5	76	88	96	100	101	100	96	90	81	106.3
V163-4.5 SO1	75	87	95	99	99	98	95	89	80	105.0
V163-4.5 SO2	73	85	93	97	98	97	94	87	78	103.5

(a) Overall sound levels are based on vendor-provided turbine data for the turbine. These levels are A-weighted octave-band sound levels with the inclusion of serrated trailing edge blades.

A point source located at the specific hub height of each proposed turbine location was used to model sound emissions from each of the wind turbines, per direction of ANSI / ACP 111-1. The sound levels shown in the table above were applied, as appropriate, to each point source. The proposed Project layout figure is provided

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in Appendix A, including the identified neighboring residences. Each residence was modeled as a receiver at a height of 1.5 meters (5.0 feet) above ground level.

4.3 Acoustic Modeling Results

Project-generated sound pressure levels were calculated for the identified receivers in the CadnaA noise modeling program using the manufacturer-specified sound power levels at each octave-band frequency and the assumptions listed above. Noise modeling results have been demonstrated in previous studies to conservatively approximate real-life measured noise from a source when extraneous noises are not present.

Sound level inputs and results at the nearest identified residential receptors are provided in tabular form in Appendix B. Any receptor within 1 dBA of the limit (45 dBA), was further analyzed to determine if sound levels at any location within 100 feet of the residence exceeded 45 dBA. The sound level contours for the Project WTGs are shown in Appendix C.

There were several residences identified that were predicted to exceed the 45-dBA limit within 100 feet of an inhabited residence with the standard turbine sound levels. In order to bring the Project into compliance with the North Dakota limits for the 57-turbine layout, SO operating modes were implemented on specific turbines to reduce noise impacts to these residential receptors. The turbines with SO operating modes are listed in Appendix A.

This mitigation strategy ensures the Project would be able to meet the sound level limits. However, mitigation may not be necessary for the final layout based on which turbines are ultimately selected to be built. A final noise model will be completed to demonstrate compliance for the final layout.

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5.0 Conclusions

Burns & McDonnell conducted a sound study for the Longspur Wind Project. The sound study included identification of applicable sound regulations and predictive modeling to estimate sound levels in the surrounding community. A comparison to the North Dakota noise levels limit of 45 dBA was performed for compliance at the neighboring residential structures and within 100 feet of the residential structures.

The Project was modeled for Vestas V163-4.5 turbines. The Vestas turbines were modeled at a hub height of 113 meters for the 57 WTGs that could be installed. Sound pressure levels were predicted for the Project area using manufacturer-specified overall sound power levels for the wind turbines and guidance from the ANSI ACP 111-1 wind turbine modeling standard to provide the loudest predicted sound pressure levels from the modeled turbines to the neighboring identified residences.

The modeling results show the Project sound levels would meet North Dakota's requirement of 45 dBA within one hundred feet of an inhabited residence or community building for the Vestas V163-4.5 through the use of low-noise operating modes on two (2) WTGs. However, this mitigation may not be necessary for the final layout based on which turbines are ultimately selected to be built. A final noise model will be completed to demonstrate compliance for the final layout.

Appendix A – Project Layout

WIND TURBINE COORDINATES (V163)

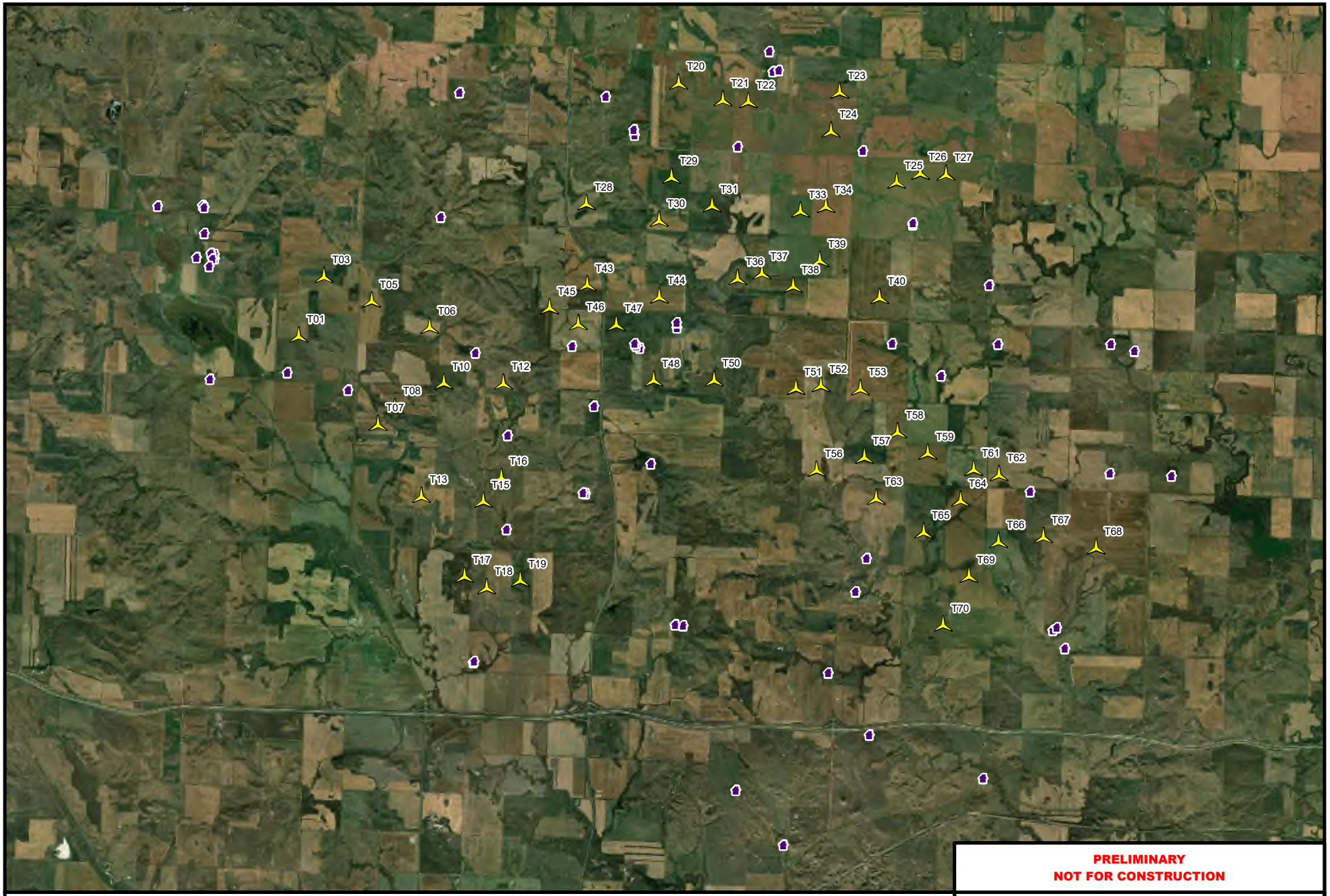
Turbine Name	Easting [m]	Northing [m]	Turbine Model	Hub Height [m]	Sound Power Level [dBA]
T01	282,280	5,201,201	V163-4.5MW	113	106.3
T03	282,778	5,202,380	V163-4.5MW	113	106.3
T05	283,721	5,201,891	V163-4.5MW	113	106.3
T06	284,869	5,201,373	V163-4.5MW	113	106.3
T07	283,847	5,199,451	V163-4.5MW	113	106.3
T08	284,179	5,199,783	V163-4.5MW	113	106.3
T10	285,150	5,200,270	V163-4.5MW	113	106.3
T12	286,330	5,200,266	V163-4.5MW	113	106.3
T13	284,706	5,198,029	V163-4.5MW	113	106.3
T15	285,933	5,197,930	V163-4.5MW	113	106.3
T16	286,289	5,198,396	V163-4.5MW	113	106.3
T17	285,559	5,196,447	V163-4.5MW	113	106.3
T18	285,996	5,196,220	V163-4.5MW	113	106.3
T19	286,662	5,196,365	V163-4.5MW	113	106.3
T20	289,796	5,206,205	V163-4.5MW	113	106.3
T21	290,669	5,205,874	V163-4.5MW	113	106.3
T22	291,173	5,205,835	V163-4.5MW	113	106.3
T23	292,983	5,206,023	V163-4.5MW	113	106.3
T24	292,810	5,205,256	V163-4.5MW	113	106.3
T25	294,107	5,204,243	V163-4.5MW	113	106.3
T26	294,579	5,204,418	V163-4.5MW	113	106.3
T27	295,086	5,204,403	V163-4.5MW	113	106.3
T28	287,971	5,203,815	V163-4.5MW	113	106.3
T29	289,655	5,204,342	V163-4.5MW	113	106.3
T30	289,409	5,203,489	V163-4.5MW	113	106.3
T31	290,456	5,203,777	V163-4.5MW	113	106.3
T33	292,205	5,203,672	V163-4.5MW	113	106.3
T34	292,711	5,203,764	V163-4.5MW	113	106.3
T36	290,963	5,202,336	V163-4.5MW	113	106.3
T37	291,442	5,202,449	V163-4.5MW	113	106.3
T38	292,061	5,202,185	V163-4.5MW	113	106.3
T39	292,590	5,202,695	V163-4.5MW	113	106.3
T40	293,772	5,201,961	V163-4.5MW	113	106.3
T43	287,986	5,202,215	V163-4.5MW	113	106.3
T44	289,412	5,201,972	V163-4.5MW	113	106.3
T45	287,241	5,201,756	V163-4.5MW	113	106.3
T46	287,811	5,201,445	V163-4.5MW SO2	113	103.5
T47	288,561	5,201,425	V163-4.5MW SO2	113	103.5
T48	289,304	5,200,329	V163-4.5MW	113	106.3
T50	290,497	5,200,333	V163-4.5MW	113	106.3
T51	292,117	5,200,162	V163-4.5MW	113	106.3
T52	292,610	5,200,219	V163-4.5MW	113	106.3
T53	293,390	5,200,156	V163-4.5MW	113	106.3
T56	292,525	5,198,543	V163-4.5MW	113	106.3
T57	293,471	5,198,801	V163-4.5MW	113	106.3
T58	294,128	5,199,304	V163-4.5MW	113	106.3
T59	294,724	5,198,883	V163-4.5MW	113	106.3
T61	295,633	5,198,559	V163-4.5MW	113	106.3
T62	296,133	5,198,457	V163-4.5MW	113	106.3
T63	293,705	5,197,990	V163-4.5MW	113	106.3
T64	295,374	5,197,952	V163-4.5MW	113	106.3
T65	294,643	5,197,324	V163-4.5MW	113	106.3
T66	296,125	5,197,133	V163-4.5MW	113	106.3
T67	297,014	5,197,230	V163-4.5MW	113	106.3
T68	298,056	5,197,006	V163-4.5MW	113	106.3
T69	295,539	5,196,447	V163-4.5MW	113	106.3
T70	295,029	5,195,483	V163-4.5MW	113	106.3

Notes:

[1] Coordinates presented in UTM NAD 83 Zone 14N (meters)

[2] Coordinates provided in "Longspur_MNPower_L013_202p5MW_45xV163-4p5_113mHH_20250807_WithAlt.shp"

[3] "SO2" identifies sound optimized mode applied to limit noise below 45 dBA limit



LEGEND

- Residential Receiver
- WTG

REFERENCE

0 1 2
MILES

0 1 2
KILOMETERS

N

PRELIMINARY
NOT FOR CONSTRUCTION

Figure A-1
Longspur Wind Project - Project Layout

LOCATION:	North Dakota
CLIENT:	Longspur Wind
PROJ. NO.:	154125
CREATED:	12/15/2025

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Appendix B – Modeled Impacts

NOISE MODEL RESULTS (V163)

Receptor Name	Easting [m]	Northing [m]	Residence Status	Project Sound Level [dBA]
REC-001	299,548	5,198,403	Non Participating	33
REC-002	298,328	5,198,450	Non Participating	37
REC-003	298,817	5,200,869	Non Participating	32
REC-004	298,346	5,201,009	Non Participating	33
REC-005	283,255	5,200,102	Non Participating	42
REC-006	280,525	5,200,317	Non Participating	33
REC-007	282,053	5,200,445	Non Participating	40
REC-008	280,615	5,202,703	Participating	33
REC-009	280,257	5,202,726	Non Participating	31
REC-010	280,612	5,202,784	Non Participating	32
REC-011	280,543	5,202,808	Non Participating	32
REC-012	280,411	5,203,201	Non Participating	31
REC-013	285,089	5,203,522	Non Participating	36
REC-014	279,487	5,203,743	Non Participating	27
REC-015	280,378	5,203,755	Non Participating	30
REC-016	293,514	5,196,773	Participating	40
REC-017	286,391	5,197,343	Participating	44
REC-018	287,953	5,198,053	Non Participating	38
REC-019	287,904	5,198,066	Non Participating	38
REC-020	296,751	5,198,091	Participating	44
REC-021	289,246	5,198,642	Participating	38
REC-022	286,413	5,199,204	Participating	42
REC-023	288,121	5,199,785	Non Participating	40
REC-024	294,990	5,200,386	Participating	40
REC-025	285,777	5,200,835	Participating	43
REC-026	287,689	5,200,972	Participating	44
REC-027	289,028	5,200,932	Participating	44
REC-028	288,957	5,200,970	Participating	44
REC-029	288,926	5,201,017	Participating	44
REC-030	294,020	5,201,020	Participating	42
REC-031	296,115	5,201,008	Non Participating	37
REC-032	289,764	5,201,336	Non Participating	44
REC-033	289,758	5,201,432	Participating	44
REC-034	295,942	5,202,178	Non Participating	36
REC-035	294,429	5,203,374	Non Participating	42
REC-036	294,431	5,203,404	Non Participating	43
REC-037	290,927	5,192,186	Non Participating	27
REC-038	293,570	5,193,278	Non Participating	31
REC-039	285,734	5,194,712	Non Participating	36
REC-040	285,749	5,194,731	Non Participating	36
REC-041	292,757	5,194,503	Non Participating	33
REC-042	297,438	5,194,987	Non Participating	35
REC-043	289,886	5,195,439	Non Participating	33
REC-044	289,728	5,195,460	Non Participating	33
REC-045	297,201	5,195,350	Non Participating	37
REC-046	297,277	5,195,400	Non Participating	37
REC-047	293,296	5,196,108	Participating	38
REC-048	285,462	5,205,985	Non Participating	32
REC-049	293,442	5,204,835	Non Participating	44
REC-050	288,924	5,205,147	Participating	41
REC-051	288,909	5,205,254	Participating	40
REC-052	288,354	5,205,907	Non Participating	38
REC-053	291,663	5,206,405	Participating	42
REC-054	291,777	5,206,426	Participating	42
REC-055	291,592	5,206,798	Non Participating	40
REC-056	290,965	5,204,916	Participating	43
REC-057	280,409	5,203,718	Non Participating	30
REC-058	280,572	5,202,698	Participating	32
REC-059	280,509	5,202,548	Participating	32
REC-060	291,869	5,191,101	Non Participating	24
REC-061	295,820	5,192,415	Non Participating	29

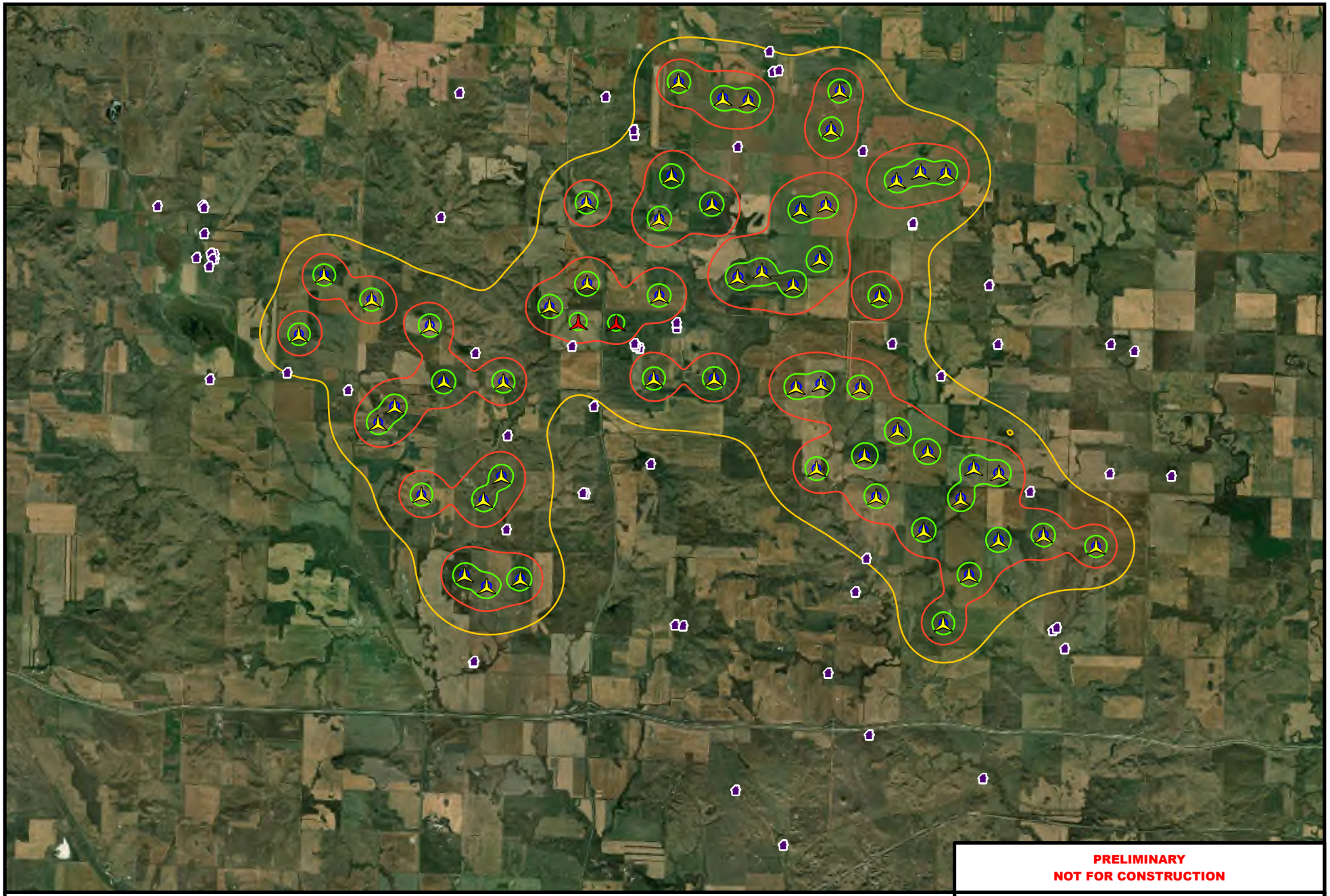
Notes:

[1] Coordinates presented in UTM NAD 83 Zone 14N (meters)

[2] Receptor coordinates provided by Client via *"Longspur_Wind_Receptor_Survey_Results - MB confirmed.xlsx"* on October 20, 2025

[3] Participating status provided by Client via *"Longspur_Wind_Receptor_Survey_Results - MB confirmed (With Yes No Status).xlsx"* on November 13, 2025

Appendix C – Sound Level Contours



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PRELIMINARY
NOT FOR CONSTRUCTION

Figure C-1
Longspur Wind Project - Sound Level Contours

LOCATION:	North Dakota
CLIENT:	Longspur Wind
PROJ. NO.:	154125
CREATED:	12/15/2025

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Studies and Assessments

B4. Shadow Flicker Assessment

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MINNESOTA POWER

Shadow Flicker Analysis

Longspur Wind

PROJECT NO. 154125
REVISION 2
DECEMBER 16, 2025

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APPENDIX B – MODELING INPUTS

APPENDIX C – FLICKER RESULTS BY RECEPTOR

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List of Abbreviations

Abbreviation	Term/Phrase/Name
Burns & McDonnell	Burns & McDonnell Engineering Company, Inc.
hr	Hour
kg/m3	Kilograms per cubic meter
m	Meter
m/s	Meters per second
Minnesota Power	Minnesota Power, a division of ALLETE, Inc.
MW	Megawatt
Project	Longspur Wind Project
Project Site	Location of Project in Morton County, North Dakota
Study	Shadow Flicker Analysis
yr	Year

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1.0 Introduction

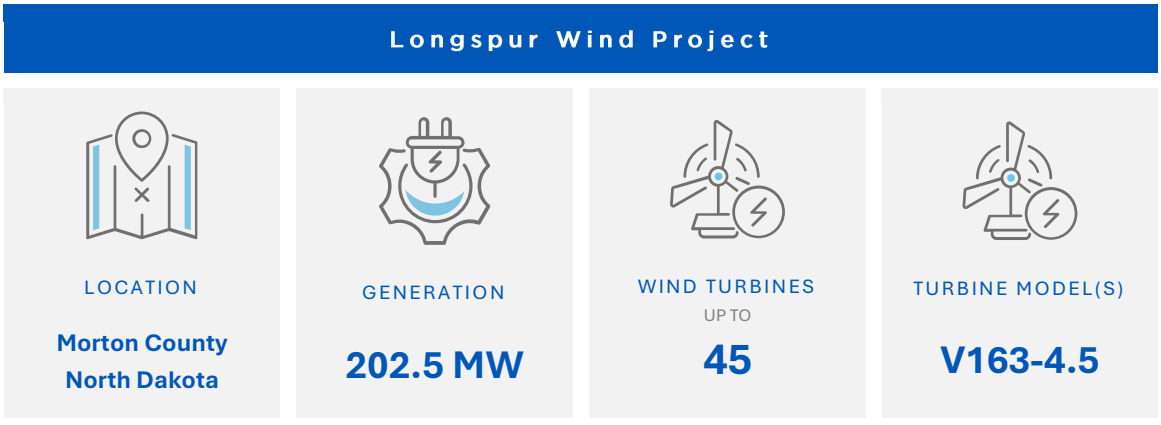
1.1 Study Overview

Burns & McDonnell Engineering Company, Inc. (“Burns & McDonnell”) was retained by Minnesota Power, a division of ALLETE, Inc. (“Minnesota Power”) to conduct a shadow flicker analysis (the “Study”) for the proposed Longspur Wind Project (the “Project”). The objective of the Study was to estimate the annual frequency of shadow flicker on occupied residences caused by Project wind turbines.

1.2 Project Overview

The proposed Project will be located in Morton County, North Dakota, approximately five (5) miles north of the city of Glen Ullin. The Project will include a quantity of up to 45 x Vestas V163-4.5 wind turbine generators at a 113-meter hub height with an aggregate nameplate capacity of approximately 202.5 megawatts (“MW”), as summarized in Section 2.2 below.

For purposes of this Study, a total of 57 turbine positions were evaluated (including 12 alternates), although only up to 45 turbines are expected to be installed. All 12 alternate turbines were modeled as the V163-4.5 turbine model.



1.3 Shadow Flicker Overview

Shadow flicker occurs when wind turbine blades pass in front of the sun to create recurring shadows on an object. Such shadows occur only under very specific conditions, including sun position, wind direction, time of day, and other similar factors.

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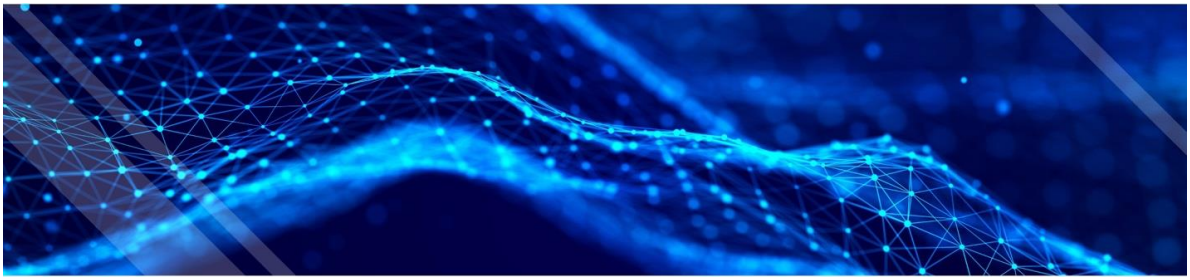
The intensity of shadow flicker varies significantly with distance, and as separation between a turbine and receptor increases, shadow flicker intensity correspondingly diminishes. Shadow flicker intensity for distances greater than 10 rotor diameters is generally considered imperceptible. At such distances, shadow flicker most commonly occurs at sunrise or sunset, when cast shadows are sufficiently long.

1.4 Applicable Regulations

Shadow flicker impacts are not currently regulated in applicable state or federal law, nor are there requirements in the current Morton County, North Dakota ordinances with regard to limitations on shadow flicker durations. This report identifies those receptors that may experience shadow flicker more than 30 hours per year, although it is noted that this threshold is presented as a typical industry benchmark for similar studies and not as a suggested limitation.

1.5 Site Visit

Burns & McDonnell did not visit the Project Site as part of this Study. The contents of this evaluation are based exclusively upon desktop analysis by Burns & McDonnell.



2.0 Modeling Parameters and Inputs

2.1 Modeling Overview

Shadow flicker was modeled for the Project Site using WindPRO, an industry-leading software package for the design and planning of wind energy projects. This package models the sun's path with respect to every turbine location during every minute over a complete year. Any shadow flicker caused by each turbine is then aggregated for each receptor for the entire year.

The following sections are summaries of the inputs utilized in the WindPRO model for this Study.

2.2 Wind Turbines

The Project will include up to 45 wind turbines when constructed, although for purposes of this Study, a total of 57 turbine positions were evaluated (including 12 alternates) to provide a conservative estimate of estimated flicker durations. A summary of the turbine model and its respective dimensions that were modeled as part of this Study is included Table 2-1.

Table 2-1: Turbine Model Dimensions

Turbine Model	Quantity	Hub Height [m]	Rotor Diameter [m]
V163-4.5	57	113	163

Shadow flicker intensity is partially dependent upon the distance from a receptor to the turbine causing the shadow. The Minnesota Power-provided coordinates of each wind turbine are presented in Appendix A and the location of each wind turbine is presented graphically in Appendix D.

2.3 Receptors

A receptor is used to designate a specific location, such as a residence or public building, where the impact of shadow flicker is assessed. A quantity of 61 receptors were modeled at the Project Site. The Minnesota Power-provided coordinates of each receptor are presented in Appendix C and the location of each receptor is presented graphically in Appendix D. Burns & McDonnell did not provide an independent verification of the location or occupied status of these receptors.

Each receptor was modeled in "green house" mode within the WindPRO model. This approach provides a conservative estimate of the amount of time when shadow flicker could occur by modeling each receptor as

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having windows on all sides and effectively causing the home to be susceptible to flicker effects in all directions.

2.4 Terrain

The WindPRO model utilizes topography data to place turbines and receptors at the proper elevations. This information is also used by the model to consider any natural land features between a turbine and a receptor that may block shadows from being seen at a receptor.

Publicly-available terrain data was downloaded from the National Elevation Dataset, a product of the United States Geological Survey. The 10-meter resolution digital elevation model was exported at 10-foot intervals for use in the WindPRO model. The WindPRO model uses the provided elevation data to determine the elevation of each turbine and receptor.

2.5 Obstacles

Obstacles located between a receptor and a turbine, such as trees or buildings, may significantly reduce or eliminate the duration and/or intensity of shadow flicker. However, to provide the most conservative estimate of the amount of time when shadow flicker could occur, no attempt was made to model the presence of potential obstacles.

2.6 Turbine Operation

Shadow flicker is contingent upon the movement of the turbine blades. Shadow flicker can only occur when the turbine is in operation (i.e., when the turbine blades are rotating). Moreover, shadow flicker is generally most notable when a turbine is facing a receptor, as this results in the widest-possible shadow being cast. To more accurately reflect the periods of operation of each Project wind turbine, on-site hub-height wind data was provided by Minnesota Power and used to indicate the periods when the turbines are inactive due to wind speeds below the turbine cut-in speed or above the turbine cut-out speed, at which time the turbine rotor is not in motion and no shadow flicker will occur.

Project Site-specific wind data was also utilized to model the orientation of the turbines relative to each receptor. The Minnesota Power-provided wind data includes data collected by an on-site meteorological mast.

Power curves for the proposed turbines were provided by Minnesota Power. These power curves were added to the WindPRO model to more accurately reflect the turbine's operational characteristics. The assumed cut-in wind speed of the proposed turbines was 3.0 m/s and the assumed cut-out wind speed was 24.0 m/s.

2.7 Flicker Relevance

At distances beyond 10 rotor diameters, shadow flicker effects are generally considered low, as shadows diffuse and become imperceptible. Thus, a distance equal to 10 times the rotor diameter of each turbine (i.e., 1,630 meters) was modeled as the maximum distance at which shadow flicker was considered relevant; receptors greater than this distance from a given turbine were not evaluated. The proximity of this buffer relative to each receptor is presented graphically in Appendix D.

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2.8 Sun Angle

The sun's path with respect to each turbine location is calculated by the WindPRO model to determine the cast shadow paths during every minute over a complete year. However, at very low sun angles, the light must pass through more atmosphere and becomes too diffused to form a coherent shadow. Thus, a value of three (3) degrees or less was utilized for the height at which the sun would not cause noticeable flicker.

2.9 Sunshine Probability

Shadow flicker is only caused when the sun is shining. Sunshine probability data was obtained by Burns & McDonnell, as shown in Appendix B. This data represents the percentage of hours each month that the sun is expected to be shining during daylight hours, with consideration given for cloud cover, rainy days, fog, or other similar occurrences that may diminish the potential occurrence or severity of shadow flicker. In WindPRO, calculations initially consider a worst-case scenario for shadow flicker, assuming continuous sunshine and wind, which is then statistically reduced by accounting for factors such as the probability of sunshine.



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3.0 Results

Using the inputs and parameters defined in Section 2.0, the WindPRO model was used to calculate shadow flicker for the identified receptors at the Project Site. Table 3-1 presents a summary of these results, while detailed tables are included within Appendix C that present shadow flicker durations by receptor, including estimated hours per year. Additionally, maps are provided in Appendix D that illustrate the shadow flicker vectors (in hours per year) caused by each Project turbine.

Table 3-1: Summary of Results

Turbine Layout	No. of Turbines	No. of Receptors	No. of Receptors, Flicker ≥ 30 hr/yr	No. of Receptors, Flicker ≥ 30 hr/yr After Mitigation
V163-4.5	57	61	4	0, See Bullet Below

The following is a set of key observations from the results of the Study:

- With the current layout, 4 of the 61 known receptors exceed 30 hours per year of shadow flicker for estimated sunshine conditions. However, mitigation techniques will be utilized to reduce the shadow flicker on the residences with more than 30 hours per year, indicated with the asterisk in Appendix C. Common techniques include planting vegetation, awning installation, and/or reduced turbine operation via curtailment. For a participating residence, a landowner may also sign an acknowledgement letter for the exceedance. Refer to Appendix C for a complete listing of results.
- The mitigation strategies ensure the Project would be able to meet the shadow flicker limits. However, mitigation may not be necessary for the final layout based on which turbines are ultimately selected to be built. A final shadow flicker model will be completed to demonstrate compliance for the final layout.
- The majority of observed shadow flicker on each receptor occurs during early morning and/or late afternoon and evening hours, as shown in Appendix E.
- For purposes of this Study, a total of 57 turbine positions were evaluated, although Burns & McDonnell understands that only up to 45 turbines are expected to be installed. Depending on the turbine location(s) that are eliminated, flicker durations at impacted receptors are likely to decrease from those presented herein.
- The Study was performed using a conservative modeling approach with Project Site-specific conditions. For example, the Study modeled each receptor as a “green house”, meaning each

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receptor was modeled as having windows on all sides and effectively causing the home to be susceptible to flicker effects in all directions. Further, the Project Site was modeled as if no obstacles were present, including trees or buildings, which may significantly reduce or eliminate the duration and/or intensity of shadow flicker at a receptor. Due to the conservative approach of the Study, the actual duration and intensity of shadow flicker experienced at each receptor is expected to be less than those reported in the Study.

Appendix A – Wind Turbine Coordinates

Table A-1: Wind Turbine Coordinates

Turbine ID	Easting [m]	Northing [m]	Wind Turbine Model
T01	282,280	5,201,201	V163-4.5MW
T03	282,778	5,202,380	V163-4.5MW
T05	283,721	5,201,891	V163-4.5MW
T06	284,869	5,201,373	V163-4.5MW
T07	283,847	5,199,451	V163-4.5MW
T08	284,179	5,199,783	V163-4.5MW
T10	285,150	5,200,270	V163-4.5MW
T12	286,330	5,200,266	V163-4.5MW
T13	284,706	5,198,029	V163-4.5MW
T15	285,933	5,197,930	V163-4.5MW
T16	286,289	5,198,396	V163-4.5MW
T17	285,559	5,196,447	V163-4.5MW
T18	285,996	5,196,220	V163-4.5MW
T19	286,662	5,196,365	V163-4.5MW
T20	289,796	5,206,205	V163-4.5MW
T21	290,669	5,205,874	V163-4.5MW
T22	291,173	5,205,835	V163-4.5MW
T23	292,983	5,206,023	V163-4.5MW
T24	292,810	5,205,256	V163-4.5MW
T25	294,107	5,204,243	V163-4.5MW
T26	294,579	5,204,418	V163-4.5MW
T27	295,086	5,204,403	V163-4.5MW
T28	287,971	5,203,815	V163-4.5MW
T29	289,655	5,204,342	V163-4.5MW
T30	289,409	5,203,489	V163-4.5MW
T31	290,456	5,203,777	V163-4.5MW
T33	292,205	5,203,672	V163-4.5MW
T34	292,711	5,203,764	V163-4.5MW
T36	290,963	5,202,336	V163-4.5MW
T37	291,442	5,202,449	V163-4.5MW
T38	292,061	5,202,185	V163-4.5MW
T39	292,590	5,202,695	V163-4.5MW
T40	293,772	5,201,961	V163-4.5MW
T43	287,986	5,202,215	V163-4.5MW
T44	289,412	5,201,972	V163-4.5MW
T45	287,241	5,201,756	V163-4.5MW
T46	287,811	5,201,445	V163-4.5MW

Turbine ID	Easting [m]	Northing [m]	Wind Turbine Model
T47	288,561	5,201,425	V163-4.5MW
T48	289,304	5,200,329	V163-4.5MW
T50	290,497	5,200,333	V163-4.5MW
T51	292,117	5,200,162	V163-4.5MW
T52	292,610	5,200,219	V163-4.5MW
T53	293,390	5,200,156	V163-4.5MW
T56	292,525	5,198,543	V163-4.5MW
T57	293,471	5,198,801	V163-4.5MW
T58	294,128	5,199,304	V163-4.5MW
T59	294,724	5,198,883	V163-4.5MW
T61	295,633	5,198,559	V163-4.5MW
T62	296,133	5,198,457	V163-4.5MW
T63	293,705	5,197,990	V163-4.5MW
T64	295,374	5,197,952	V163-4.5MW
T65	294,643	5,197,324	V163-4.5MW
T66	296,125	5,197,132	V163-4.5MW
T67	297,014	5,197,230	V163-4.5MW
T68	298,056	5,197,006	V163-4.5MW
T69	295,539	5,196,447	V163-4.5MW
T70	295,029	5,195,483	V163-4.5MW

Notes:
[1] Coordinates presented in UTM NAD83 Zone 14 (meters)
[2] Coordinates via "*Longspur_MNPower_L013_202p5MW_45xV163-4p5_113mHH_20250922_WithAlt*"

Appendix B – Modeling Inputs

Table B-1: Monthly Sunshine Probability for Bismarck, North Dakota

Month	Sunshine Probability
January	54%
February	52%
March	61%
April	58%
May	64%
June	67%
July	75%
August	72%
September	67%
October	53%
November	42%
December	45%

Notes:
[1] Data source: NOAA 11-2024 - Sunshine Probability Hours by City
[2] Data location: Bismarck, North Dakota

Appendix C – Flicker Results by Receptor

Table C-1: Flicker Results by Receptor

Receptor ID	Easting [m]	Northing [m]	Participating Status	Flicker Duration [hours/year]	Mitigated Flicker Duration
REC-001	299,548	5,198,403	Non Participating	0.00	-
REC-002	298,328	5,198,450	Non Participating	0.00	-
REC-003	298,817	5,200,869	Non Participating	0.00	-
REC-004	298,346	5,201,009	Non Participating	0.00	-
REC-005	283,255	5,200,102	Non Participating	31.22	30.00*
REC-006	280,525	5,200,317	Non Participating	0.00	-
REC-007	282,053	5,200,445	Non Participating	0.00	-
REC-008	280,615	5,202,703	Participating	0.00	-
REC-009	280,257	5,202,726	Non Participating	0.00	-
REC-010	280,612	5,202,784	Non Participating	0.00	-
REC-011	280,543	5,202,808	Non Participating	0.00	-
REC-012	280,411	5,203,201	Non Participating	0.00	-
REC-013	285,089	5,203,522	Non Participating	0.00	-
REC-014	279,487	5,203,743	Non Participating	0.00	-
REC-015	280,378	5,203,755	Non Participating	0.00	-
REC-016	293,514	5,196,773	Participating	12.25	-
REC-017	286,391	5,197,343	Participating	3.20	-
REC-018	287,953	5,198,053	Non Participating	0.00	-
REC-019	287,904	5,198,066	Non Participating	0.00	-
REC-020	296,751	5,198,091	Participating	35.37	30.00*
REC-021	289,246	5,198,642	Participating	0.00	-
REC-022	286,413	5,199,204	Participating	0.00	-
REC-023	288,121	5,199,785	Non Participating	13.12	-
REC-024	294,990	5,200,386	Participating	3.08	-
REC-025	285,777	5,200,835	Participating	56.90	30.00*
REC-026	287,689	5,200,972	Participating	14.03	-
REC-027	289,028	5,200,932	Participating	24.77	-
REC-028	288,957	5,200,970	Participating	23.65	-
REC-029	288,926	5,201,017	Participating	19.65	-
REC-030	294,020	5,201,020	Participating	2.70	-
REC-031	296,115	5,201,008	Non Participating	0.00	-
REC-032	289,764	5,201,336	Non Participating	6.75	-
REC-033	289,758	5,201,432	Participating	6.68	-
REC-034	295,942	5,202,178	Non Participating	0.00	-
REC-035	294,429	5,203,374	Non Participating	0.00	-
REC-036	294,431	5,203,404	Non Participating	0.00	-

Receptor ID	Easting [m]	Northing [m]	Participating Status	Flicker Duration [hours/year]	Mitigated Flicker Duration
REC-037	290,927	5,192,186	Non Participating	0.00	-
REC-038	293,570	5,193,278	Non Participating	0.00	-
REC-039	285,734	5,194,712	Non Participating	0.00	-
REC-040	285,749	5,194,731	Non Participating	0.00	-
REC-041	292,757	5,194,503	Non Participating	0.00	-
REC-042	297,438	5,194,987	Non Participating	0.00	-
REC-043	289,886	5,195,439	Non Participating	0.00	-
REC-044	289,728	5,195,460	Non Participating	0.00	-
REC-045	297,201	5,195,350	Non Participating	0.00	-
REC-046	297,277	5,195,400	Non Participating	0.00	-
REC-047	293,296	5,196,108	Participating	0.00	-
REC-048	285,462	5,205,985	Non Participating	0.00	-
REC-049	293,442	5,204,835	Non Participating	36.12	30.00*
REC-050	288,924	5,205,147	Participating	9.53	-
REC-051	288,909	5,205,254	Participating	2.65	-
REC-052	288,354	5,205,907	Non Participating	3.67	-
REC-053	291,663	5,206,405	Participating	25.52	-
REC-054	291,777	5,206,426	Participating	21.68	-
REC-055	291,592	5,206,798	Non Participating	4.47	-
REC-056	290,965	5,204,916	Participating	3.28	-
REC-057	280,409	5,203,718	Non Participating	0.00	-
REC-058	280,572	5,202,698	Participating	0.00	-
REC-059	280,509	5,202,548	Participating	0.00	-
REC-060	291,869	5,191,101	Non Participating	0.00	-
REC-061	295,820	5,192,415	Non Participating	0.00	-

Notes:

[1] Coordinates presented in UTM NAD83 Zone 14 (meters)

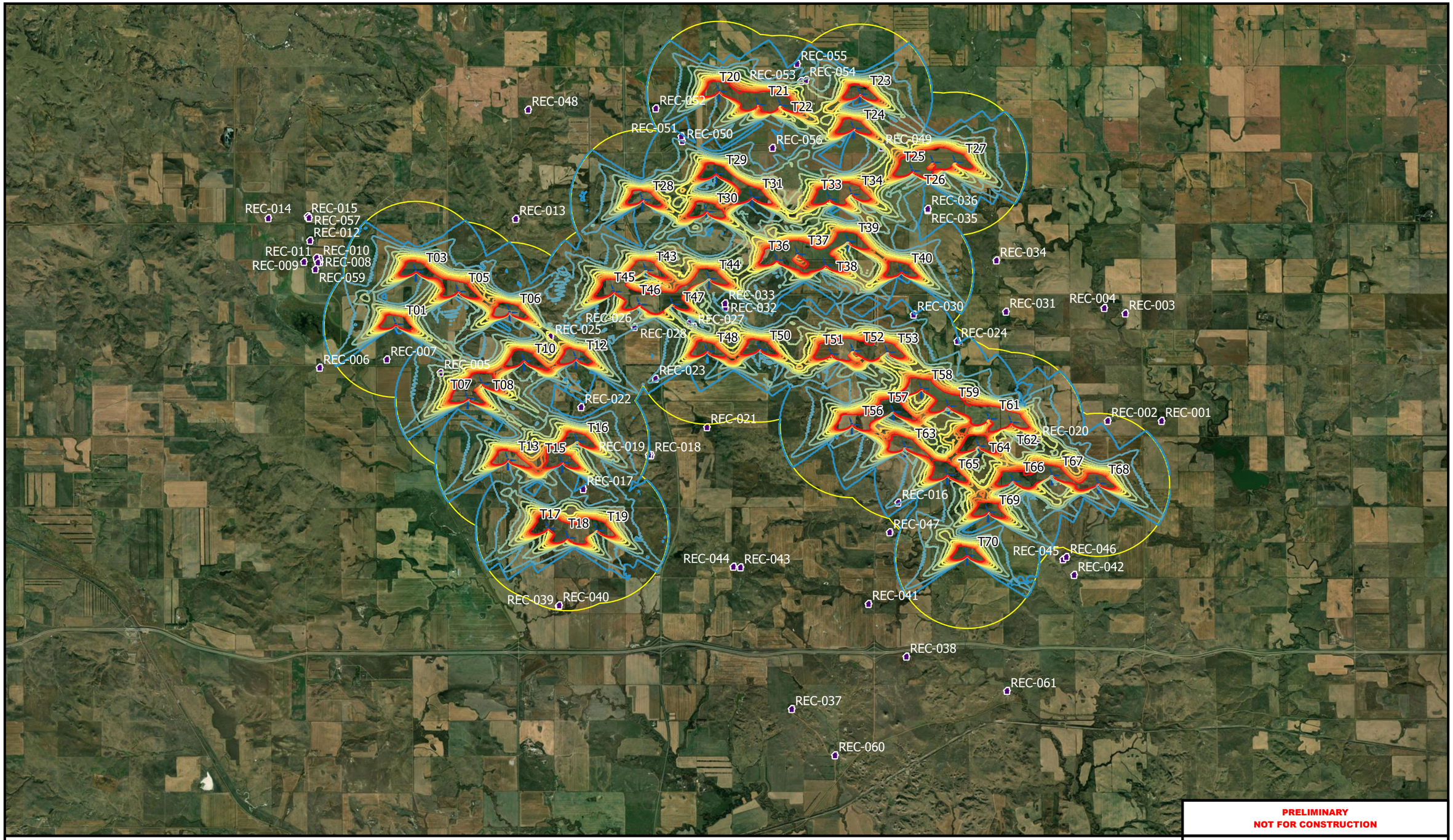
[2] Receptor coordinates provided by Client via "*Longspur_Wind_Receptor_Survey_Results - MB confirmed.xlsx*" on October 20, 2025

[3] Participating status provided by Client via "*Longspur_Wind_Receptor_Survey_Results - MB confirmed (With Yes No Status).xlsx*" on November 13, 2025

[4] Results based on turbine layout in Table A-1

[5] Mitigation techniques will be utilized to reduce the shadow flicker on residences with more than 30 hours per year, indicated with the asterisk. Common techniques include planting vegetation, awning installation, and/or reduced turbine operation via curtailment. The mitigation strategies ensure the Project would be able to meet the shadow flicker limits. However, mitigation may not be necessary for the final layout based on which turbines are ultimately selected to be built. A final shadow flicker model will be completed to demonstrate compliance for the final layout.

Appendix D – Shadow Flicker Duration Map



LEGEND

- Turbine Buffer (10 x RD - 1630m)
- Turbines
- Receptors

Shadow Flicker Vectors [hours per year]

0 10 20 30 40 50 60 70 80 90 100

REFERENCE

0 1 2 MILES

0 1 2 KILOMETERS

N

SK MB ND MT MN SD WY

PRELIMINARY
NOT FOR CONSTRUCTION

LONGSPUR WIND
Shadow Flicker Duration [Hr/Yr]

LOCATION:	MORTON COUNTY, NORTH DAKOTA
CLIENT:	MINNESOTA POWER
PROJ. NO.:	154125
CREATED:	11/05/2025

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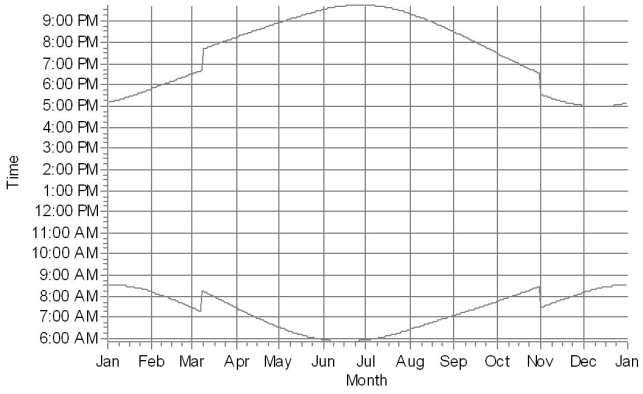
Appendix E – Shadow Flicker Calendar

Licensed user:
1898 & Co., Part of Burns & McDonnell
9400 Ward Parkway
US-KANSAS CITY, MO 64114
816 448 7338
Tirthesh / tmshah@burnsmcd.com

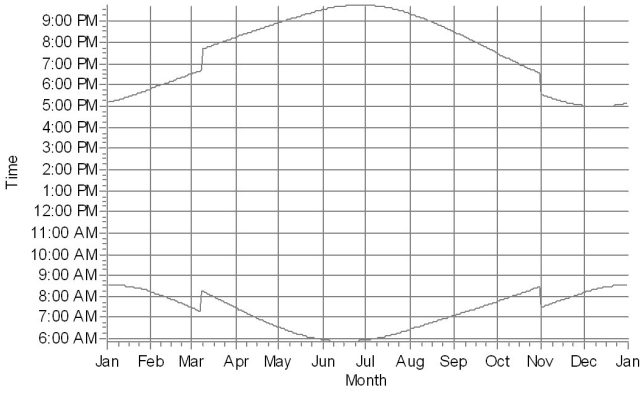
SHADOW - Calendar, graphical

Calculation: Client Freq data_ShadowFlicker_Analysis_L013_Layout_57loc

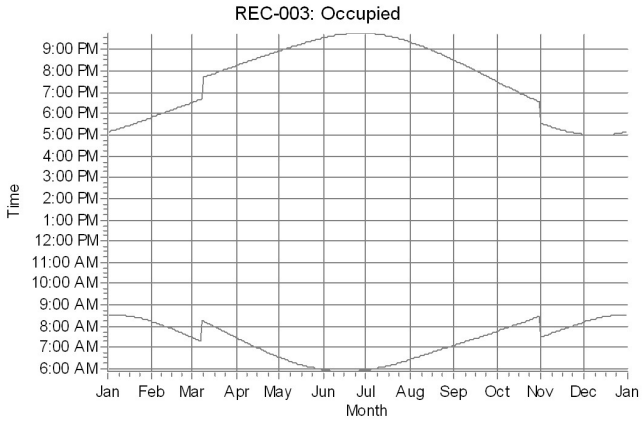
REC-001: Occupied



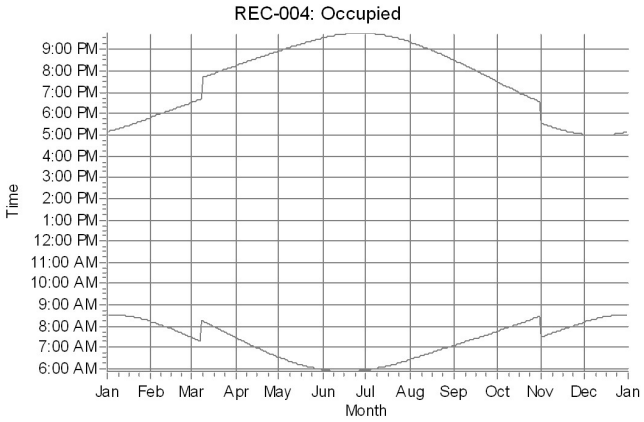
REC-002: Occupied



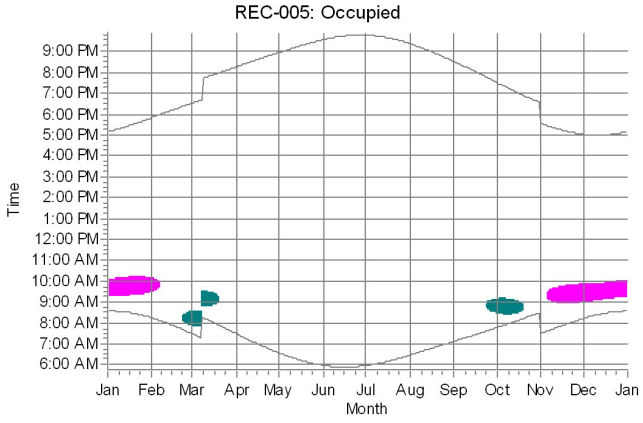
REC-003: Occupied



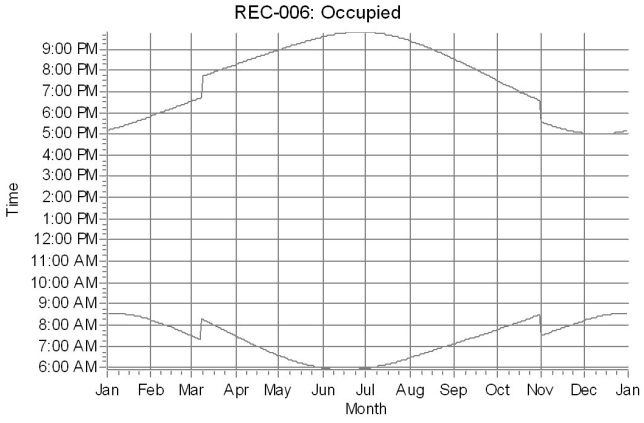
REC-004: Occupied



REC-005: Occupied



REC-006: Occupied





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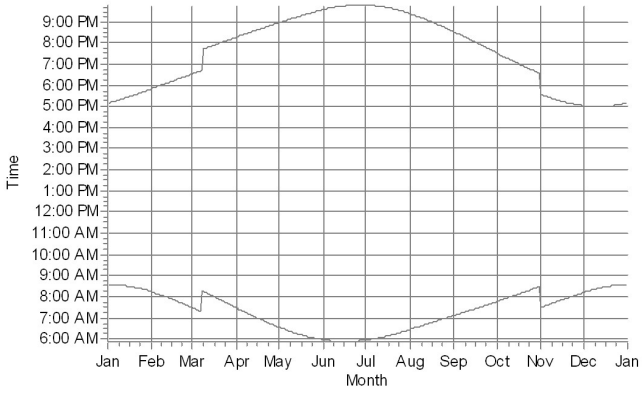
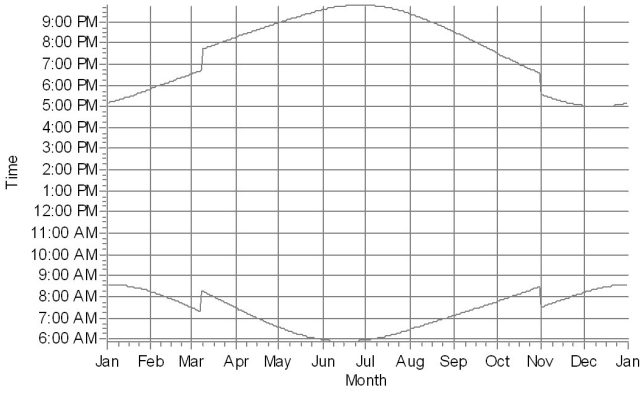
SHADOW - Calendar, graphical

Calculation: Client Freq data_ShadowFlicker_Analysis_L013_Layout_57loc

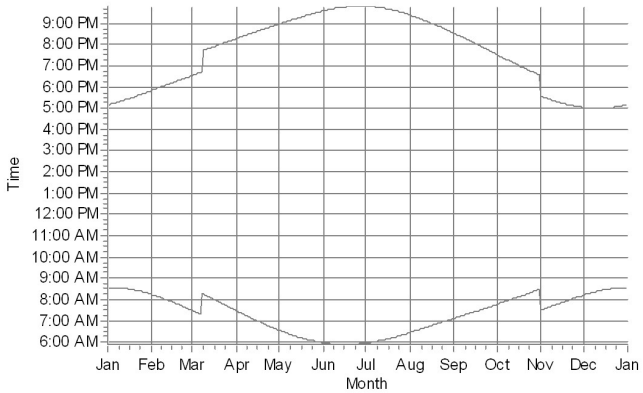
REC-007: Occupied



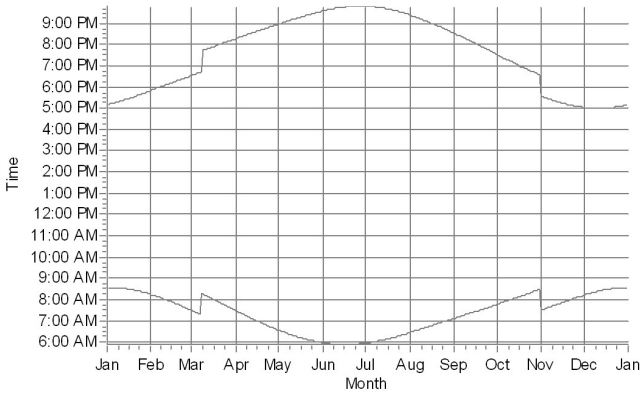
REC-008: Occupied



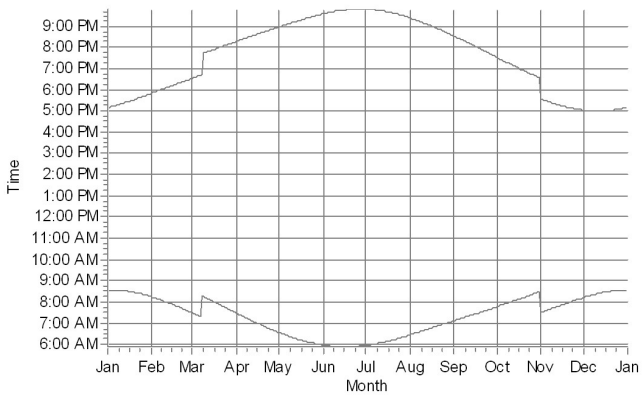
REC-009: Occupied



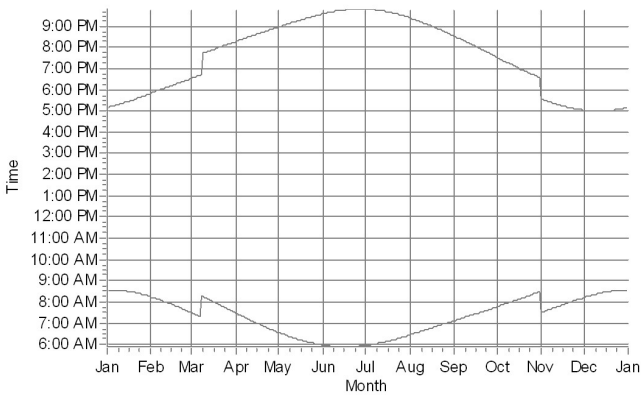
REC-010: Occupied



REC-011: Occupied



REC-012: Occupied



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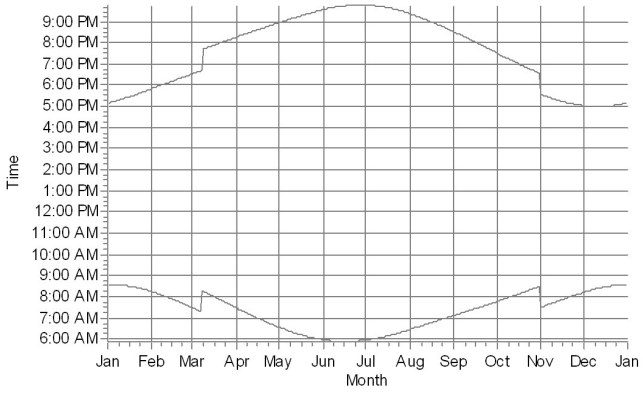
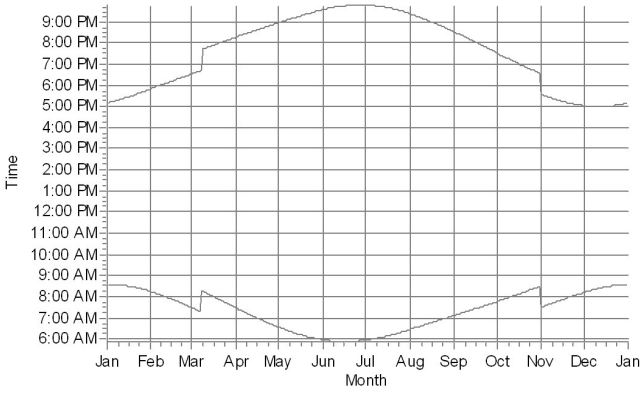
Calculation: Client Freq data_ShadowFlicker_Analysis_L013_Layout_57loc

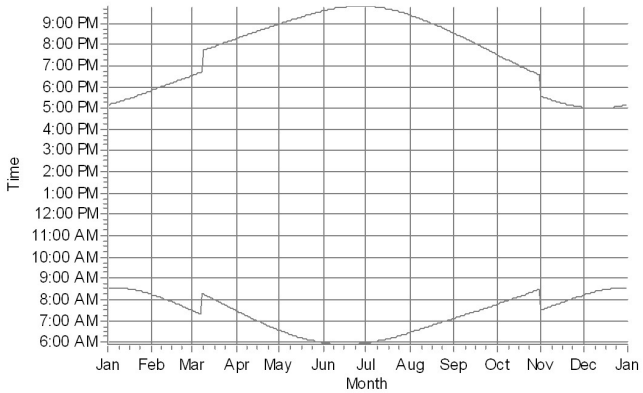
REC-013: Occupied



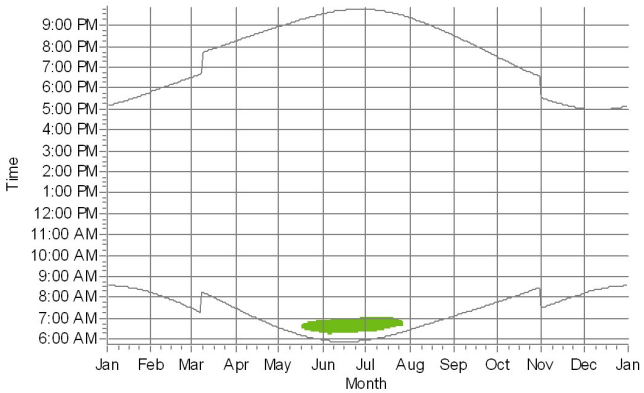
REC-014: Occupied



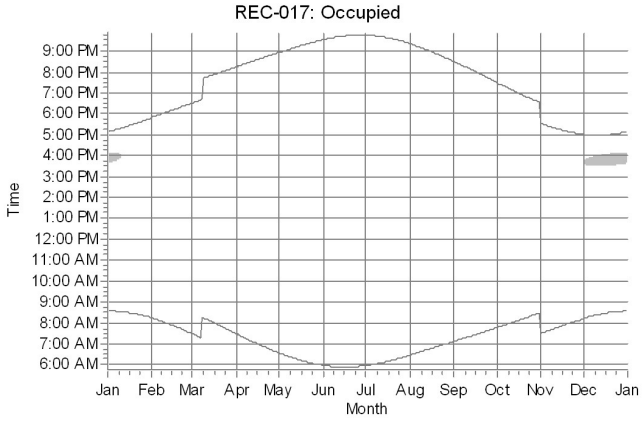
REC-015: Occupied



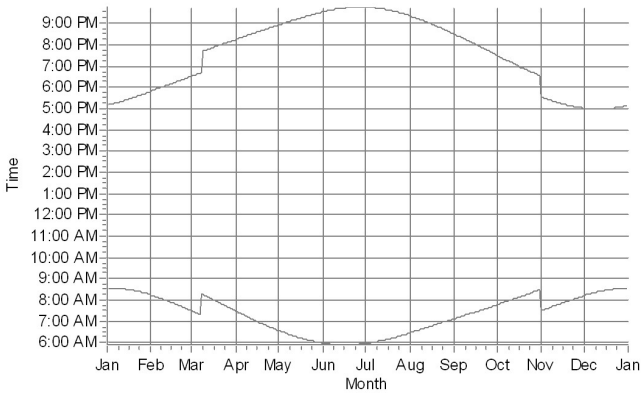
REC-016: Occupied



REC-017: Occupied



REC-018: Occupied



WTGs

T17: Primary

T65: Primary

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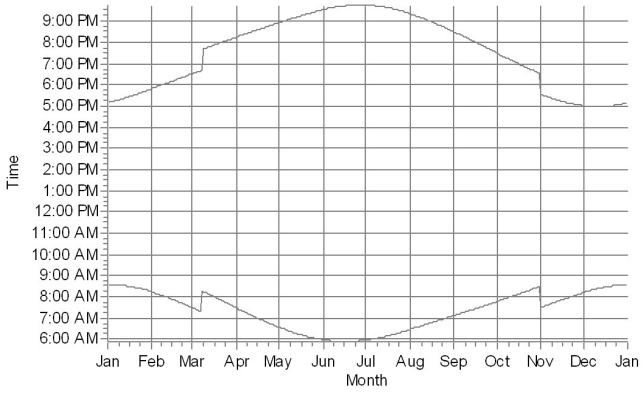
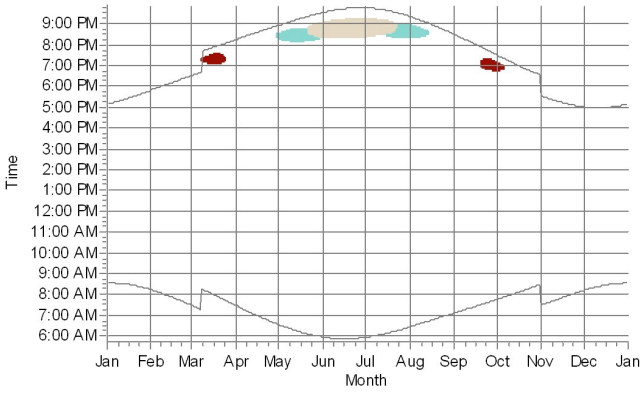
SHADOW - Calendar, graphical

Calculation: Client Freq data_ShadowFlicker_Analysis_L013_Layout_57loc

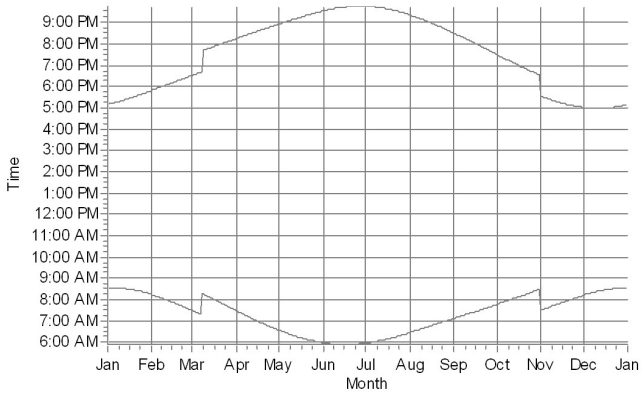
REC-019: Occupied



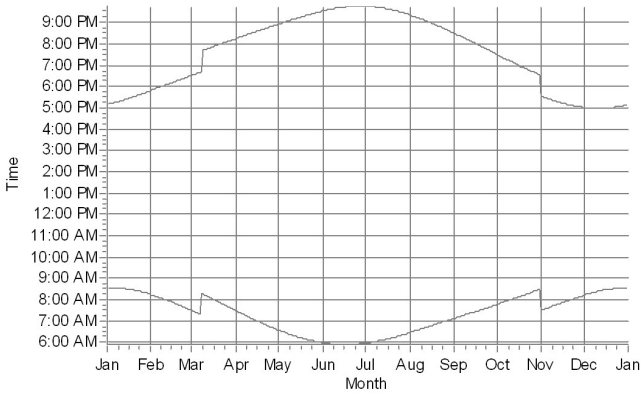
REC-020: Occupied



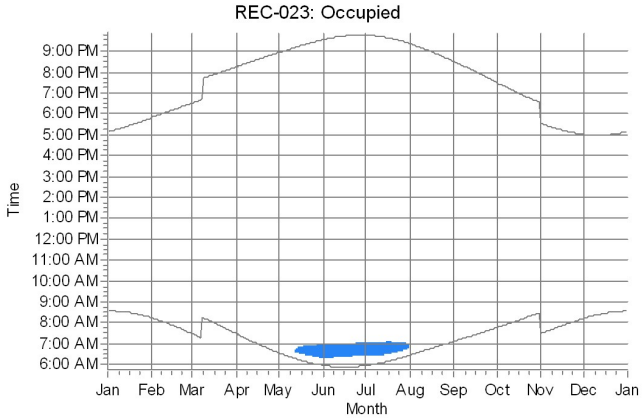
REC-021: Occupied



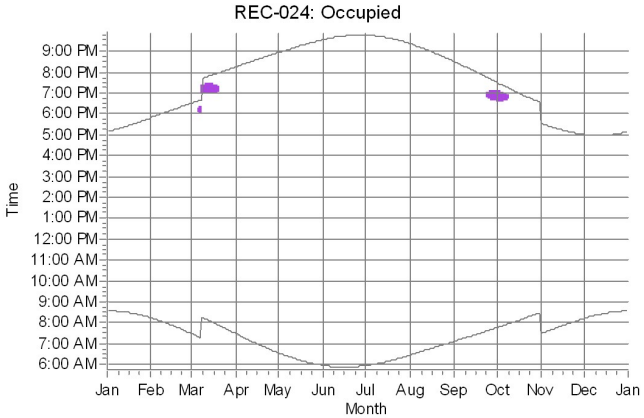
REC-022: Occupied

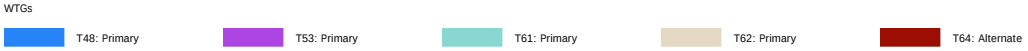


REC-023: Occupied



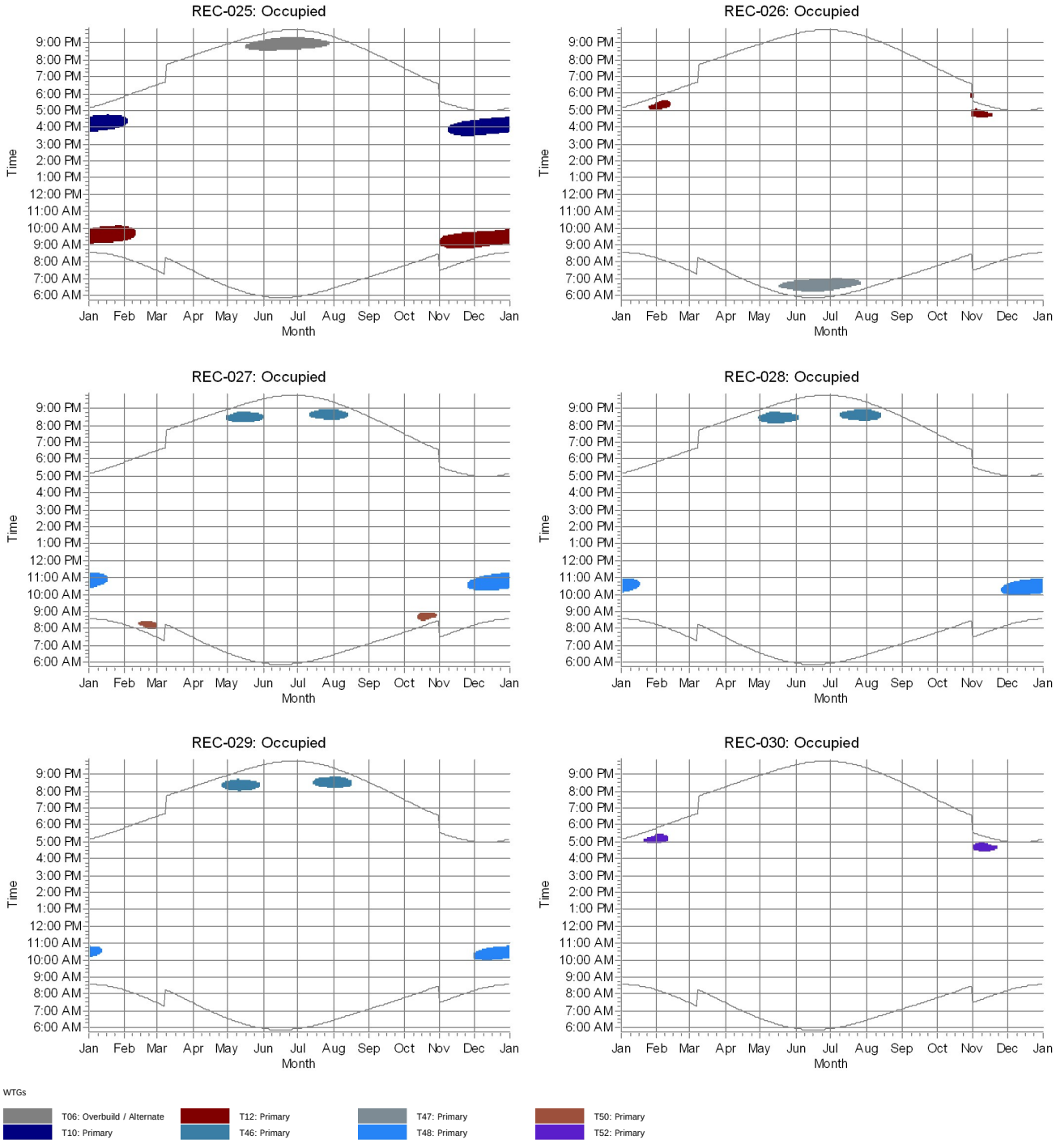
REC-024: Occupied





SHADOW - Calendar, graphical

Calculation: Client Freq data_ShadowFlicker_Analysis_L013_Layout_57loc



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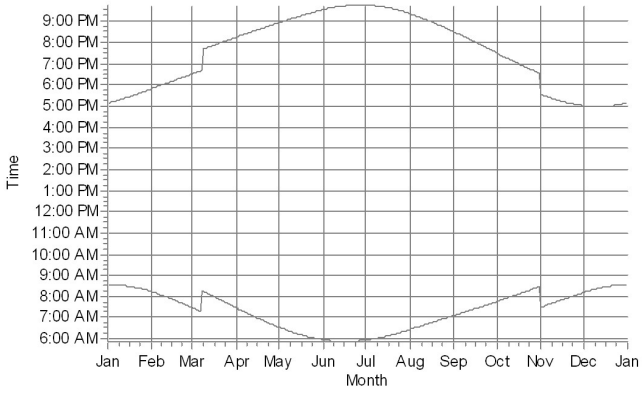
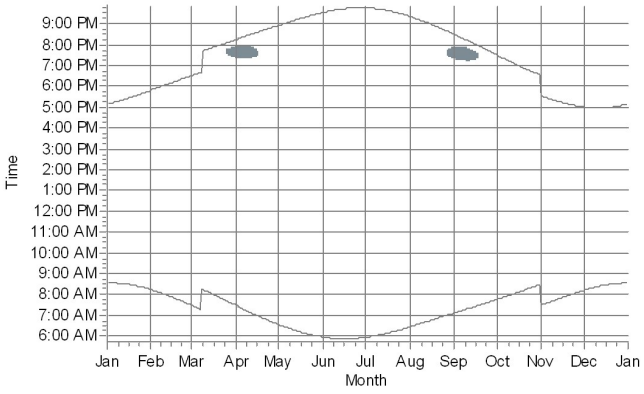
Calculation: Client Freq data_ShadowFlicker_Analysis_L013_Layout_57loc

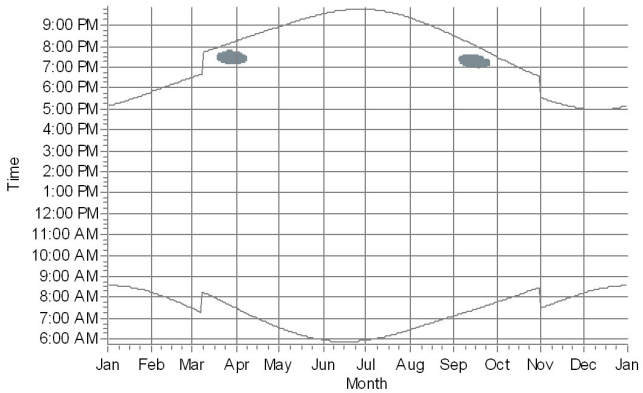
REC-031: Occupied



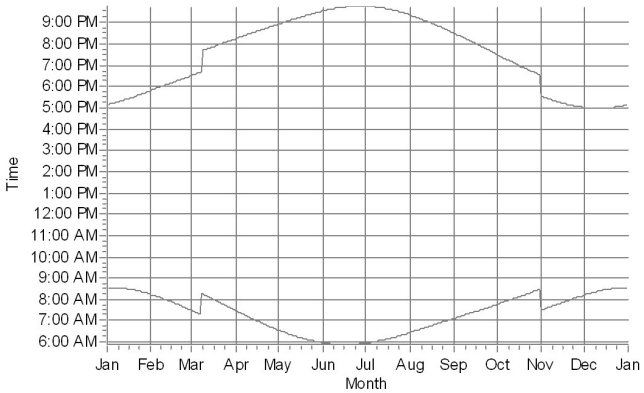
REC-032: Occupied



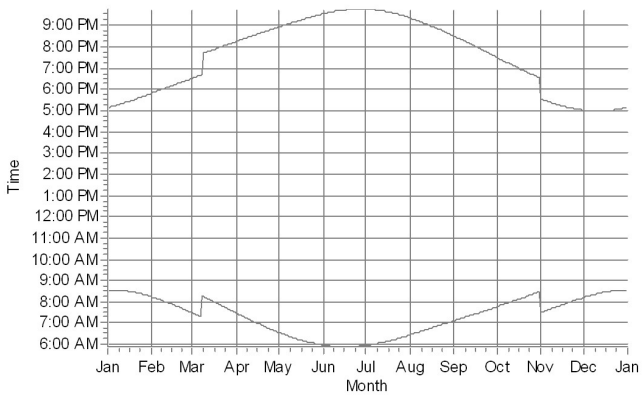
REC-033: Occupied



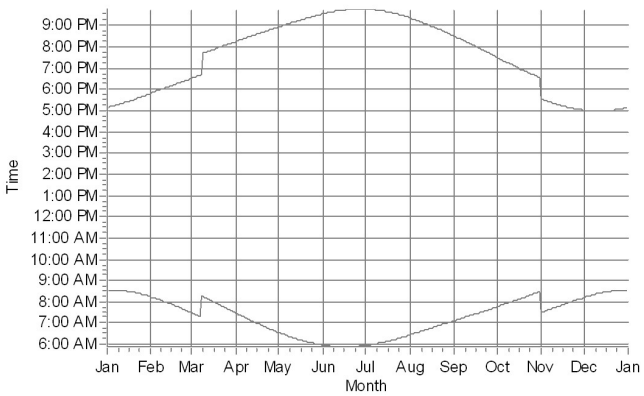
REC-034: Occupied



REC-035: Occupied



REC-036: Occupied



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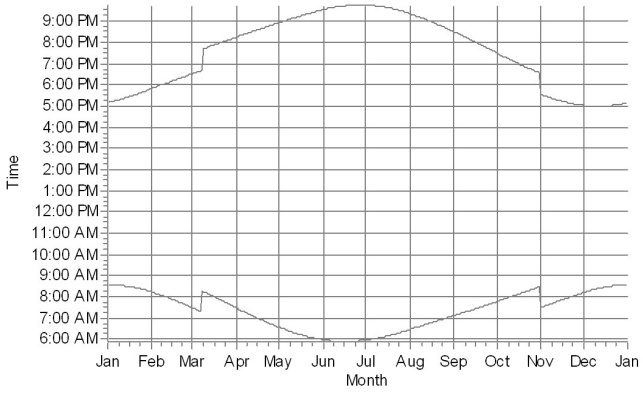
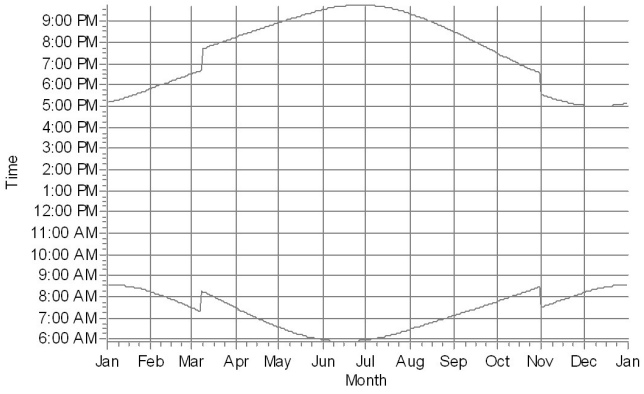
Calculation: Client Freq data_ShadowFlicker_Analysis_L013_Layout_57loc

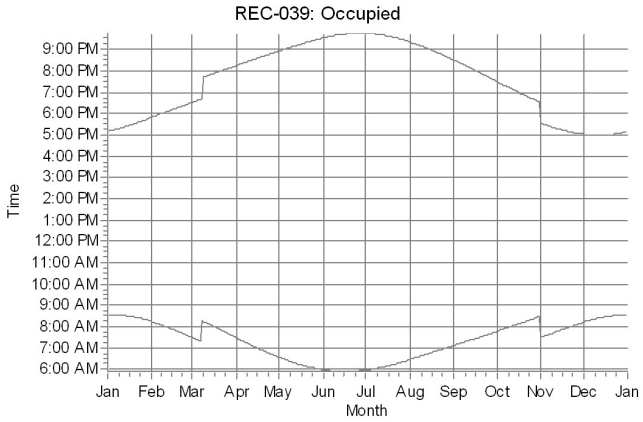
REC-037: Occupied



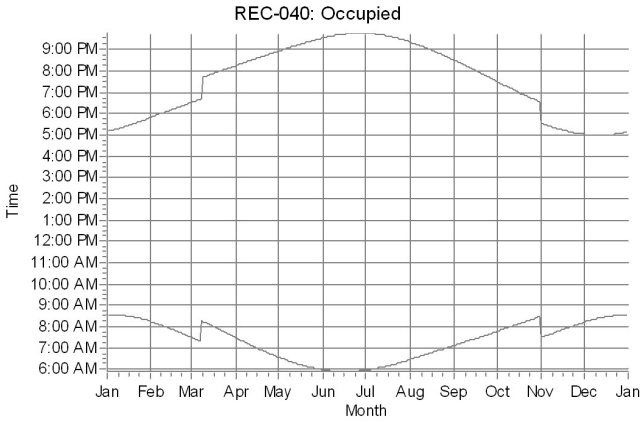
REC-038: Occupied



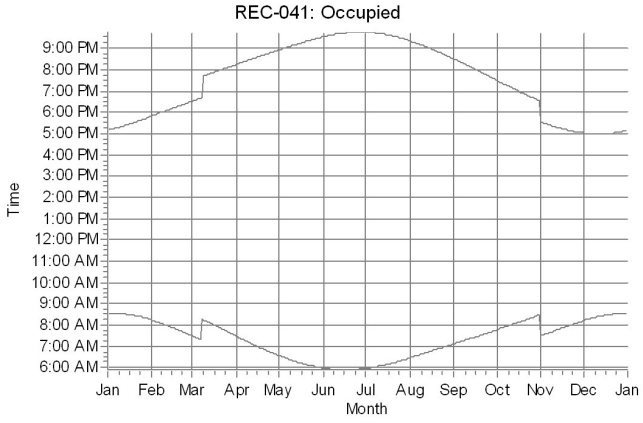
REC-039: Occupied



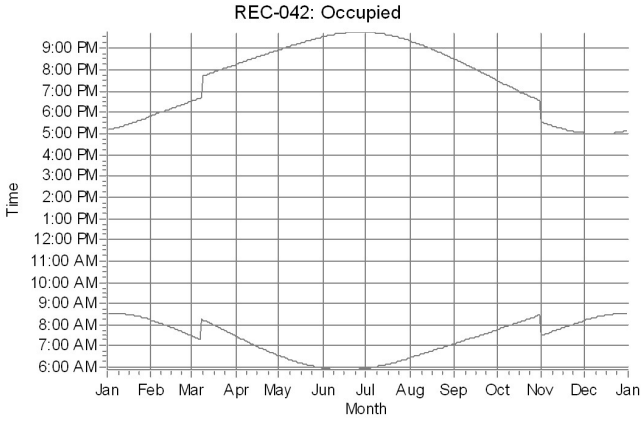
REC-040: Occupied



REC-041: Occupied



REC-042: Occupied



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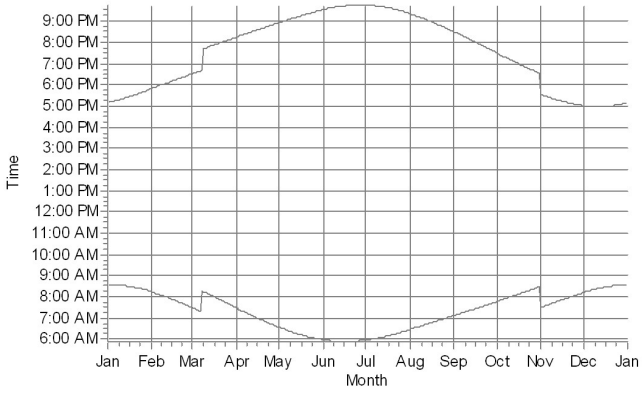
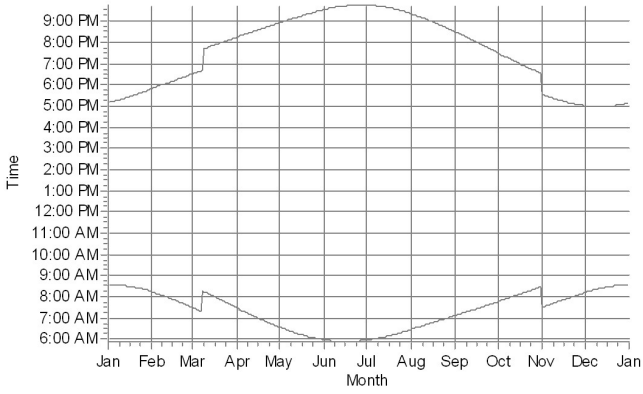
Calculation: Client Freq data_ShadowFlicker_Analysis_L013_Layout_57loc

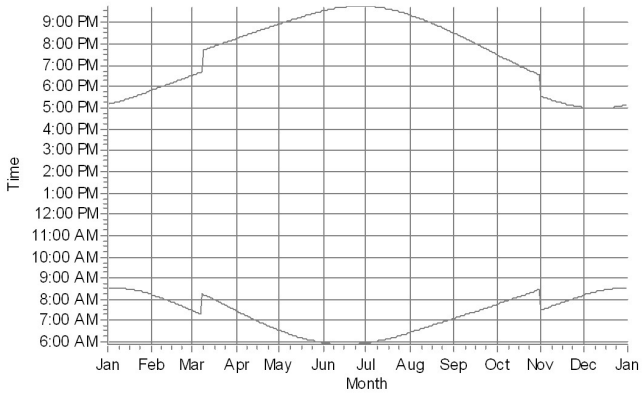
REC-043: Occupied



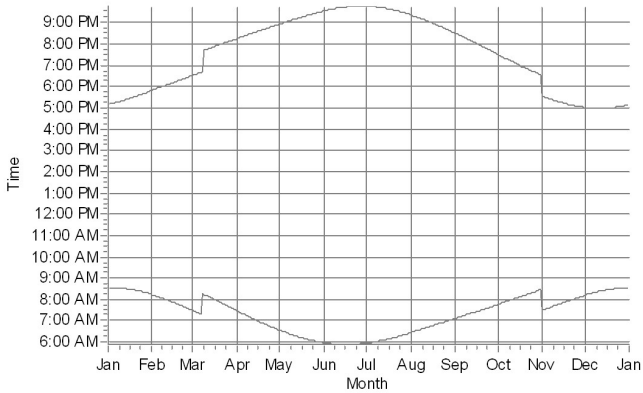
REC-044: Occupied



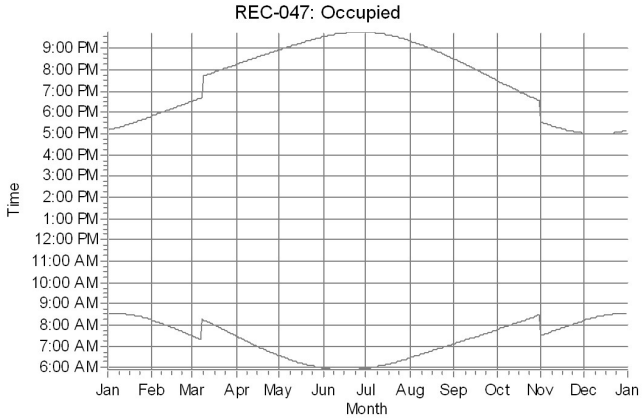
REC-045: Occupied



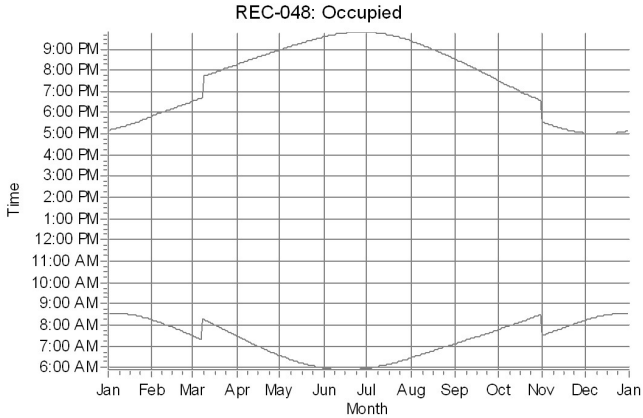
REC-046: Occupied



REC-047: Occupied



REC-048: Occupied



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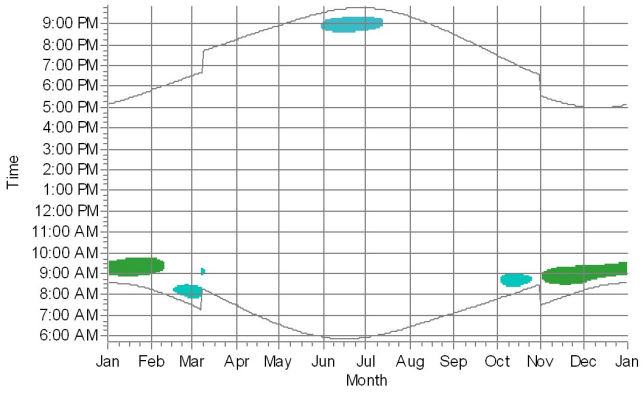
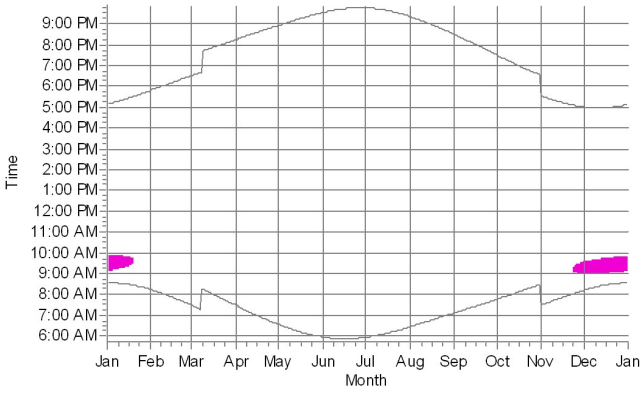
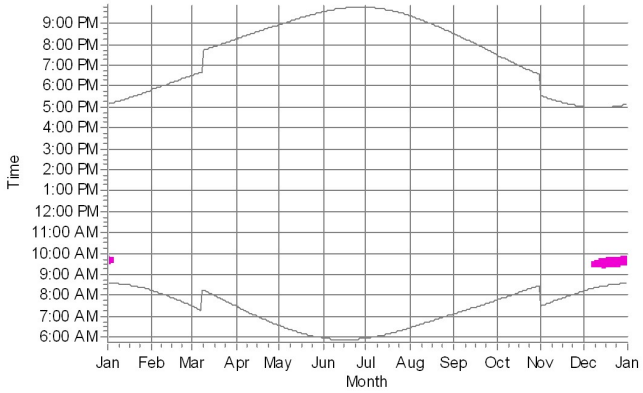
REC-049: Occupied



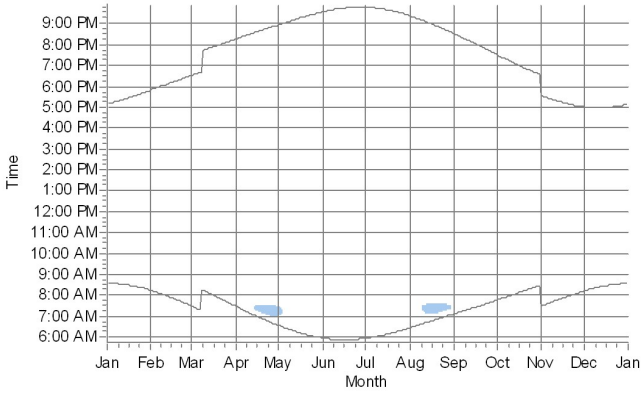
REC-050: Occupied



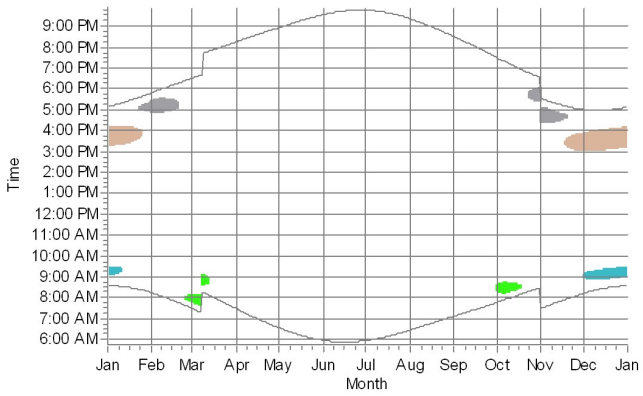
REC-051: Occupied



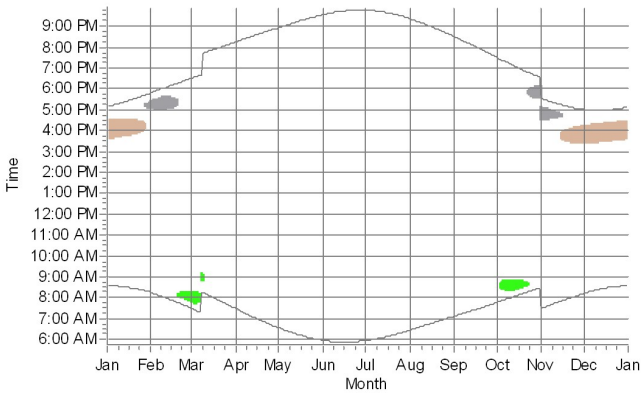
REC-052: Occupied



REC-053: Occupied



REC-054: Occupied





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SHADOW - Calendar, graphical

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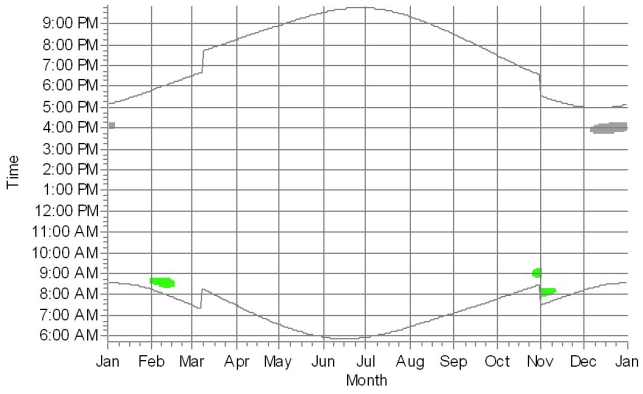
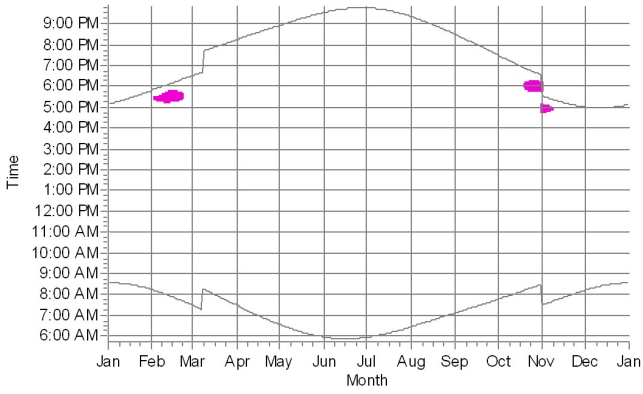
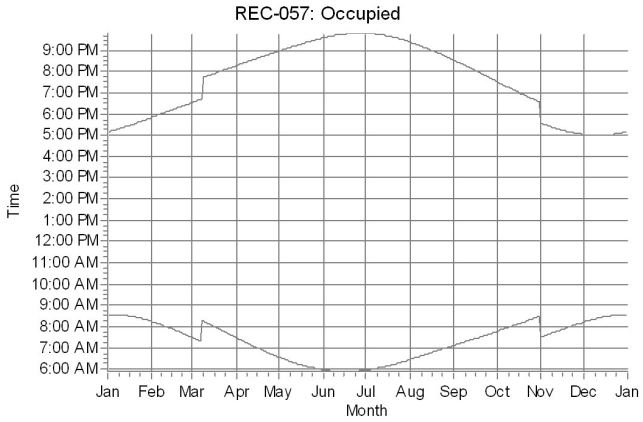
REC-055: Occupied



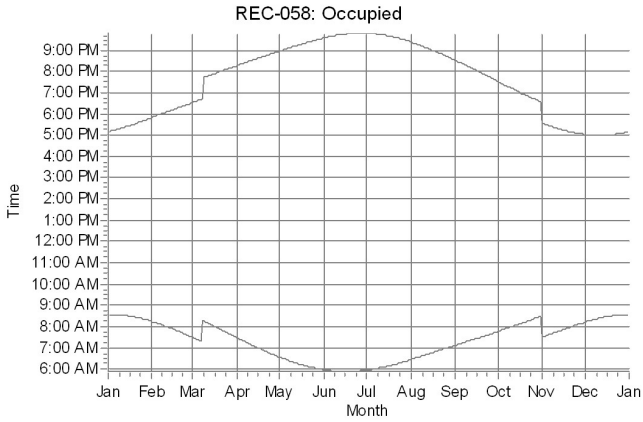
REC-056: Occupied



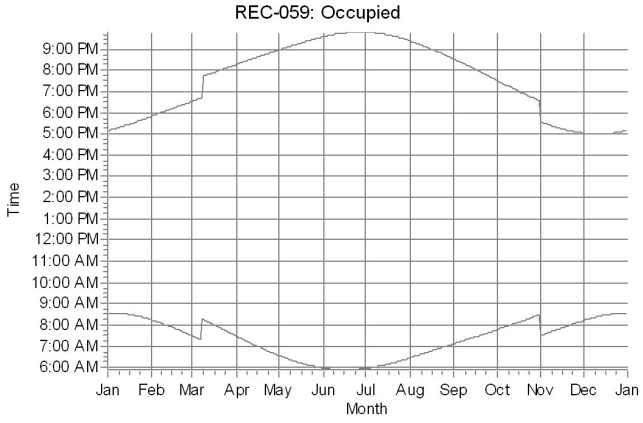
REC-057: Occupied



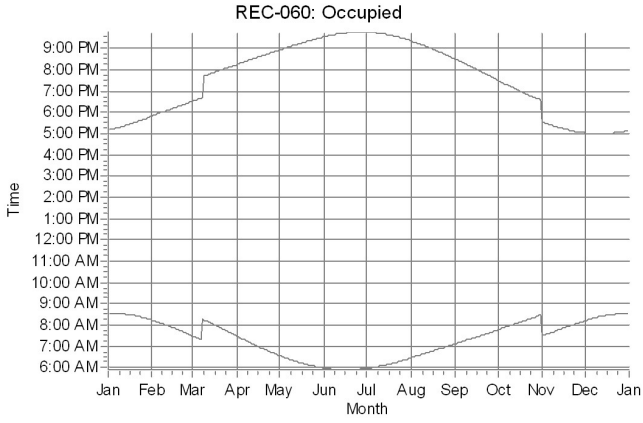
REC-058: Occupied



REC-059: Occupied



REC-060: Occupied





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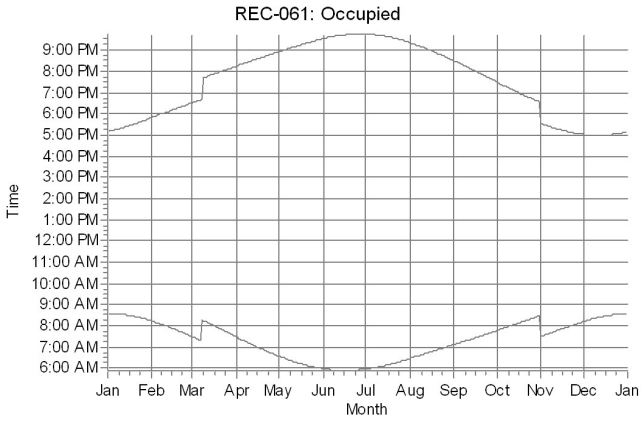
SHADOW - Calendar, graphical

Calculation: Client Freq data_ShadowFlicker_Analysis_L013_Layout_57loc



WTGs


BURNS
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Studies and Assessments

B5. Grassland Assessment

Grassland Habitat Assessment
Longspur Wind Project
Morton County, North Dakota

Final Report
November 2024



Prepared for:

Minnesota Power

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Confidential Business Information

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INTRODUCTION

Minnesota Power is developing the Longspur Wind Project (Project) in Morton County, North Dakota (Figure 1). Minnesota Power contracted Western EcoSystems Technology, Inc. (WEST), to complete a grassland habitat assessment, including categorization of unbroken/broken sod status, to support development of the Project. Unbroken grasslands, defined in the North Dakota Game and Fish Department's (NDGFD) *KeyWind Energy Development in North Dakota, Best Management Practices* (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 unbroken and broken grasslands within the Project Area (Figure 1). This effort verified and updated previous grassland surveys conducted at the Project in 2020 (Brazeal and Piorkowski 2021) using current data and refreshed field verification for the Project Area. A desktop review identified grassland parcels and categorized the sod type of each parcel as either unbroken or broken. Field surveys were then conducted to verify the current land cover status of all identified grasslands within the Project Area, including those grasslands previously verified in 2020. Results from this assessment can help inform siting of facilities and guide decisions regarding future survey needs at the Project.

PROJECT AREA

The Project is located in south-western North Dakota, approximately four miles north of Glen Ullin in Morton County (Figure 1). The Project is within the Northwestern Great Plains Level III and the Missouri Plateau Level IV ecoregions, which encompass much of western North Dakota (US Environmental Protection Agency 2012). This ecoregion consists of semi-arid rolling plains punctuated by buttes and badlands.

The Project Area, provided in October 2024, is approximately 25,933 acres (ac; Figure 1). Topography within the Project Area is characterized by flat land to gently rolling hills with elevation ranging from 2,080–2,477 feet above mean sea level (US Geological Survey 2024). Small waterways and scattered natural and man-made wetlands are present in the Project Area (US Fish and Wildlife Service National Wetlands Inventory 2024). The primary land uses include cultivated crops and livestock grazing. According to the National Land Cover Database (NLCD), the Project Area is primarily a mix of cropland (56.3%) and herbaceous (grasslands) land cover (32.3%). Other common land cover types in the Project Area include shrub/scrub (4.5%), hay/pasture (4.1%), and developed (2.3%; NLCD 2021; Table 1). Each remaining land cover type comprises less than 1% of the Project Area (Table 1).

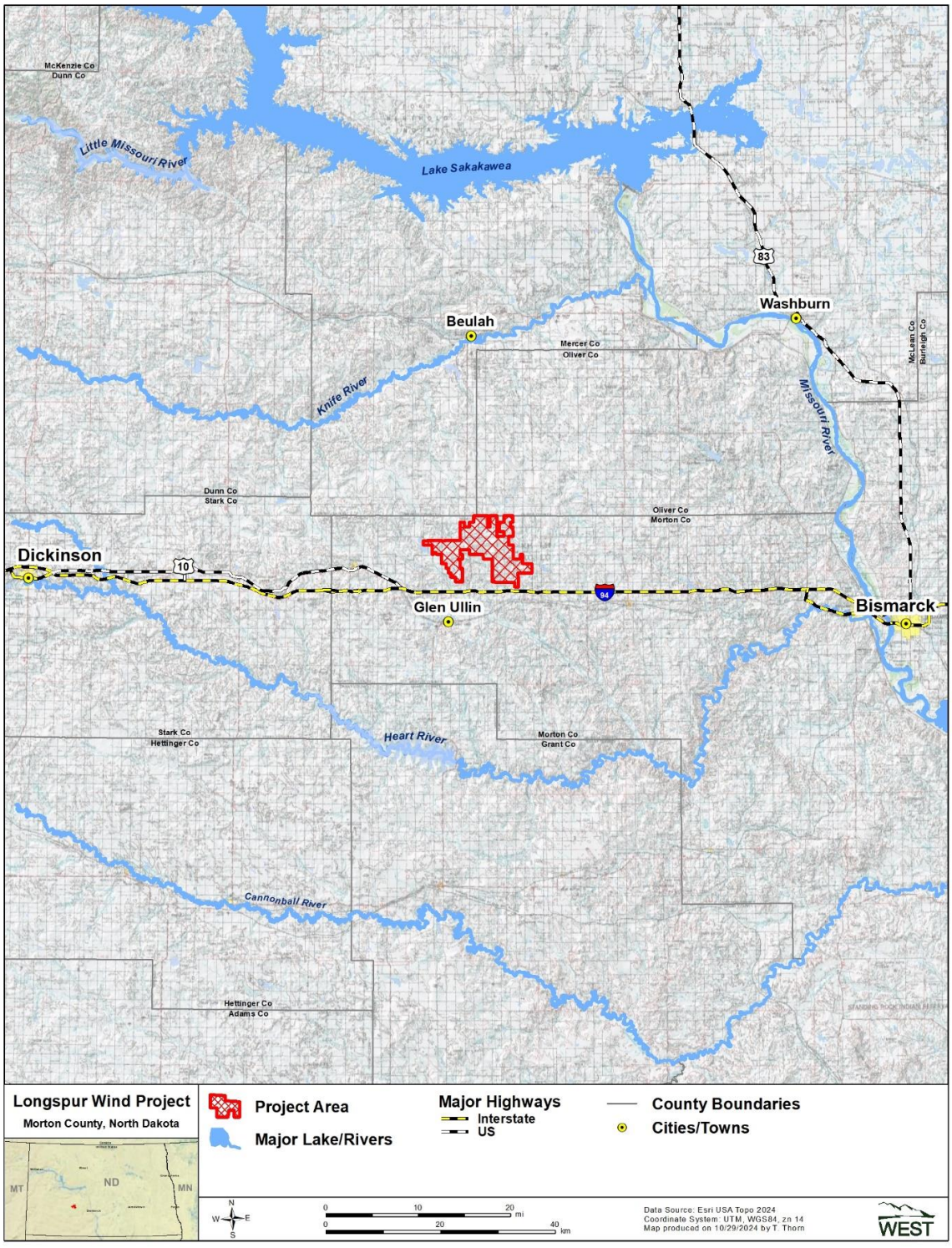

Figure 1. Location of the Longspur Wind Project in Morton County, North Dakota.

Table 1. Land cover types, coverage, and percent composition within the Project Area at the Longspur Wind Project in Morton County, North Dakota.

Land Cover Type	Coverage (acres)	Percent Composition
Cultivated Crops	14,604	56.3
Herbaceous	8,371	32.3
Shrub/Scrub	1,172	4.5
Hay/Pasture	1,061	4.1
Developed	605	2.3
Water/Wetland	91	0.4
Tree/Forest	29	0.1
Barren Land	2	<0.1
Total[1]	**25,933**	**100**

1. Sums of values may not add to the total value shown, due to rounding.

Source: National Land Cover Database 2021.

METHODS

The grassland assessment was completed using a two-step process: a desktop review followed by field verification. The desktop review was completed for the entire Project Area. The field verification surveys were conducted at all identified grassland parcels within the Project Area, to the extent possible.

Desktop Review

WEST completed a desktop review to identify potential grasslands within the Project Area using aerial imagery (US Department of Agriculture [USDA] Farm Production and Conservation Business Center 2023) and NDGFD's "Native Prairie" layer (2022). This review, conducted using Environmental Systems Research Institute Software (ArcGIS 10.8), resulted in a digital data layer of polygons delineating "grassland" or "other" (i.e., non-grass areas such as cultivated cropland, shrub/scrub, development, wetlands, forests, and barren land).

Delineated grassland polygons were further examined using a series of historical USDA National Agriculture Imagery Program aerial photography and USDA North Dakota statewide imagery from 1957 – 1962 (USDA 2017) and defined by visual changes in the landscape (e.g., grassland to cropland or forest edges) to establish a preliminary classification of the grassland sod type (i.e., unbroken or broken). A unique identifier (Grassland ID) was given to each polygon. Broken sod was identified based on features such as rock piles indicating extensive mechanized rock clearing; presence and amount or height of trees and shrubs; field edge changes; absence of scattered rocks; straight line features indicating plowing, disking, harvesting, or planting; or any other features indicating human disturbance. Unbroken sod was identified based on the lack of these disturbance features. The geographical information system specialist provided maps showing all grassland polygons, Grassland ID, roads, cities, and land access information for field verification surveys.

Field Surveys

Field surveys were conducted to verify the desktop classification of unbroken and broken grasslands within the Project Area. A biologist conducted visual surveys from publicly accessible roads using binoculars. For each grassland polygon that was visible, the biologist recorded the sod type (unbroken, broken), tree/shrub presence, field edge changes, rock piles, human disturbance such as buildings, and linear features such as disking, harvesting, plowing, or planting. Representative photographs were taken to document the status and features of the grassland parcels (Appendix A). Field surveys included field verification from at least one survey location for each of the desktop delineated polygons and may not be a complete representation of the entire polygon. In the event that a grassland polygon was not visible from public roads, previously verified data from Brazeal and Piorkowski (2021) were used. If no previously verified data was available, grassland polygon classification was based on a desktop review only.

WEST implemented quality assurance and quality control measures at all stages of the assessment, including during the desktop review, in the field, during data entry, and during report writing. If any errors, omissions, or problems were identified, follow-up measures were implemented including discussions and review of field data with field staff and/or the Project Manager. Upon completion of field surveys, the digital data layer created during the desktop review was updated, as needed.

RESULTS

The desktop review identified 9,064 ac of grassland in the Project Area (Table 2, Figure 2). Field verification surveys were conducted from November 7–8, 2024, for all visible grassland polygons within the Project Area. Approximately 86% (7,813 ac) of grasslands in the Project Area were classified as unbroken. Of this, 7,773 ac were confirmed unbroken by field verification and 40 ac were classified as unbroken based on only the desktop review (Table 2, Figure 2). The remaining 14% (1,252 ac) of grasslands were classified as broken, with 1,189 ac of this confirmed broken during field verification surveys (Table 2, Figure 2).

Table 2. Grassland sod types and field verification of grassland sod types within the Longspur Wind Project in Morton County, North Dakota.

Sod Type	Survey Type	Acres
Unbroken Grassland	Field Verified	7,773
	Desktop Review	40
Broken Grassland	Field Verified	1,189
	Desktop Review	63
Total[1]		**9,064**

1. Sums of values may not add to the total value shown, due to rounding.

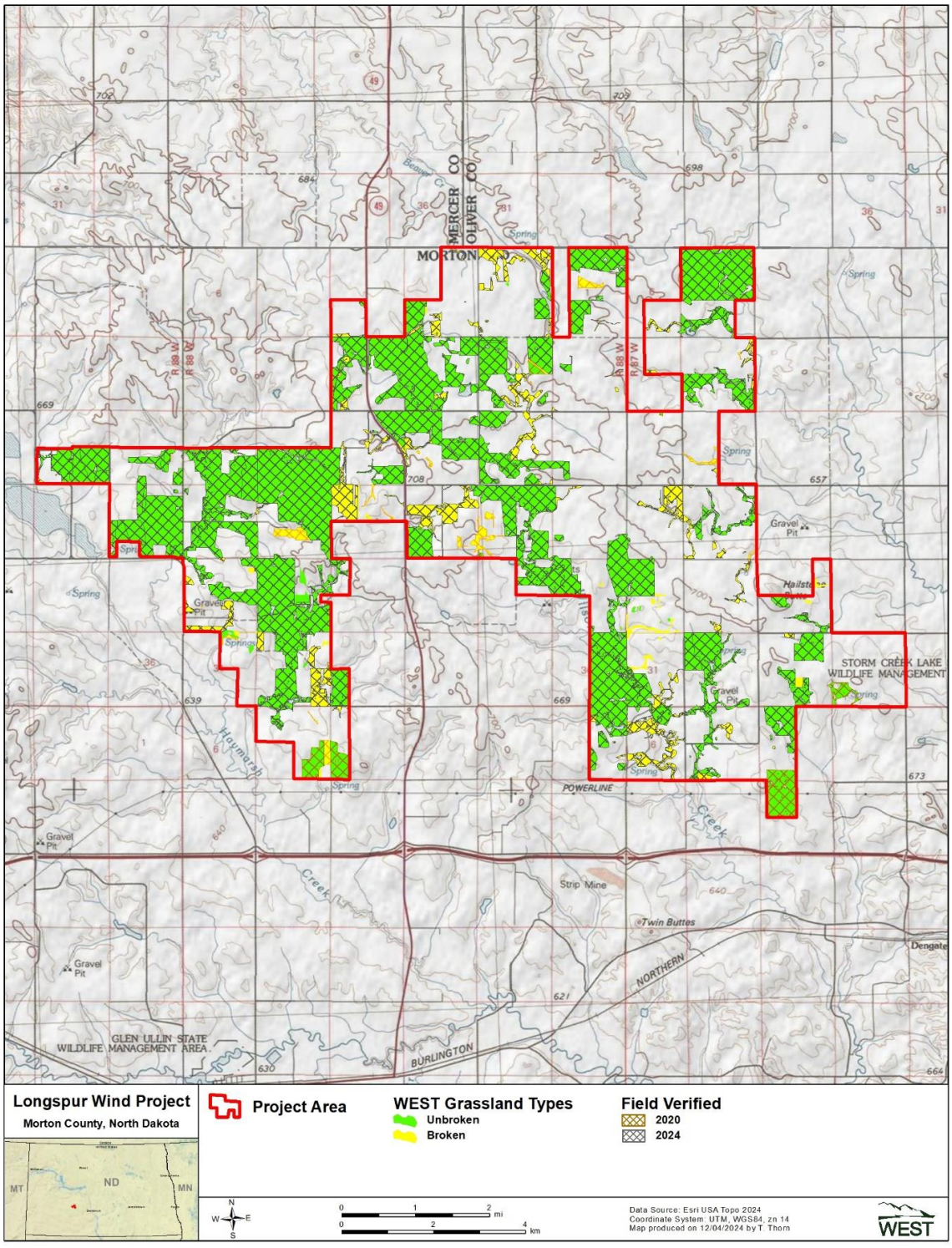

Figure 2. Results of the 2024 desktop review and field verification of potential grassland habitat at the Longspur Wind Project in Morton County, North Dakota.

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Appendix A. Representative Photographs of Unbroken and Broken Grassland Habitats at the Longspur Wind Project in Morton County, North Dakota, November 7–8, 2024.



Appendix A1. Unbroken grassland habitat within the Longspur Wind Project in Morton County, North Dakota, November 7–8, 2024.



Appendix A2. Unbroken grassland habitat within the Longspur Wind Project in Morton County, North Dakota, November 7–8, 2024.



Appendix A3. Broken grassland habitat within the Longspur Wind Project in Morton County, North Dakota, November 7–8, 2024.



Appendix A4. Broken grassland habitat within the Longspur Wind Project in Morton County, North Dakota, November 7–8, 2024

Studies and Assessments

B6. Wetlands and Other Waters Delineation Report

WETLAND AND WATERBODY DELINEATION REPORT

Longspur Wind Project

Mercer and Morton Counties, North Dakota

Minnesota Power

Prepared by:

merjent

December 2025

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1.0 INTRODUCTION

Merjent, Inc. (Merjent), Verdanterra, LLC (Verdanterra), and Western EcoSystems Technology, Inc. (WEST) conducted field surveys to determine the presence and extent of wetlands and waterbodies for Minnesota Power's proposed Longspur Wind Project (Project) located in Mercer and Morton Counties, North Dakota (see Figure 1). Waterbodies can include, but are not limited to, streams, ponds, and lakes.

This wetland and waterbody delineation report describes the wetlands and waterbodies present within the 4,651.32-acre survey area (Survey Area) available for the Project (see Figure 1). The delineated boundaries and communities described in this report will be used for project planning and the basis on which impacts to wetland and waterbodies will be determined. The purpose of this report is to document the findings from the field survey efforts that were performed May 19 to May 23, 2025, by Merjent; October 7 to October 14, 2025, by Verdanterra; and October 21 to November 4, 2025, by WEST.

This report outlines the field survey methods and results, as completed by Merjent, Verdanterra, and WEST. This report has been compiled by the following staff that are trained and experienced in wetland delineation methods and applicable regulations:

Kyle Hanson (Field Manager; Senior QA/QC) is a wetland scientist with 17 years of experience working in the Upper Midwest. He is a Professional Wetland Scientist and Certified Minnesota Wetland Professional with experience including 11 years conducting wetland delineations and wetland mitigation bank management in Minnesota and Wisconsin. His work has supported client projects in utilities, residential and commercial development, public transit, recreational trails, and wetland restoration and mitigation banking. Mr. Hanson is responsible for performing environmental field surveys, document preparations, wetland replacement plans, and permit applications.

Matt Pudlo (Field Lead, Report Author) is a biologist with over five years of experience in natural resources. His expertise includes performing wetland delineations, T&E species reviews and habitat assessments, regulatory permitting, technical writing, and designing soil erosion and sedimentation control plans for project sites. He has worked on oil & gas, power, and renewable energy projects in seventeen different states throughout the United States.

Adam Weishair (Field Lead) is a Field Services Specialist 6, specializing in wetland delineations, environmental surveys, and compliance in the Upper Midwest. Mr. Weishair has five years of experience serving Oil & Gas, Transmission, Transportation, and Development sectors, and seven years of experience conducting field surveys for the US Fish and Wildlife Service and the National Park Service. Mr. Weishair has conducted field surveys and desktop reviews of threatened and endangered species surveys, grassland assessments, wetland delineations, cultural resources, and Phase I environmental site assessments, environmental SWPPP surveys, and construction compliance.

Kallie Koon, MS (Report Author) is a skilled field botanist experienced in wetland delineations and vegetation monitoring. She received a BS in Biology from Arkansas Tech University, as well as a MS in Botany from Miami University. She has worked in multiple herbaria and has taught Field Botany at Miami University. She has performed wetland delineations and habitat evaluations throughout the Upper Midwest and has received a certificate in wetland delineation from the Wetland Training Institute.

Jameson Loesch (GIS Analyst) is a Senior Analyst with over 10 years of experience conducting environmental review, permitting, compliance, and project management in the energy and utility industry throughout the Midwestern United States. His expertise focuses on utilizing GIS and other geospatial tools to make environmental review and decision making more efficient and effective during the planning, permitting, construction, and post-construction phases of his projects. Mr. Loesch has extensive experience through all phases of the environmental permitting process having worked as a field lead coordinating and conducting wetland delineations, botanical surveys, rare species surveys, and construction site compliance monitoring; as a GIS project manager developing site, access, and stormwater plans, while also conducting in depth desktop reviews and managing geospatial data in support of routing, planning, and permitting needs; and as a lead in the development of permit applications and enforcement at the local, state, and federal levels. Mr. Loesch is also experienced in conducting threatened/endangered species reviews, having completed a mix of desktop reviews, field surveys, agency consultations, and coordination with clients to ensure proper planning and compliance on over 1000 projects to date.

Verdanterra is an environmental, land survey, and engineering consulting firm, driven by innovative professionals committed to providing exceptional customer service.

Verdanterra's wetland ecologists, wildlife biologists, and soil scientists are experts in conducting natural resource field assessments. They are experienced at performing field assessments on complex linear projects, such as pipelines and transmission lines. They understand the challenges of spanning regulatory jurisdictions and what is required to meet state and federal requirements. Their staff understands the value of rapidly collecting high-quality and defensible data to help keep their clients' projects moving forward.

Western EcoSystems Technology, Inc. (WEST) provides environmental and statistical consulting services and contract research nationally and internationally for industry, government, and private organizations. They offer clients a unique combination of field ecology and statistics to help solve ongoing and contemporary natural resource challenges.

WEST's wetland scientists across the US and Canada provide desktop assessments, field delineations, permit support, and mitigation planning and monitoring. Staying current with regulatory guidelines, WEST's wetland scientists map and assess aquatic resources following US Army Corps of Engineers (USACE) guidelines under the Clean Water Act and expanding state regulations to help develop permit strategies.

2.0 DEFINITIONS

2.1 WETLANDS DEFINITION

The *United States Army Corps of Engineers* (USACE) *Wetlands Delineation Manual* (Environmental Laboratory, 1987) defines wetlands as follows:

> "Those areas that are inundated or saturated by surface or ground water 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. Wetlands generally include swamps, marshes, bogs, and similar areas."

In order for a surveyor to make a positive determination that a wetland is present based on the methods described in the *USACE Wetlands Delineation Manual* (Environmental Laboratory, 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region* (USACE, 2010), one positive indicator (except in certain situations) from each of the three elements must be present, which are as follows:

- dominance of hydrophytic plant species;
- presence of hydric soil; and
- wetland hydrology is present during the growing season.

Where one or more elements used to define the presence or absence, extent, or composition of wetland communities is obscured fully or in part by conditions that are naturally problematic and/or significantly disturbed, the extent of the wetland area and the communities within the wetland may be difficult to define. In these situations, the presence or absence of undisturbed wetland indicators, landscape position, topography, and a review of aerial photography are used to inform professional judgement to determine wetland boundaries and community types.

2.2 WATERBODIES DEFINITION

Waterbodies are defined as both linear surface water conveyances (streams) and non-linear surface water features (open waterbodies).

2.2.1 Streams Definition

Streams are defined as any linear waterway otherwise referred to as, but not limited to, streams, creeks, rivers, or other local designations. Streams are characterized by evidence of flow and a continuous bed and bank, bounded by observed and defined field indicators.

2.2.2 Open Waterbodies Definition

Open waterbodies are defined as non-linear features that permanently hold water deeper than approximately six feet and of enough duration to preclude most aquatic vegetation or other wetland characteristics. These features include those commonly referred to as, but not limited to, ponds, lakes, or reservoirs.

3.0 METHODS

3.1 RESOURCE REVIEW

The following processes and procedures were followed to determine the potential presence of wetlands and waterbodies within the Survey Area. Prior to the field survey, Merjent's delineators review available desktop resources to identify suspected wetlands and waterbodies which advise the development and execution of the field survey.

3.1.1 Topography

Merjent reviewed the U.S. Geological Survey (USGS) topographic map (USGS, 2019) The review of topographical data aided in determining general locations of wetland and waterbody features and surface water flow across a landscape within and surrounding the Survey Area.

3.1.2 Soil Survey

Merjent reviewed the Natural Resources Conservation Service (NRCS), U.S. Dept. of Agriculture (USDA) Soil Survey Geographic Database (SSURGO; Soil Survey Staff, NRCS, USDA, 2019) soils inventory prior to the field survey. SSURGO data describes the soils for the Survey Area and surrounding landscape. Attributes within each soil's series can provide evidence for potential wetlands, most commonly the Hydric Soils classification attribute. While historical land use and common drainage practices have led to many of these areas no longer supporting any remaining indication of wetland conditions, hydric soils series are still useful in determining areas with which to focus survey effort.

3.1.3 Mapped Aquatic Resources

A desktop review was completed using the following aquatic resources datasets prior to the field survey:

- The National Wetlands Inventory (NWI; United States Fish and Wildlife Service [USFWS], 2021) is a nation-wide layer developed locally to remotely identify wetland areas based on additional background information. Portions may be updated at the state or county level at various time intervals, and some may be field verified in select locations.

- The USGS National Hydrography Dataset (NHD; USGS, 2004) provides the most up-to-date and comprehensive nationwide dataset for rivers, streams, canals, lakes, ponds, coastline, dams, and stream gages.

3.1.4 Recent Climatic Conditions and Precipitation Data

The Antecedent Precipitation Tool (APT) was used to determine antecedent, or recent, rainfall conditions for a given location to the range of normal rainfall conditions that occurred during the preceding 30 years. The APT is a desktop tool developed by the USACE. The APT is commonly used by the USACE and U.S. Environmental Protection Agency (USEPA) to support decisions as to whether field data collection and other site-specific observations occurred under normal climatic conditions. This tool was originally developed by the USACE to streamline the review of climate data, which supports decision-making related to wetland delineations. In addition to providing a standardized methodology to evaluate normal precipitation conditions, the APT can also be used

to assess the presence of drought conditions, as well as the approximate dates of the wet and dry seasons for a given location (USEPA, 2021).

3.2 FIELD SURVEY METHODS

3.2.1 Naming Conventions

Features identified in associated figures and appendices are named in the following manner:

- Wetlands (w001, w002, etc.)
- Streams (s01, s02, etc.)
- Open water features (o01, o02, etc.)
- Wetland determination data points (dp001, dp002, etc.)
- Stream data points (sp01, sp02, etc.)
- Photo locations (pp0001, pp0002, etc.)

Features are named consecutively, as encountered in the field, and may not follow a geographical spatial order.

3.2.2 Wetlands

Merjent delineated wetlands based on the methodology described in the *USACE Wetlands Delineation Manual* (Environmental Laboratory, 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region* (USACE, 2010). Delineators documented wetland indicators, or lack of, on Wetland Determination Data Forms at locations representative of the vegetative communities being described during the field survey within or near the wetland. Delineators identified vegetative wetland communities according to the *Cowardin* (Cowardin et al., 1979) classification system.

3.2.2.1 Wetland Determination Data Forms

Wetland Determination Data Forms were completed during the field survey as written documentation of how representative sample point locations meet or do not meet each of the wetland criteria. Plant species nomenclature follows the *National Wetland Plant List* (USACE, 2022). Hydric soils were identified using the methods outlined in *Field Indicators of Hydric Soils in the United States, Version 9.2* (USDA-NRCS, 2025).

Wetland Determination Data Forms were completed during the field survey for desktop-mapped resources that are determined to be absent. In areas of upland associated with hydric soils or linear stream features, representative photos are taken of upland conditions. In areas of upland conditions within NWI mapped features, a sample point, Wetland Determination Data Form, and photos are taken to document upland conditions, unless the area is significantly sloped or otherwise obviously upland; in those circumstances, representative photos may be deemed sufficient.

3.2.2.2 Naturally Problematic and Significantly Disturbed Features

Naturally Problematic and Significantly Disturbed features are those by which wetland indicators of, or lack thereof, are obscured, and additional context may be needed in making accurate determinations. Commonly encountered Naturally Problematic conditions include hardpan, natural cobble or gravel, bedrock, and a dominance of upland and/or facultative upland plant

species. Significantly Disturbed conditions relate specifically to the obscuring of indicators caused by anthropogenic influence or recent, catastrophic natural disturbances. Commonly encountered anthropogenic Significantly Disturbed conditions include row crop agriculture, forestry practices, and site clearing or grading. Natural Significantly Disturbed conditions can include dam breaches or other major flooding and storm-related blowdown.

Where wetland indicators may be disturbed or naturally problematic, a conservative assumption of the presence or absence of wetlands may be made using the observable wetland indicators and best professional judgement. Additional desktop review may also be used and can be useful, especially in agricultural settings.

3.2.3 Streams

Merjent identified and mapped streams in accordance with the *USACE National Ordinary High Water Mark Field Delineation Manual for Rivers and Streams* (David et. al., 2025). Biologists filled out data forms at data points during the field survey within stream areas to document indicators, or lack of, for each suspected feature.

For these features, the OHWM width, substrate, and estimated flow were recorded, along with the OHWM indicators and analysis found within the data sheets. The OHWM determination is a direct in-field observation, used to document evidence used to determine the shape of the channel of a linear feature that reflects the magnitudes and variety of flows necessary to define it based on direct observations and indicators. The OHWM width is the result of the compilation of evidence observed in-field (David et. al., 2025).

3.2.3.1 Rapid Ordinary High Water Mark Field Identification Data Sheets

The Rapid OHWM Field Identification Data Sheets were completed during field survey as written documentation of what indicators of the potential OHWM were observed, and how they are applied in determining the OHWM.

This data sheet was developed for the sole purpose of identifying the OHWM of linear features, and it does not apply to open waterbodies such as lakes or ponds.

3.2.4 Open Waterbodies

Boundaries for open waterbodies were generally mapped at the transition between the presence and absence of surface water. Wetland vegetative communities may be present on either side of the open waterbody boundary.

3.2.5 Site Photographs

Representative photos were collected for each wetland community and waterbody identified. Photos were taken up, down, and across each linear stream feature. Site photos were collected throughout the Survey Area to demonstrate upland and transitional conditions. Representative photographs are provided in Appendix A.

3.2.6 Limitations of Survey Data

Merjent surveyed all data point locations and boundaries of wetlands, streams, and open waterbodies using Global Positioning System (GPS) technology capable of sub-meter accuracy.

While these surveys provide reasonably accurate and industry-standard spatial data, they do not provide the same level of accuracy as a professional land survey.

For linear features narrower than twice the accuracy of GPS (i.e., 2 meters), the centerline was mapped, and the feature is widened using GIS. A center line may be taken for forested features where GPS accuracy can be reduced. Lateral extents for anomalies such as impoundments or culvert washes are collected in-field to accurately map the variability along entire feature.

Feature boundaries were not flagged during the field survey.

4.0 RESULTS

4.1 DESKTOP REVIEW RESULTS

4.1.1 Previous Wetland and Waterbody Delineation Review

Merjent is unaware of previous wetland and waterbody delineation mapping at this site or associated regulatory review; as such, a review of previous wetland and waterbody delineations was not completed.

4.1.2 Background Data Review

4.1.2.1 Topography

The topographic map (see Figure 2) for this Project shows relatively flat landscapes with some areas of rolling hills and slopes within the Survey Area (USGS, 2019).

4.1.2.2 Soil Survey

The SSURGO soil map (see Figure 3) identifies 58 soil types within the Survey Area, two of which are classified as hydric (see Table 4.1.2-1 below; Soil Survey Staff; NRCS, USDA, 2019). Hydric soils are primarily located in swales within the Survey Area.

TABLE 4.1.2-1

Mapped Soil Units

Symbol	Description	Hydric Soil Unit?	Acres
E0415A	Belfield-Daglum complex, 0 to 2 percent slopes	No	122.09
E0454B	Daglum-Rhoades complex, 0 to 6 percent slopes	No	156.44
E0454C	Daglum-Rhoades complex, 6 to 9 percent slopes	No	36.59
E0541C	Rhoades-Daglum-Rhoades, severely eroded complex, 0 to 9 percent slopes	No	8.57
E0605A	Belfield-Grail clay loams, 0 to 2 percent slopes	No	126.35
E0617B	Belfield-Wyola-Daglum complex, 2 to 6 percent slopes	No	204.46
E0623B	Grail-Belfield clay loams, 2 to 6 percent slopes	No	160.59
E0651A	Regent-Janesburg complex, 0 to 3 percent slopes	No	27.67
E0651B	Regent-Janesburg complex, 3 to 6 percent slopes	No	330.78
E0651C	Regent-Janesburg complex, 6 to 9 percent slopes	No	7.80
E0701F	Dogtooth-Janesburg-Cabba complex, 6 to 35 percent slopes	No	59.64
E0811A	Grail silty clay loam, 0 to 2 percent slopes	No	13.27
E0835A	Wyola-Grail silty clay loams, 0 to 2 percent slopes	No	12.03
E0837B	Wyola silty clay loam, 2 to 6 percent slopes	No	130.57
E0837C	Wyola silty clay loam, 6 to 9 percent slopes	No	7.61
E1009B	Moreau-Barkof silty clays, 3 to 6 percent slopes	No	2.62
E1025A	Regent-Wyola silty clay loams, 0 to 3 percent slopes	No	10.06
E1025B	Regent-Wyola silty clay loams, 3 to 6 percent slopes	No	37.91
E1025C	Regent-Wyola silty clay loams, 6 to 9 percent slopes	No	35.63
E1333C	Vebar-Cohagen fine sandy loams, 6 to 9 percent slopes	No	399.11
E1355D	Vebar-Flasher-Tally complex, 9 to 15 percent slopes	No	173.92
E1403D	Beisigl-Flasher-Telfer loamy fine sands, 6 to 15 percent slopes	No	5.69
E1423F	Flasher-Vebar-Parshall complex, 9 to 35 percent slopes	No	21.40
E1601B	Beisigl-Lihen loamy fine sands, 0 to 6 percent slopes	No	76.77

TABLE 4.1.2-1

Mapped Soil Units

Symbol	Description	Hydric Soil Unit?	Acres
E1625A	Vebar-Parshall fine sandy loams, 0 to 3 percent slopes	No	26.92
E1625B	Vebar-Parshall fine sandy loams, 3 to 6 percent slopes	No	277.46
E1805B	Lihen-Parshall complex, 0 to 6 percent slopes	No	52.24
E1823A	Parshall fine sandy loam, 0 to 2 percent slopes	No	13.26
E1865B	Tally-Parshall fine sandy loams, 2 to 6 percent slopes	No	14.36
E2107A	Arnegard loam, 0 to 2 percent slopes	No	63.45
E2107B	Arnegard loam, 2 to 6 percent slopes	No	4.72
E2145A	Shambo loam, 0 to 2 percent slopes	No	20.70
E2145B	Shambo loam, 2 to 6 percent slopes	No	18.29
E2203A	Farland silt loam, 0 to 2 percent slopes	No	75.51
E2203B	Farland silt loam, 2 to 6 percent slopes	No	96.51
E2203C	Farland silt loam, 6 to 9 percent slopes	No	1.13
E2601C	Amor-Cabba loams, 6 to 9 percent slopes	No	337.32
E2601D	Amor-Cabba loams, 9 to 15 percent slopes	No	251.88
E2607D	Amor-Werner loams, 9 to 15 percent slopes	No	4.61
E2617F	Cabba-Chama-Shambo loams, 9 to 50 percent slopes	No	59.65
E2737C	Chama-Cabba-Sen silt loams, 6 to 9 percent slopes	No	232.28
E2741D	Cabba-Chama-Sen silt loams, 9 to 15 percent slopes	No	80.56
E2801A	Amor-Arnegard loams, 0 to 3 percent slopes	No	48.39
E2803B	Amor-Shambo loams, 3 to 6 percent slopes	No	206.53
E2819B	Reeder-Farnuf loams, 3 to 6 percent slopes	No	122.41
E2913B	Chama-Sen-Cabba silt loams, 3 to 6 percent slopes	No	43.56
E2927B	Morton-Farland silt loams, 3 to 6 percent slopes	No	64.27
E2931C	Morton-Cabba silt loams, 6 to 9 percent slopes	No	189.19
E2987B	Sen-Chama silt loams, 3 to 6 percent slopes	No	31.28
E3033D	Ringling-Daglum loams, 6 to 15 percent slopes	No	5.06
E4005A	Harriet loam, 0 to 2 percent slopes, occasionally flooded	Yes	51.13
E4139A	Korchea-Fluvaquents complex, channeled, 0 to 2 percent slopes, frequently flooded	No	37.32
E4161A	Straw loam, 0 to 2 percent slopes, rarely flooded	No	2.94
E4569F	Wabek-Cabba-Shambo complex, 6 to 35 percent slopes	No	1.27
E4575A	Wanagan loam, 0 to 2 percent slopes	No	16.59
E4585B	Manning fine sandy loam, 2 to 6 percent slopes	No	30.04
E4711A	Dimmick silty clay, 0 to 1 percent slopes	Yes	2.42
E4999	Water	No	0.50
		TOTAL:	**4,651.32**

Source: Soil Survey Staff, NRCS, USDA, 2019

4.1.2.3 Mapped Aquatic Resources

The hydrology map (see Figure 4) shows 32.34 acres of NWI-mapped wetland features within the Survey Area (see Table 4.1.2-2 below; USFWS, 2021). NWI-mapped wetland features are located within valleys and swales in meadows and agricultural fields throughout the Survey Area. Additionally, multiple NHD-mapped surface water features are located within the Survey Area (USGS, 2004).

TABLE 4.1.2-2

Mapped NWI Features

Symbol	Description	Acres
PABFh	Palustrine; Aquatic bed; Semipermanently flooded; Diked/impounded	2.36
PEM1A	Palustrine; Emergent; Persistent; Temporarily flooded	9.86
PEM1C	Palustrine; Emergent; Persistent; Seasonally flooded	8.74
PEM1Ch	Palustrine; Emergent; Persistent; Seasonally flooded; Diked/impounded	0.09
PEM1Cx	Palustrine; Emergent; Persistent; Seasonally flooded; Excavated	<0.01
PFOA	Palustrine; Forested; Temporarily flooded	0.05
PUBFx	Palustrine; Unconsolidated bottom; Semipermanently flooded; Excavated	0.06
R4SBC	Riverine; Intermittent; Streambed; Seasonally flooded	11.18
R5UBH	Riverine; Unknown perennial; Unconsolidated bottom; Permanently flooded	<0.01
	TOTAL:	**32.34**

Source: USFWS, 2021

4.1.3 Current, Historic, and High-Resolution Aerial Imagery

Merjent reviewed multiple sources of historic aerial imagery to evaluate the Survey Area for wetland signatures. Based on this review, potential wet signatures were present in depressions and swales in valleys and agricultural fields throughout the Survey Area.

4.1.4 Recent Climatic Conditions and Precipitation Data

Merjent compared recent precipitation data with historic precipitation data from a 30-year dataset using the Antecedent Precipitation Tool (APT) to determine if normal hydrologic and climatic conditions were present on-site during field surveys. The APT analysis indicated normal precipitation conditions were present during the field surveys from May 19 to May 23, 2025, and October 7 to October 14, 2025. Wetter than normal precipitation conditions were present during the field surveys from October 21 to November 4, 2025 (see Appendix B; USEPA, 2021).

4.2 FIELD SURVEY RESULTS

From May 19 to May 23, 2025, Merjent wetland ecologists conducted a wetland and waterbody delineation of the Survey Area to evaluate site conditions and determine boundaries of wetlands and waterbodies. Verdanterra continued the survey from October 7 to October 14, 2025. WEST completed the remaining survey efforts from October 21 to November 4, 2025.

Dominant land use within the Survey Area includes active agricultural fields, upland meadows, field edges, and roadside right-of-way (ROW).

Weather conditions at the time of surveys were favorable and did not impair observations. All portions of the Survey Area were accessible during the field survey.

4.2.1 Uplands

The majority of the upland areas within the Survey Area consisted of active agricultural fields planted with soybeans (*Glycina max*), canola (*Brassica napus*), corn (*Zea mays*), or wheat (*Triticum spp.*) in the 2025 growing season.

Upland meadows were also present throughout the Survey Area. These meadows commonly had a dense herbaceous stratum dominated by smooth brome (*Bromus inermis*), common snowberry (*Symphoricarpos albus*), Kentucky blue grass (*Poa pratensis*), and alfalfa (*Medicago sativa*).

The Survey Area also includes some roadside rights-of-way. These areas were dominated by smooth brome, fox-tail barley (*Hordeum jubatum*), alfalfa, and common snowberry.

4.2.2 Wetlands

106 wetlands totaling 77.79 acres were identified within the Survey Area according to *Cowardin* (1979) classification (see Figure 5; Summary of Delineated Wetlands Table in Appendix C). All identified wetlands consisted of either palustrine emergent (PEM) communities or palustrine unconsolidated bottom (PUB) communities. Representative photographs of the wetlands are provided in Appendix A. More detailed information for the associated data points is found in the wetland determination data forms in Appendix D. Summaries of the various types of PEM and PUB wetlands identified within the Survey Area are provided below.

4.2.2.1 Vegetated Palustrine Emergent Wetlands

Vegetated PEM wetlands (62.83 acres) were identified throughout the Survey Area. These communities were commonly adjacent to stream channels and in vegetated swales in agricultural fields. These communities typically had a dense herbaceous stratum. Species commonly encountered in the herbaceous stratum included reed canary grass (*Phalaris arundinacea*), freshwater cord grass (*Spartina pectinata*), fox-tail barley, smooth brome, curly dock (*Rumex crispus*), narrow-leaf cat-tail (*Typha angustifolia*), Kentucky blue grass, and soft-stem club-rush (*Schoenoplectus tabernaemontani*). There were no species observed in the tree or sapling/shrub strata.

The soils in the vegetated PEM wetlands commonly met the criteria for hydric soil indicators: Depleted Below Dark Surface (A11), Loamy Mucky Mineral (F1), Depleted Matrix (F3), or Redox Dark Surface (F6).

Common indicators of wetland hydrology observed included Surface Water (A1), High Water Table (A2), Saturation (A3), Salt Crust (B11), Surface Soil Cracks (B6), Sparsely Vegetated Concave Surface (B8), Drainage Patterns (B10), Dry-Season Water Table (C2), Saturation Visible on Aerial Imagery (C9), Geomorphic Position (D2), and FAC-neutral Test (D5).

4.2.2.2 Roadside Ditch Palustrine Emergent Wetlands

Roadside ditch PEM wetlands (0.16 acre) were identified throughout the Survey Area. These communities had dense herbaceous strata dominated by reed canary grass, freshwater cord grass, smooth brome, lamp rush (*Juncus effusus*), narrow-leaf cat-tail, river club-rush (*Schoenoplectus fluviatilis*), and uptight sedge (*Carex stricta*). There were no species observed in the tree or sapling/shrub strata.

The soils in the roadside ditch PEM wetlands commonly met the criteria for hydric soil indicators: Depleted Matrix (F3) or Redox Dark Surface (F6).

Common indicators of wetland hydrology observed included Surface Water (A1), Saturation (A3), Geomorphic Position (D2), and FAC-neutral Test (D5).

4.2.2.3 Farmed Palustrine Emergent Wetlands

Farmed PEM wetlands (13.01 acres) also were identified throughout the Survey Area. These communities were typically found in depressions or swales within the agricultural fields in the Survey Area. These areas were planted with soybeans, canola, corn, or wheat in the 2025 growing season. Farmed wetlands were bare of non-agricultural vegetation or had sparsely vegetated herbaceous strata that typically consisted of weedy annual species. Species commonly observed within the farmed wetlands included Mexican fireweed (*Bassia scoparia*), yellow bristle grass (*Setaria pumila*), fox-tail barley, stink grass (*Eragrostis cilianensis*), and large barnyard grass (*Echinochloa crus-galli*). There were no species observed in the tree or sapling/shrub strata.

The soils in the farmed PEM wetlands commonly met the criteria for hydric soil indicators: Depleted Below Dark Surface (A11), Depleted Matrix (F3), or Redox Dark Surface (F6).

Common indicators of wetland hydrology observed included Surface Water (A1), High Water Table (A2), Saturation (A3), Salt Crust (B11), Surface Soil Cracks (B6), Drainage Patterns (B10), Saturation Visible on Aerial Imagery (C9), Geomorphic Position (D2), and FAC-neutral Test (D5).

4.2.2.4 Palustrine Unconsolidated Bottom

Several wetlands within the Survey Area also contained a PUB component (1.79 acres). In some areas, the wetland boundary was determined via desktop analysis and visually confirmed due to safety reasons or access limitations. For these areas, soils were assumed to be hydric based on landscape position, the dominance of hydrophytic vegetation, and observed wetland hydrology indicators.

Species commonly encountered in the herbaceous stratum included primarily freshwater cord grass and lamp rush. There were no species observed in the tree or sapling/shrub strata.

The soils in the PUB wetlands meet the criteria for the hydric soil indicator Redox Dark Surface (F6).

Common indicators of wetland hydrology observed include Surface Water (A1), Saturation (A3), Geomorphic Position (D2), and FAC-neutral Test (D5).

4.2.2.5 Naturally Problematic and Significantly Disturbed Datapoints

Multiple wetlands were found in agricultural fields within the Survey Area. These wetlands had significantly disturbed vegetation due to recurring agricultural activities. In these situations, the problematic hydrophytic vegetation indicator was used if hydric soil and wetland hydrology were confirmed.

4.2.3 Streams

Survey crews identified 21 streams totaling 1.54 acres (6,209 linear feet) within the Survey Area (see Summary of Delineated Streams Table in Appendix E). The completed Rapid OHWM Field Identification Data Sheets are provided in Appendix F. Representative photographs of the streams are provided in Appendix A. Summaries of the stream types are provided below.

4.2.3.1 Ephemeral Streams

Ten ephemeral streams (0.16 acre; 2,967 linear feet) were identified within the Survey Area.

Stream data points were recorded to document OHWM indicators present within the Survey Area. The OHWMs for the ephemeral streams were typically determined by combination of observations such as a break in slope on the banks, in-stream bedforms and other bedload transport evidence, exposed roots below intact soil layer, vegetation matted down and/or bent, and changes in vegetation type and density.

4.2.3.2 Intermittent Streams

Seven intermittent streams (0.18 acre; 1,562 linear feet) were identified within the Survey Area.

Stream data points were recorded to document OHWM indicators present within the Survey Area. The OHWMs for the intermittent streams were typically determined by a combination of observations such as a break in slope on the banks, in-stream bedforms and other bedload transport evidence, vegetation matted down and/or bent, and changes in vegetation type and density.

4.2.3.3 Perennial Streams

Four perennial streams (1.20 acres; 1,680 linear feet) were identified within the Survey Area.

Stream data points were recorded to document OHWM indicators present within the Survey Area. The OHWMs for the perennial streams were typically determined by a combination of observations such as a break in slope on the banks, in-stream bedforms and other bedload transport evidence, vegetation matted down and/or bent, and changes in vegetation type and density.

4.2.4 Open Waterbodies

Merjent identified one open waterbody (o01) totaling 0.08 acre within the Survey Area (See Page 162 of Figure 5). The open waterbody was identified west of wetland w063 as part of a larger wetland/stream/waterbody complex.

5.0 SUMMARY AND CONCLUSION

Merjent, Verdanterra, and WEST performed a delineation of wetlands and other surface water features for the Longspur Wind Project in Mercer and Morton Counties, North Dakota.

Based on the field survey and review of desktop resources, it is our professional opinion that 106 wetlands totaling 77.79 acres, 21 streams totaling 1.54 acres (6,209 linear feet), and one open waterbody totaling 0.08 acre were identified within the 4,651.32-acre Survey Area. This report represents our best professional judgment based on our local knowledge and experience.

6.0 DISCLAIMER

The survey results described in this report represent the physical conditions encountered at the time the field survey was performed. In addition, the surveys were performed using regulatory guidance and scientific methods in effect and current at the time. If regulatory frameworks or technical guidance change in the future, some additional survey work or modifications to the survey report may be required.

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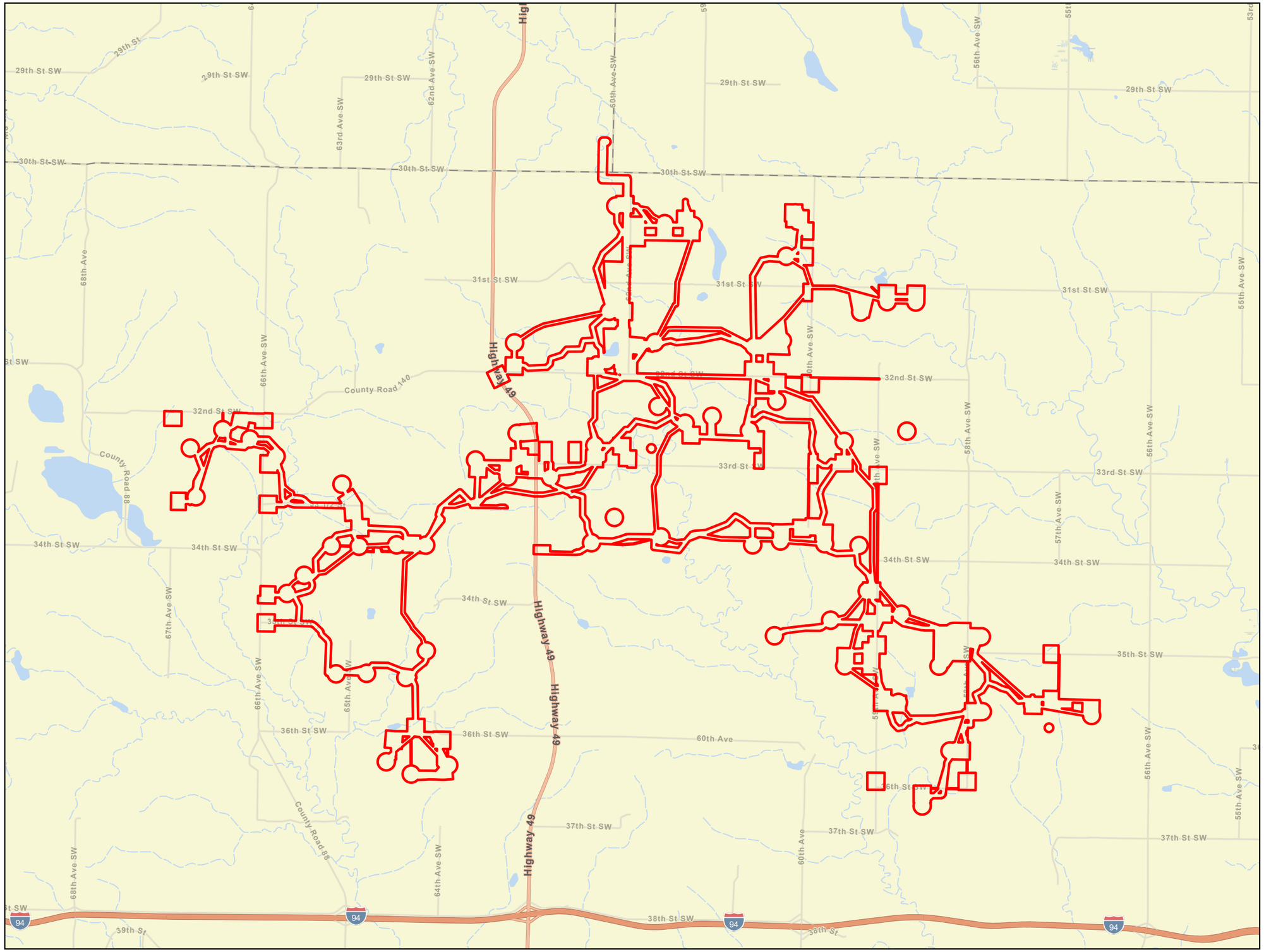
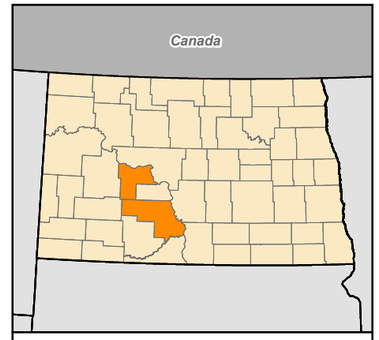
Figure 1

Project Location





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Survey Area

Figure 1
Project Location
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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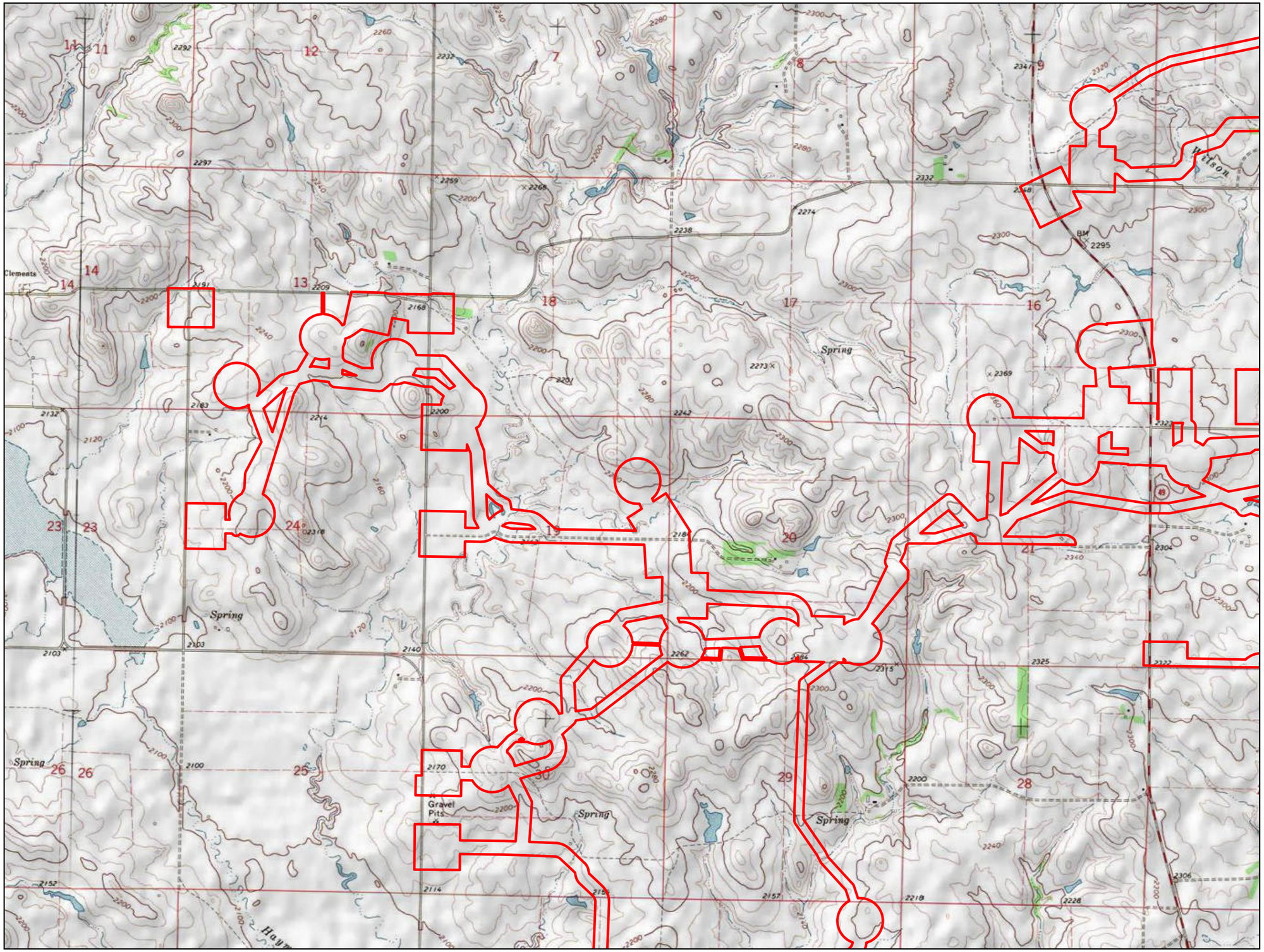
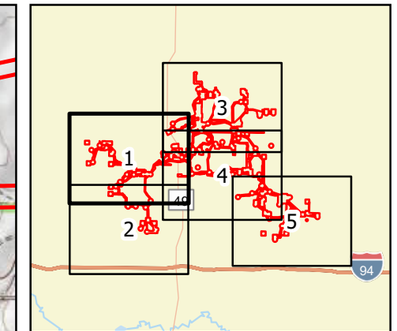
Figure 2

Topographic Map





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1 inch = 2,000 feet

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Survey Area

Figure 2
Topographic Map
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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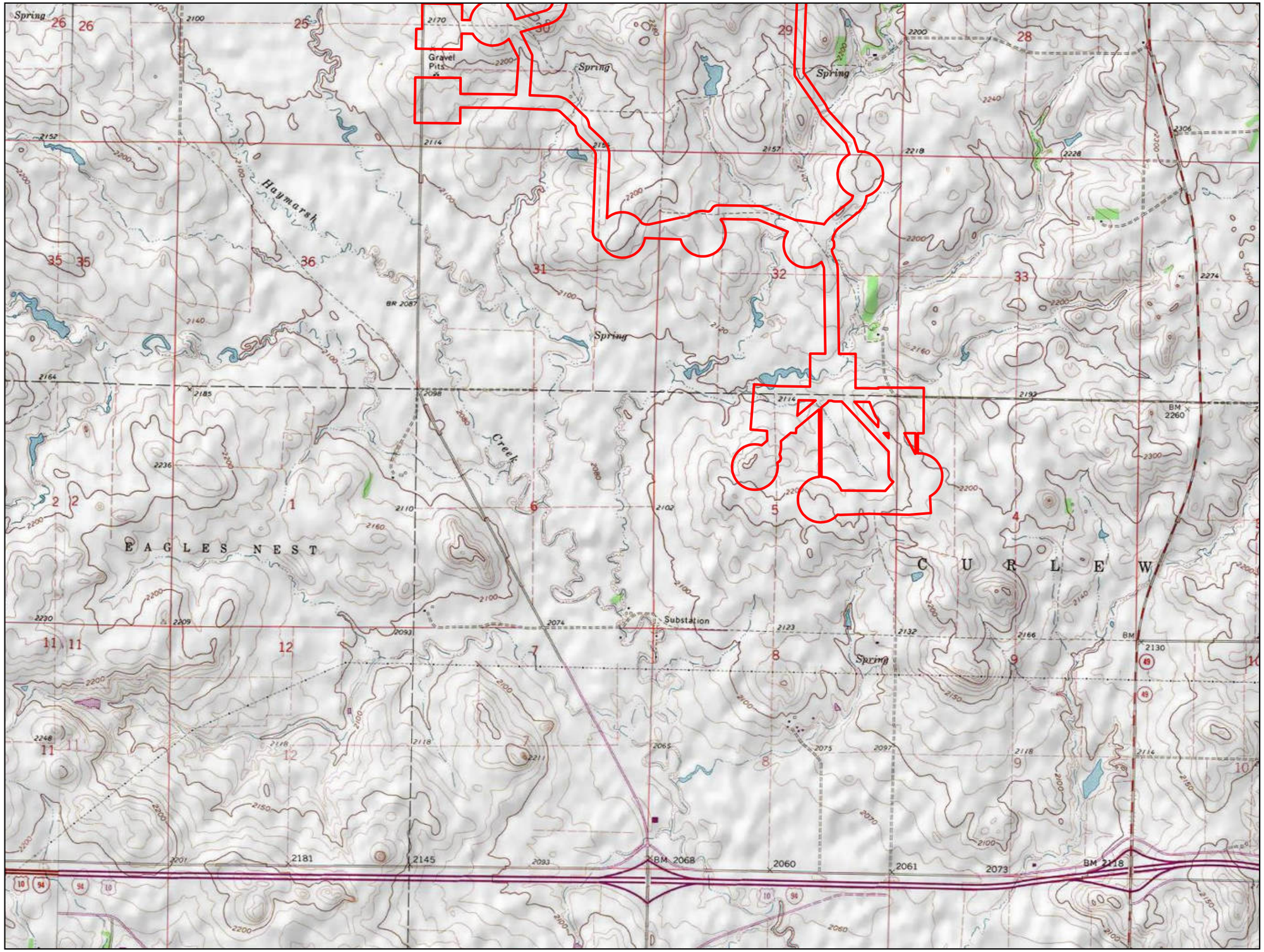

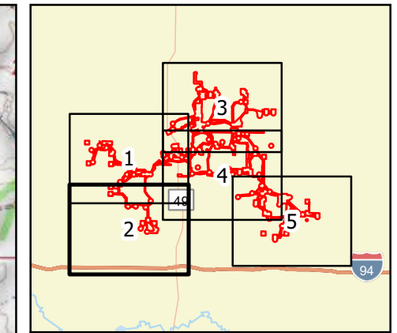

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Survey Area

Figure 2
Topographic Map
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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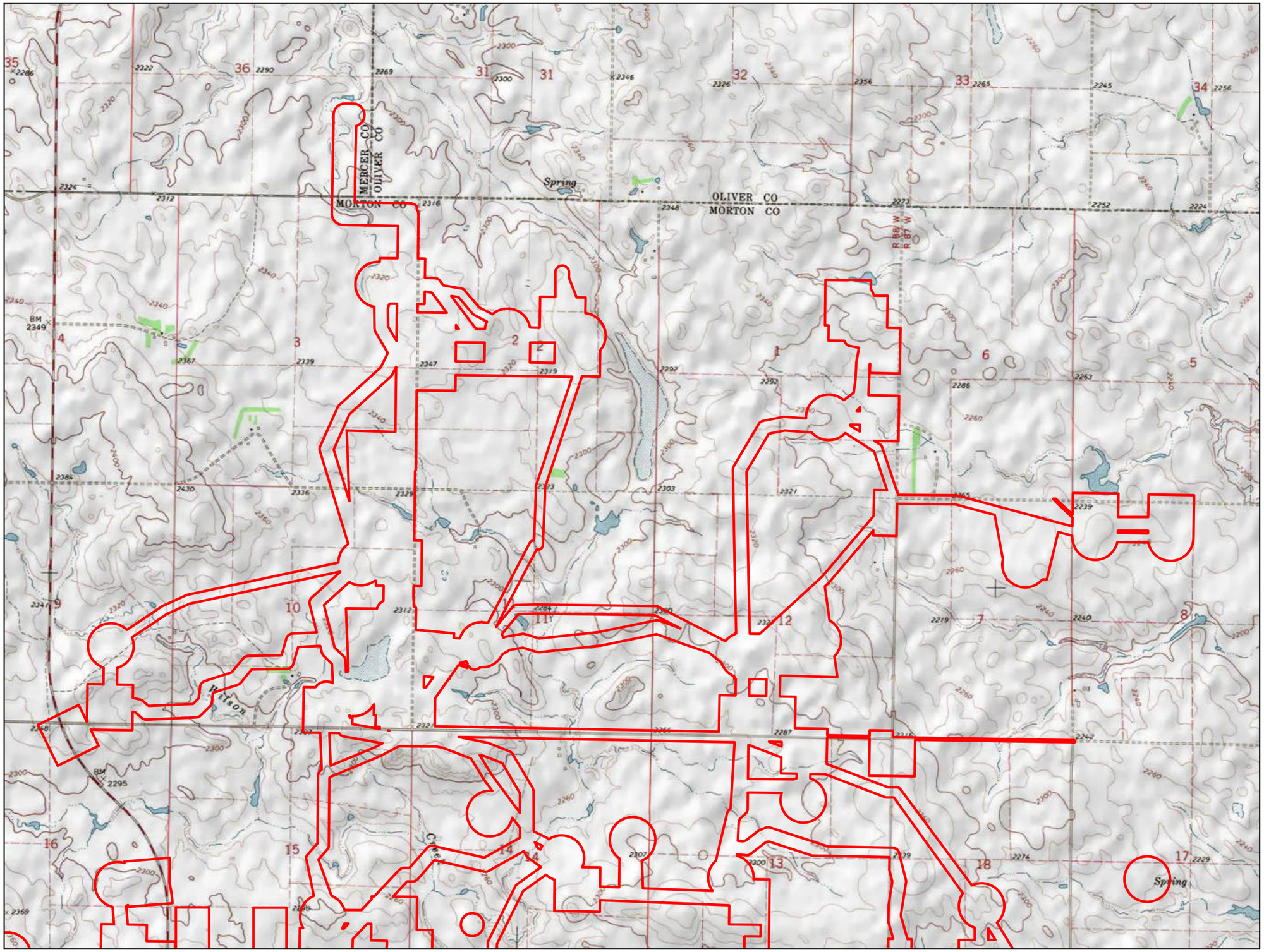

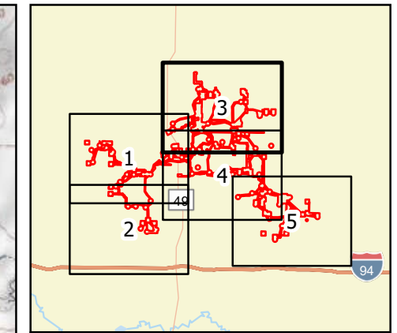

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Survey Area

Figure 2
Topographic Map
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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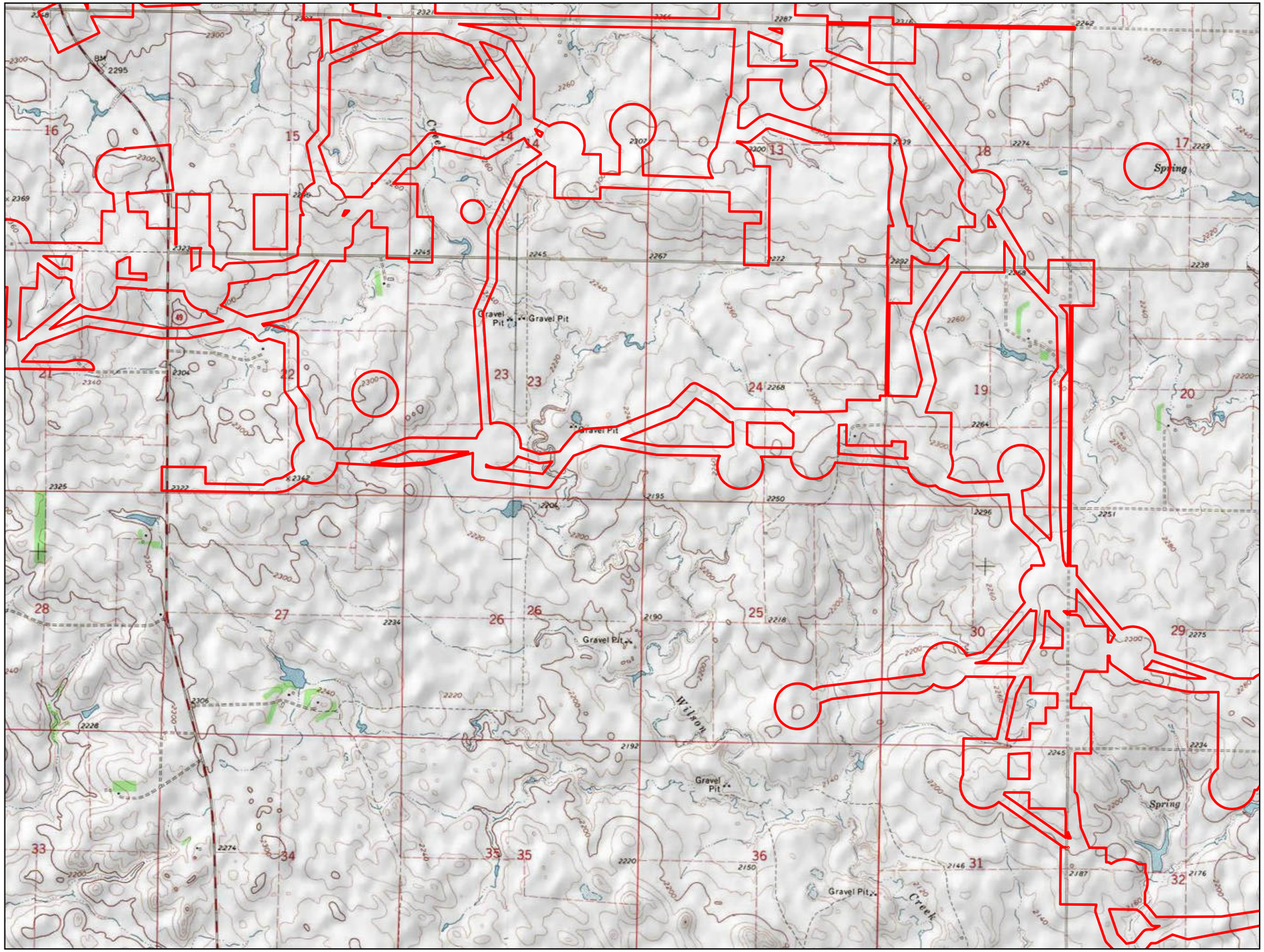

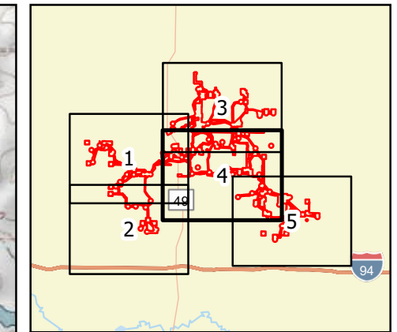

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1 inch = 2,000 feet

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Survey Area

Figure 2
Topographic Map
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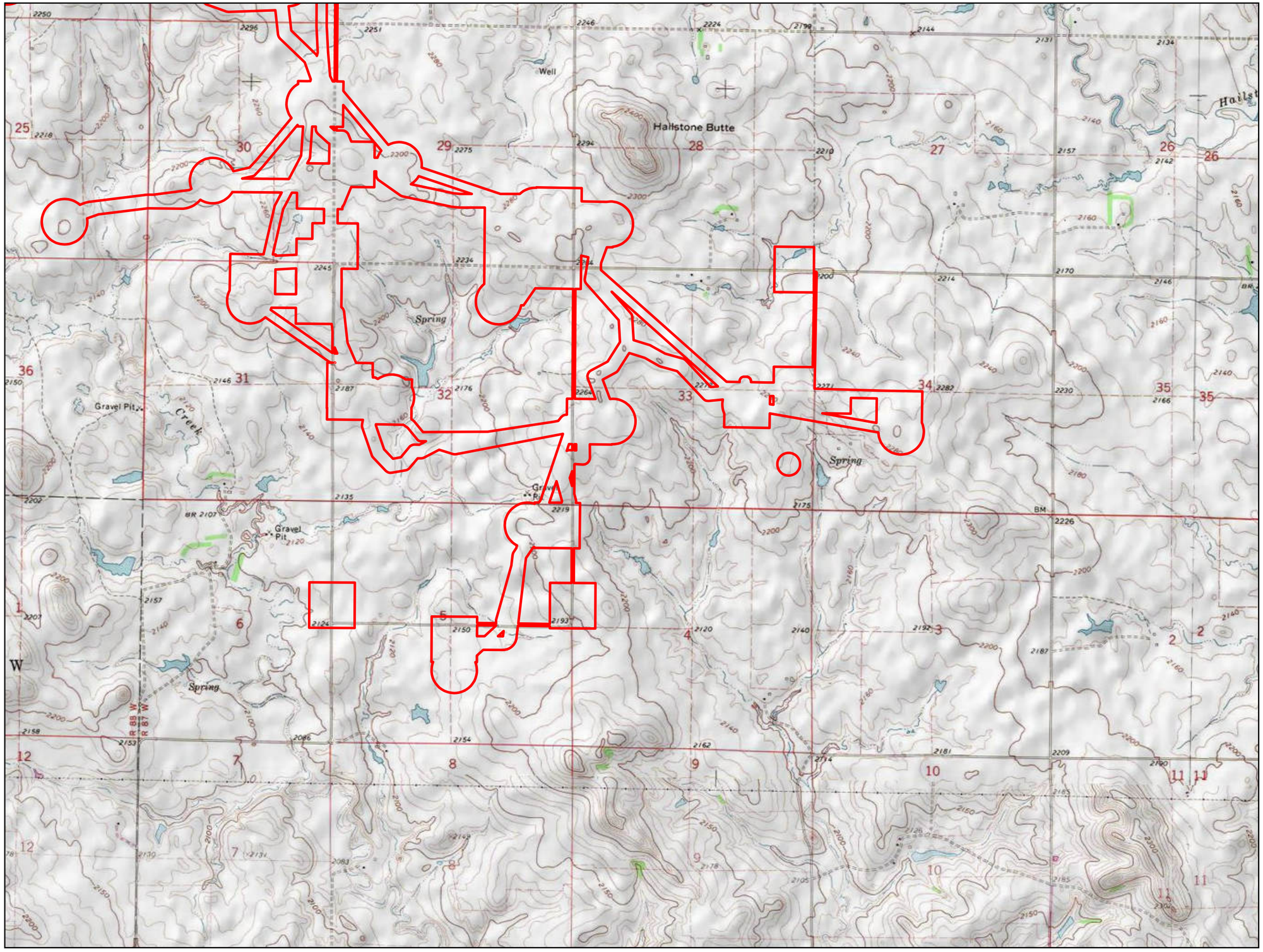

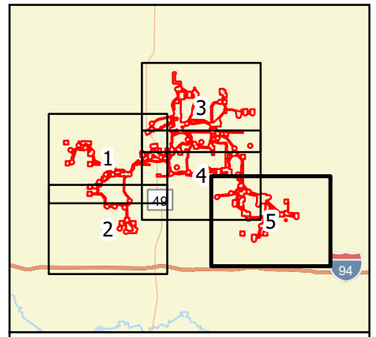

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Survey Area

Figure 2
Topographic Map
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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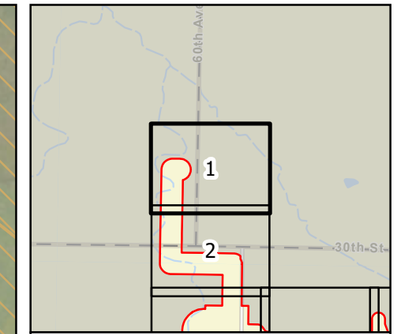
Figure 3

Soil Units (SSURGO)





0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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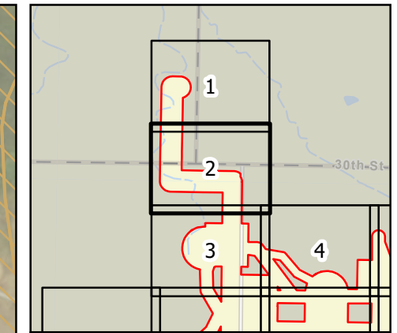

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
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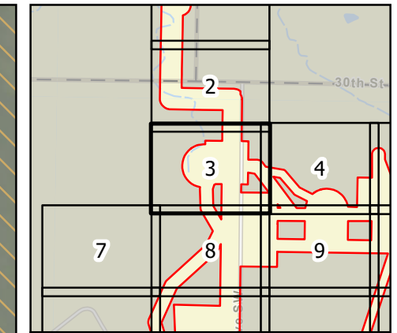

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
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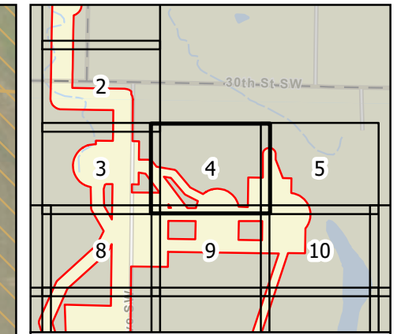

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
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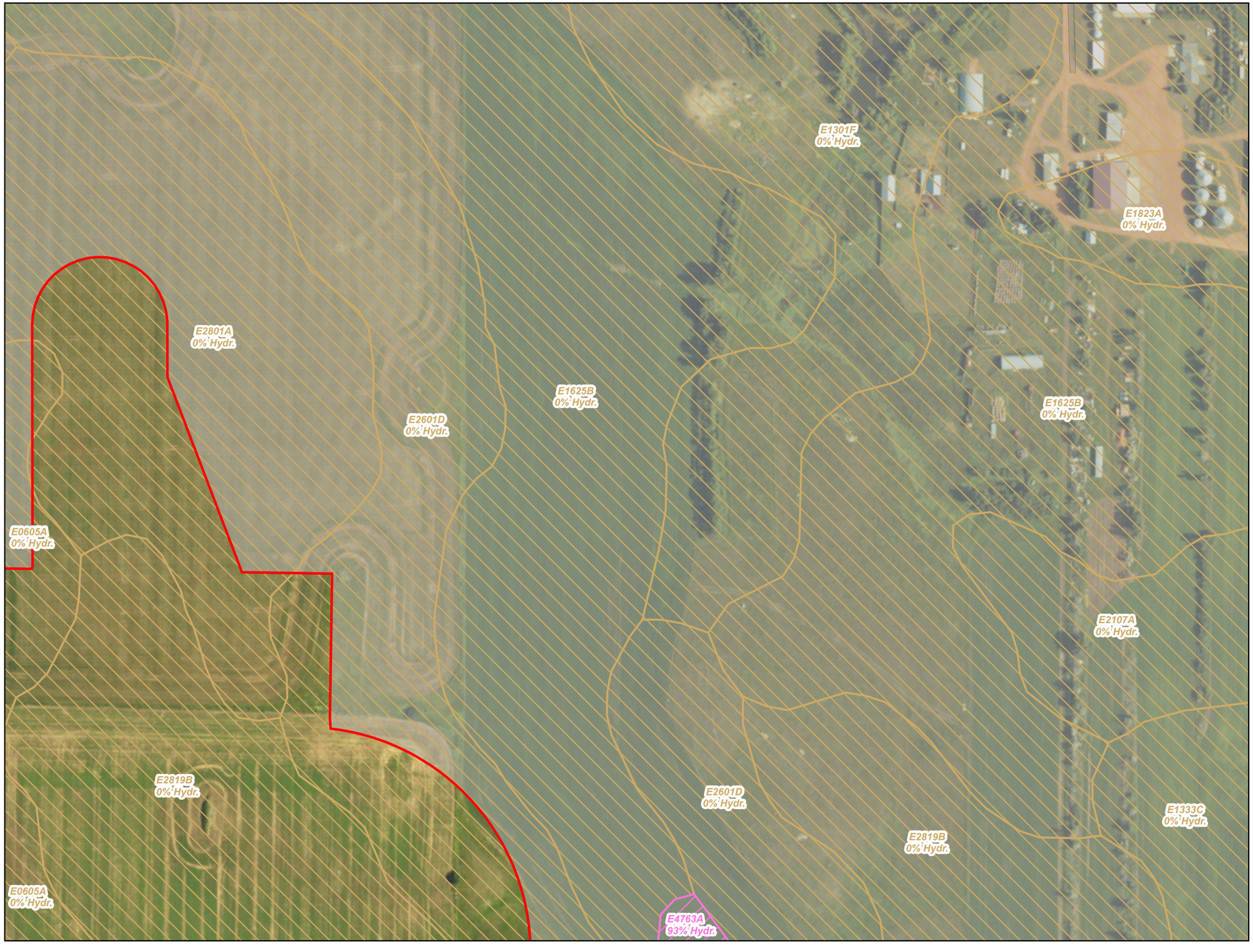

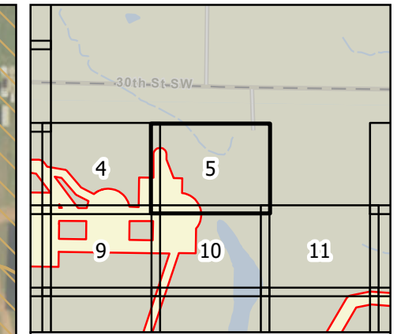

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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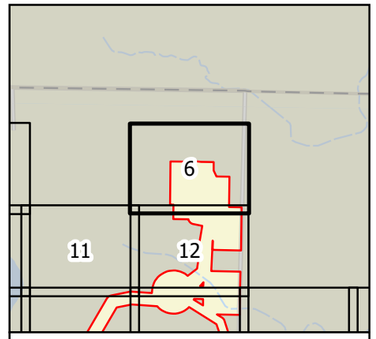

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1 inch = 200 feet

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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
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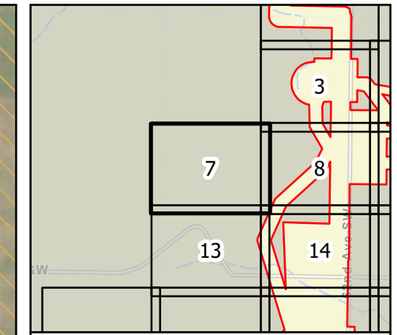

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
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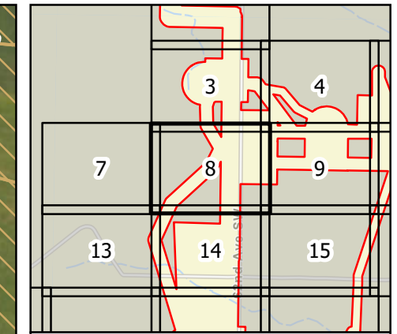

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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Mercer & Morton Counties,
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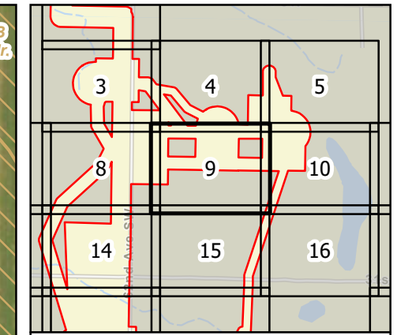

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
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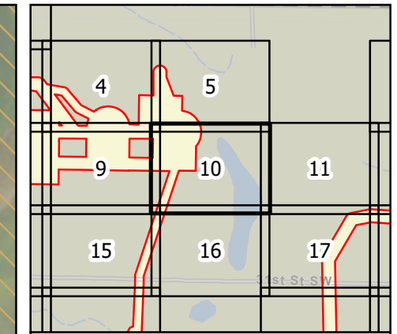

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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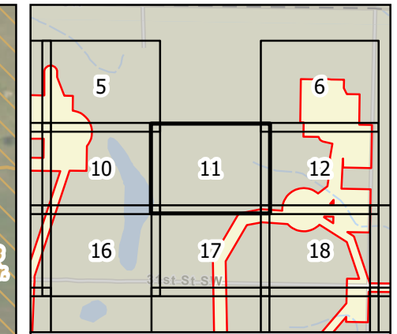

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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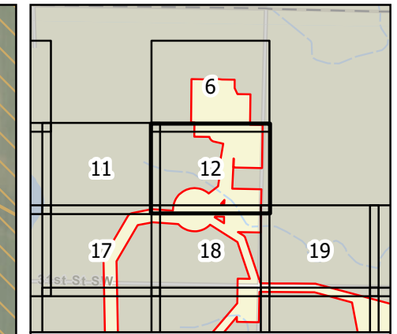

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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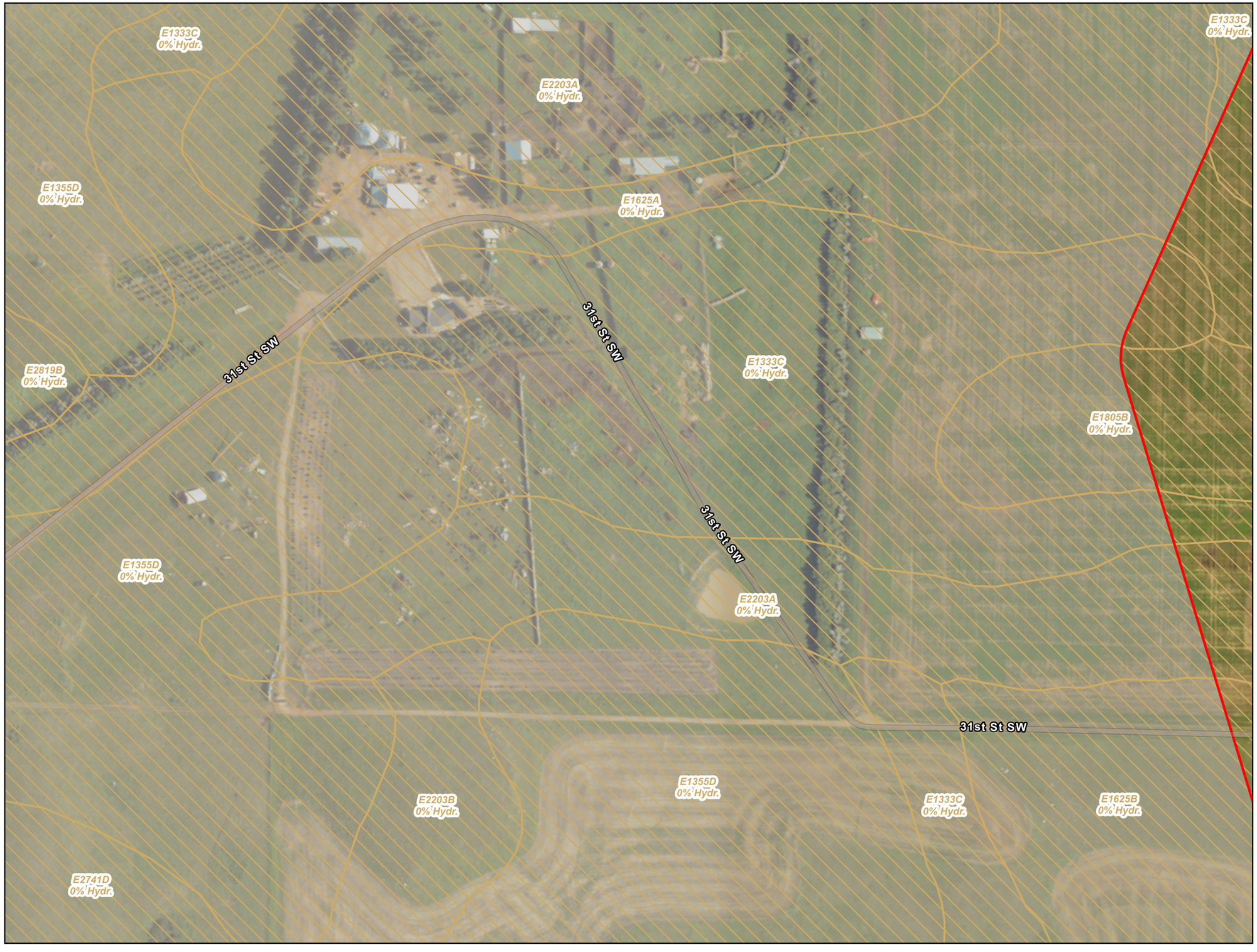

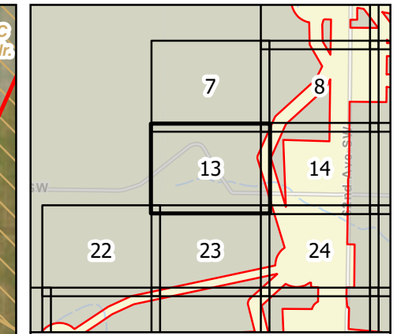

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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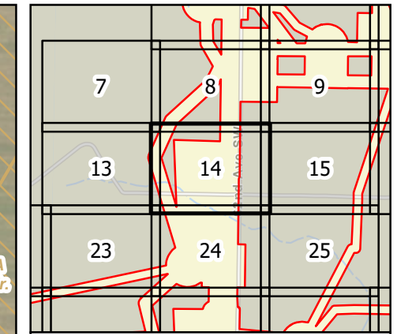

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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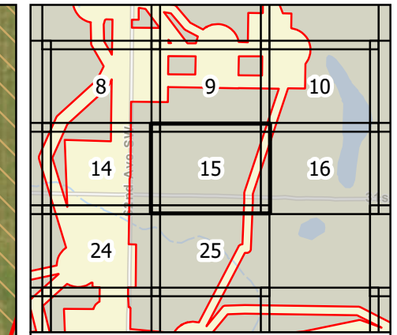

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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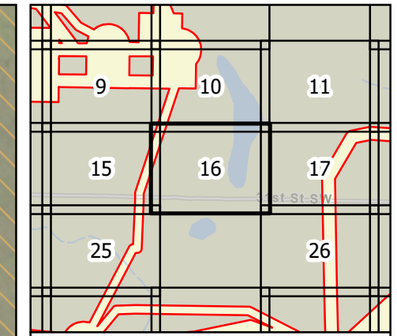

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1 inch = 200 feet

N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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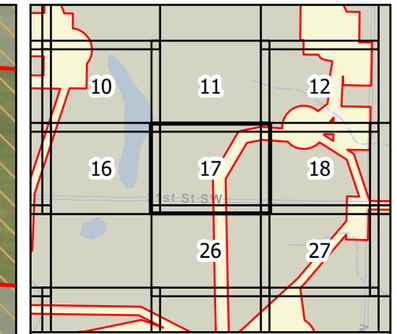

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1 inch = 200 feet

N S E W

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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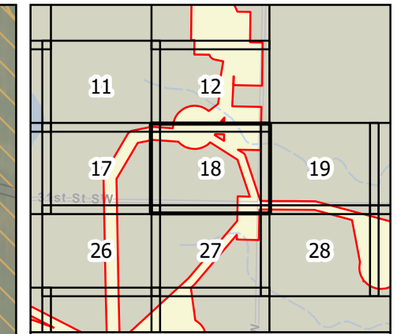

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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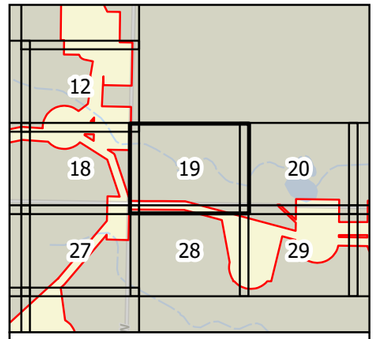

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1 inch = 200 feet

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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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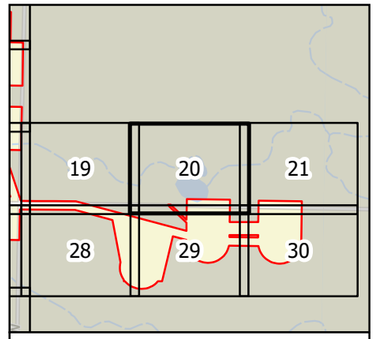

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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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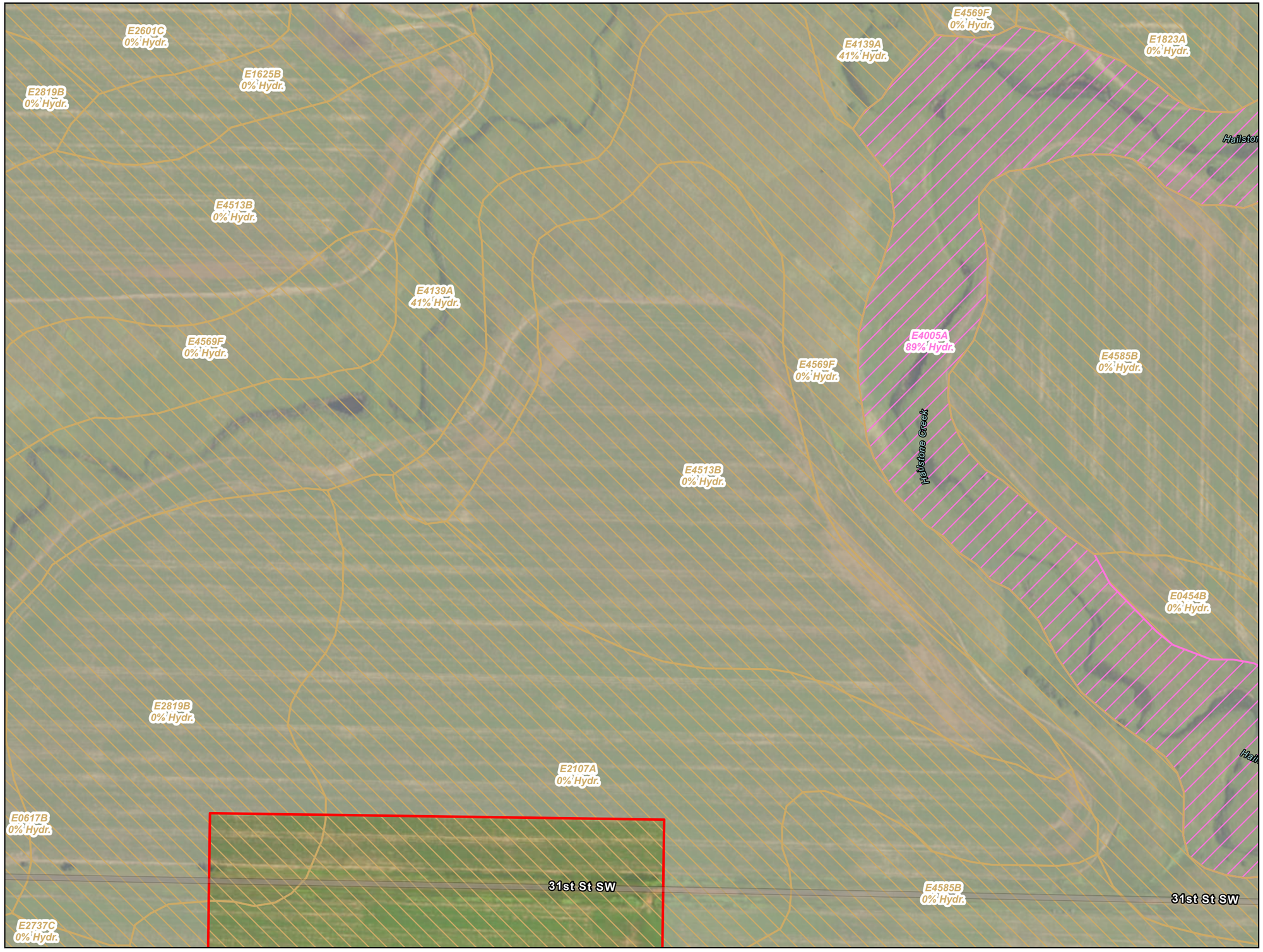

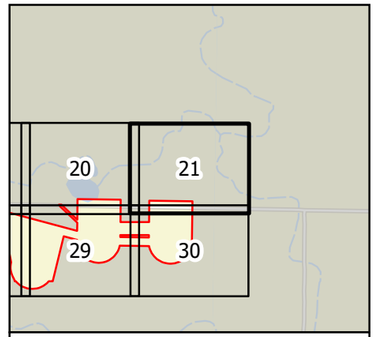

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1 inch = 200 feet

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- Survey Area
- Hydric Soil
- Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties, North Dakota

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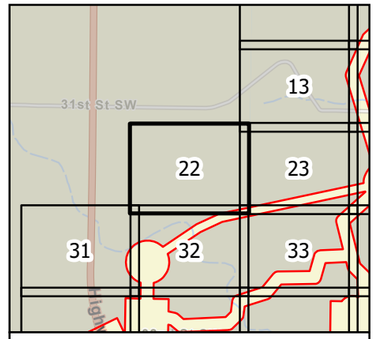

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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties, North Dakota

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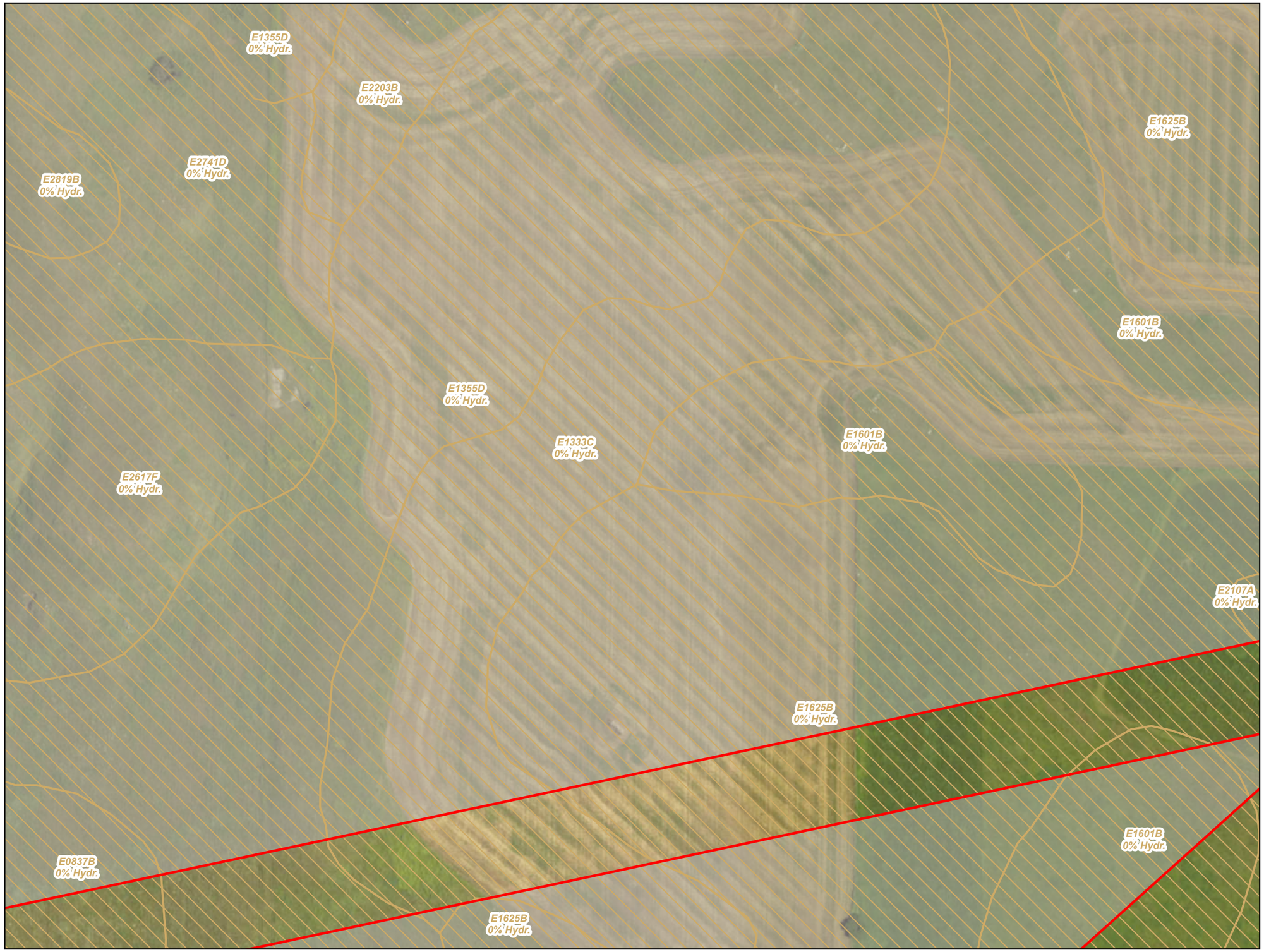

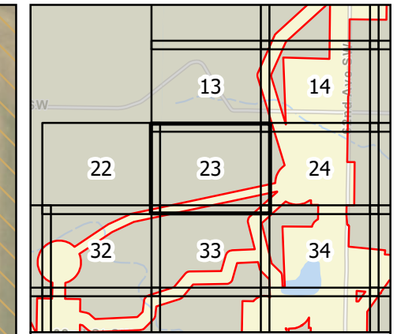

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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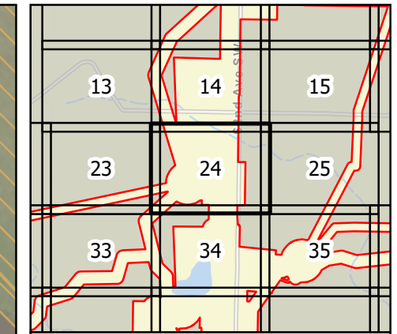

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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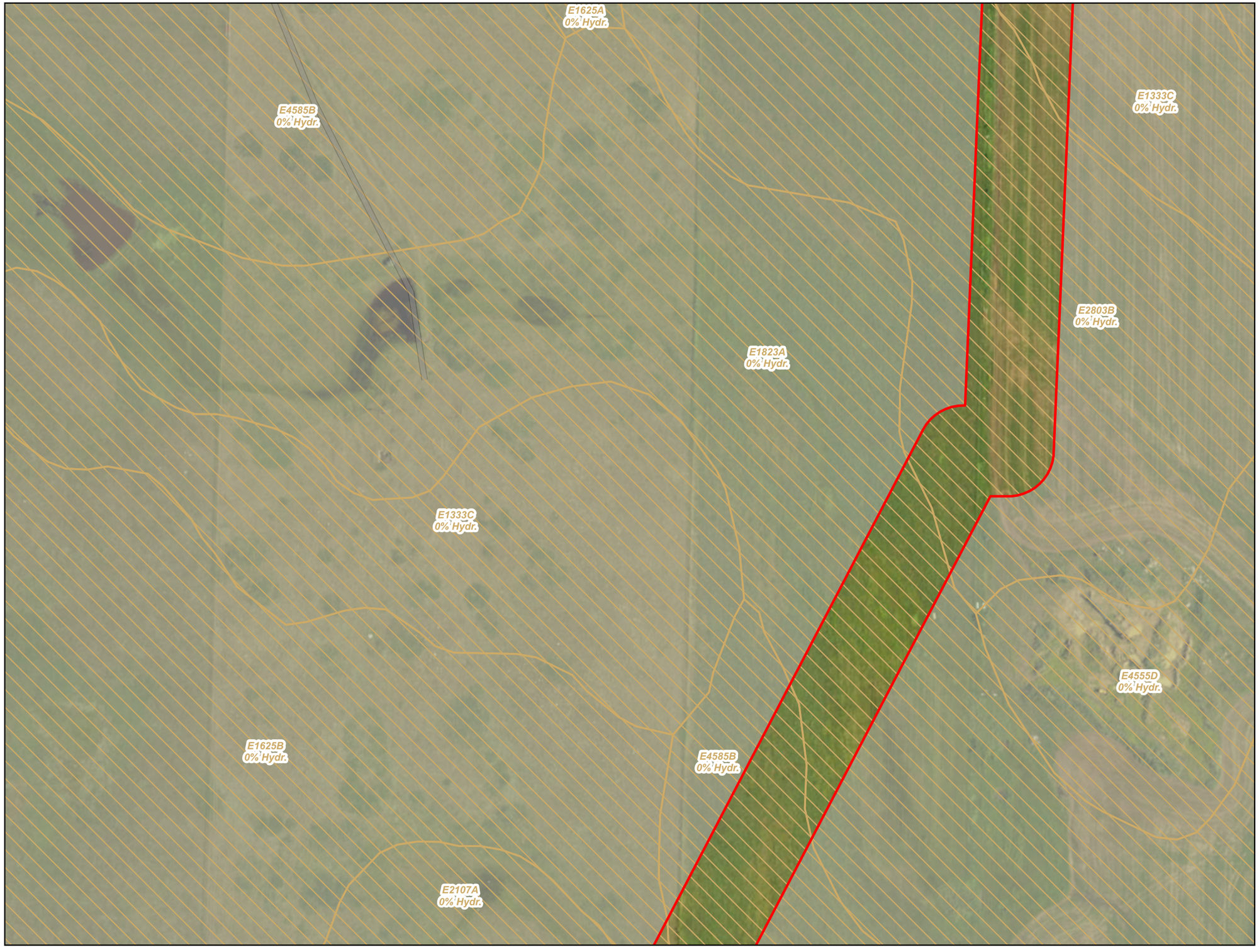

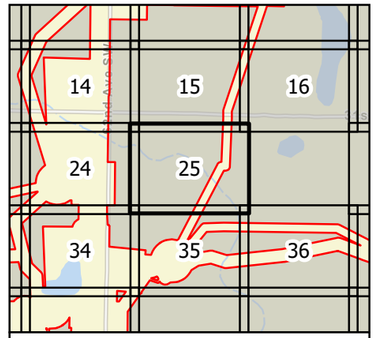

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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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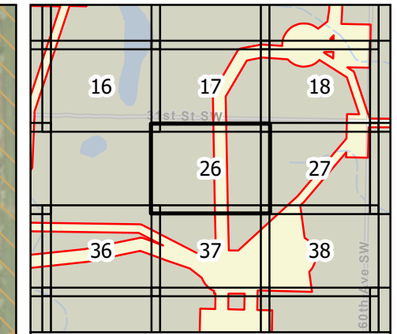

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1 inch = 200 feet

N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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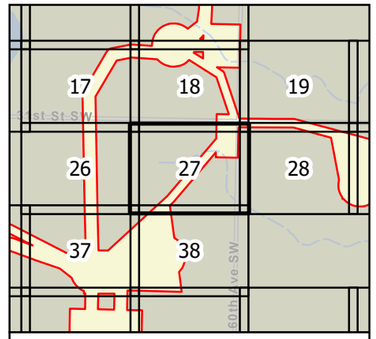

0 100 200 Feet

1 inch = 200 feet

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- Survey Area
- Hydric Soil
- Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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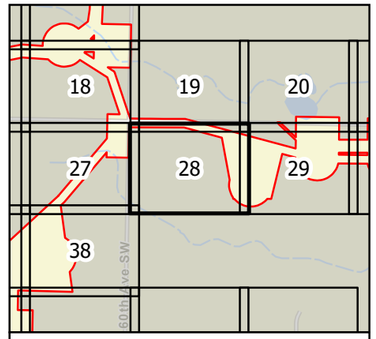

0 100 200 Feet

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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties, North Dakota

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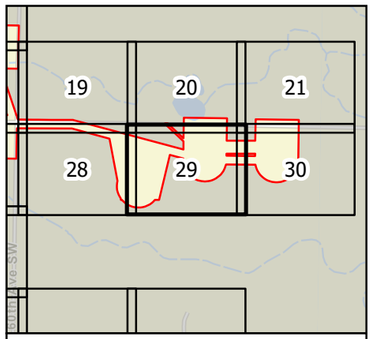

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1 inch = 200 feet

N
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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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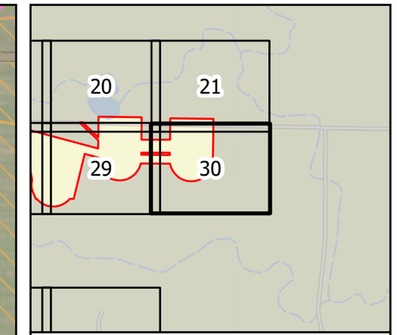

0 100 200 Feet

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
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Mercer & Morton Counties,
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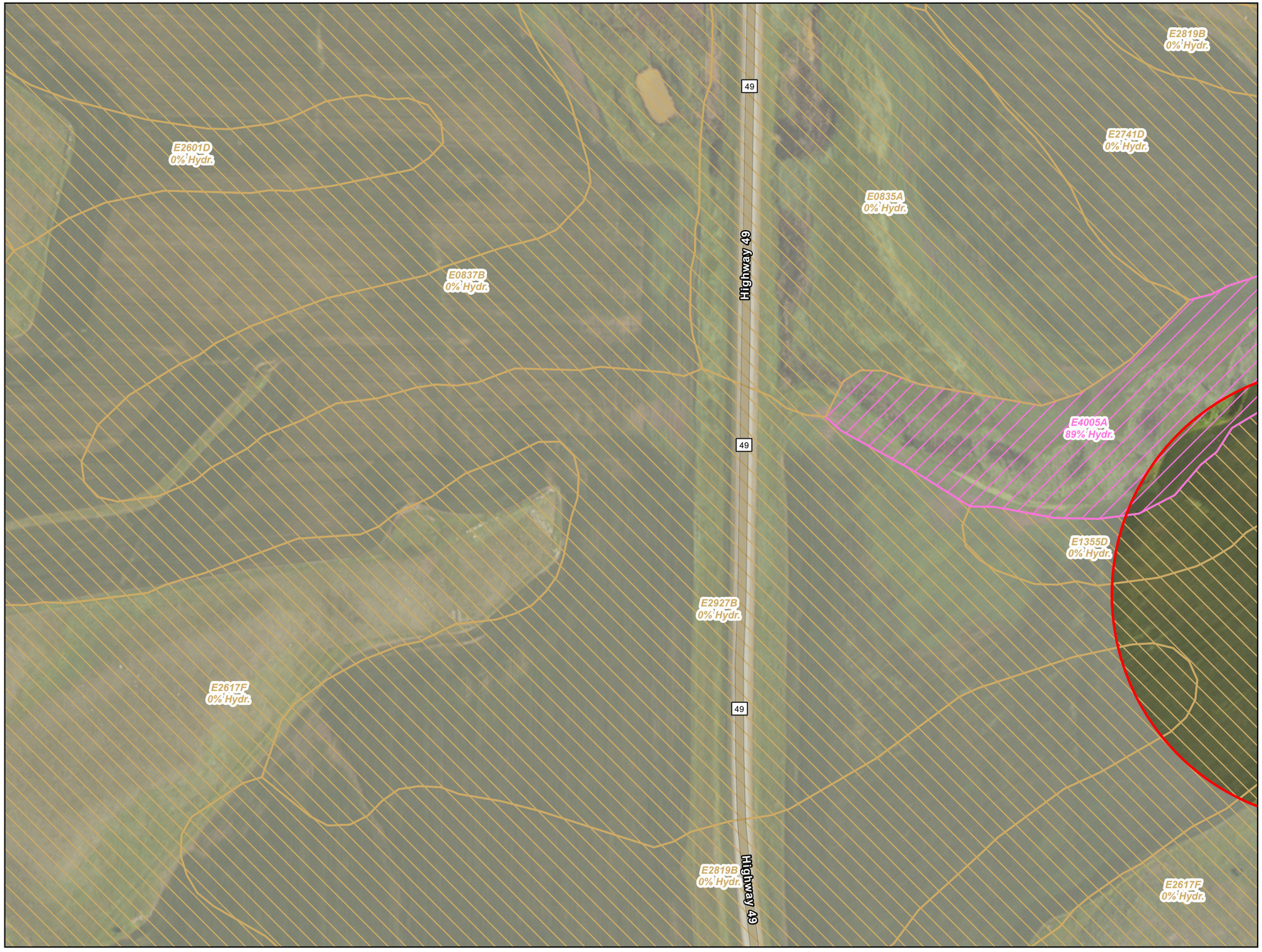

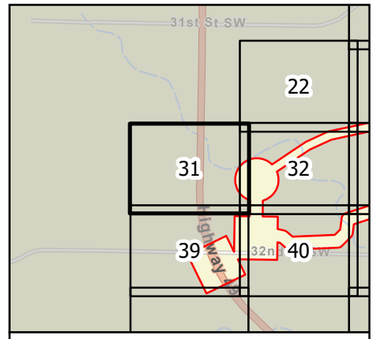

0 100 200 Feet

1 inch = 200 feet

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- Survey Area
- Hydric Soil
- Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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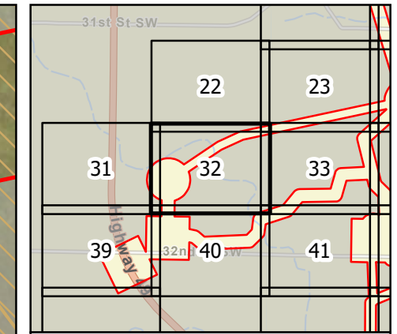

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
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Mercer & Morton Counties,
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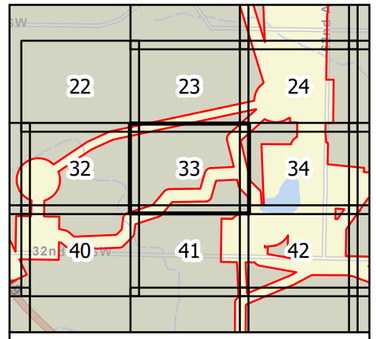

0 100 200 Feet

1 inch = 200 feet

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- Survey Area
- Hydric Soil
- Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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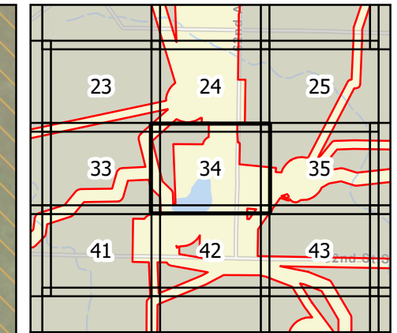

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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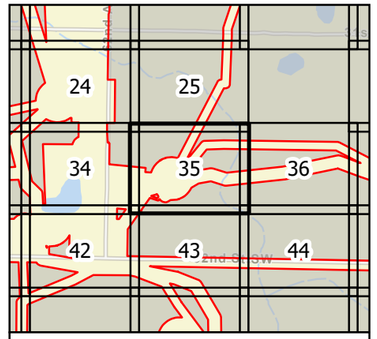

0 100 200 Feet

1 inch = 200 feet

N
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- Survey Area
- Hydric Soil
- Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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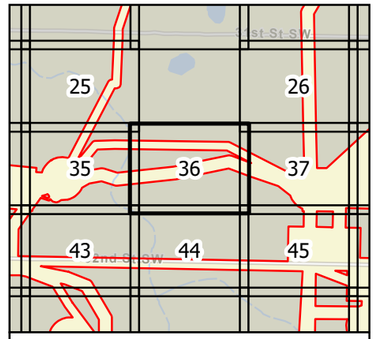

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1 inch = 200 feet

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- Survey Area
- Hydric Soil
- Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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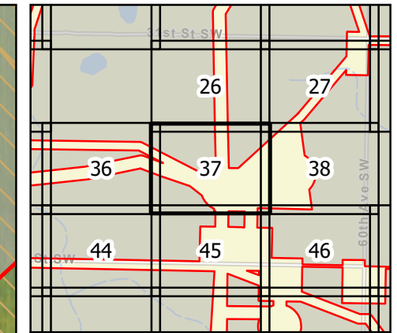

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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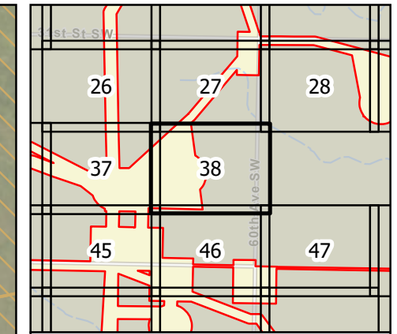

Figure 3
Soil Units (SSURGO)
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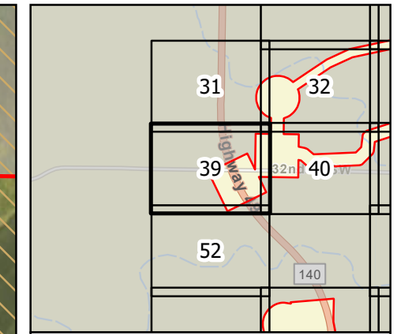

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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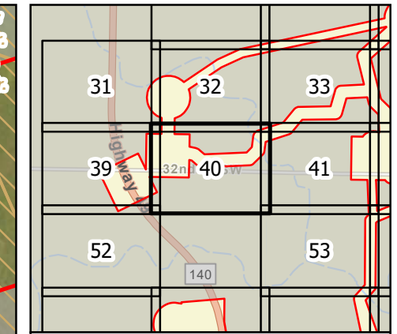

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1 inch = 200 feet

N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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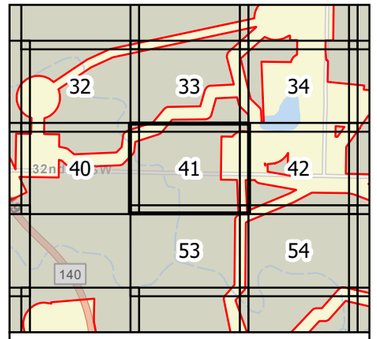

0 100 200 Feet

1 inch = 200 feet

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- Survey Area
- Hydric Soil
- Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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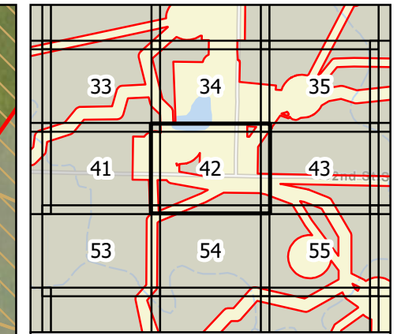

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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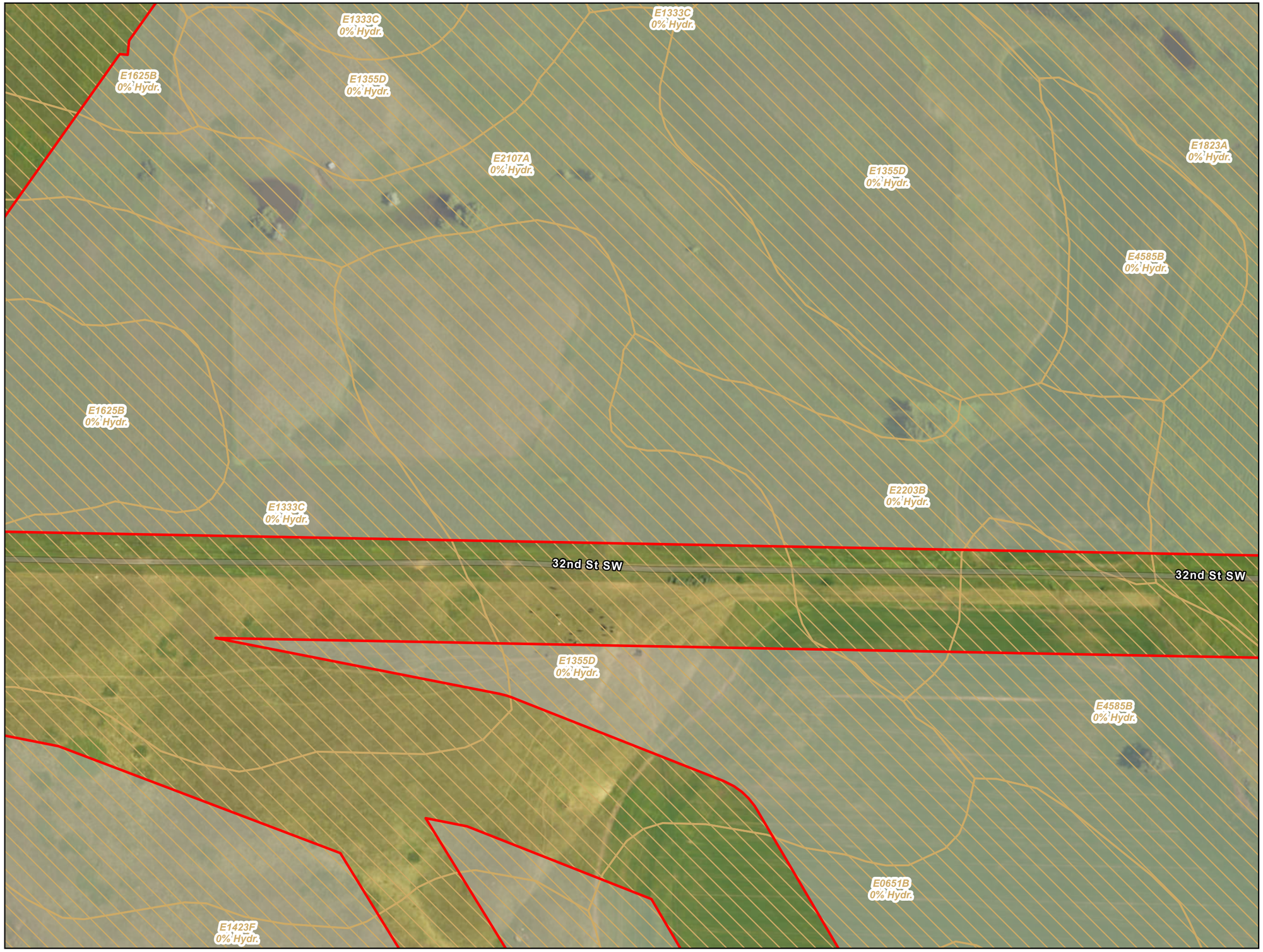

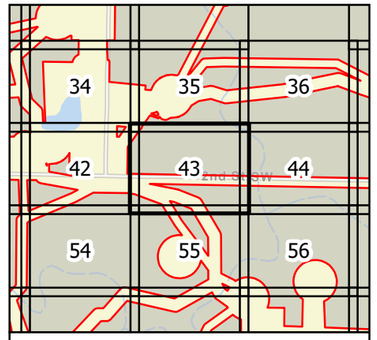

0 100 200 Feet

1 inch = 200 feet

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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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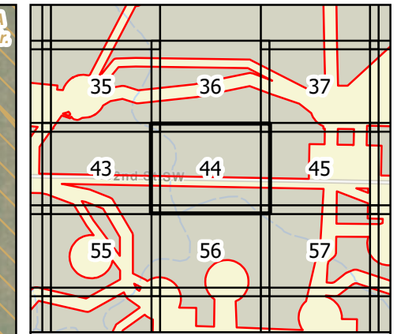

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Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
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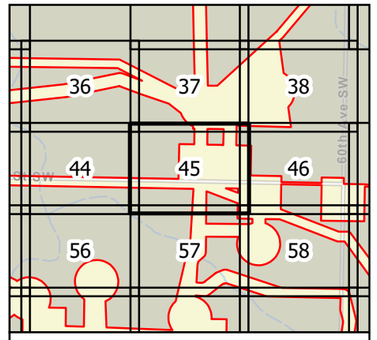

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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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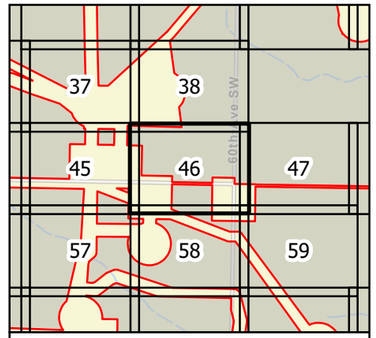

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- Non-Hydric Soil

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Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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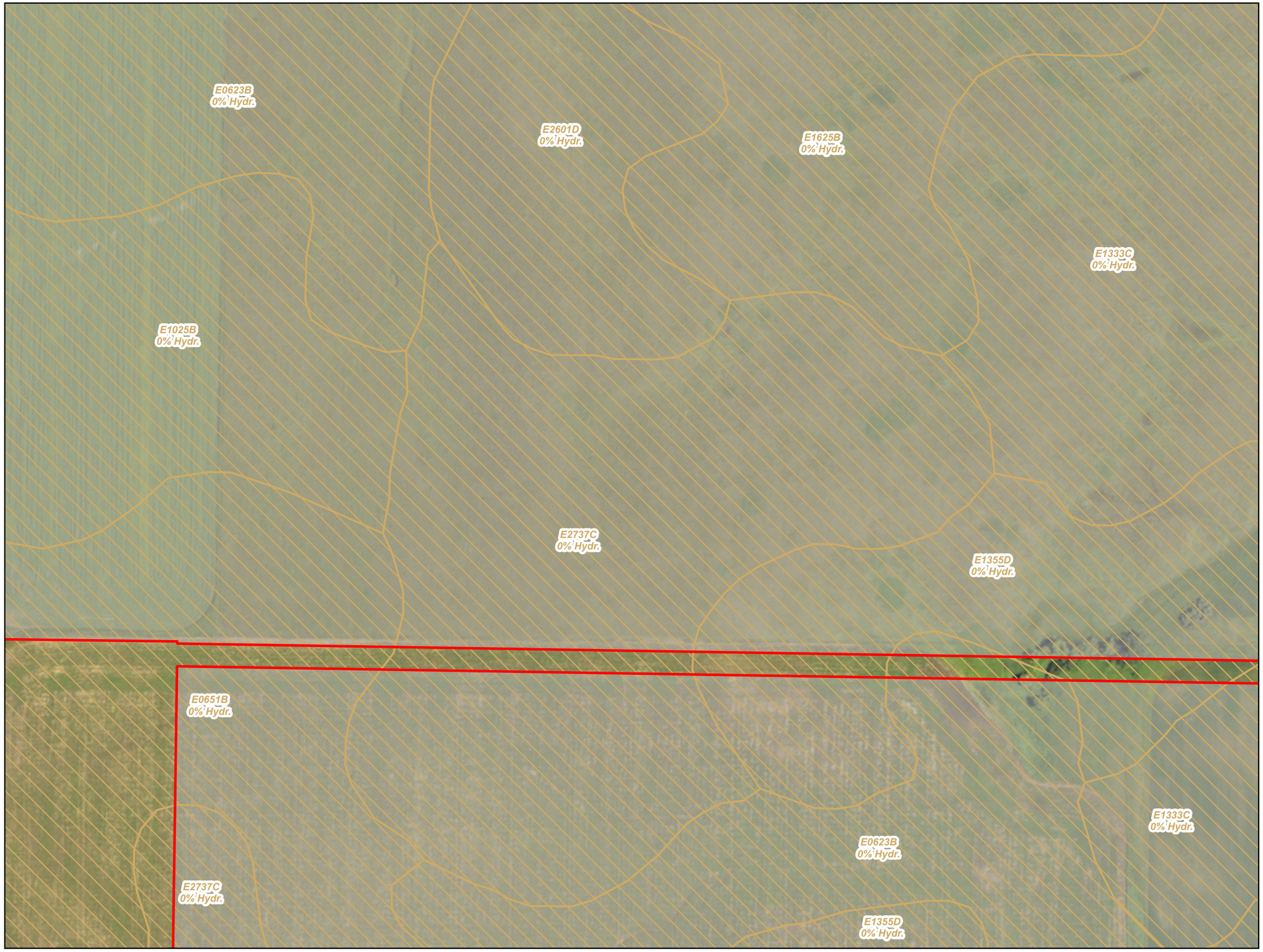

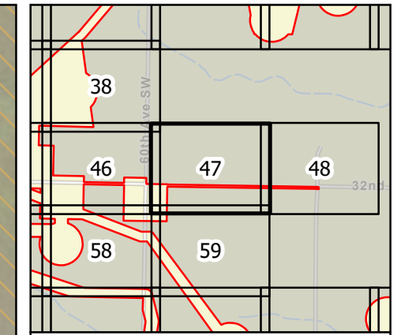

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N W E S

Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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Mercer & Morton Counties,
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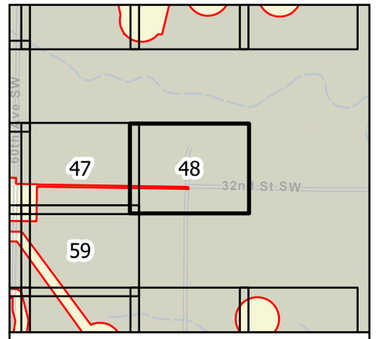

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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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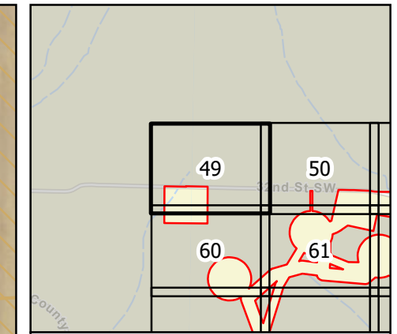

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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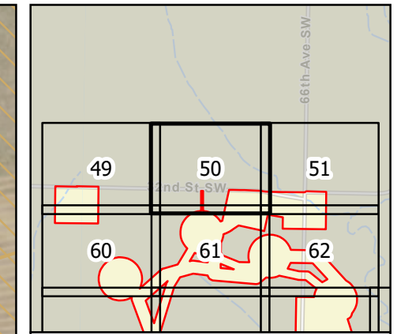

Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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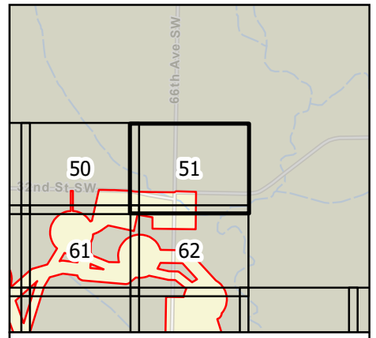

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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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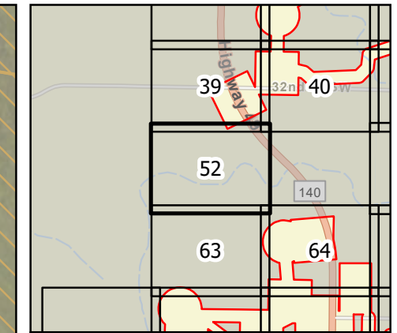

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
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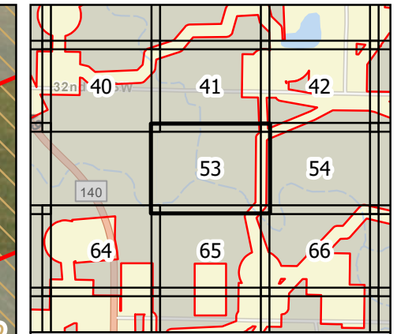

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
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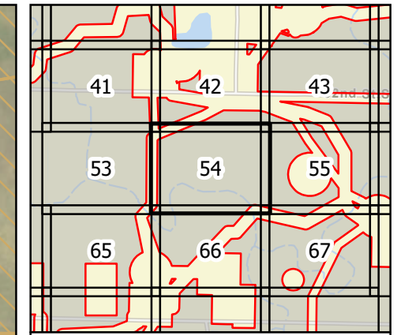

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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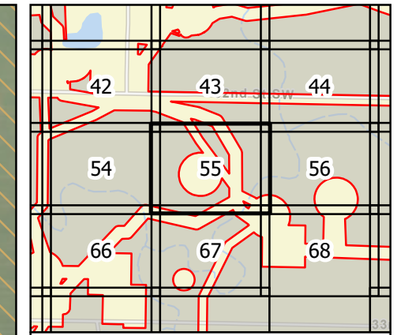

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
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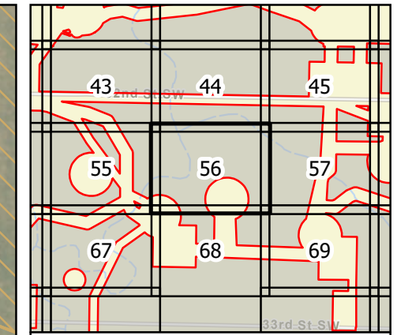

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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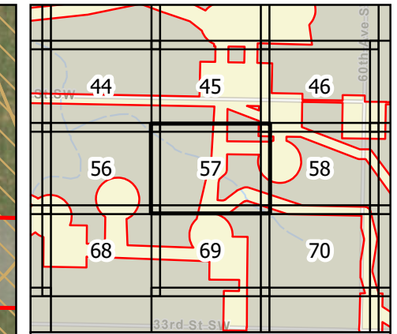

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Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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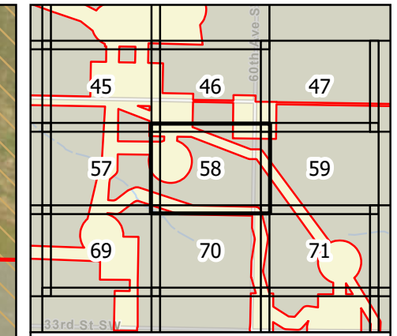

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Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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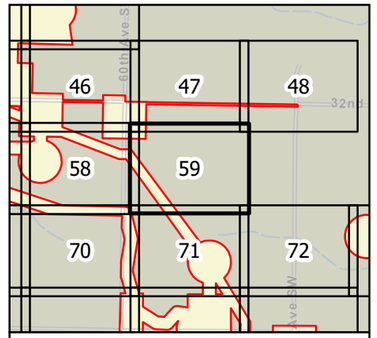

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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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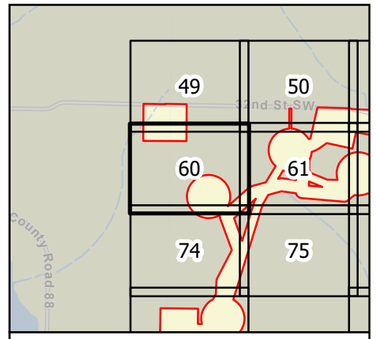

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- Survey Area
- Hydric Soil
- Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties, North Dakota

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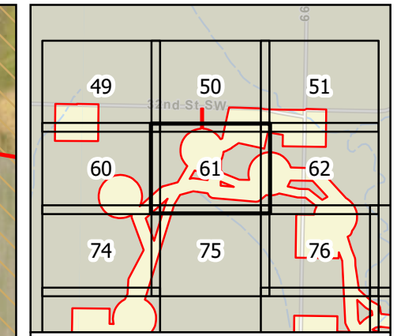

Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
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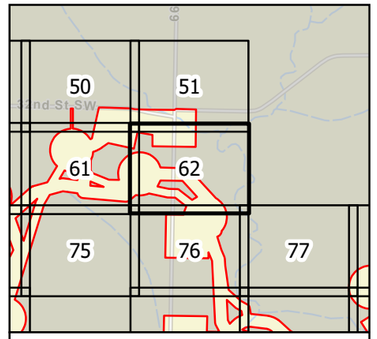

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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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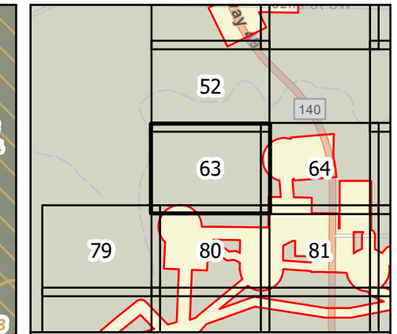

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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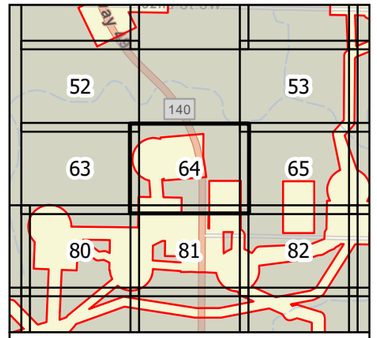

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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
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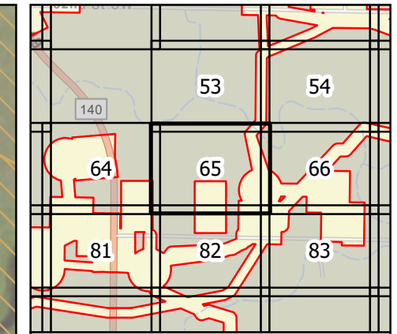

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Survey Area

Hydric Soil

Non-Hydric Soil

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Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
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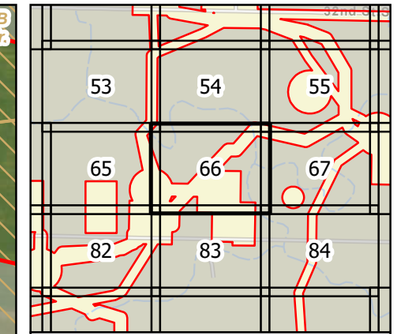

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
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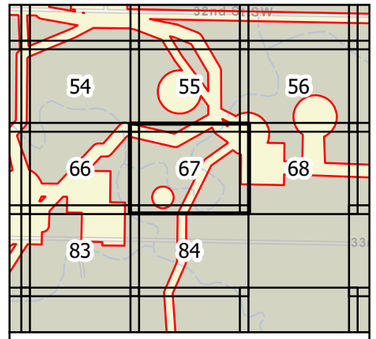

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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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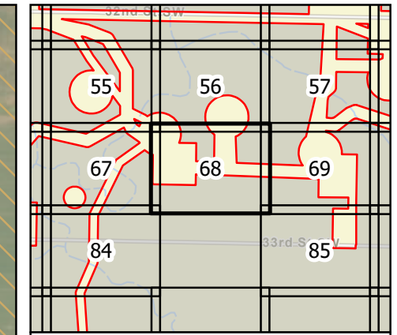

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Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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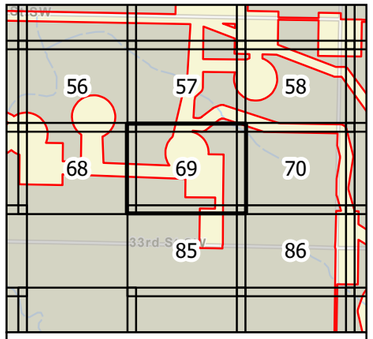

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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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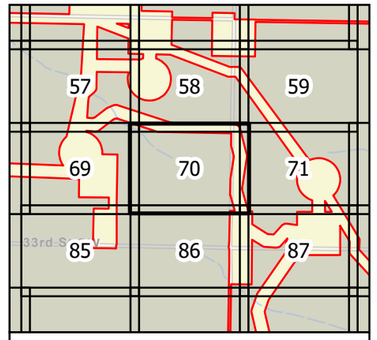

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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
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North Dakota

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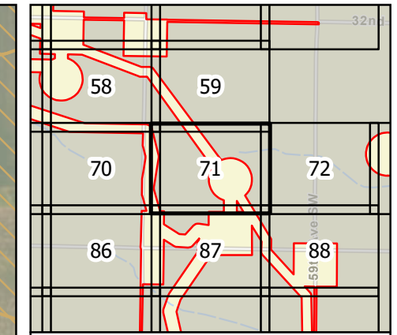

Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
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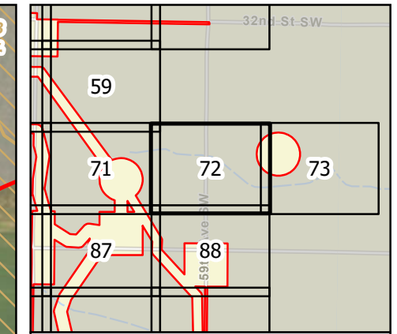

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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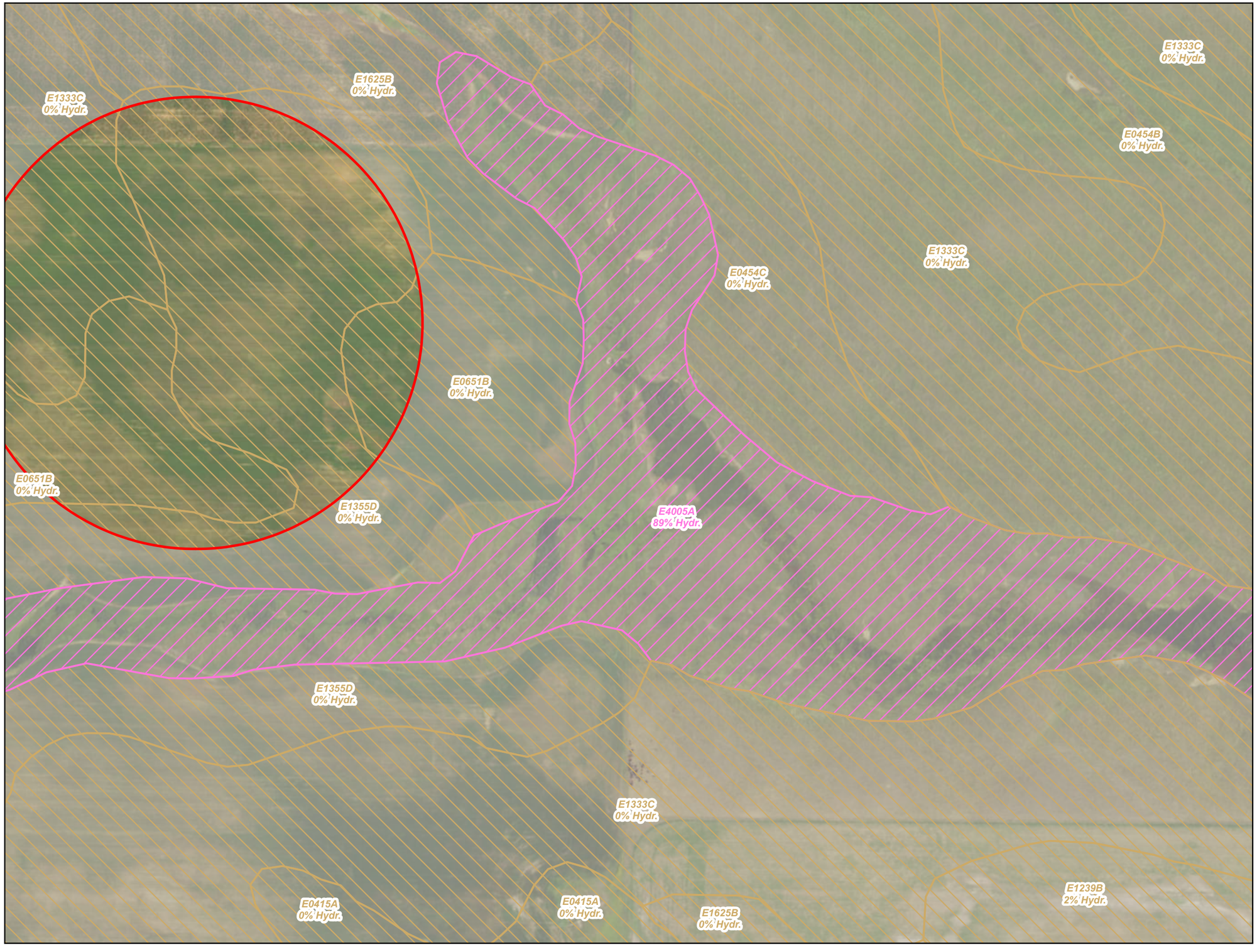

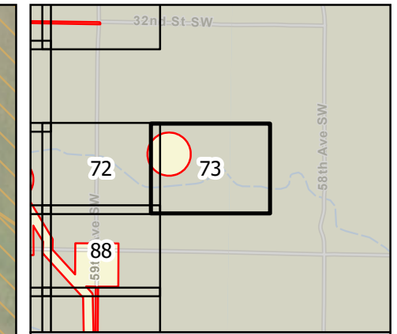

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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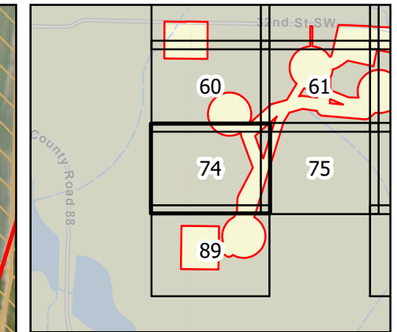

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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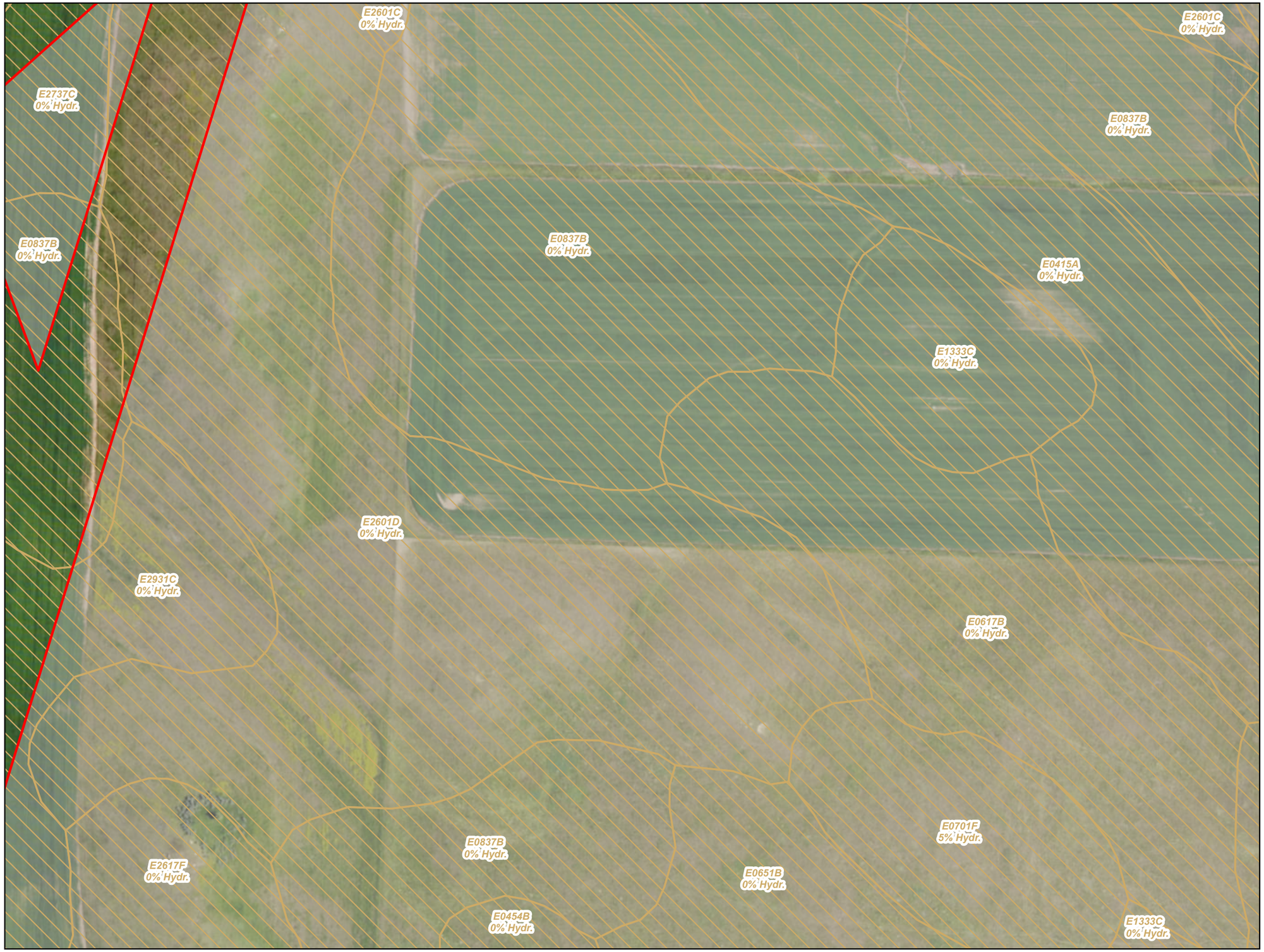

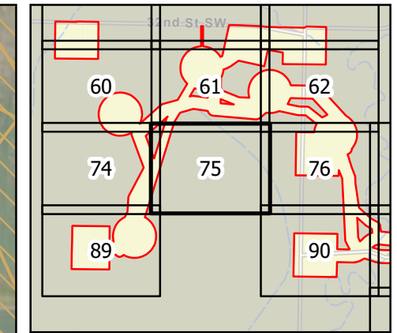

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Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
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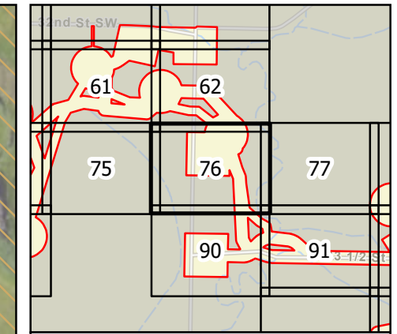

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Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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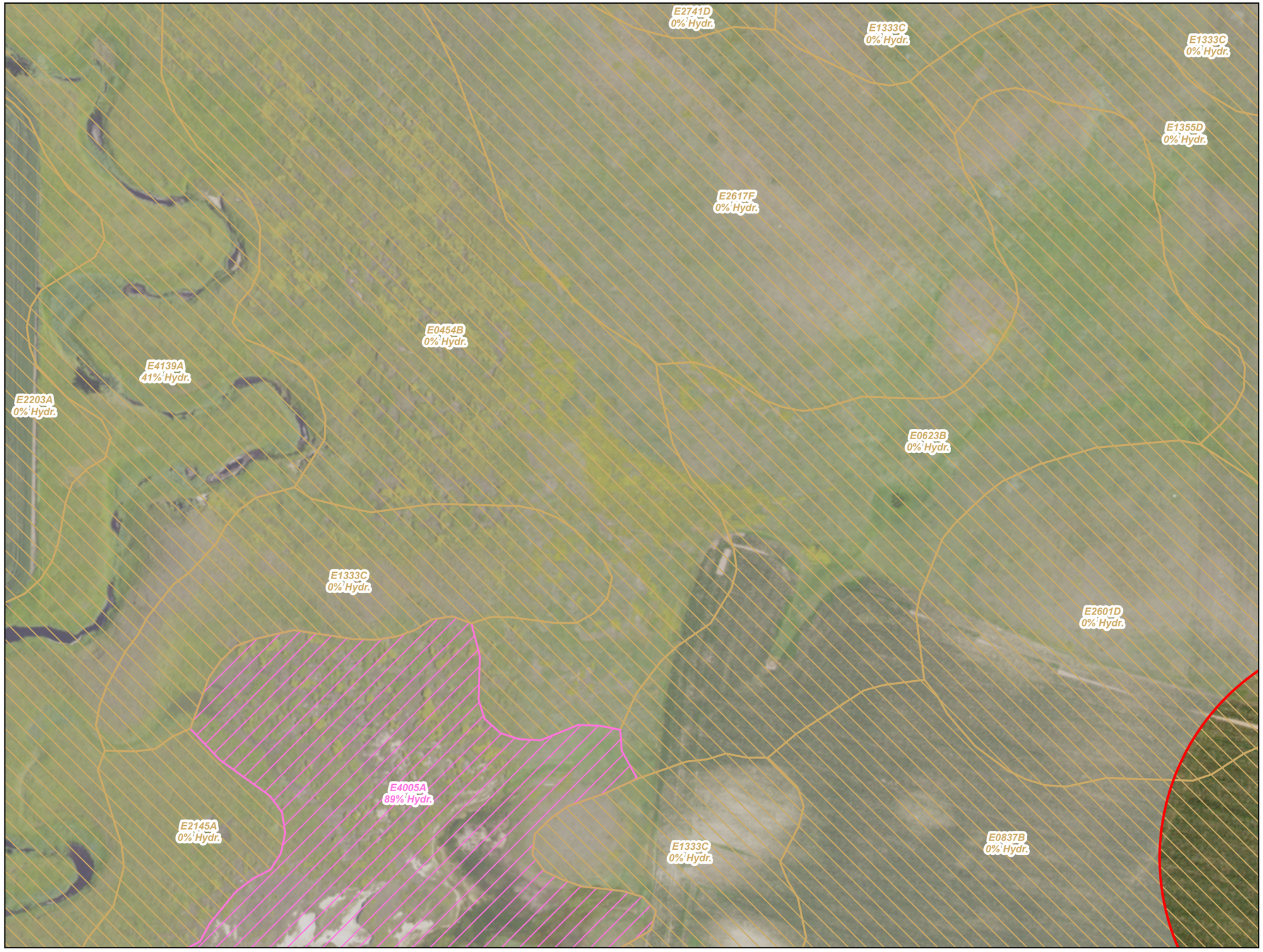

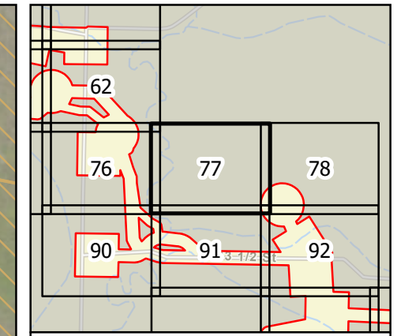

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Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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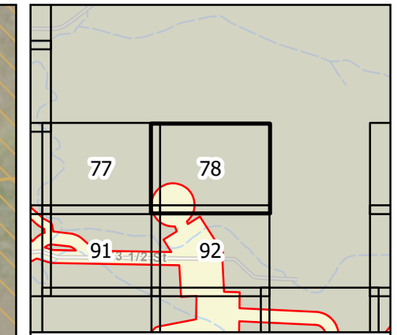

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Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
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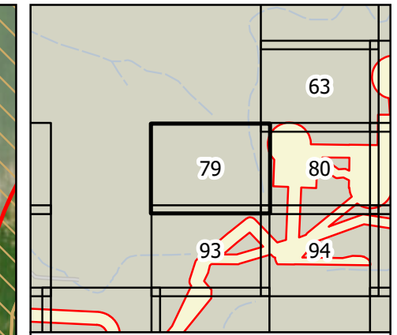

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Survey Area

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Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
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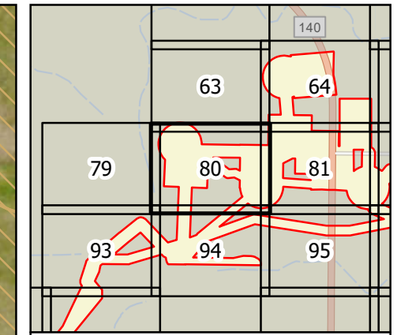

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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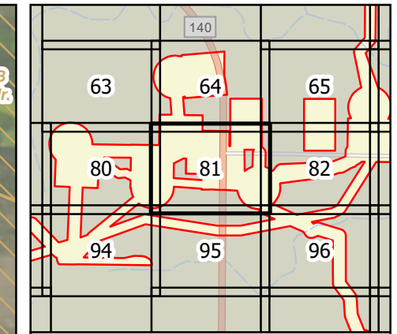

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Survey Area

Hydric Soil

Non-Hydric Soil

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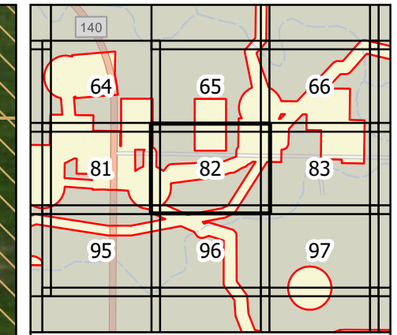

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Survey Area

Hydric Soil

Non-Hydric Soil

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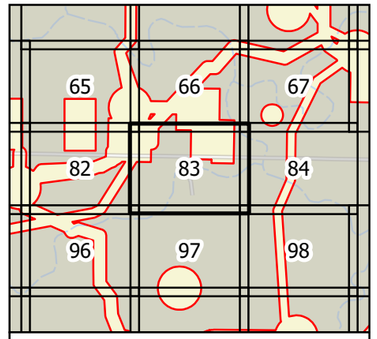

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- Survey Area
- Hydric Soil
- Non-Hydric Soil

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Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
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North Dakota

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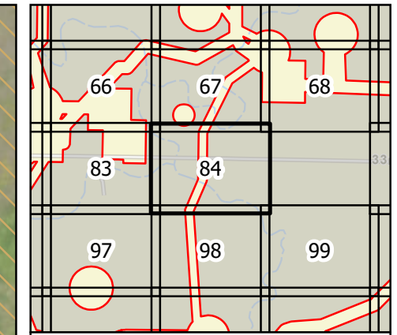

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Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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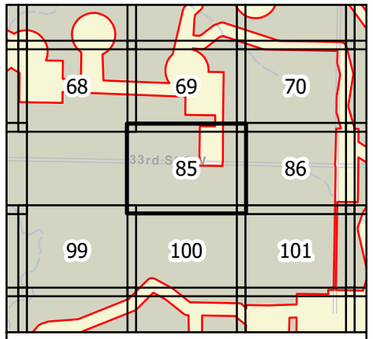

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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
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Longspur Wind Project
Minnesota Power
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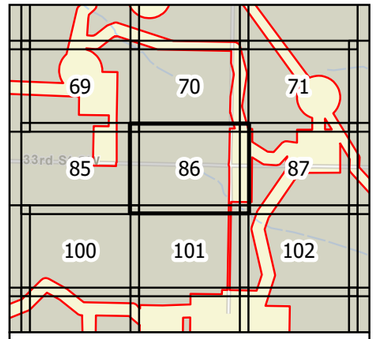

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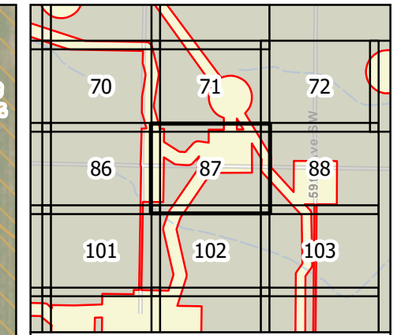

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Survey Area

Hydric Soil

Non-Hydric Soil

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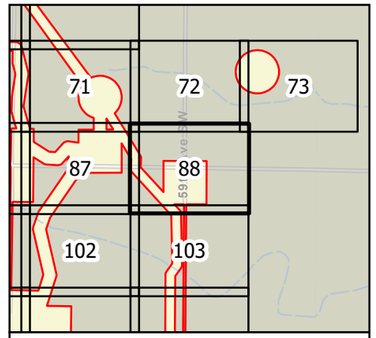

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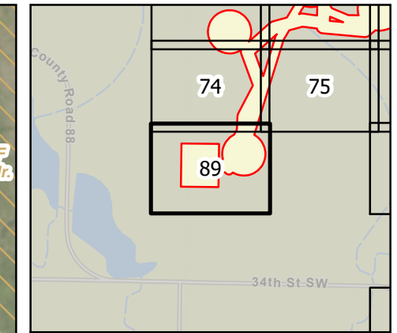

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Survey Area

Hydric Soil

Non-Hydric Soil

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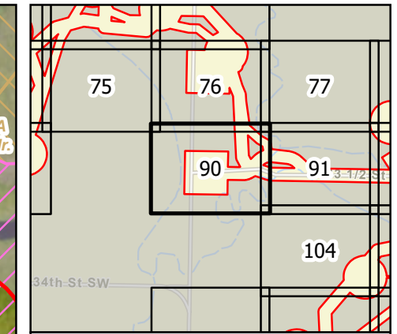

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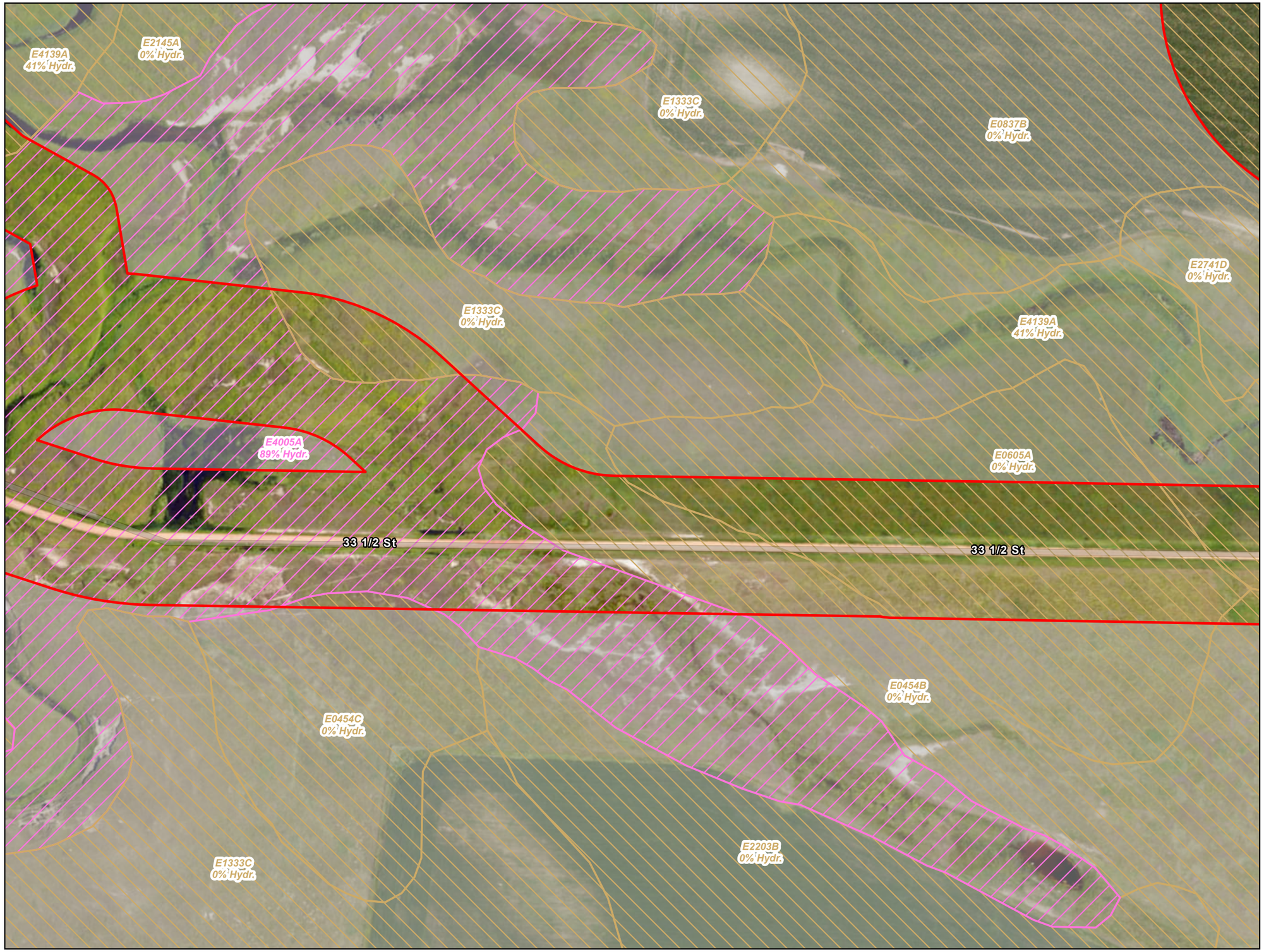

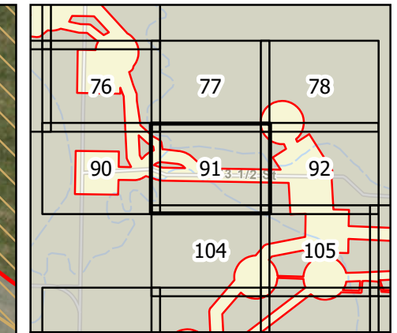

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Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
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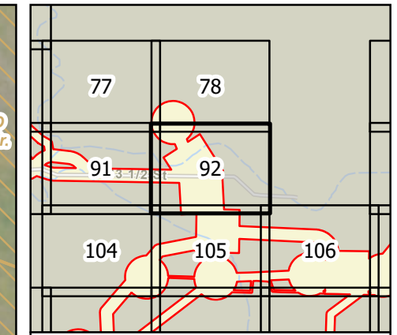

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Survey Area

Hydric Soil

Non-Hydric Soil

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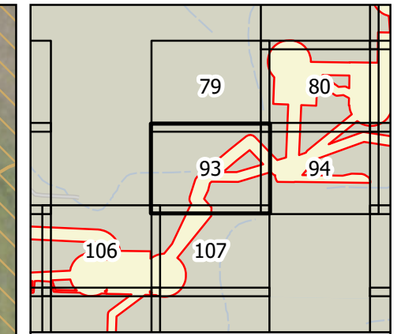

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Survey Area

Hydric Soil

Non-Hydric Soil

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Longspur Wind Project
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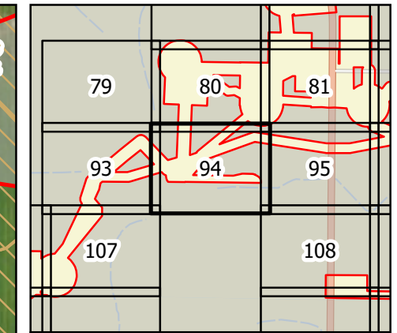

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Survey Area

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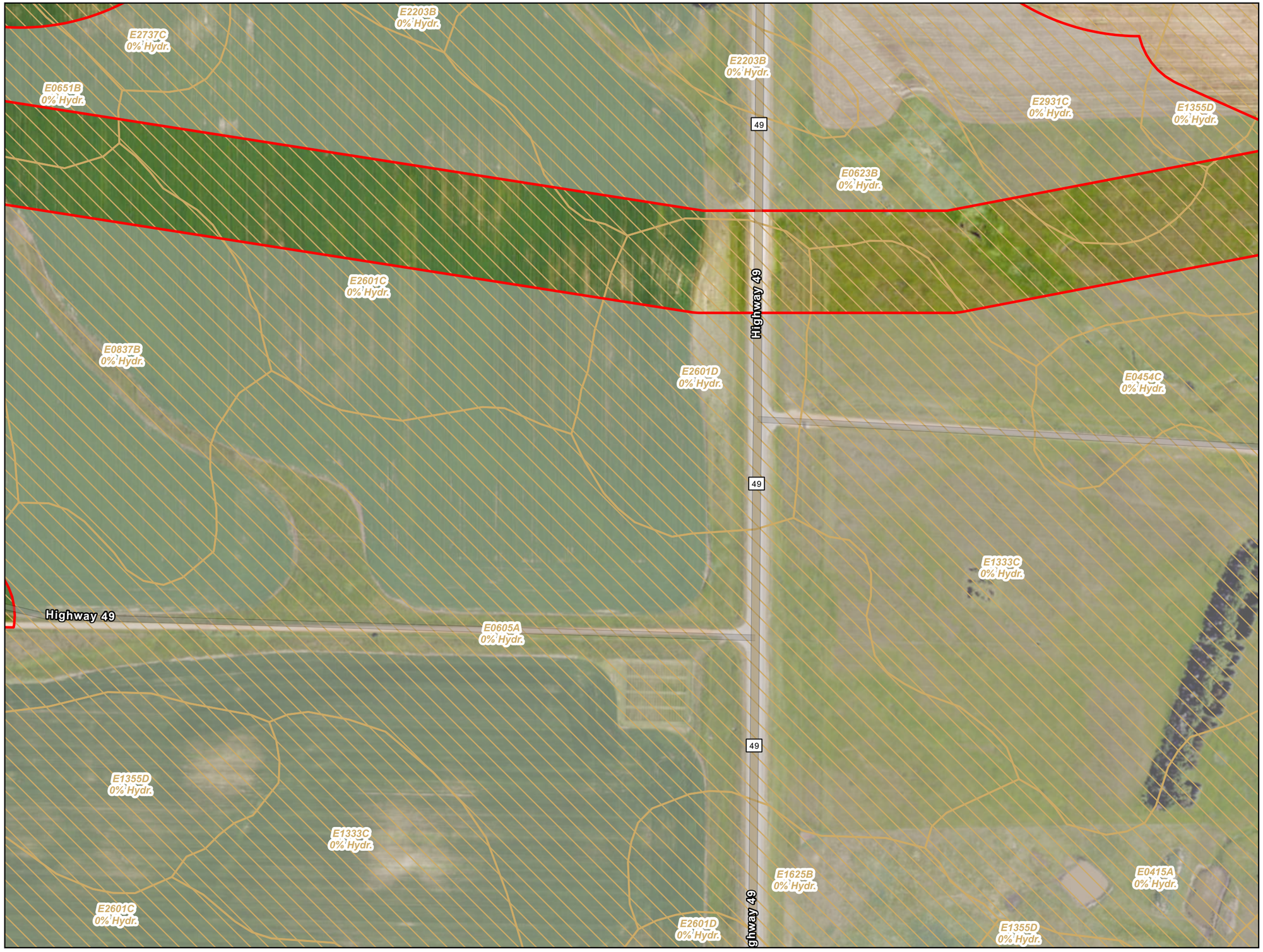

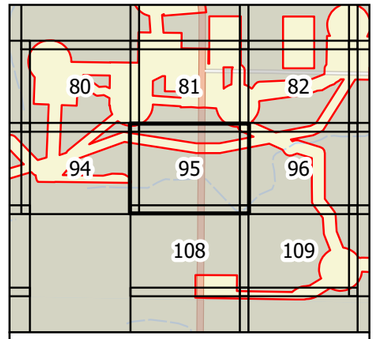

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- Survey Area
- Hydric Soil
- Non-Hydric Soil

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Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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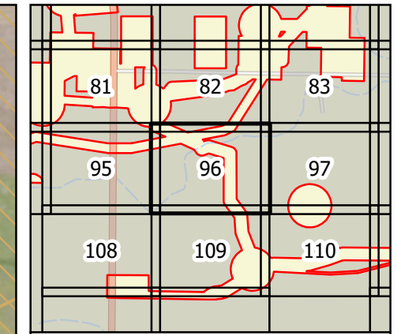

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Survey Area

Hydric Soil

Non-Hydric Soil

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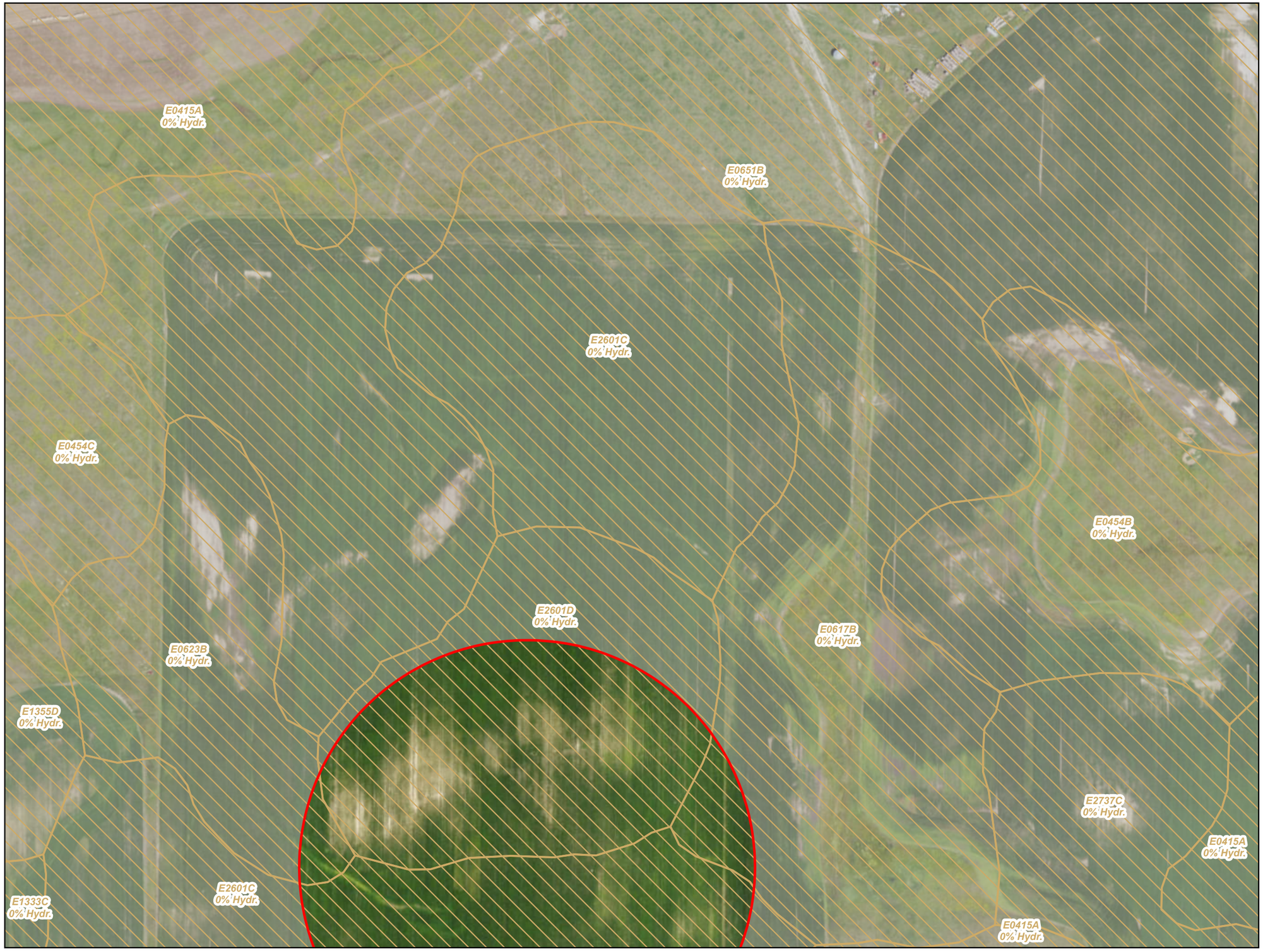

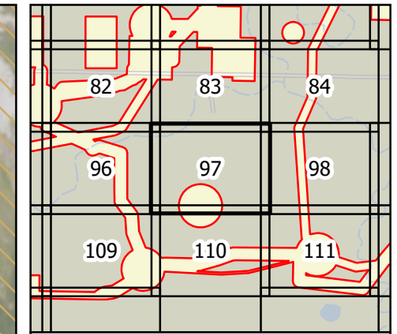

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Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
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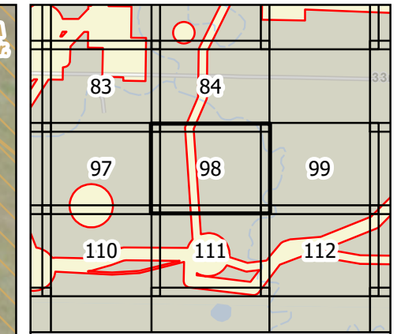

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Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
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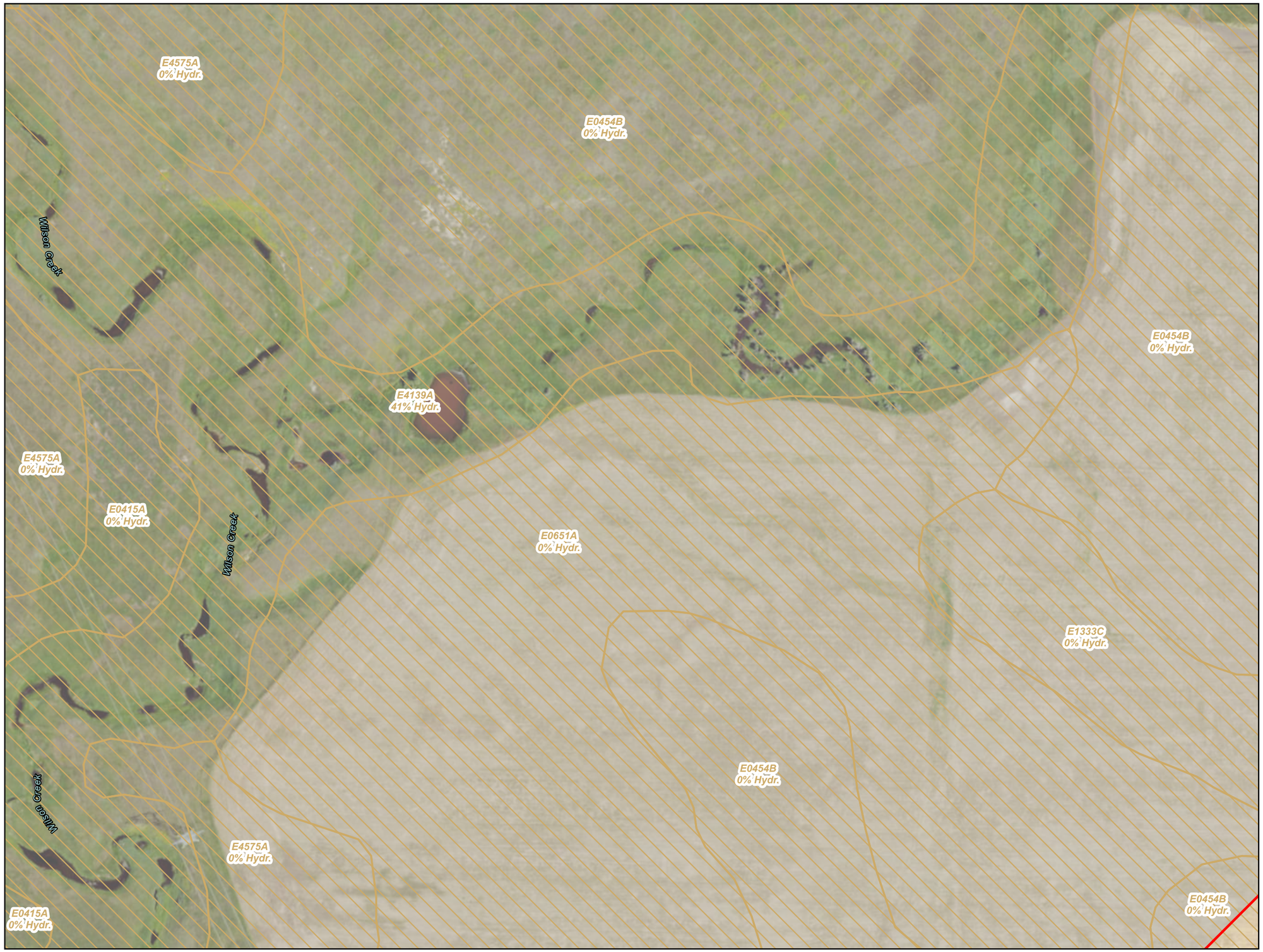

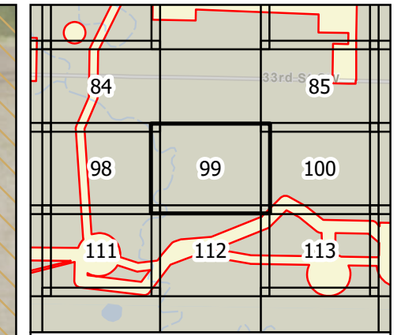

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Survey Area

Hydric Soil

Non-Hydric Soil

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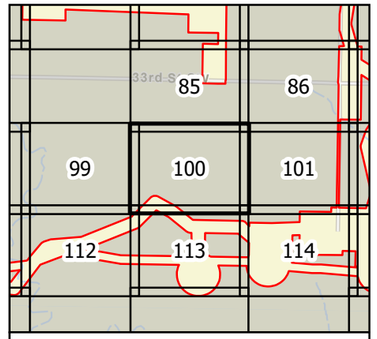

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Survey Area
Hydric Soil
Non-Hydric Soil

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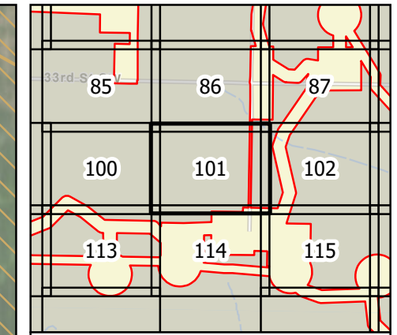

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Survey Area

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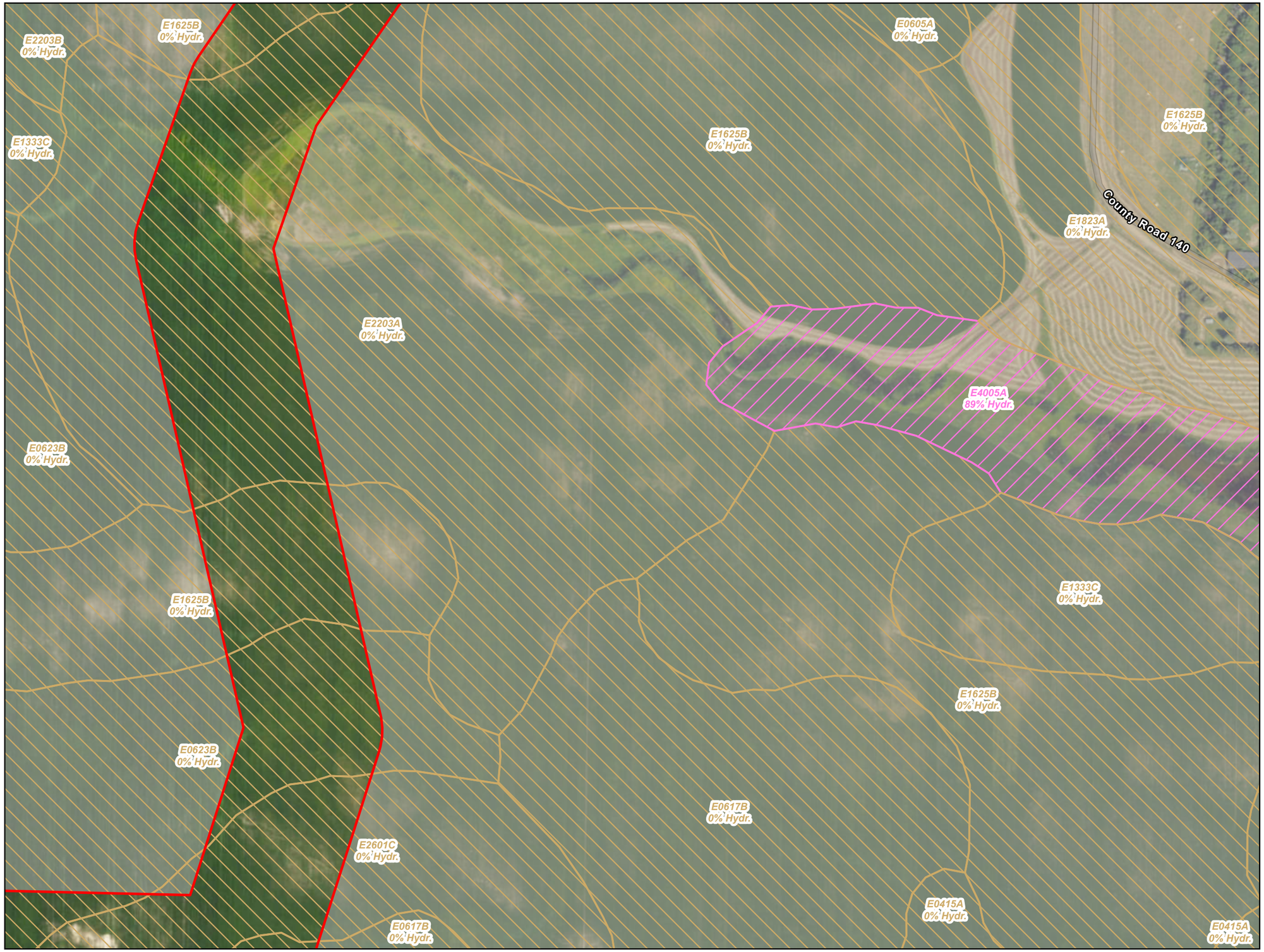

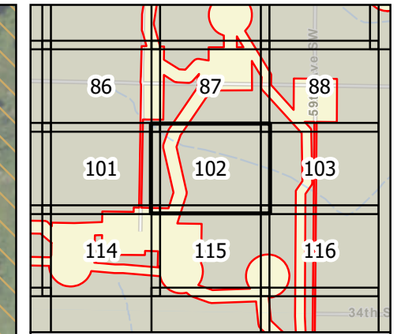

Survey Area
Hydric Soil
Non-Hydric Soil

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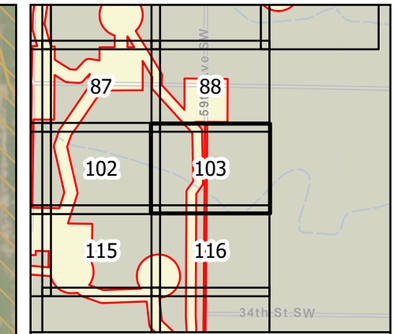

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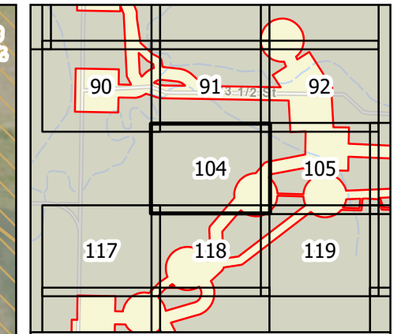

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Non-Hydric Soil

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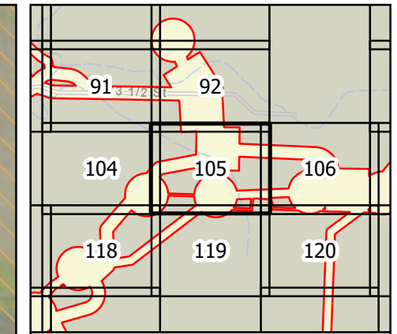

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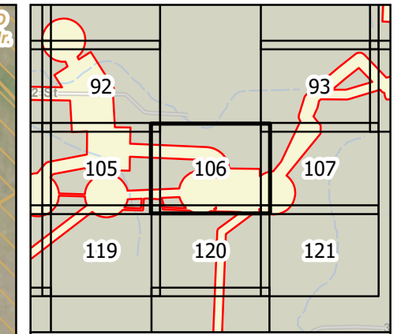

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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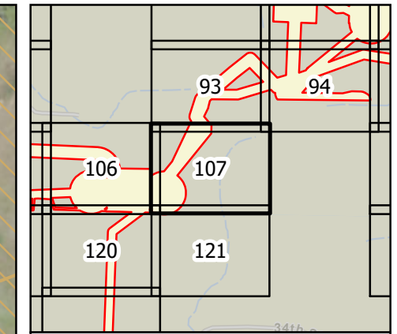

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
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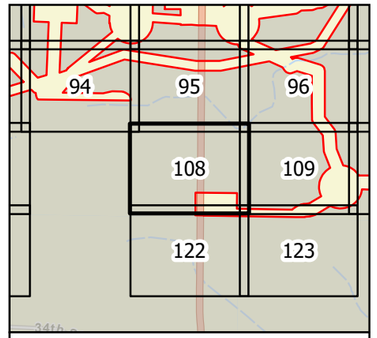

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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties, North Dakota

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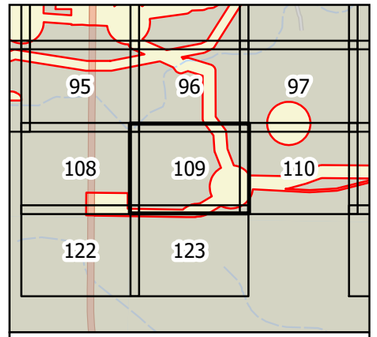

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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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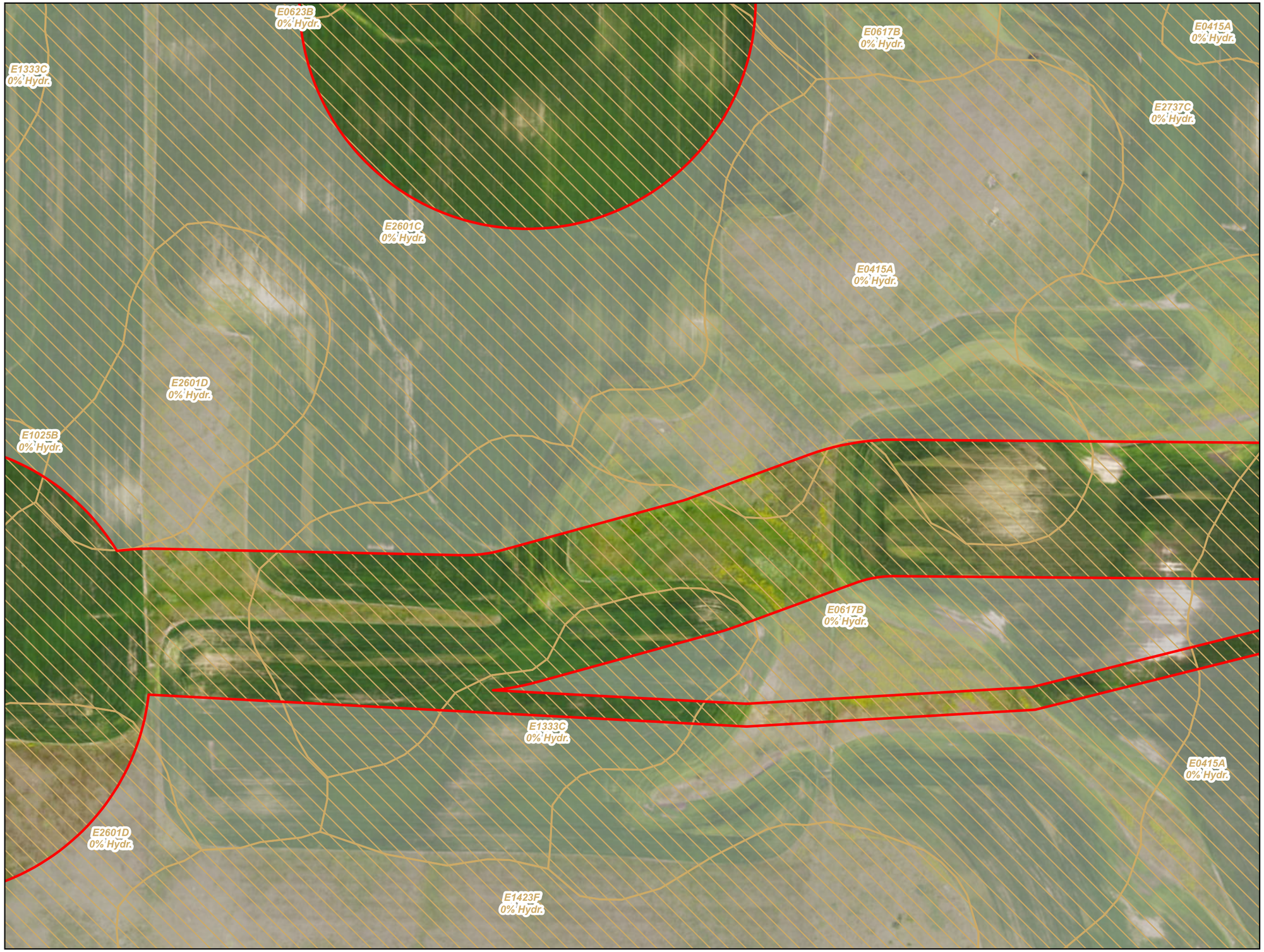

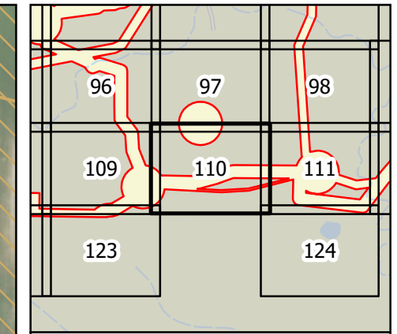

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Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
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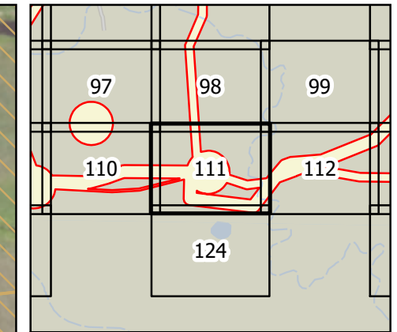

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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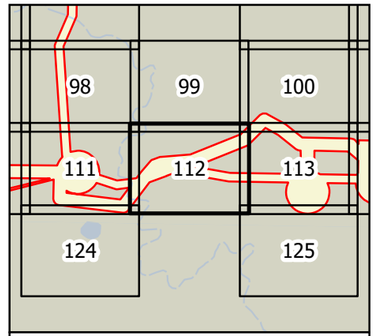

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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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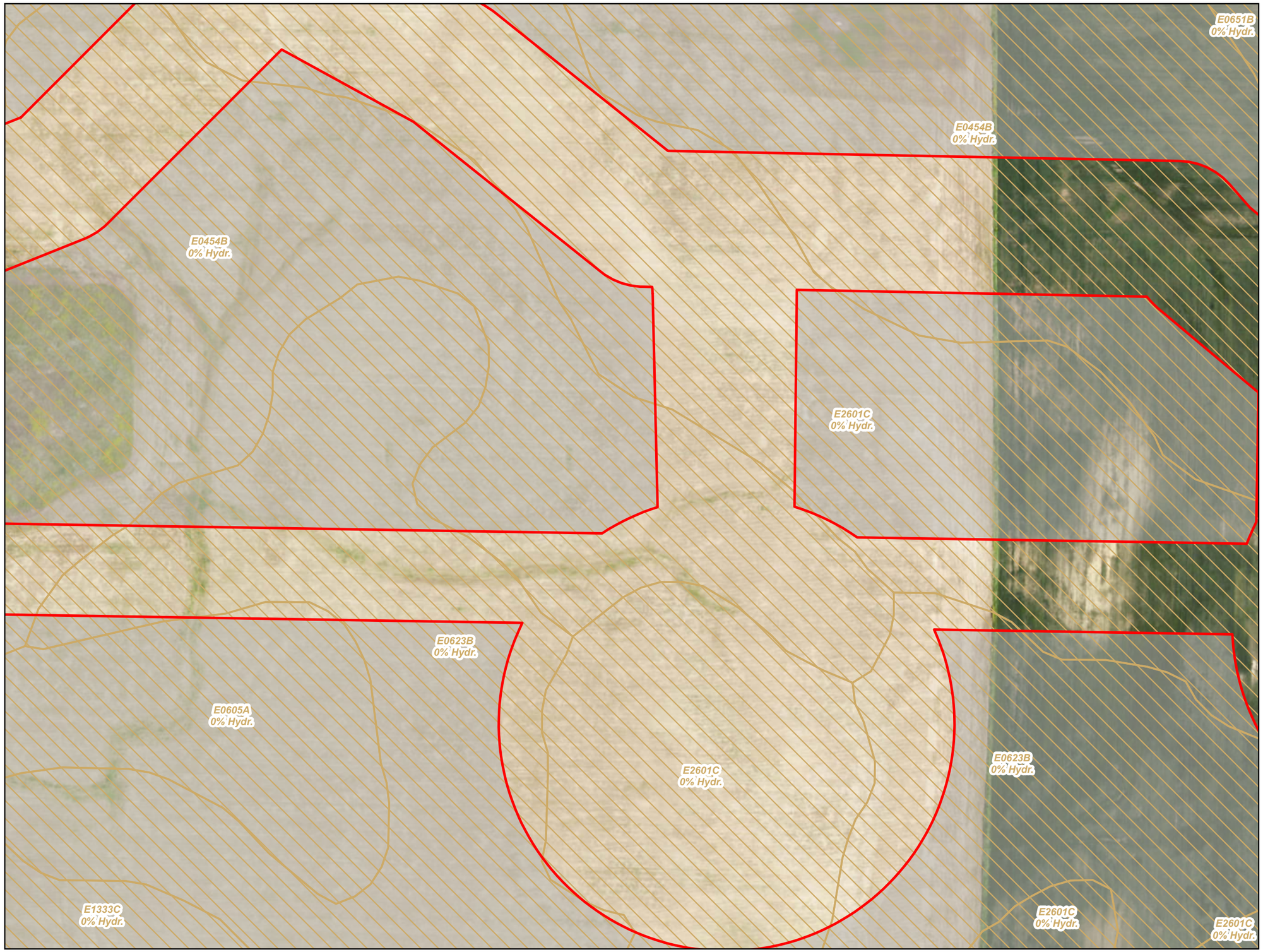

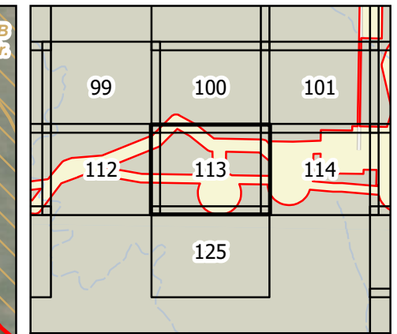

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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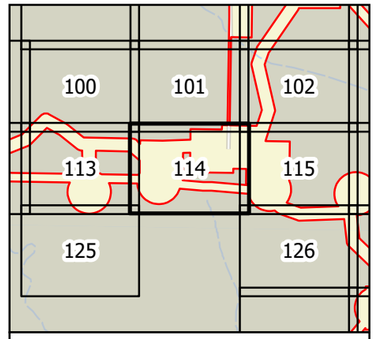

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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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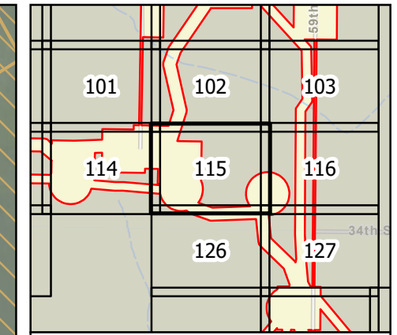

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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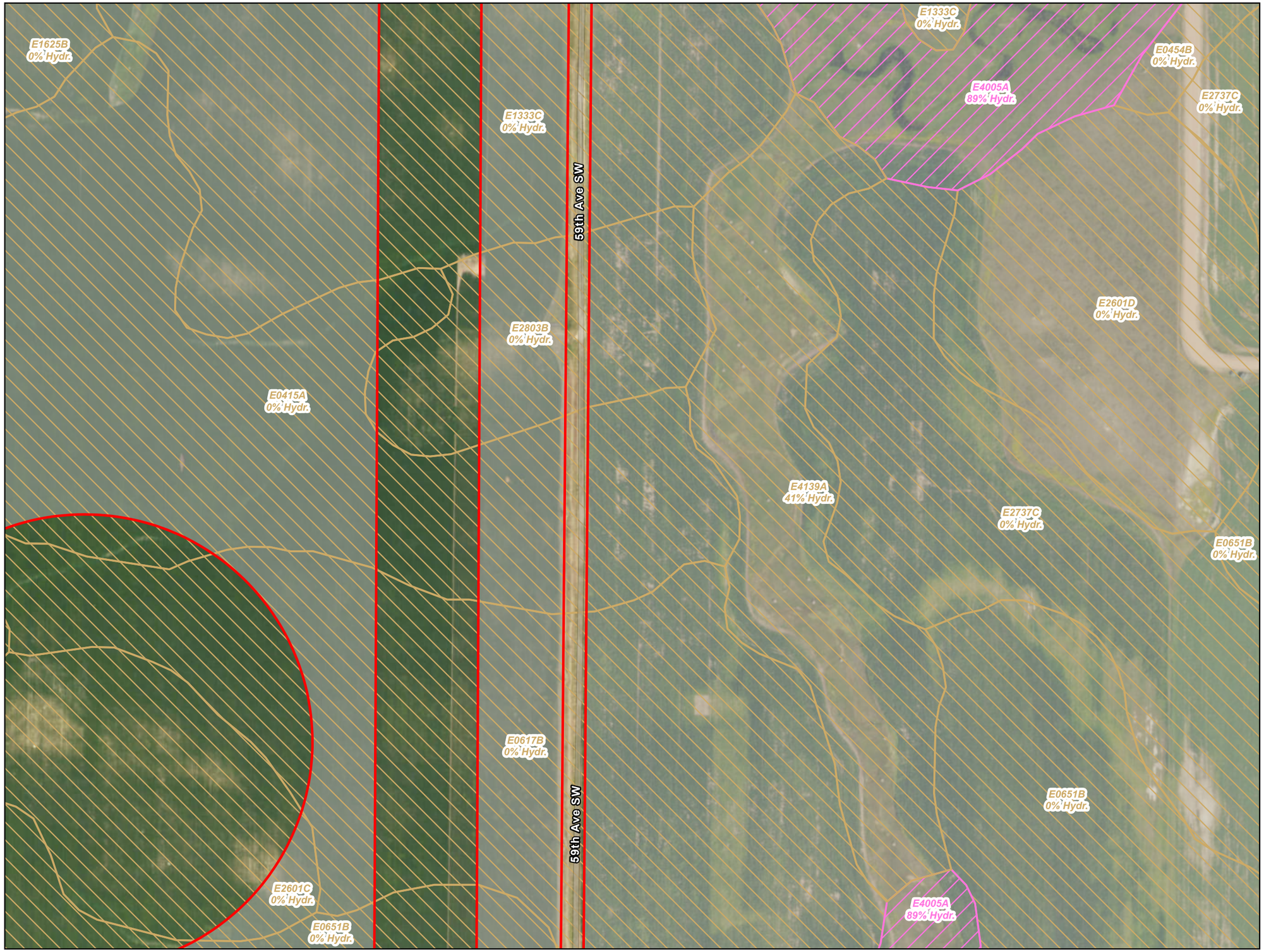

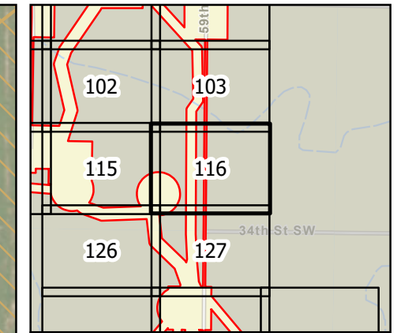

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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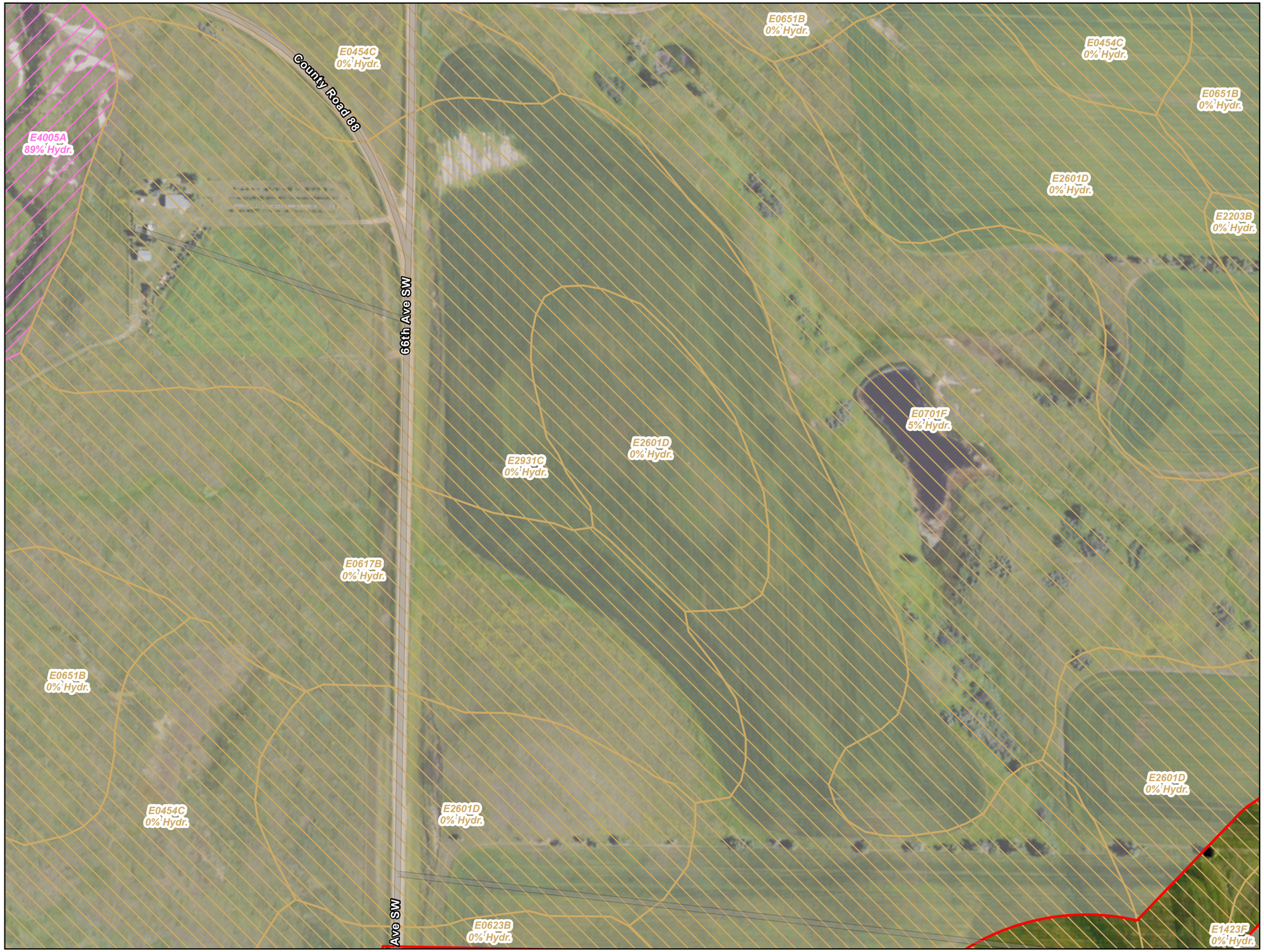

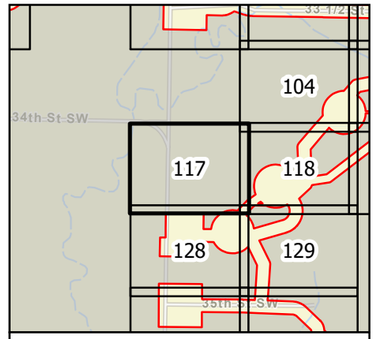

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1 inch = 200 feet

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- Survey Area
- Hydric Soil
- Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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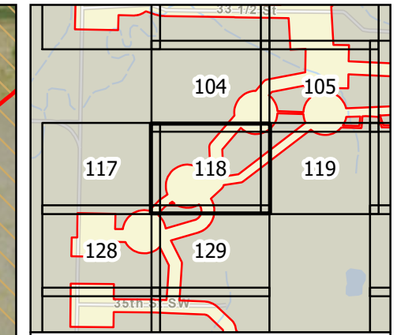

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Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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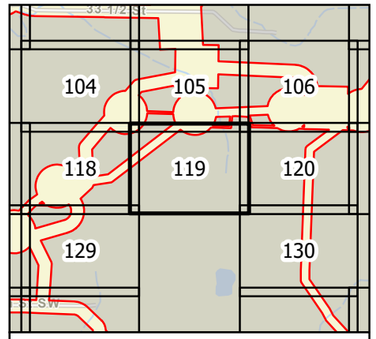

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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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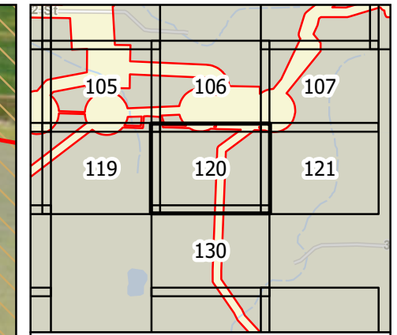

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Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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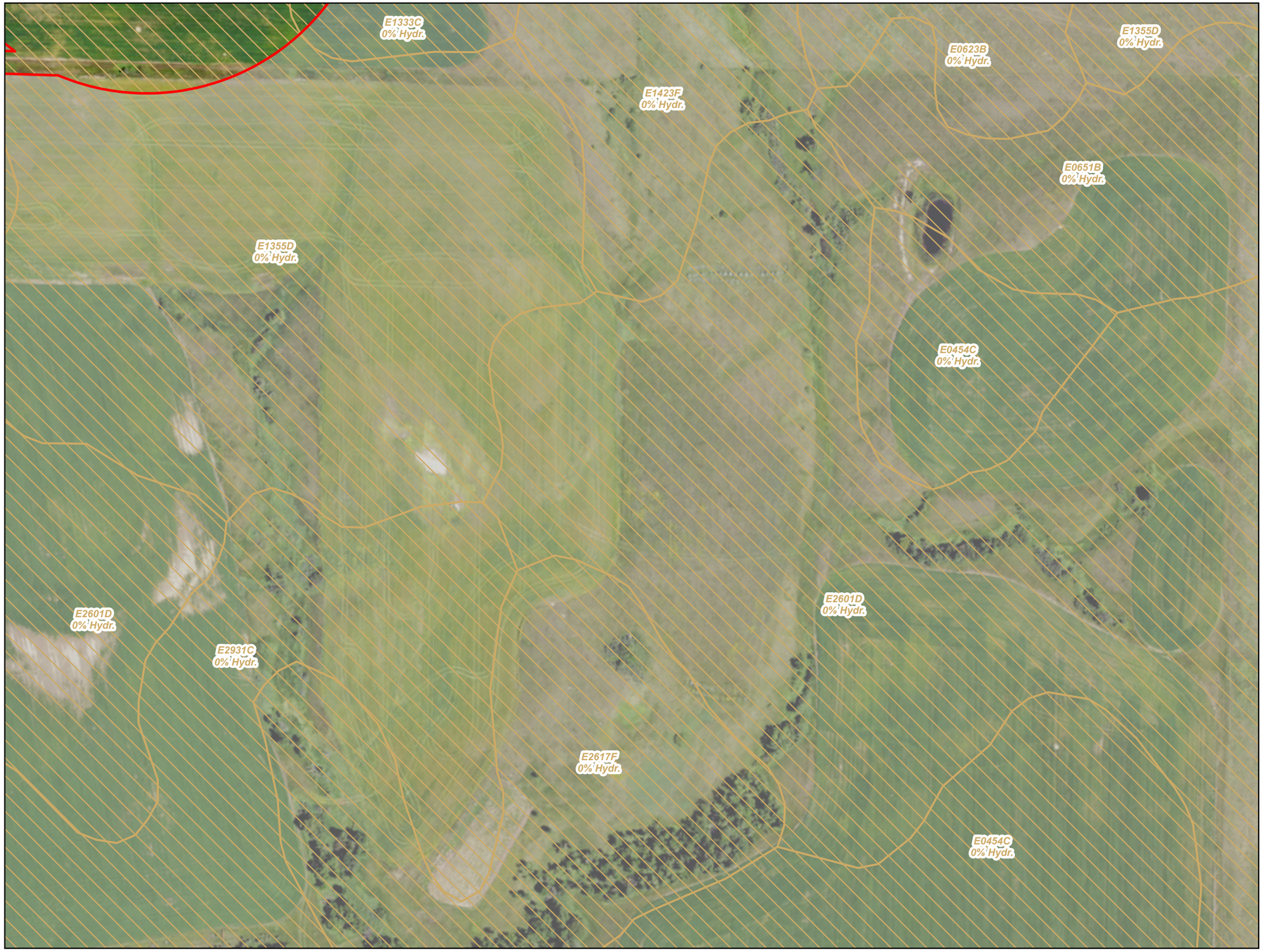

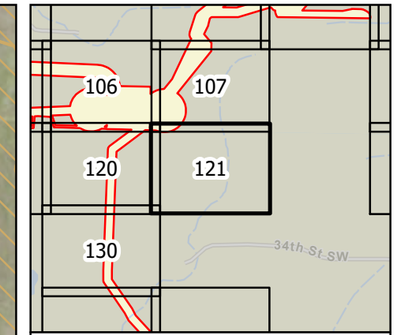

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Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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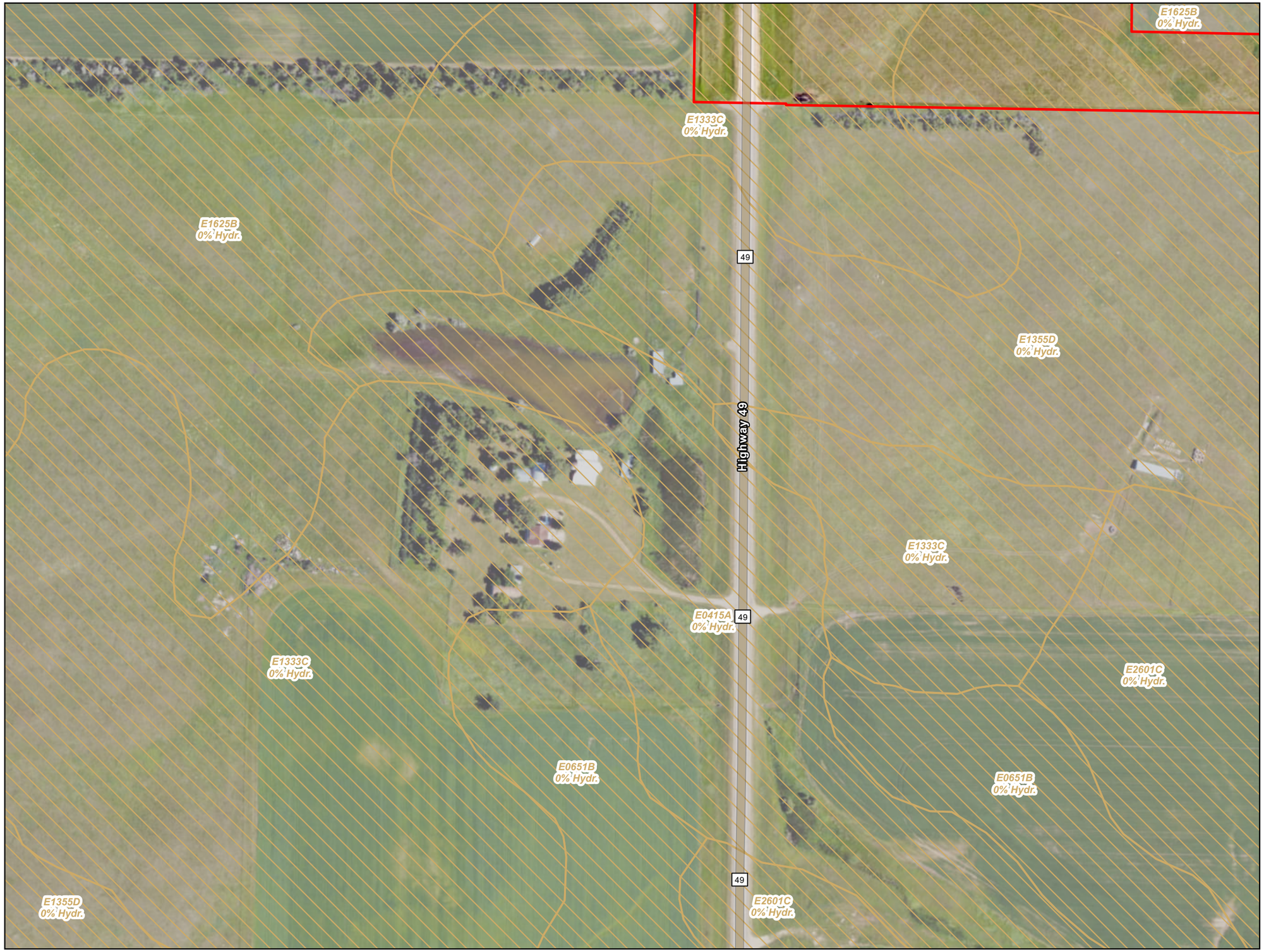

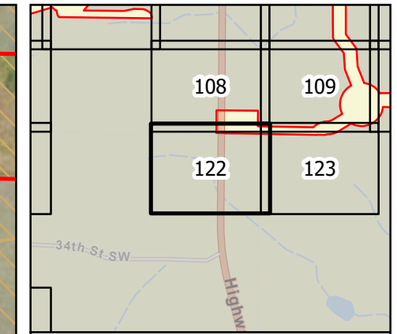

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Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
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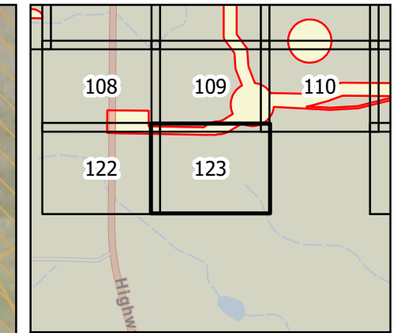

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Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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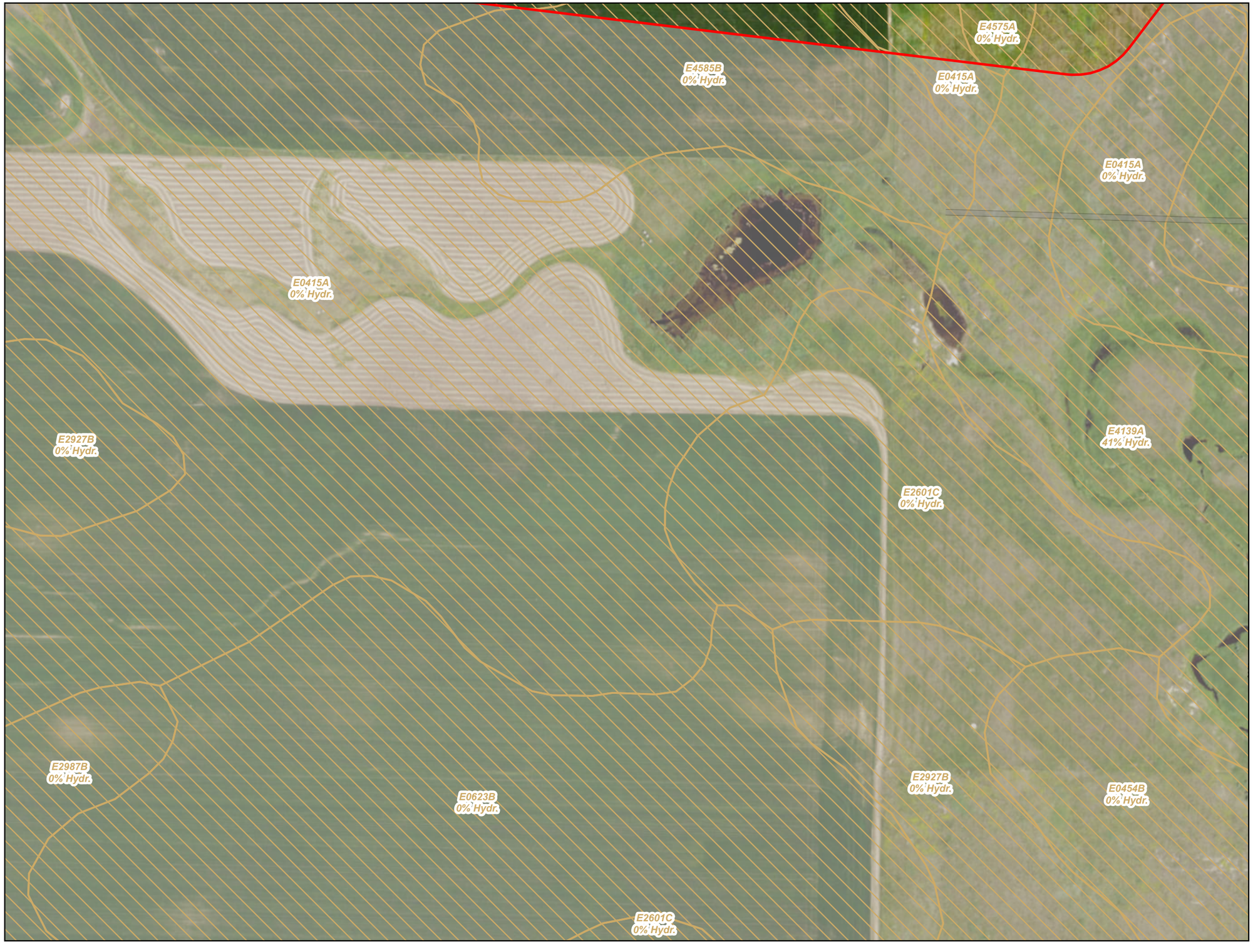

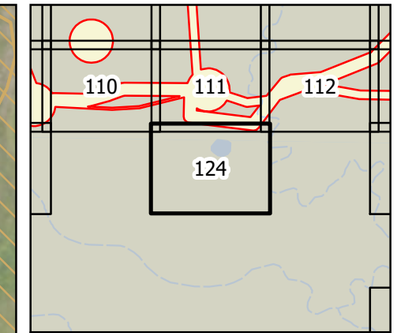

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Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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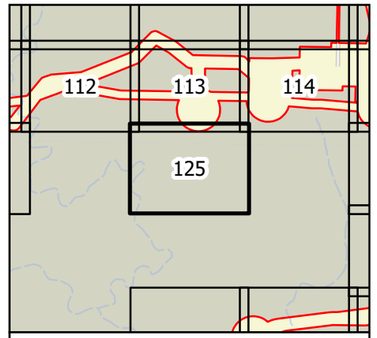

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- Survey Area
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- Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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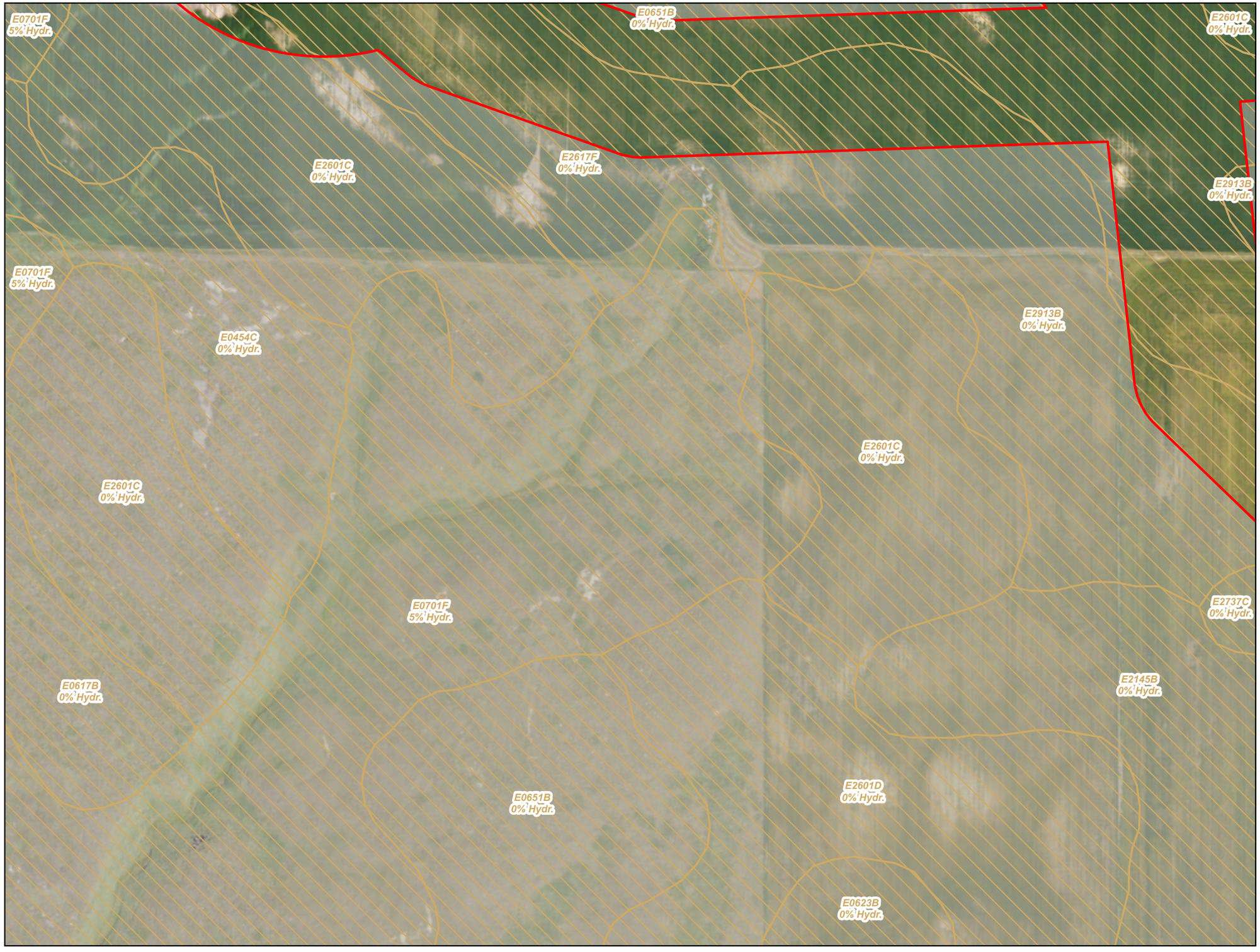

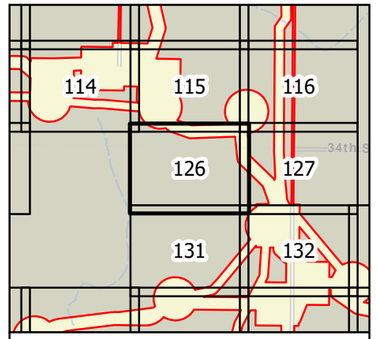

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Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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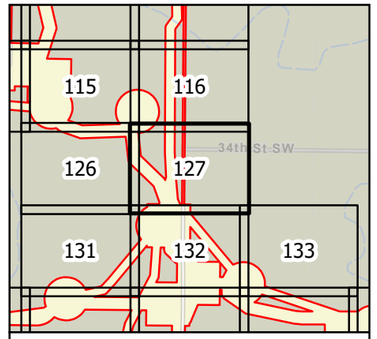

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Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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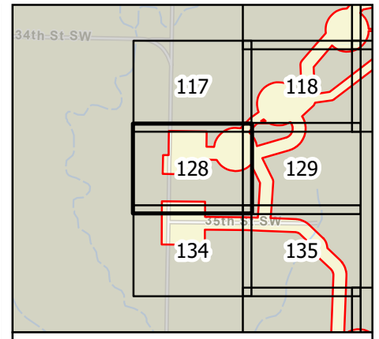

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Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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North Dakota

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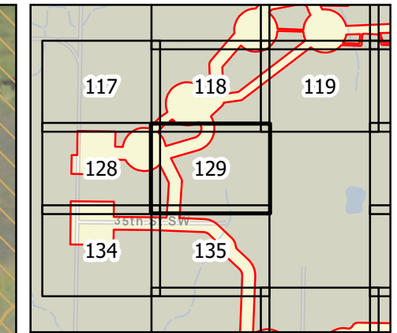

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
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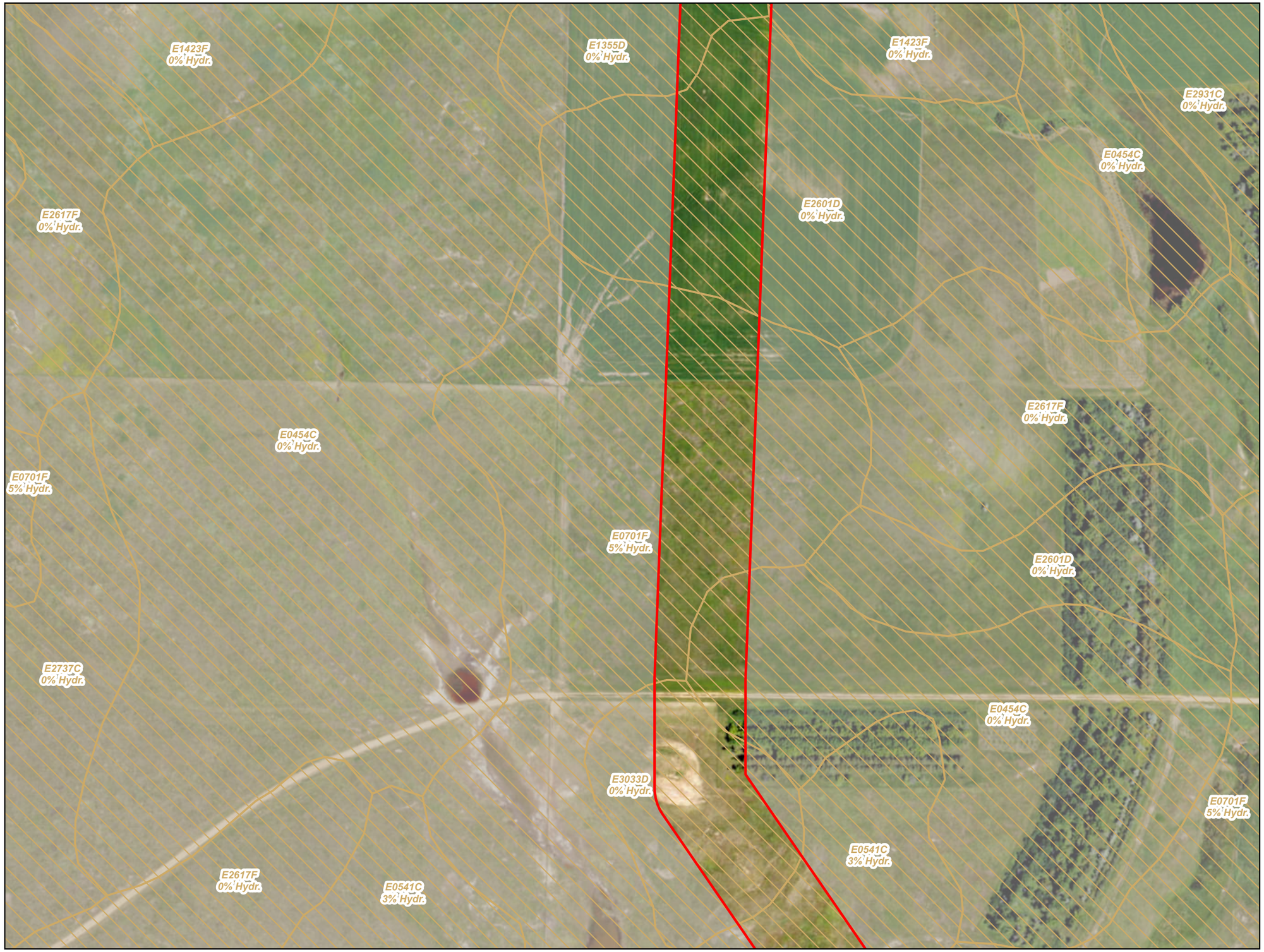

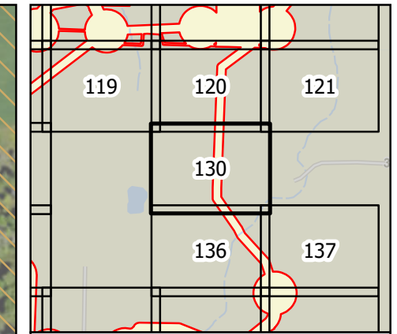

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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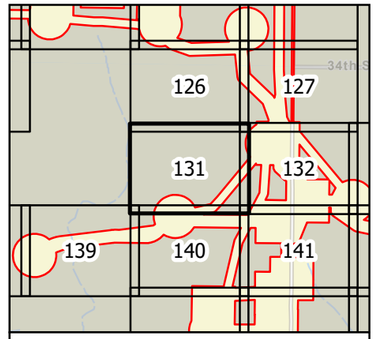

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- Survey Area
- Hydric Soil
- Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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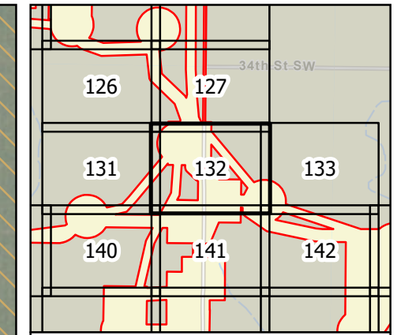

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
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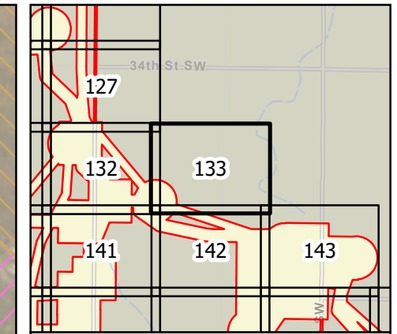

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
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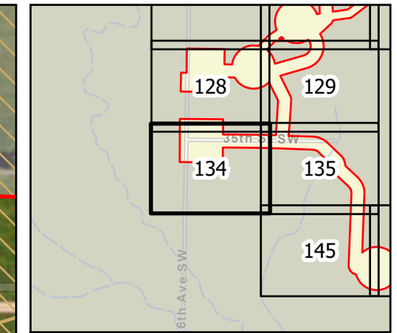

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Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
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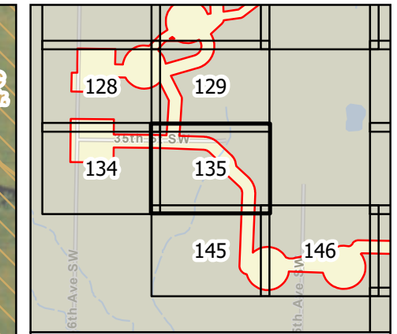

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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Mercer & Morton Counties,
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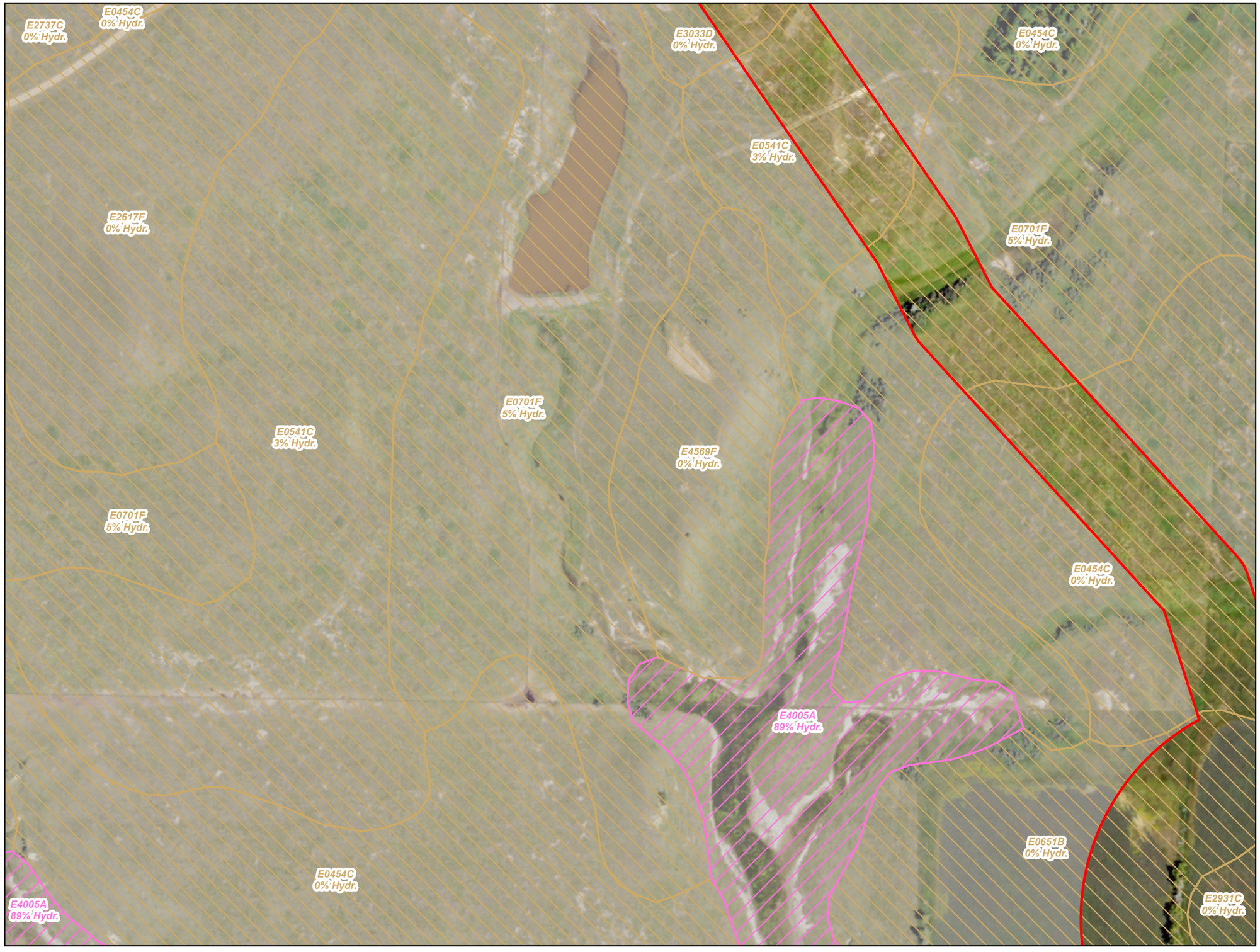

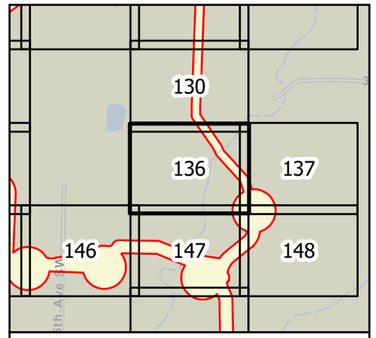

Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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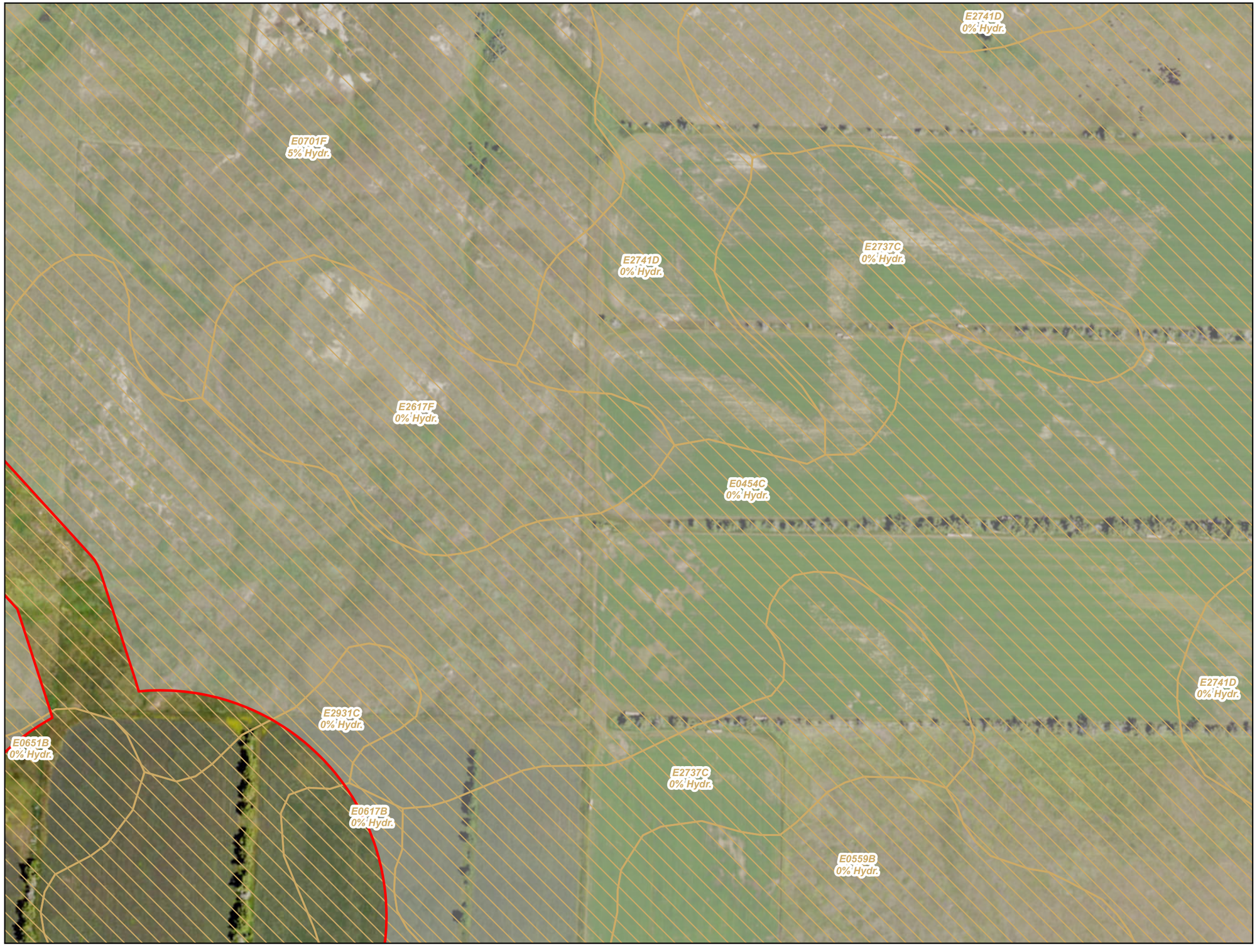

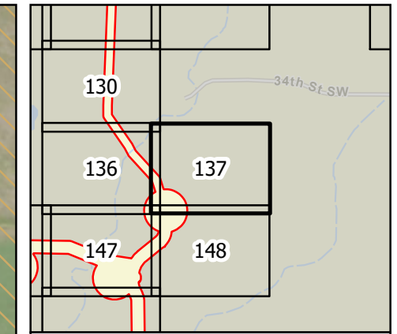

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
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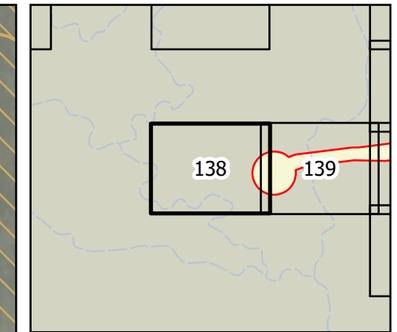

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
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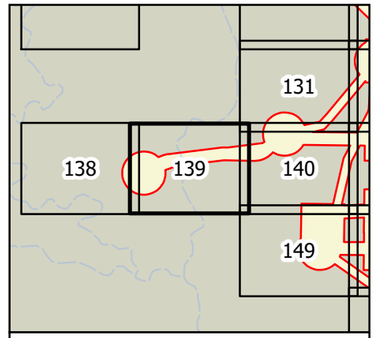

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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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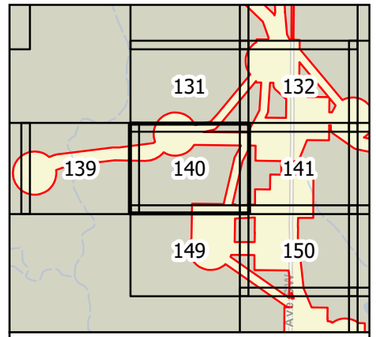

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- Survey Area
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- Non-Hydric Soil

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Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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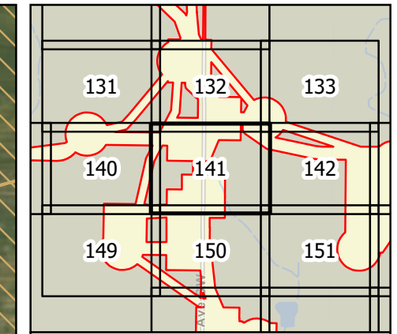

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
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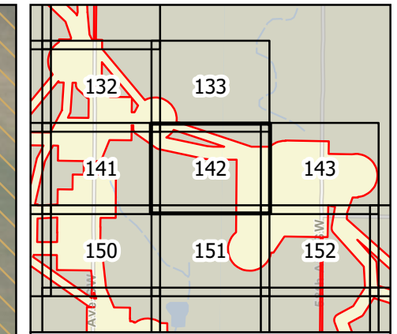

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
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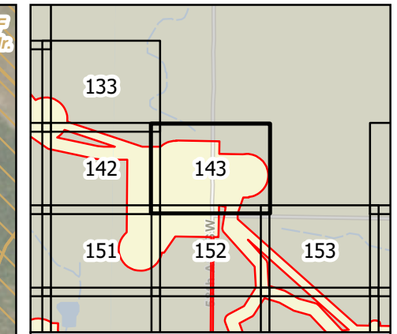

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
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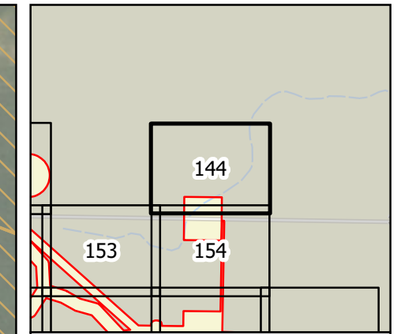

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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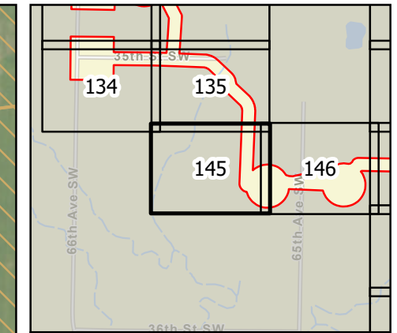

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Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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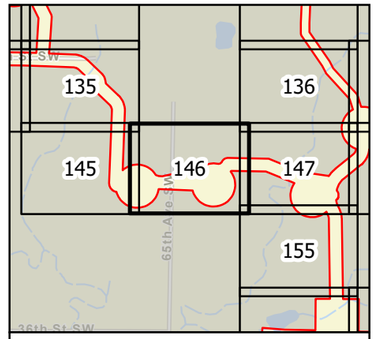

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- Survey Area
- Hydric Soil
- Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties, North Dakota

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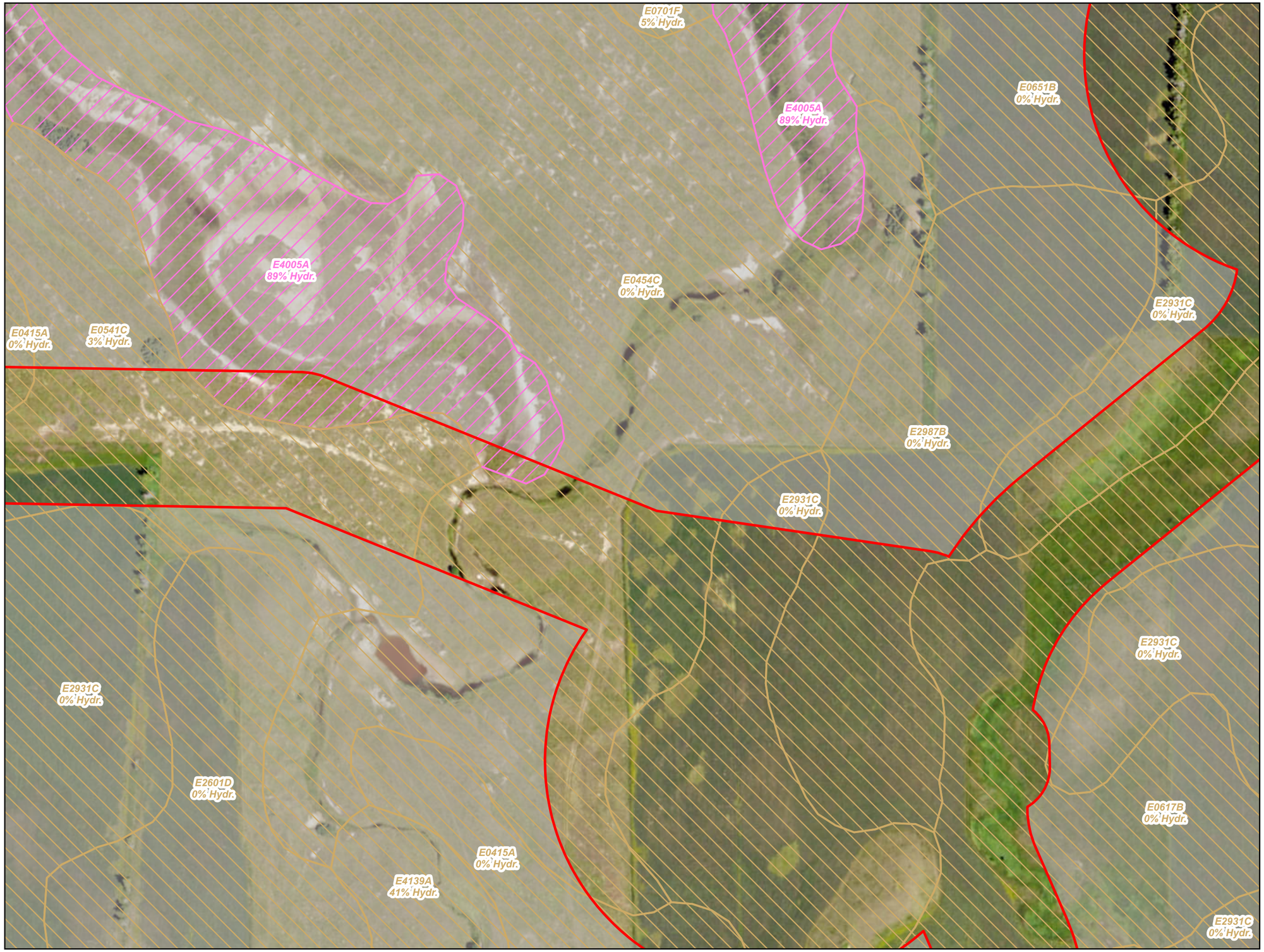

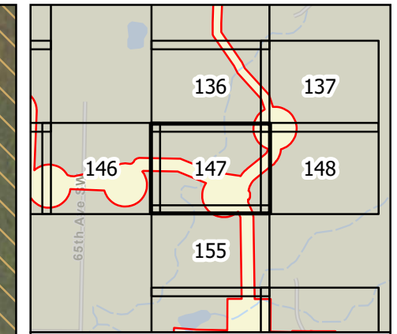

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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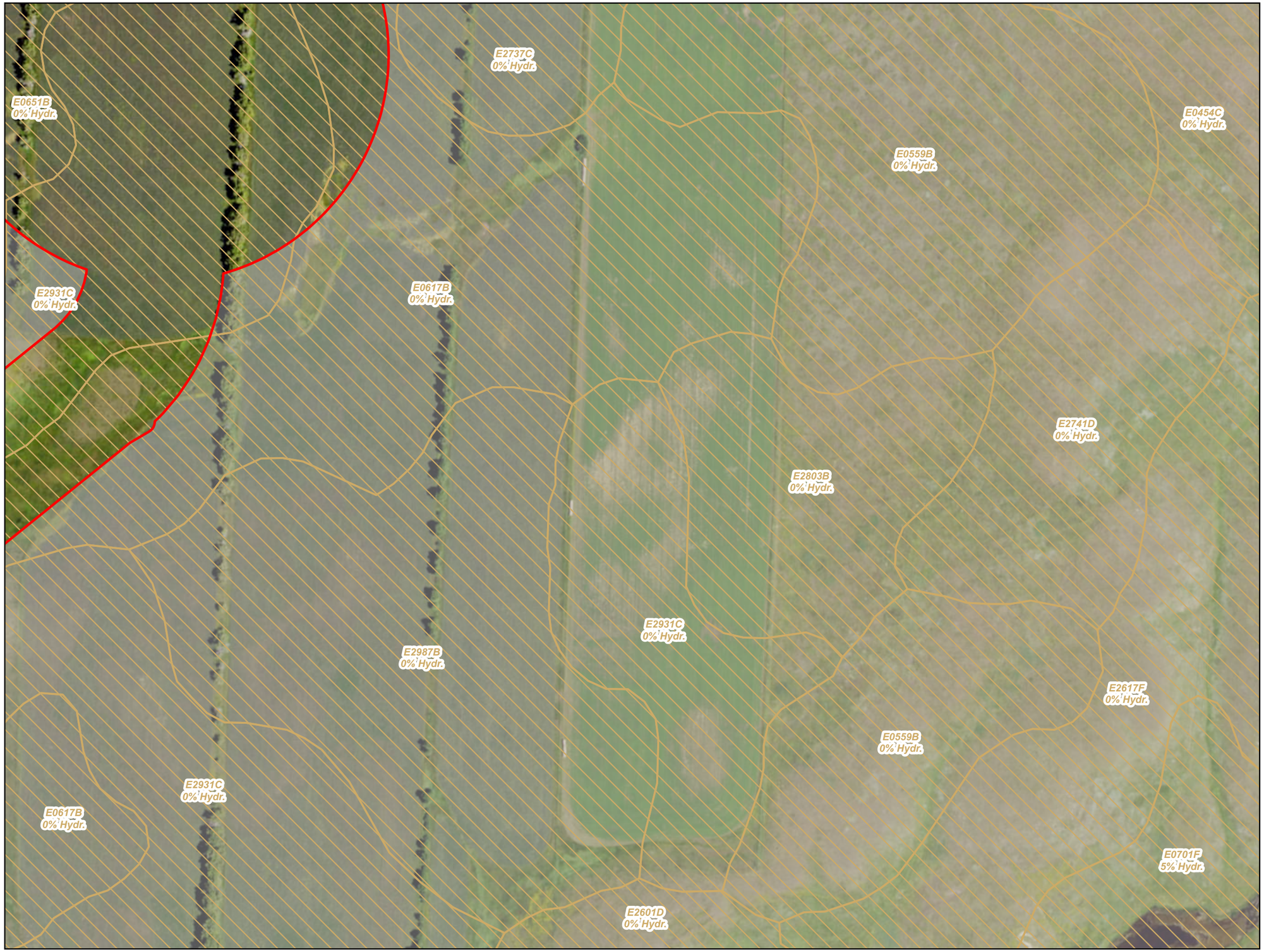

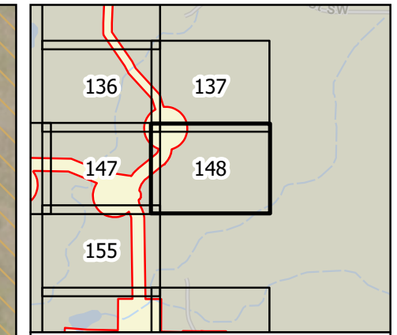

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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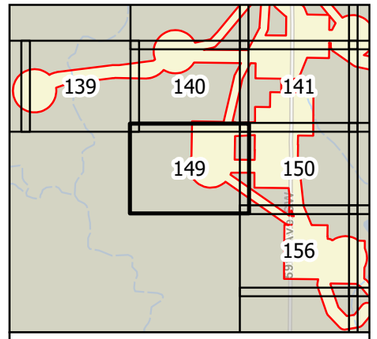

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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties, North Dakota

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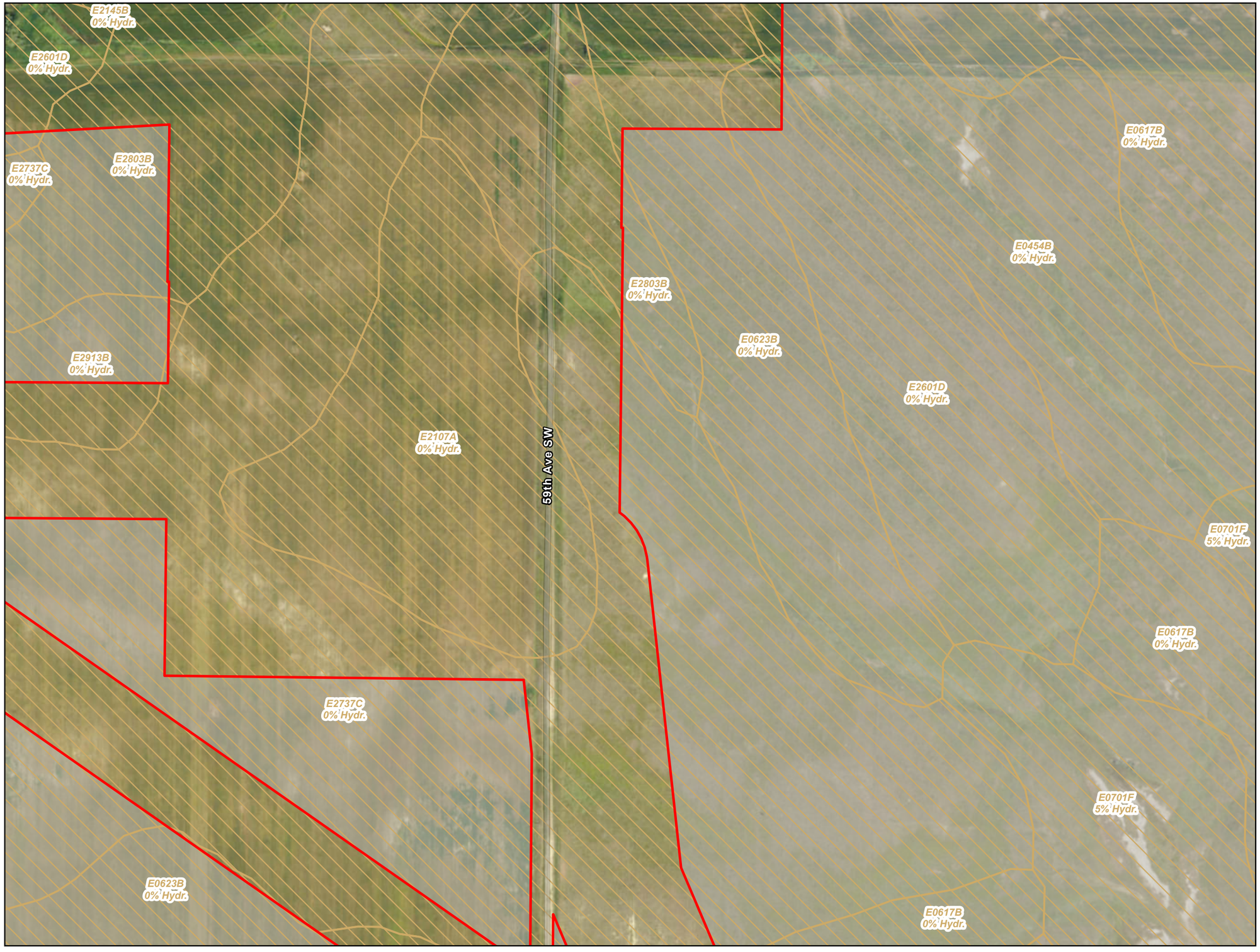

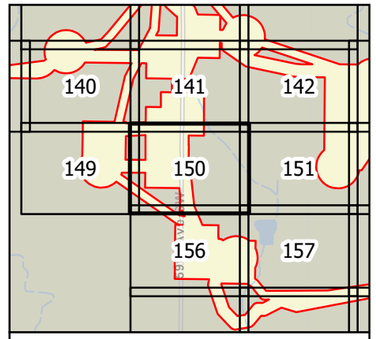

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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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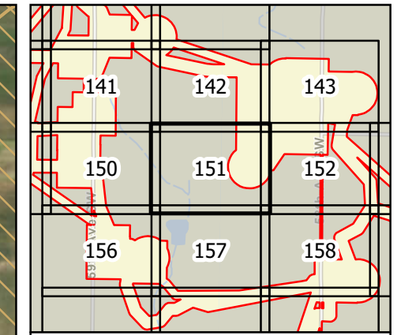

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N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
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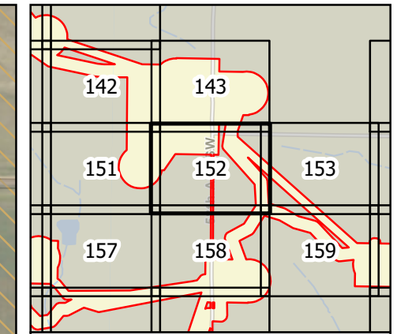

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Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
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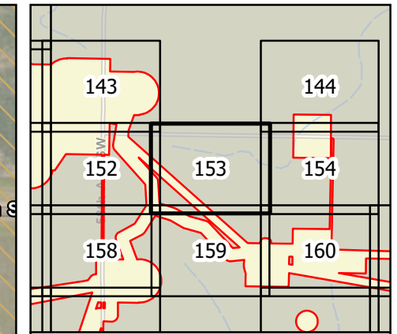

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Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
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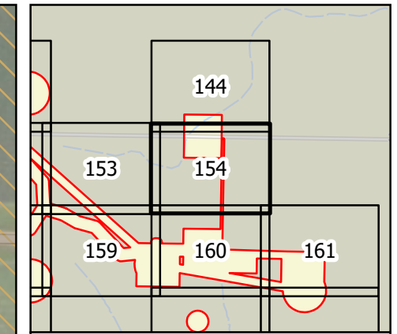

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Survey Area

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Non-Hydric Soil

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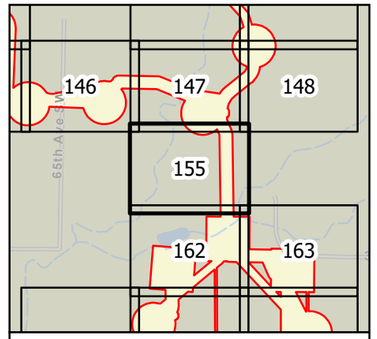

0 100 200 Feet

1 inch = 200 feet

N
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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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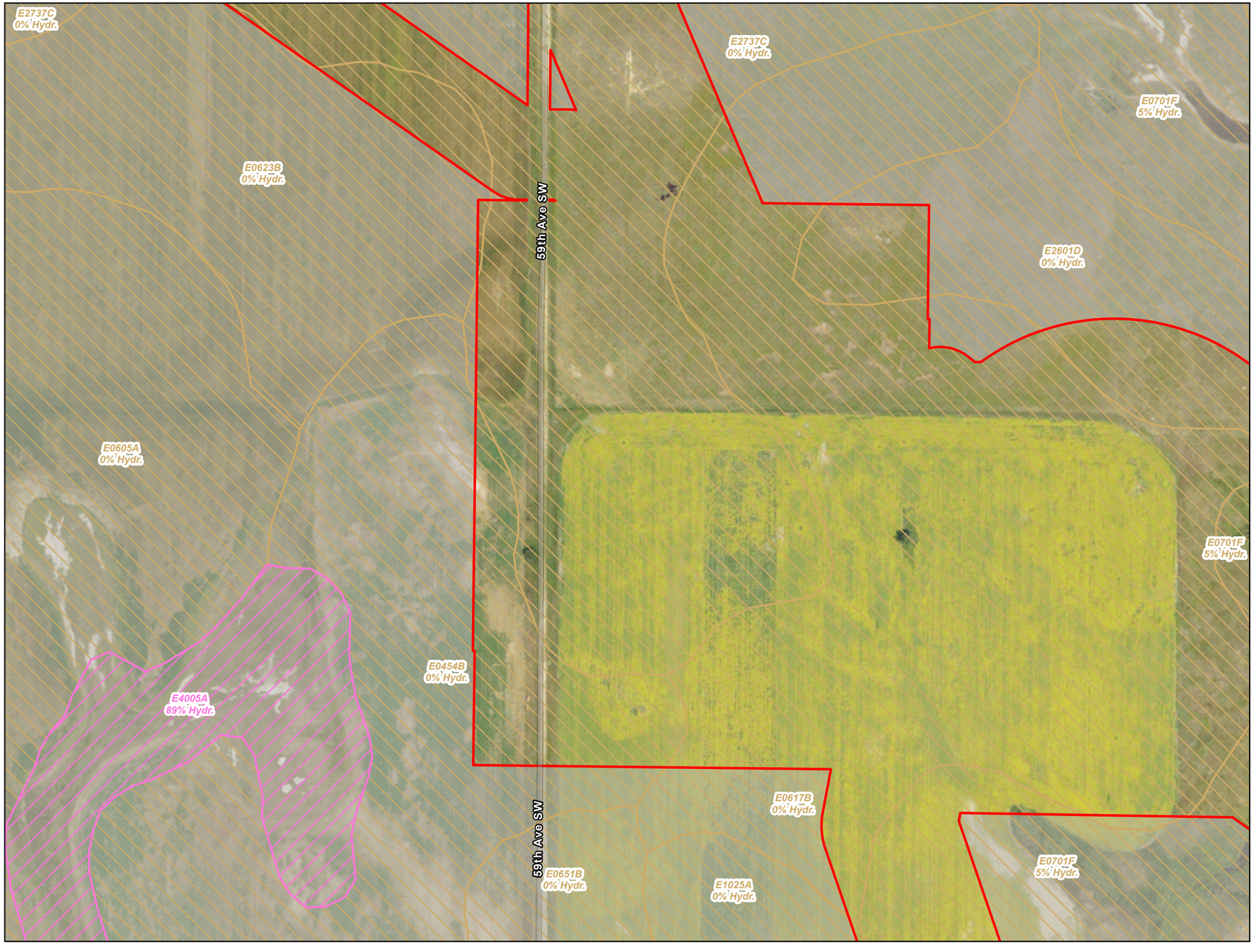

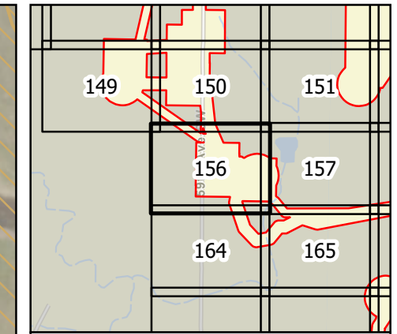

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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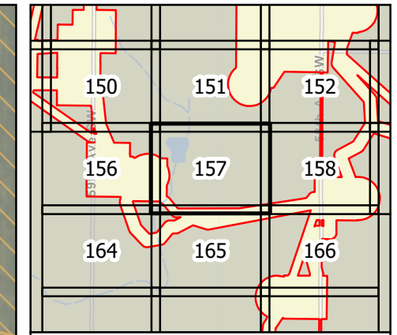

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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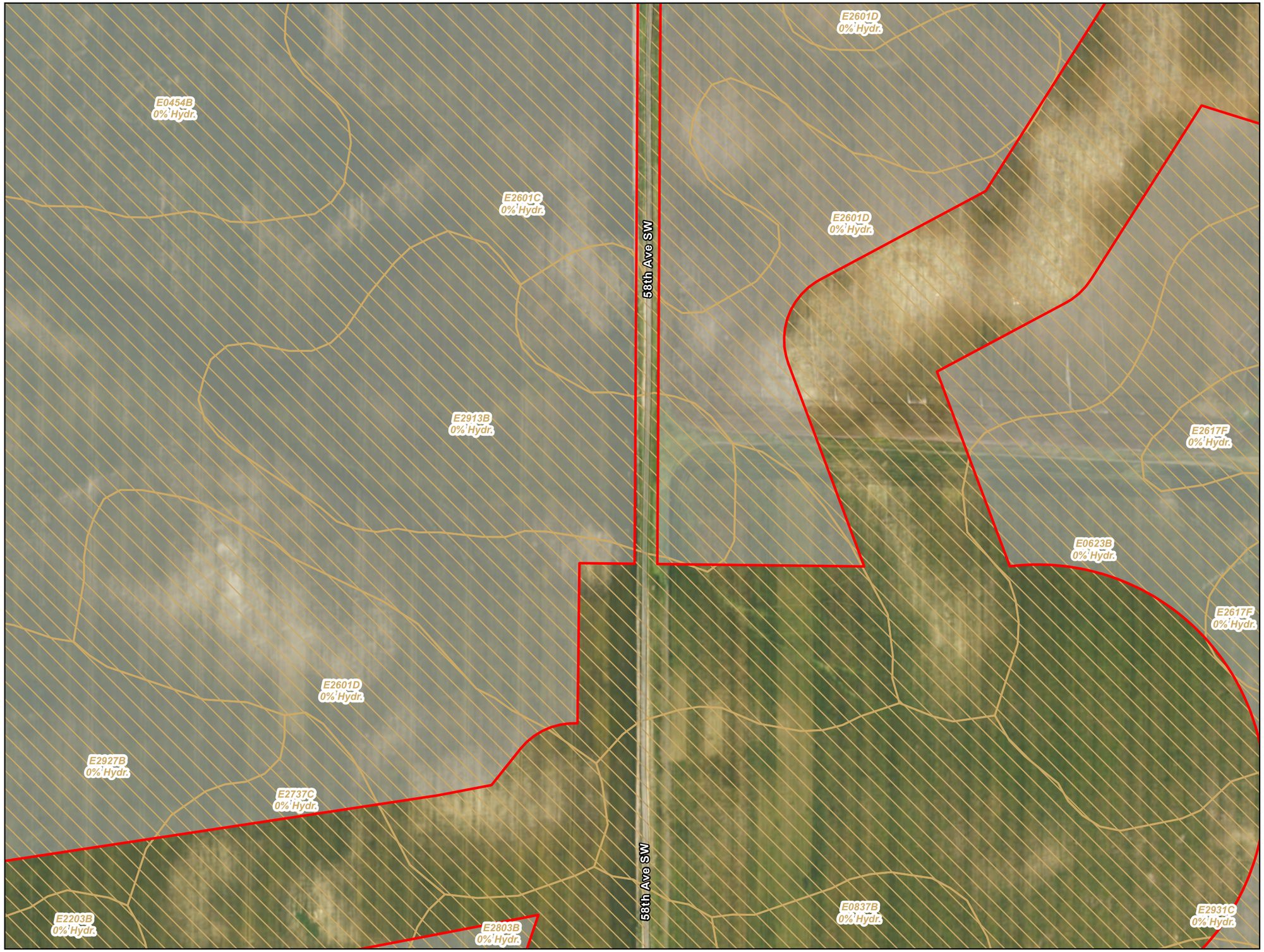

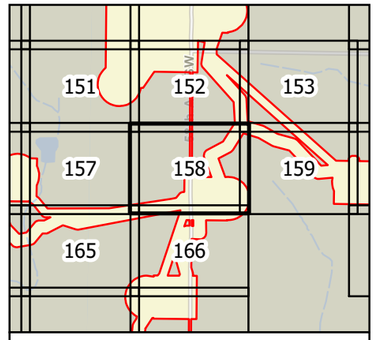

0 100 200 Feet

1 inch = 200 feet

N
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- Survey Area
- Hydric Soil
- Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties, North Dakota

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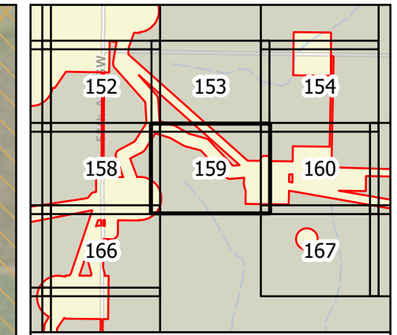

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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Mercer & Morton Counties,
North Dakota

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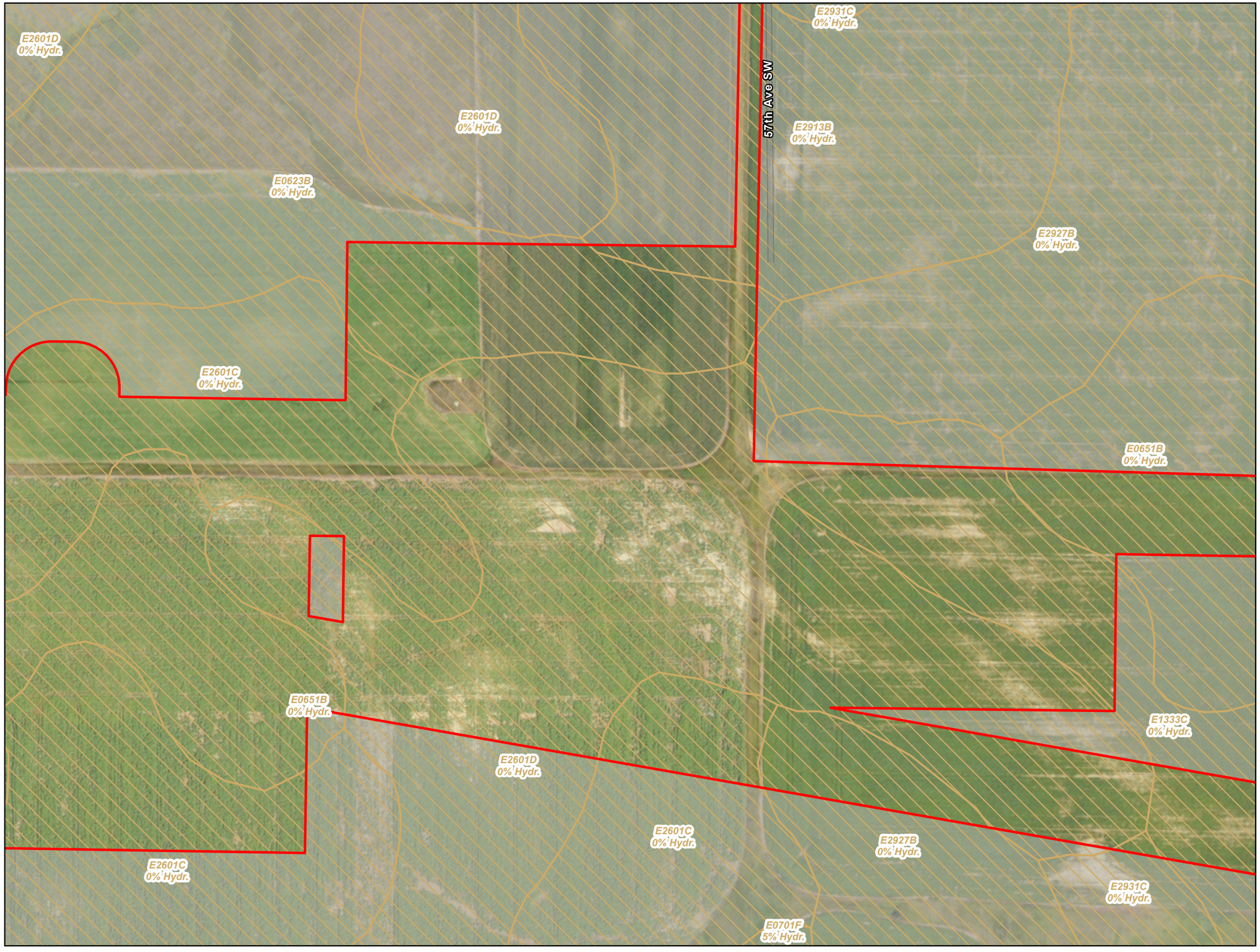

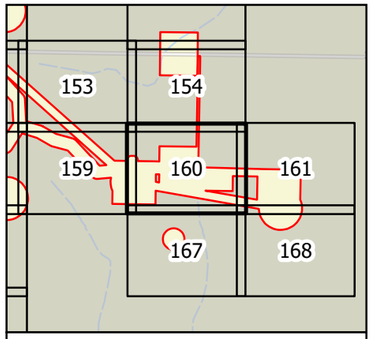

0 100 200 Feet

1 inch = 200 feet

N
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- Survey Area
- Hydric Soil
- Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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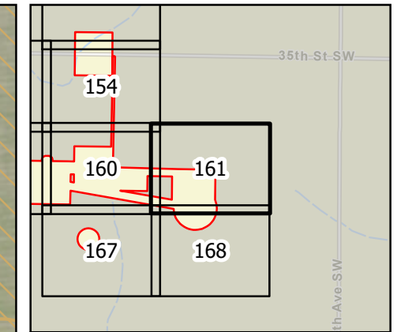

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
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Mercer & Morton Counties,
North Dakota

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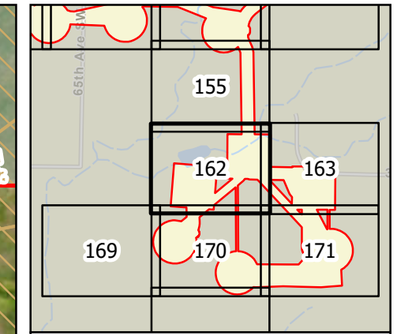

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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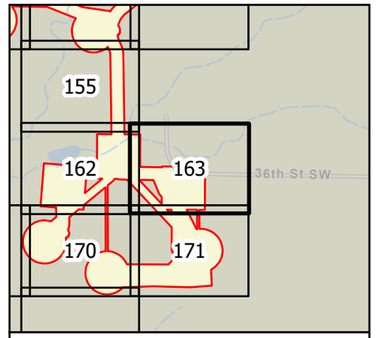

0 100 200 Feet

1 inch = 200 feet

N
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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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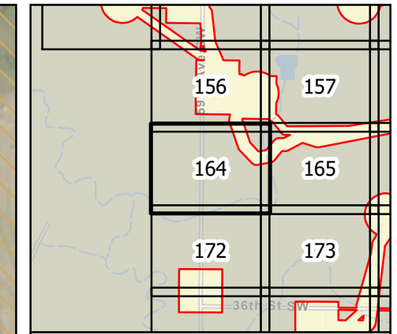

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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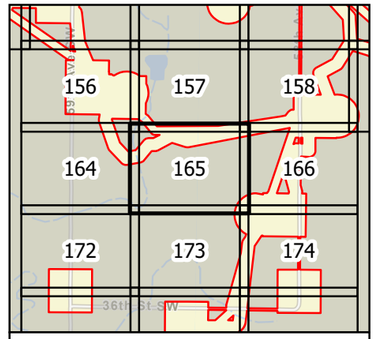

0 100 200 Feet

1 inch = 200 feet

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- Survey Area
- Hydric Soil
- Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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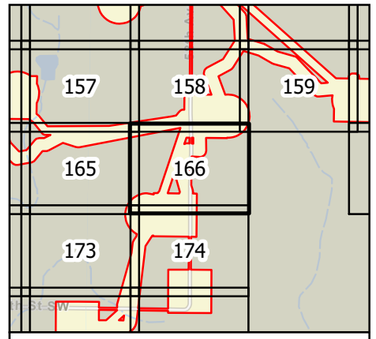

0 100 200 Feet

1 inch = 200 feet

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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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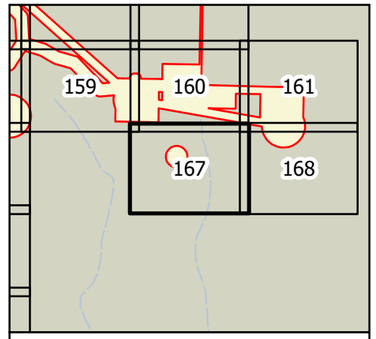

0 100 200 Feet

1 inch = 200 feet

N
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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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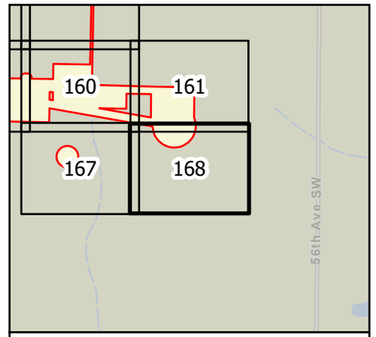

0 100 200 Feet

1 inch = 200 feet

N
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Survey Area
Hydric Soil
Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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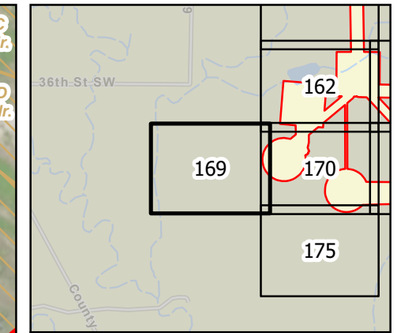

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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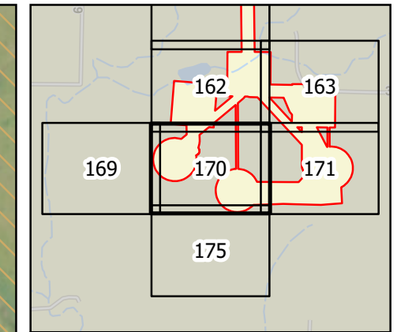

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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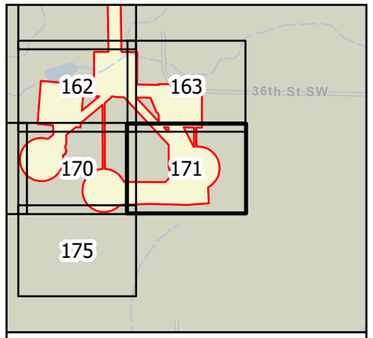

0 100 200 Feet

1 inch = 200 feet

N
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- Survey Area
- Hydric Soil
- Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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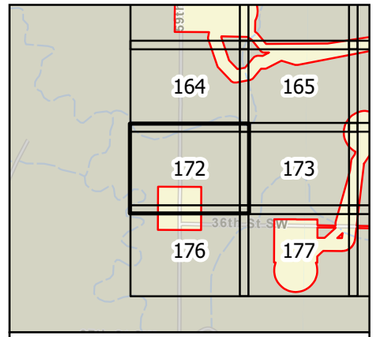

0 100 200 Feet

1 inch = 200 feet

N
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- Survey Area
- Hydric Soil
- Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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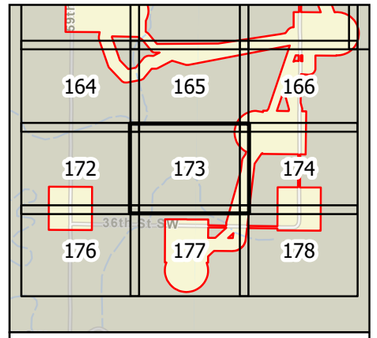

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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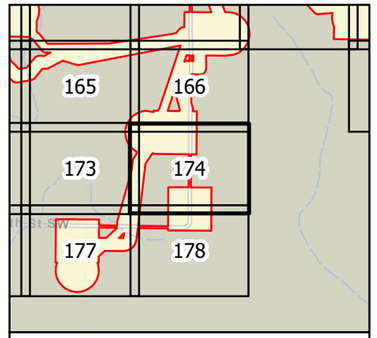

0 100 200 Feet

1 inch = 200 feet

N
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S

- Survey Area
- Hydric Soil
- Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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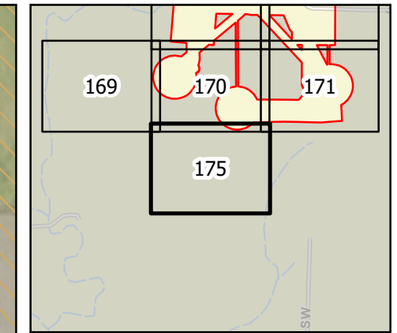

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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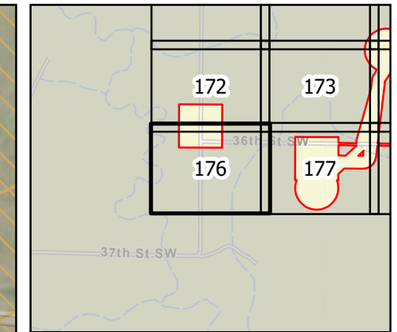

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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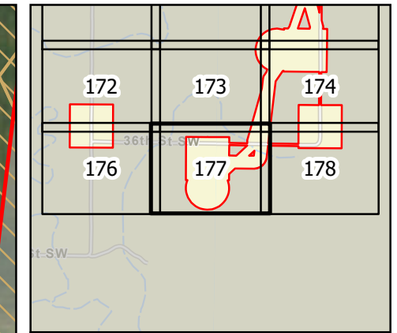

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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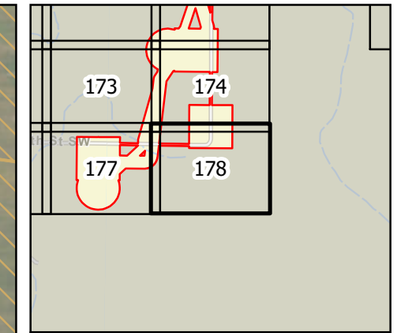

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Hydric Soil

Non-Hydric Soil

Figure 3
Soil Units (SSURGO)
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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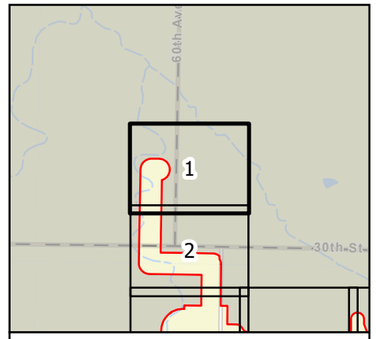
Figure 4

Hydrology





0 100 200 Feet

1 inch = 200 feet

N
W E
S

- Survey Area
- Wetland (NWI)
- Waterway (NHD)
- Waterbody (NHD)

Figure 4
Hydrology
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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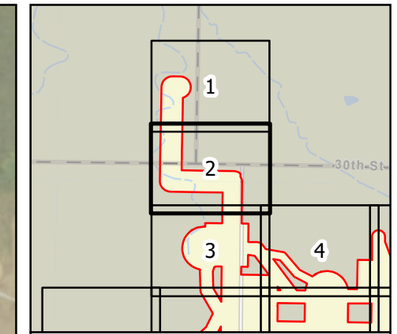

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area
Wetland (NWI)
Waterway (NHD)
Waterbody (NHD)

Figure 4
Hydrology
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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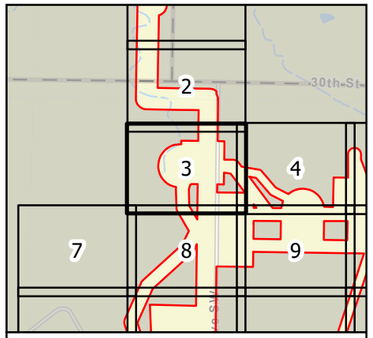

0 100 200 Feet

1 inch = 200 feet

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- Survey Area
- Wetland (NWI)
- Waterway (NHD)
- Waterbody (NHD)

Figure 4
Hydrology
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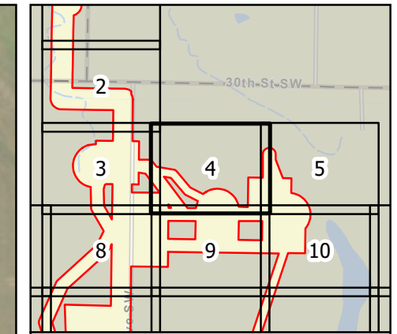

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N W E S

Survey Area
Wetland (NWI)
Waterway (NHD)
Waterbody (NHD)

Figure 4
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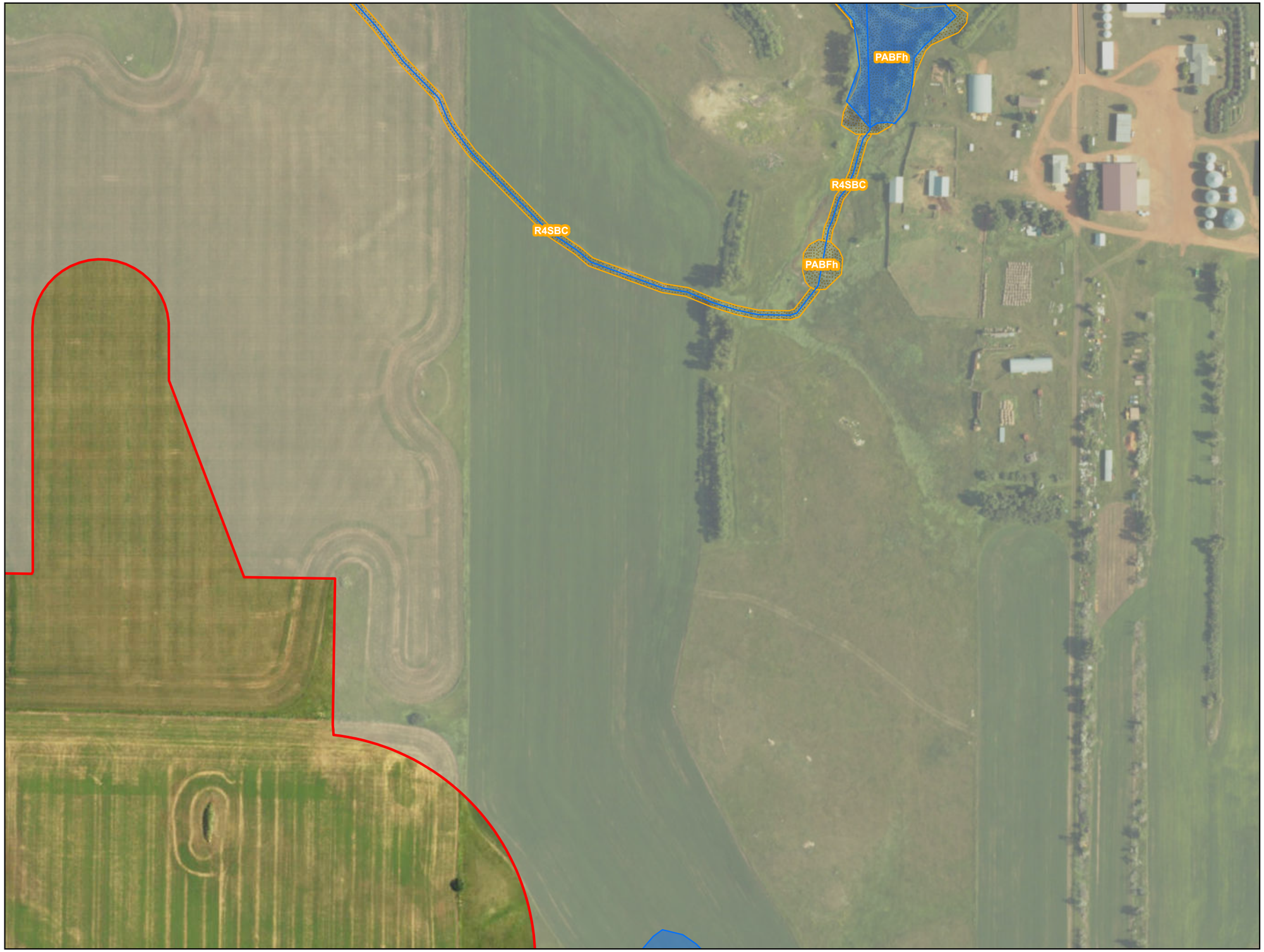

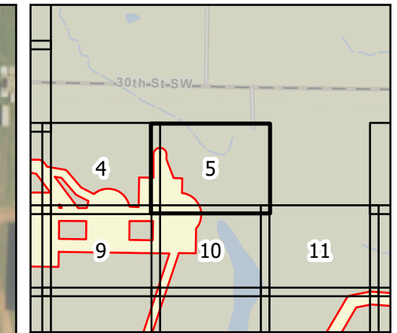

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N W E S

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Wetland (NWI)
Waterway (NHD)
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Figure 4
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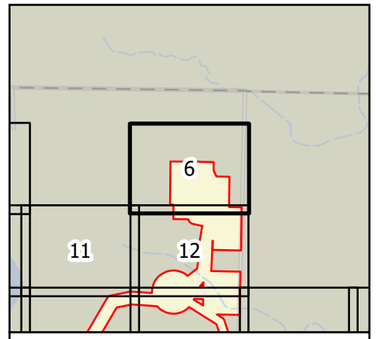

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Figure 4
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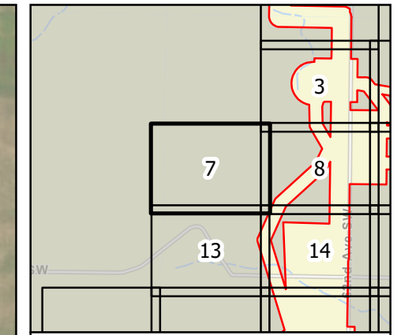

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Survey Area
Wetland (NWI)
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Figure 4
Hydrology
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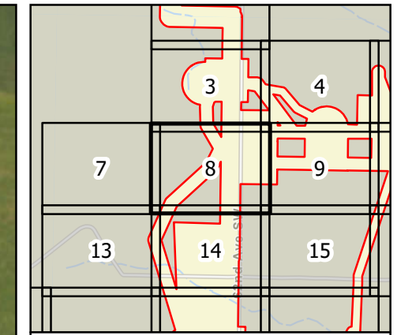

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Figure 4
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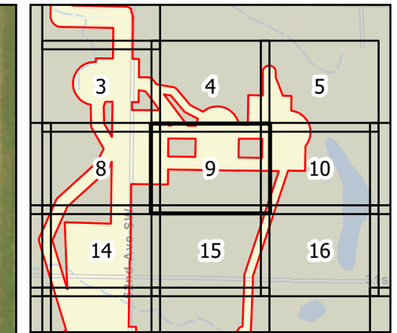

Survey Area
Wetland (NWI)
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Waterbody (NHD)

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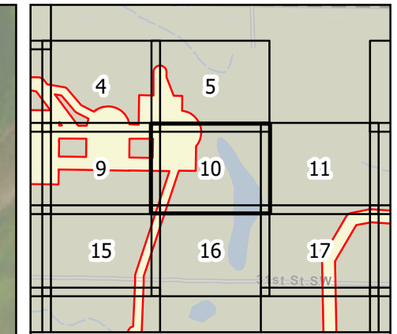

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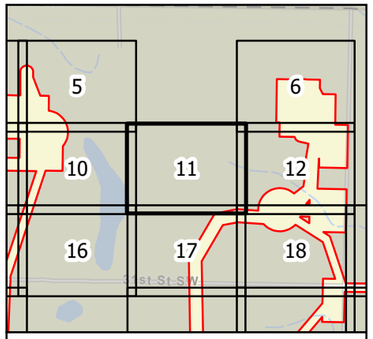

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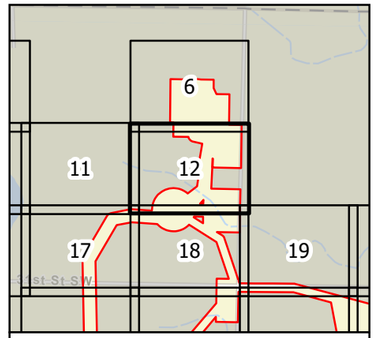

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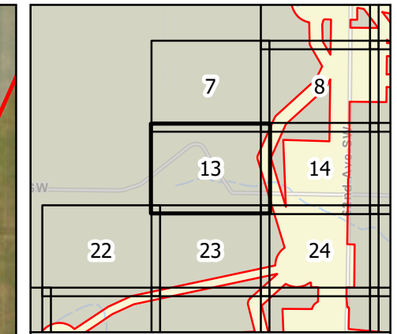

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Survey Area
Wetland (NWI)
Waterway (NHD)
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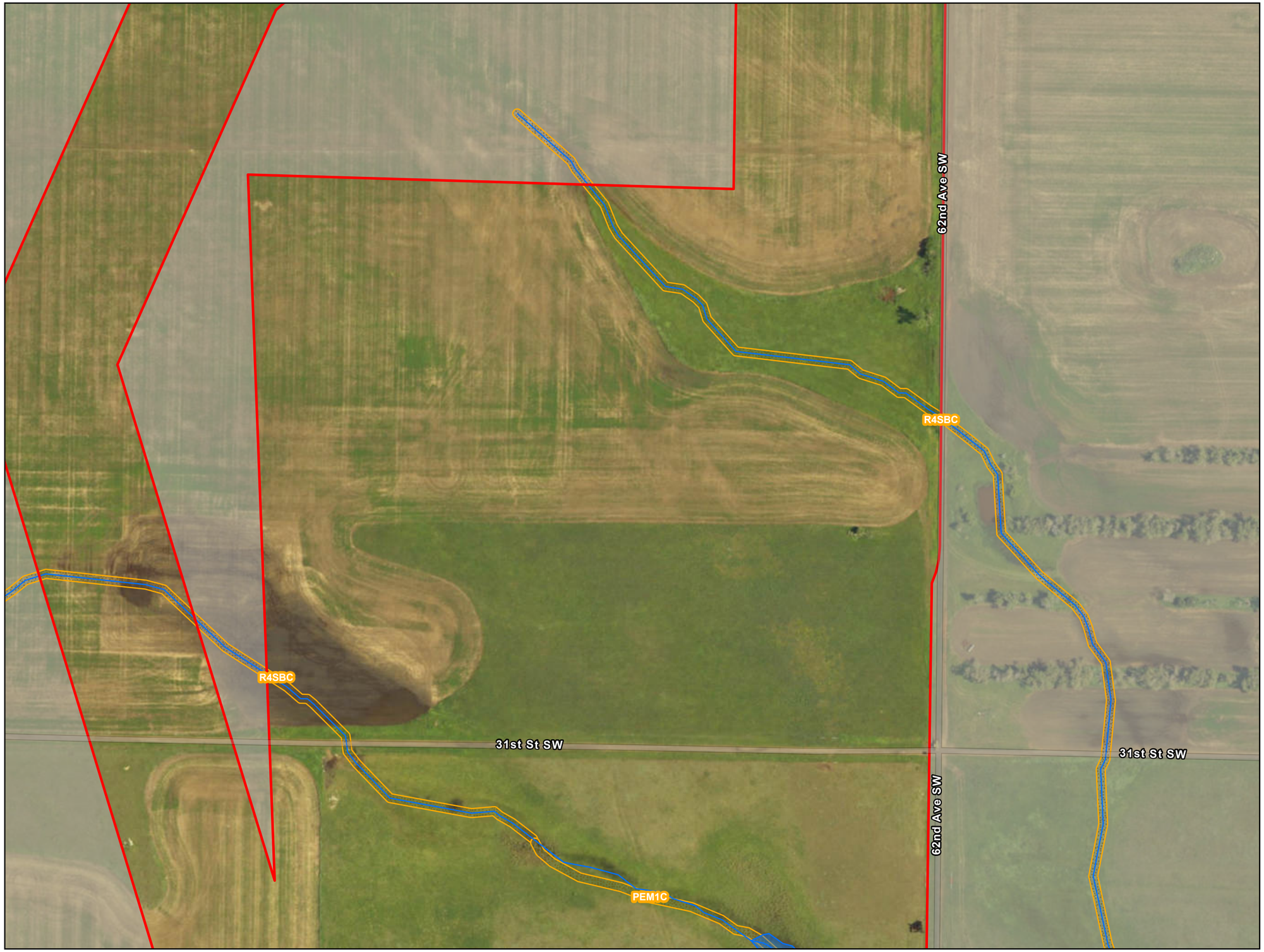

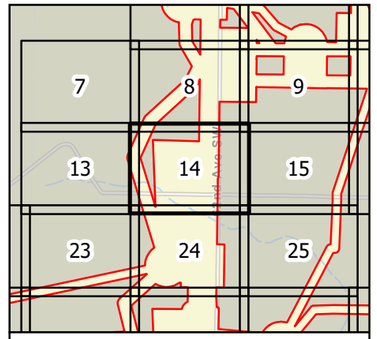

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Figure 4
Hydrology
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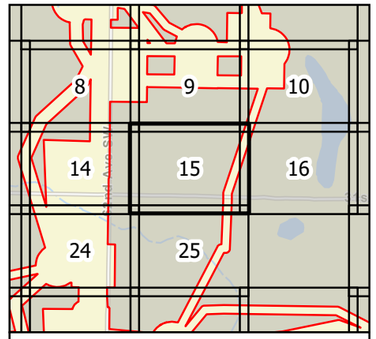

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Wetland (NWI)
Waterway (NHD)
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Figure 4
Hydrology
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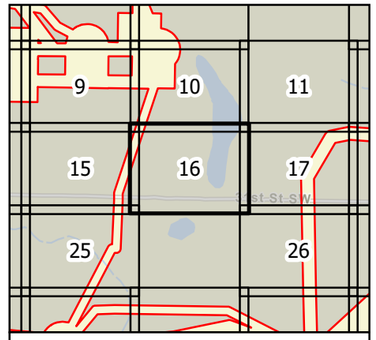

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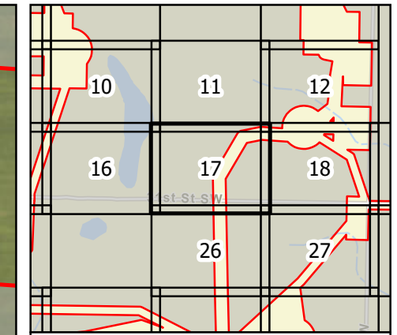

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Wetland (NWI)
Waterway (NHD)
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Figure 4
Hydrology
Longspur Wind Project
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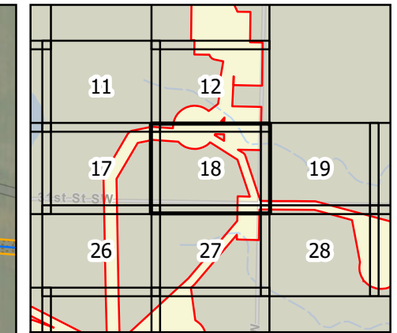

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Survey Area
Wetland (NWI)
Waterway (NHD)
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Figure 4
Hydrology
Longspur Wind Project
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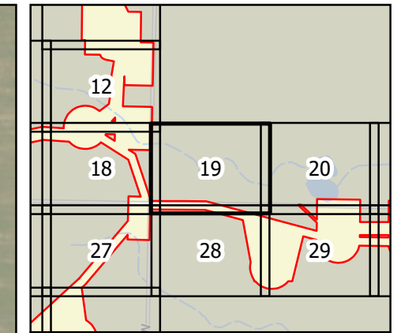

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Hydrology
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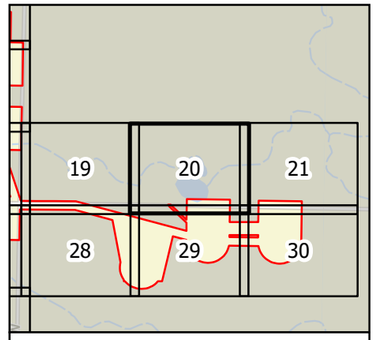

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Hydrology
Longspur Wind Project
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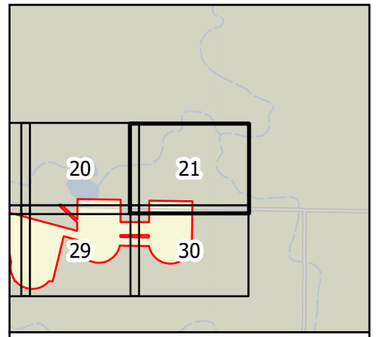

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Figure 4
Hydrology
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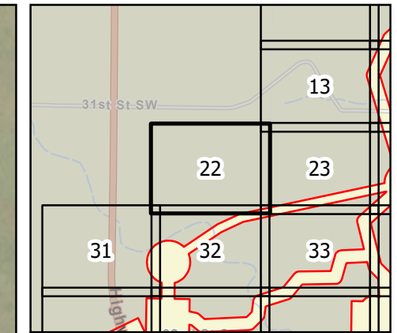

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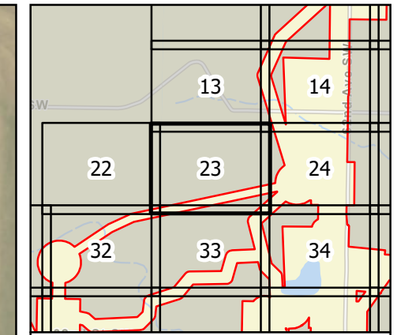

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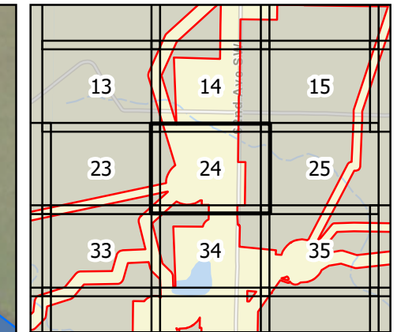

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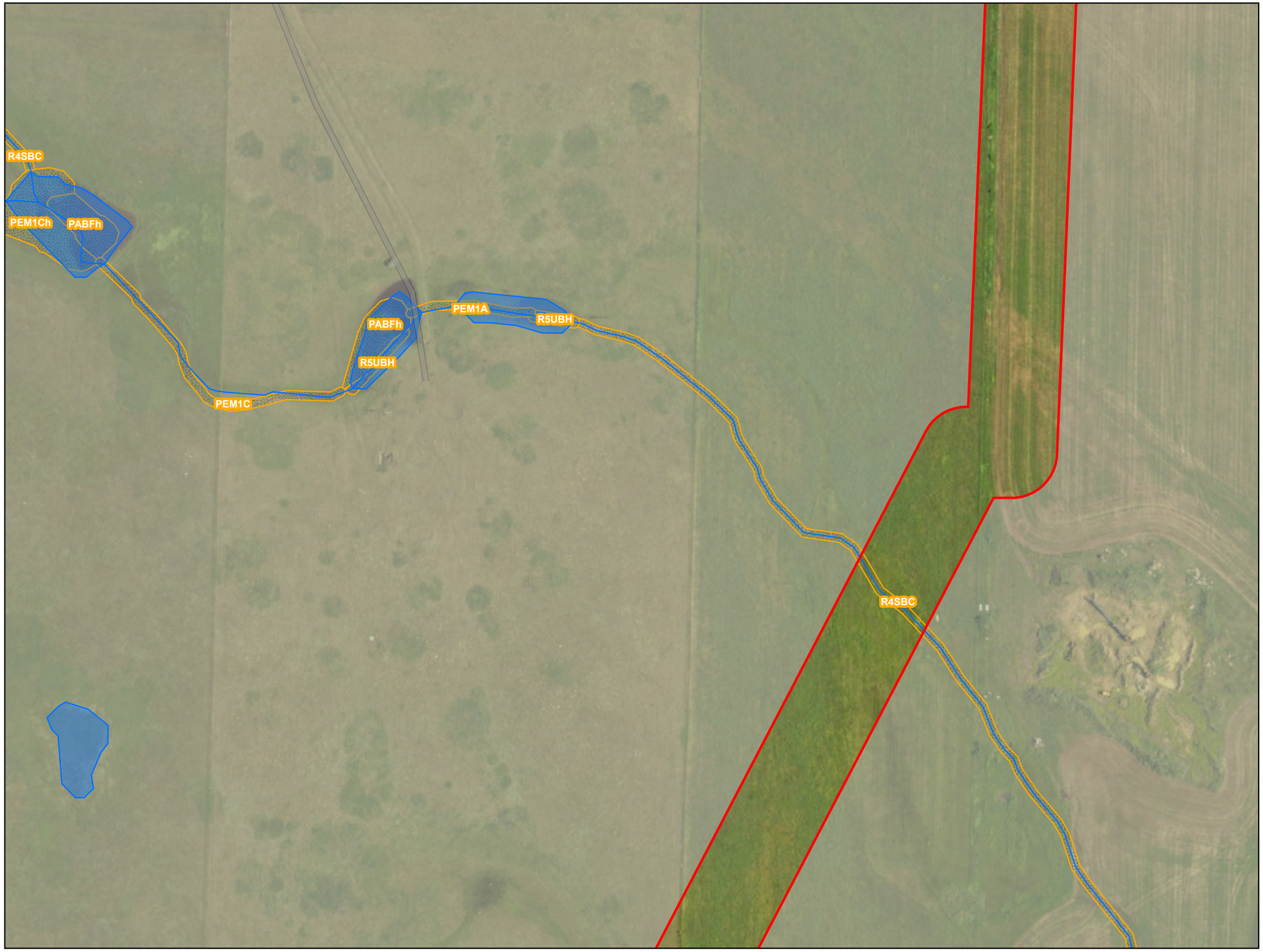

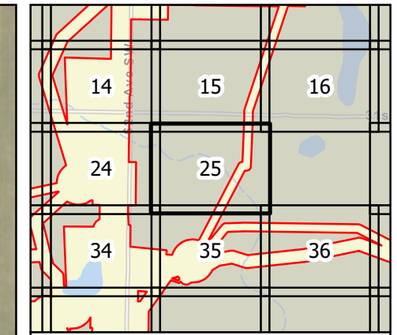

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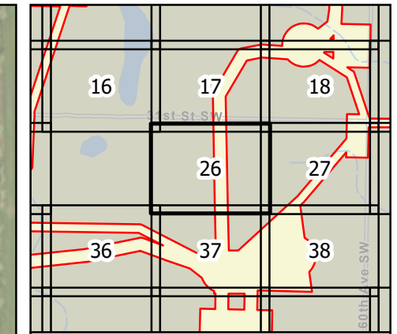

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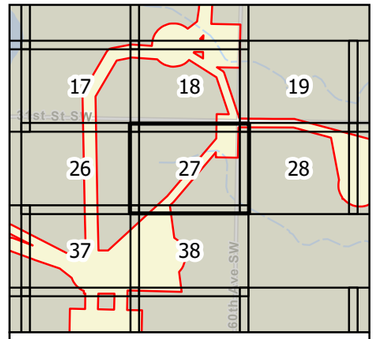

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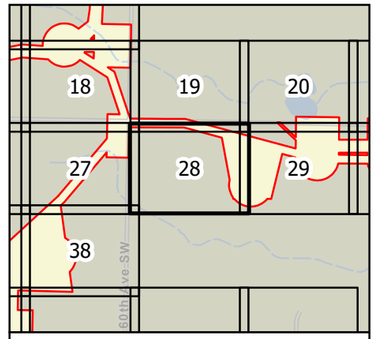

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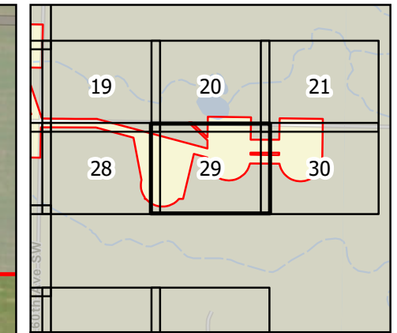

0 100 200 Feet

1 inch = 200 feet

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Survey Area
Wetland (NWI)
Waterway (NHD)
Waterbody (NHD)

Figure 4
Hydrology
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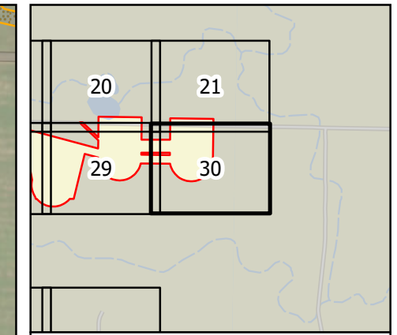

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N W E S

Survey Area
Wetland (NWI)
Waterway (NHD)
Waterbody (NHD)

Figure 4
Hydrology
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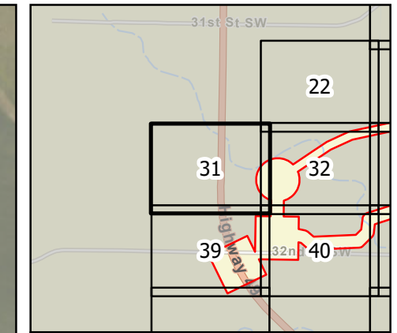

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Wetland (NWI)
Waterway (NHD)
Waterbody (NHD)

Figure 4
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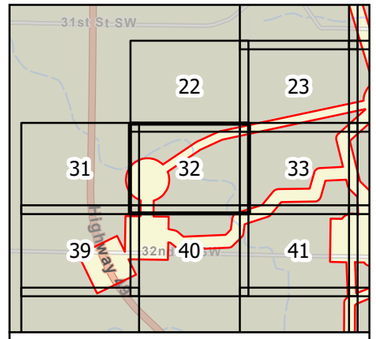

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Figure 4
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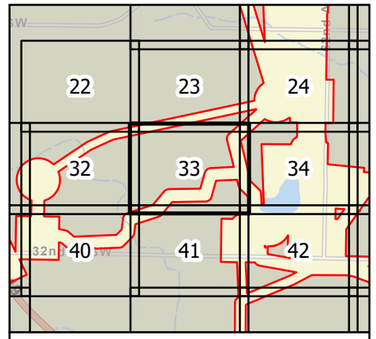

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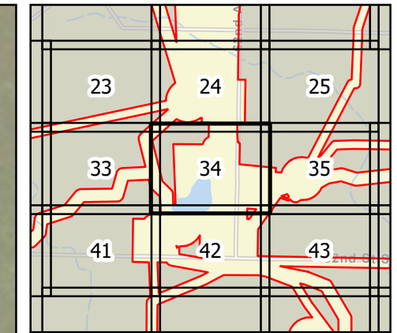

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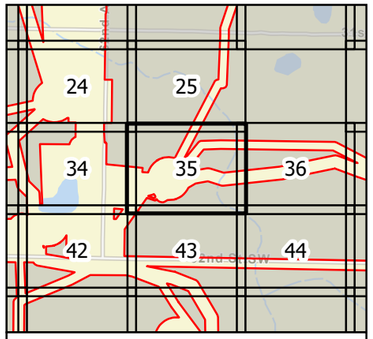

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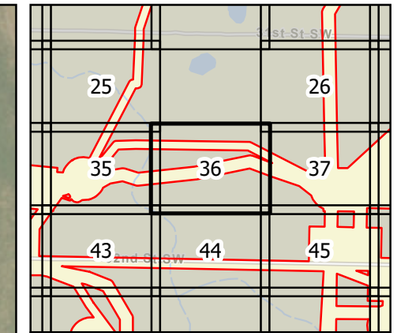

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Wetland (NWI)
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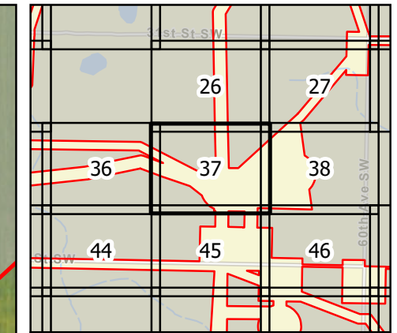

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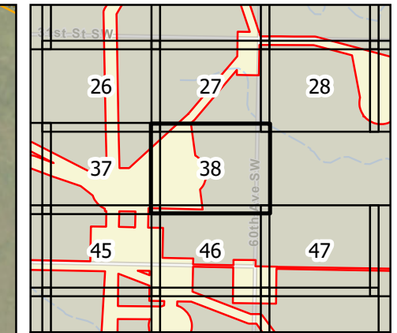

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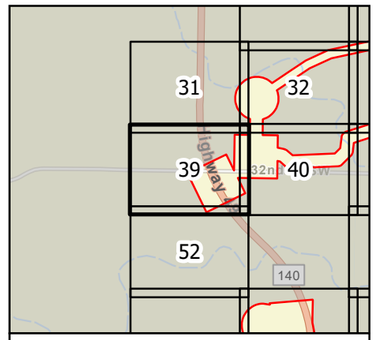

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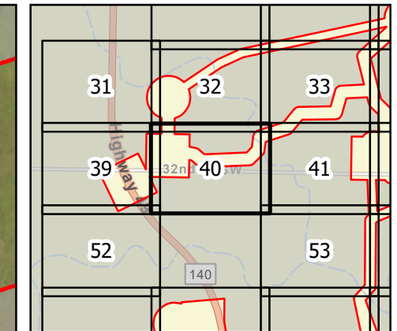

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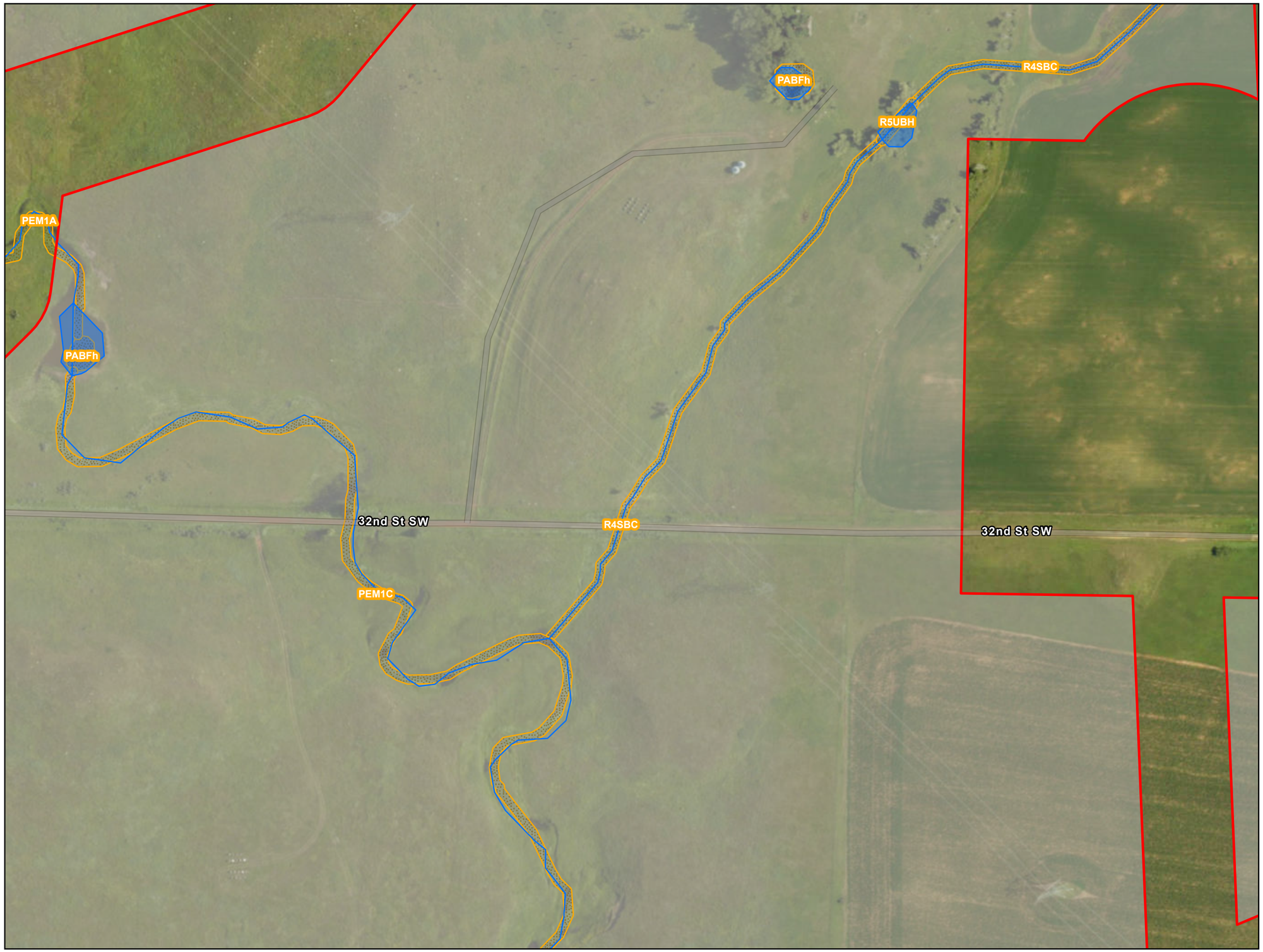

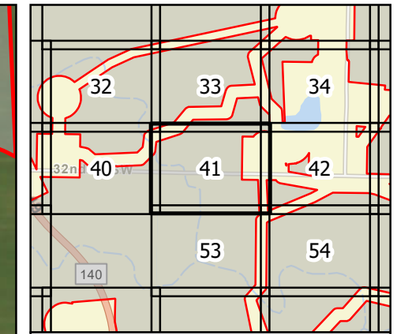

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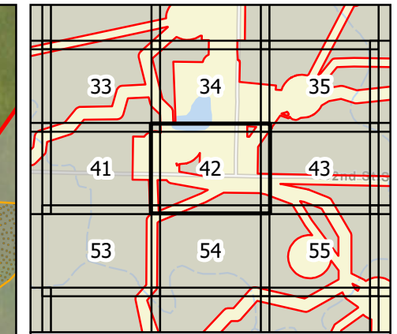

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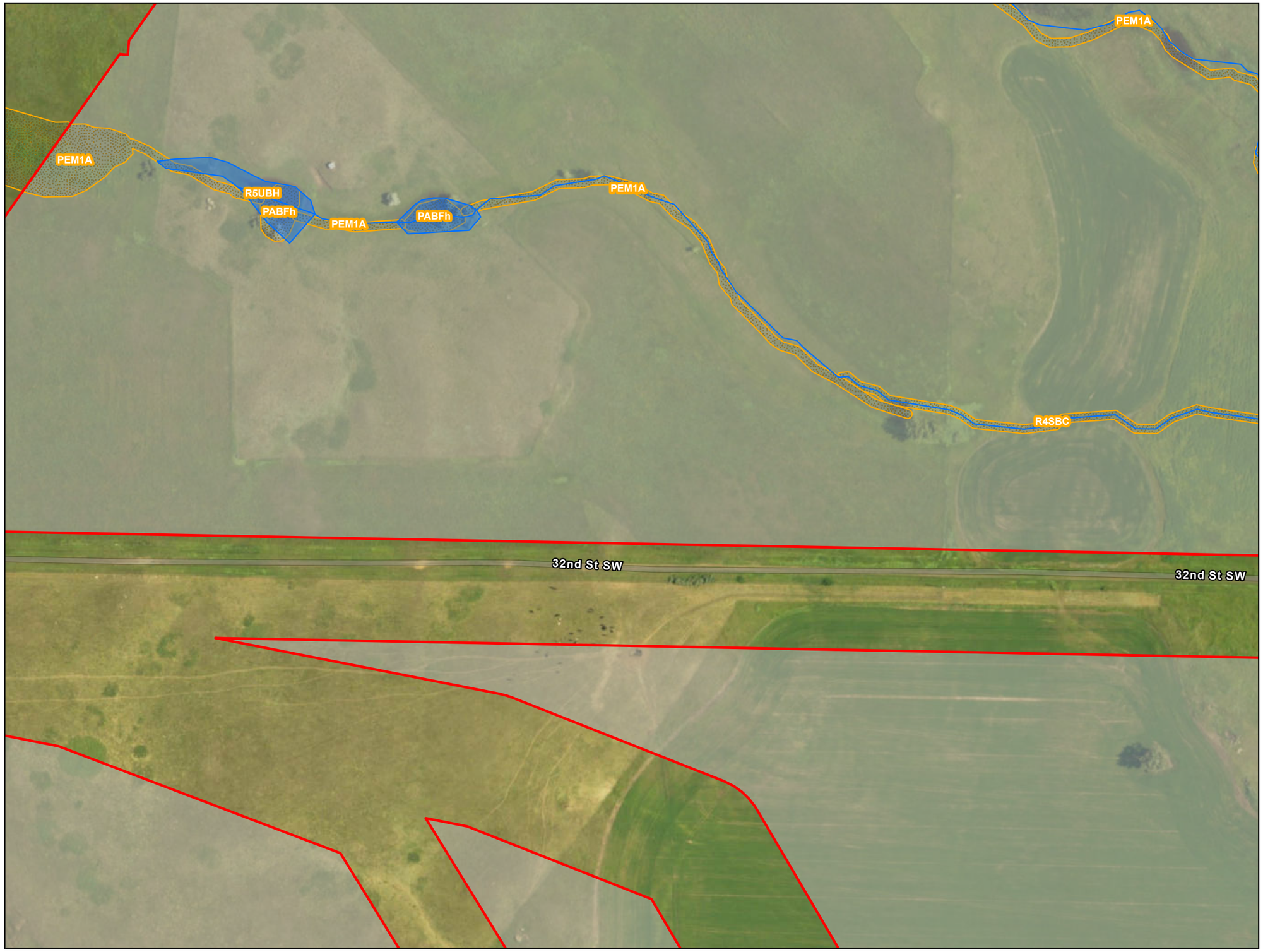

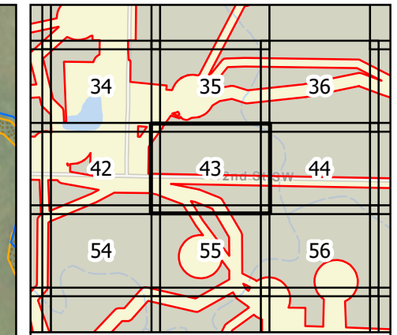

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Wetland (NWI)
Waterway (NHD)
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Figure 4
Hydrology
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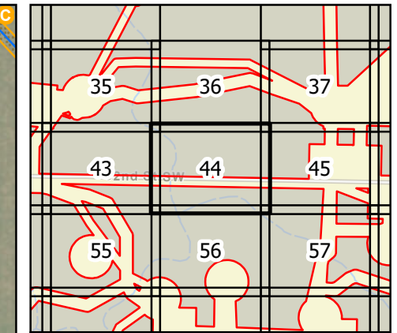

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N W E S

Survey Area
Wetland (NWI)
Waterway (NHD)
Waterbody (NHD)

Figure 4
Hydrology
Longspur Wind Project
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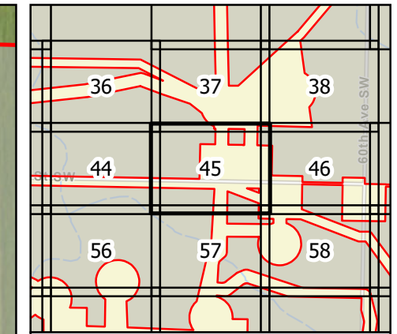

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Waterway (NHD)
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Figure 4
Hydrology
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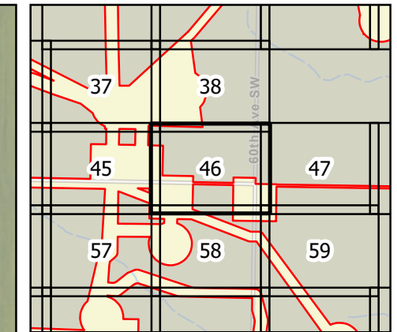

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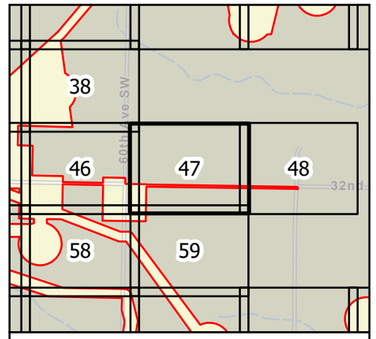

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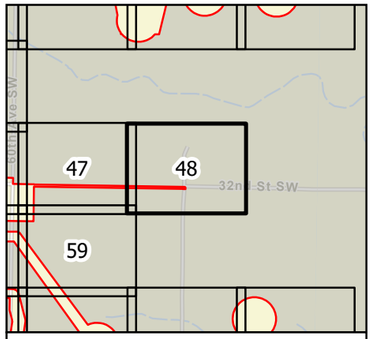

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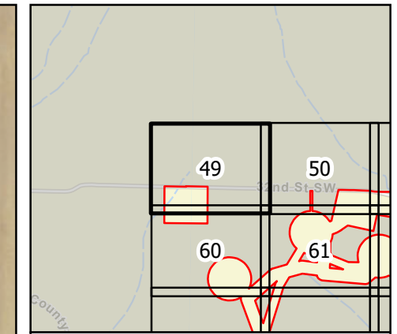

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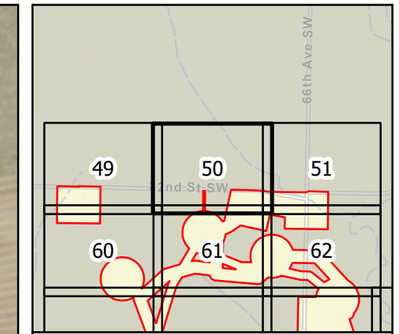

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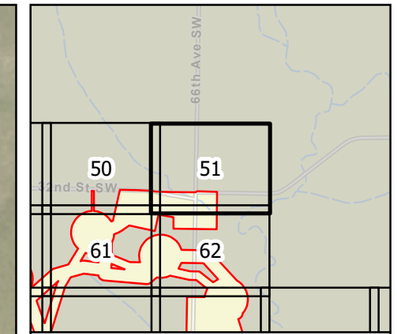

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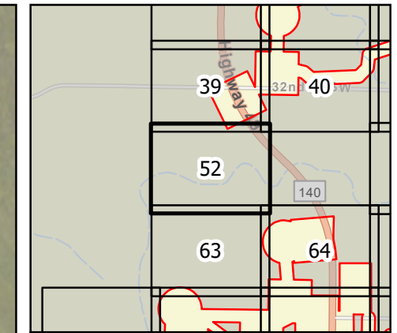

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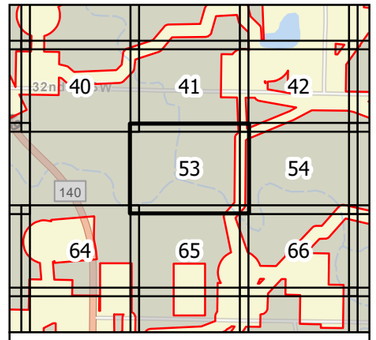

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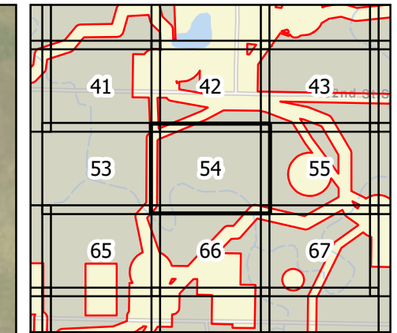

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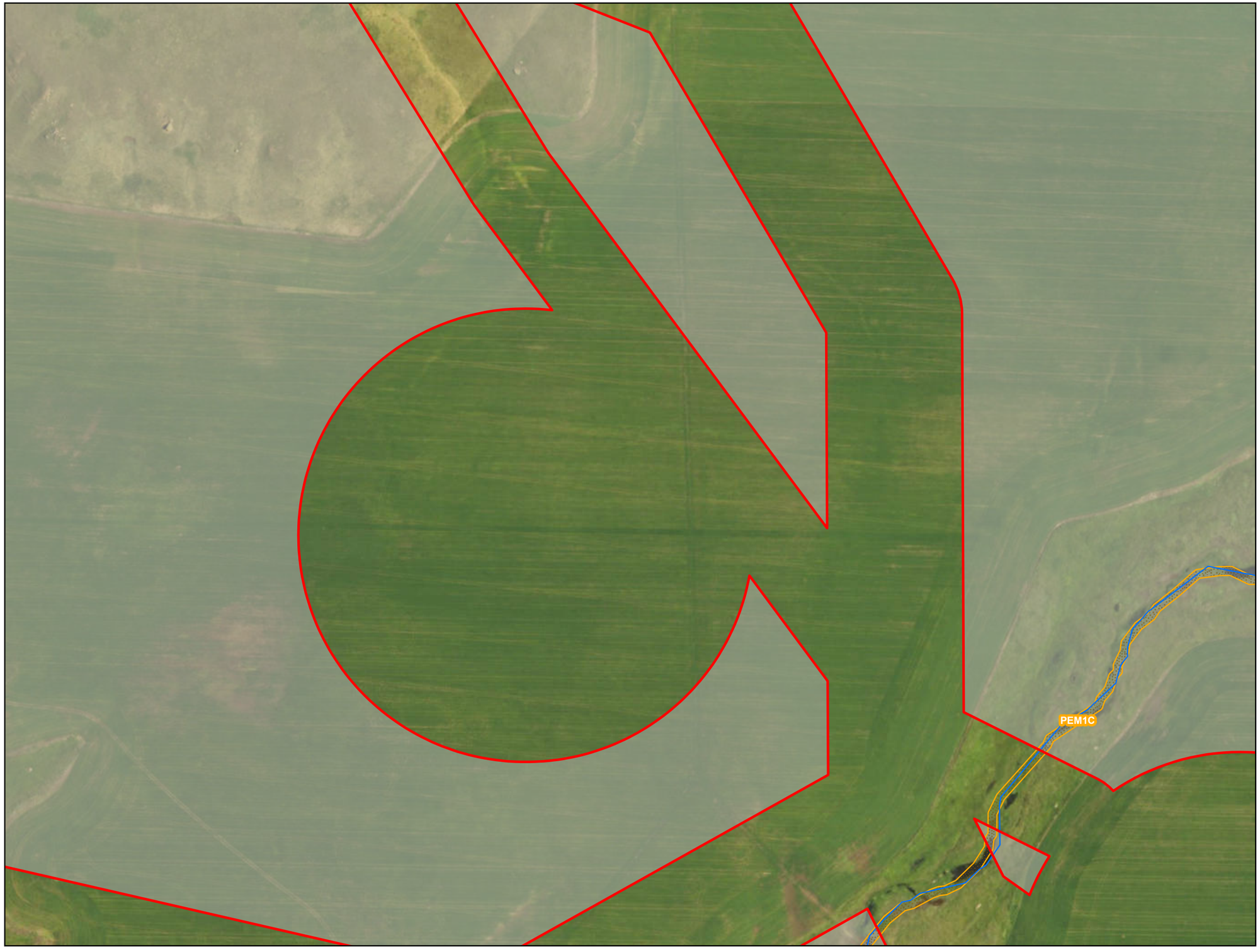

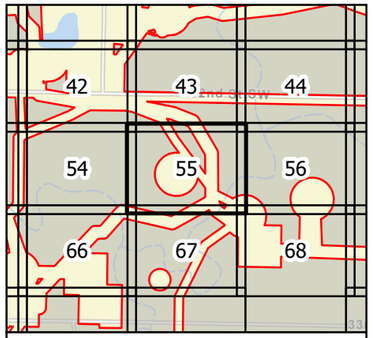

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Wetland (NWI)
Waterway (NHD)
Waterbody (NHD)

Figure 4
Hydrology
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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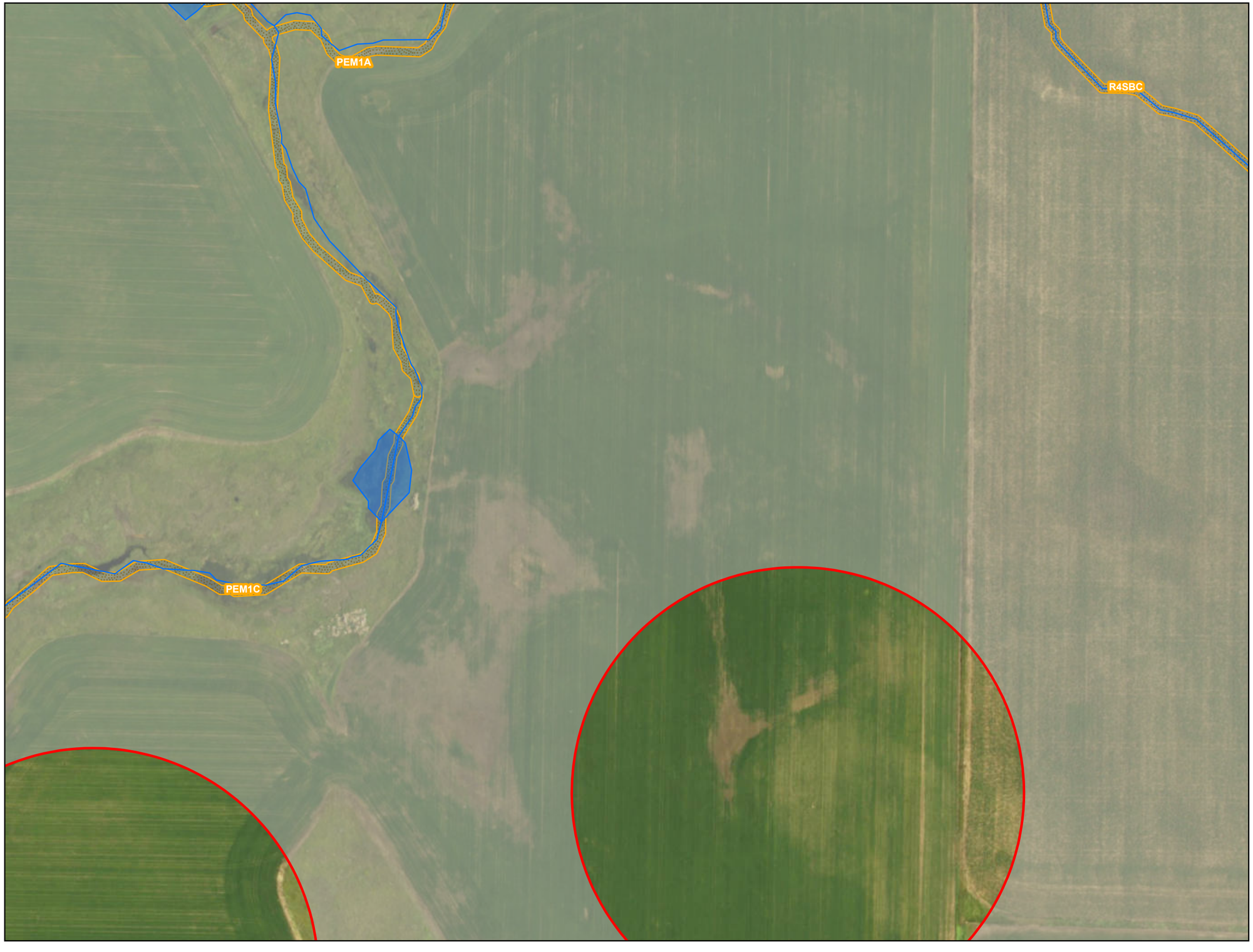

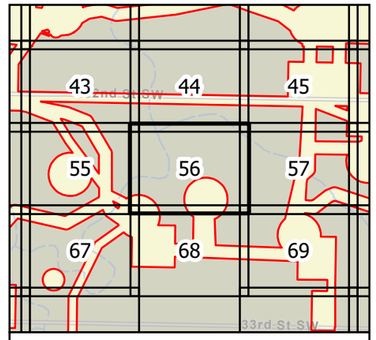

0 100 200 Feet

1 inch = 200 feet

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- Survey Area
- Wetland (NWI)
- Waterway (NHD)
- Waterbody (NHD)

Figure 4
Hydrology
Longspur Wind Project
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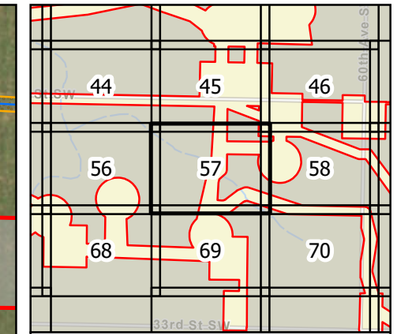

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N W E S

Survey Area
Wetland (NWI)
Waterway (NHD)
Waterbody (NHD)

Figure 4
Hydrology
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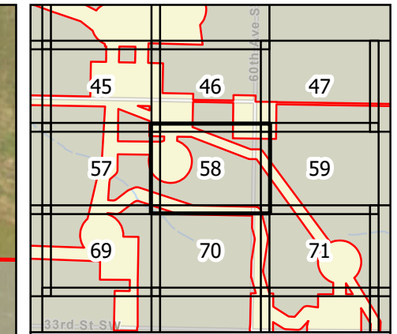

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N W E S

Survey Area
Wetland (NWI)
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Figure 4
Hydrology
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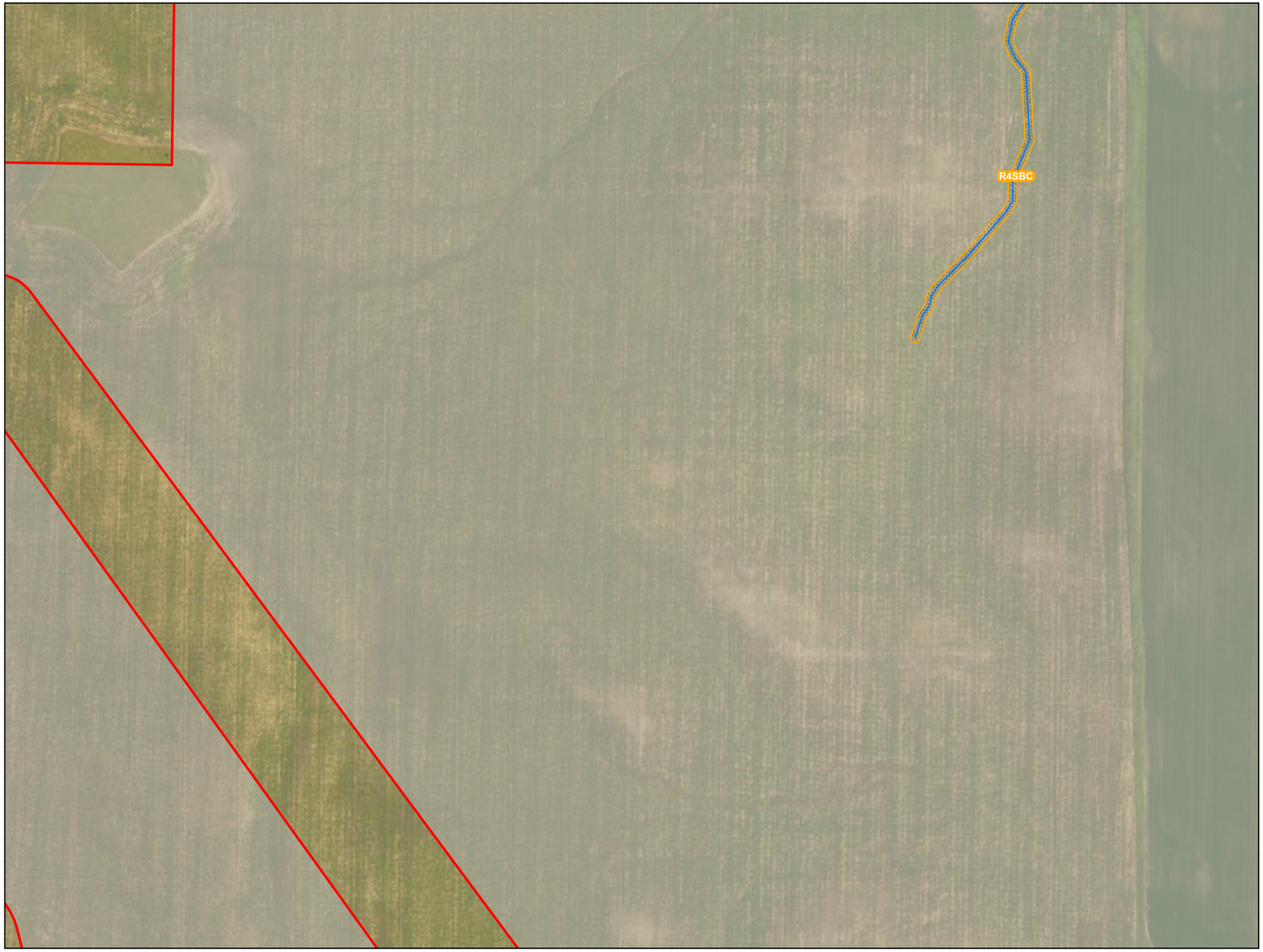

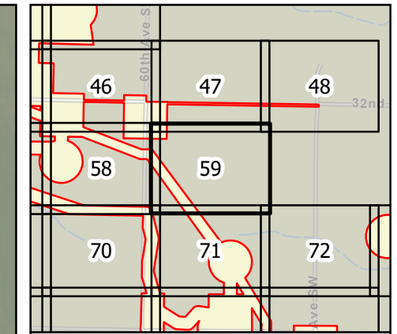

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N W E S

Survey Area
Wetland (NWI)
Waterway (NHD)
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Figure 4
Hydrology
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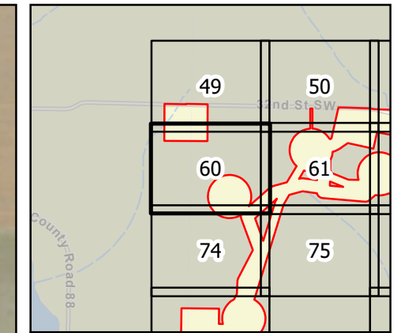

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Wetland (NWI)
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Figure 4
Hydrology
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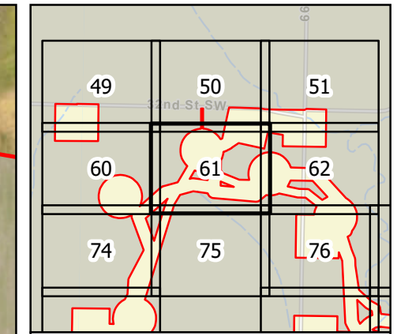

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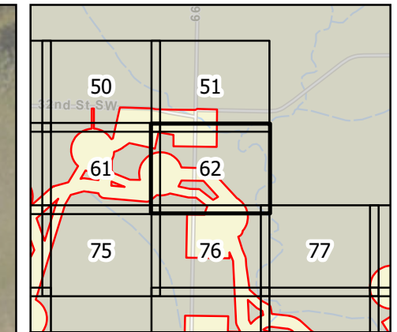

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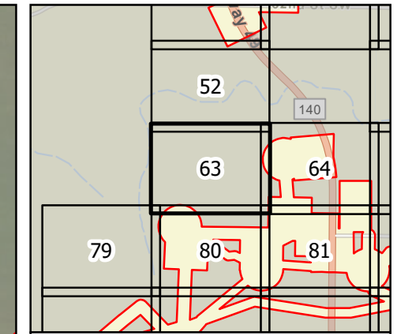

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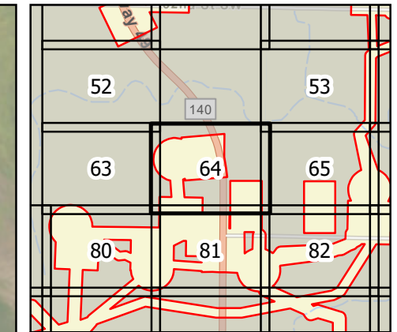

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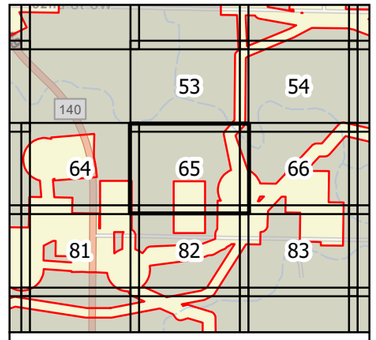

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Hydrology
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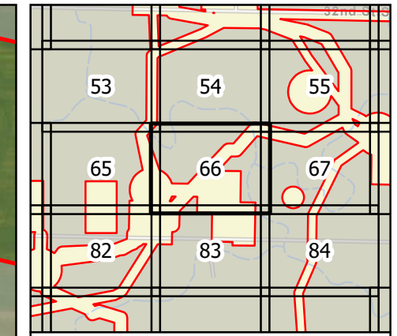

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N W E S

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Hydrology
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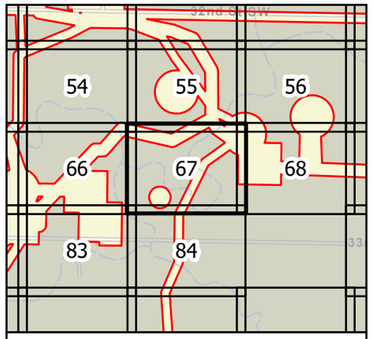

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Figure 4
Hydrology
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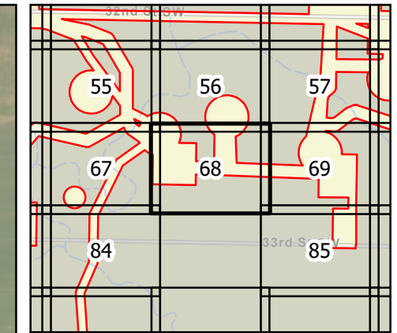

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Waterway (NHD)
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Figure 4
Hydrology
Longspur Wind Project
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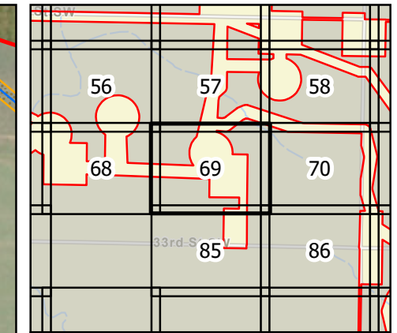

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N W E S

Survey Area
Wetland (NWI)
Waterway (NHD)
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Figure 4
Hydrology
Longspur Wind Project
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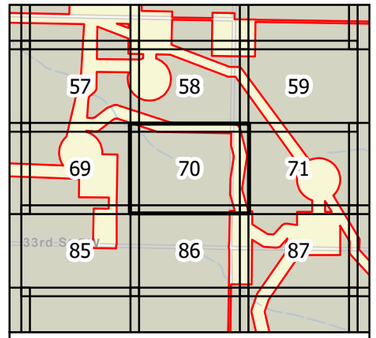

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Figure 4
Hydrology
Longspur Wind Project
Minnesota Power
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North Dakota

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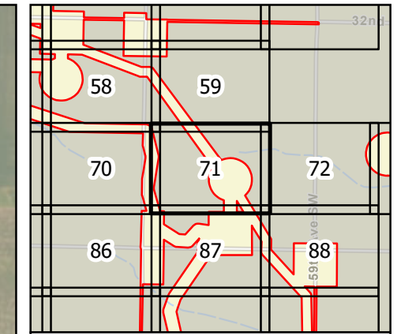

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Survey Area
Wetland (NWI)
Waterway (NHD)
Waterbody (NHD)

Figure 4
Hydrology
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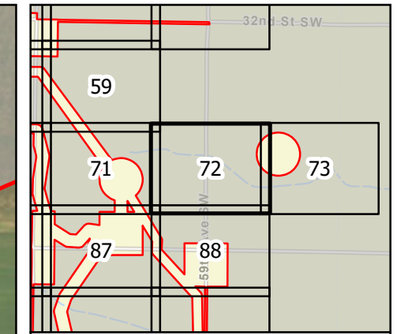

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N W E S

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Wetland (NWI)
Waterway (NHD)
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Figure 4
Hydrology
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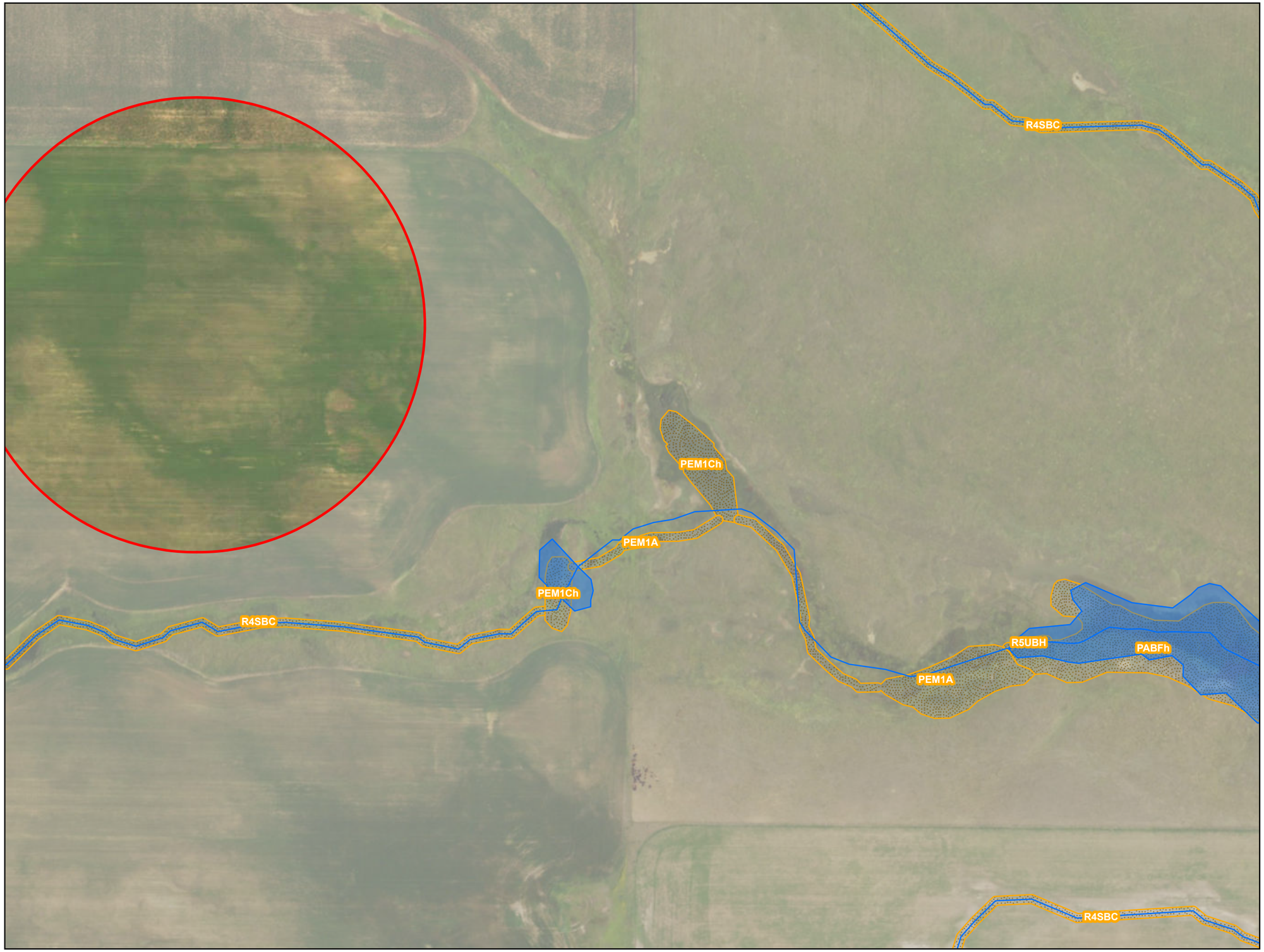

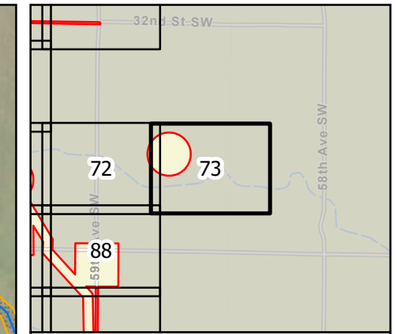

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N W E S

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Wetland (NWI)
Waterway (NHD)
Waterbody (NHD)

Figure 4
Hydrology
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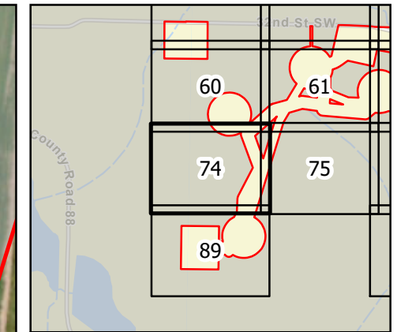

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Waterway (NHD)
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Figure 4
Hydrology
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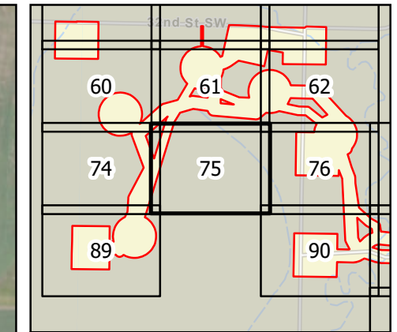

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Hydrology
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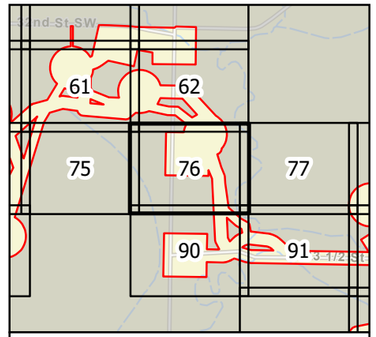

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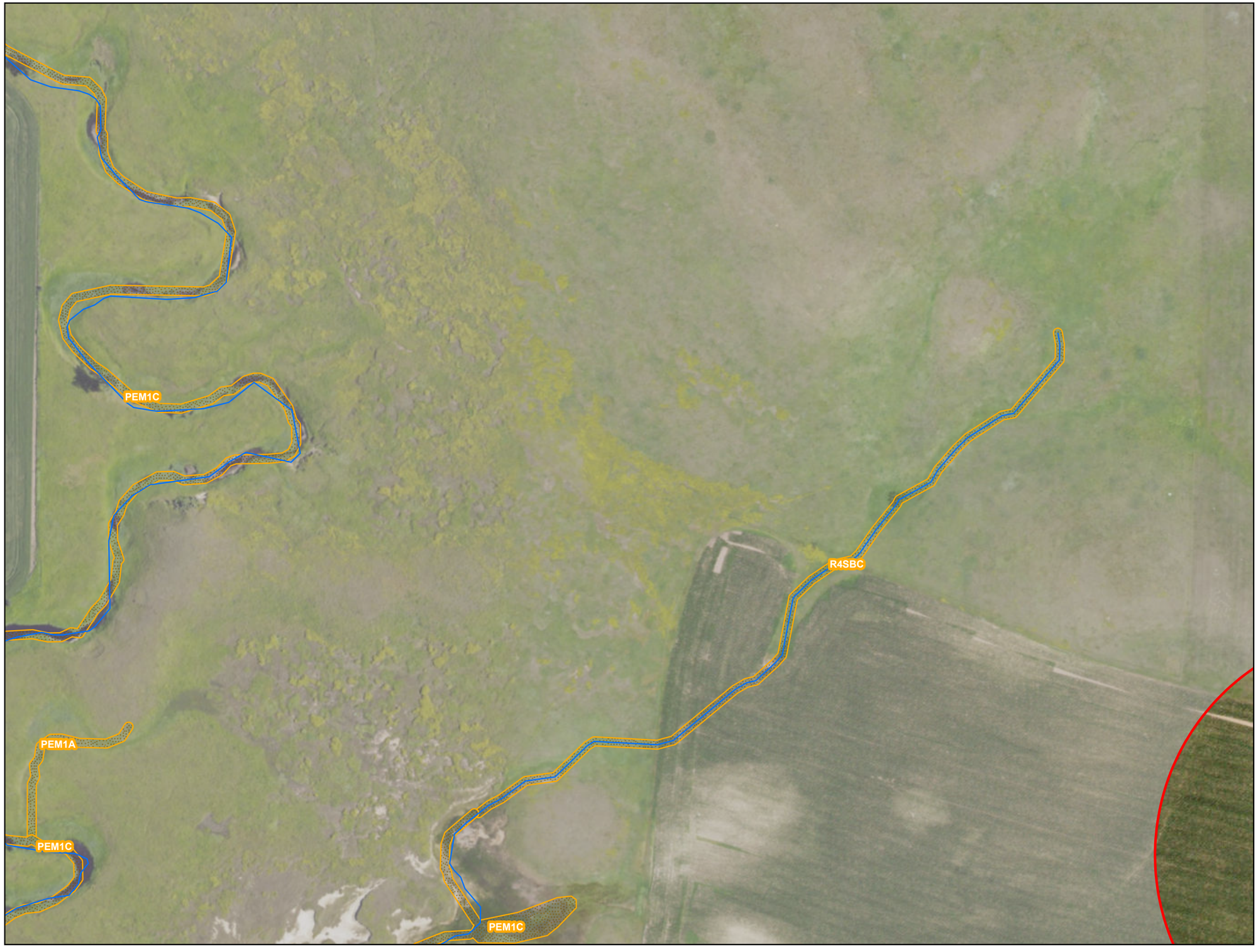

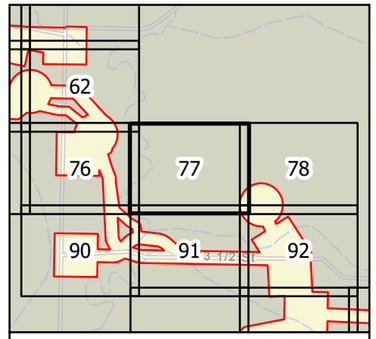

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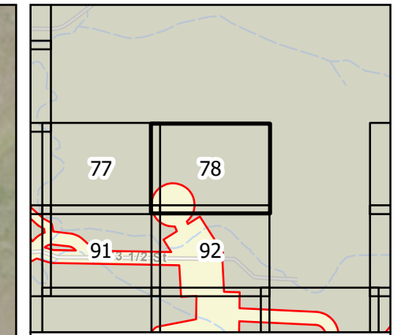

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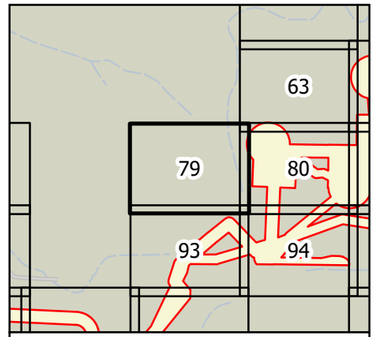

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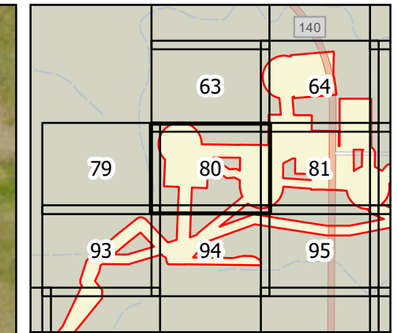

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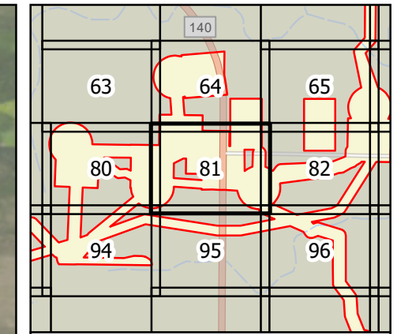

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area
Wetland (NWI)
Waterway (NHD)
Waterbody (NHD)

Figure 4
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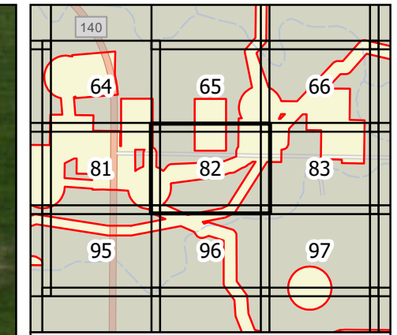

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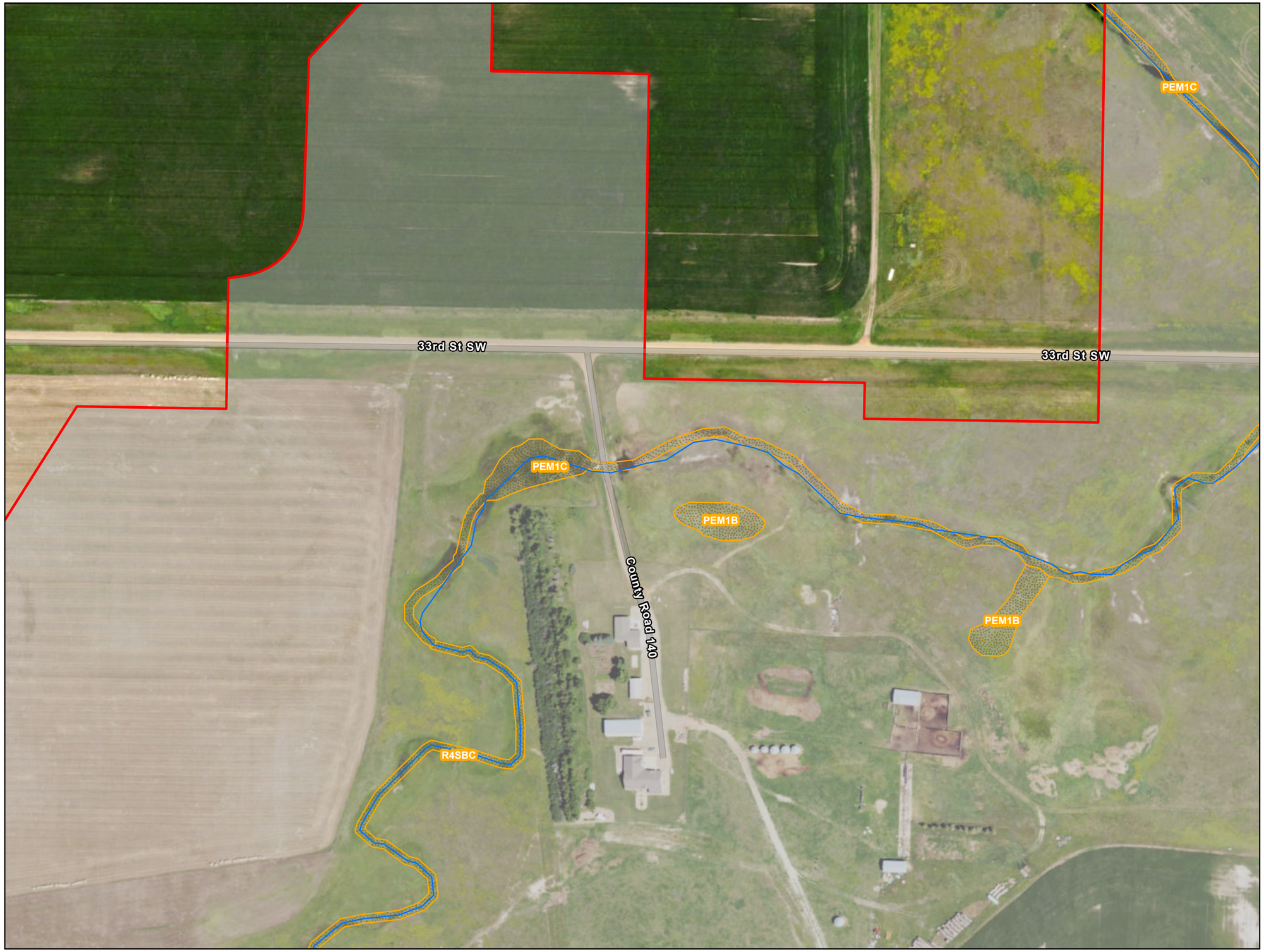

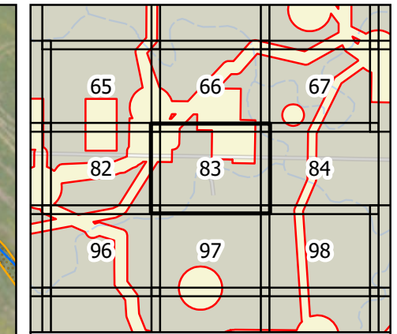

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Wetland (NWI)
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Figure 4
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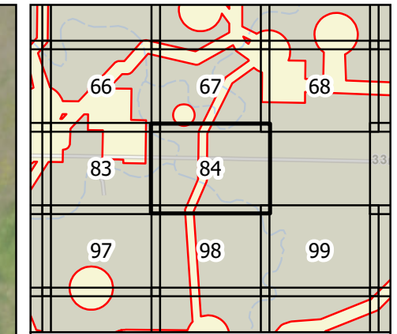

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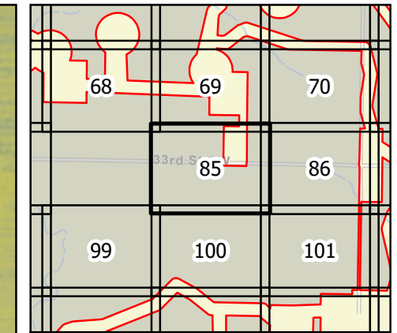

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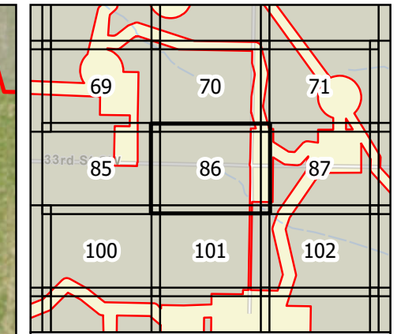

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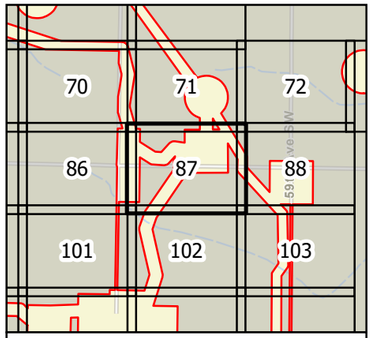

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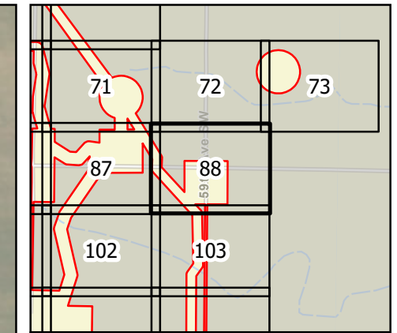

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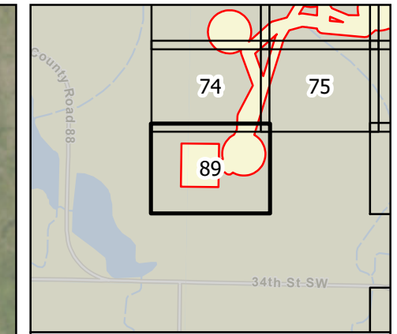

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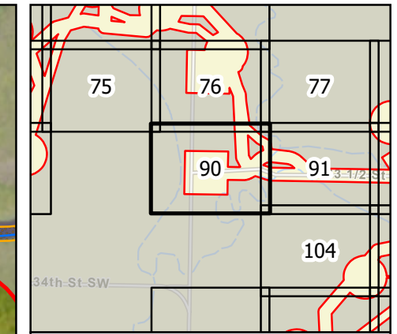

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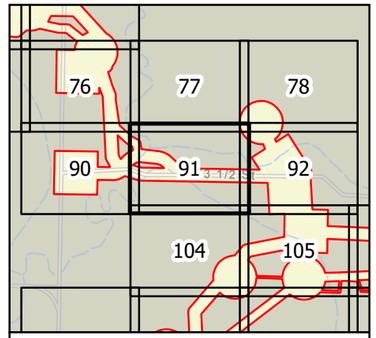

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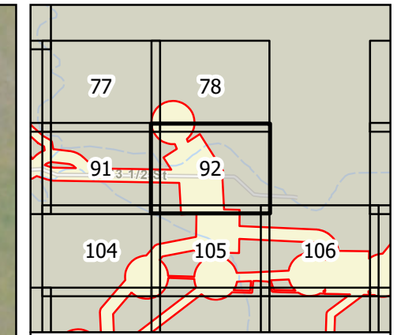

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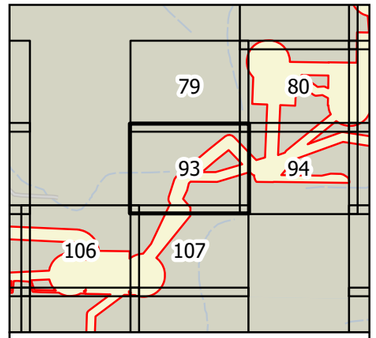

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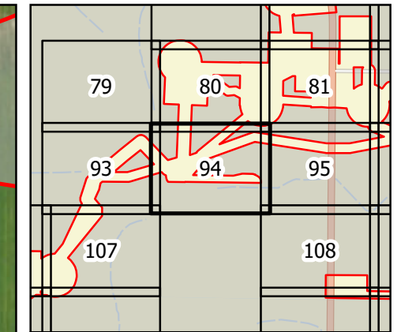

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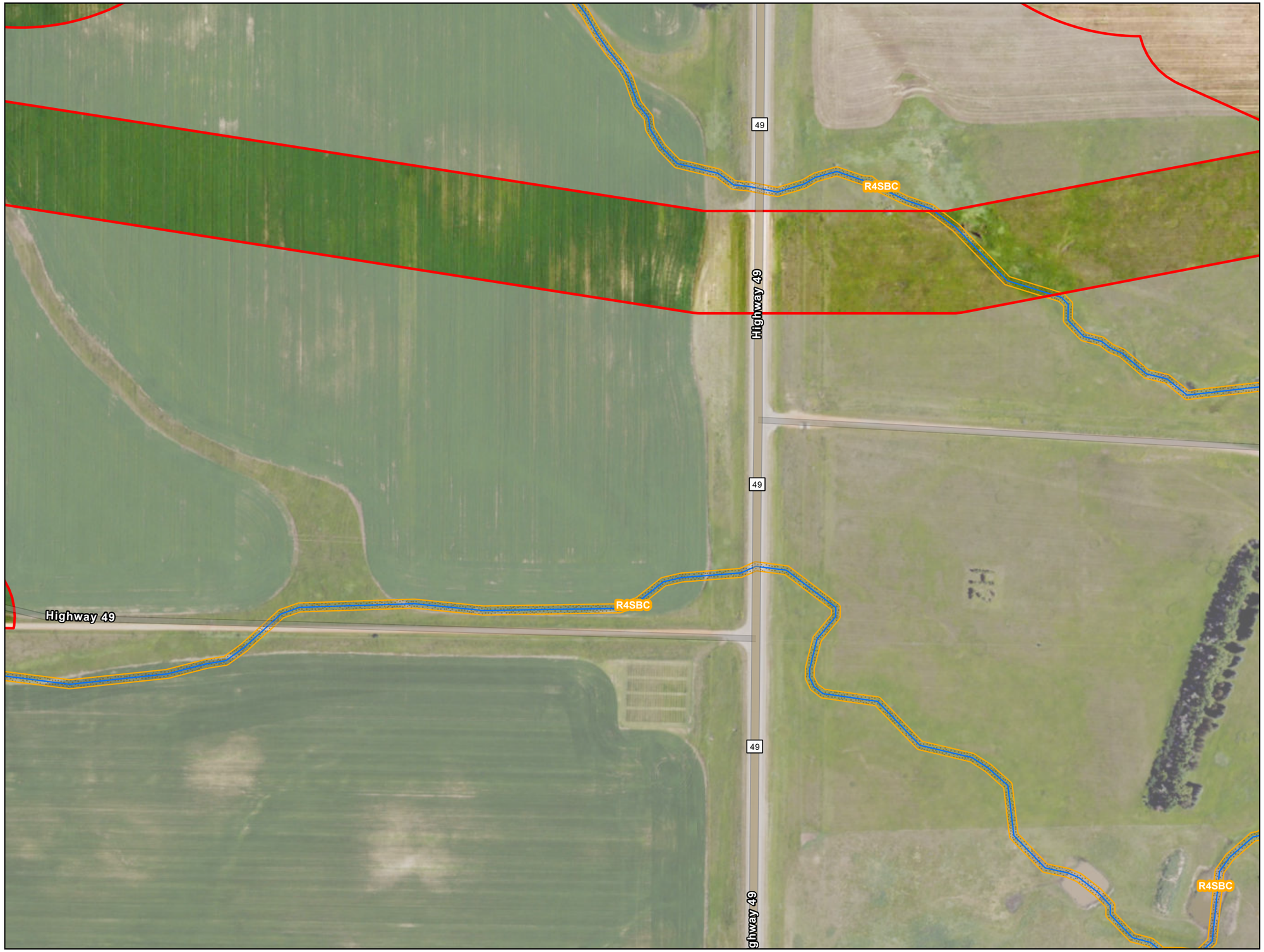

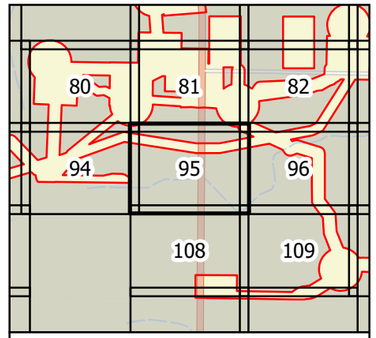

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Figure 4
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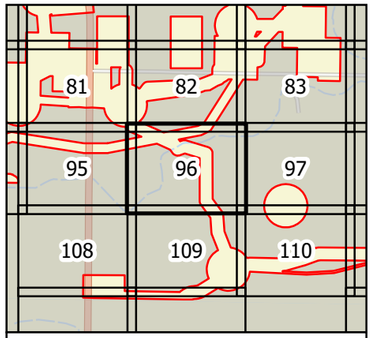

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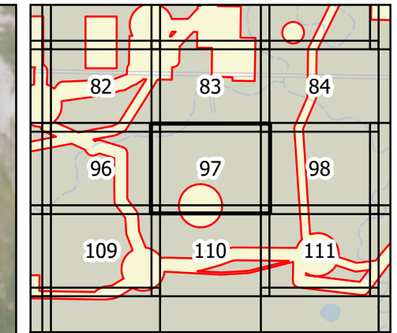

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Hydrology
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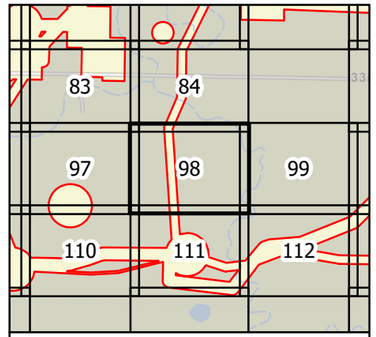

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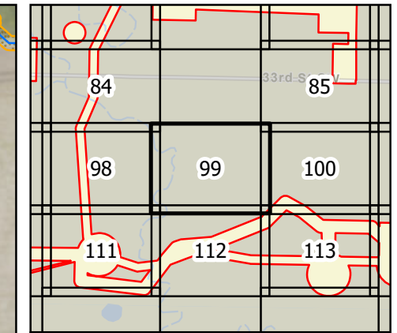

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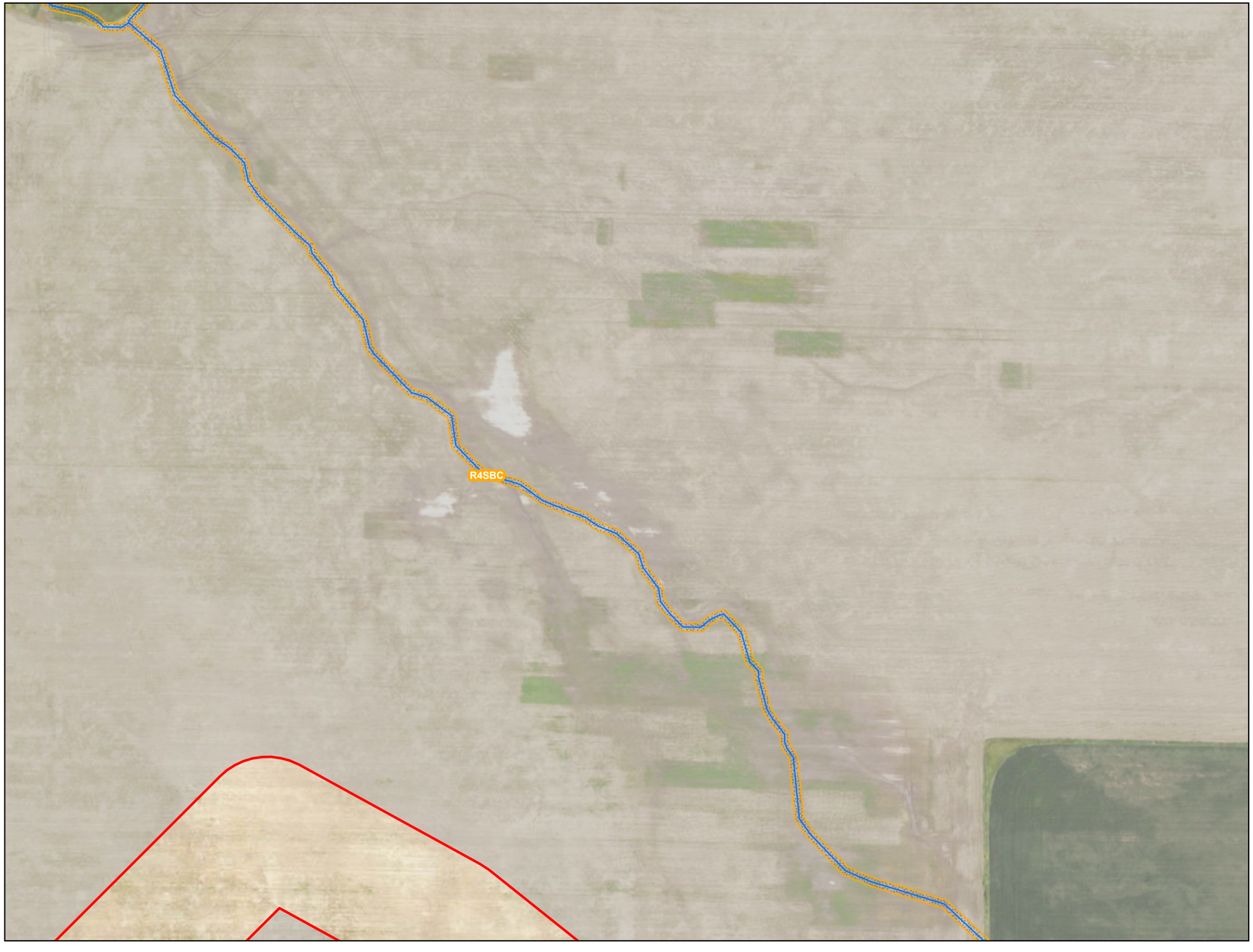

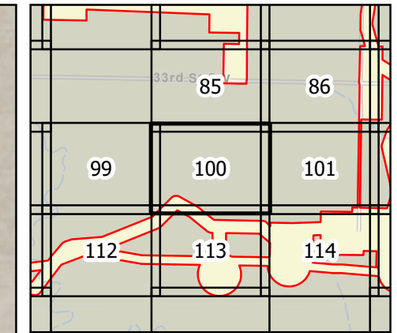

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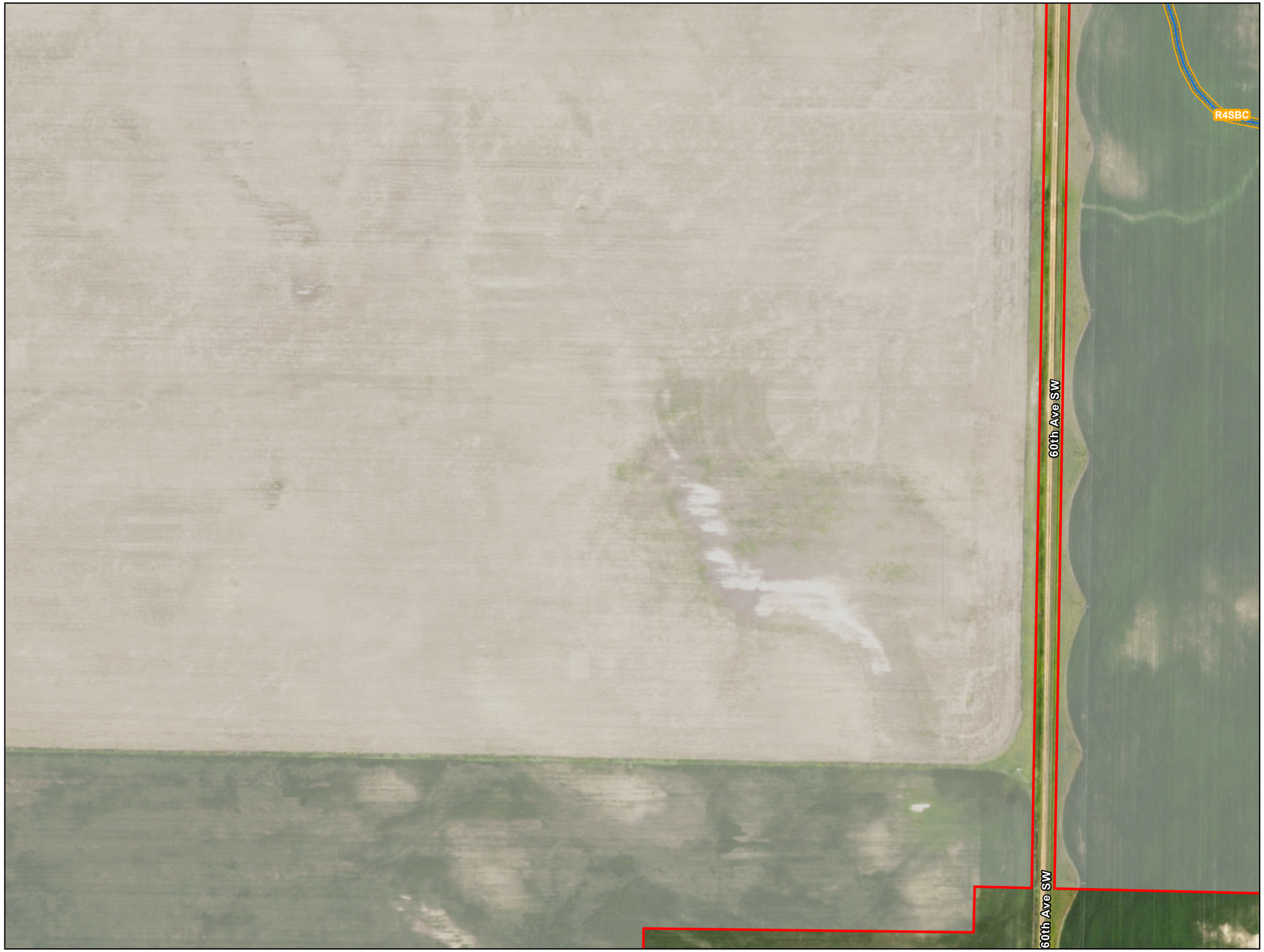

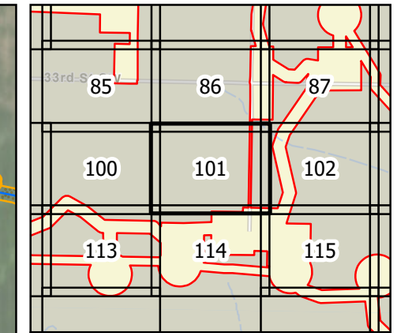

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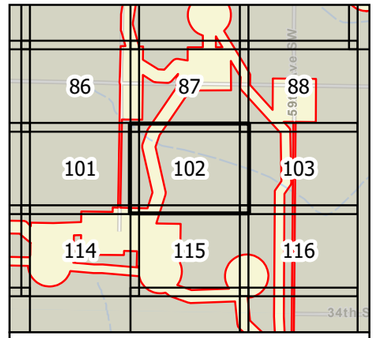

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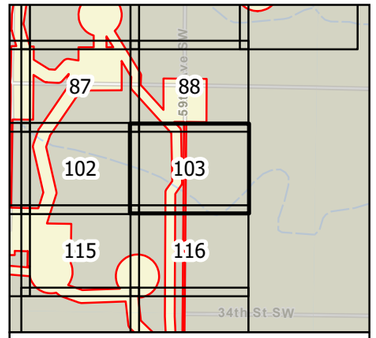

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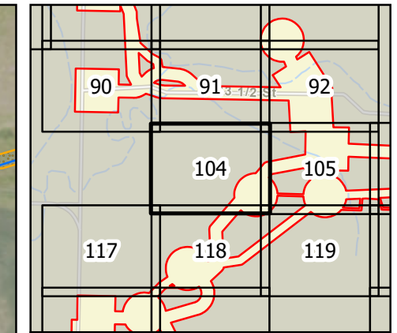

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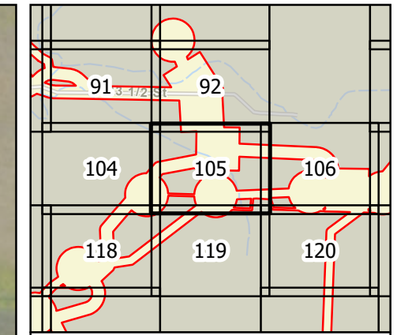

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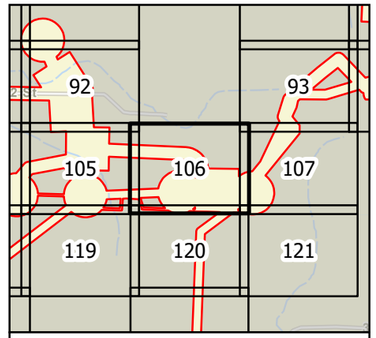

0 100 200 Feet

1 inch = 200 feet

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Survey Area
Wetland (NWI)
Waterway (NHD)
Waterbody (NHD)

Figure 4
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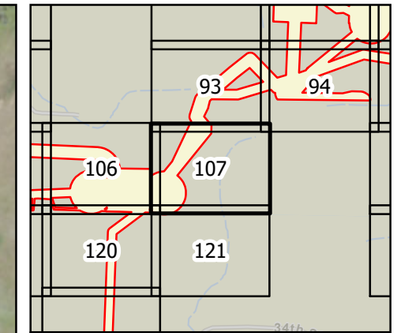

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N W E S

Survey Area
Wetland (NWI)
Waterway (NHD)
Waterbody (NHD)

Figure 4
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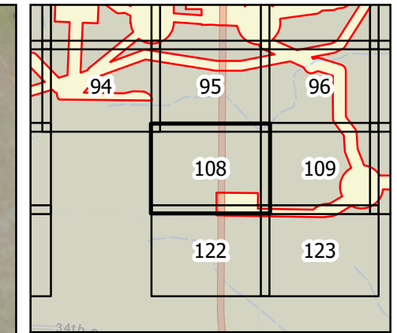

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N W E S

Survey Area
Wetland (NWI)
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Waterbody (NHD)

Figure 4
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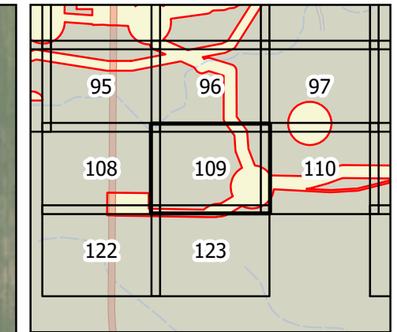

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N W E S

Survey Area
Wetland (NWI)
Waterway (NHD)
Waterbody (NHD)

Figure 4
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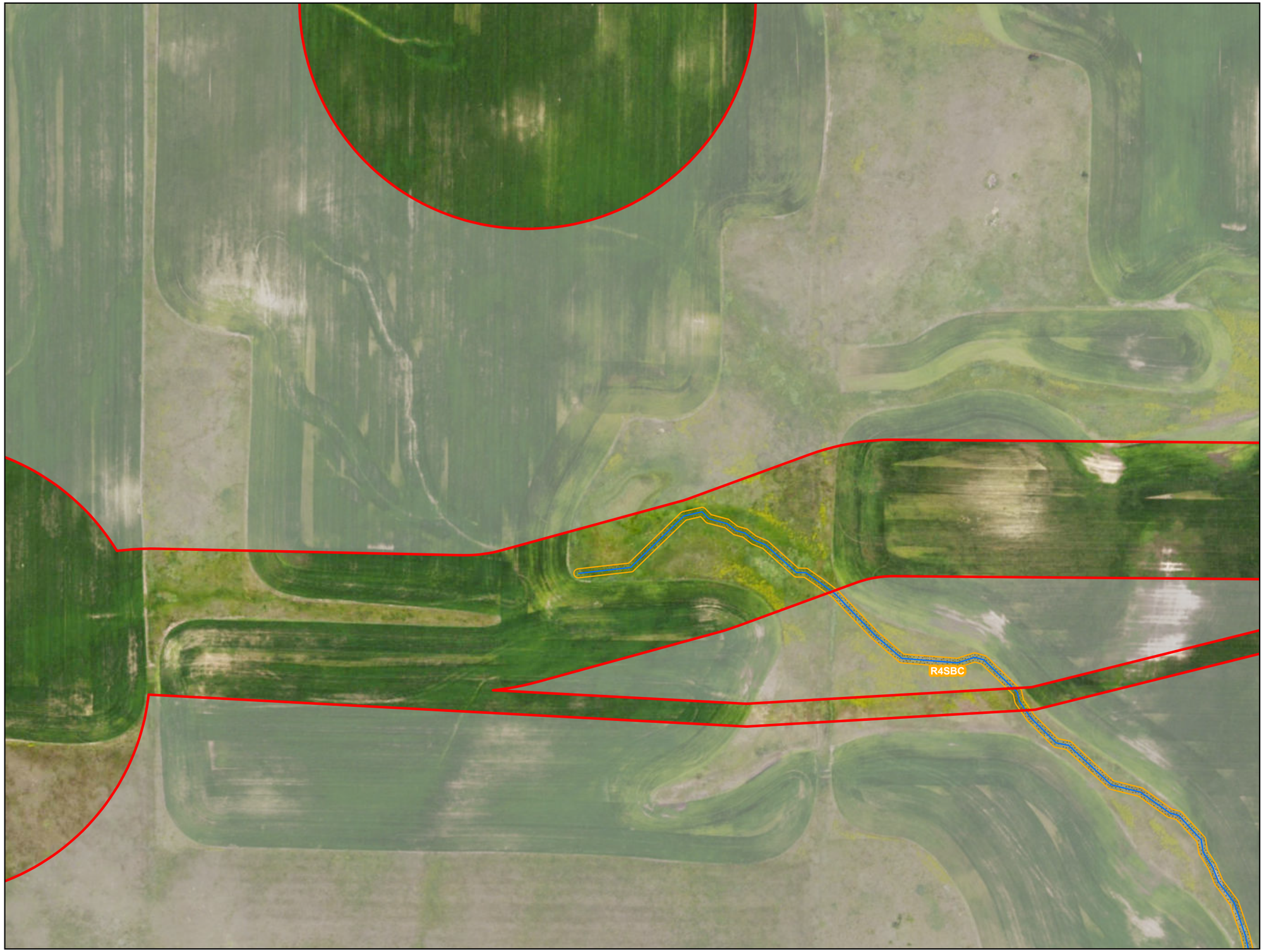

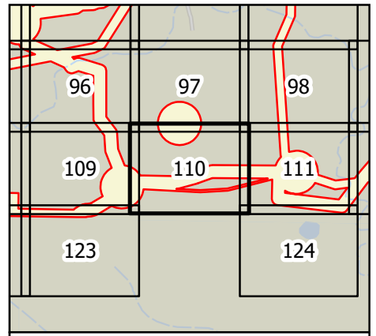

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Survey Area
Wetland (NWI)
Waterway (NHD)
Waterbody (NHD)

Figure 4
Hydrology
Longspur Wind Project
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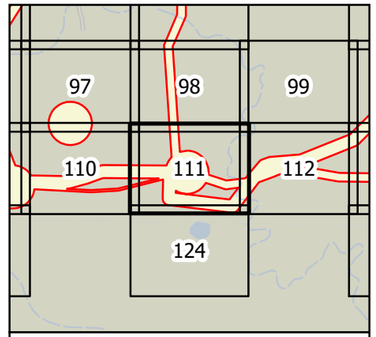

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- Survey Area
- Wetland (NWI)
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- Waterbody (NHD)

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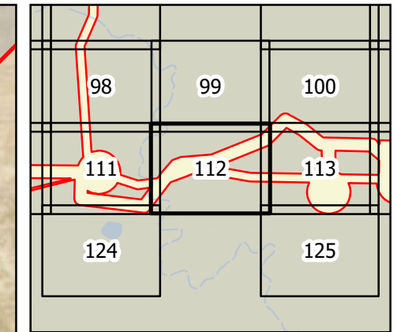

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Survey Area
Wetland (NWI)
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Waterbody (NHD)

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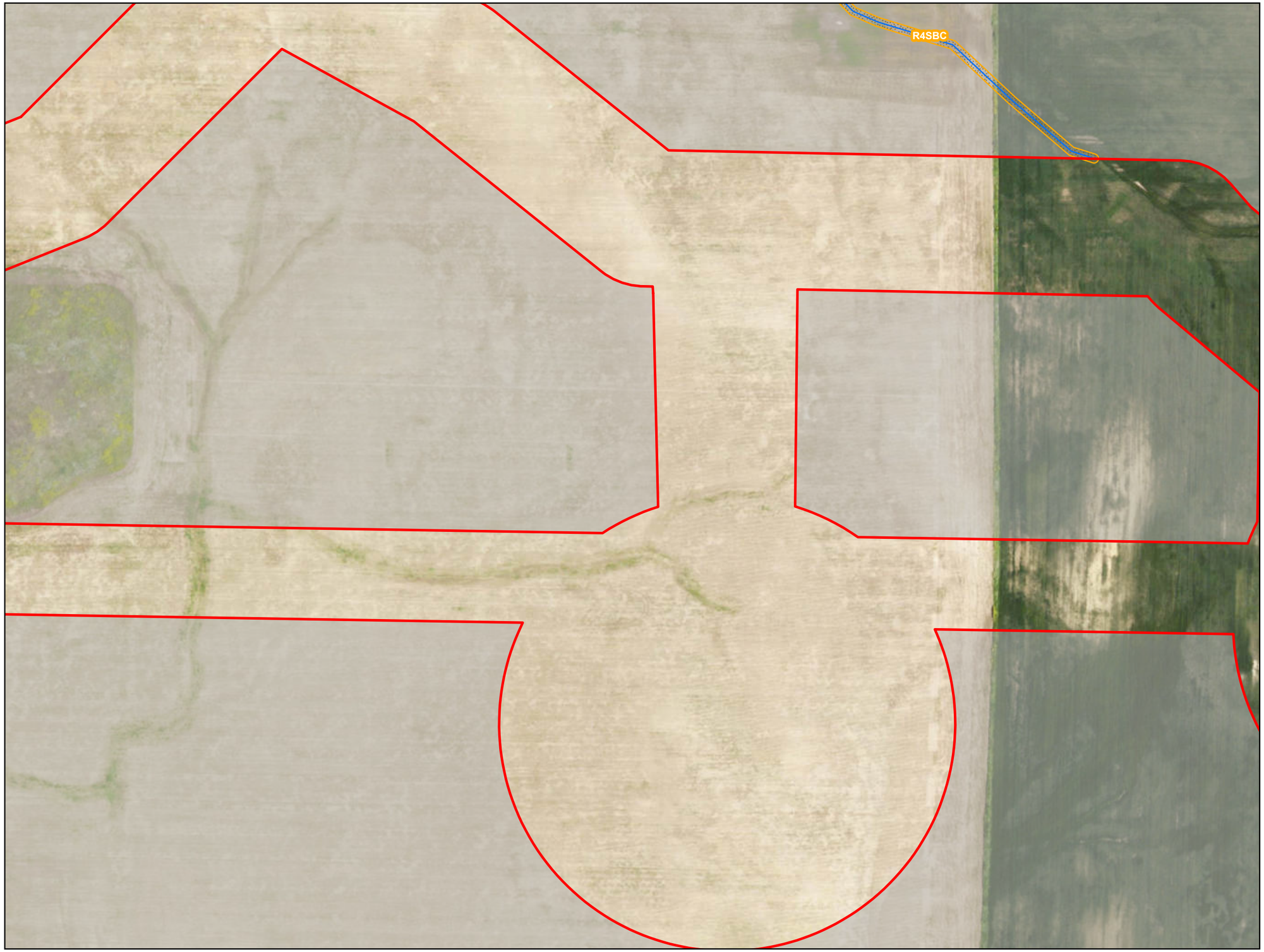

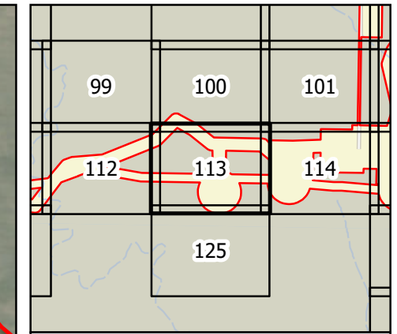

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Wetland (NWI)
Waterway (NHD)
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Hydrology
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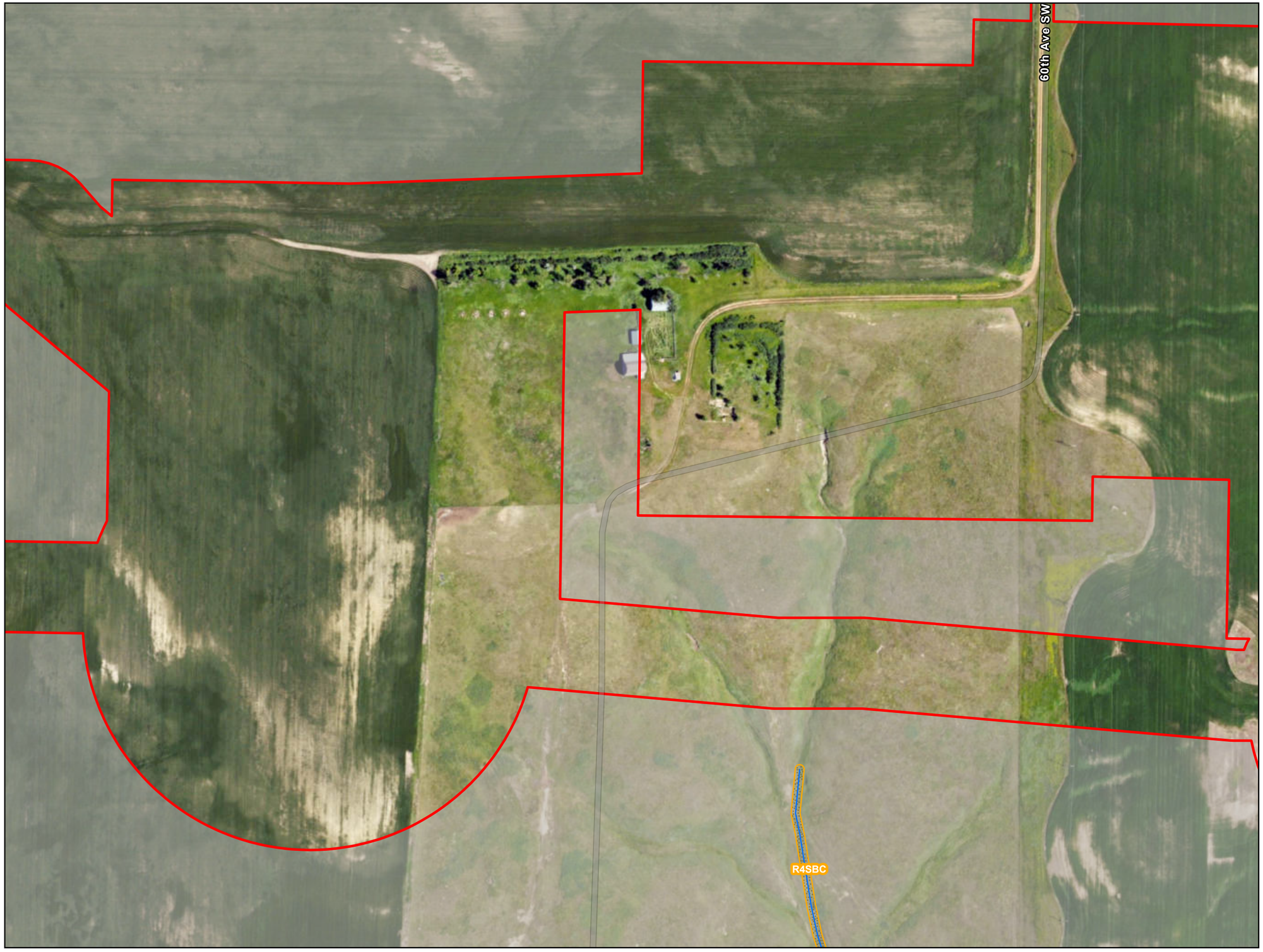

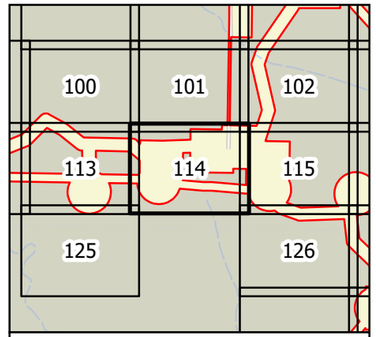

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Survey Area
Wetland (NWI)
Waterway (NHD)
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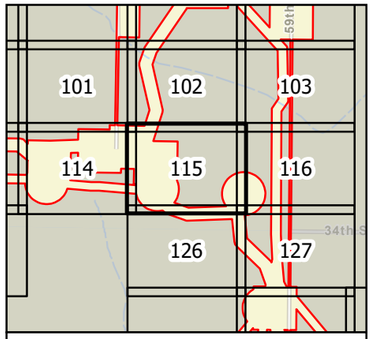

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- Wetland (NWI)
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Figure 4
Hydrology
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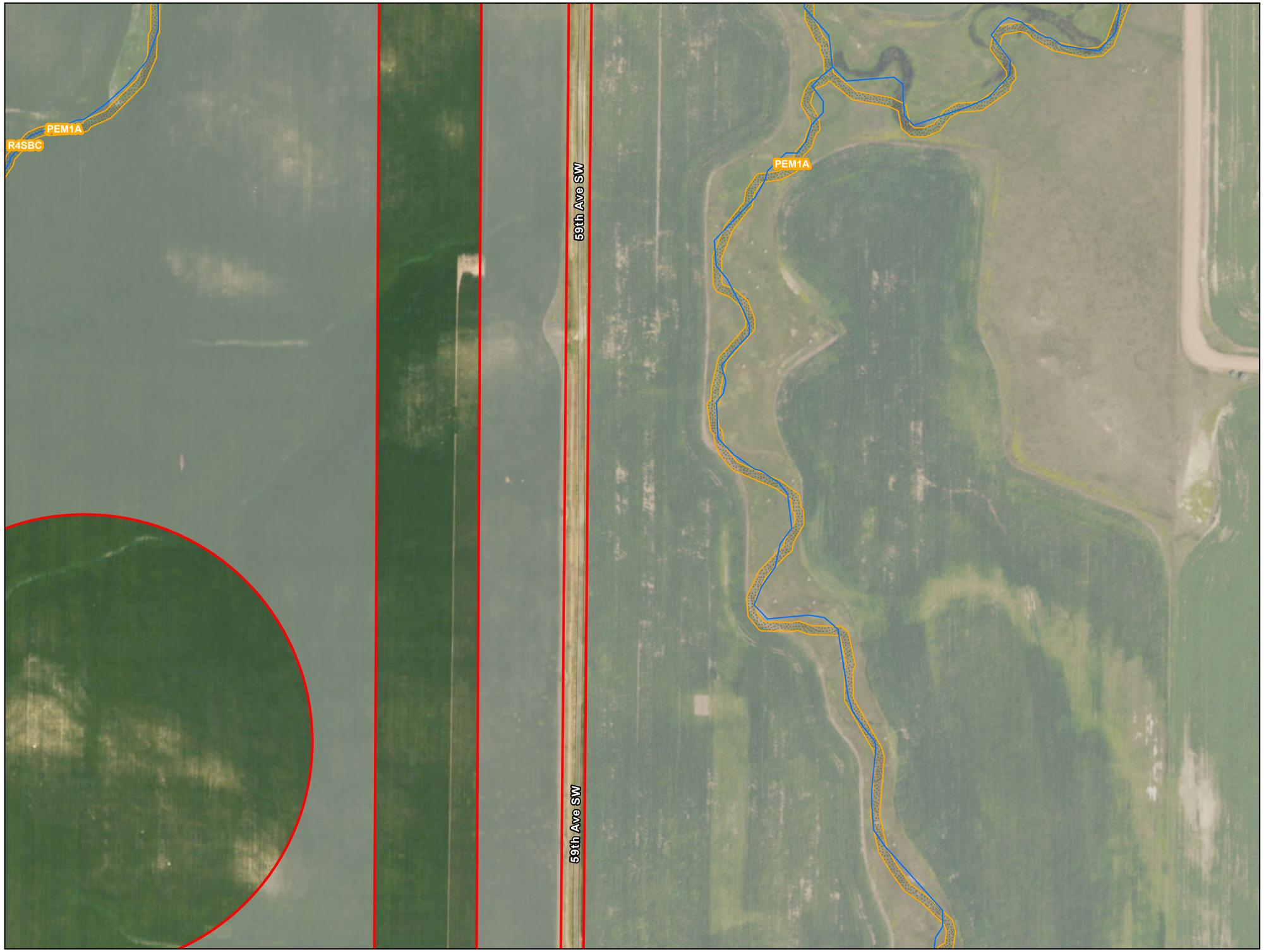

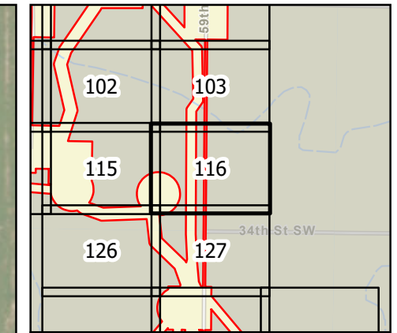

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N W E S

Survey Area
Wetland (NWI)
Waterway (NHD)
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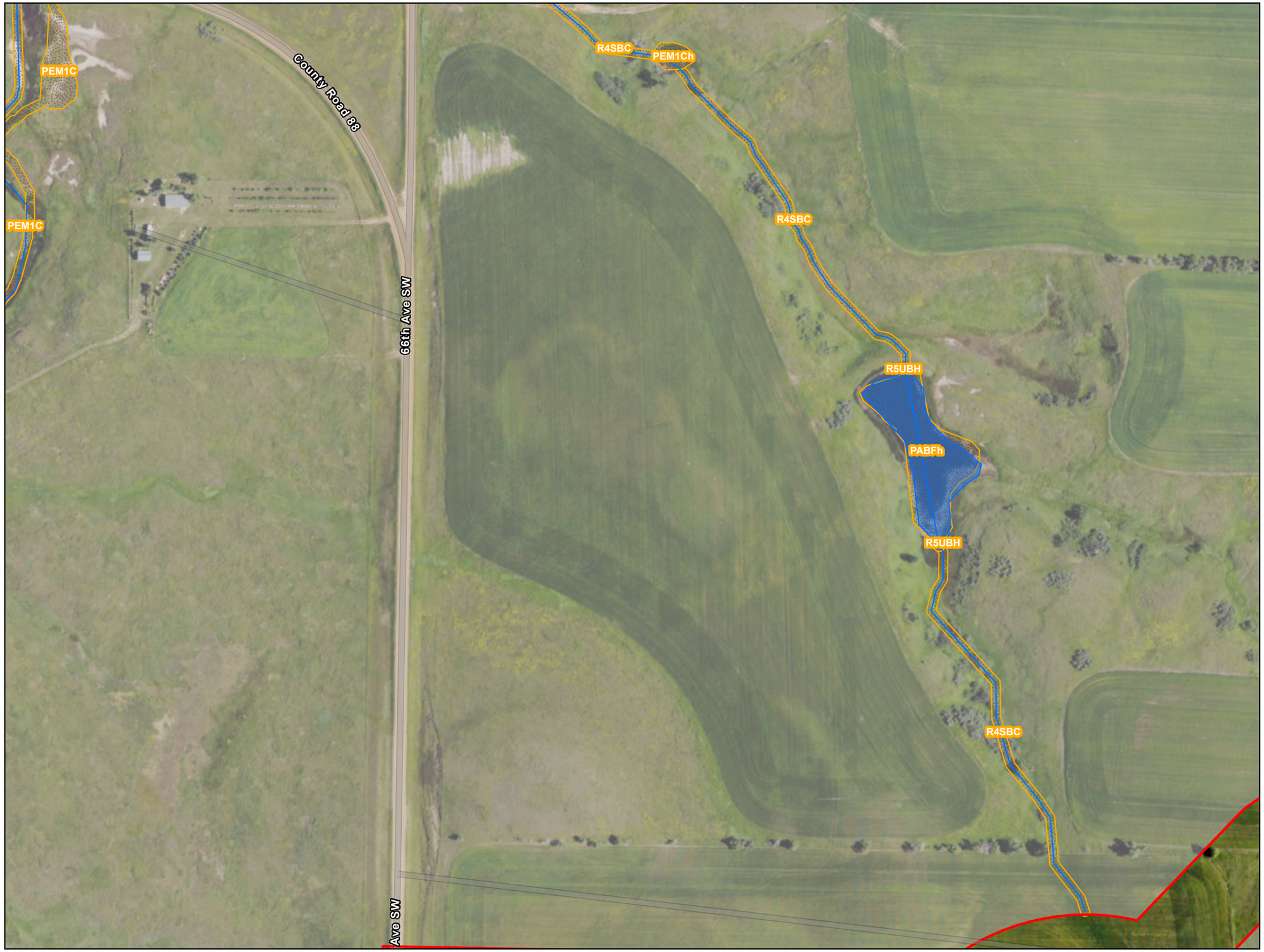

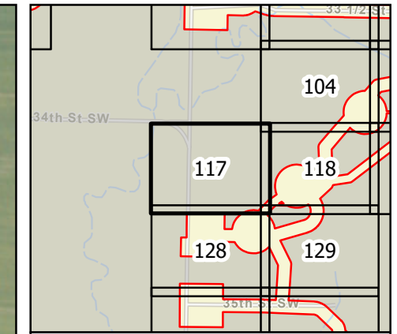

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Survey Area

Wetland (NWI)

Waterway (NHD)

Waterbody (NHD)

Figure 4
Hydrology
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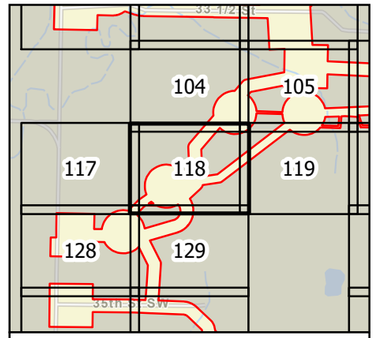

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- Wetland (NWI)
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Figure 4
Hydrology
Longspur Wind Project
Minnesota Power
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North Dakota

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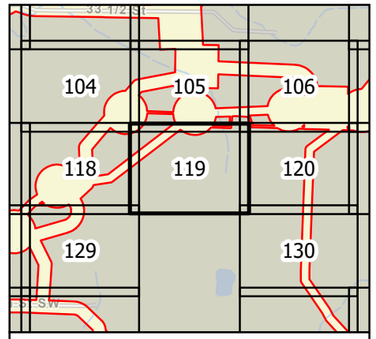

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- Survey Area
- Wetland (NWI)
- Waterway (NHD)
- Waterbody (NHD)

Figure 4
Hydrology
Longspur Wind Project
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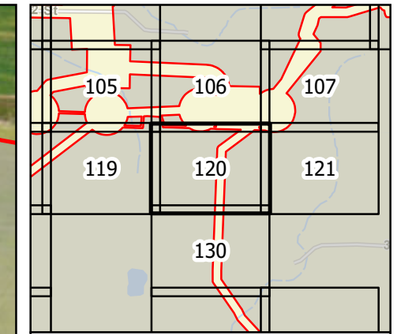

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N W E S

Survey Area
Wetland (NWI)
Waterway (NHD)
Waterbody (NHD)

Figure 4
Hydrology
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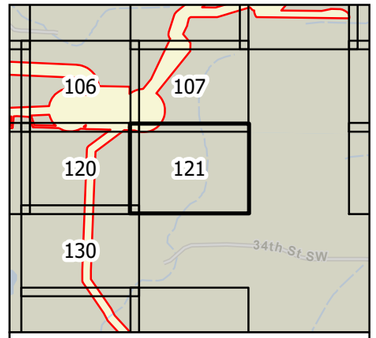

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- Survey Area
- Wetland (NWI)
- Waterway (NHD)
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Figure 4
Hydrology
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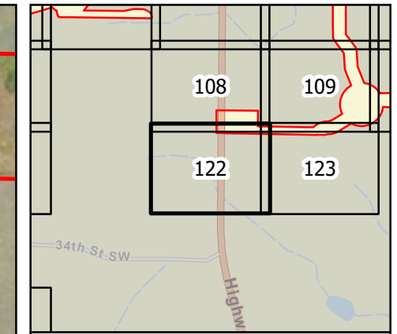

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N W E S

Survey Area
Wetland (NWI)
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Hydrology
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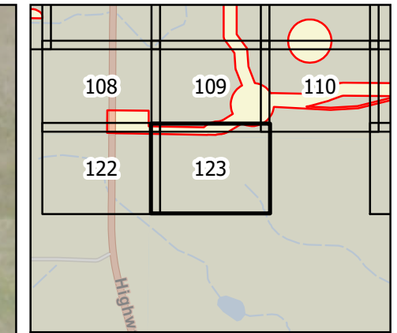

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Hydrology
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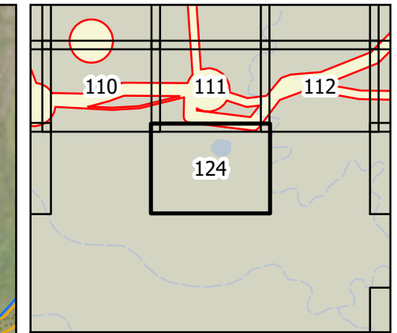

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Waterway (NHD)
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Hydrology
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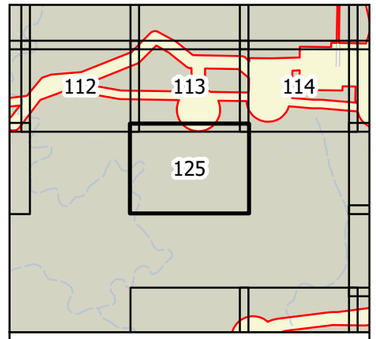

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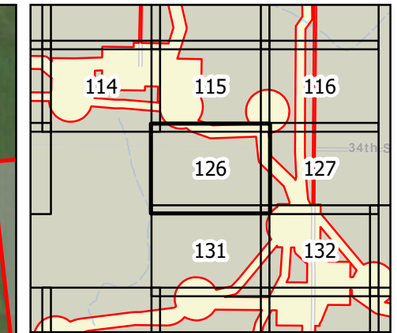

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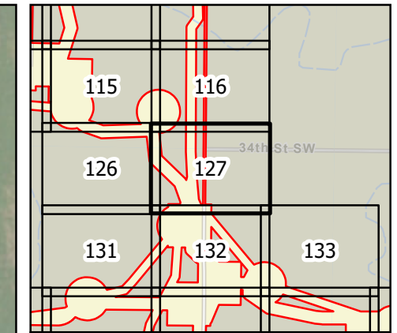

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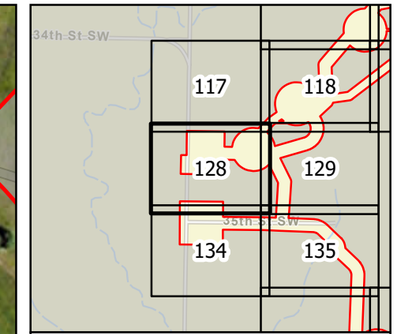

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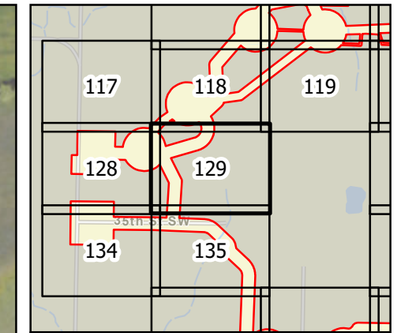

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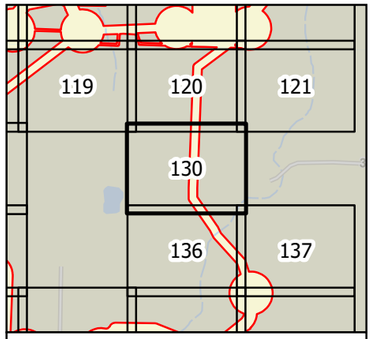

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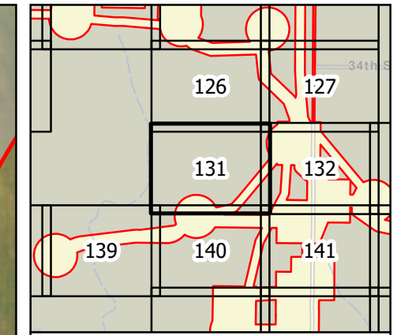

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area
Wetland (NWI)
Waterway (NHD)
Waterbody (NHD)

Figure 4
Hydrology
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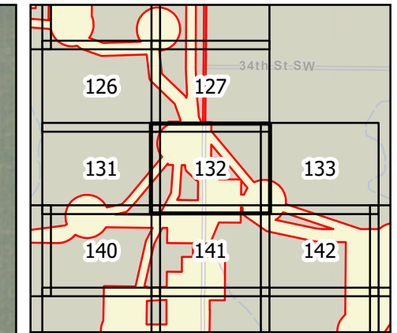

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N W E S

Survey Area
Wetland (NWI)
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Waterbody (NHD)

Figure 4
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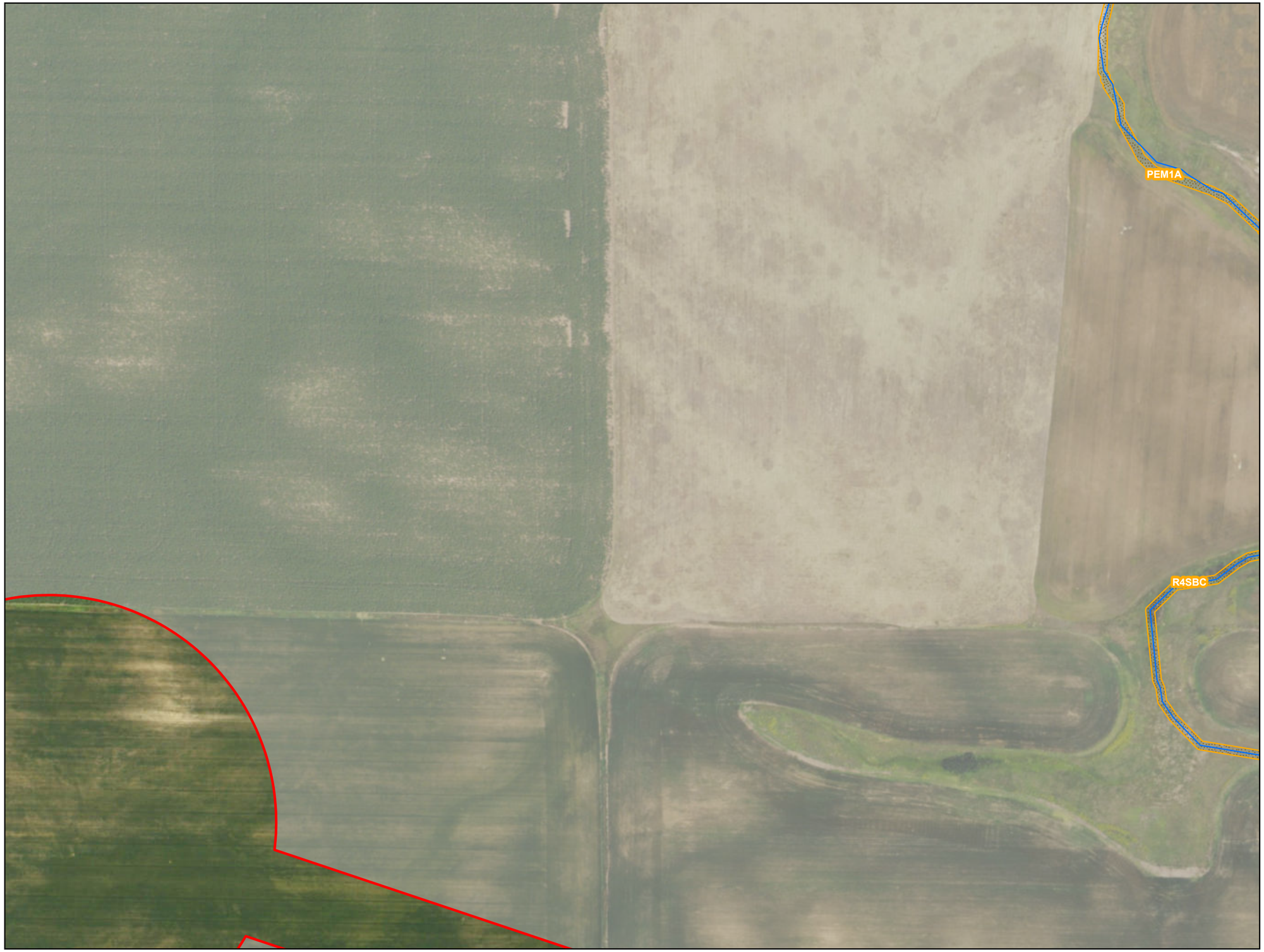

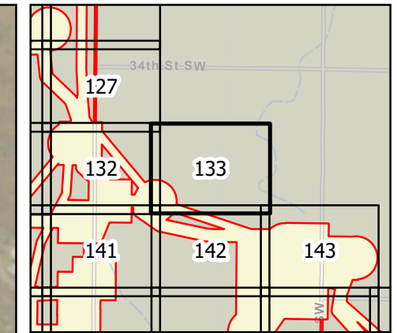

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Survey Area
Wetland (NWI)
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Figure 4
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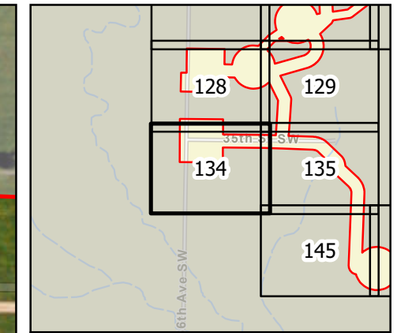

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N W E S

Survey Area
Wetland (NWI)
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Waterbody (NHD)

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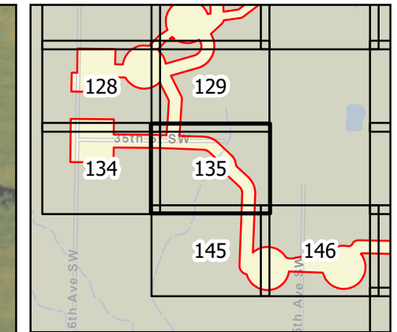

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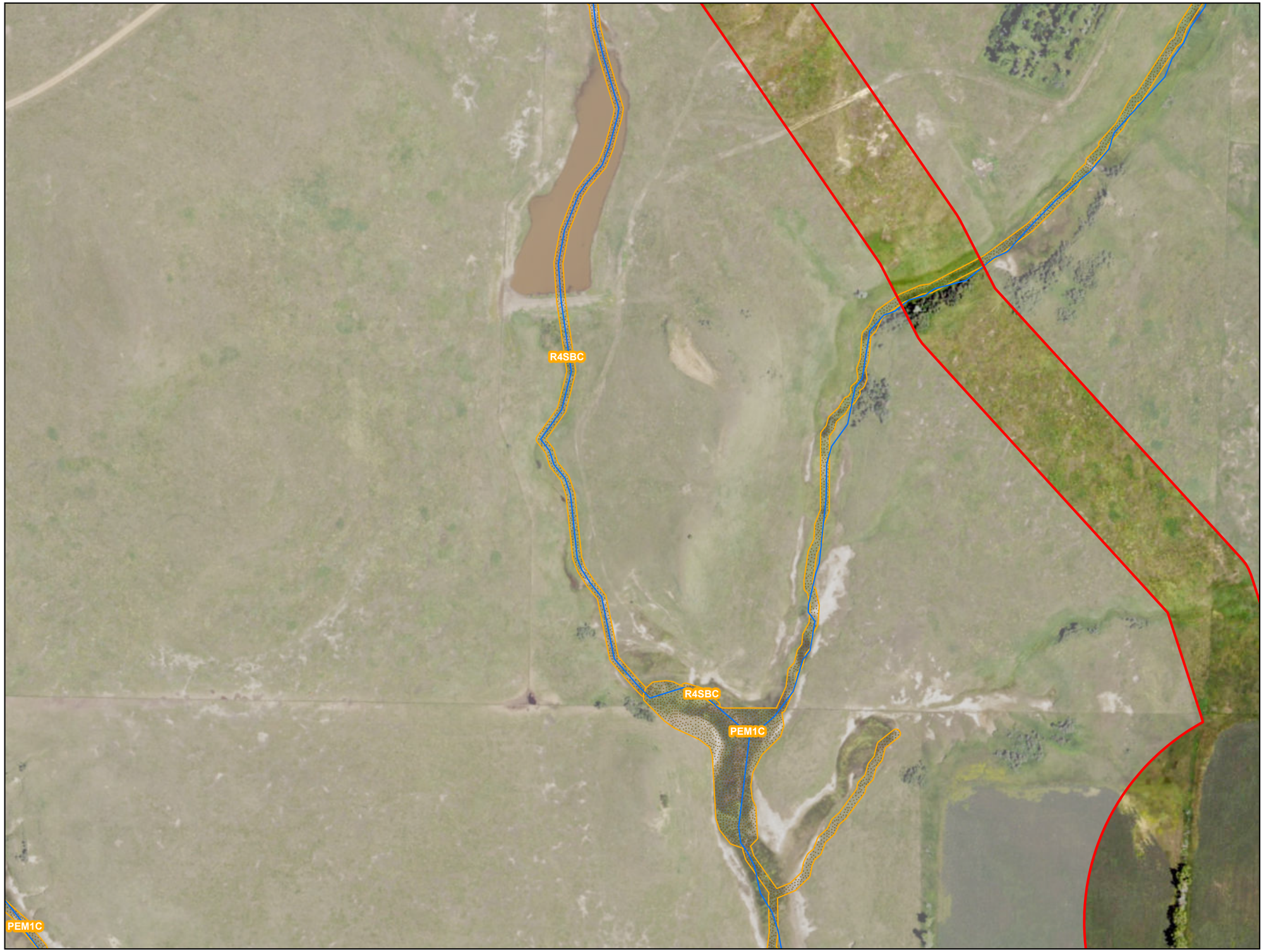

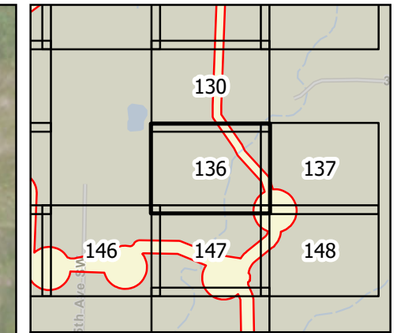

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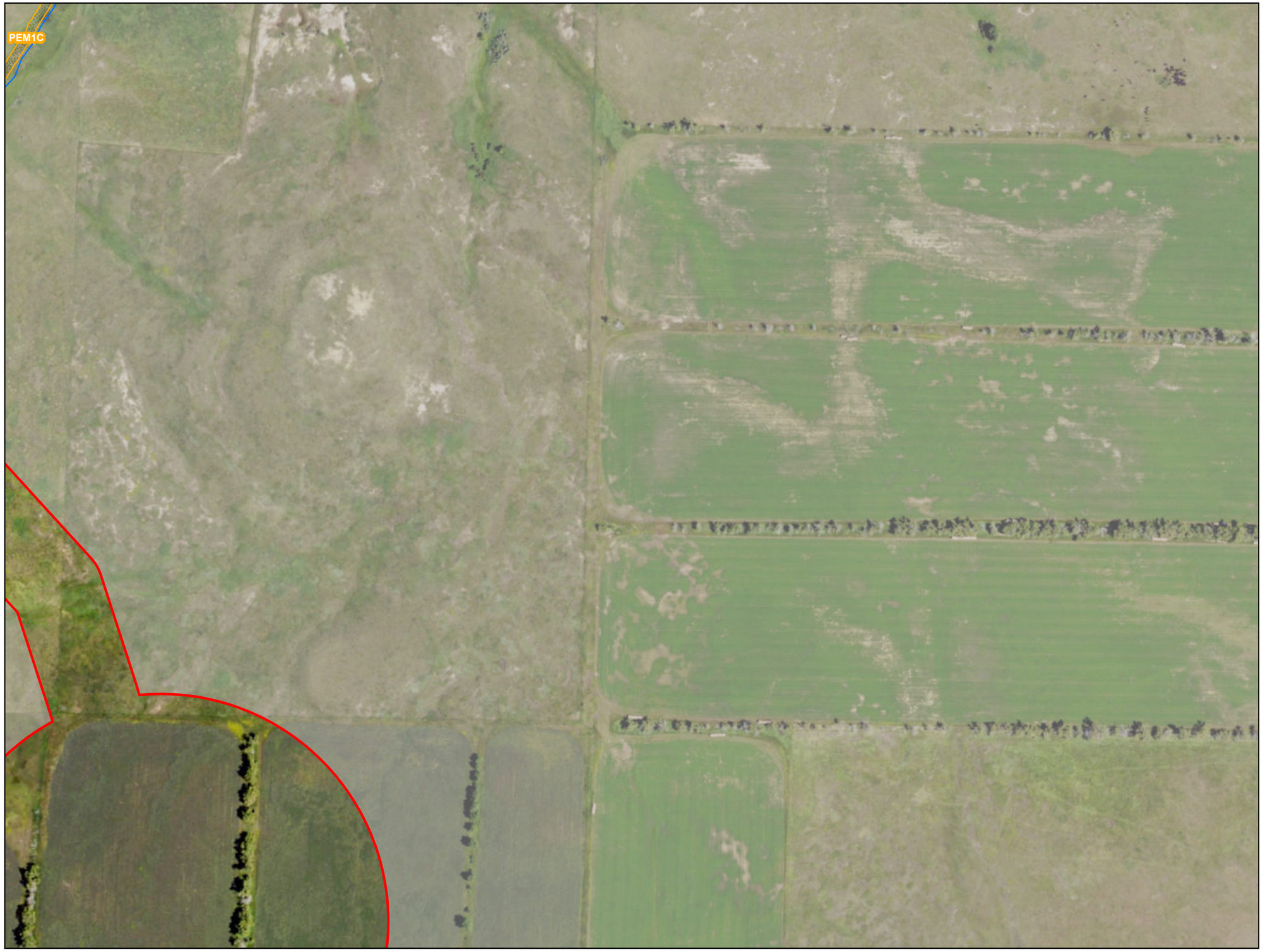

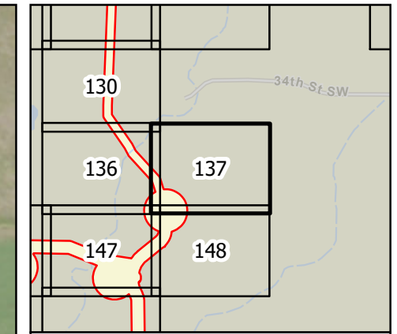

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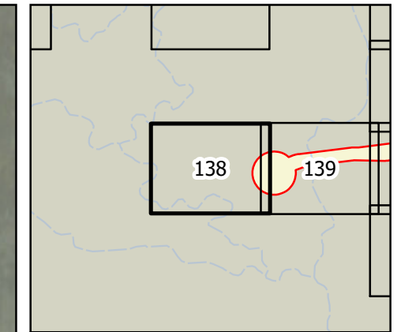

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Wetland (NWI)
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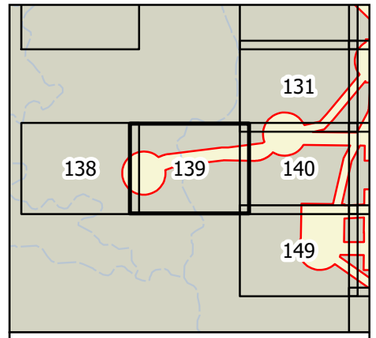

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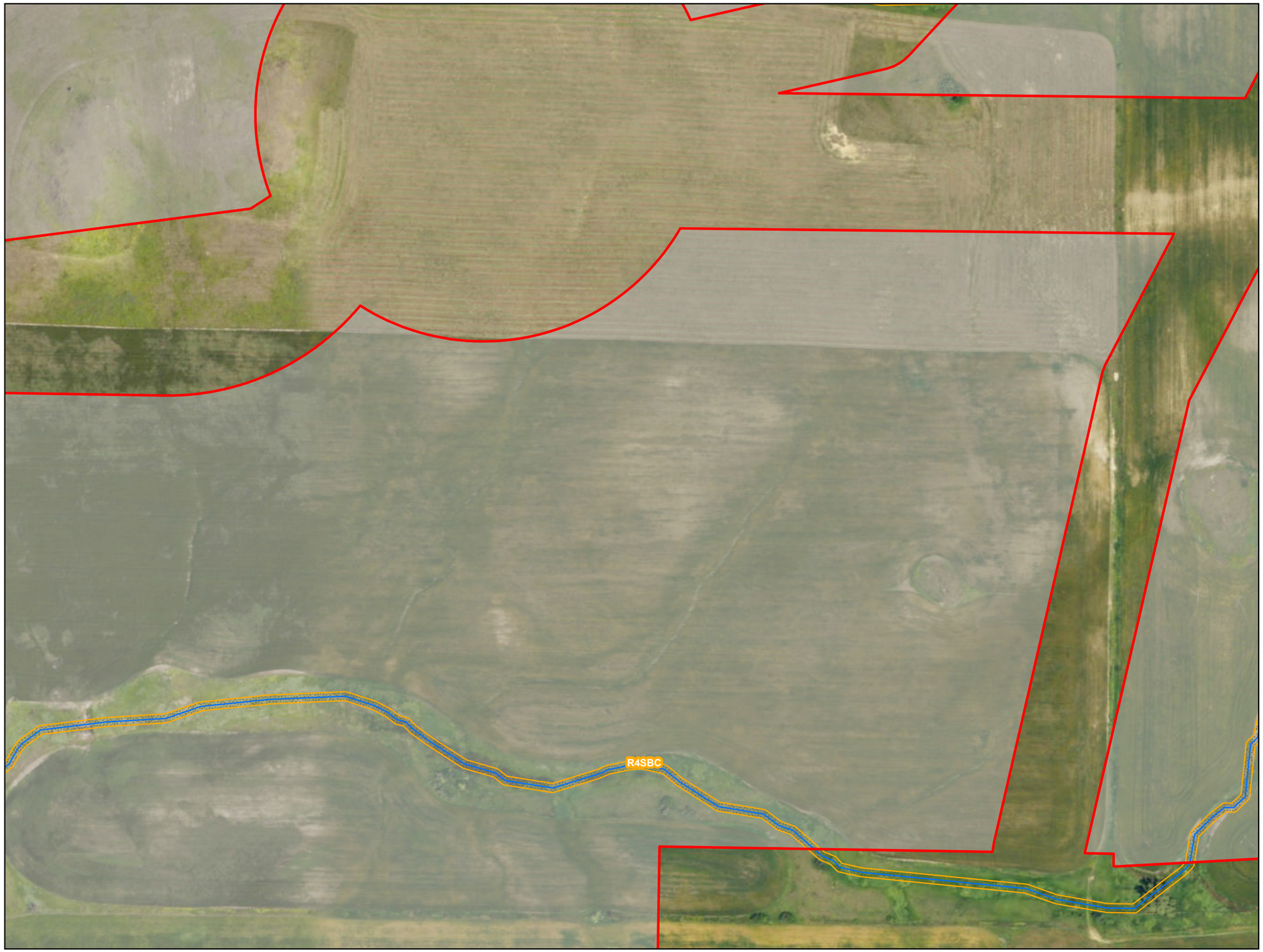

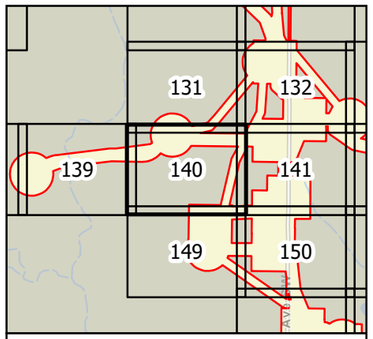

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Figure 4
Hydrology
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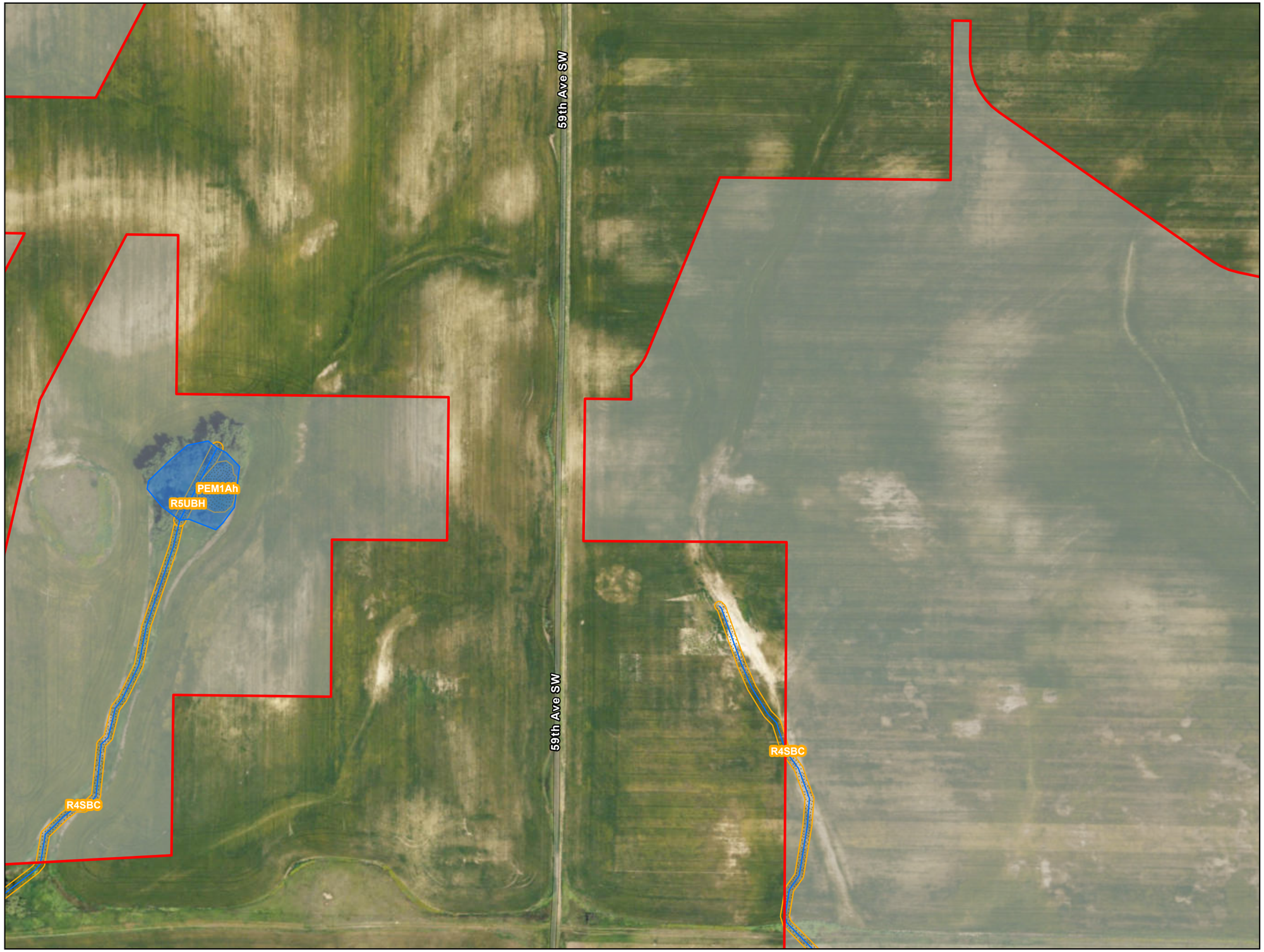

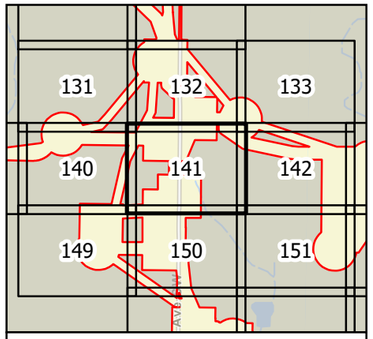

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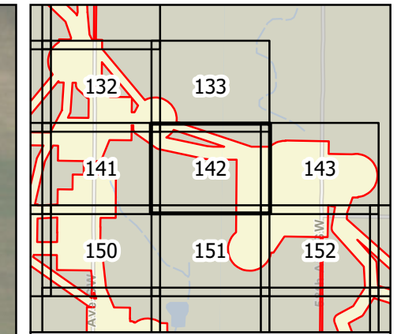

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Figure 4
Hydrology
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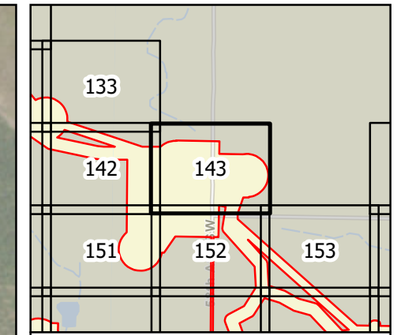

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Hydrology
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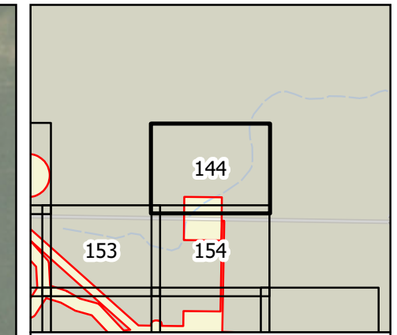

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Survey Area
Wetland (NWI)
Waterway (NHD)
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Figure 4
Hydrology
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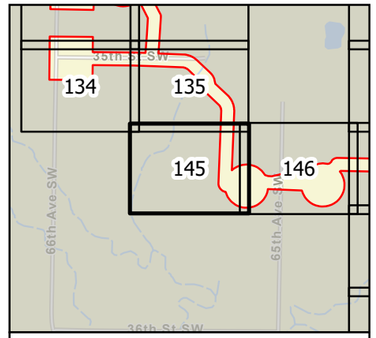

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- Wetland (NWI)
- Waterway (NHD)
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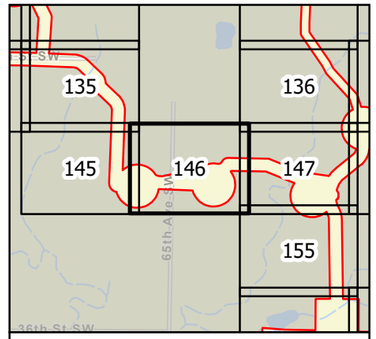

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Hydrology
Longspur Wind Project
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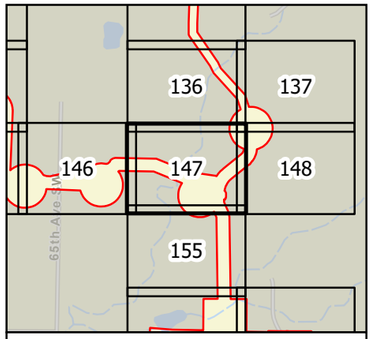

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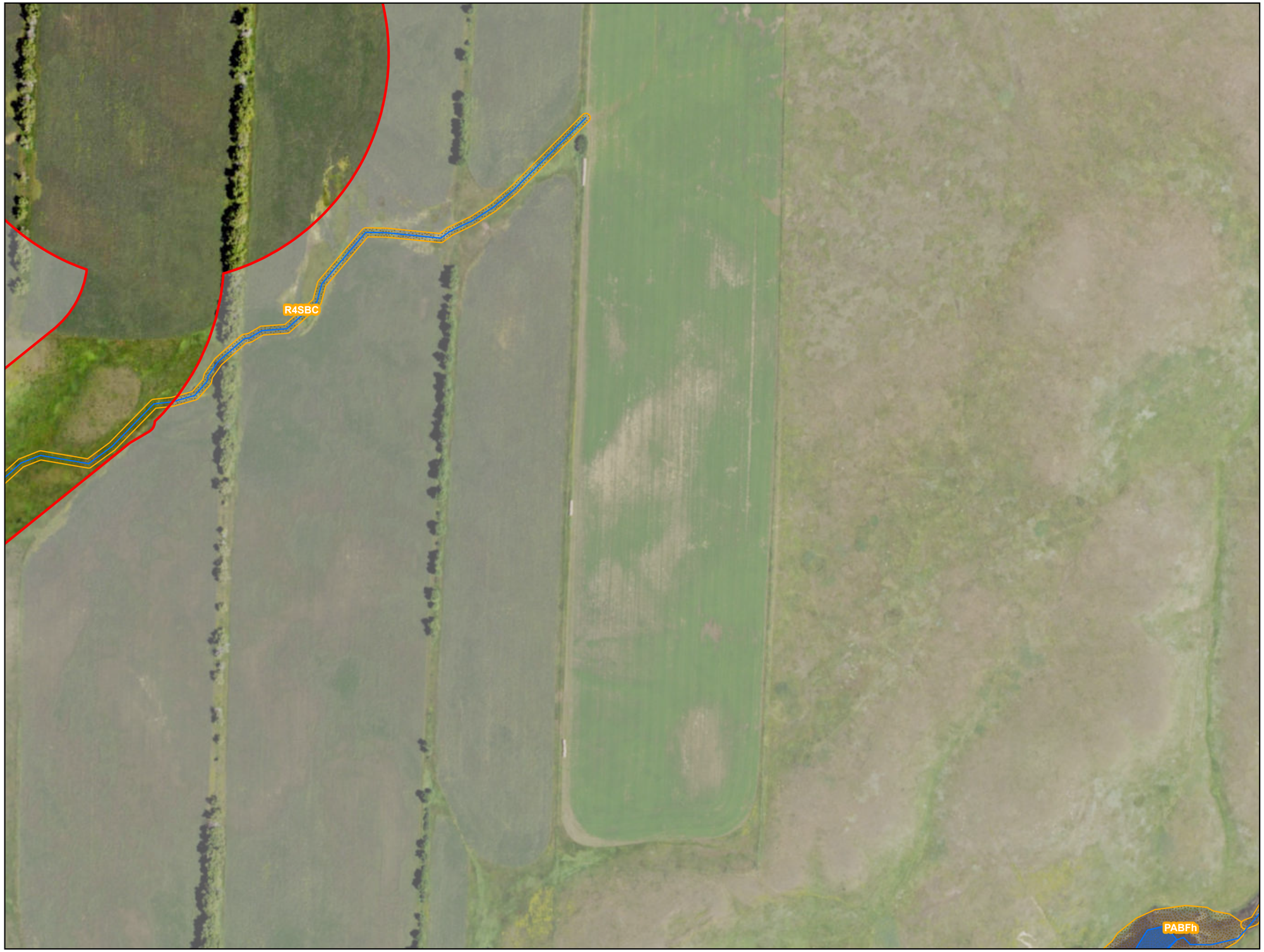

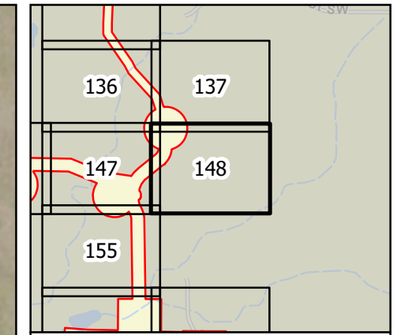

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Hydrology
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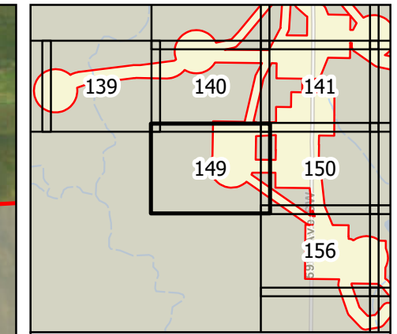

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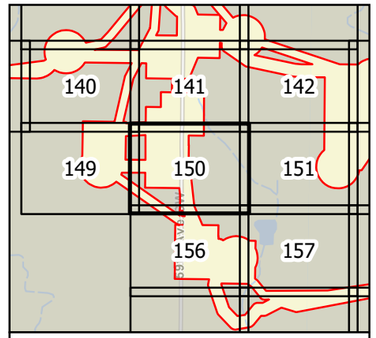

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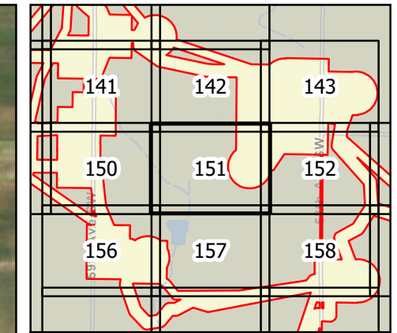

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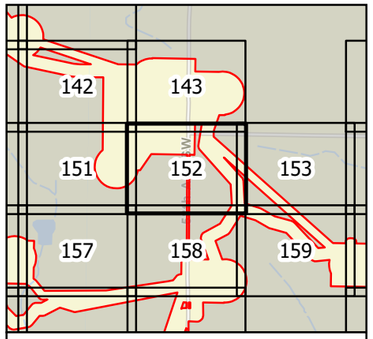

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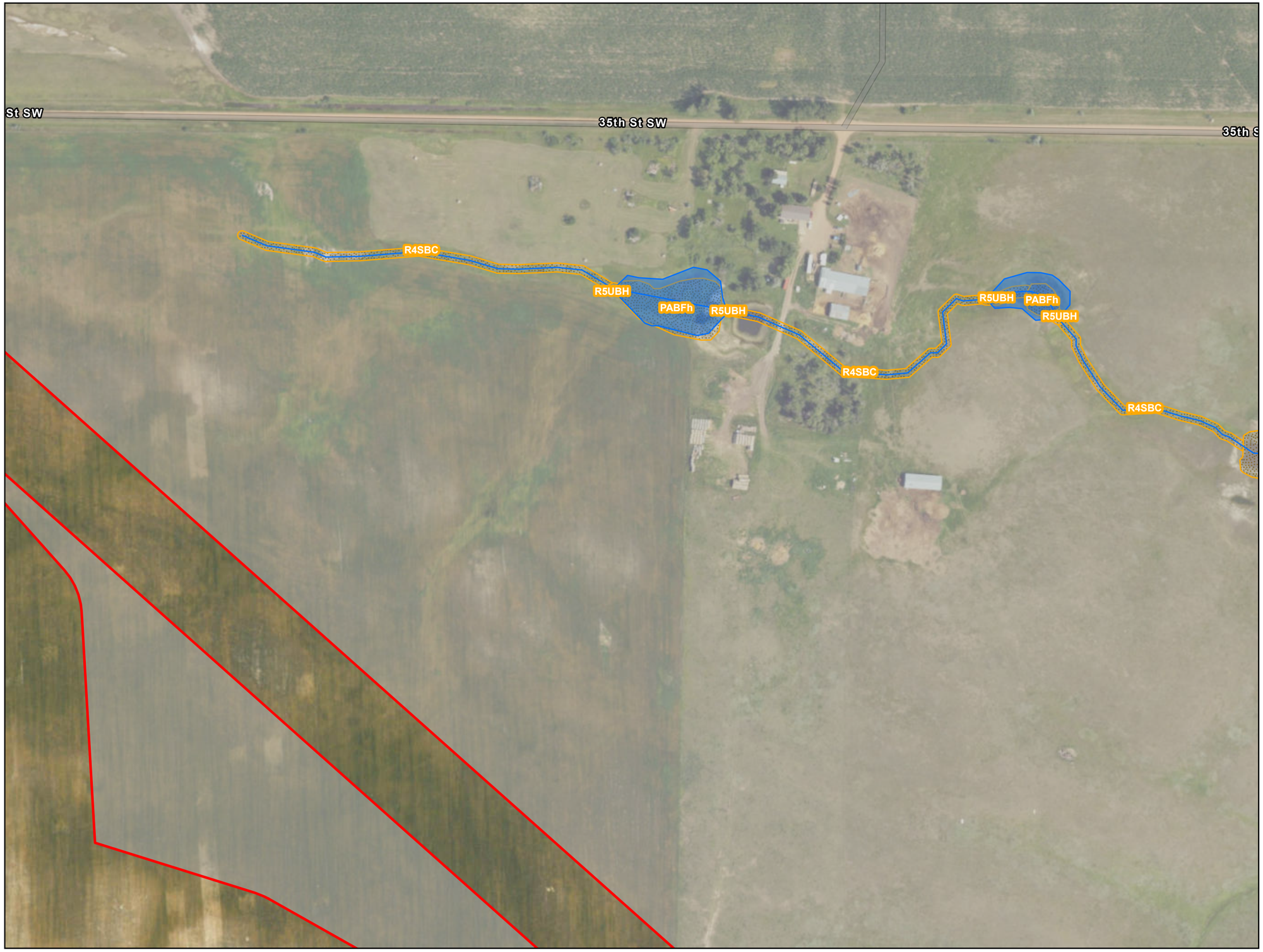

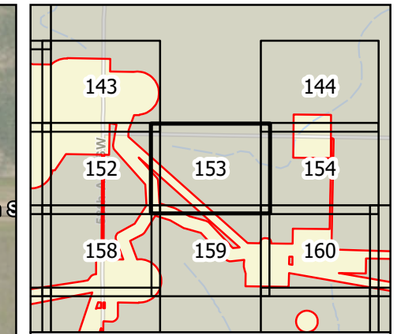

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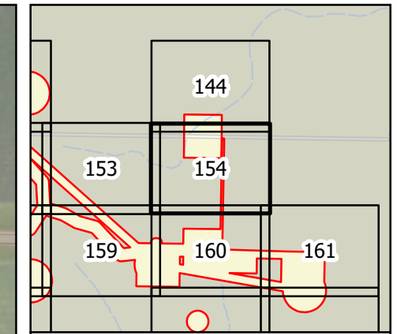

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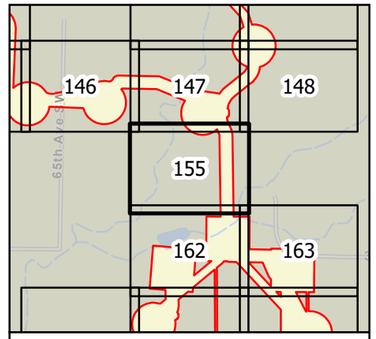

0 100 200 Feet

1 inch = 200 feet

N
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- Survey Area
- Wetland (NWI)
- Waterway (NHD)
- Waterbody (NHD)

Figure 4
Hydrology
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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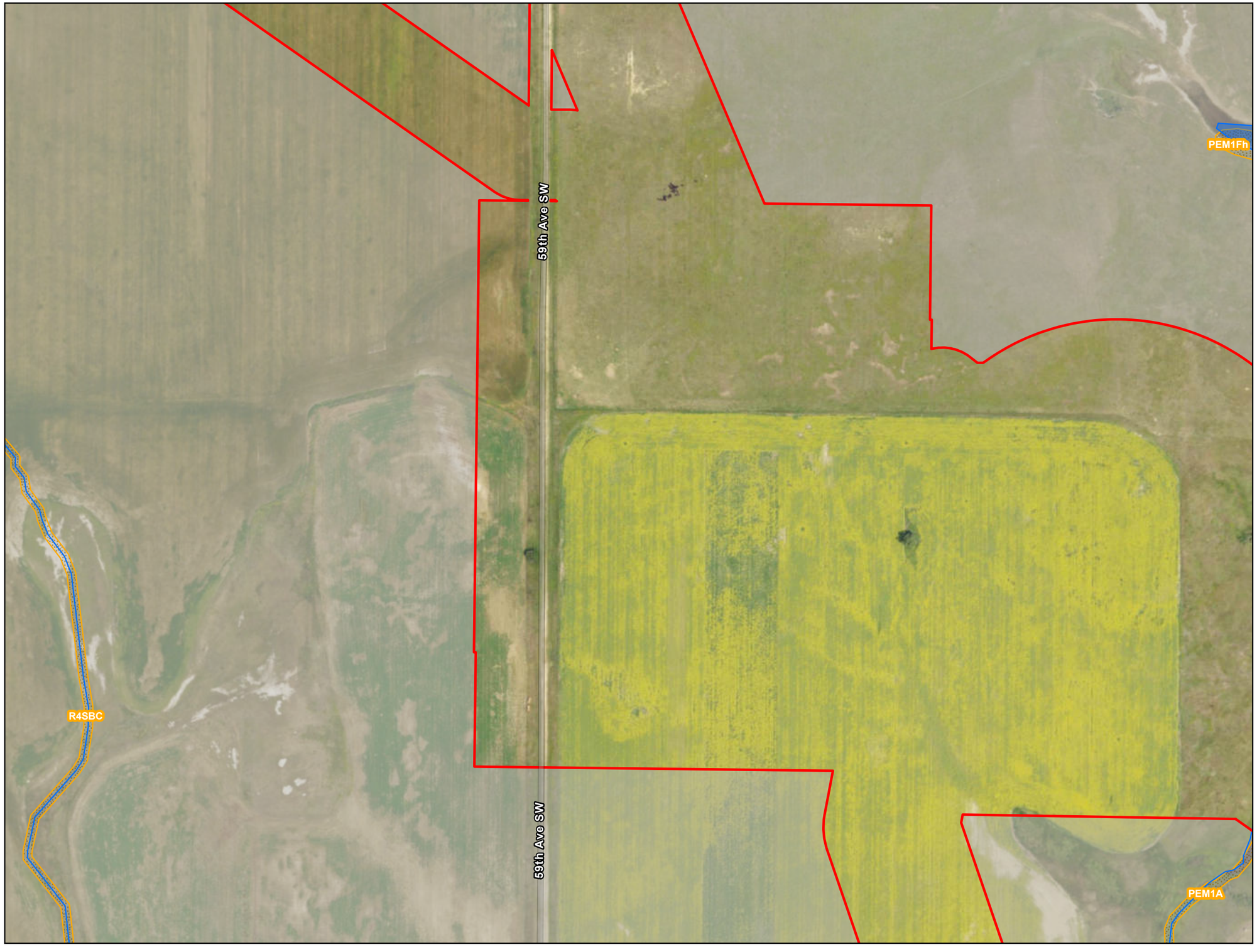

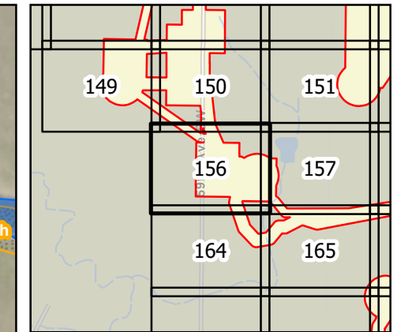

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N W E S

Survey Area

Wetland (NWI)

Waterway (NHD)

Waterbody (NHD)

Figure 4
Hydrology
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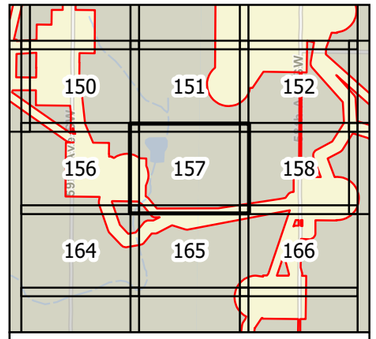

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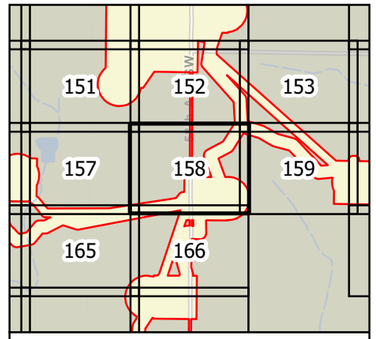

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Hydrology
Longspur Wind Project
Minnesota Power
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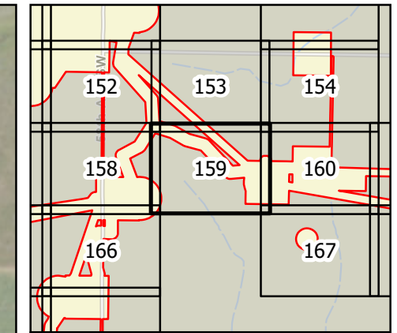

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Wetland (NWI)
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Figure 4
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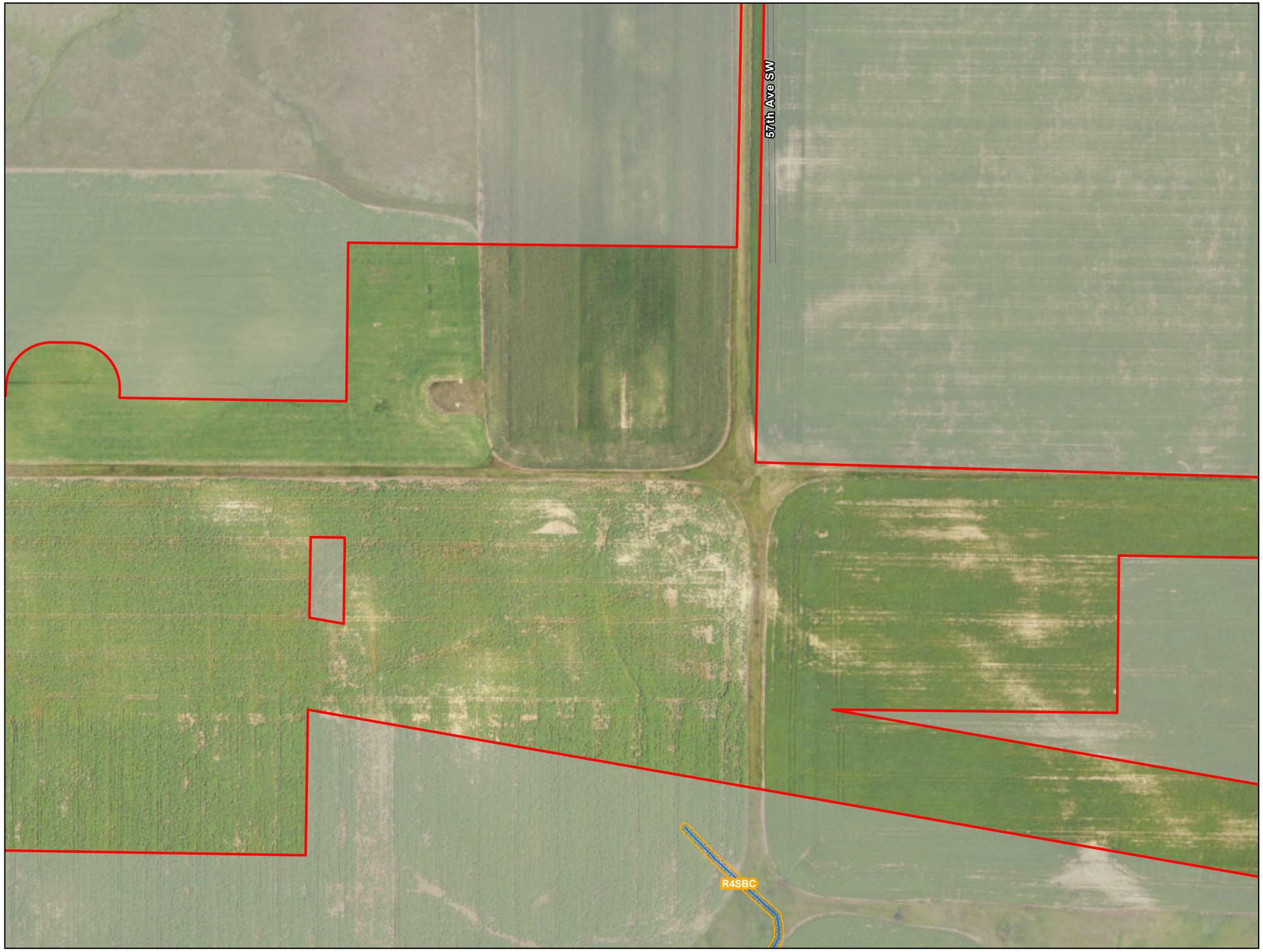

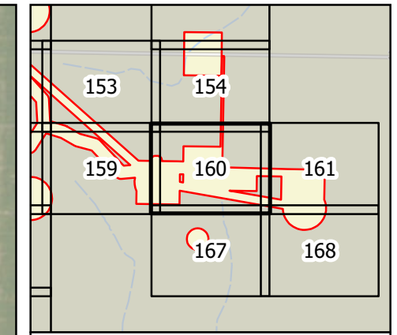

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Hydrology
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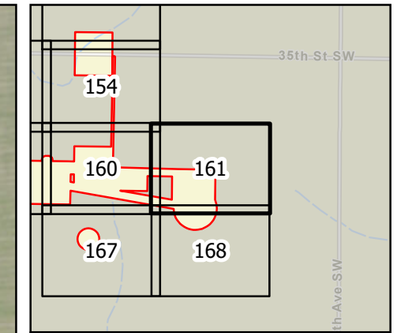

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N W E S

Survey Area
Wetland (NWI)
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Hydrology
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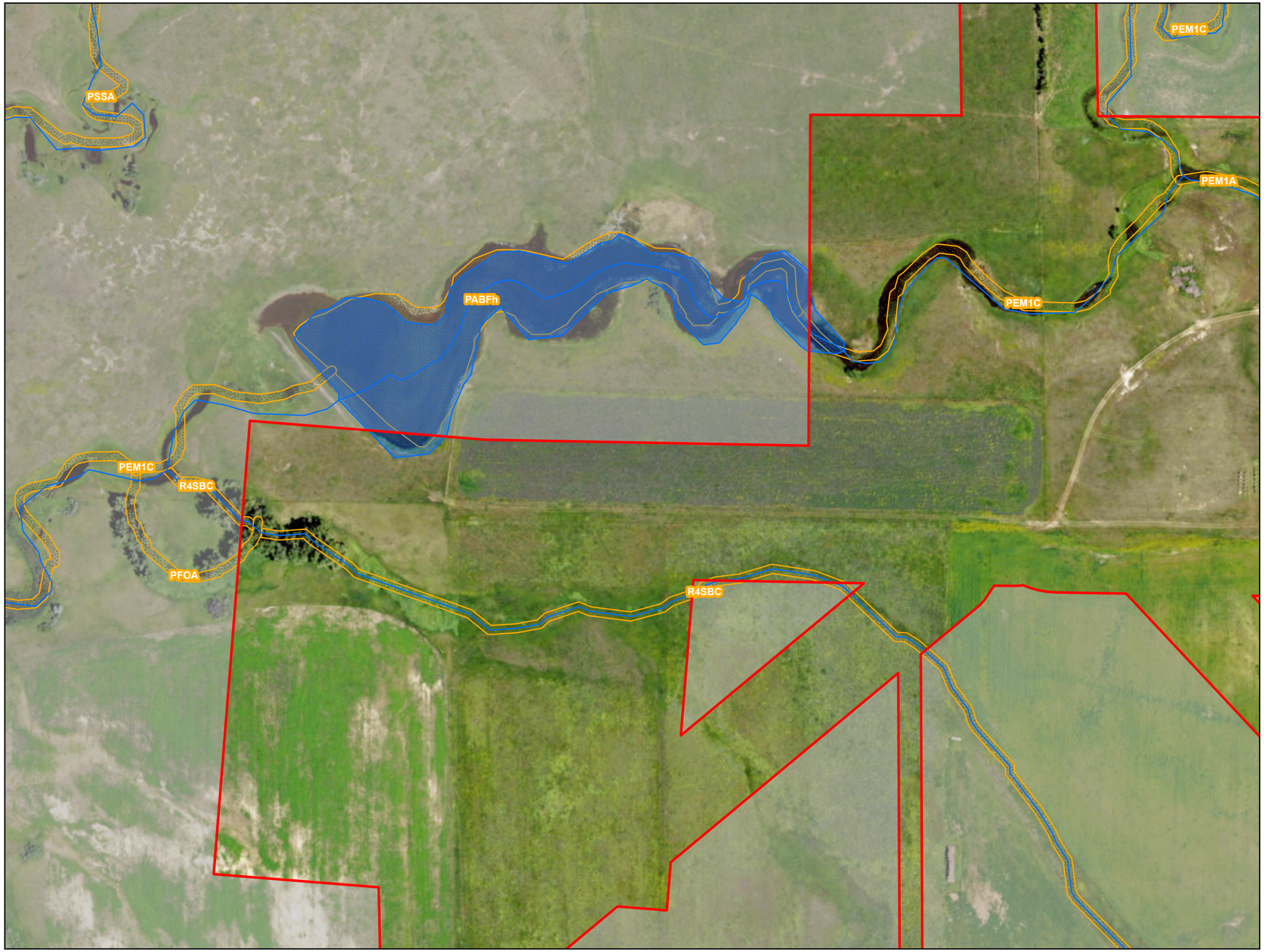

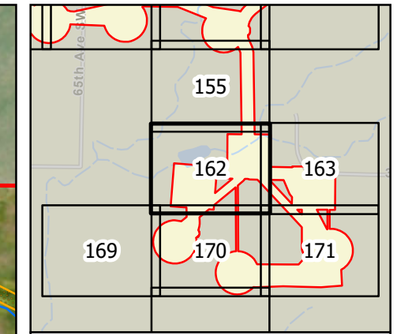

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Wetland (NWI)
Waterway (NHD)
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Hydrology
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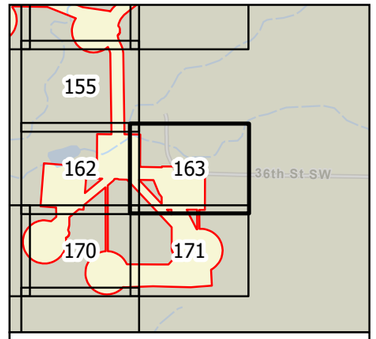

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Figure 4
Hydrology
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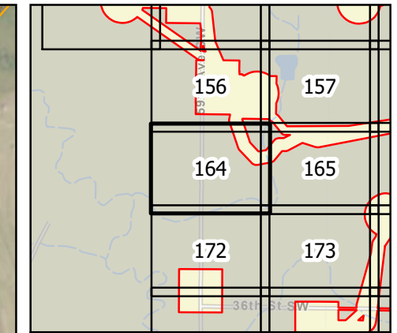

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N W E S

Survey Area
Wetland (NWI)
Waterway (NHD)
Waterbody (NHD)

Figure 4
Hydrology
Longspur Wind Project
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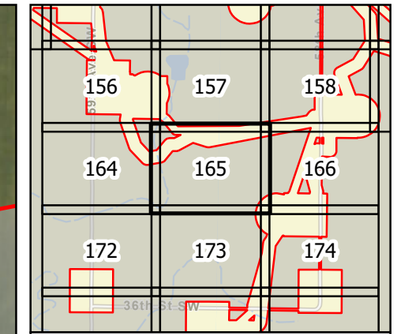

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N W E S

Survey Area
Wetland (NWI)
Waterway (NHD)
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Hydrology
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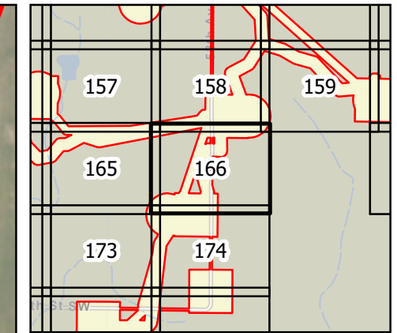

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Wetland (NWI)
Waterway (NHD)
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Hydrology
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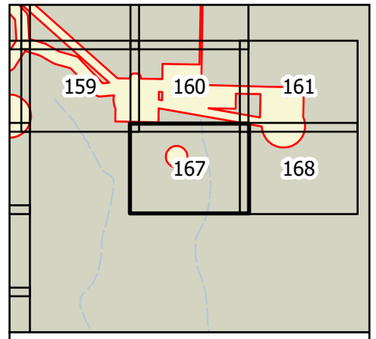

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Figure 4
Hydrology
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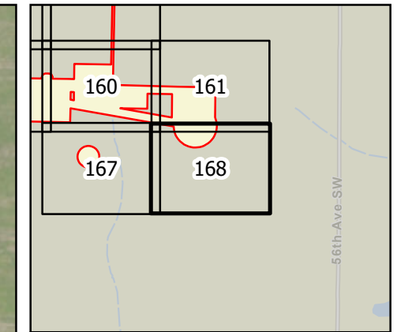

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N W E S

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Wetland (NWI)
Waterway (NHD)
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Figure 4
Hydrology
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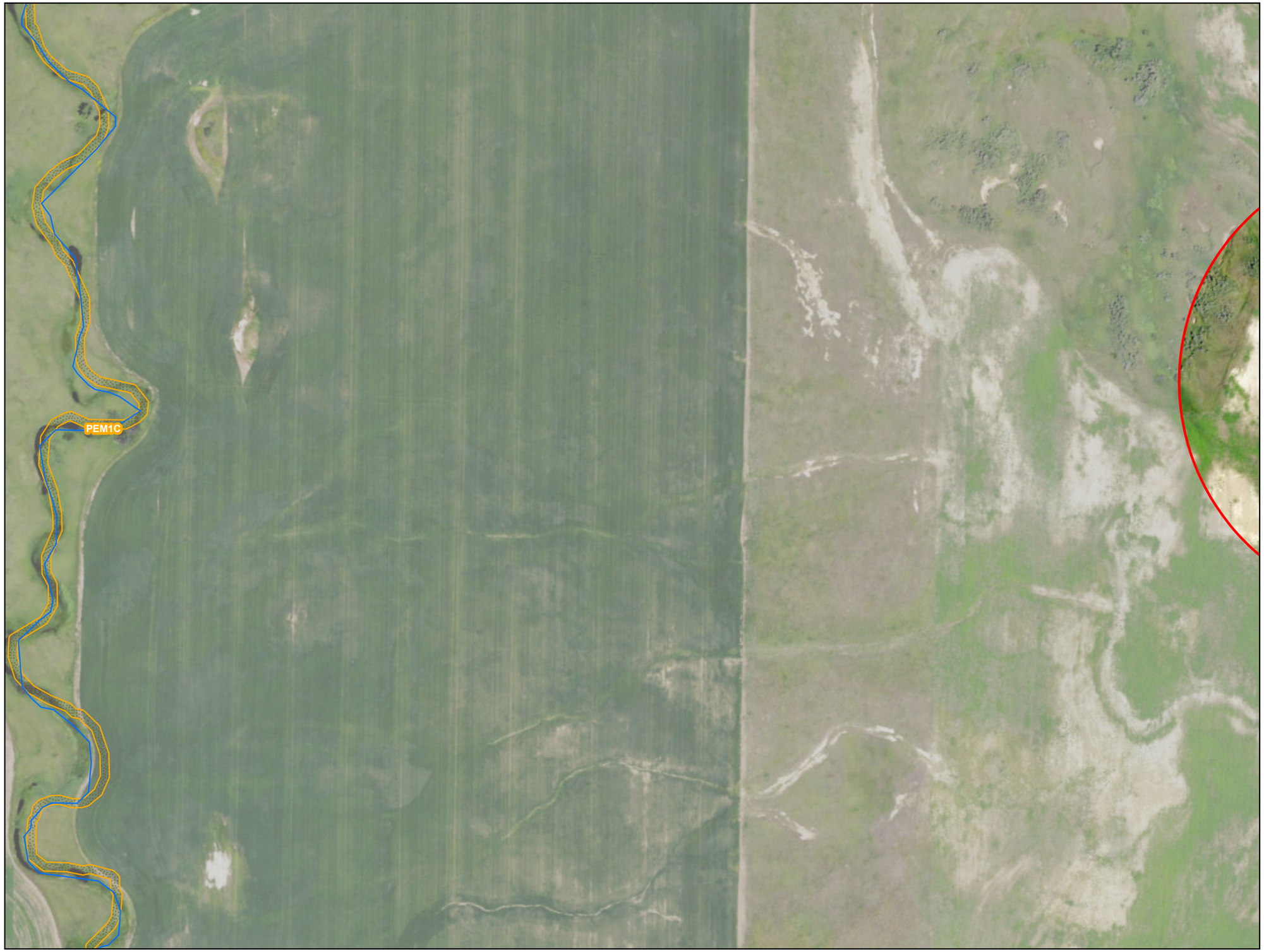

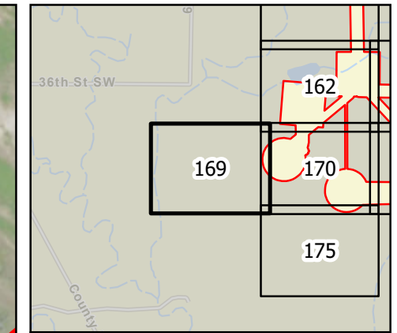

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Waterway (NHD)
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Figure 4
Hydrology
Longspur Wind Project
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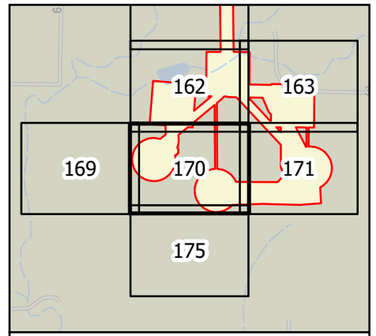

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Hydrology
Longspur Wind Project
Minnesota Power
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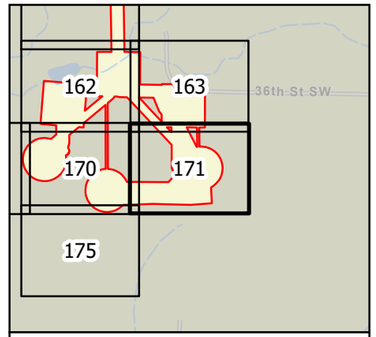

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Hydrology
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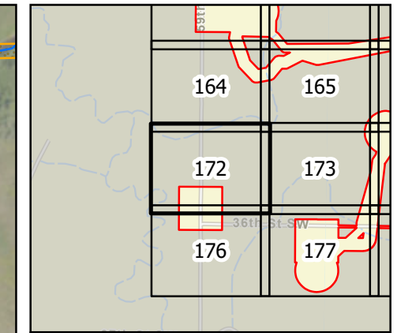

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Hydrology
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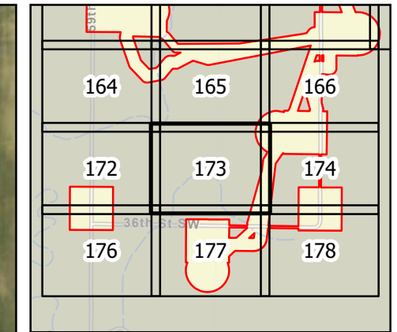

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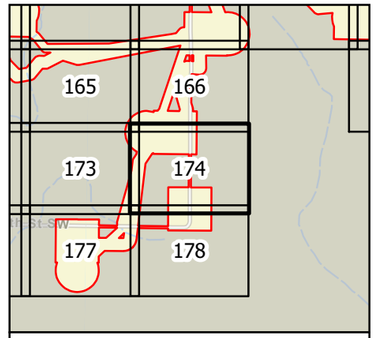

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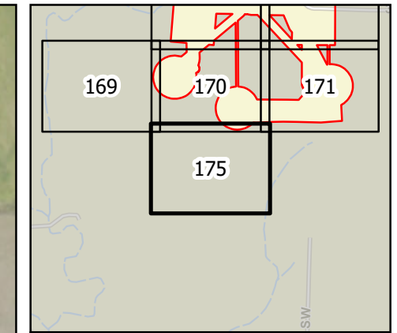

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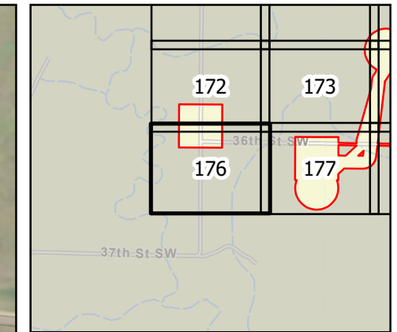

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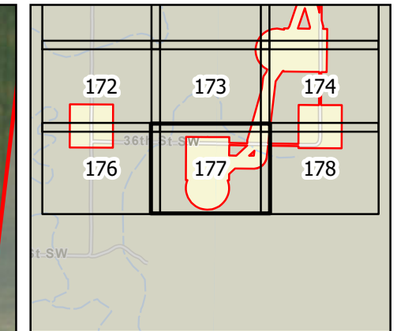

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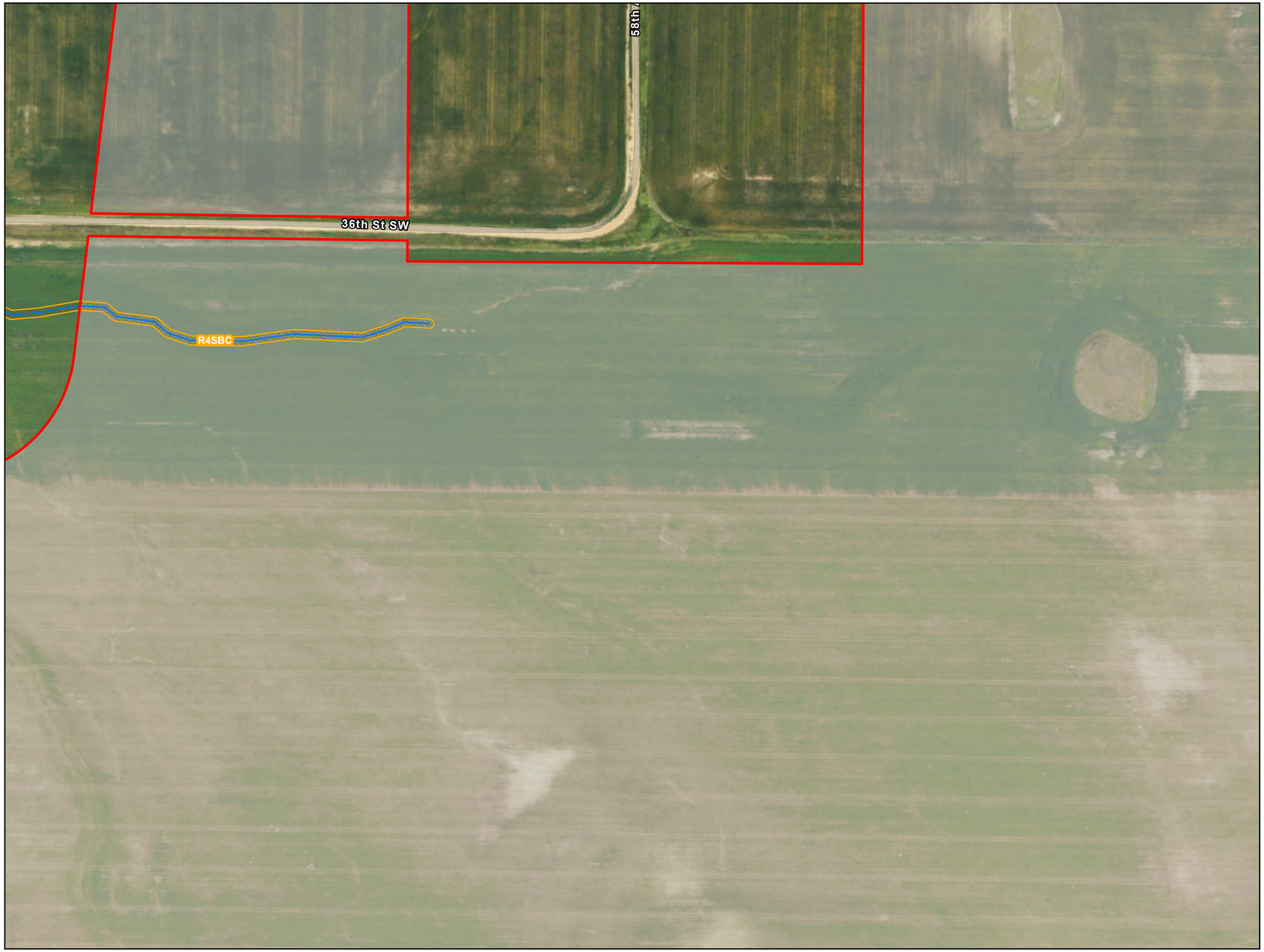

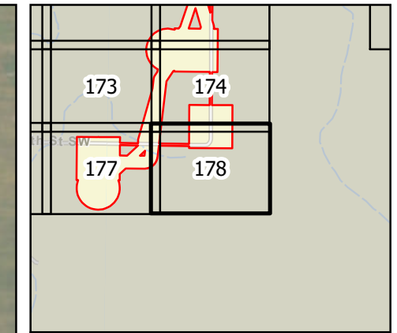

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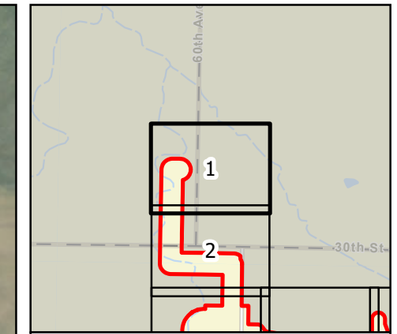
Figure 5

Wetland Delineation





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1 inch = 200 feet

N W E S

Survey Area

Culvert Point

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
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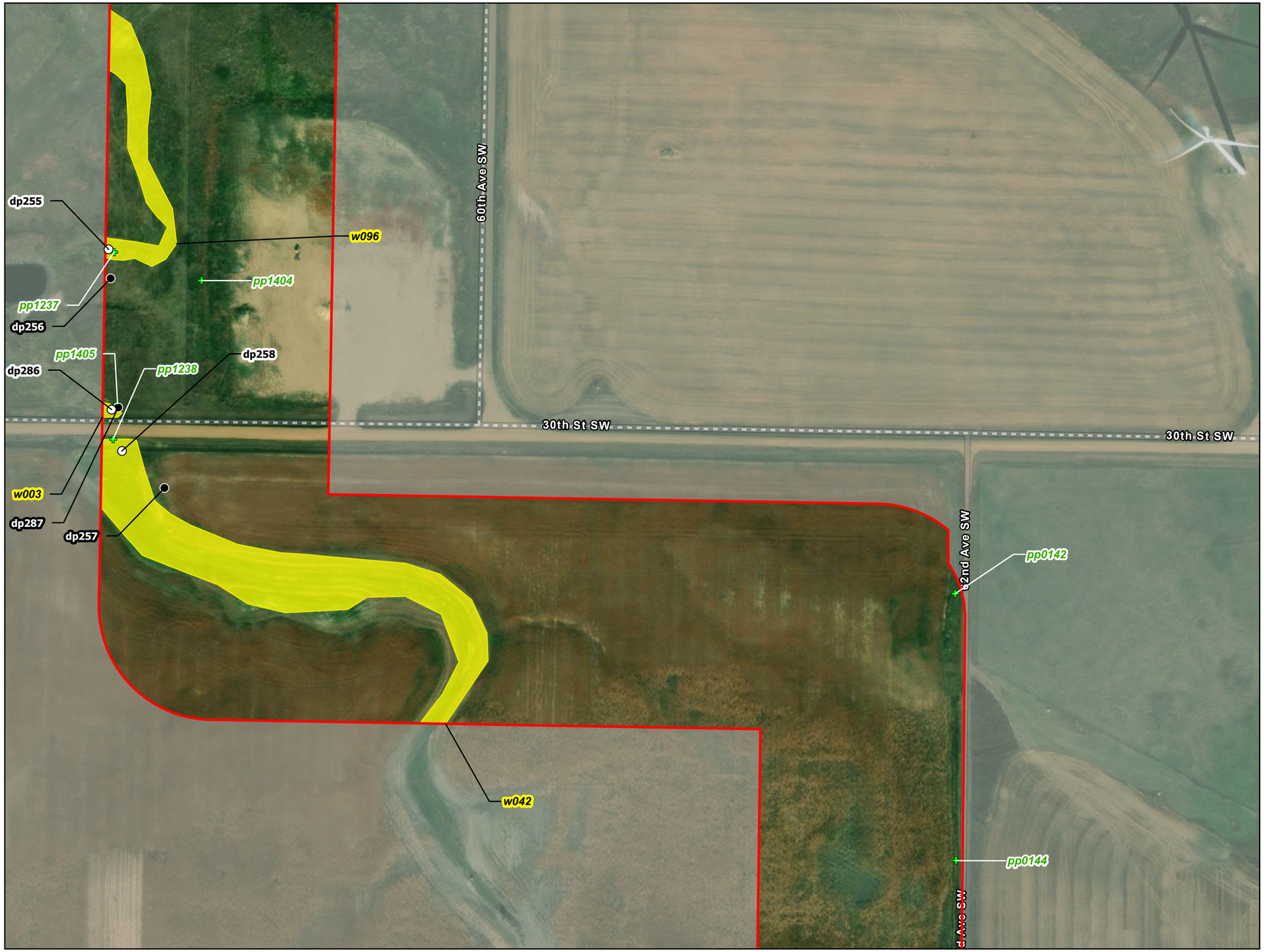

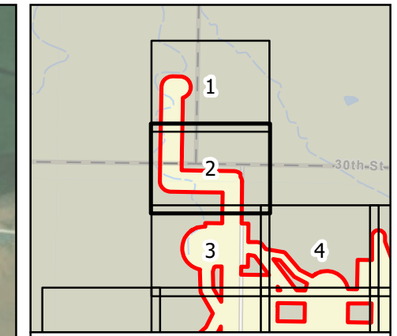

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
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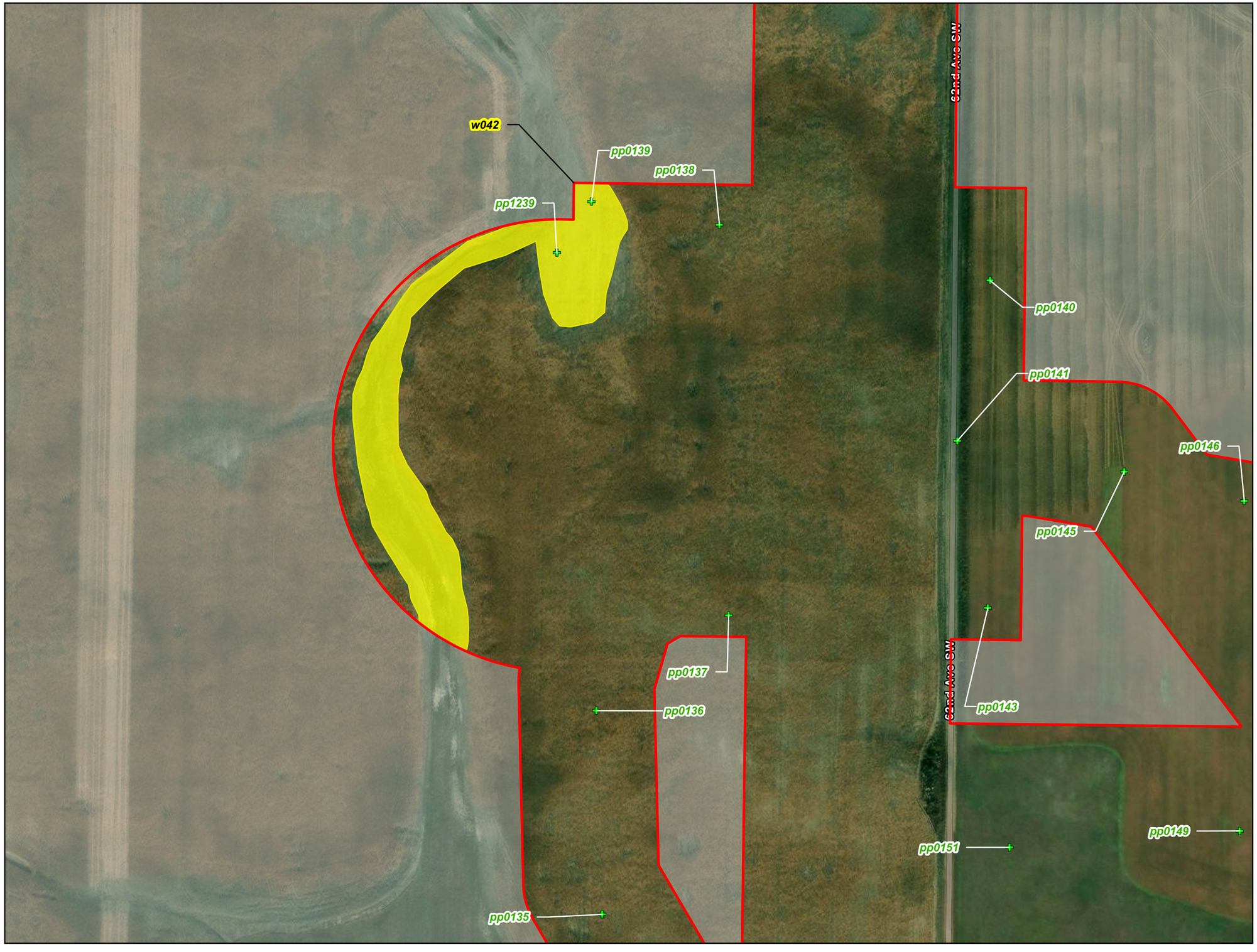

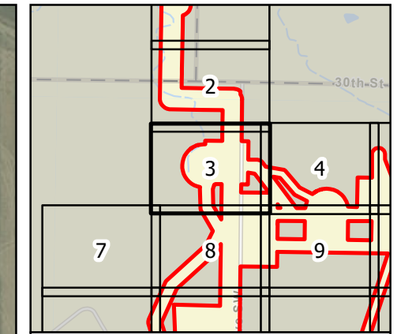

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Survey Area

Photo Point

Delineated Wetland

PEM

Figure 5
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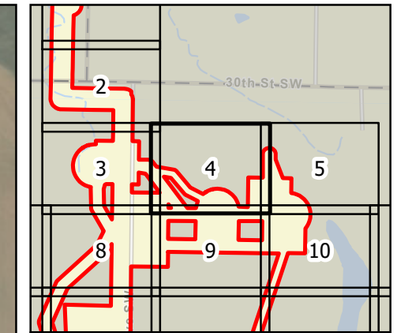

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Figure 5
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Longspur Wind Project
Minnesota Power
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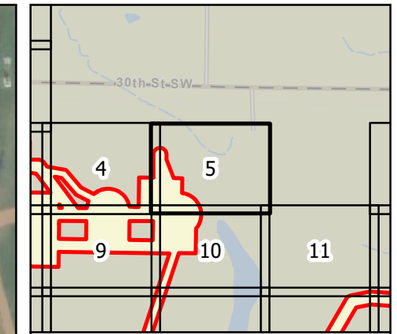

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Survey Area

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Delineated Wetland

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Figure 5
Wetland Delineation
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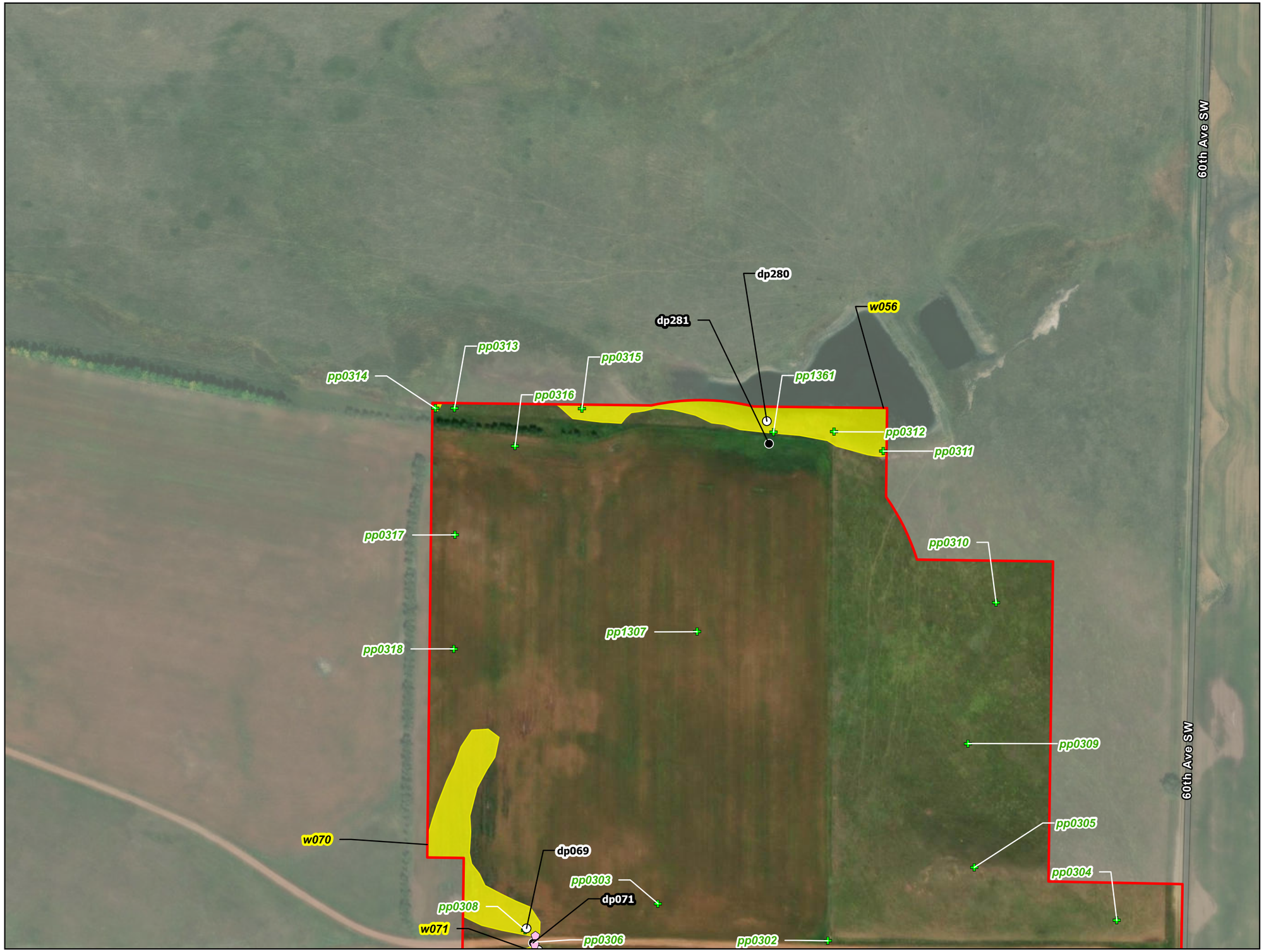

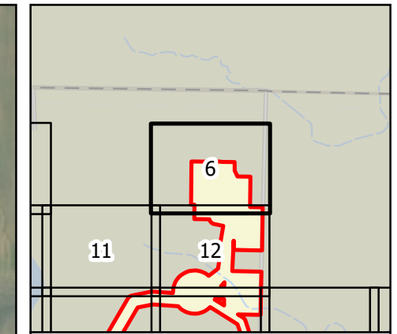

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N W E S

Survey Area

Culvert Point

Photo Point

Upland Data Point

Wetland Data Point

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Longspur Wind Project
Minnesota Power
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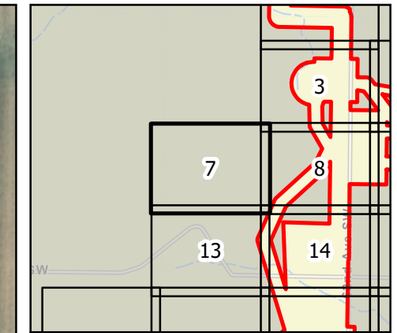

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Survey Area

Photo Point

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Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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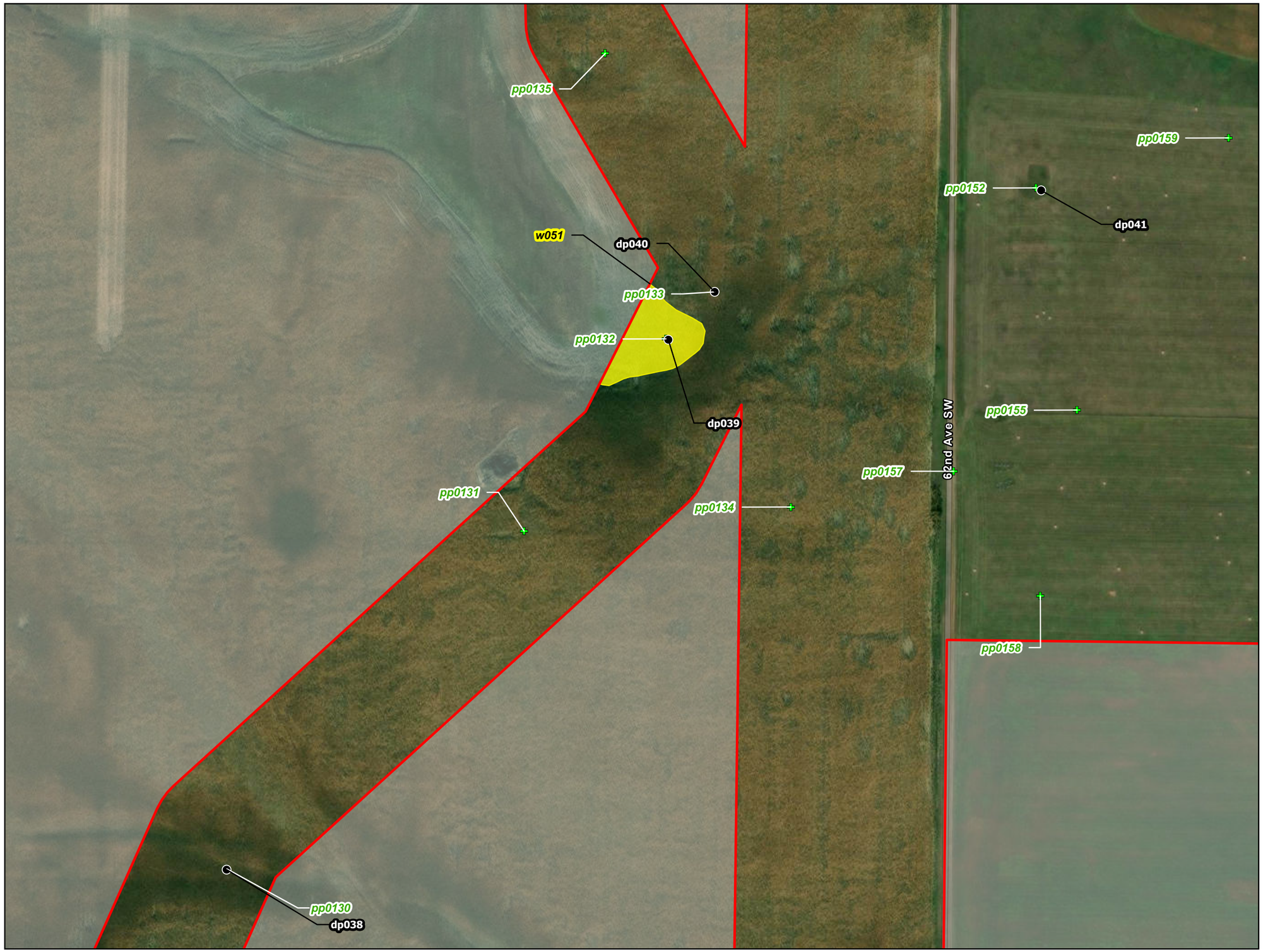

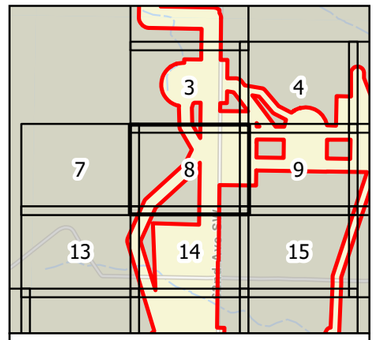

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Survey Area

Photo Point

Upland Data Point

Delineated Wetland

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Figure 5
Wetland Delineation
Longspur Wind Project
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North Dakota

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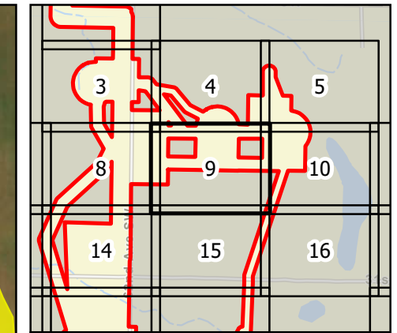

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Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

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Figure 5
Wetland Delineation
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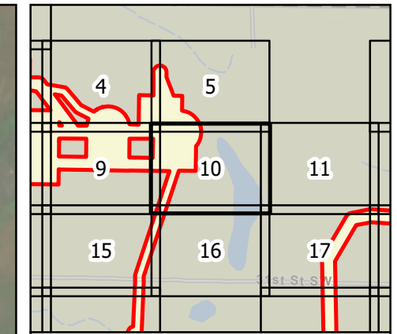

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Figure 5
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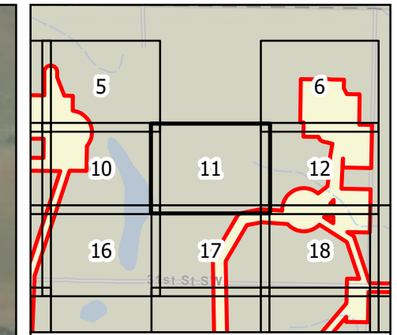

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Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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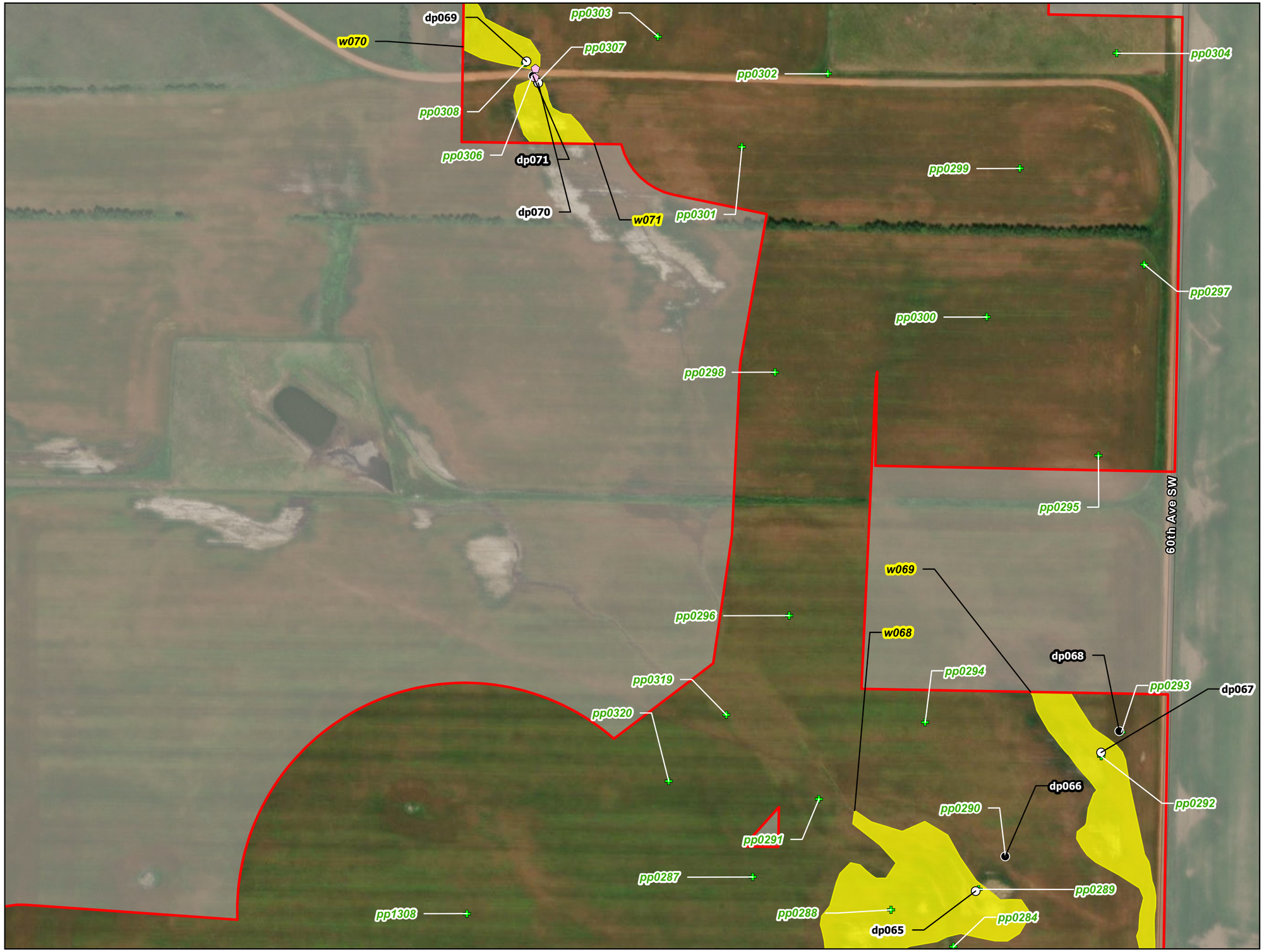

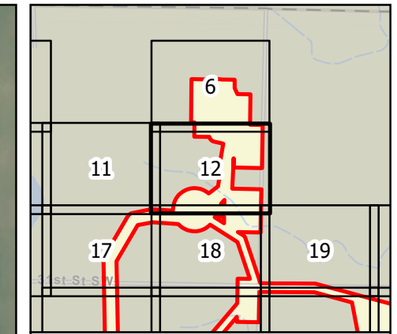

0 100 200 Feet

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Survey Area

Culvert Point

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
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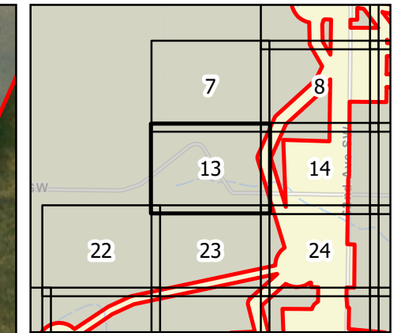

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Survey Area

Photo Point

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PEM

Figure 5
Wetland Delineation
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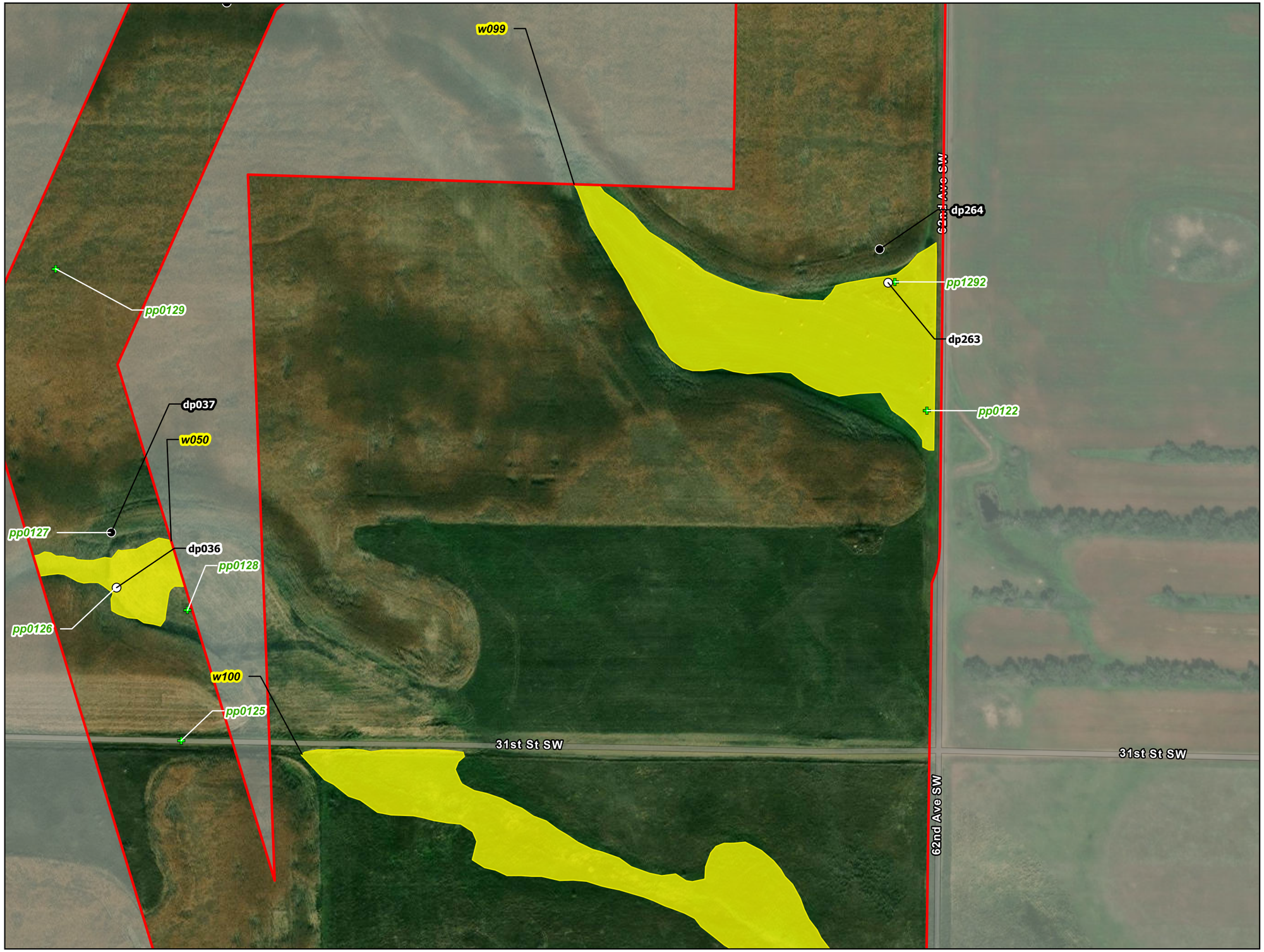

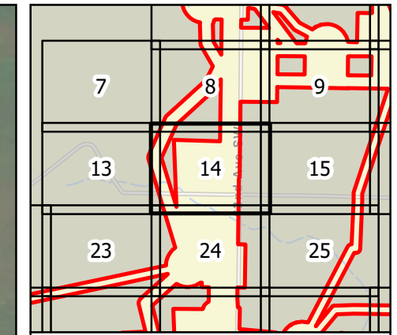

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Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

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Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
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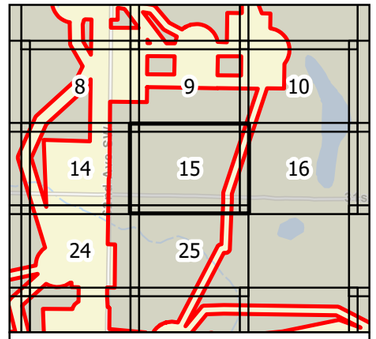

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Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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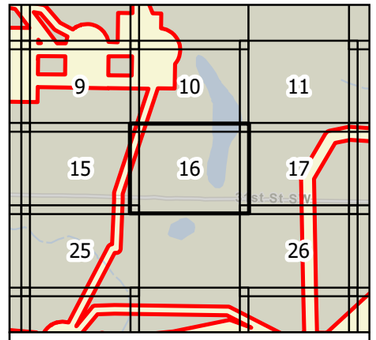

0 100 200 Feet

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Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
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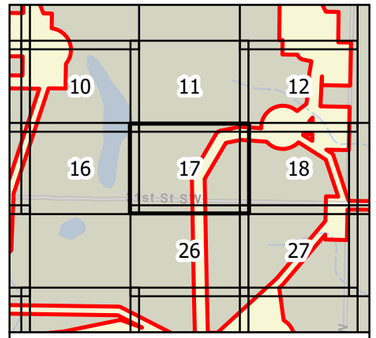

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Survey Area

Photo Point

Figure 5
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Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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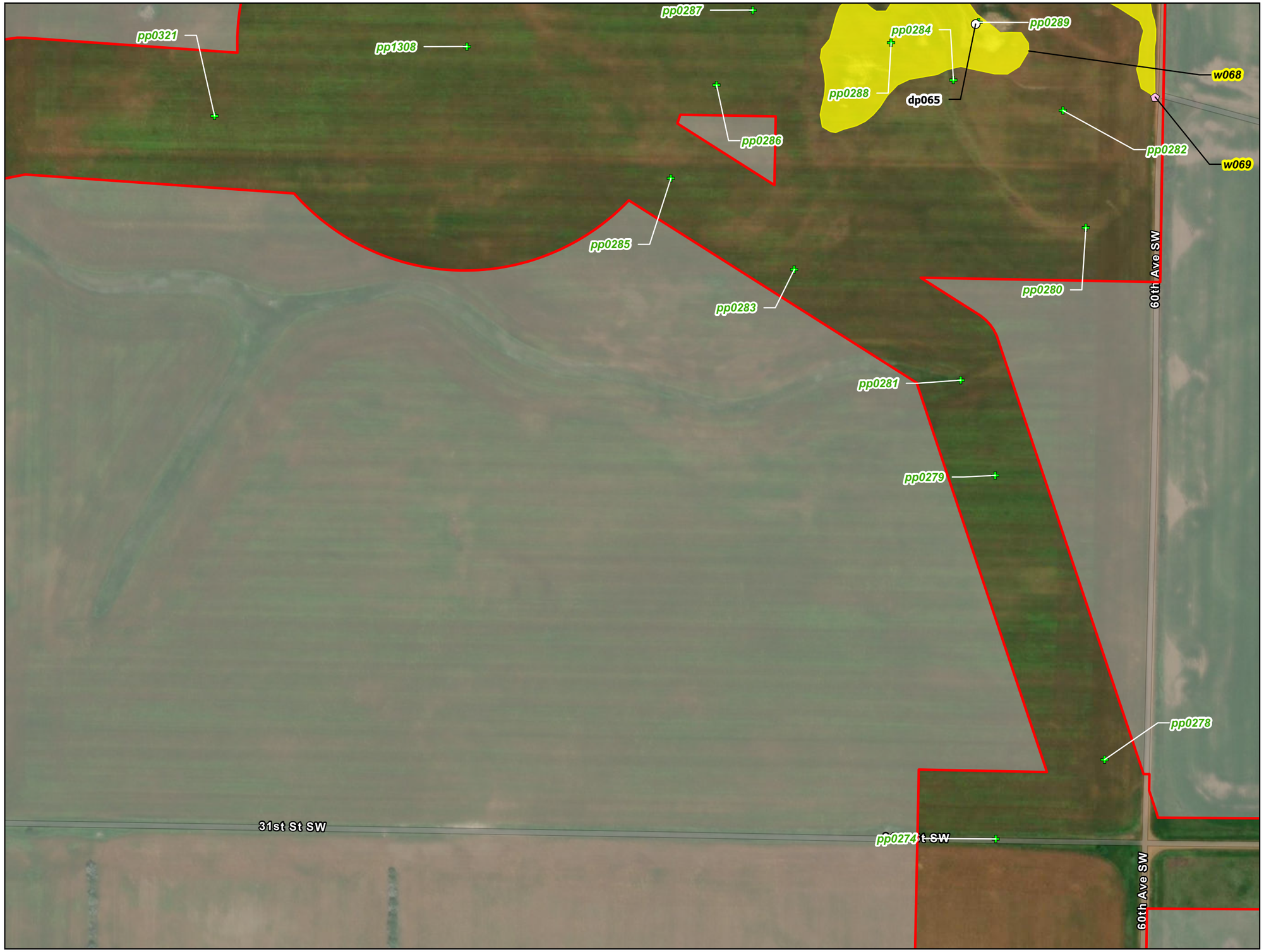

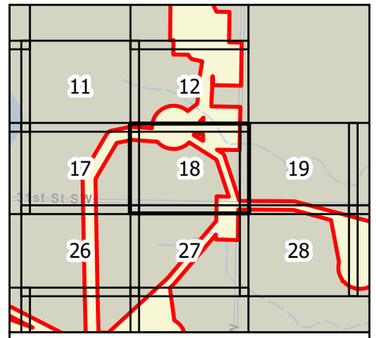

0 100 200 Feet

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- Survey Area
- Culvert Point
- Photo Point
- Wetland Data Point

Delineated Wetland

- PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
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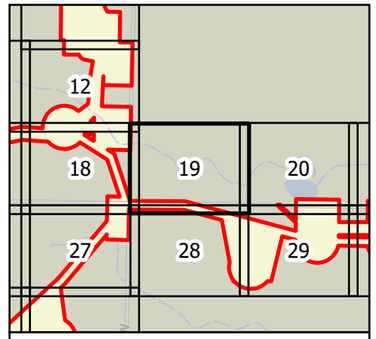

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Delineated Wetland

- PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
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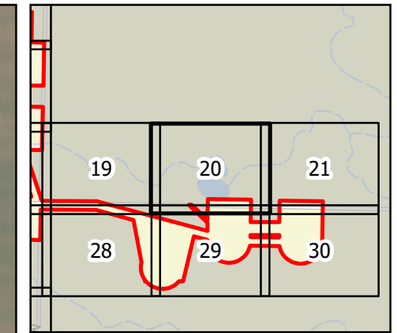

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N W E S

Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

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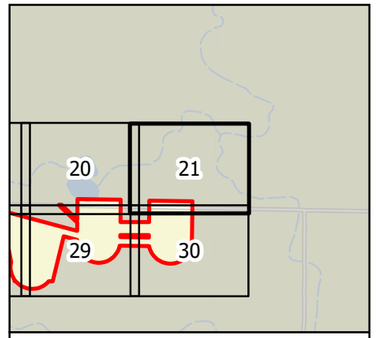

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Survey Area

Photo Point

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Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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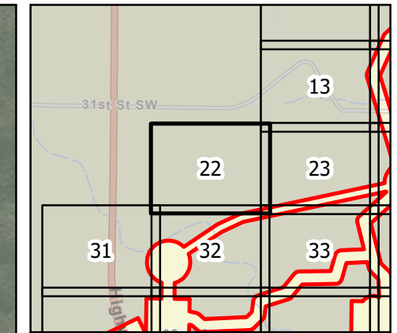

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N W E S

Survey Area

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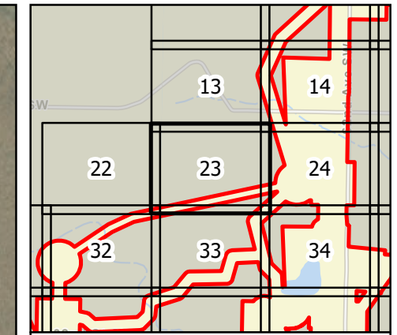

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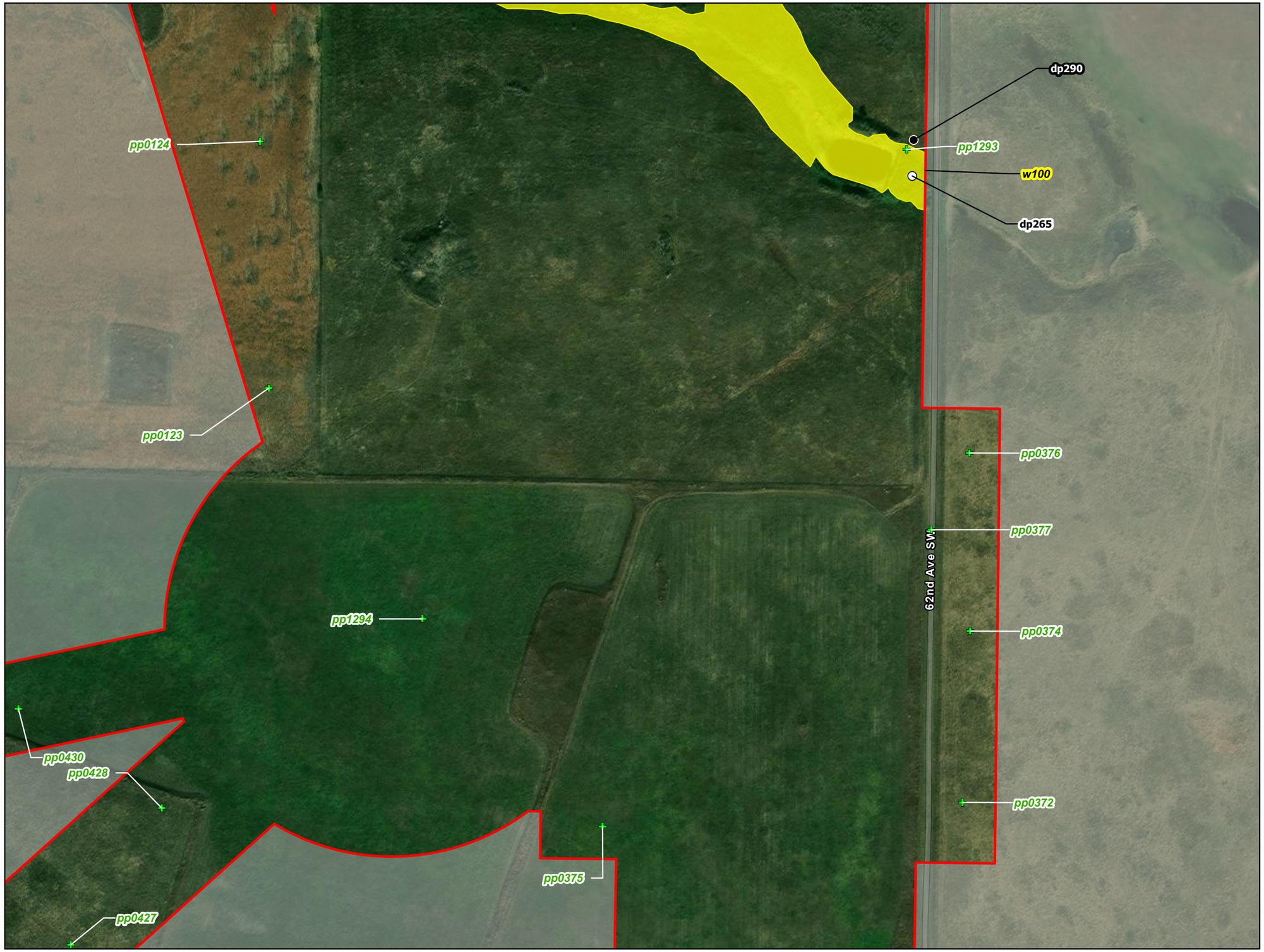

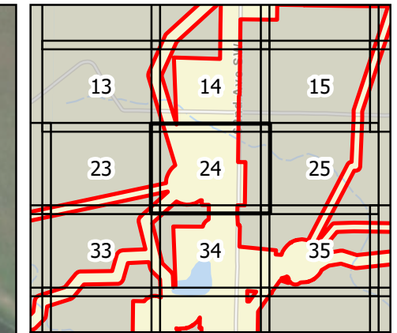

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Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
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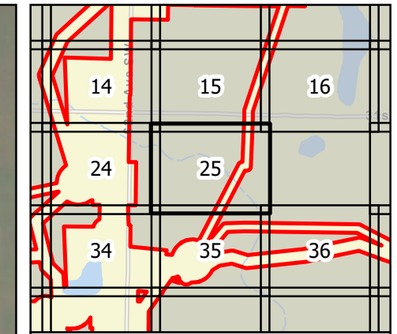

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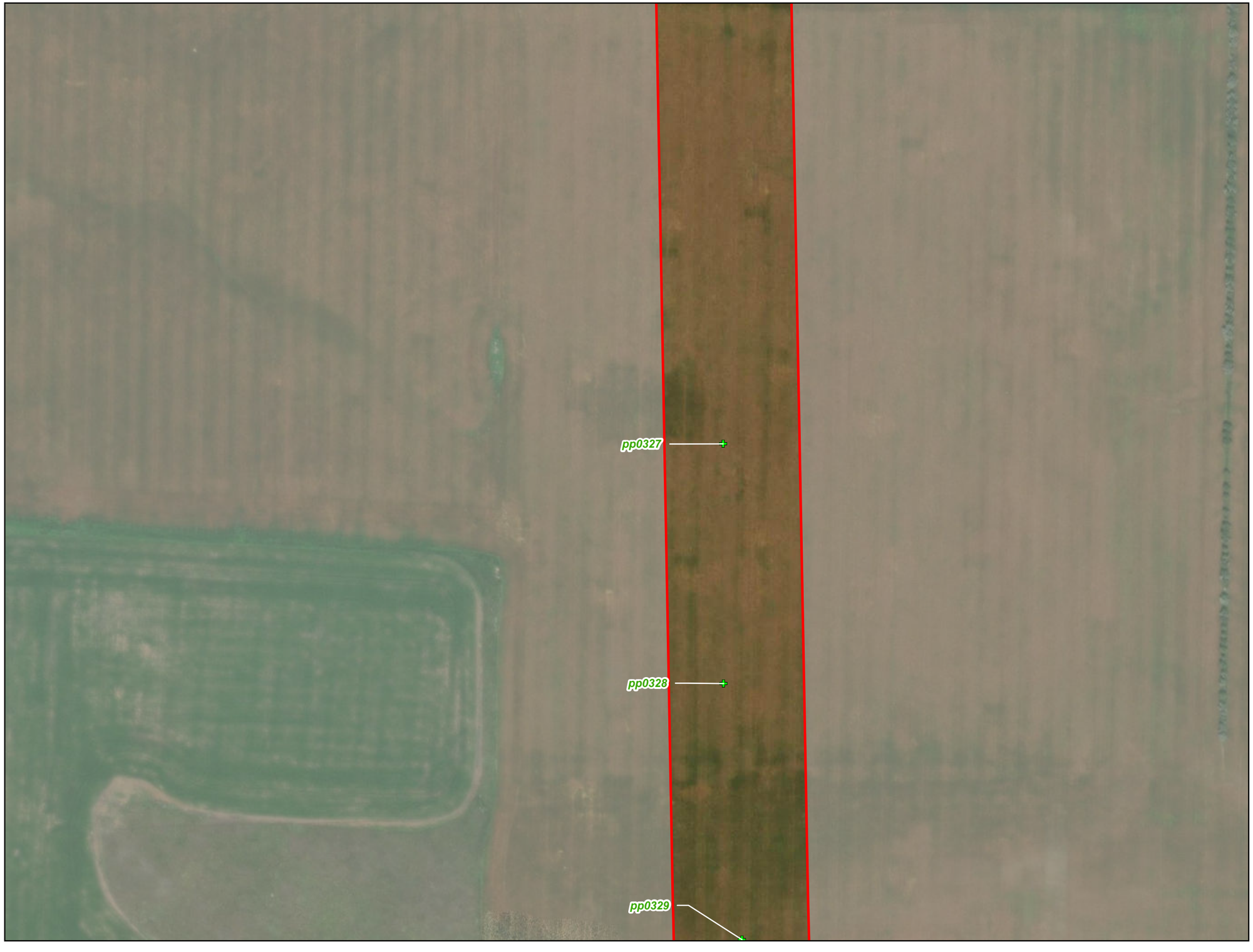

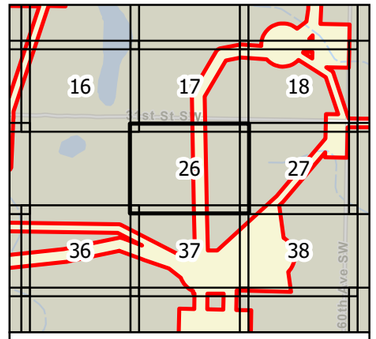

0 100 200 Feet

1 inch = 200 feet

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Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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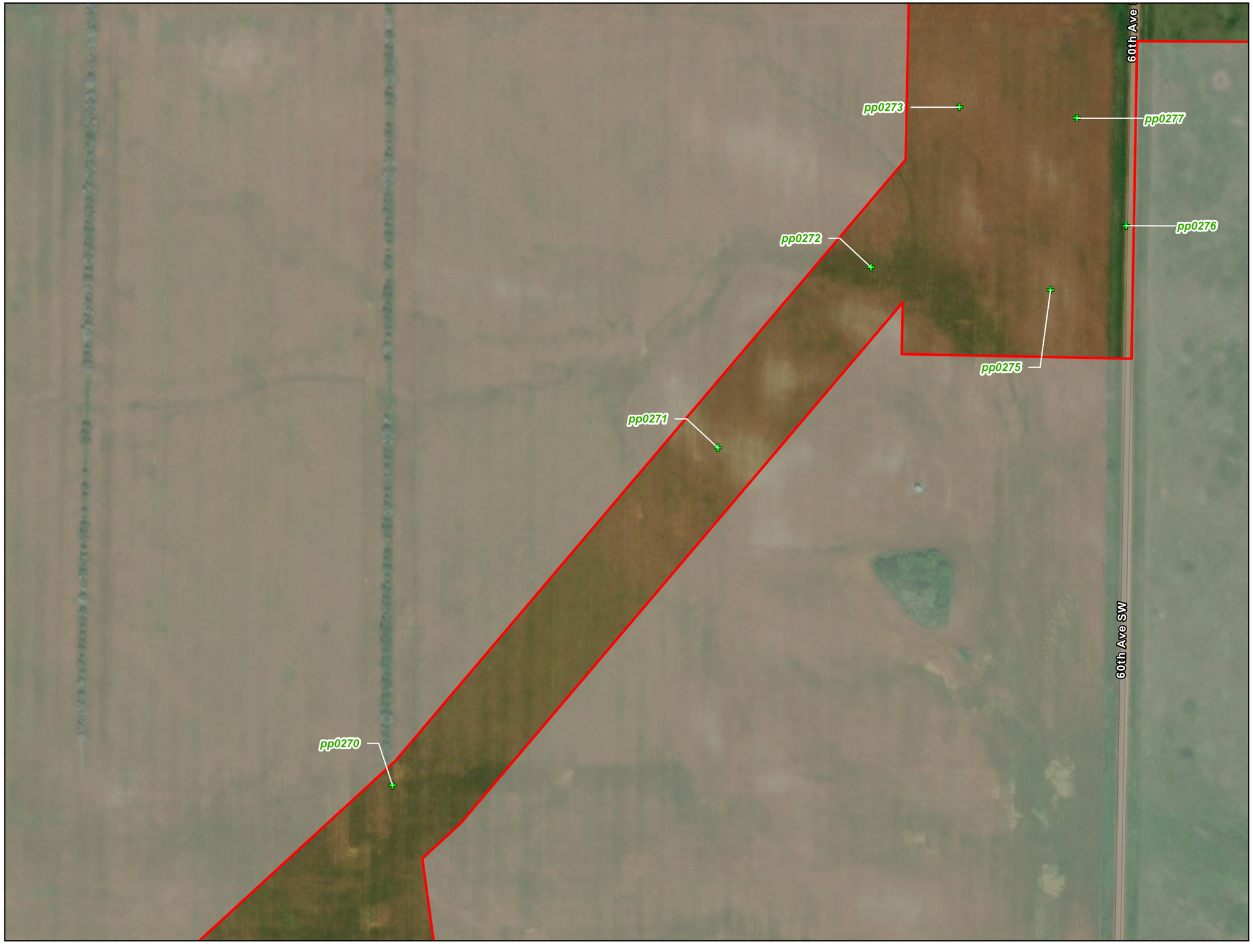

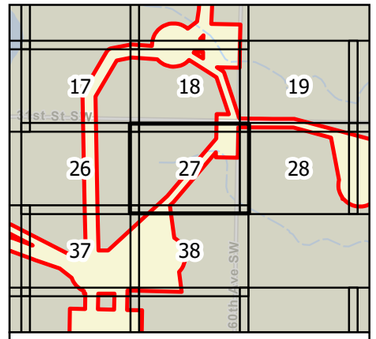

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Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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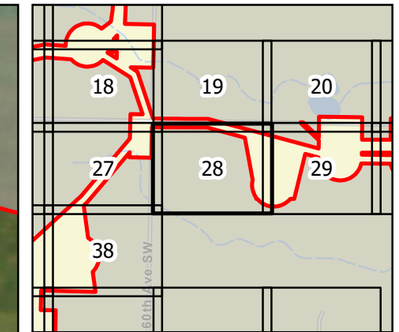

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1 inch = 200 feet

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Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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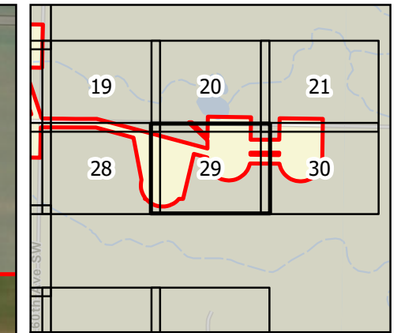

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Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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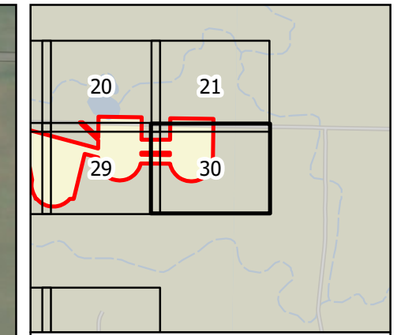

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Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
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Mercer & Morton Counties,
North Dakota

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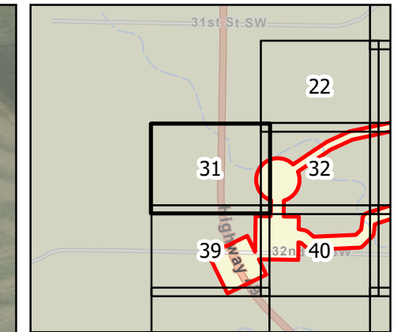

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1 inch = 200 feet

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Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

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Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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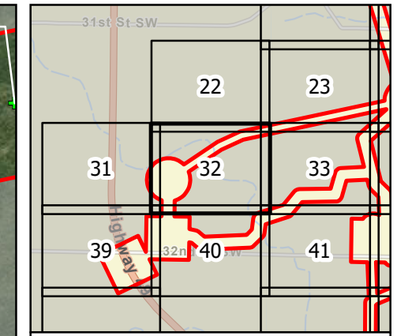

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Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

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Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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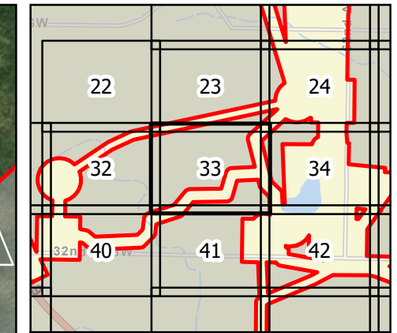

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Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

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Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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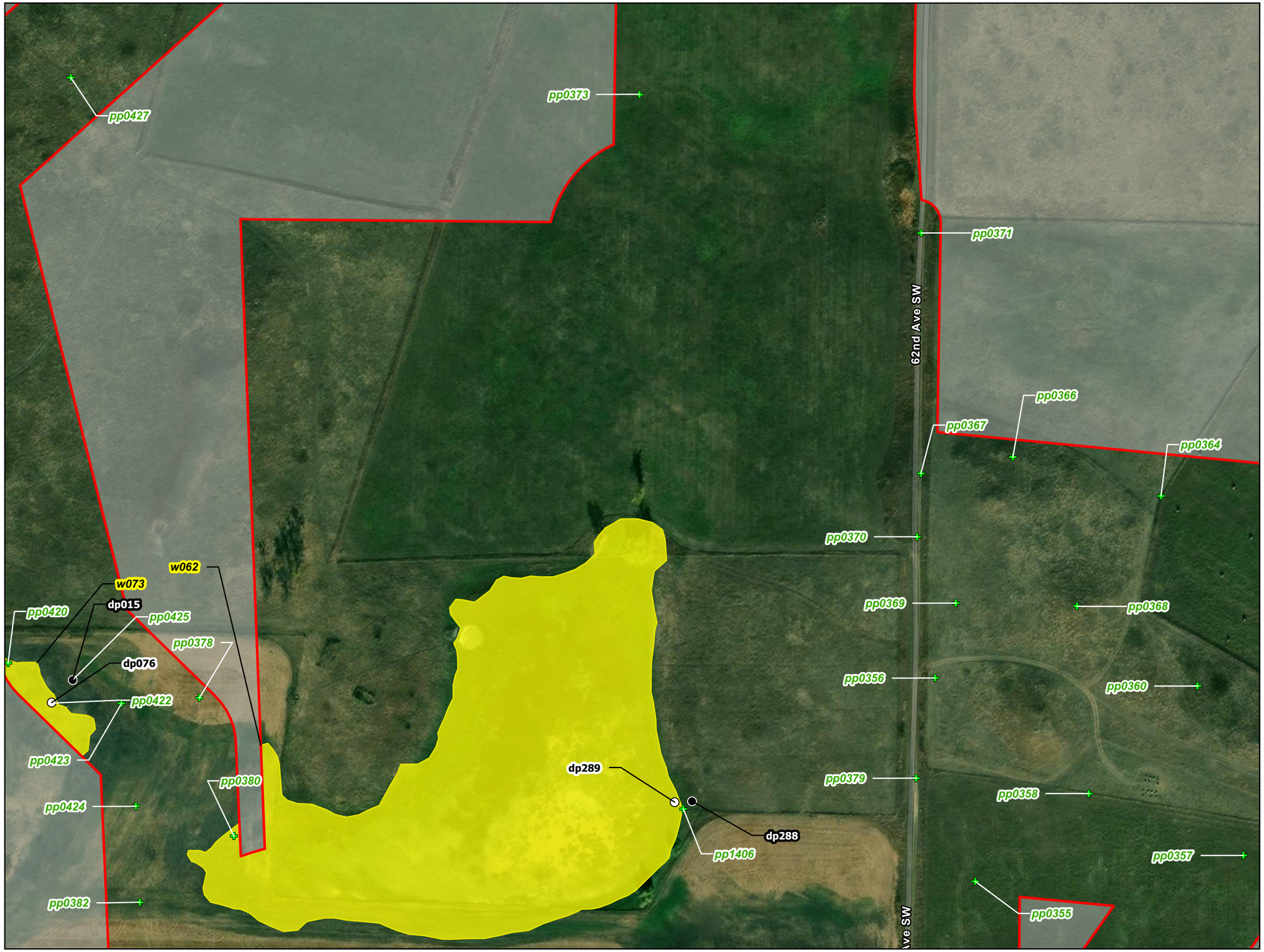

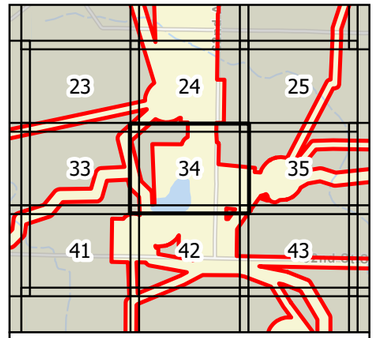

0 100 200 Feet

1 inch = 200 feet

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Survey Area
Photo Point
Upland Data Point
Wetland Data Point
Delineated Wetland
PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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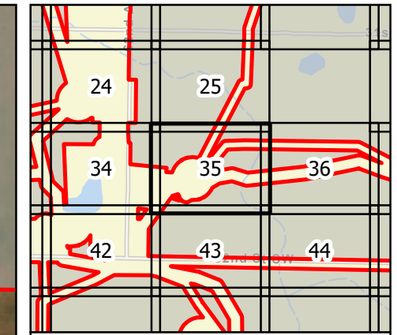

0 100 200 Feet

1 inch = 200 feet

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Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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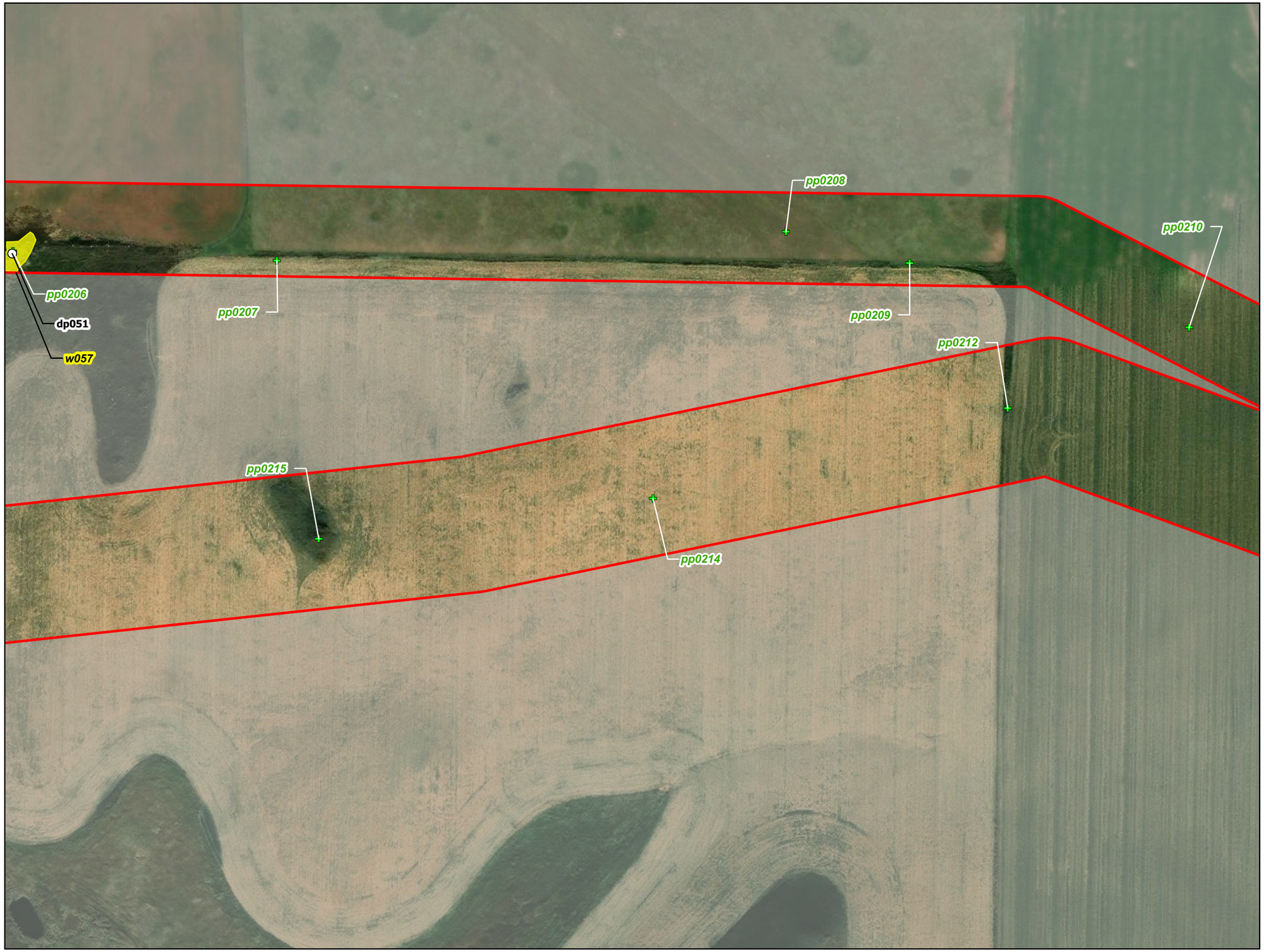

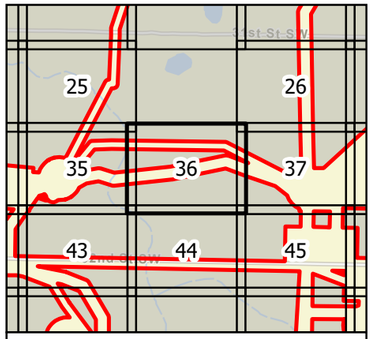

0 100 200 Feet

1 inch = 200 feet

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- Survey Area
- Photo Point
- Wetland Data Point

Delineated Wetland

- PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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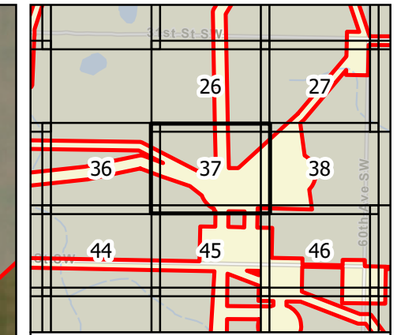

0 100 200 Feet

1 inch = 200 feet

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Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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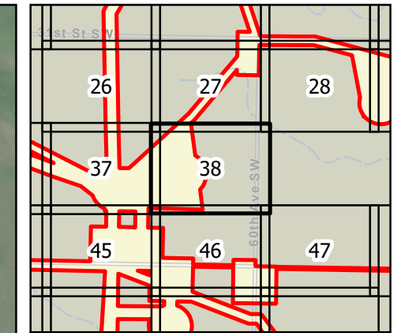

Survey Area
Photo Point
Upland Data Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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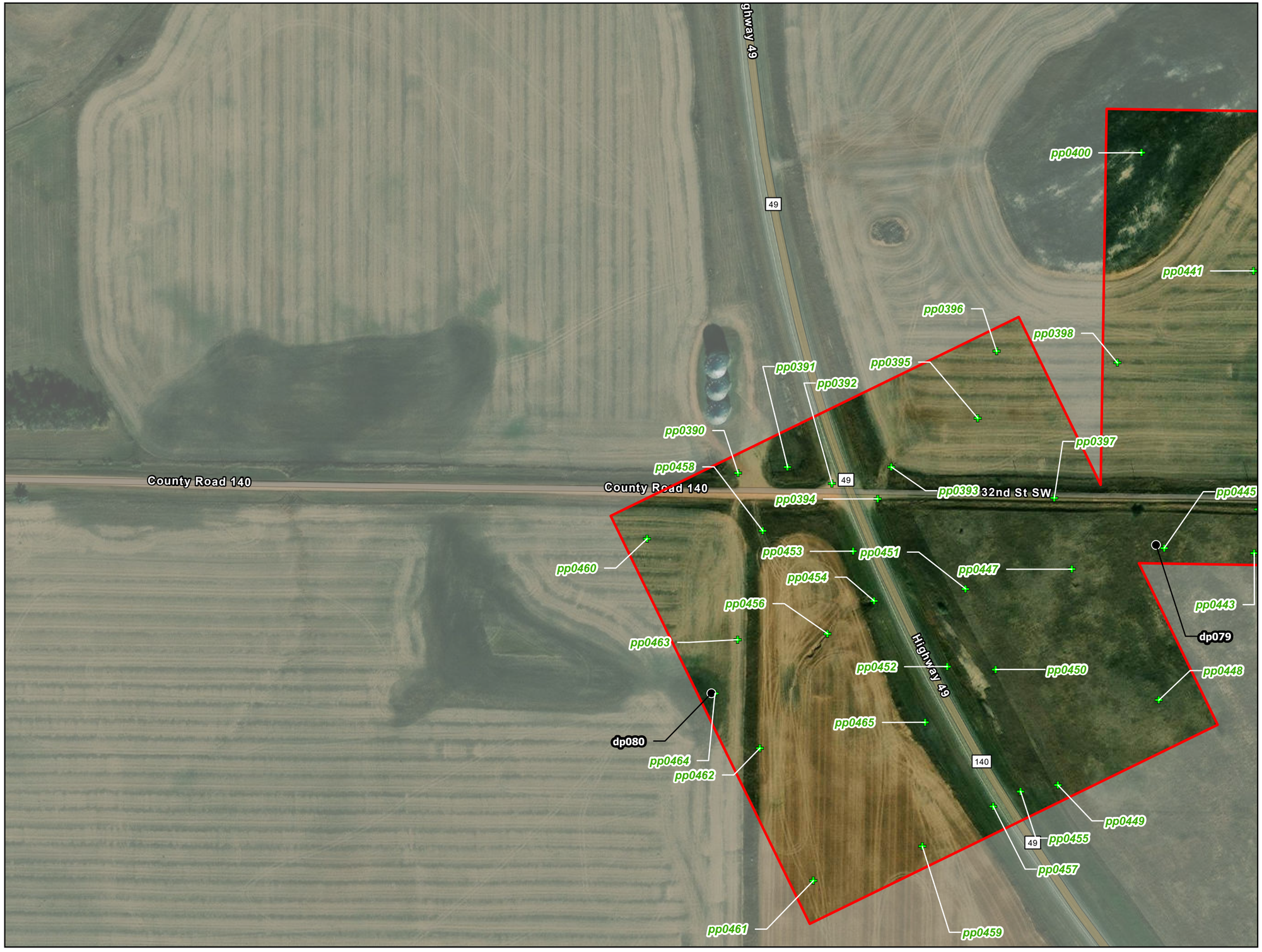

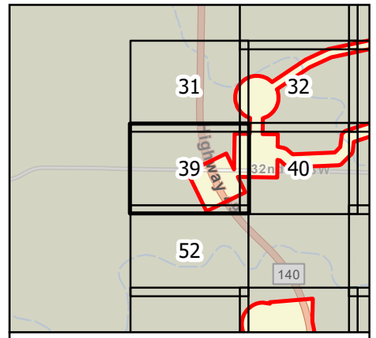

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Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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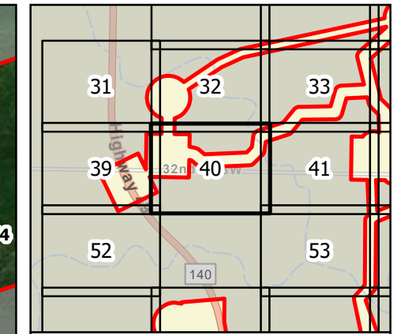

0 100 200 Feet

1 inch = 200 feet

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Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

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Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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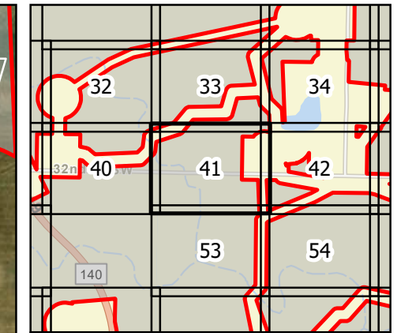

0 100 200 Feet

1 inch = 200 feet

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Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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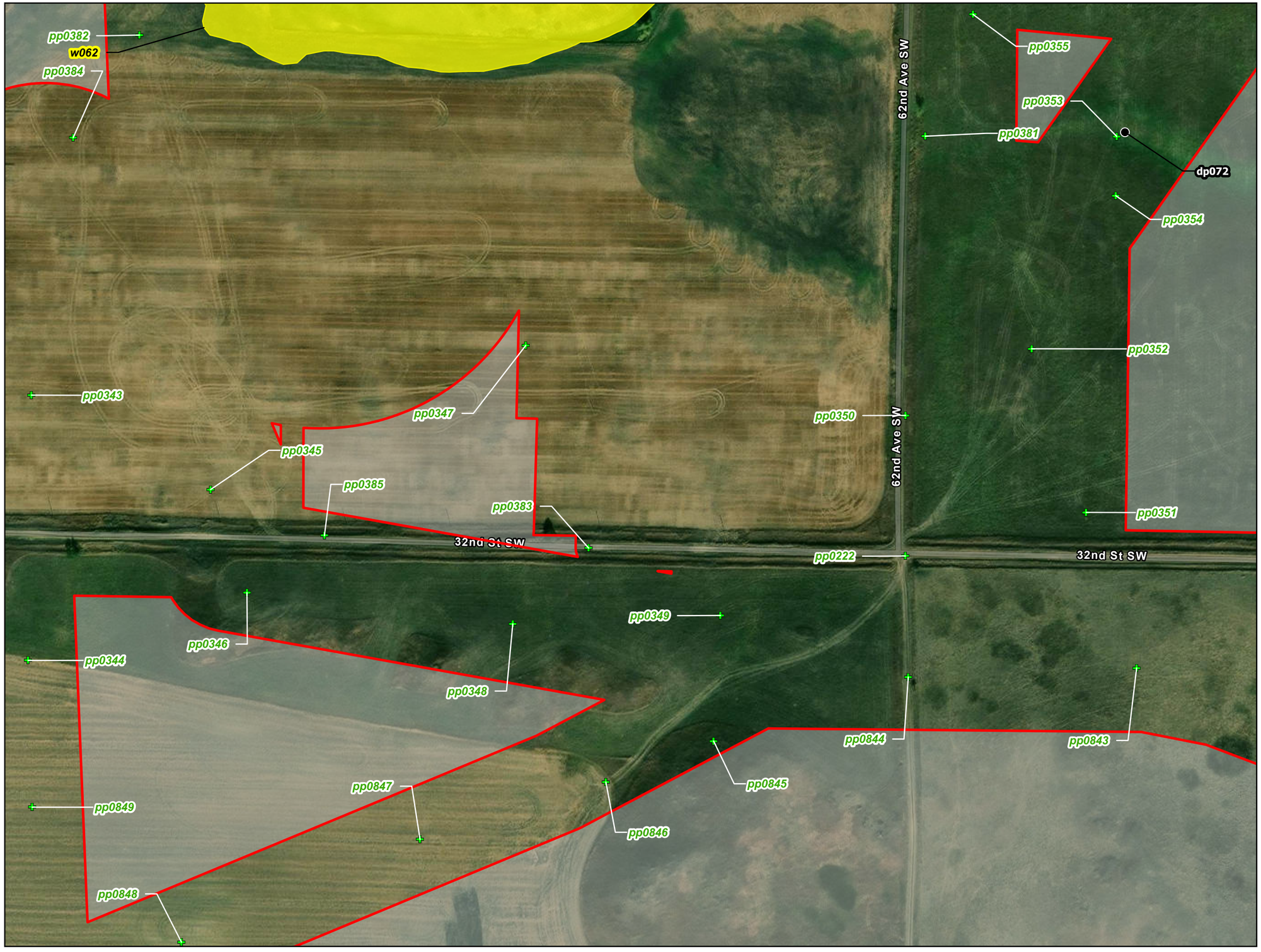

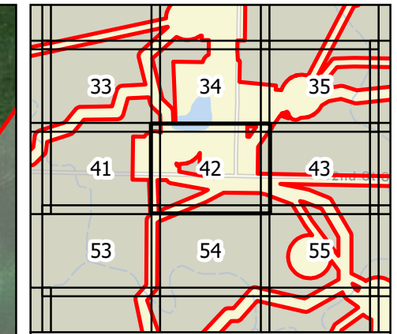

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Survey Area

Photo Point

Upland Data Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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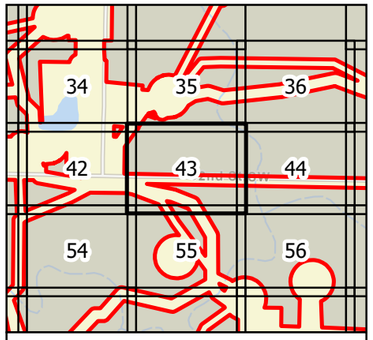

0 100 200 Feet

1 inch = 200 feet

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- Photo Point
- Upland Data Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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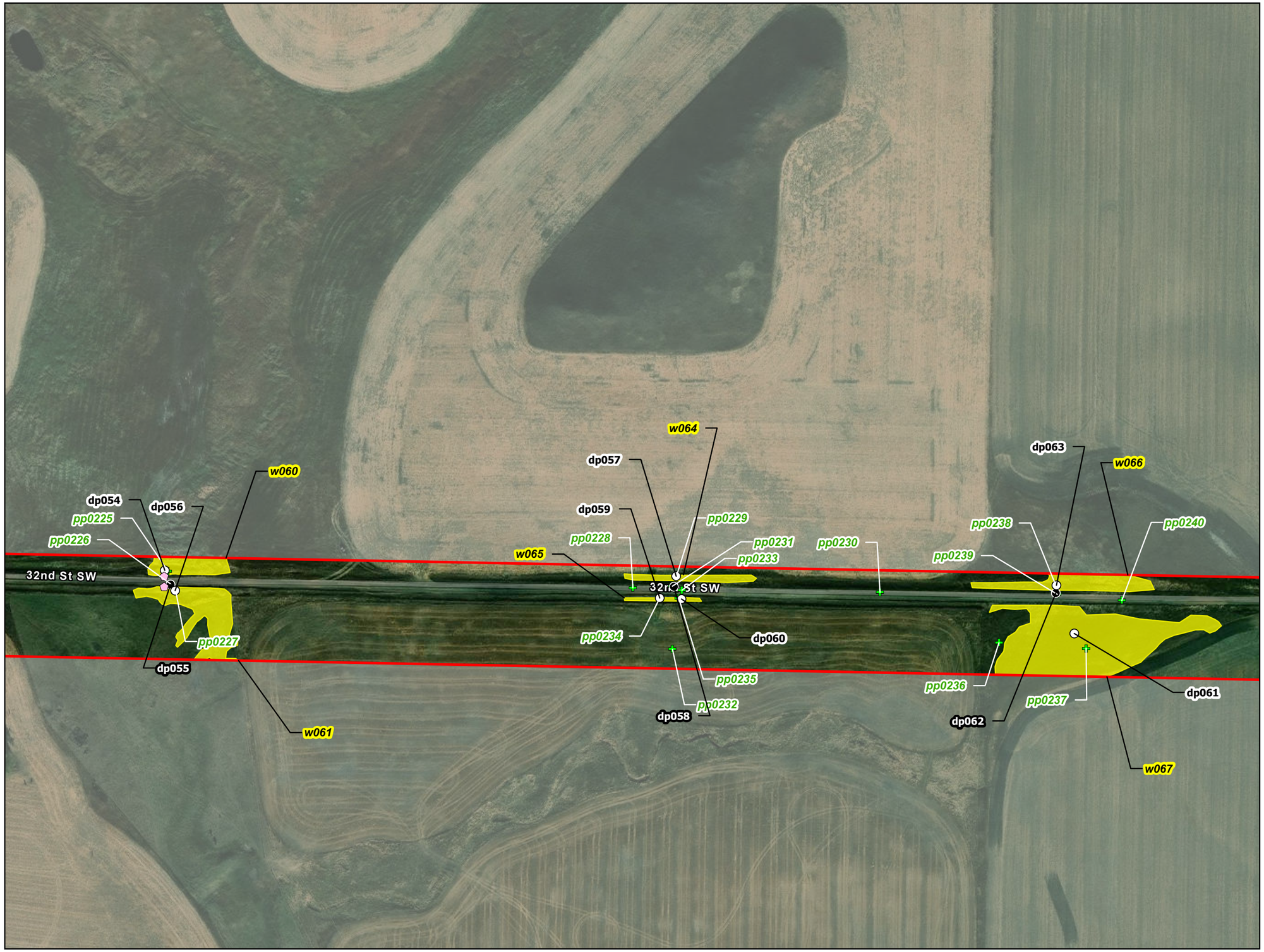

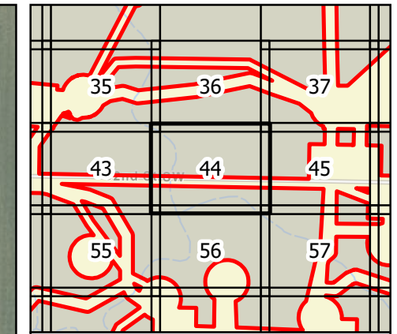

0 100 200 Feet

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Survey Area

Culvert Point

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
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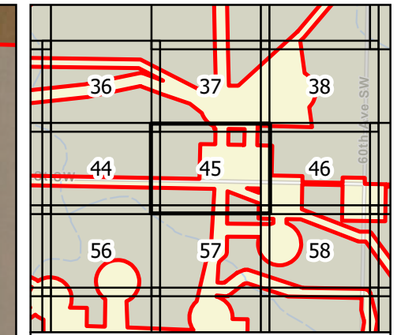

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Survey Area

Photo Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
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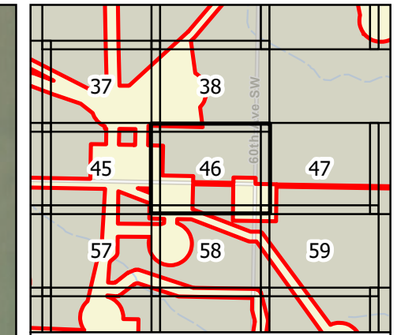

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Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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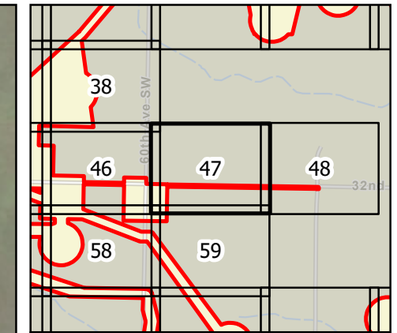

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N W E S

Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
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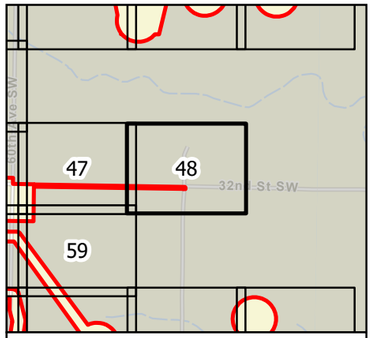

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Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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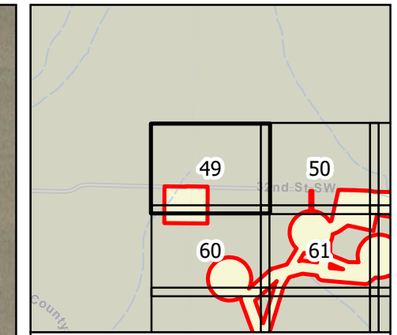

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N W E S

Survey Area

Culvert Point

Photo Point

Upland Data Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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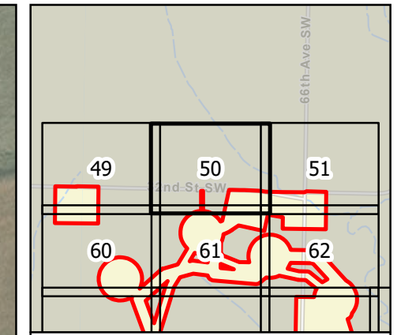

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Survey Area

Photo Point

Figure 5
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Longspur Wind Project
Minnesota Power
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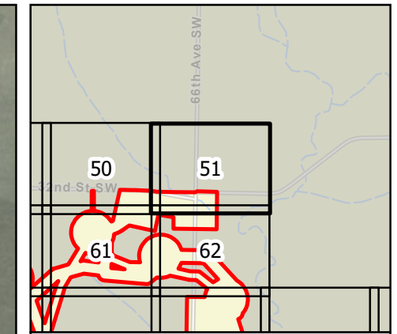

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Stream Point

Upland Data Point

Wetland Data Point

Delineated Waterway

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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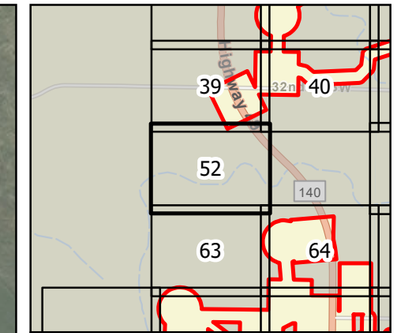

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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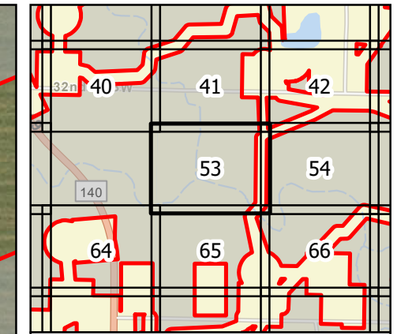

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area
Photo Point
Stream Point
Upland Data Point
Wetland Data Point
Delineated Waterway
Delineated Wetland
PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
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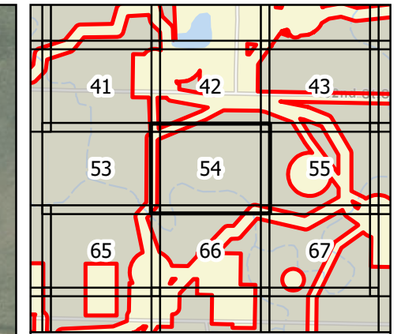

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Waterway

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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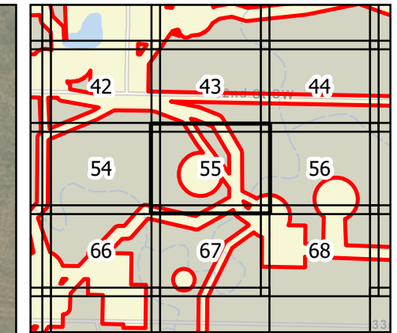

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area
Photo Point
Stream Point
Upland Data Point
Wetland Data Point
Delineated Waterway
Delineated Wetland
PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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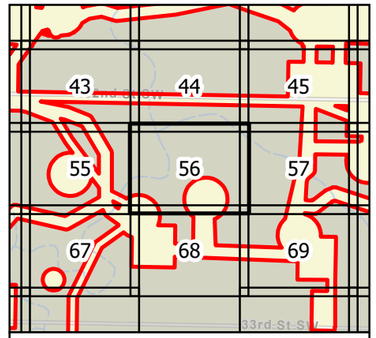

0 100 200 Feet

1 inch = 200 feet

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Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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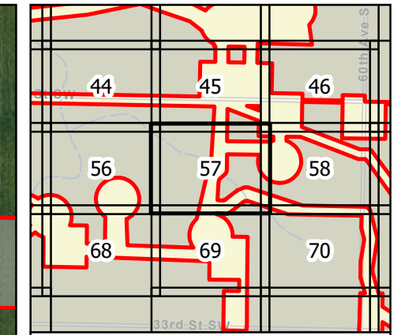

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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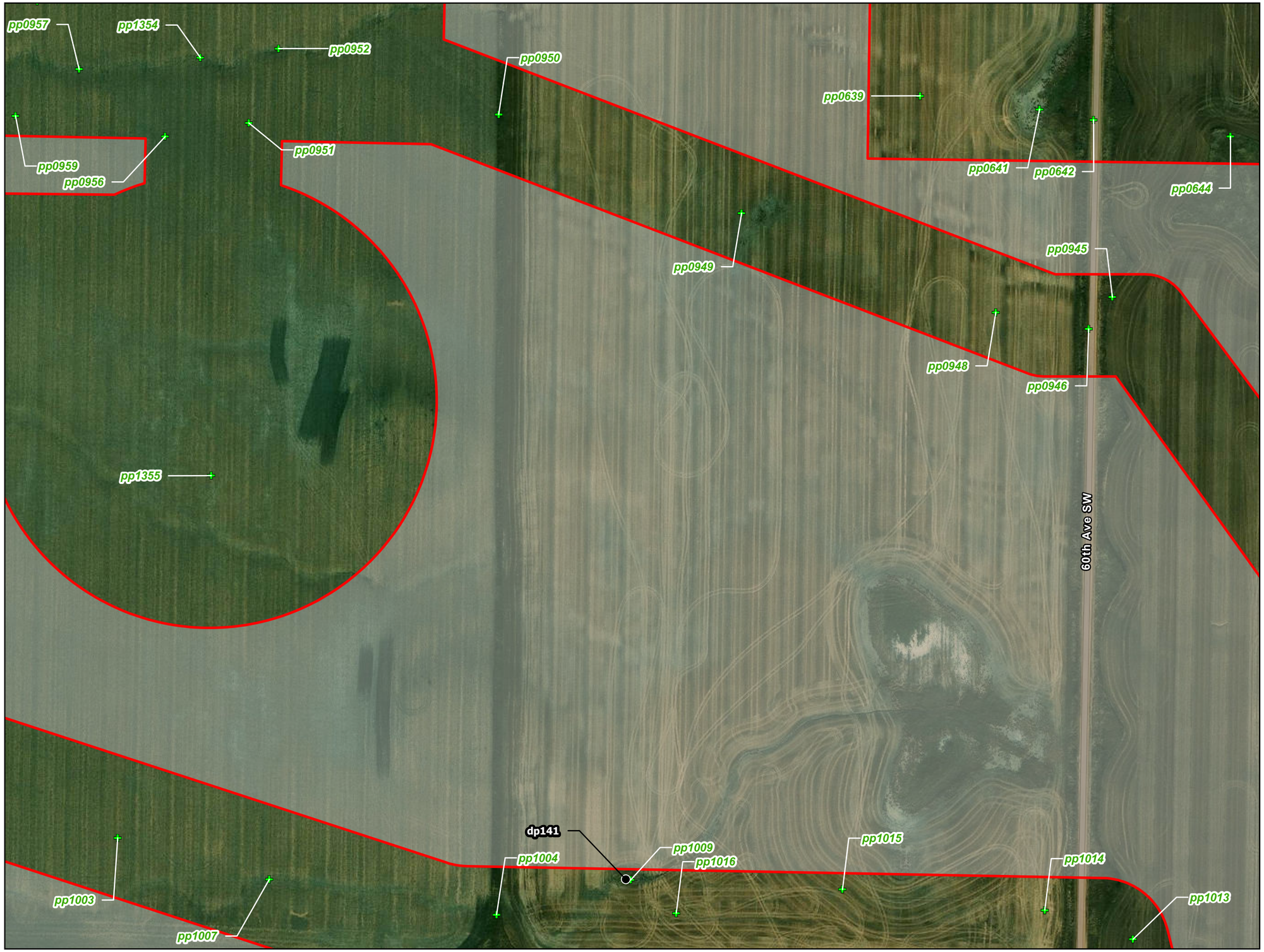

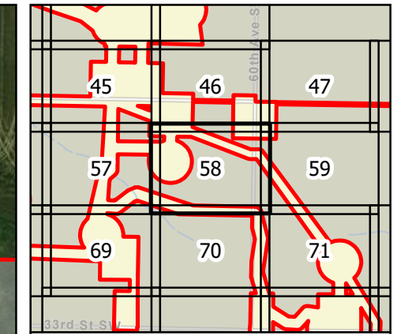

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Upland Data Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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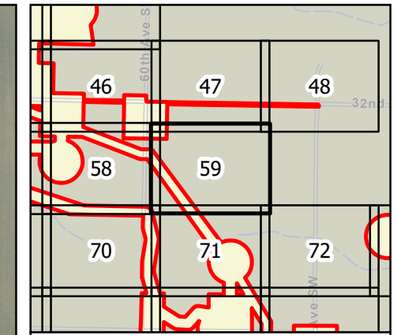

Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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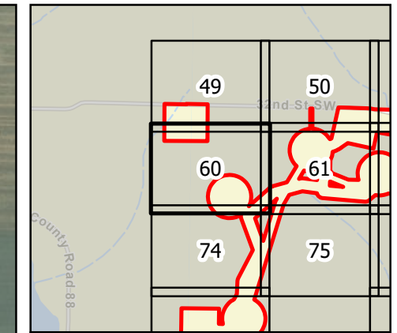

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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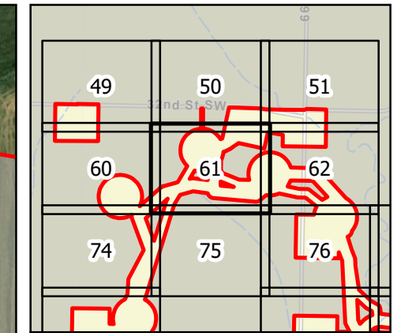

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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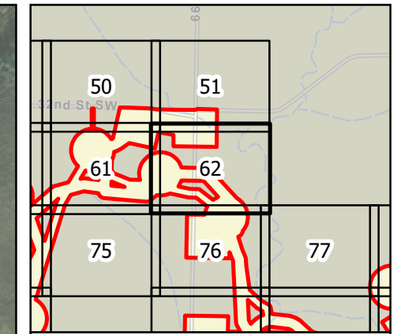

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Waterway

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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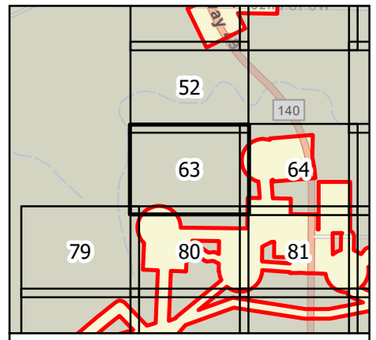

0 100 200 Feet

1 inch = 200 feet

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Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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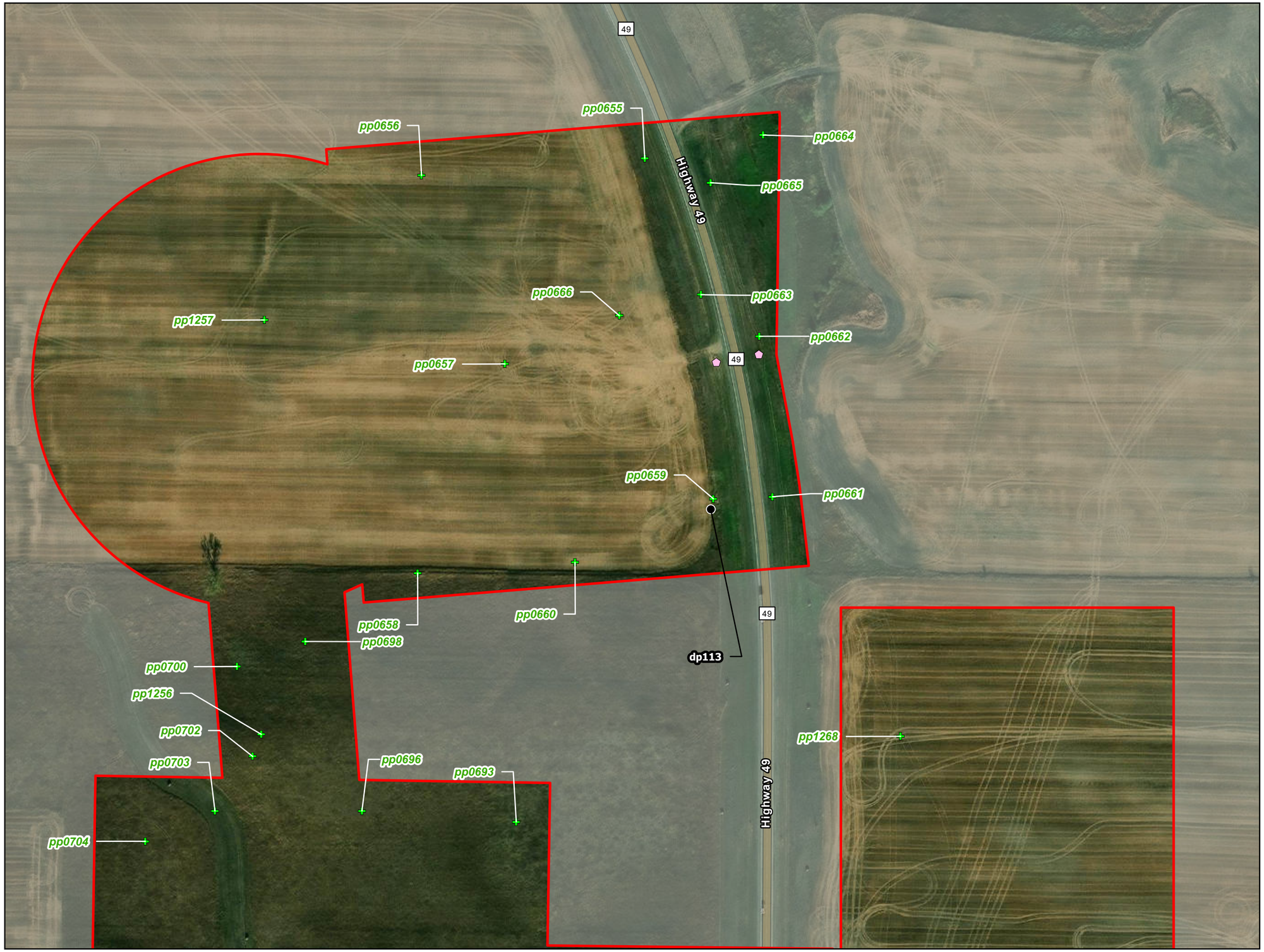

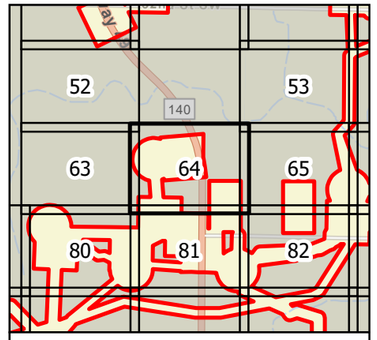

0 100 200 Feet

1 inch = 200 feet

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- Survey Area
- Culvert Point
- Photo Point
- Upland Data Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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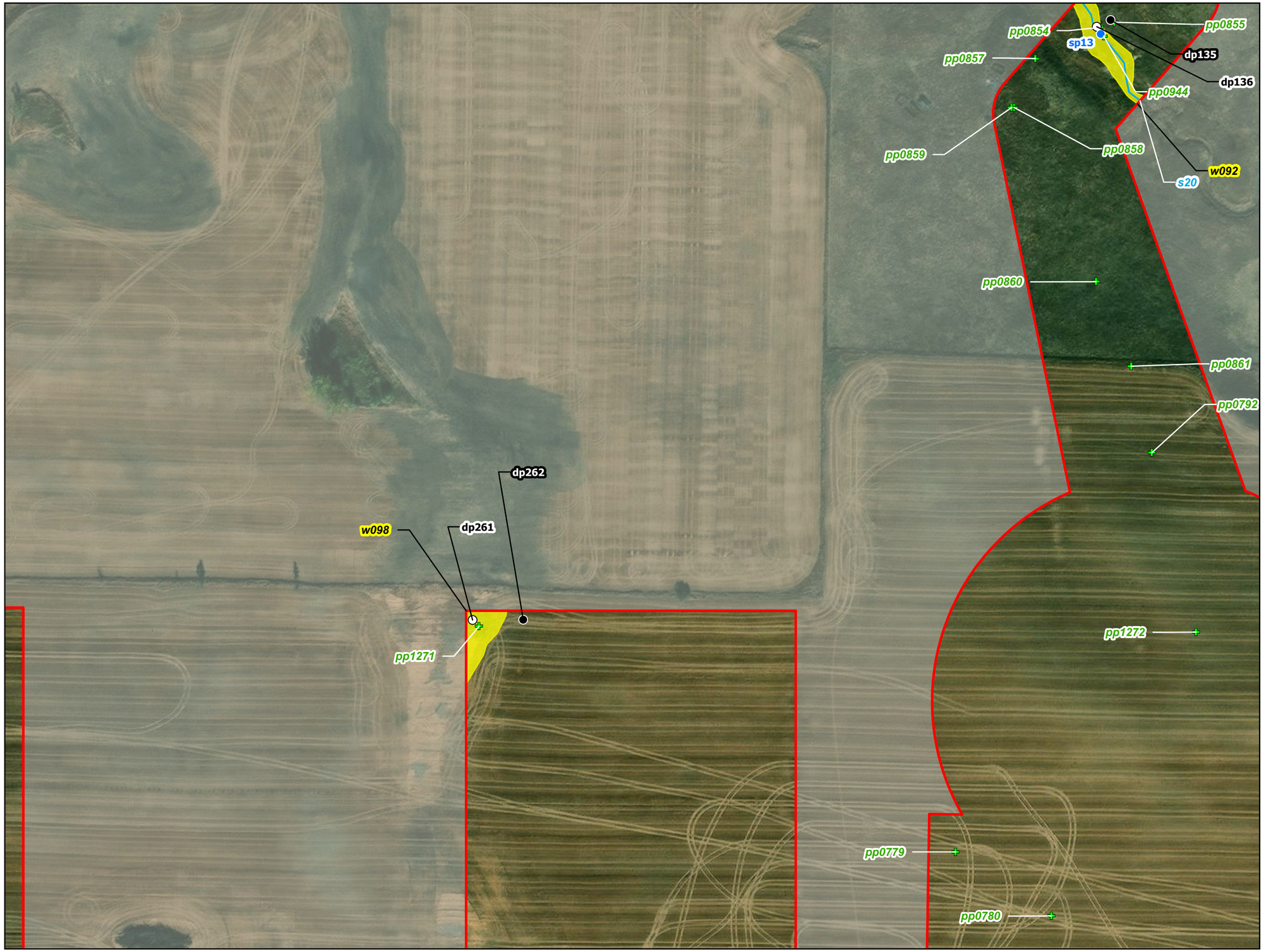

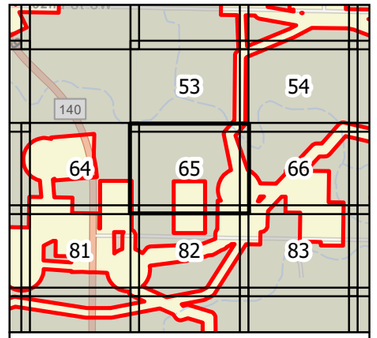

0 100 200 Feet

1 inch = 200 feet

N
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- Survey Area
- Photo Point
- Stream Point
- Upland Data Point
- Wetland Data Point
- Delineated Waterway

Delineated Wetland

- PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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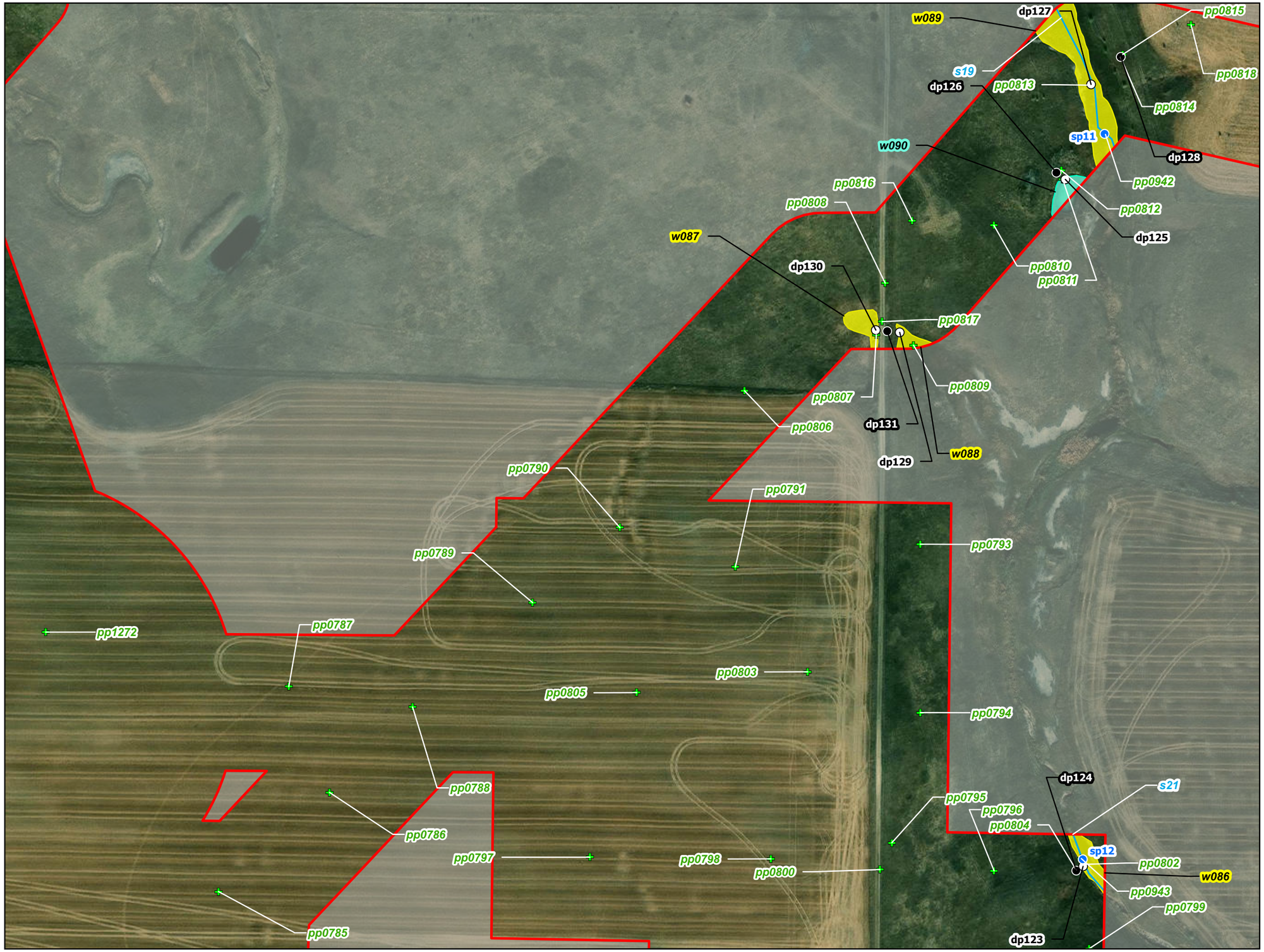

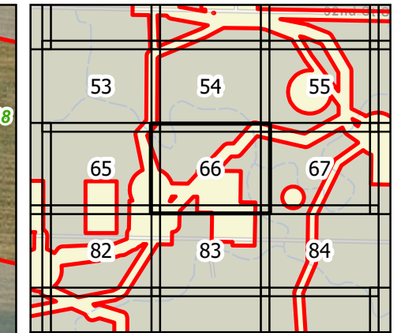

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Stream Point

Upland Data Point

Wetland Data Point

Delineated Waterway

Delineated Wetland

PEM

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Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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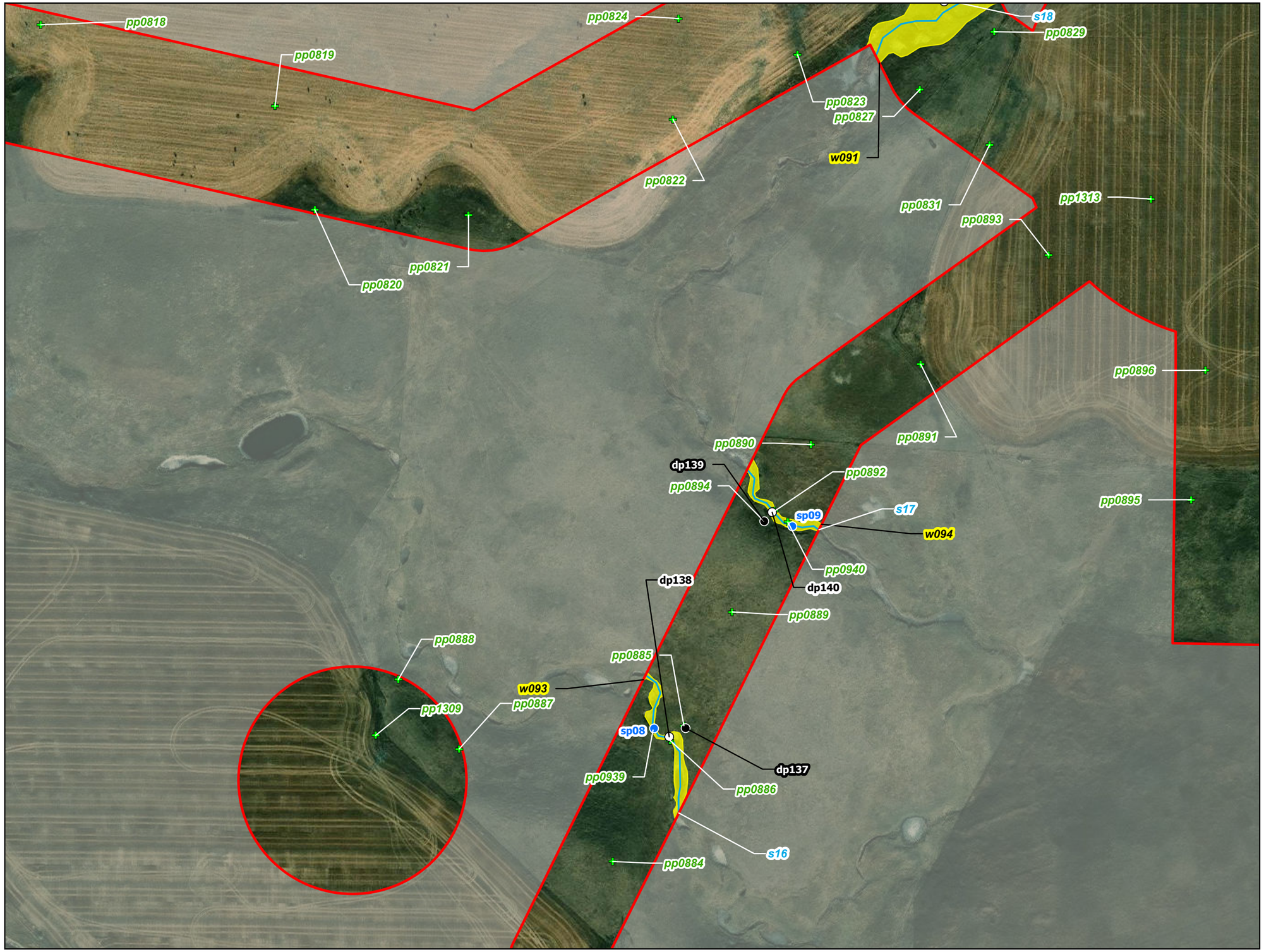

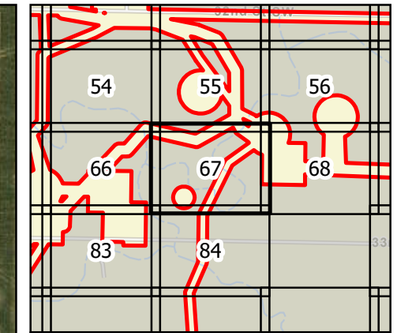

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area
Photo Point
Stream Point
Upland Data Point
Wetland Data Point
Delineated Waterway
Delineated Wetland
PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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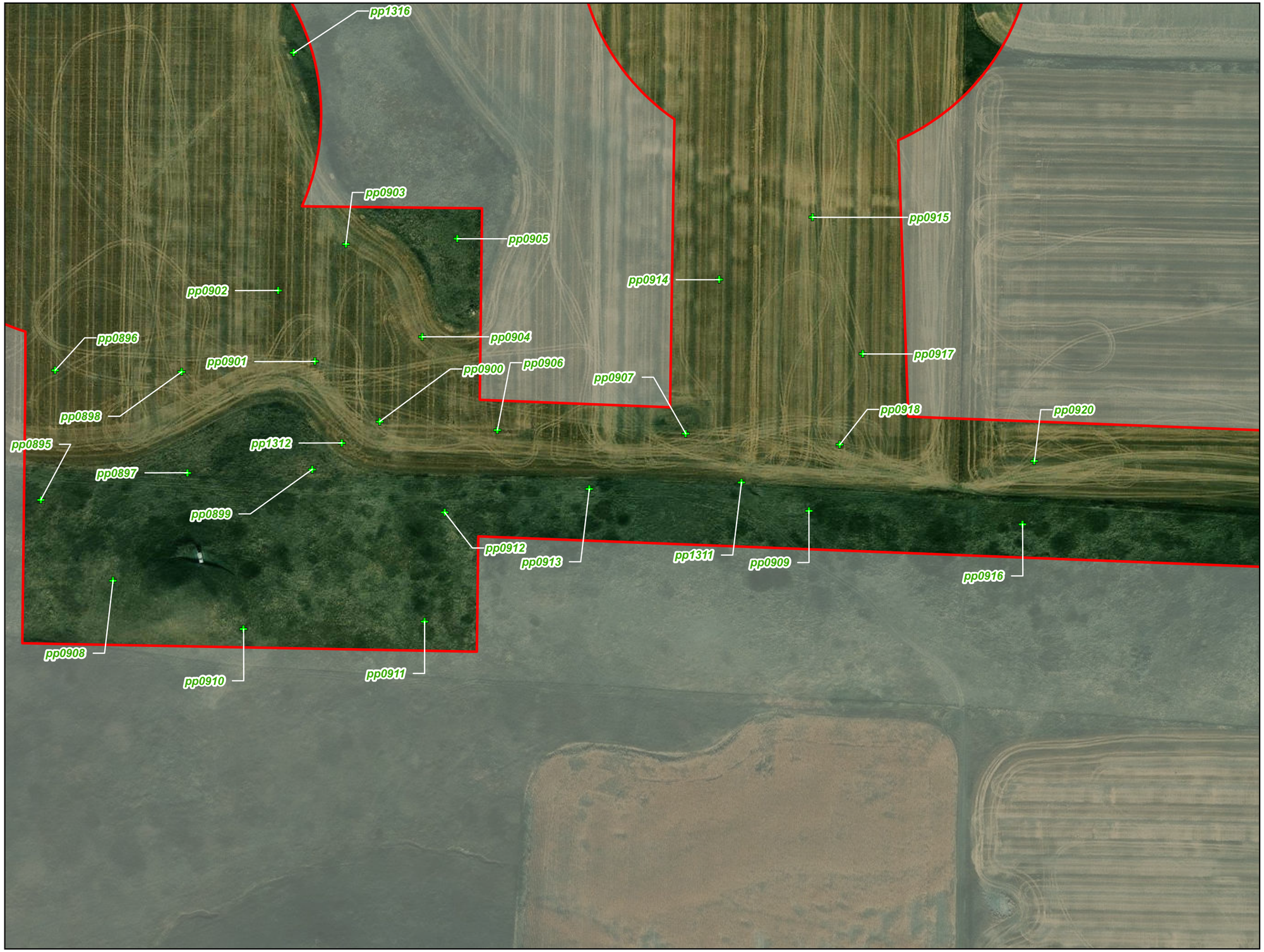

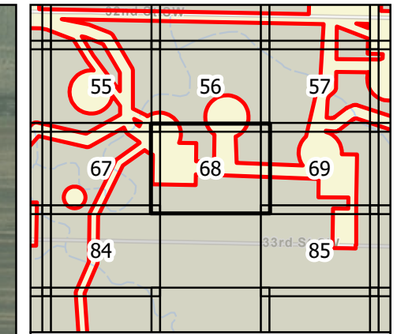

0 100 200 Feet

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N W E S

Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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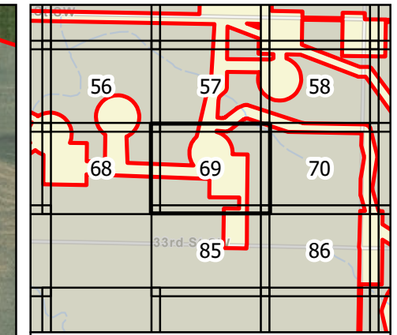

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
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North Dakota

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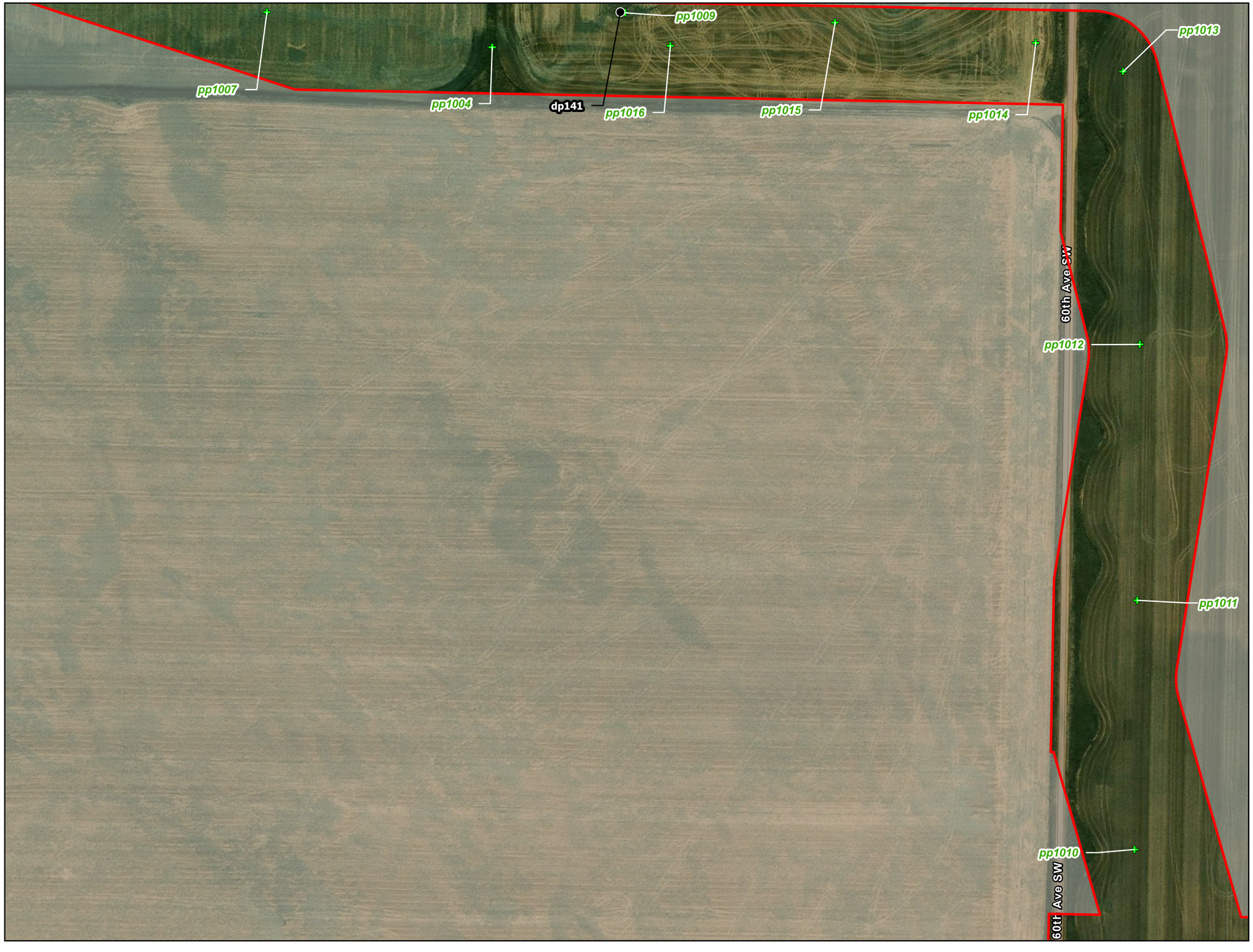

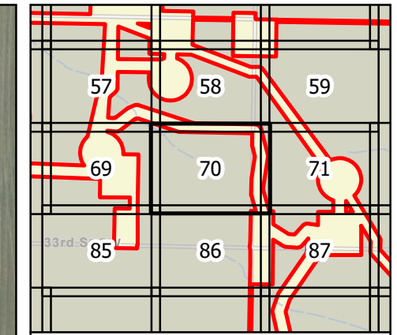

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Upland Data Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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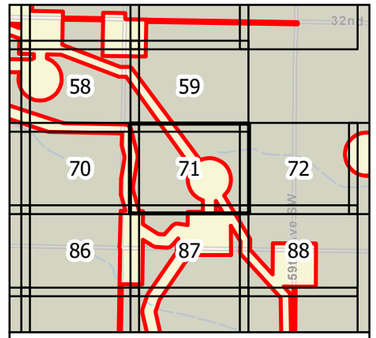

0 100 200 Feet

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Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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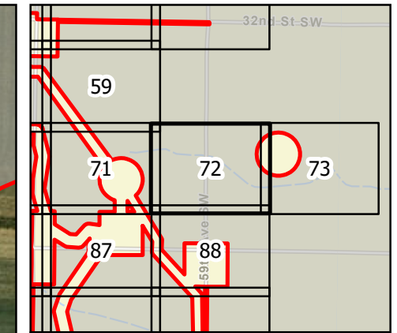

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1 inch = 200 feet

N W E S

Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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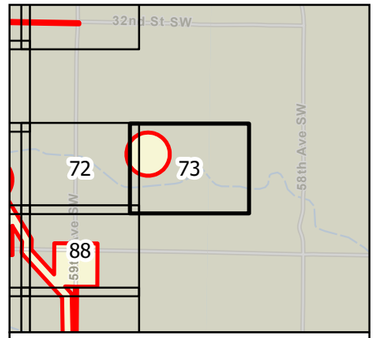

0 100 200 Feet

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Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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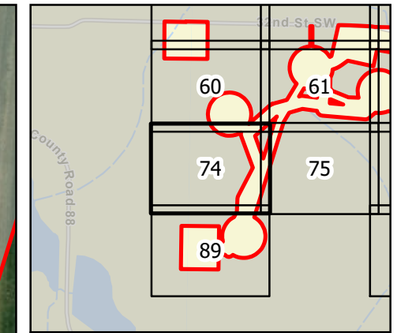

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1 inch = 200 feet

N W E S

Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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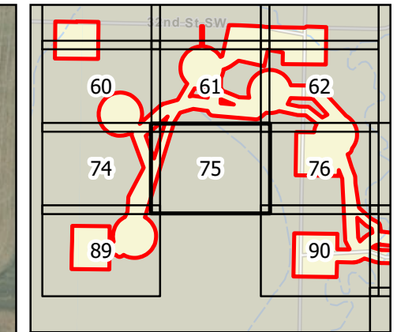

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N W E S

Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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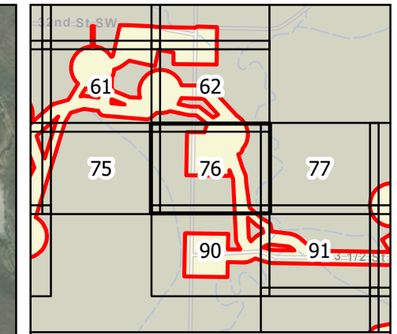

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Delineated Waterway

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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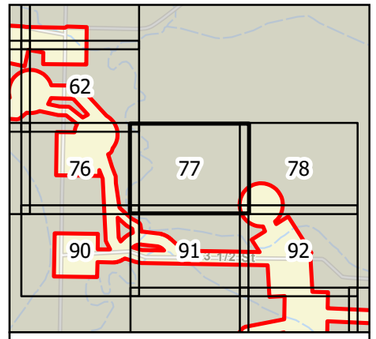

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Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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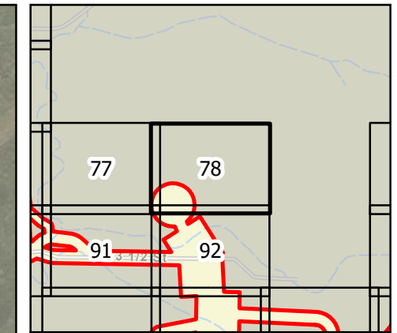

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Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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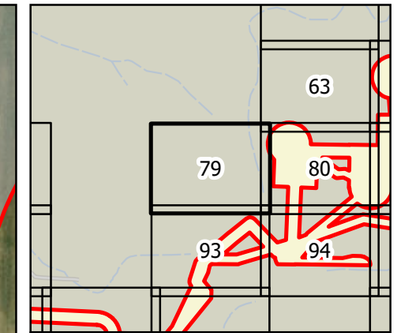

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N W E S

Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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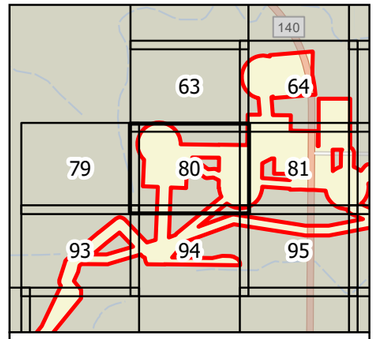

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Survey Area
Photo Point
Upland Data Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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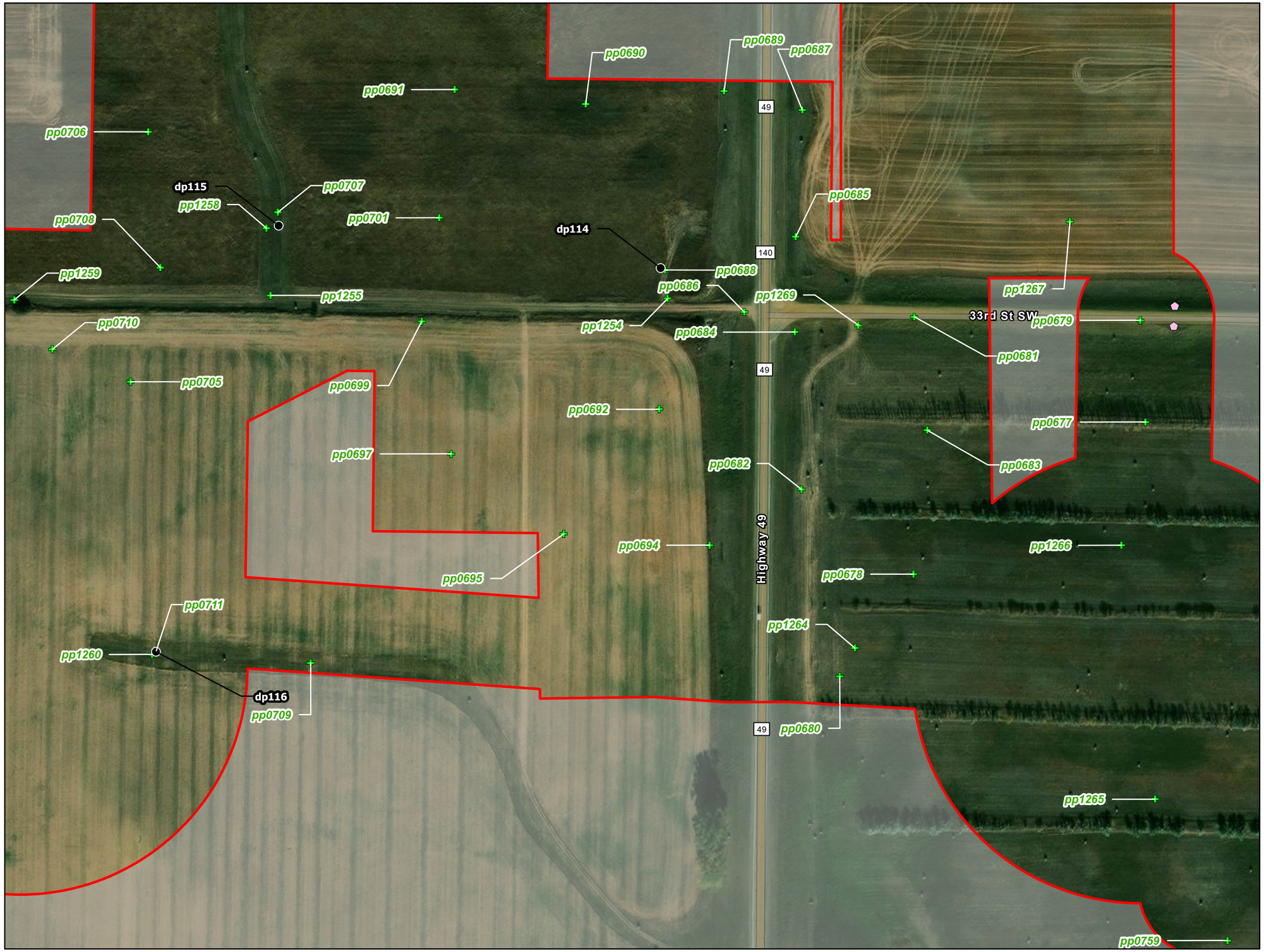

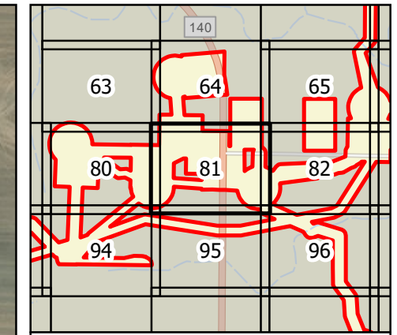

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N W E S

Survey Area

Culvert Point

Photo Point

Upland Data Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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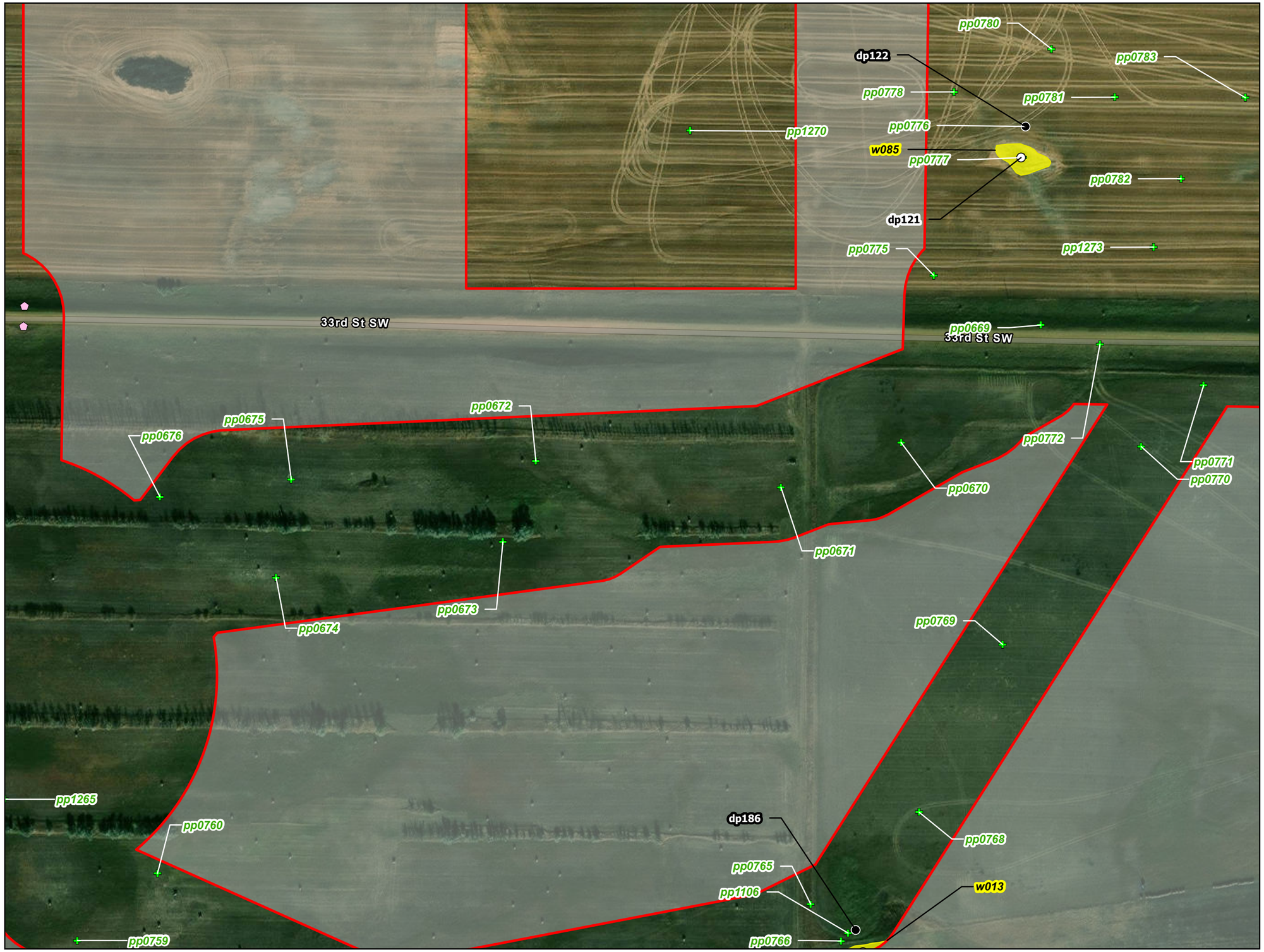

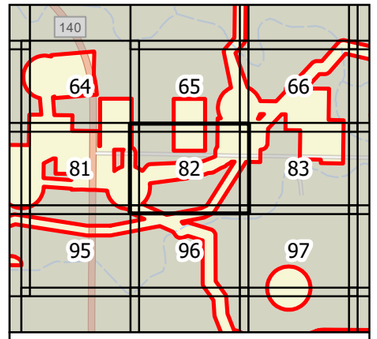

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- Survey Area
- Culvert Point
- Photo Point
- Upland Data Point
- Wetland Data Point

Delineated Wetland

- PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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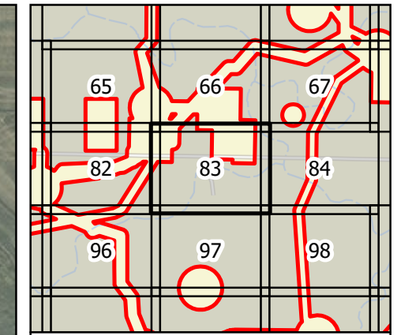

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N W E S

Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Waterway

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
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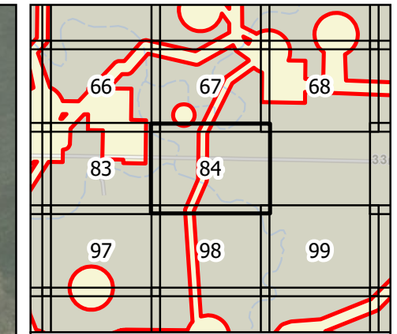

Survey Area
Photo Point
Stream Point
Upland Data Point
Wetland Data Point
Delineated Waterway
Delineated Wetland
PEM

Figure 5
Wetland Delineation
Longspur Wind Project
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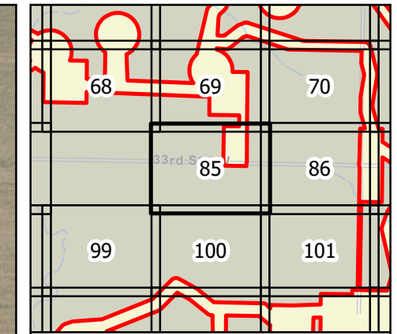

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N W E S

Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
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Mercer & Morton Counties,
North Dakota

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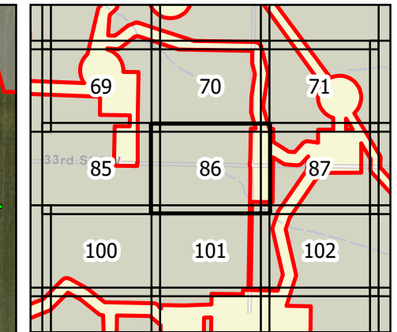

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Survey Area

Culvert Point

Photo Point

Stream Point

Delineated Waterway

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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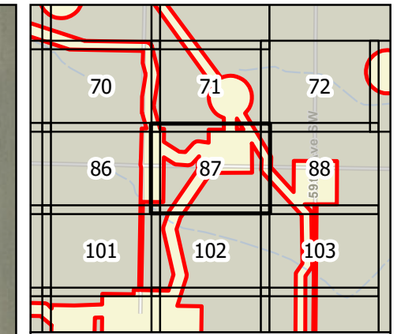

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N W E S

Survey Area

Culvert Point

Photo Point

Figure 5
Wetland Delineation
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Mercer & Morton Counties,
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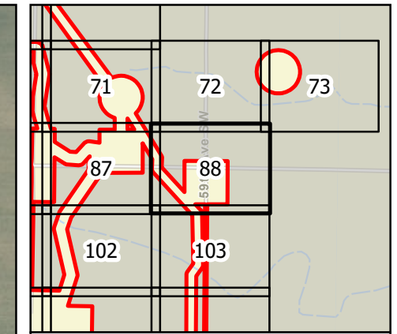

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Survey Area

Culvert Point

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
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Mercer & Morton Counties,
North Dakota

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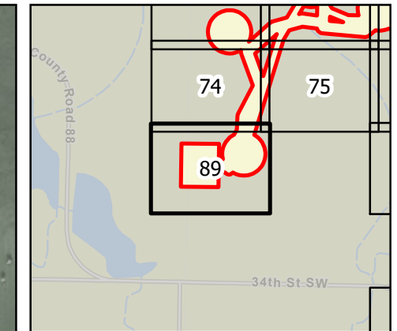

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Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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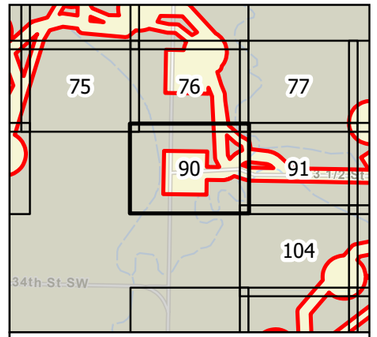

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- Survey Area
- Culvert Point
- Photo Point
- Stream Point
- Upland Data Point
- Wetland Data Point
- Delineated Waterway

Delineated Wetland

- PEM

Figure 5
Wetland Delineation
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Mercer & Morton Counties,
North Dakota

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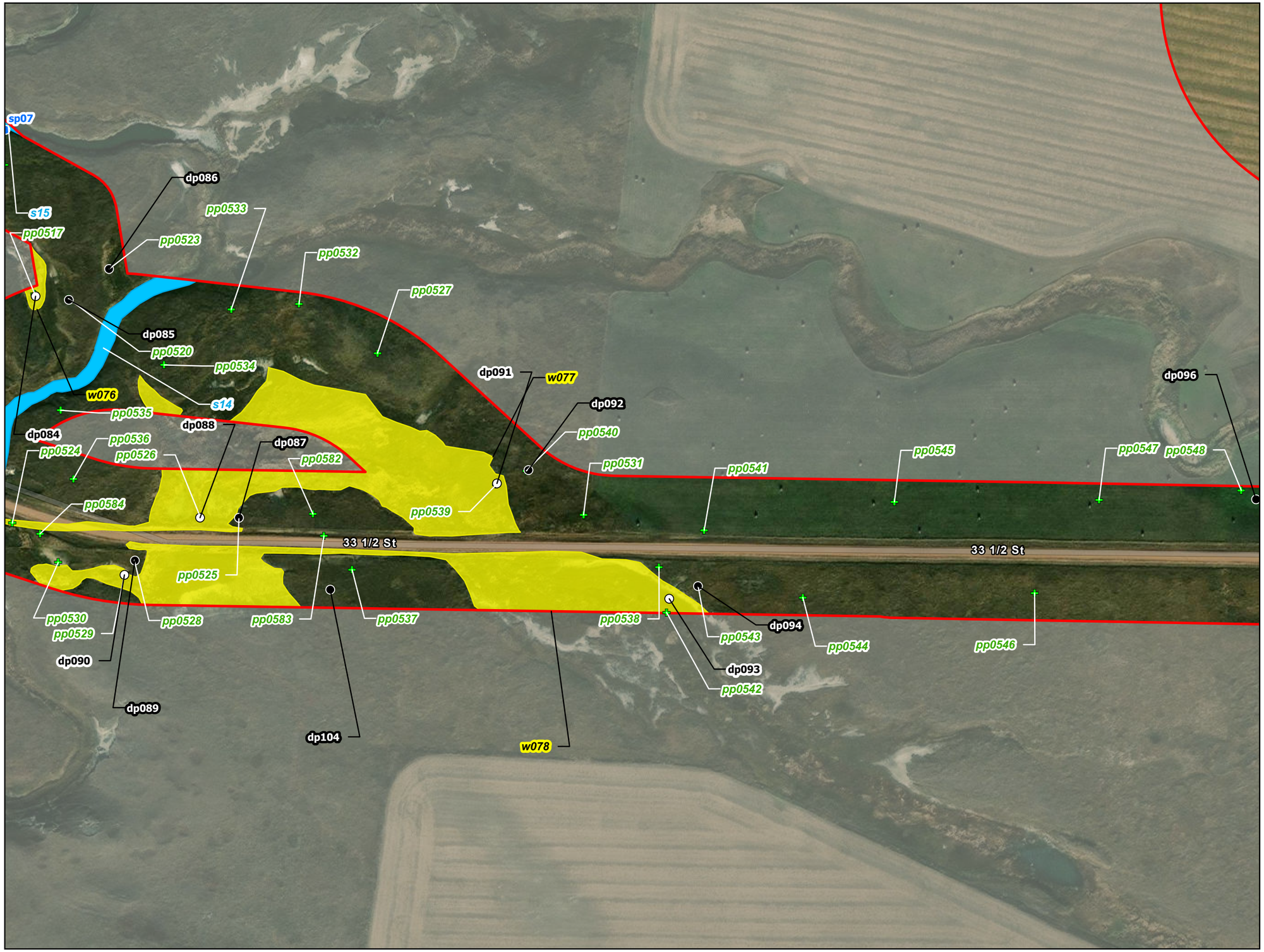

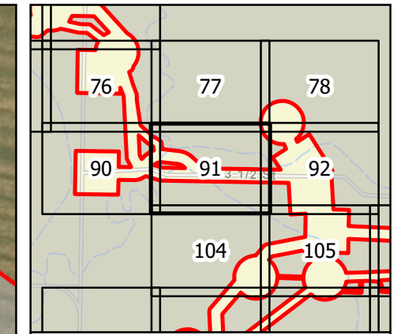

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Survey Area

Photo Point

Stream Point

Upland Data Point

Wetland Data Point

Delineated Waterway

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
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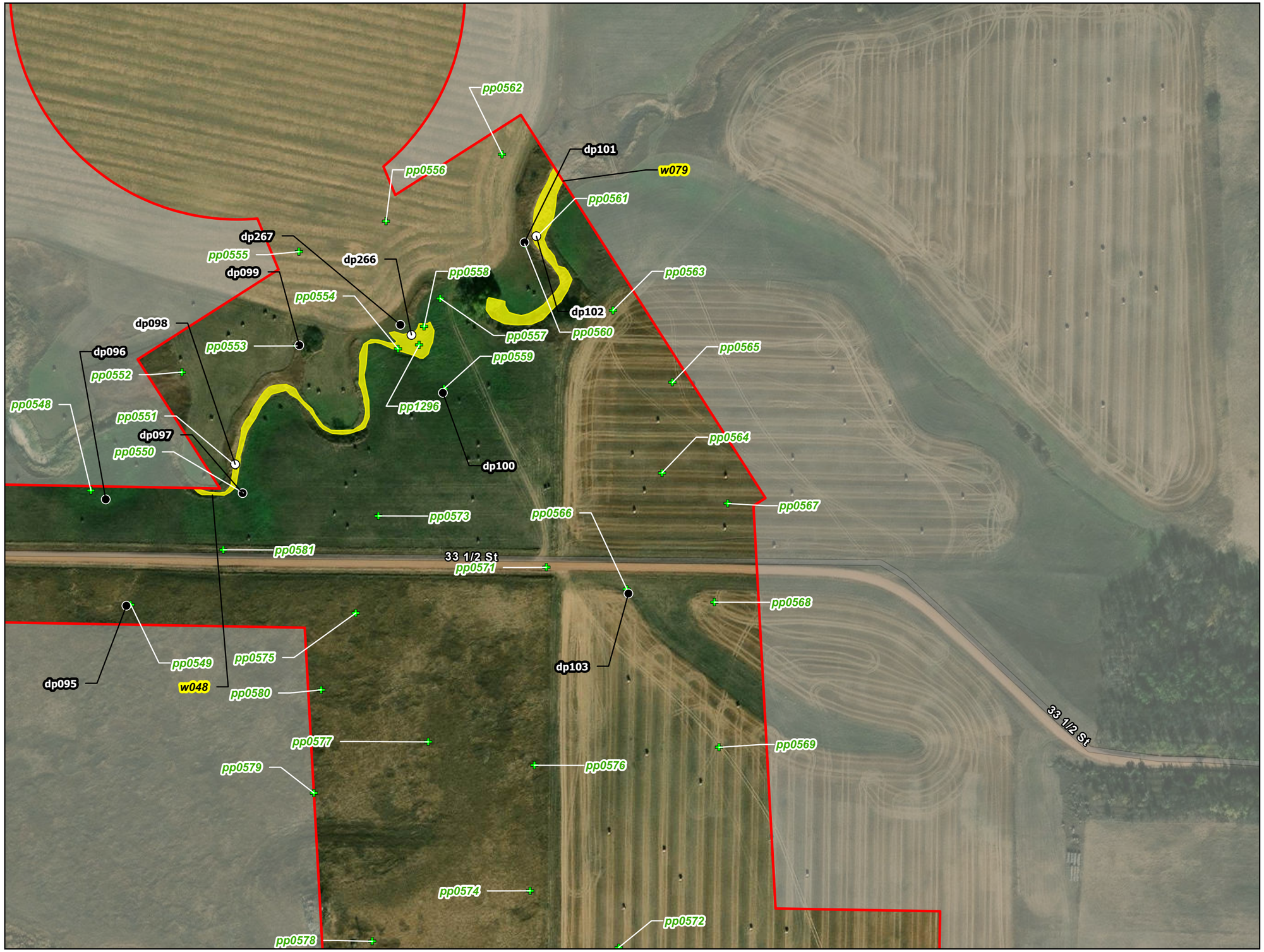

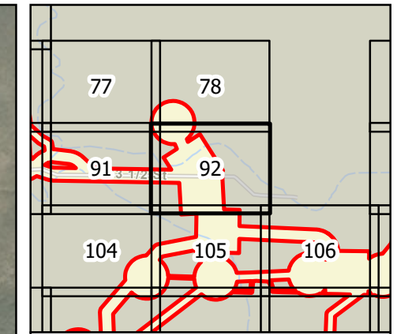

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N W E S

Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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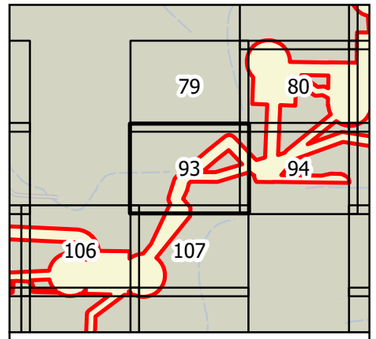

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Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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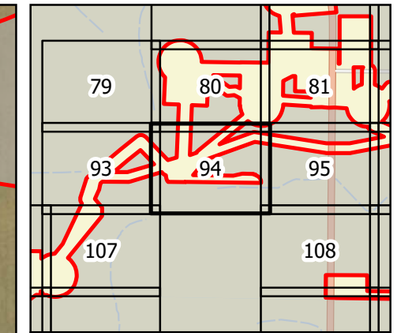

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Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
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North Dakota

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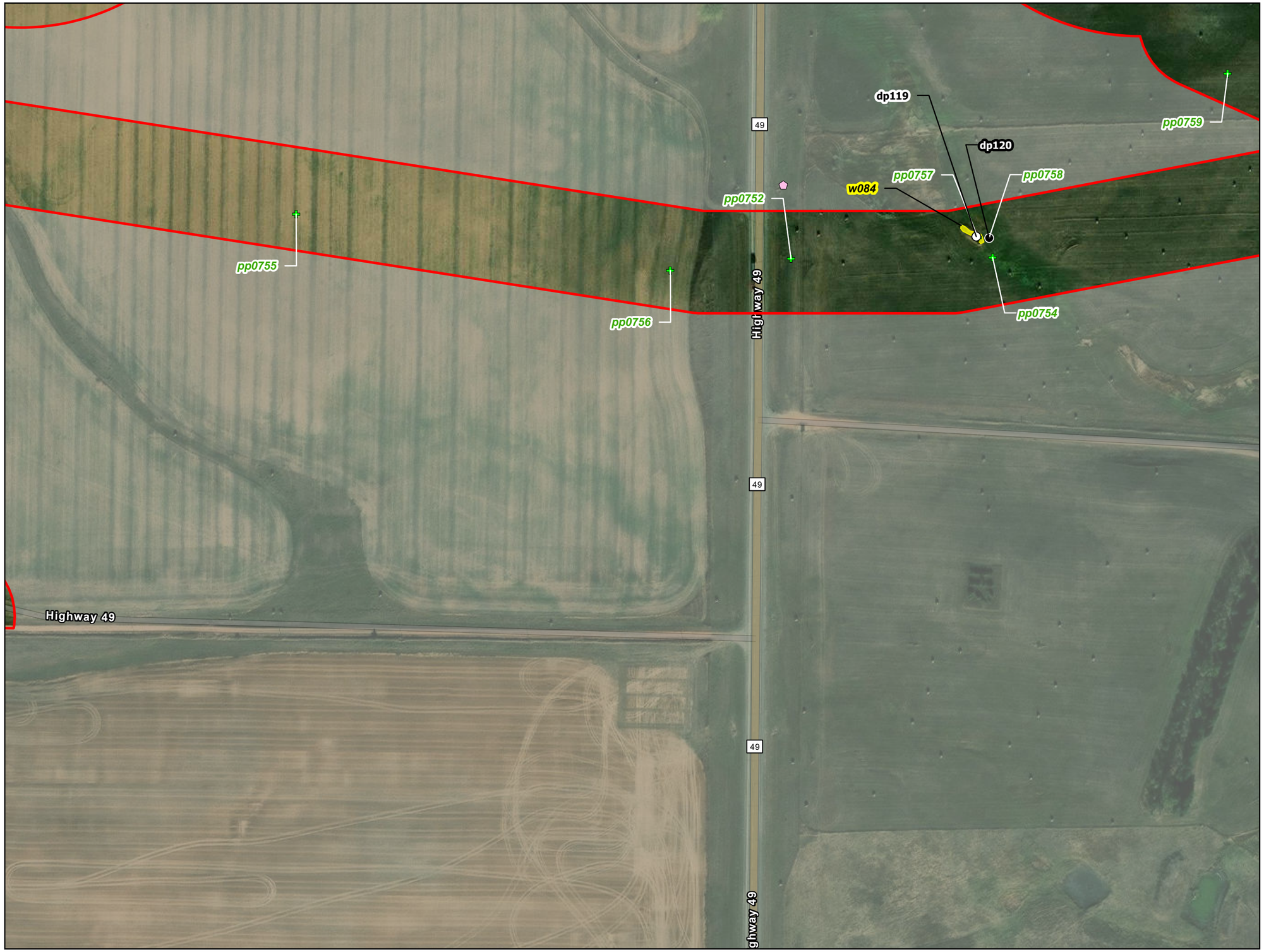

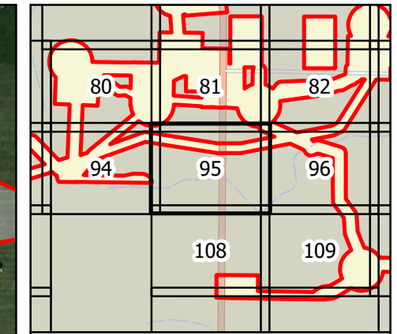

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N W E S

Survey Area

Culvert Point

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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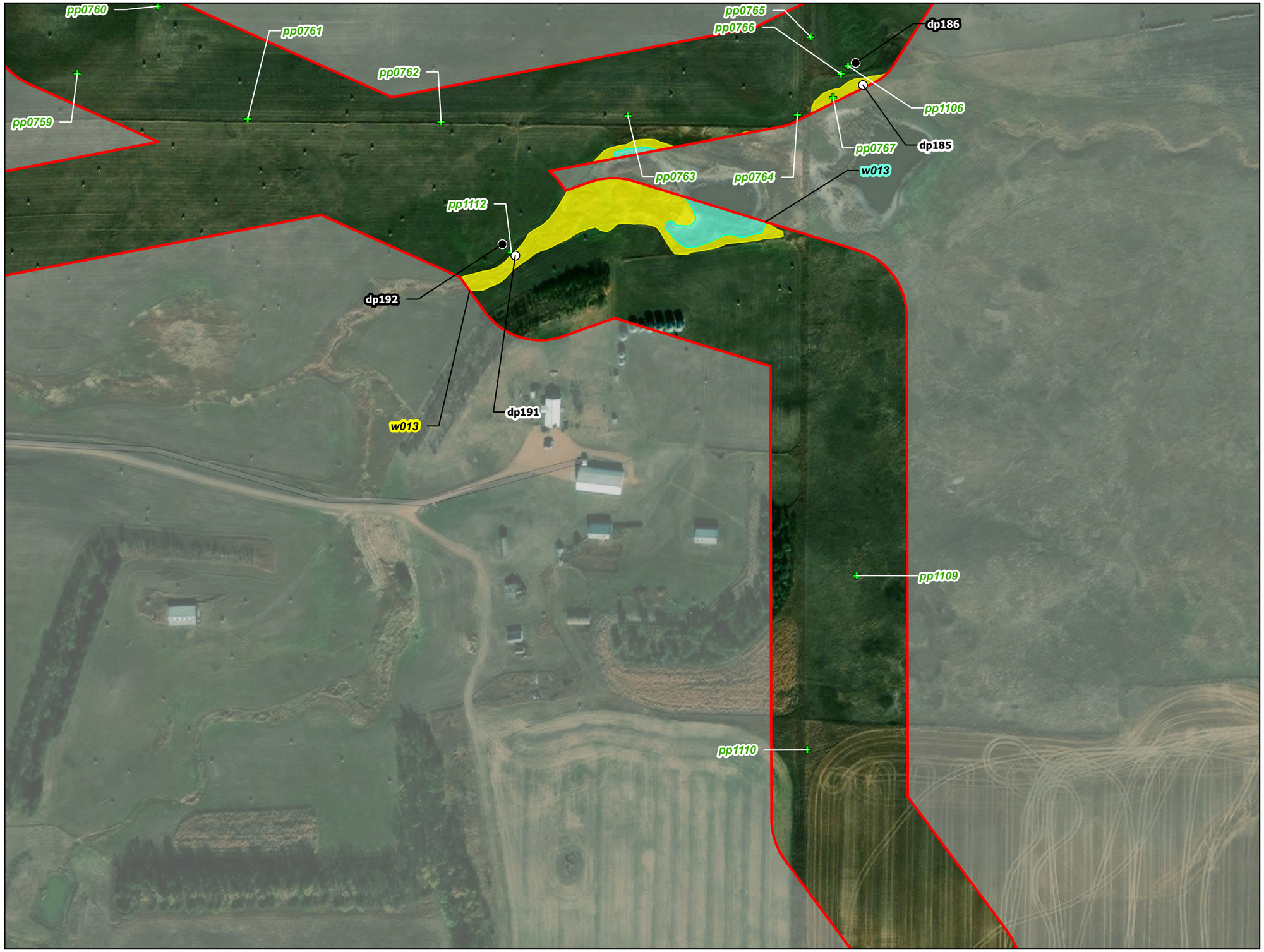

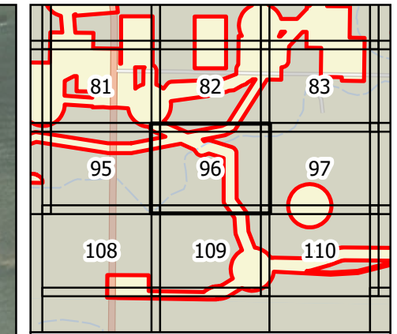

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N W E S

Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

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Figure 5
Wetland Delineation
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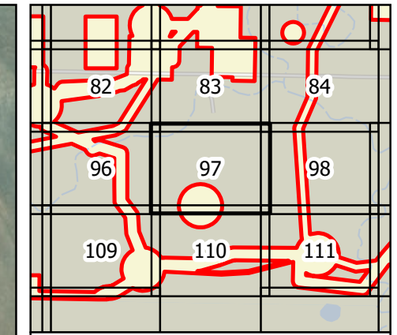

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Survey Area

Photo Point

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Wetland Delineation
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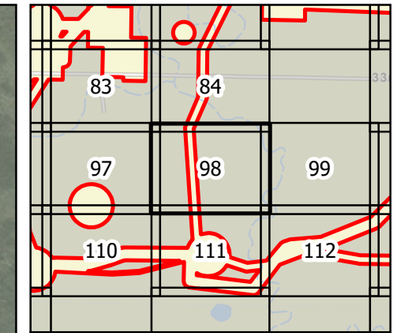

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N W E S

Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
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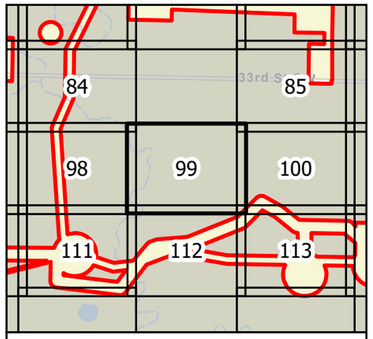

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Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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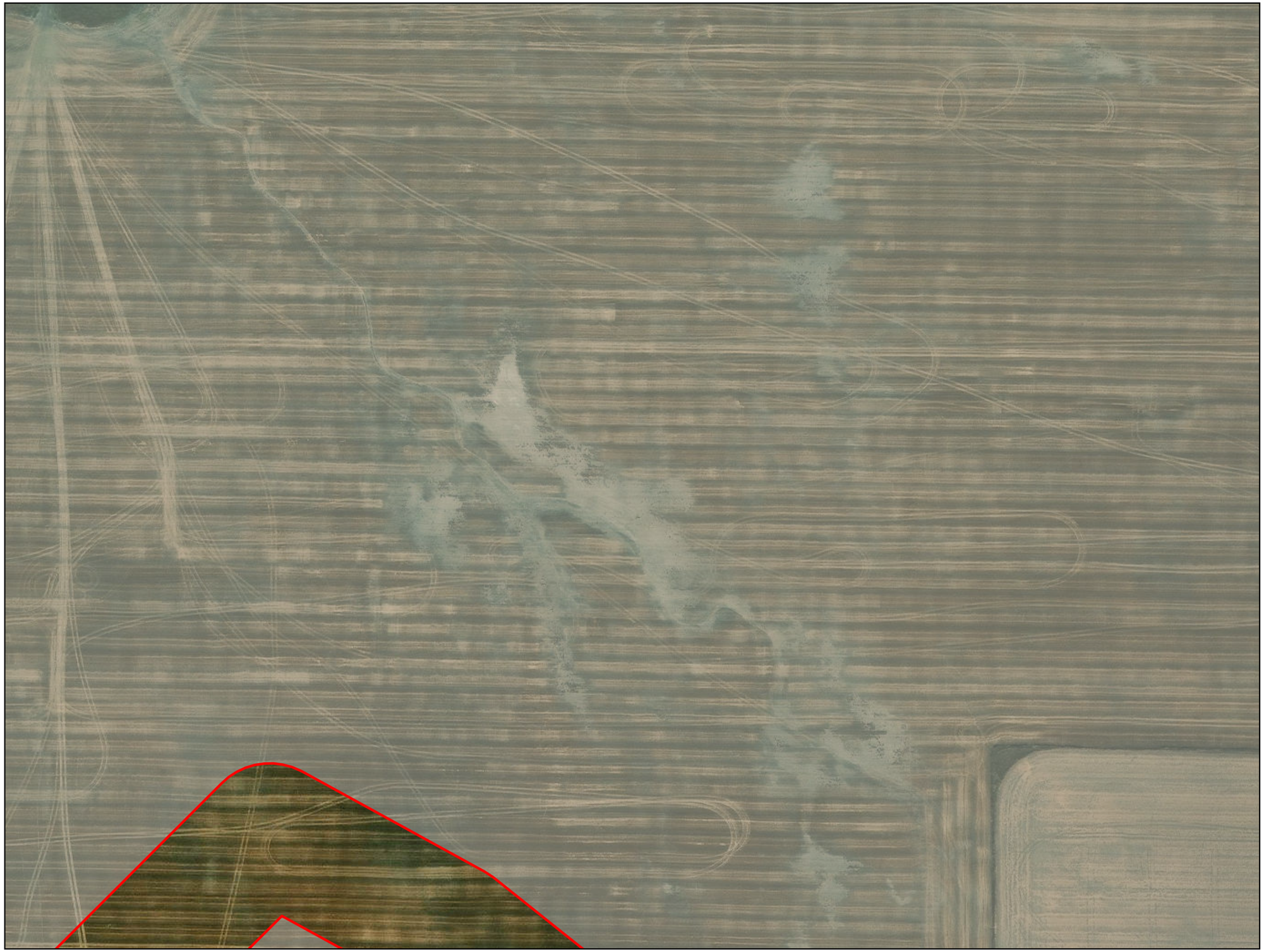

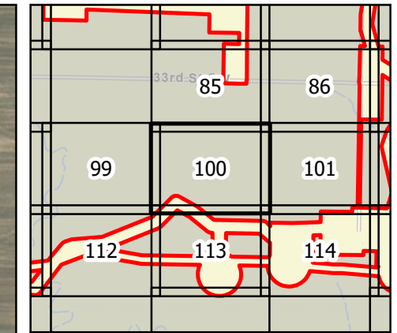

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N W E S

Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
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Mercer & Morton Counties,
North Dakota

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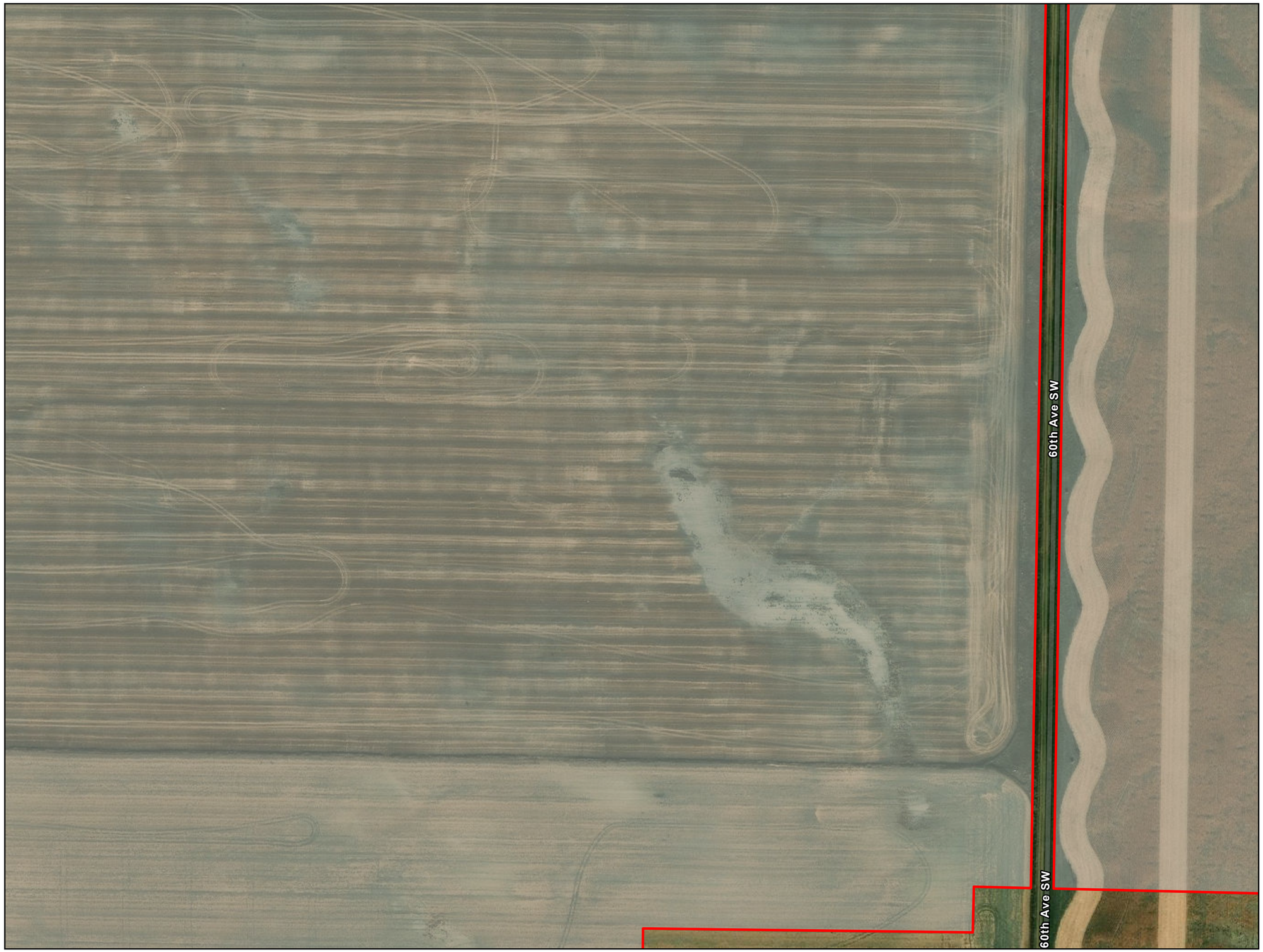

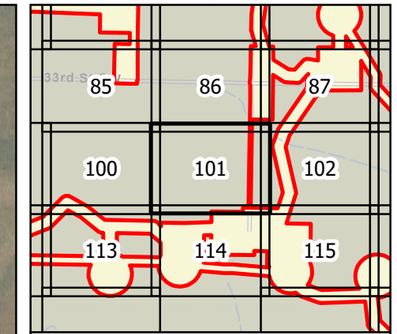

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

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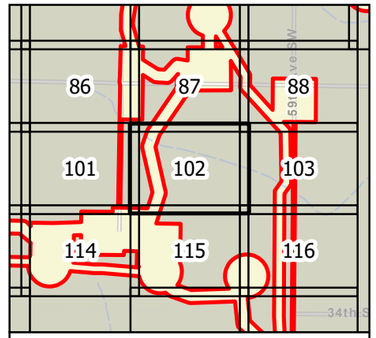

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- Survey Area
- Photo Point
- Upland Data Point
- Wetland Data Point

Delineated Wetland

- PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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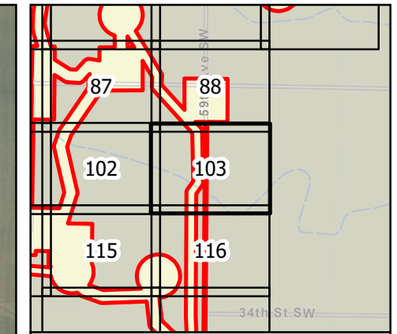

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Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
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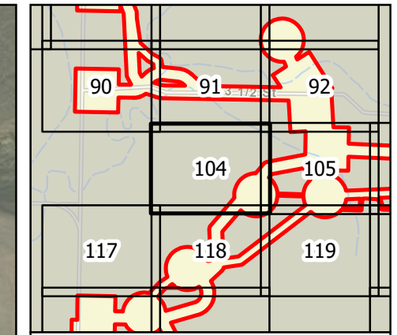

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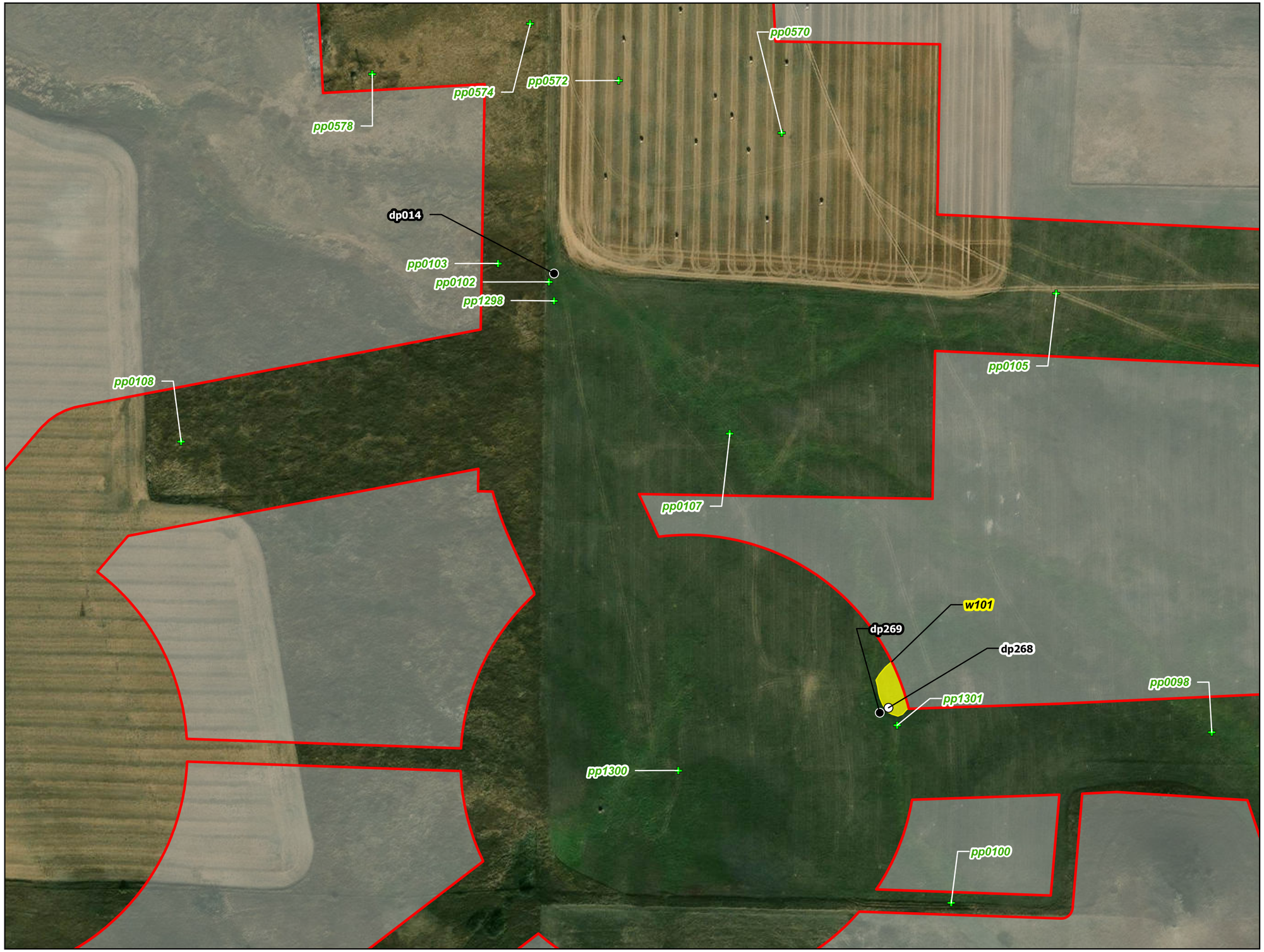

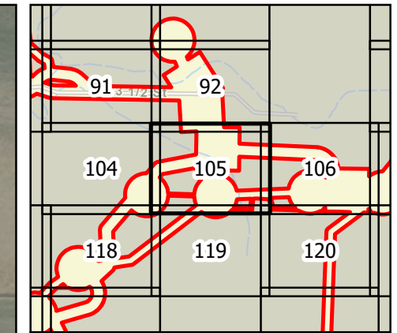

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Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
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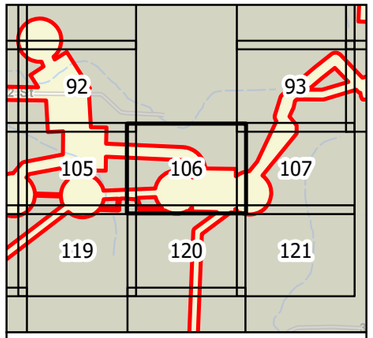

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Photo Point
Upland Data Point
Wetland Data Point
Delineated Wetland
PEM

Figure 5
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Minnesota Power
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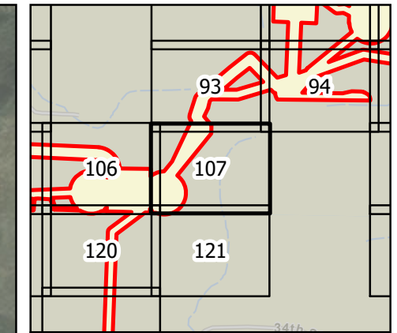

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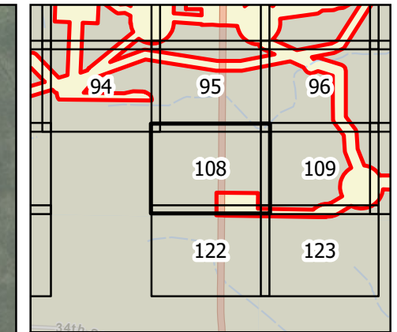

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Survey Area

Photo Point

Upland Data Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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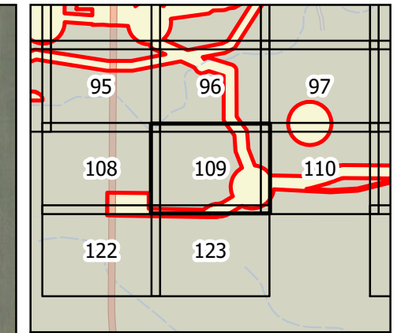

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N W E S

Survey Area

Photo Point

Upland Data Point

Figure 5
Wetland Delineation
Longspur Wind Project
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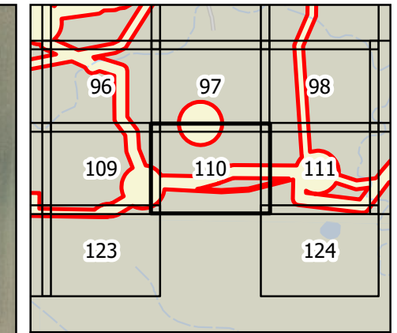

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Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
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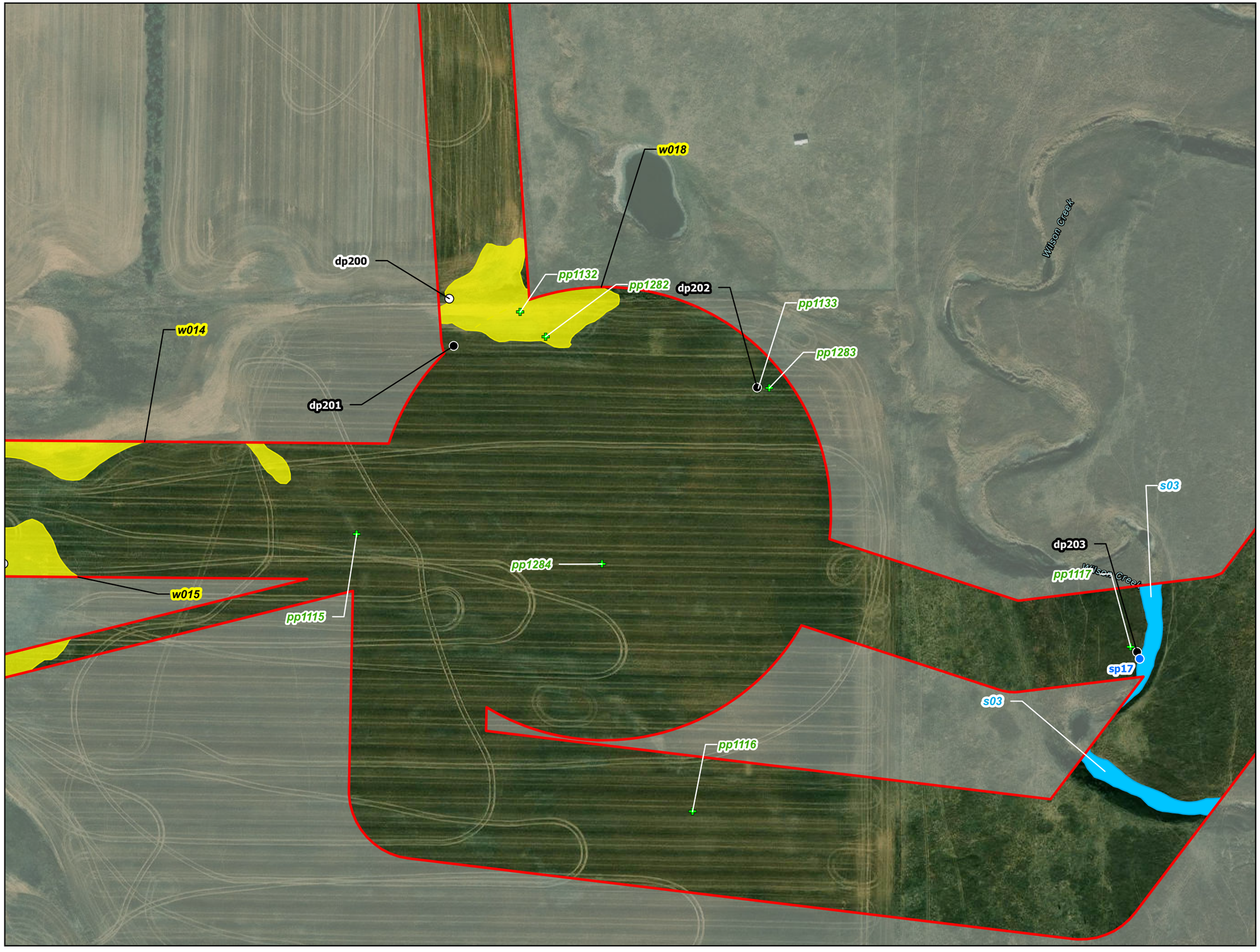

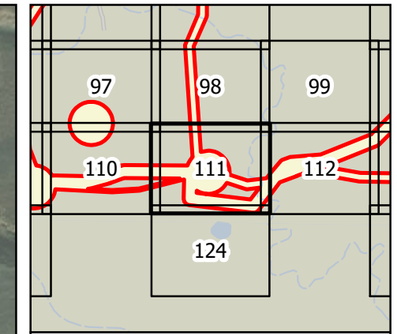

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Survey Area

Photo Point

Stream Point

Upland Data Point

Wetland Data Point

Delineated Waterway

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
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North Dakota

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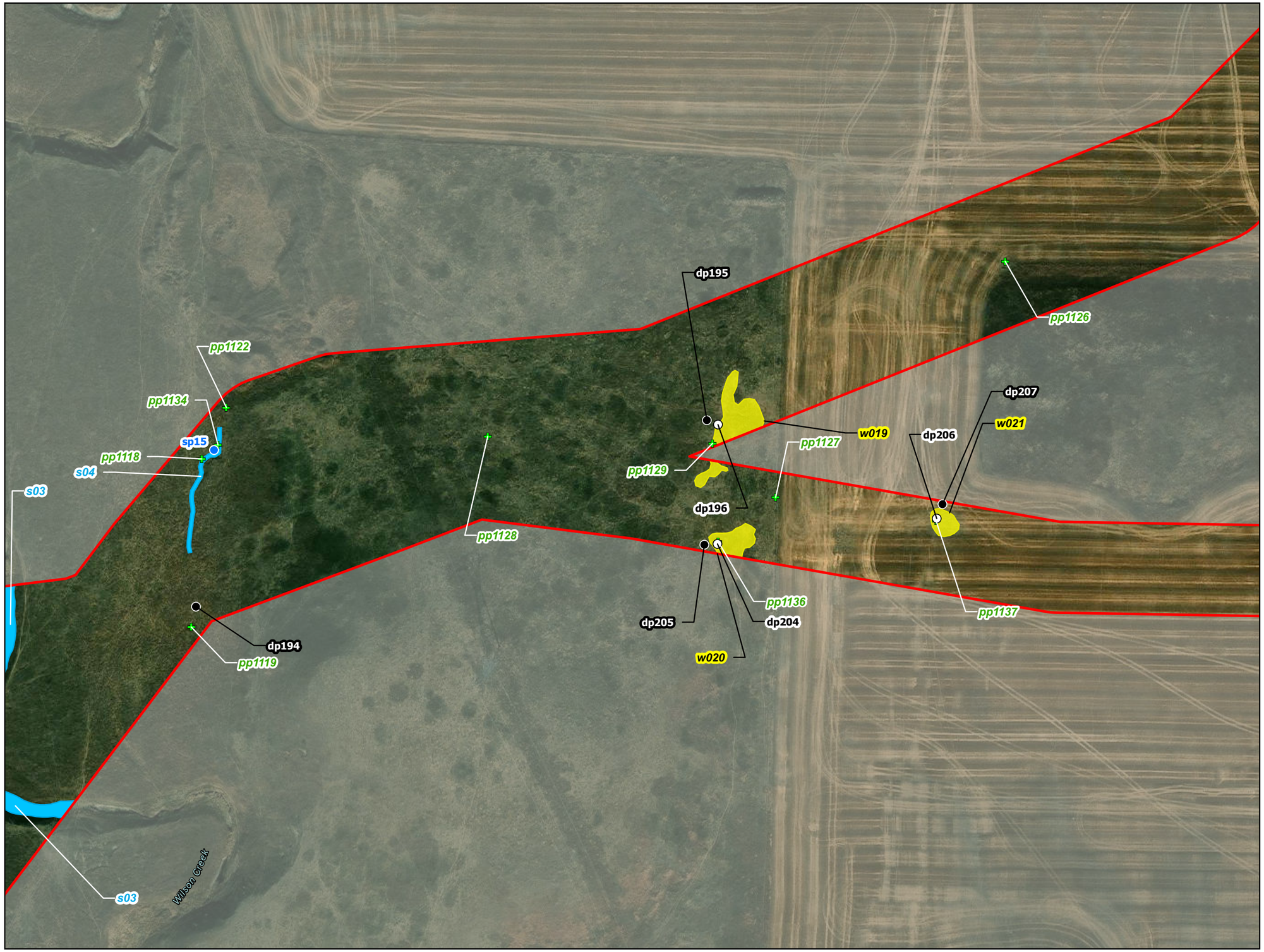

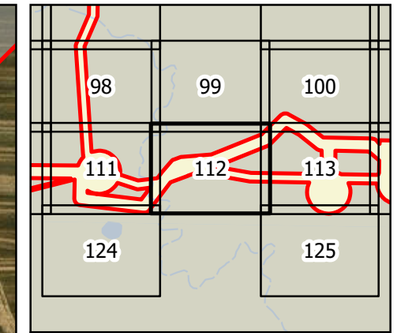

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Survey Area

Photo Point

Stream Point

Upland Data Point

Wetland Data Point

Delineated Waterway

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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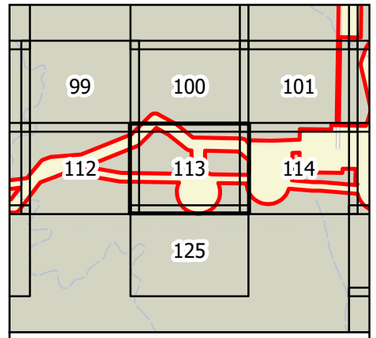

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- Survey Area
- Photo Point
- Stream Point
- Delineated Waterway

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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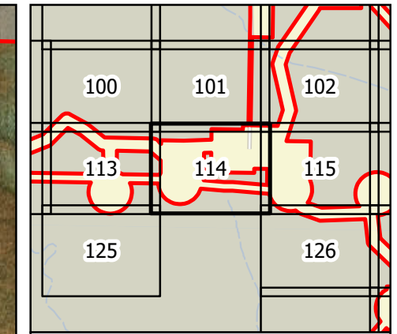

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N W E S

Survey Area

Photo Point

Stream Point

Upland Data Point

Wetland Data Point

Delineated Waterway

Delineated Wetland

PEM

Figure 5
Wetland Delineation
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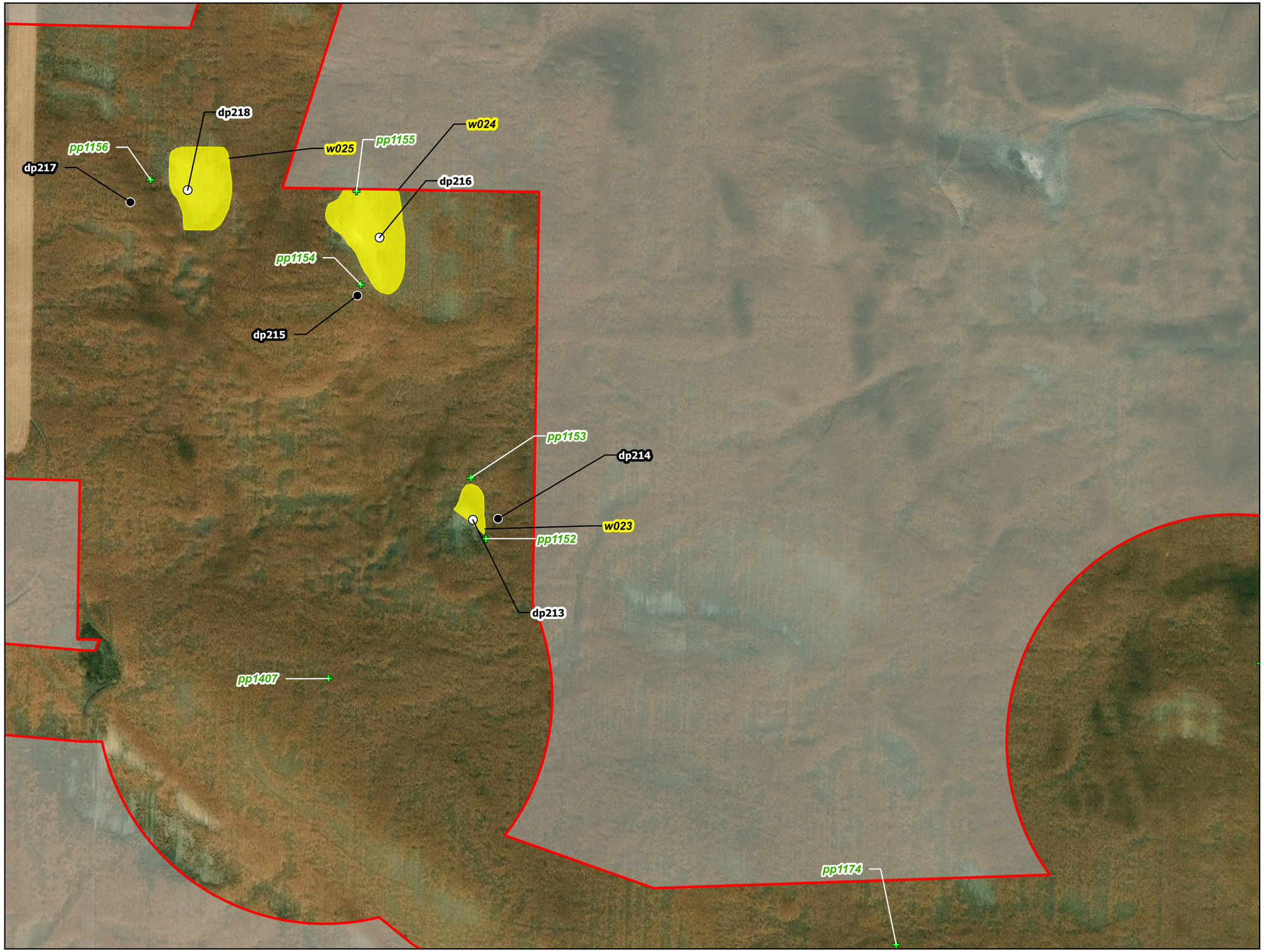

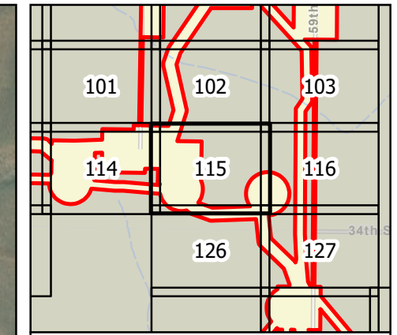

Survey Area
Photo Point
Upland Data Point
Wetland Data Point
Delineated Wetland
PEM

Figure 5
Wetland Delineation
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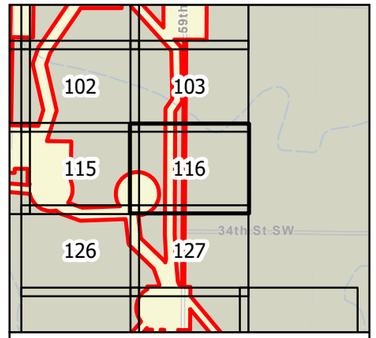

Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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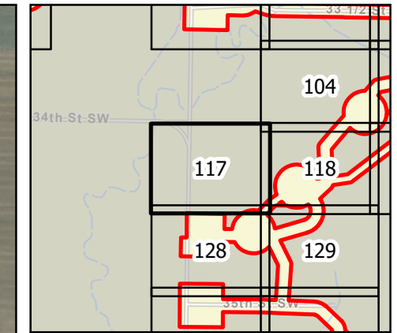

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Survey Area

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Wetland Delineation
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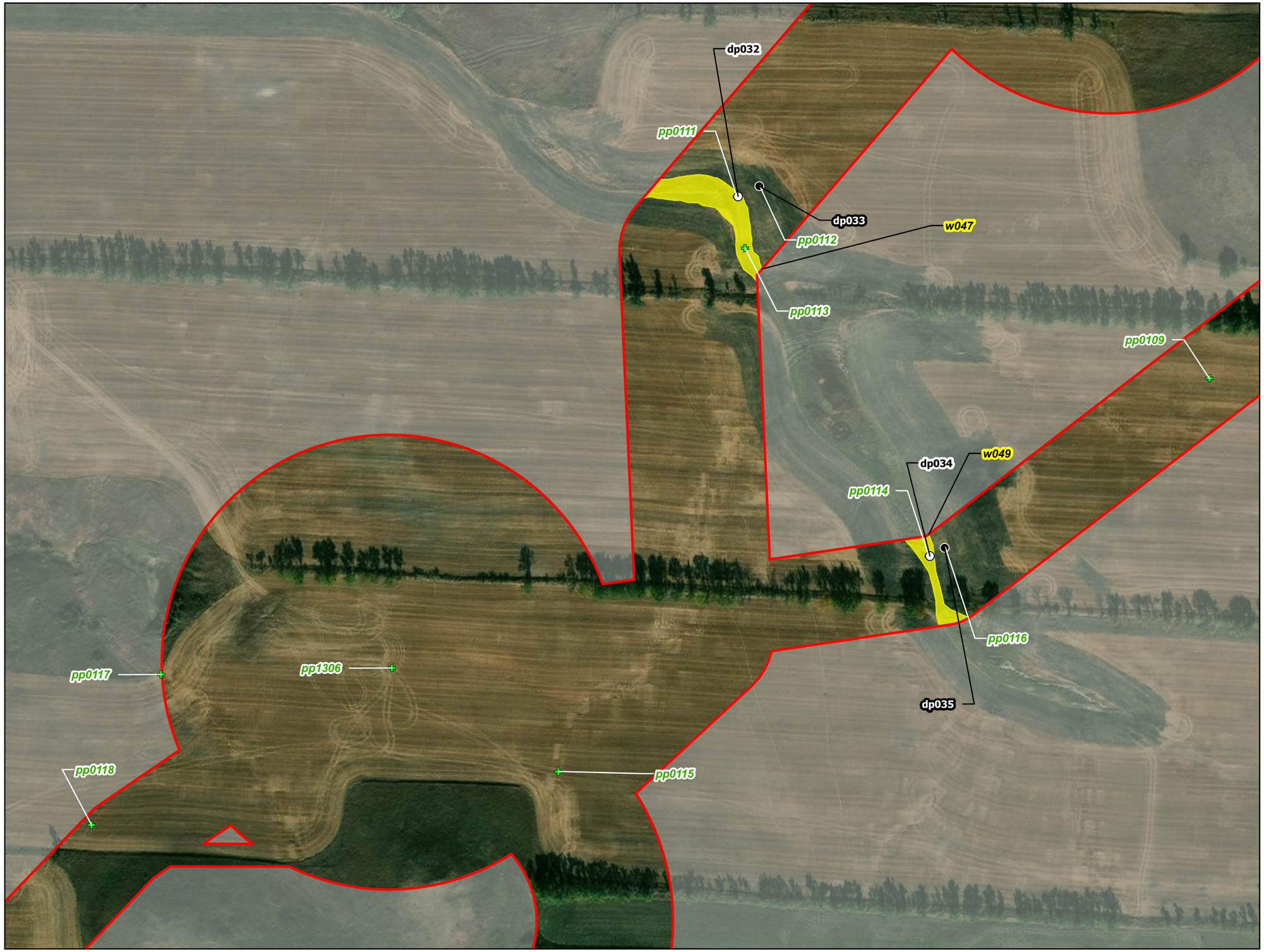

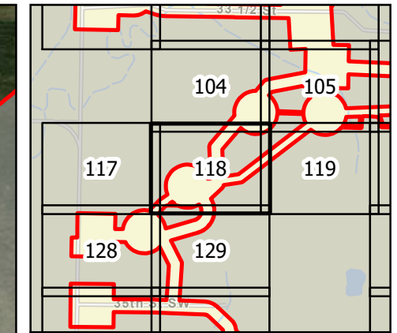

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Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
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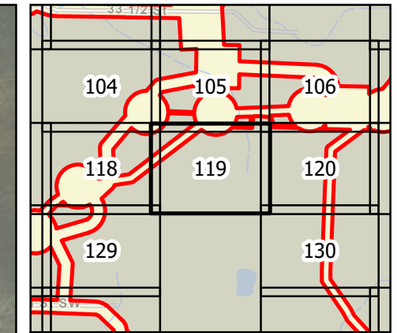

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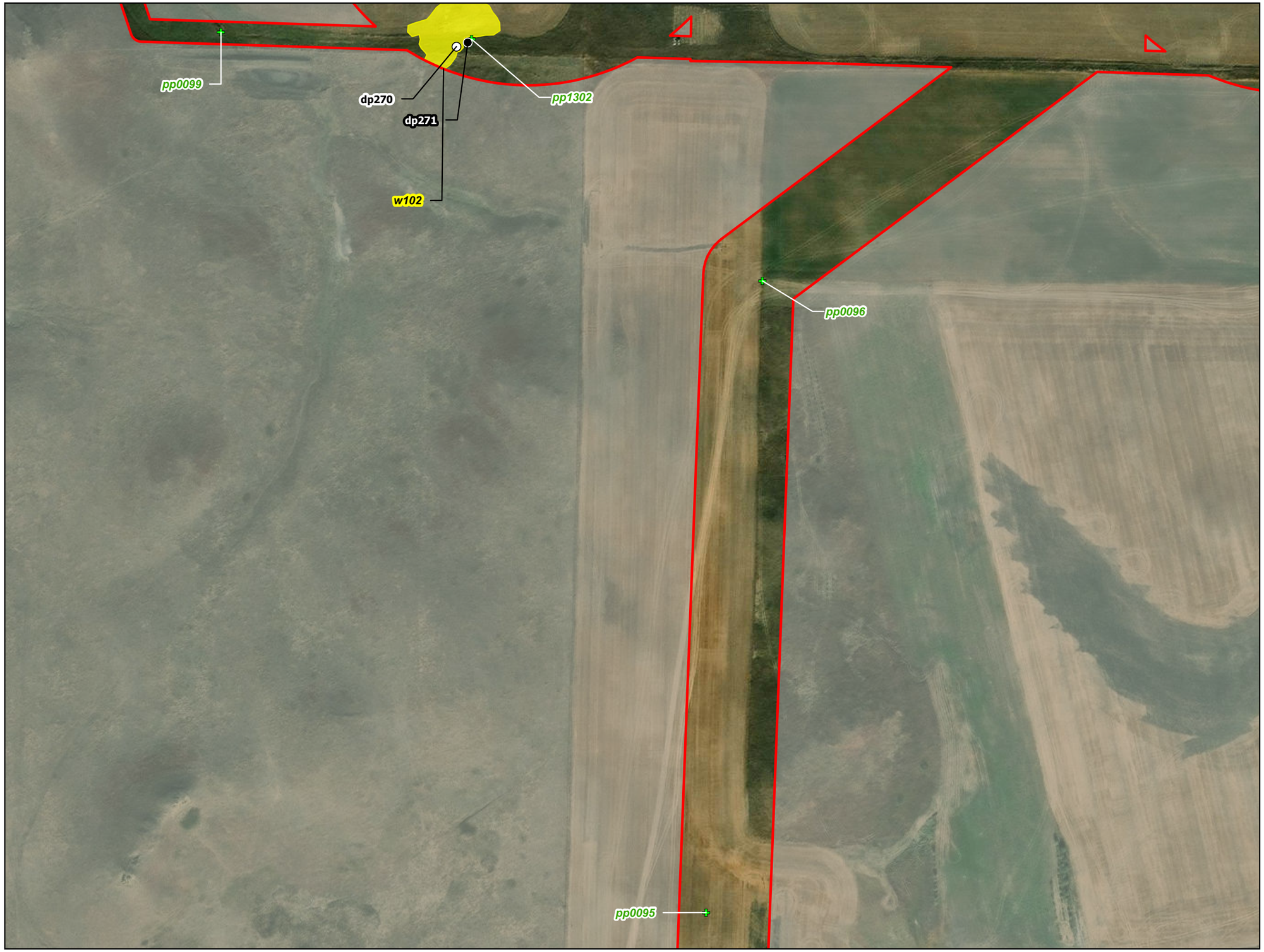

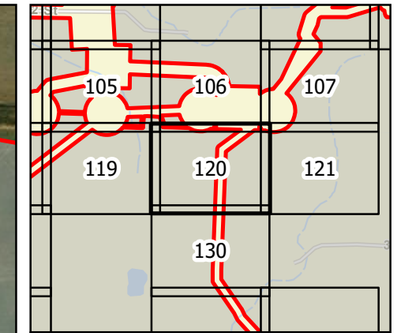

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Upland Data Point

Wetland Data Point

Delineated Wetland

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Wetland Delineation
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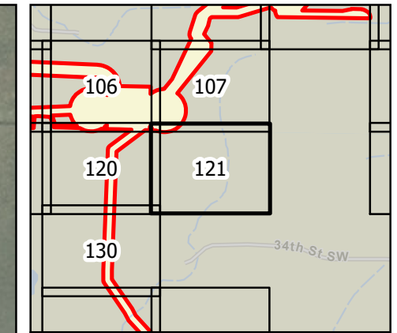

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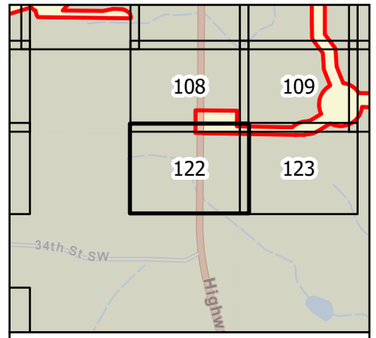

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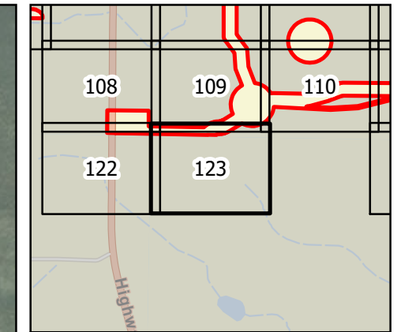

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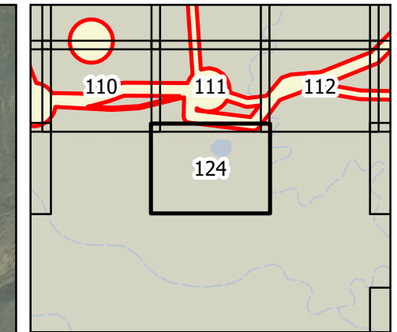

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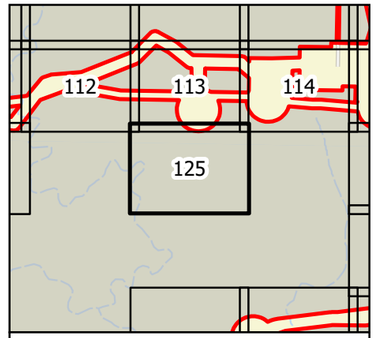

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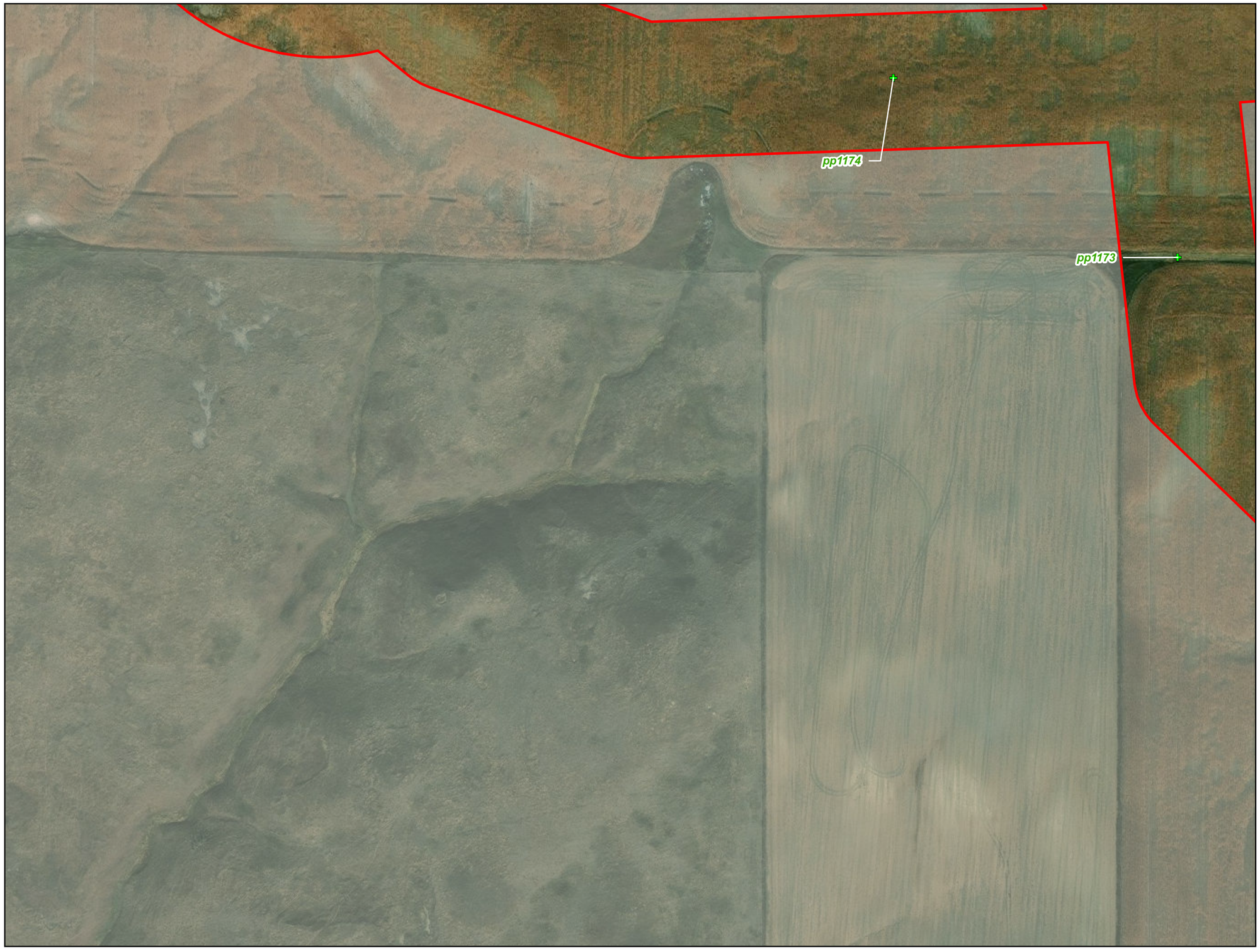

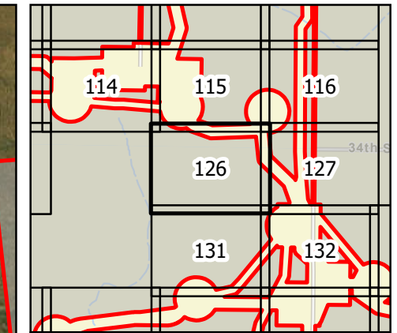

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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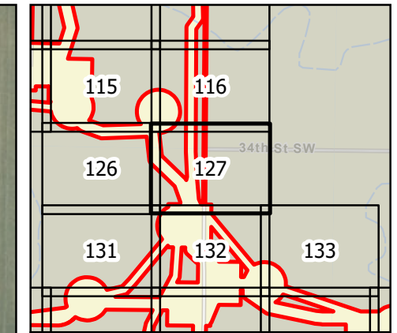

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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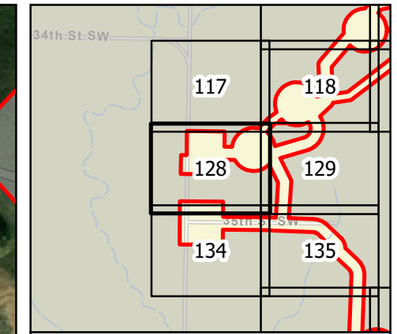

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Culvert Point

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
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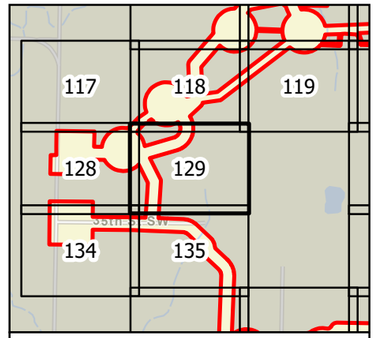

0 100 200 Feet

1 inch = 200 feet

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Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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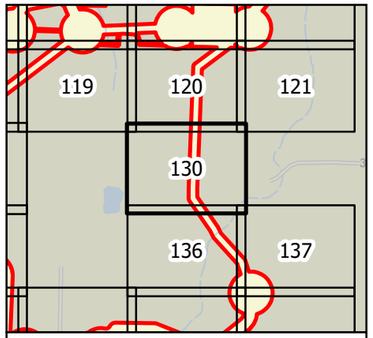

0 100 200 Feet

1 inch = 200 feet

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Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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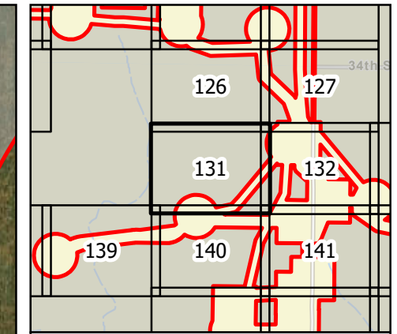

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1 inch = 200 feet

N W E S

Survey Area

Photo Point

Upland Data Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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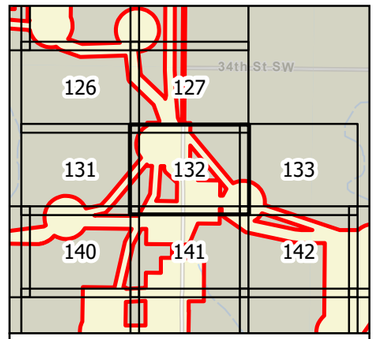

0 100 200 Feet

1 inch = 200 feet

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Survey Area
Photo Point
Upland Data Point
Delineated Wetland
PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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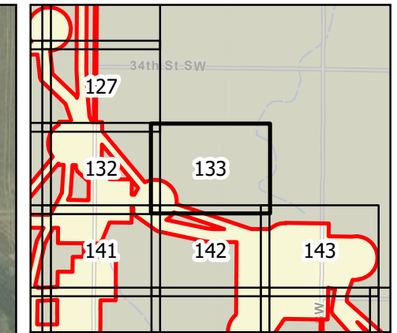

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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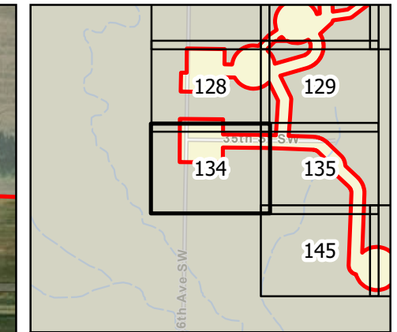

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Stream Point

Delineated Waterway

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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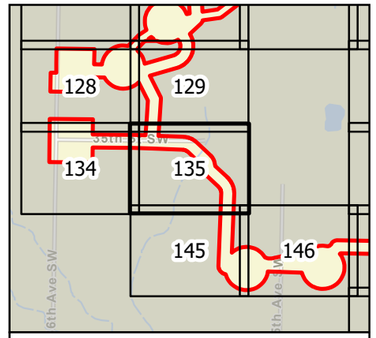

0 100 200 Feet

1 inch = 200 feet

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- Survey Area
- Photo Point
- Upland Data Point
- Wetland Data Point

Delineated Wetland

- PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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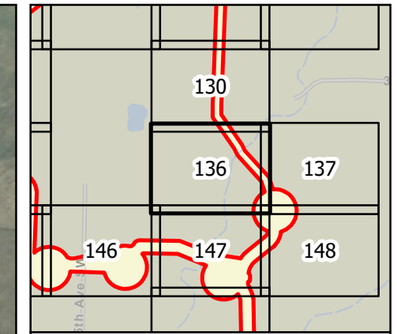

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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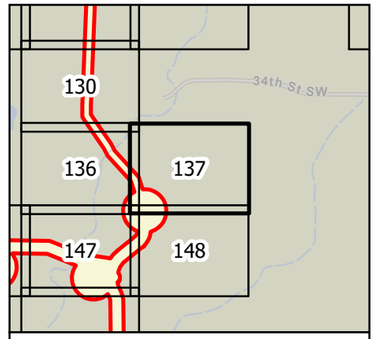

0 100 200 Feet

1 inch = 200 feet

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Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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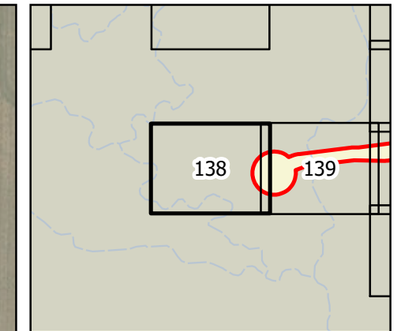

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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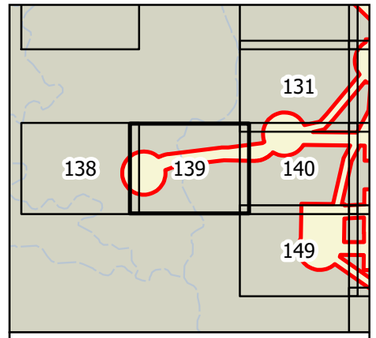

0 100 200 Feet

1 inch = 200 feet

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Survey Area
Photo Point
Upland Data Point
Wetland Data Point
Delineated Wetland
PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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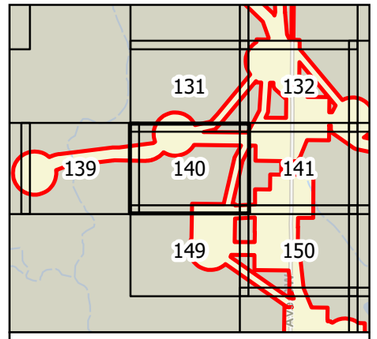

0 100 200 Feet

1 inch = 200 feet

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Survey Area
Photo Point
Upland Data Point
Wetland Data Point
Delineated Wetland
PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
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North Dakota

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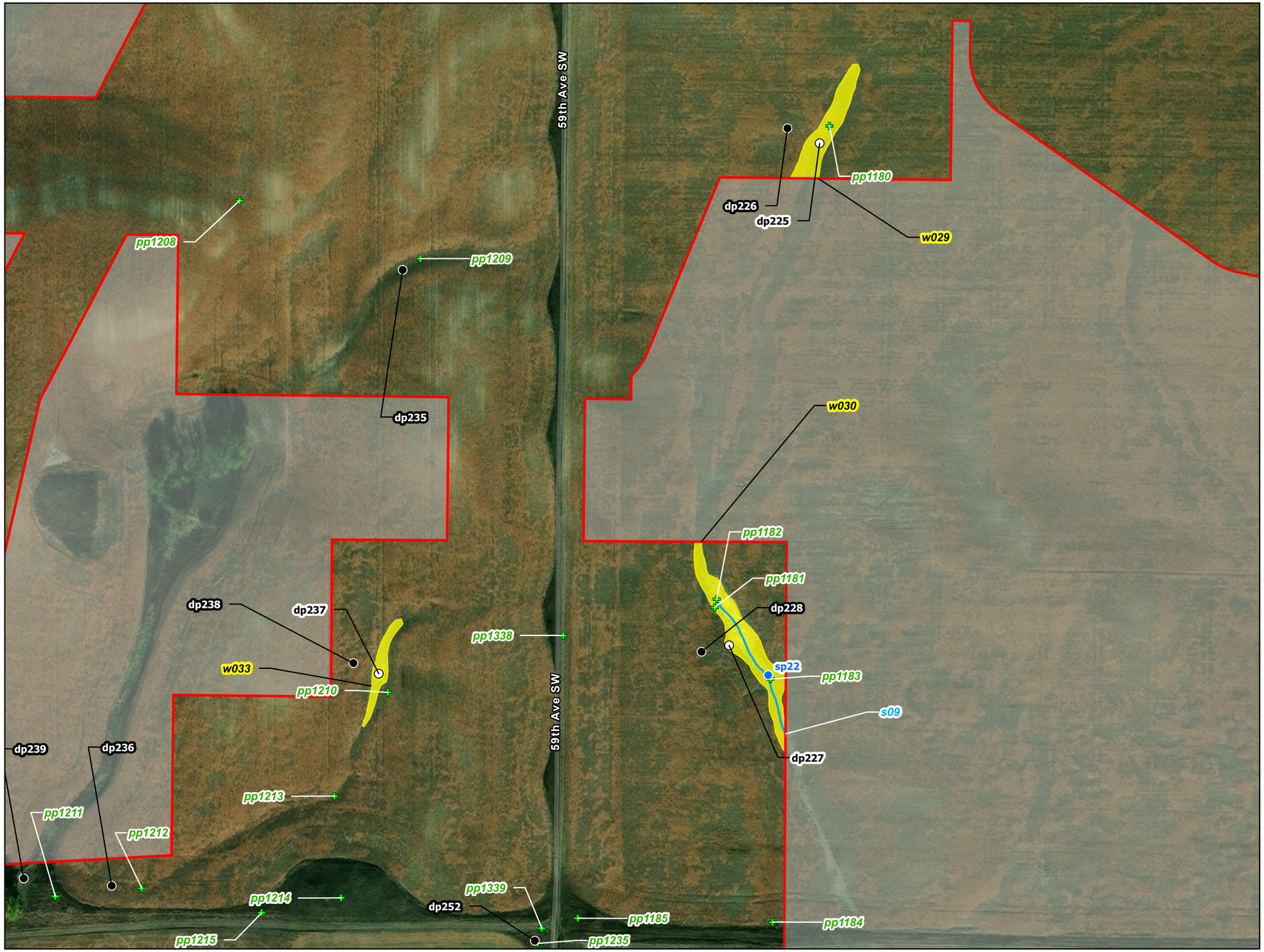

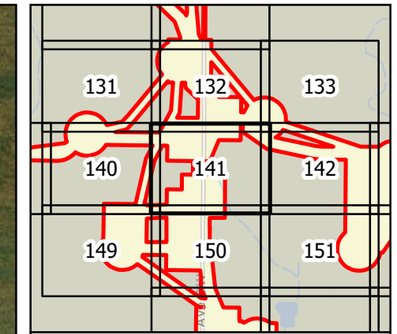

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Stream Point

Upland Data Point

Wetland Data Point

Delineated Waterway

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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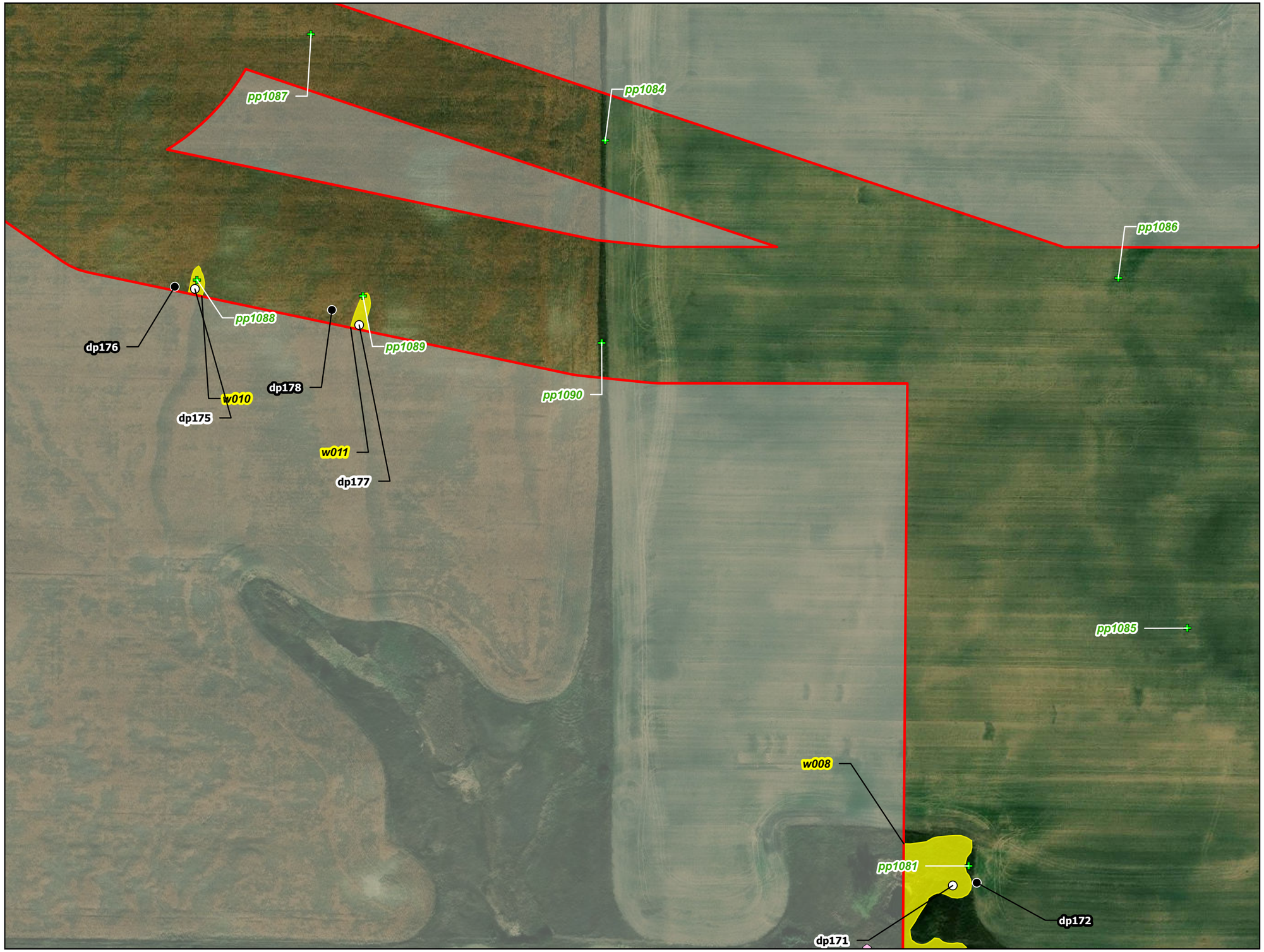

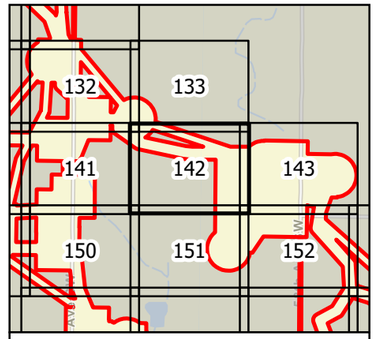

0 100 200 Feet

1 inch = 200 feet

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- Survey Area
- Culvert Point
- Photo Point
- Upland Data Point
- Wetland Data Point

Delineated Wetland

- PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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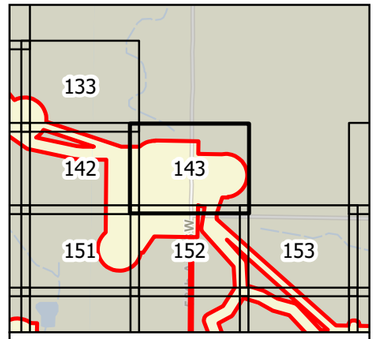

Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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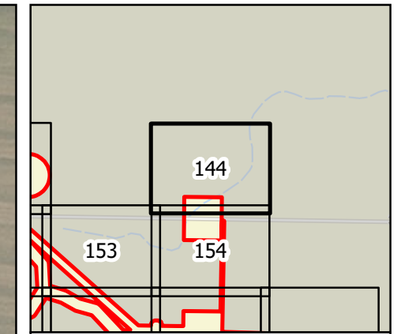

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area
Culvert Point
Photo Point
Upland Data Point
Wetland Data Point
Delineated Wetland
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Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
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North Dakota

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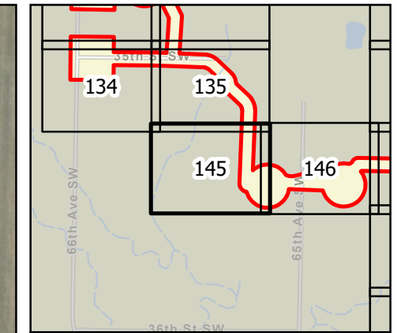

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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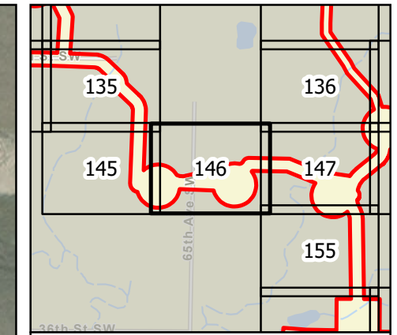

0 100 200 Feet

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N W E S

Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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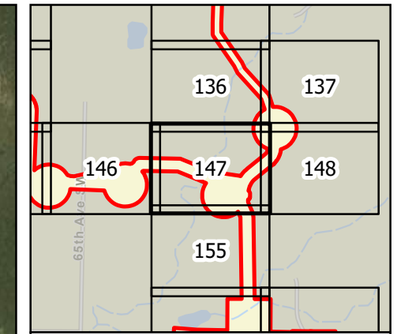

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N W E S

Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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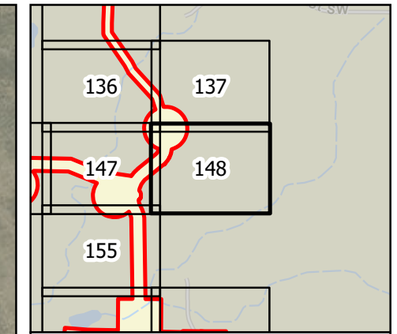

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N W E S

Survey Area

Photo Point

Upland Data Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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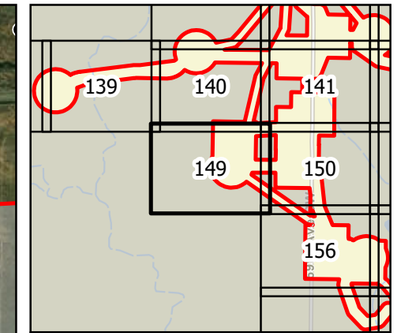

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N W E S

Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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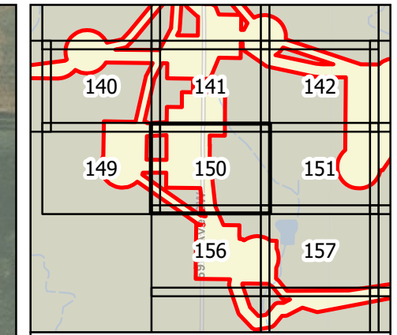

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N W E S

Survey Area

Photo Point

Upland Data Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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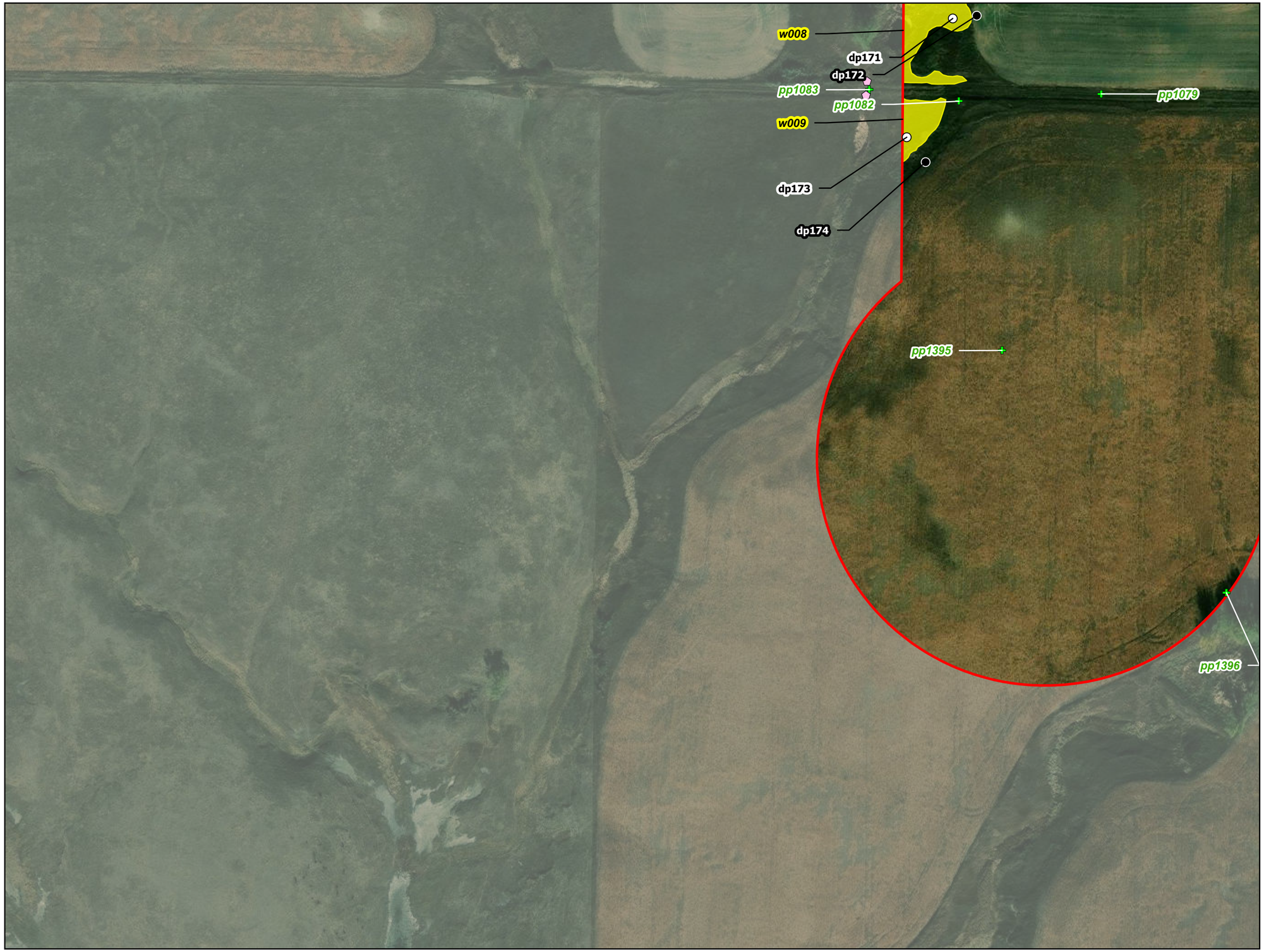

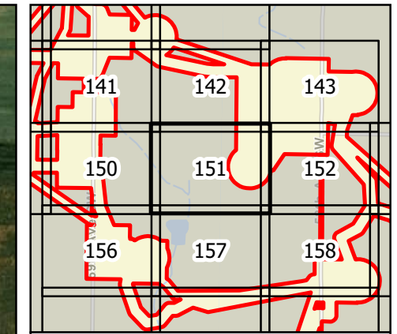

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N W E S

Survey Area

Culvert Point

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
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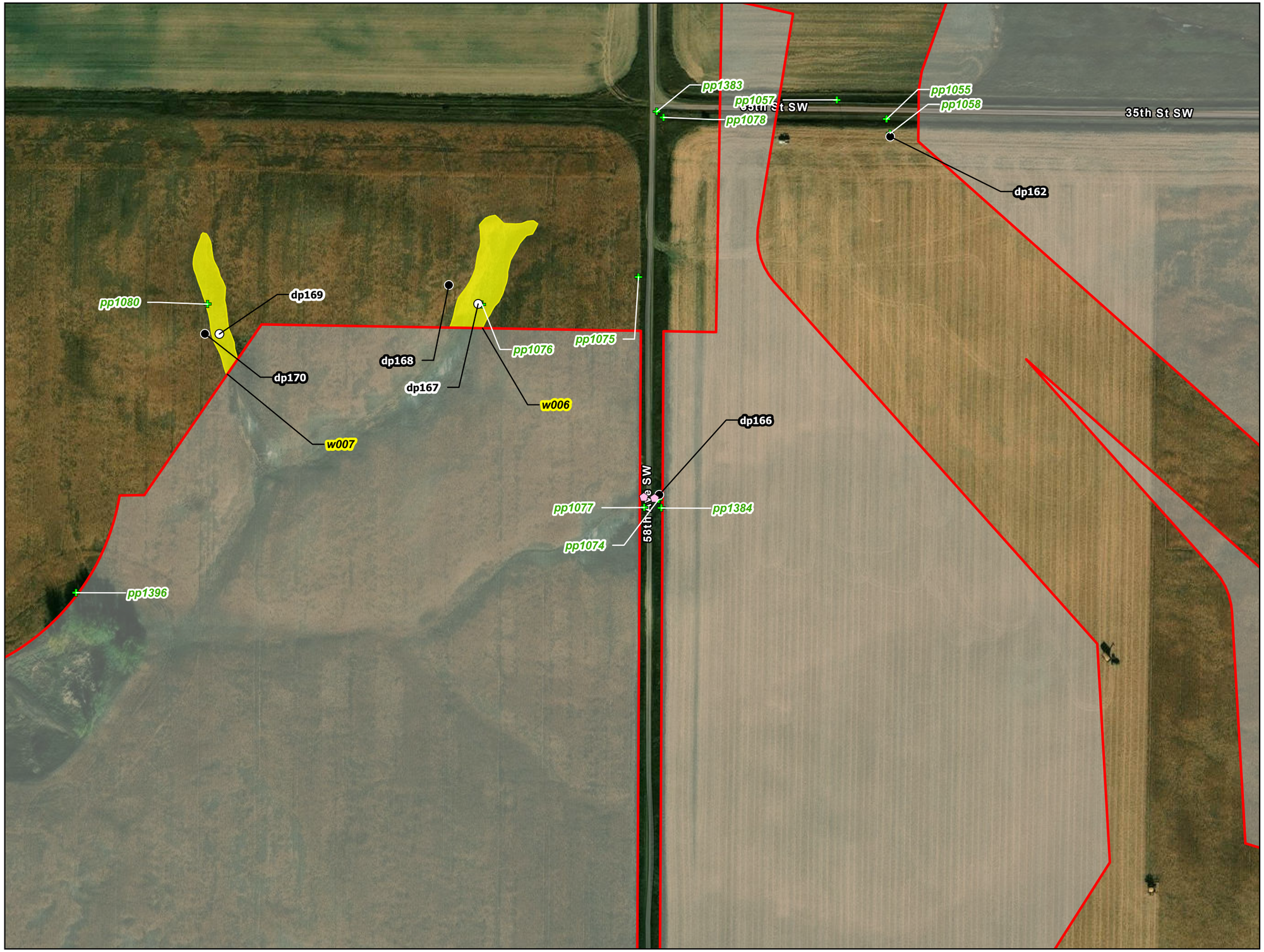

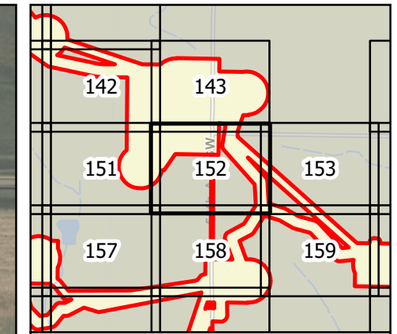

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Culvert Point

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
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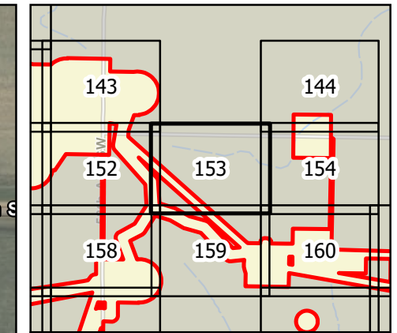

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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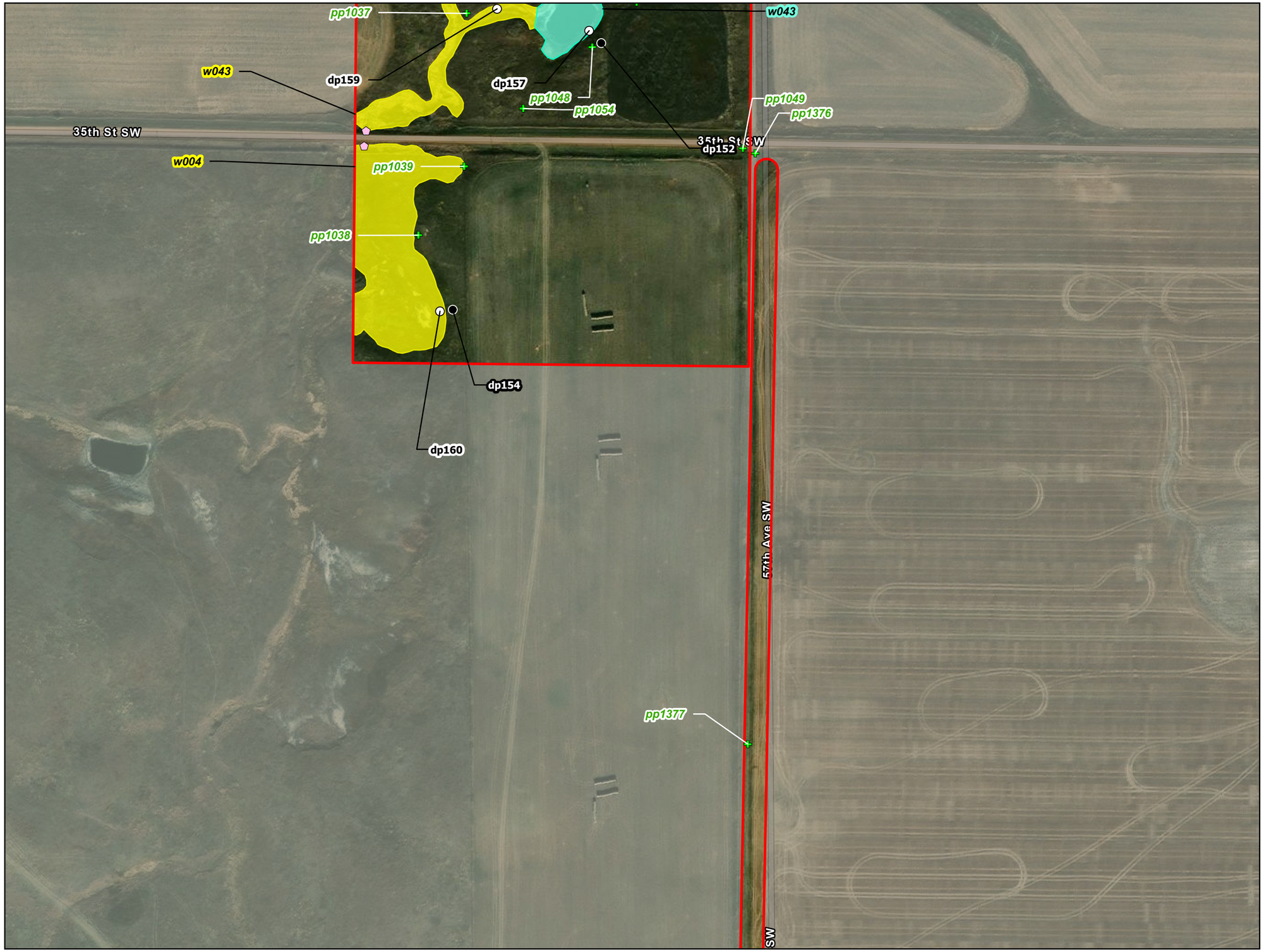

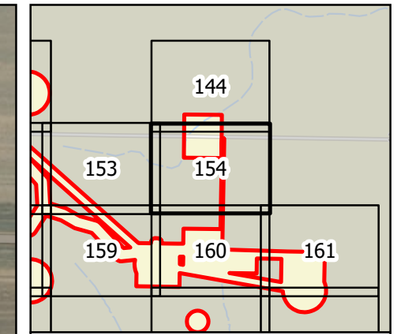

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Culvert Point

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

PUB

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
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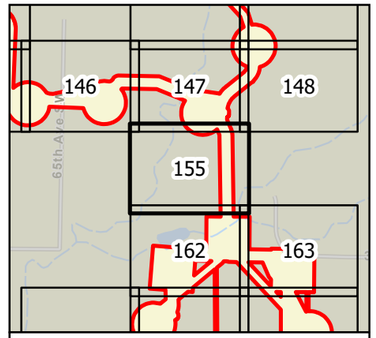

0 100 200 Feet

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Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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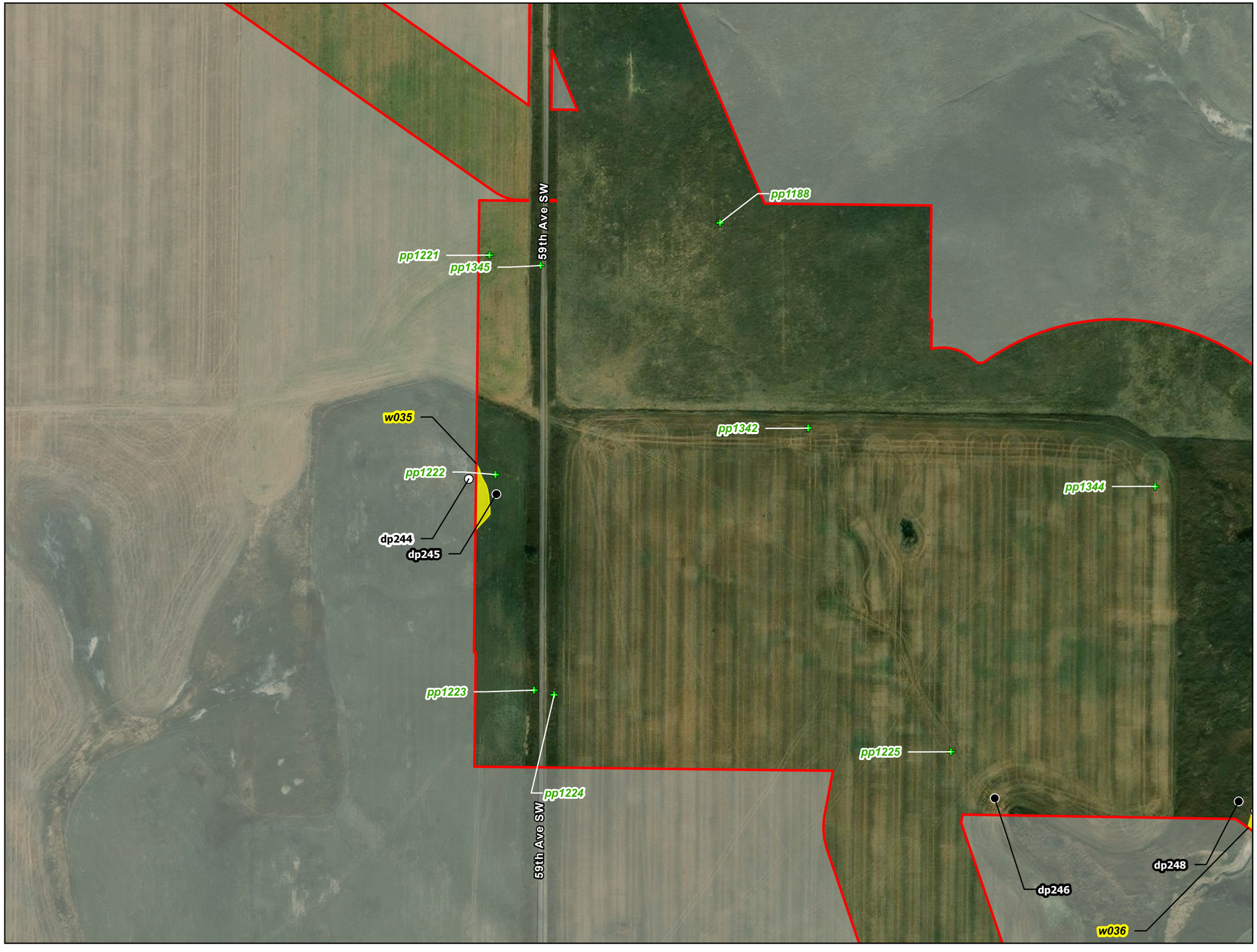

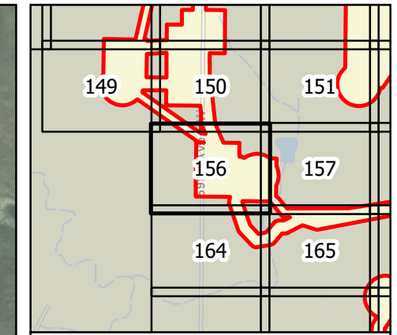

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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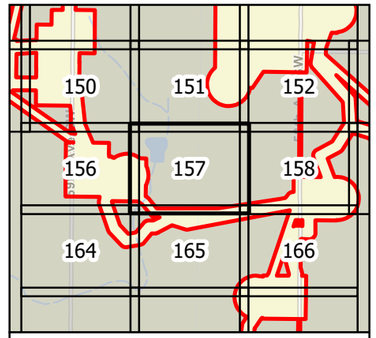

0 100 200 Feet

1 inch = 200 feet

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- Survey Area
- Photo Point
- Upland Data Point
- Wetland Data Point

Delineated Wetland

- PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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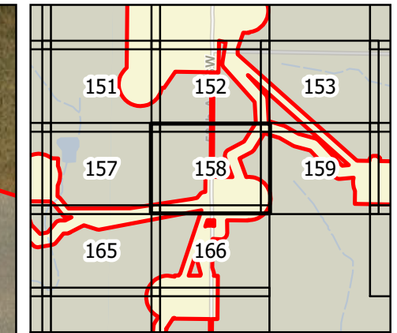

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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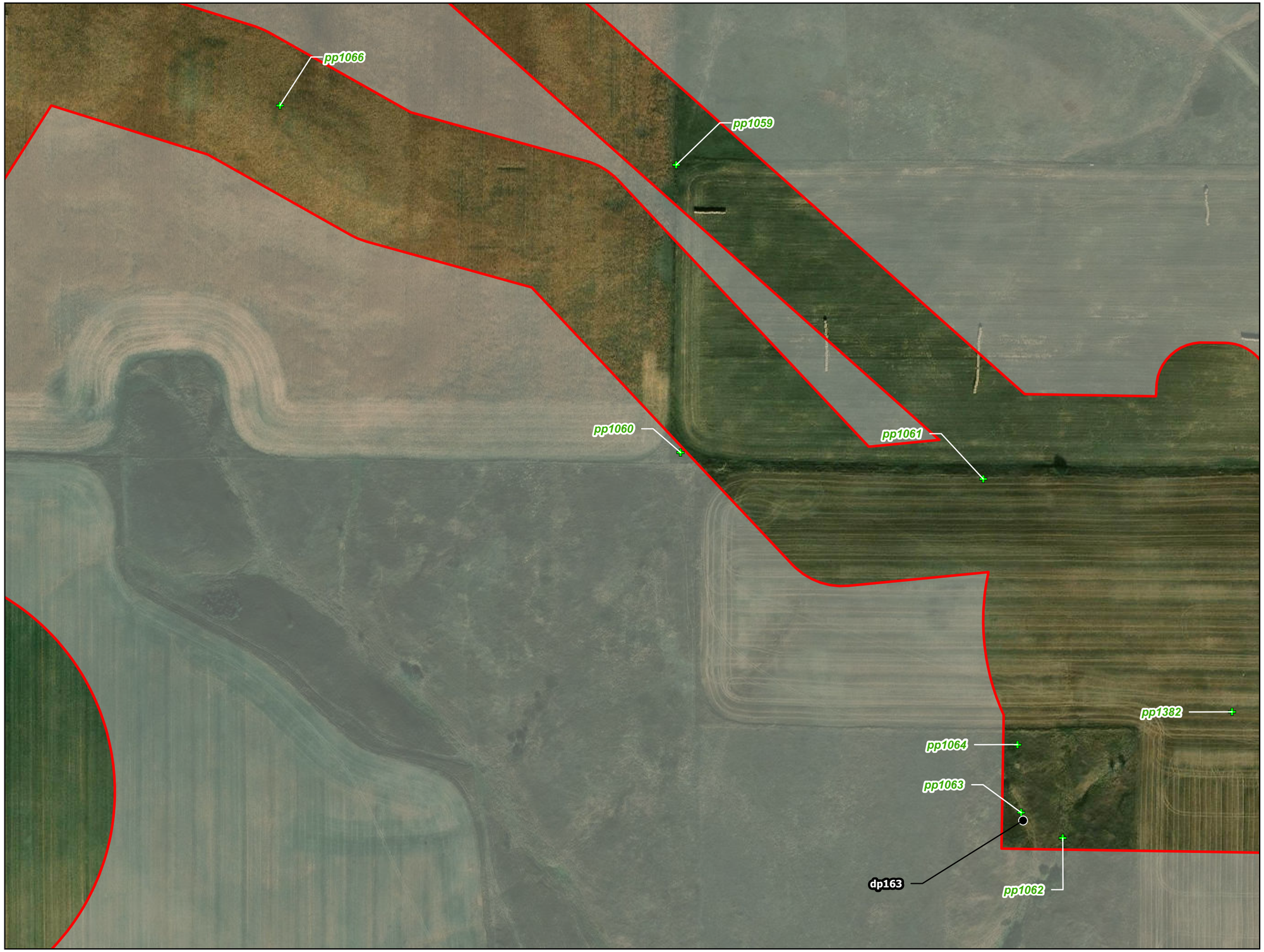

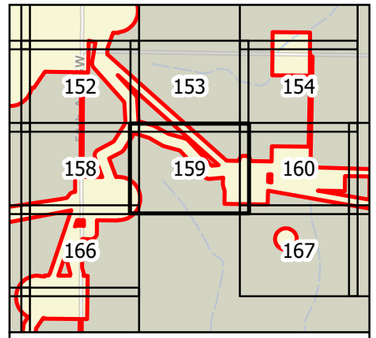

0 100 200 Feet

1 inch = 200 feet

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Survey Area

Photo Point

Upland Data Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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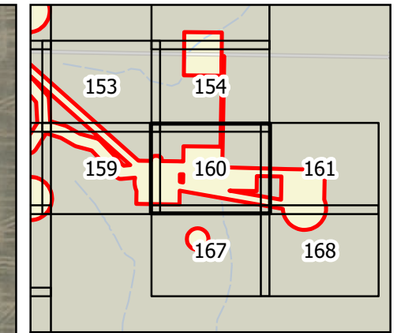

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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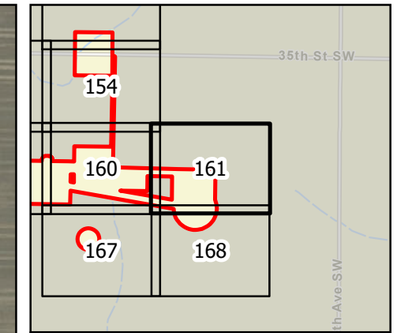

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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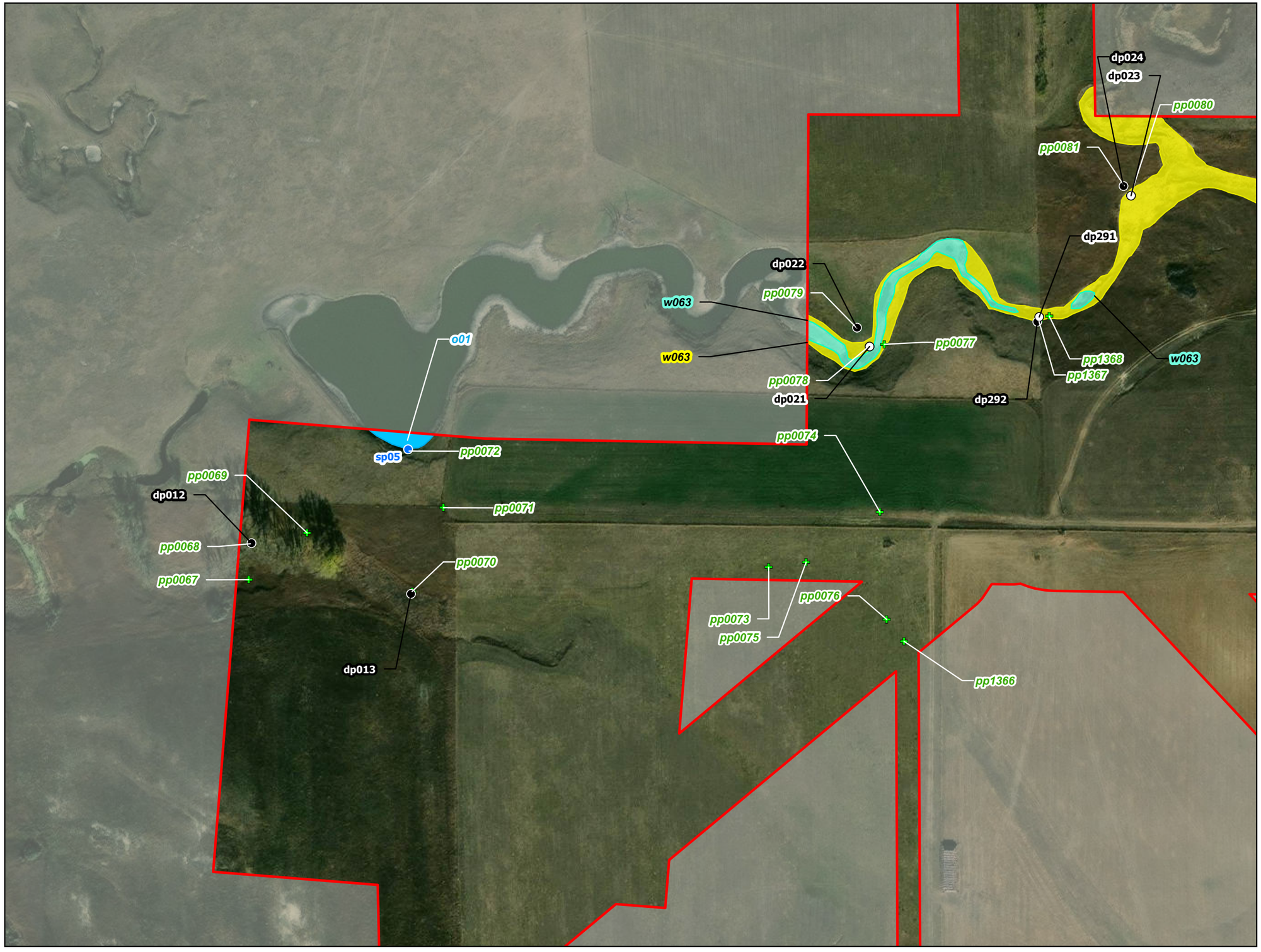

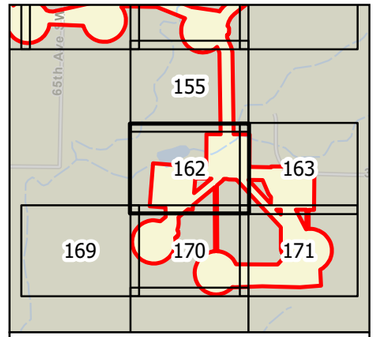

0 100 200 Feet

1 inch = 200 feet

N
W E
S

- Survey Area
- Photo Point
- Stream Point
- Upland Data Point
- Wetland Data Point
- Delineated Waterway

Delineated Wetland

- PEM
- PUB

Figure 5
Wetland Delineation
Longspur Wind Project
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Mercer & Morton Counties,
North Dakota

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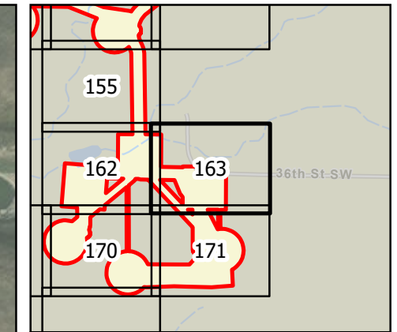

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Upland Data Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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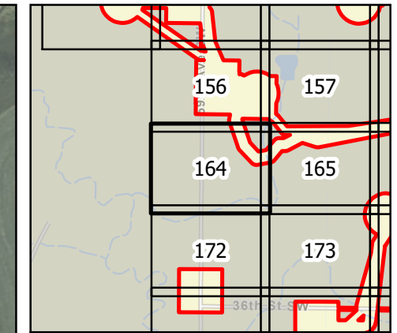

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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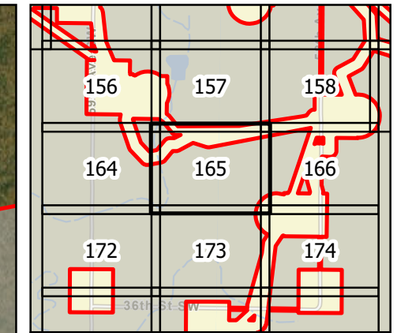

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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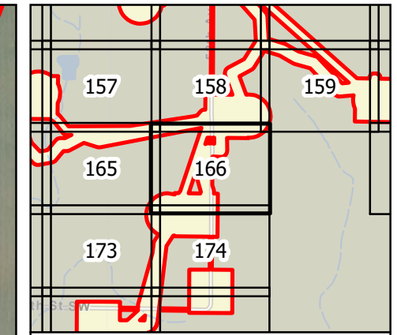

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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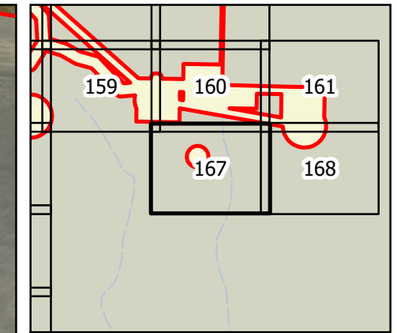

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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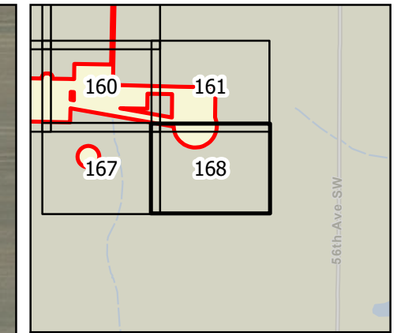

0 100 200 Feet

1 inch = 200 feet

N W E S

Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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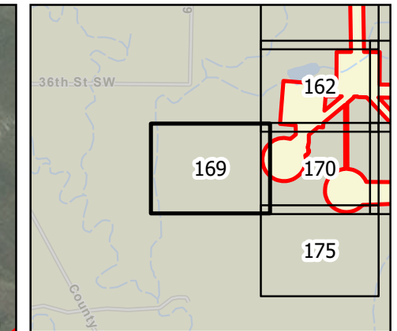

0 100 200 Feet

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N W E S

Survey Area

Photo Point

Upland Data Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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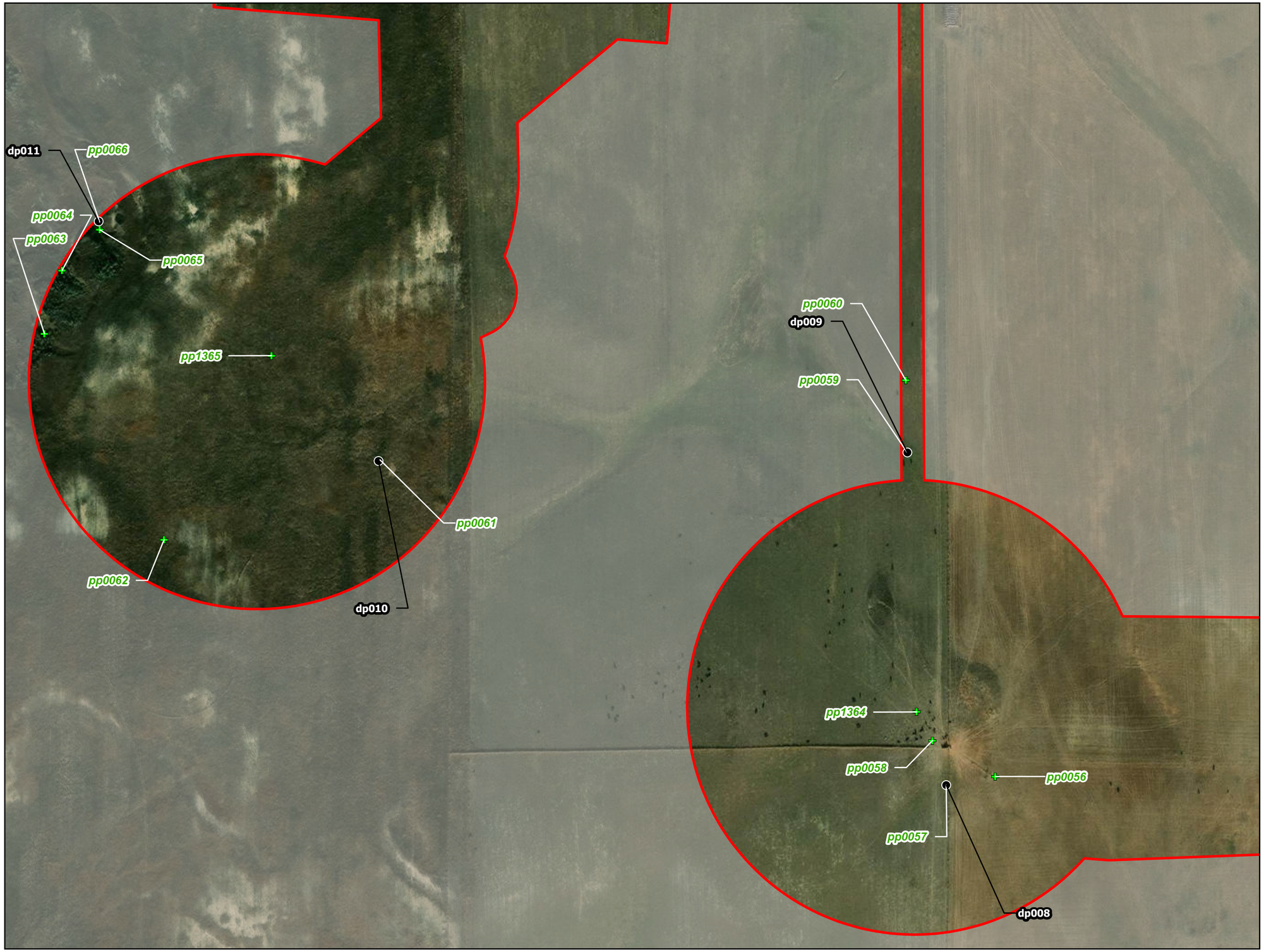

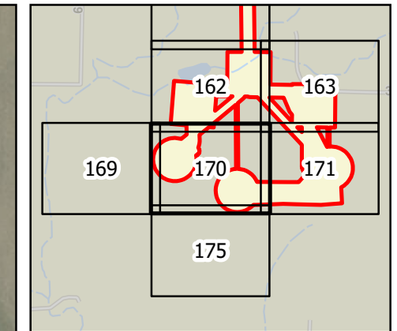

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N W E S

Survey Area

Photo Point

Upland Data Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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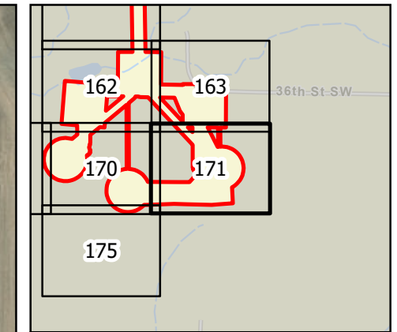

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N W E S

Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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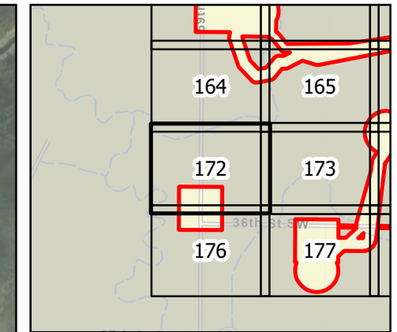

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N W E S

Survey Area

Photo Point

Upland Data Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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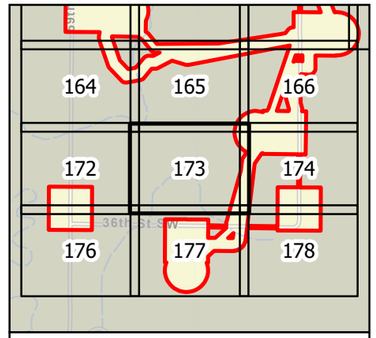

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- Survey Area
- Photo Point
- Upland Data Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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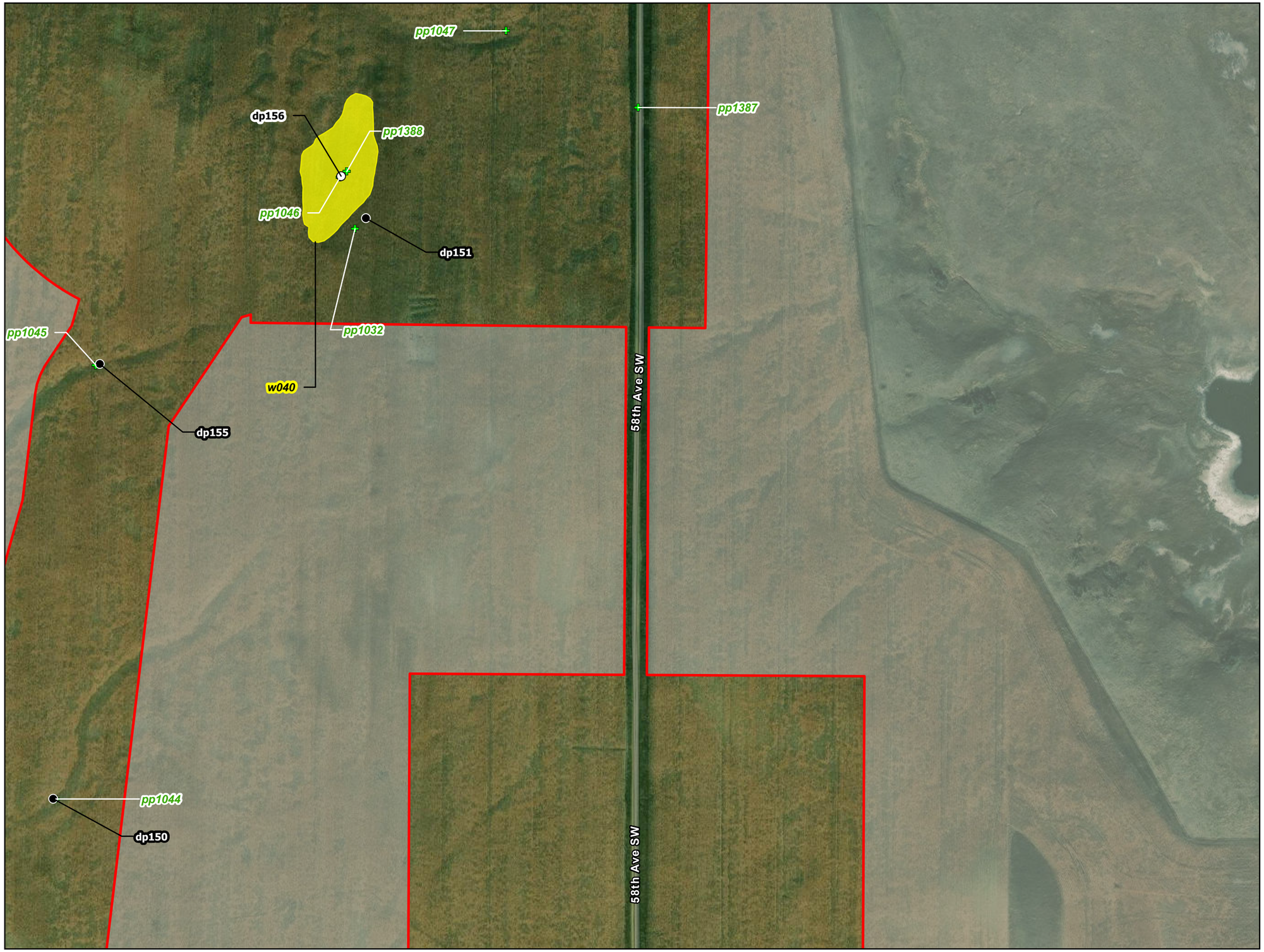

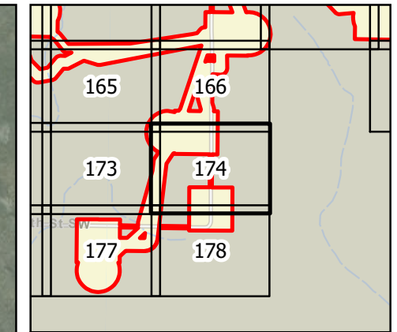

0 100 200 Feet

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N W E S

Survey Area

Photo Point

Upland Data Point

Wetland Data Point

Delineated Wetland

PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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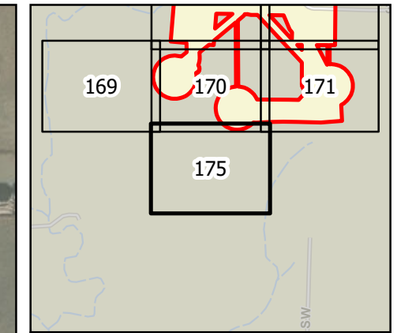

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N W E S

Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

minnesota power
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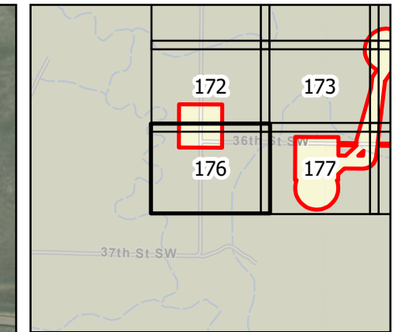

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N W E S

Survey Area

Photo Point

Upland Data Point

Figure 5
Wetland Delineation
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Minnesota Power
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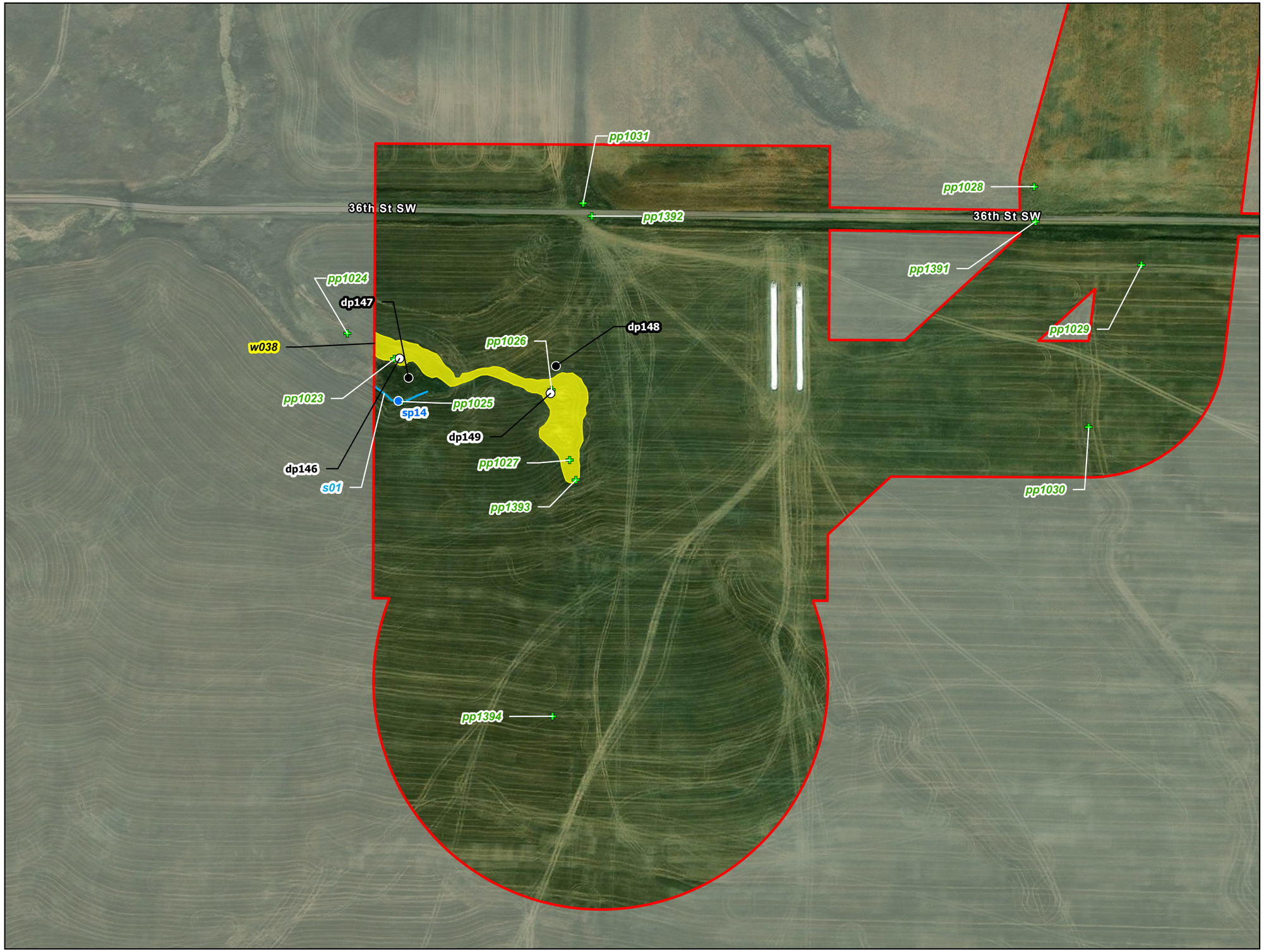

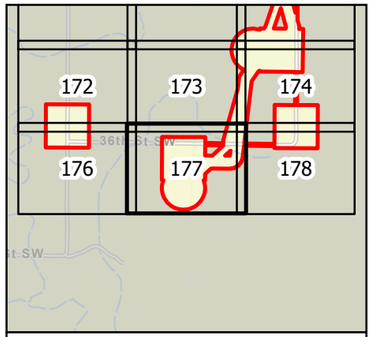

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- Photo Point
- Stream Point
- Upland Data Point
- Wetland Data Point
- Delineated Waterway

Delineated Wetland

- PEM

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
Mercer & Morton Counties,
North Dakota

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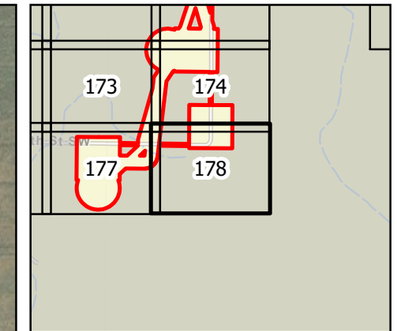

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Survey Area

Photo Point

Figure 5
Wetland Delineation
Longspur Wind Project
Minnesota Power
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Studies and Assessments

B7. Eagle Nest Survey Reports

ENVIRONMENTAL & STATISTICAL CONSULTANTS

4007 State Street, Suite 109 Bismarck, North Dakota 58503
Phone: 701-250-1756 ◆ www.west-inc.com

TECHNICAL MEMORANDUM

Date: June 14, 2024

To: Drew Jenke, Minnesota Power | ALLETE Inc.

From: Martin Piorkowski and Andrew Burmester, Western Ecosystems Technology, Inc.

Subject: Longspur Wind Project – 2024 Eagle Nest Survey

INTRODUCTION

At the request of ALLETE Inc., Western Ecosystems Technology, Inc. (WEST) conducted eagle nest surveys as part of its due diligence on wildlife and habitats. Survey design was informed by the US Fish and Wildlife Service's (USFWS's) *Land-based Wind Energy Guidelines* (2012), USFWS Eagle Conservation Plan Guidance: Module 1 – Land-based Wind Energy (v2; ECPG; 2013), and the North Dakota Game and Fish Department (NDGFD) Wind Energy Development: Best Management Practices (BMPs; NDGFD 2021). The Project is located approximately 54 miles (mi; 87 kilometers [km]) west of Bismarck, North Dakota, north of Interstate 94. The objective of the eagle nest surveys was to update previously collected information on eagle, large, or very large, nests during the 2024 eagle nesting season.

STUDY AREA

The Project area encompasses 35,258 acres (14,268 hectares) within Morton County in central North Dakota, which is located within the Level III Northwestern Great Plains ecoregion (US Environmental Protection Agency 2013). The landscape is mainly composed of cultivated crops (52%) and herbaceous land cover (37%; Table 1). Shrub/scrub habitat is found to a lesser extent (5%) along with hay/pasture (4%) and developed land (2%). All remaining land cover types account for less than 1% of the Project area (National Land Cover Database 2021). The elevation within the Project area ranged from approximately 2,080 to 2,480 feet (ft; 634 to 756 meters [m]). The Study Area, which has similar land cover and topography, included a 2-mi (3.2-km) buffer extending out from the Project area.

Table 1. Land cover types and percent composition of the Longspur Wind Project, Morton County, North Dakota.

Land cover type	Coverage (Acres)	Percent Composition
Cultivated Crops	18,317	52
Herbaceous	12,910	37
Shrub/Scrub	1,716	5
Hay/Pasture	1,345	4
Developed	794	2
Water/Wetland	125	<1
Trees/Forest	49	<1
Barren Land	2	<1
Total	**35,258**	**100**

Source: National Land Cover Database 2021.

Sums of values may not add to totals shown due to rounding.

METHODS

One survey was conducted in April to align with the greatest potential of observing eagles tending to nests or incubating eggs before regional leaf-out of trees. Pre-flight planning included historically collected data (ALLETE 2016, Piorkowski and Brazeal 2020) and a review of aerial imagery and land cover data to develop a survey route and identify potential eagle nesting habitats within the Study Area (Figure 1). The survey was conducted using an R44 helicopter, operated by a pilot experienced in wildlife surveys and accompanied by two biologists experienced in conducting raptor nest surveys. The survey was conducted across the Study Area (Figure 1), focusing on likely eagle nesting habitat (e.g., large trees, rocky out croppings, and human structures such as power poles). Any eagle nest or large or very large stick structure with characteristics consistent with eagle nests were recorded.

The helicopter was flown at approximately 150–200 ft (46–61 m) above ground level at an air speed of approximately 50 mi per hour (80 km per hour). During the survey, the pilot positioned the helicopter to allow the biologists a thorough visual inspection of nest structures. The survey team took care to minimize disturbance to breeding eagles. When nests were located, the pilot reduced speed and adjusted the flight track such that one of the biologists could clearly see the nest to record data accurately. A survey track was recorded using a Global Positioning System-(GPS-) enabled tablet running Locus Map 4 Outdoor Navigation (Locus Map 2024) to ensure adequate coverage of the Study Area.

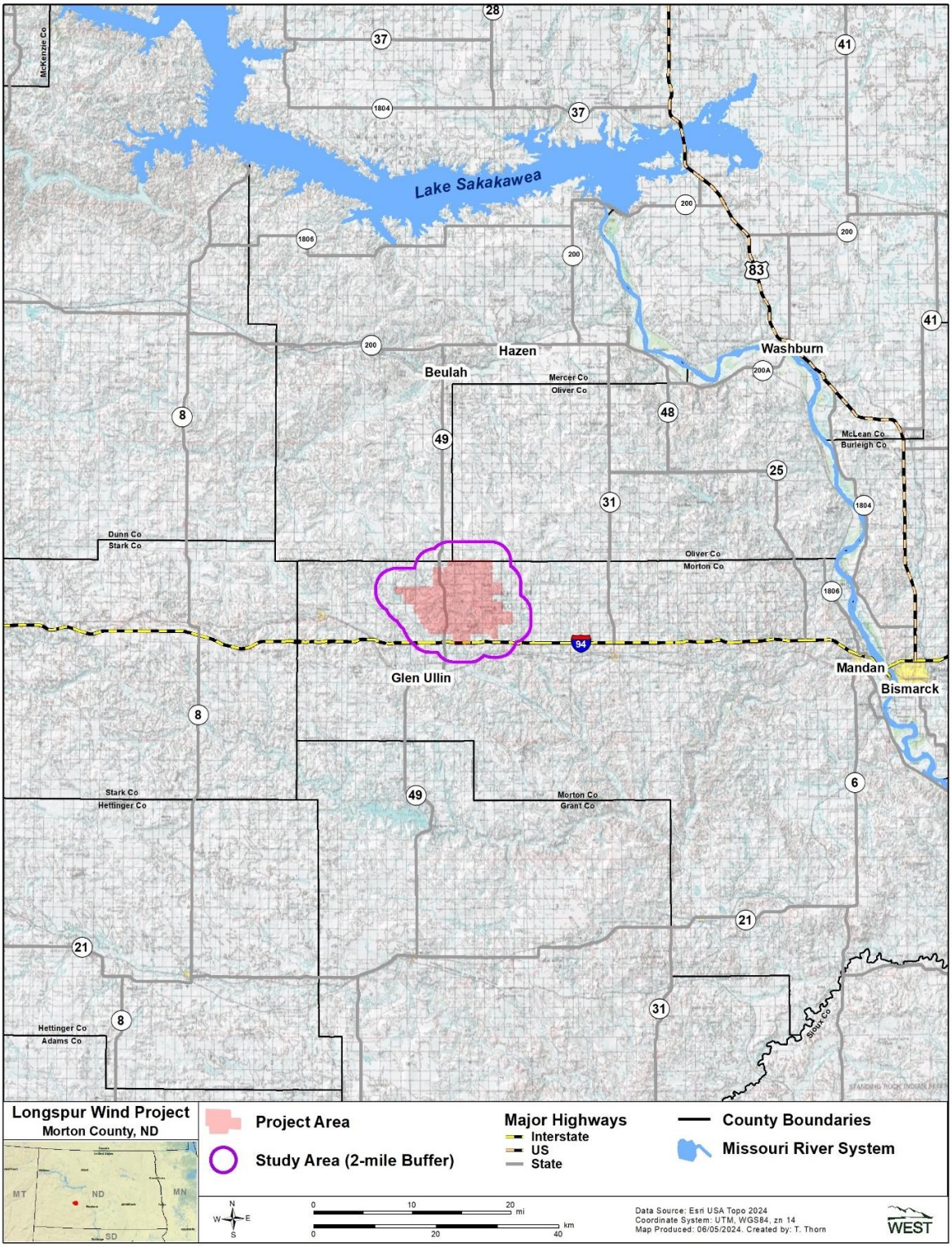

Figure 1. Overview of the Project area and Study Area for the Longspur Wind Project, Morton County, North Dakota.

Data was recorded for each nest based on guidelines from the USFWS's ECPG, adapted from terminology used in Postupalsky (1974). A unique identifier was given to all eagle nests found during the survey. Data for each nest recorded included: nest location (GPS coordinates), nest status (i.e., occupied, active, inactive), nest condition (i.e., good, fair, poor), number of adults and nestlings present, nest substrate (e.g., tree, powerline, cliff), and nest height. Photos were taken of each eagle nest observed to verify nest status. For nest status, a nest was recorded as active if eggs or young were observed or if eagle behavior indicated eggs have been laid in the nest. This can be determined by the presence of an adult observed in an incubating or brooding position or signs an adult is tending to young. Nests which did not show any of the above characteristics were recorded as inactive.

RESULTS

The survey was conducted on April 25, 2024. Biologists detected two eagle nests (one new and one historic) within the 2-mi buffer of the Project area (Figure 2, Table 2). Nest 1 was a new nest found during the survey and was determined to be active with one adult bald eagle (*Haliaeetus leucocephalus*) observed sitting in the nest in an incubating position and a second adult perched in an adjacent tree (Photo 1). Nest 2, a historic nest, was determined to be active, with one adult bald eagle observed sitting in the nest in an incubating position (Photo 2). No other large or very large stick nests were observed within the Study Area.

Table 2. Large stick nests located during the 2024 eagle nest survey at the Longspur Wind Project, Morton County, North Dakota.

Nest Identification	Species	Status	Substrate	Condition
1	bald eagle	active	deciduous tree	good
2[a]	bald eagle	active	deciduous tree	good

[a] Historic nest.

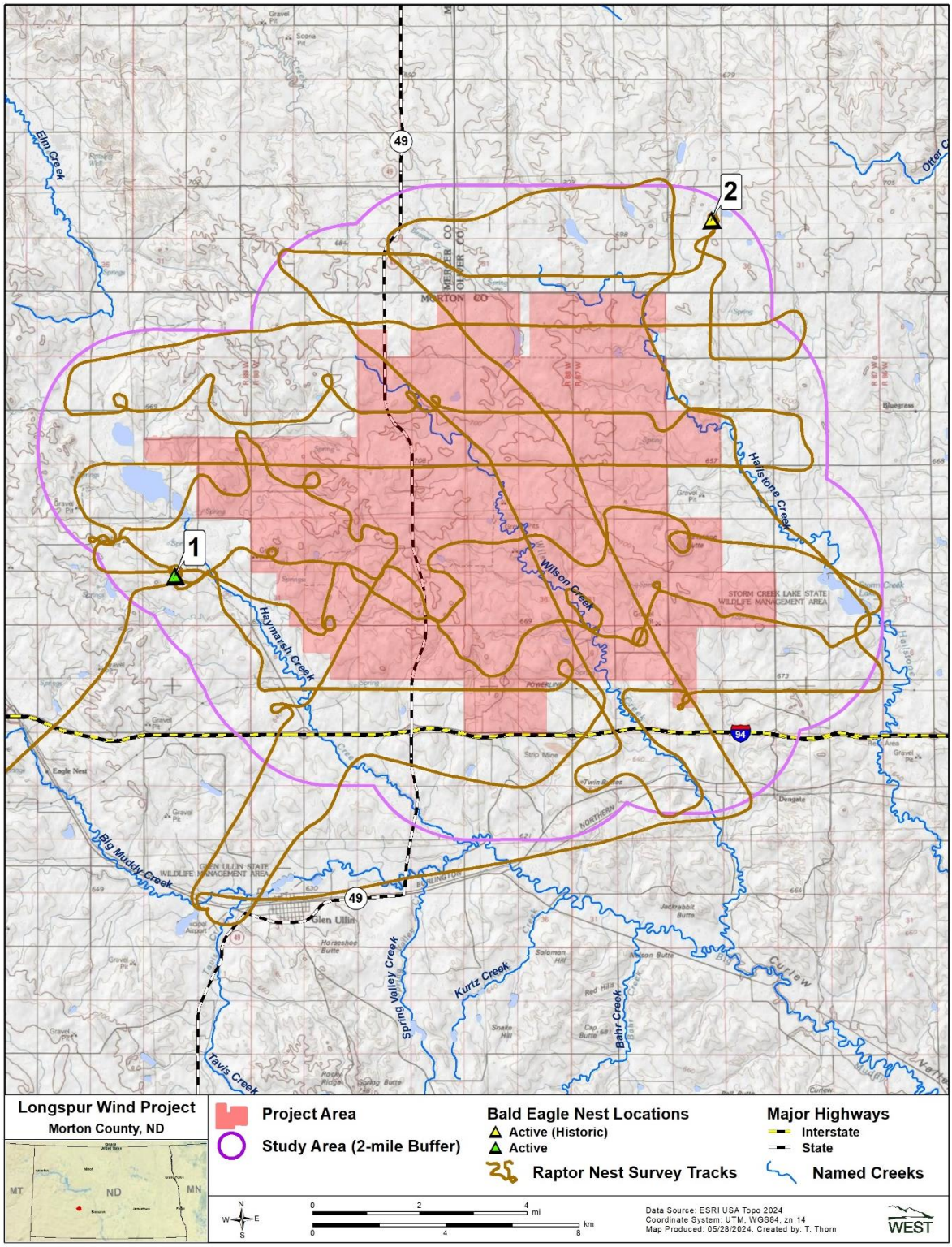

Figure 2. Results of the 2024 eagle nest surveys and survey tracks recorded at the Longspur Wind Project, Morton County, North Dakota.



Photo 1. Bald eagle nest 1 within the Study Area of the Longspur Wind Project, Morton County, North Dakota, 2024.



Photo 2. Bald eagle nest 2 within the Study Area of the Longspur Wind Project, Morton County, North Dakota, 2024.

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2025 Eagle and Raptor Nest Surveys
Longspur Wind Project
Morton County, North Dakota

Final Report



Prepared for:

Minnesota Power

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Prepared by:

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September 5, 2025

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Confidential Business Information

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REPORT REFERENCE

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INTRODUCTION

Minnesota Power is developing the Longspur Wind Project (Project) in Morton County, North Dakota. Minnesota Power contracted Western EcoSystems Technology, Inc. (WEST), to conduct eagle and raptor nest surveys within the Project Area (as updated October 7, 2024; Figure 1) and 2-mile (mi) buffer surrounding the Project Area (collectively referred to as the Study Area; Figure 1). Recommendations from the US Fish and Wildlife Service (USFWS) *Land-Based Wind Energy Guidelines* (WEG; 2012), *Eagle Conservation Plan Guidance* (ECPG; 2013), and the USFWS *Region 6 Recommended Protocol for Conducting Pre-Construction Eagle Nest Surveys at Wind Energy Projects* (Protocol; 2021) were followed.

The objectives of the eagle and raptor nest surveys were to provide information on the 2025 nesting activity of eagles and other raptor species within the Study Area and update previously collected nest information from eagle nest surveys conducted in 2024. Results of these surveys provide baseline information on the nesting status of all raptor species at the Project.

STUDY AREA

The Project Area encompasses 25,933 acres in southwestern North Dakota, approximately four mi north of Glen Ullin in Morton County (Figure 1). The Project is within the Northwestern Plains Level III and the Missouri Plateau Level IV ecoregions, which encompass much of western North Dakota (US Environmental Protection Agency 2012, 2013). This ecoregion consists of semi-arid rolling plains punctuated by buttes and badlands. The primary land uses include cultivated crops and livestock grazing. According to the National Land Cover Database (NLCD; 2021), the dominant land cover type with the Project Area is cultivated crops (56.3%), followed by herbaceous (32.3%). Other land cover types include shrub/scrub (4.5%), hay/pasture (4.1%), and developed (2.3%; NLCD 2021; Table 1). Each remaining land cover type comprises less than 1.0% of the Project Area (Table 1).

The Study Area is located in Morton, Mercer, and Oliver counties, North Dakota, and encompasses approximately 86,610 acres (Figure 1). Small waterways and scattered natural and man-made wetlands are present in the Study Area (USFWS National Wetlands Inventory 2024). Land cover types within the entire Study Area are similar to the Project Area, with cultivated crop and grassland/herbaceous comprising the majority (49.1% and 36.2%, respectively). The remaining land cover types included shrub/scrub (6.1%), hay/pasture (3.9%), developed (2.9%), and wetland/open water (1.6%), with the remaining land cover types comprising less than 1% of the Study Area (Table 1).

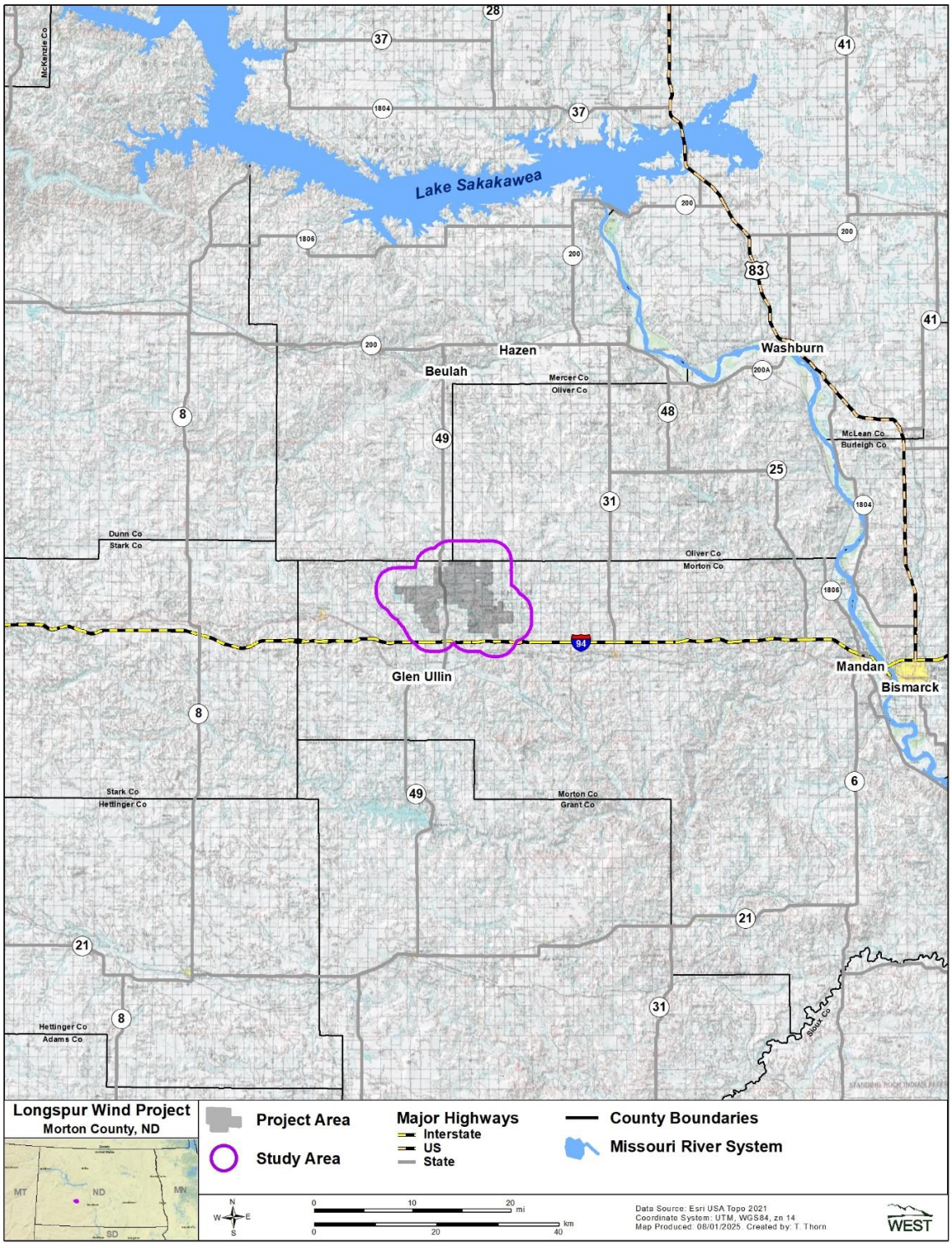

Figure 1. Location of the Longspur Wind Project and Study areas in Morton, Mercer, and Oliver counties, North Dakota.

Table 1. Land cover types, coverage, and percent composition within the Project and Study areas at the Longspur Wind Project in Morton, Mercer, and Oliver counties, North Dakota.

	Project Area		Study Area[1]	
Land Cover Type	**Acres**	**Percent (%)**	**Acres**	**Percent (%)**
Cultivated Crops	14,604	56.3	42,568	49.1
Grassland/Herbaceous	8,371	32.3	31,343	36.2
Shrub/Scrub	1,172	4.5	5,318	6.1
Hay/Pasture	1,061	4.1	3,356	3.9
Developed[2]	605	2.3	2,487	2.9
Wetland/Open Water	90	0.3	1,372	1.6
Forest	28	0.1	150	0.2
Barren Land	2	< 0.1	16	<0.1
Total[3]	**25,933**	**100**	**86,610**	**100**

1. Study Area is inclusive of the Project Area.

2. Developed land cover type includes open space, low intensity, medium intensity, and high intensity.

3. Sums of values may not add to total value shown due to rounding.

Sources: National Land Cover Database 2021.

METHODS

WEST conducted aerial and ground surveys for raptor nests within the Study Area, with an emphasis on bald (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) nests. WEST defines raptors as medium- to large-sized birds of prey and included the following types: *Accipiter* spp., *Buteo* spp., eagles, *Falco* spp., northern harrier (*Circus hudsonius*), and owls. Prior to surveys, a data request was sent to the North Dakota Game and Fish Department (NDGFD; S. Johnson, NDGFD, pers comm. December 6, 2025), for all known historical eagle nests within the Study Area. Additionally, WEST used previous survey efforts to inform searches for known eagle nests within the Study Area during the 2025 surveys (ALLETE 2016, Piorkowski and Brazeal 2020, Piorkowski and Burmester 2024)

Raptor nest surveys conducted between February 2 and June 18, 2025, followed the eagle nest survey schedule outlined in the USFWS Region 6 recommendations (USFWS 2021; Table 2). According to the Region 6 recommendations, the first four visits were to determine nest occupancy, while Visit 5 and Visit 6 were conducted for only active eagle nests to collect success and productivity information. A summary of the recommended visitation schedule in Table 2 and was generally followed during the study.

Table 2. Survey Schedule for Eagle and Other Raptor Nests at the Longspur Wind Project, North Dakota.

Survey	Method	Date Range	Objective
1	Ground	January 1 to the end of the 3rd week in February	Check historical, known eagle nests for occupancy; each eagle nest with no evidence of occupancy should be observed until occupancy is confirmed, or for at least 4 hours
2	Aerial	Last week of February through the 3rd week of March	Check occupancy of known nests and search for new eagle and raptor nests
3	Ground	Last week of March through the end of April	Check status of occupied eagle nests; including new eagle nests or large stick nests found during Survey 2; each eagle nest with no evidence of occupancy should be observed until occupancy is confirmed, or for at least 4 hours
4	Aerial	Third week of April to the end of May	Check occupancy of known nests and search for new eagle and raptor nests
5	Ground	Beginning of June to the end of the first week of July	Check nest success and productivity of occupied eagle nests
6	Ground	Second week of July through the end of August	Check nest success and productivity of occupied eagle nests

Aerial Surveys

Aerial surveys 2 and 4 allowed for a thorough visual inspection of potentially suitable nesting habitats within the Study Area. Pre-flight planning included a review of aerial imagery and land cover data to identify potential eagle and other raptor nesting habitats within the Study Area and develop a survey route. Potential nesting habitats for eagles and other raptors included riparian corridors and forested areas, large trees, or rocky outcrops, and anthropogenic structures such as power poles. Additionally, biologists checked all previously identified eagle nests within the Study Area (i.e., two eagle nests; Piorkowski and Burmester 2024).

Two experienced WEST biologists conducted aerial raptor nest surveys from a Robinson R-44 Raven II helicopter, with one experienced biologist focused on searching for nest structures and a second biologist recording nest data in addition to searching for nests. The first aerial survey (Survey 2) was conducted prior to deciduous tree leaf out to aid in the detection of nests and ensure the search effort coincided with the period when eagles were likely incubating eggs or tending young, based on chronology for nesting eagles in the region (Pagel et al. 2010, USFWS 2013). This survey was scheduled when other local raptor species were likely nesting (e.g., *Buteo* spp. and owls); however, late-nesting species may not yet have been present. A second aerial survey (Survey 4) was conducted later in the breeding season to account for those raptors that initiate nesting later in the season and to recheck and confirm the status of nests recorded during Survey 2. The same methods used during the first aerial survey were repeated during the second aerial survey.

The helicopter was flown at approximately 150–200 feet (ft) above ground level at an air speed of approximately 50 mi per hour. When nests were located, the pilot reduced speed and adjusted

the flight track such that one of the biologists could clearly see the nest to record data accurately. The pilot approached the nest slowly from the raptor's field of view and maintained the greatest possible distance (no closer than 492 ft) at which the nest status could be documented if raptors were present on the nest. The airspace was occupied for the minimum possible duration, no longer than 15–30 seconds (Pagel et al. 2010, USFWS 2013). To ensure adequate coverage of the Study Area, the survey flight path was recorded using a Global Positioning System- (GPS-) enabled tablet running Locus Map 4 software (Locus Map 2025).

To determine the status of a nest, the biologists evaluated behavior of adults on or near the nest and the presence of eggs, young, whitewash, or fresh building materials. Species, nest type, nest status, nest condition, and nest substrate were recorded at each nest location, to the extent possible.

Ground-based Surveys

The ground-based survey methods were focused on observation points in order to view eagle and large stick nests with the potential to be eagle nests. A review of previously recorded eagle nest locations was conducted (Piorkowski and Burmester 2024) prior to surveys. Pre-survey planning included a desktop review of aerial imagery and land cover data to create field maps of possible observation points for eagle nests and large stick nests (recorded during aerial surveys that could be potential eagle nests) on publicly accessible areas, and/or lands where access needed to be or had been obtained.

One experienced biologist conducted ground-based surveys of known or potential eagle nests according to the recommendations in the Protocol. Eagle and very large stick-nests were observed from public roads continuously for four hours or until occupancy could be documented. To determine the status of a nest, the biologist evaluated behavior of adults on or near the nest, and the presence of young, whitewash, or fresh building materials. Data were recorded for each nest to the extent possible. If no activity was observed during the first four-hour survey, the nest was monitored again at least 30 days later for another four hours or until occupancy was confirmed, following ECPG recommendations (USFWS 2013). The biologist took care to minimize disturbance to breeding eagles and other raptors by maintaining a minimum distance of 0.5 mi from all active nest sites, using binoculars and a spotting scope to aid observation. Ground-based surveys and aerial surveys followed the same data collection methods.

Data Collection Methods and Terminology

Each nest was assigned a unique nest identification (ID) number. Additionally, location was recorded with a GPS, and attribute data including species, condition, size, whether the nest was potentially suitable for eagle use, status, and substrate were documented. Below are detailed descriptions of nest attributes and applicable definitions and terms. Representative photographs of eagle nests were taken when possible (Appendix A).

Species – A species was assigned to each nest, when possible.

Nest condition – Nest condition was categorized using descriptions ranging from poor to good, which provided a relative sense of when a nest or nest site may have been last used.

- poor: a nest that appeared dilapidated (e.g., in disrepair, sloughing, or sagging heavily) and required major repair to be suitable for successful nesting
- fair: a nest with a defined bowl and minor sagging that may require some repair to be used
- good: a nest with a well-defined bowl with no sagging or sloughing that was considered suitable for nesting
- unknown: nest condition was unknown (e.g., the nest structure could not be adequately viewed due to access issues)

Nest size

- Very large nests were greater than 3.0 ft in diameter (Katzner et al. 2020, Buehler 2022).
    - bald eagle nests typically ranged from 4.9–5.9 ft in diameter and 2.3–3.9 ft high
    - golden eagle nests typically ranged from 3.0–5.0 ft in diameter and 2.0–3.0 ft high
- Large nests ranged from 2.0–3.0 ft in diameter and were usually characteristic of nests built and/or used by non-eagle raptors; however, some large nests could potentially support eagles.
- Medium nests range from 1.0–2.0 ft in diameter.
- Small nests were usually less than 1.0 foot in diameter.

Potential Eagle Nest Characterization – Along with nest size, other characteristics included structure, location relative to landscape features, and building materials, which can all be important in distinguishing between nests of eagles and non-eagle raptors (e.g., *Buteo* spp., owls). Each nest was ultimately categorized as either a potential eagle nest or a non-eagle raptor nest. Eagle nests may be used by other raptors, such as great horned owls or ferruginous hawks.

The bald eagle nest shape conforms to the shape of the tree the nest was built in (Stalmaster 1987) and nests were typically located high in the tree canopy, which offers good flight access (Buehler 2022). The bald eagle usually nests in large trees near bodies of water that contain sufficient foraging opportunities (Isaacs and Anthony 2011, Buehler 2022).

Golden eagle nests are comprised of a few large, several medium, and an abundant number of small sticks (Watson 2010; Katzner et al. 2020). Golden eagles typically nest along cliffs, in large live trees, and on anthropogenic structures, such as nesting platforms that can bear the weight of an eagle nest (Katzner et al. 2020).

Nest status – Nest status was categorized using definitions originally proposed by Postupalsky (1974) and these definitions follow those of the ECPG.

- occupied: nests were classified as occupied if any of the following were observed at the nest structure: 1) an adult in an incubating position; 2) eggs; 3) nestlings or fledglings; 4) presence of an adult (or sub-adults); 5) a newly constructed or refurbished stick-nest in the area where territorial behavior of a raptor had been observed earlier in the breeding season; or 6) a recently repaired nest with fresh sticks (clean breaks) or fresh boughs on top, and/or droppings and/or molted feathers on the nest rim or underneath
    - occupied active: nest had eggs, nestlings, and/or an adult in incubating/brooding position at the time of the survey
    - occupied inactive: nest had evidence of recent tending of the nest or presence by an adult, but there were no eggs, nestlings, or adult in incubating/brooding position
- inactive: during a given visit, a nest has no evidence of tending and no eggs, nestlings, or adults present. This term only applies when enough information could be gathered to discern status during a visit (i.e., an aerial survey or four hours of ground-based monitoring). Inactive is not a final status for a breeding season (*see unoccupied and undetermined inactive*).
- unoccupied: a nest classified as inactive for at least three visits for eagles (at least 30 days apart) and two visits for non-eagle raptor nests within the current nesting season
- undetermined inactive: a final nest status for nests that were inactive, but not enough data or evidence were gathered to determine whether the nest was occupied or unoccupied (e.g., the nest was only visited once during the season)
- unknown: status could not be determined because sufficient monitoring was not conducted to assess status, or the presence of the nest could not be confirmed based on access or visibility
- missing: the nest was no longer present or could not be found

Nest substrate – Nest substrate included trees, cliffs and rock outcrops, and anthropogenic structures (e.g., power line poles and nest platforms).

Nesting success – Nesting success was calculated if subsequent nest surveys were completed to confidently determine nest fate(s). For one pair, nesting success was defined as at least one young fledging from the nest, or at least one nestling reaching the minimum acceptable age for assuming fledging would occur. For golden eagles, nest success was assumed when at least one nestling survives to at least 56 days of age. For bald eagles, nest success was assumed when at least one nestling survives to at least 67 days of age (Steenhof and Newton 2007, USFWS 2013). For multiple breeding pairs of a given species, nesting success was the proportion of occupied active nests resulting in at least one young fledging or reaching the minimum acceptable age for determining nesting success.

Productivity – defined as the average number of young that reached fledging age (or minimum age for success, as described above) per occupied active nest within a given study area for a particular breeding period.

Data Management

Data Compilation and Storage

WEST data-entry staff were trained in proper data entry procedures, which included an independent review of the field data. System controls were implemented to ensure correct data were entered; however, if any errors were identified in later stages of analysis, the errors were traced back to the raw data where appropriate changes and measures were implemented. Data were entered into a PostgreSQL (PostgreSQL Global Development Group, Berkeley, California) database and underwent a quality assurance and quality control (QA/QC) process.

Quality Assurance and Quality Control

WEST implemented QA/QC measures at all stages of the surveys, including in the field, during data entry and analysis, and report writing. All WEST field staff were trained in proper survey techniques and all data collected were recorded in a tablet and on paper datasheets. Data were reviewed before and after the data were submitted for data entry. If errors or anomalies were found, follow-up measures were implemented including discussions and review of field data with the field coordinator and/or the Project Manager.

Reporting and Review Process

WEST's reporting and review process included technical editing and content review, senior technical review, and a final review by the Project Manager before delivery to the client.

RESULTS

One historical bald eagle nest was provided by NDGF, while a second was observed during 2024 surveys (Piorkowski and Burmester 2024). Aerial searches for nests provided complete coverage of suitable habitat in the Study Area (Figure 2). Raptor nest surveys were conducted on the following dates in 2025:

- Survey 1 (ground): February 2
- Survey 2 (aerial): March 9
- Survey 3 (ground): April 8
- Survey 4 (aerial): May 17
- Survey 5 (ground): June 18
- Survey 6 (ground): N/A

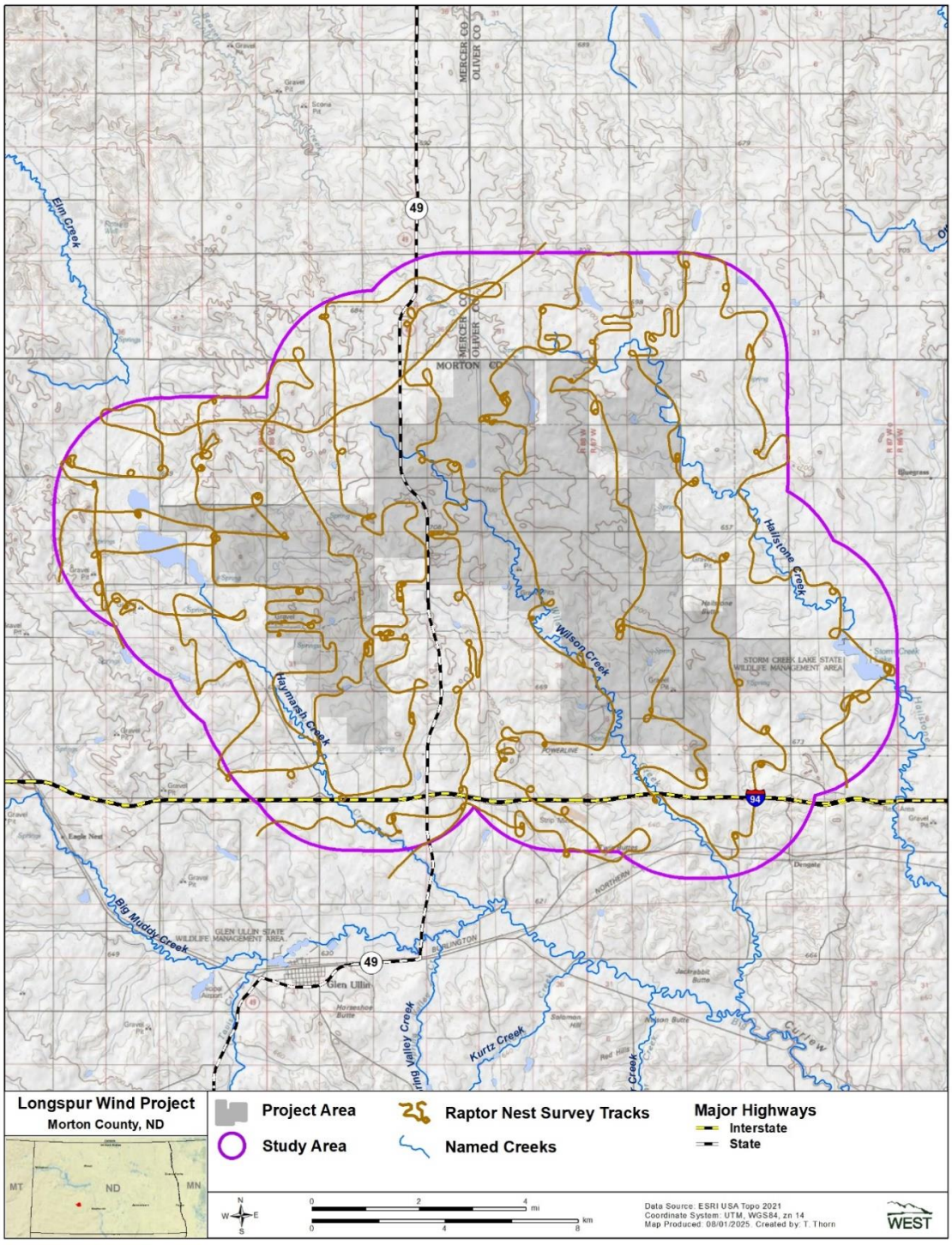

Figure 2. Survey flight path recorded during the aerial raptor nest surveys within the Longspur Wind Project Study Area in Morton, Mercer, and Oliver counties, North Dakota, from February – June 2025.

Eagle Nests

The two historical bald eagle nests (Nest 1 and 2) were documented during surveys, and no new eagle nests were found (Table 3). Nest 1 was determined to be occupied and active on Survey 3 due to an adult observed in the nest (adult observed in incubating position). During Survey 4, Nest 1 had one adult bald eagle located at the nest but no evidence of eggs or nestlings present (Table 3) and was considered a failed nesting attempt. Nest 2 was determined to be occupied and active on Survey 3 with one adult bald eagle seen in the nest in an incubating position. On Survey 4, Nest 2 was recorded as active as one adult and one nestling was observed in the nest. The nesting was estimated to be 21 days old during Survey 4. Nest 2 was determined to have failed by Visit 5, when no sign of the nestling or adults were observed after four hours of observation (Table 3). The previously observed nestling would have been approximately 52 days old during this survey, which does not meet the definition of a successful nest (i.e., at least 67 days old). Nest success was determined to be zero for both bald eagle nests.

Table 3. Bald eagle nests documented in the Longspur Wind Project Study Area in Morton, Mercer, and Oliver counties, North Dakota, from February – June 2025.

Nest ID	Nest Status	Location	Nest Condition	Substrate	Comments
1	Occupied active – Failed	Study Area	Good	Deciduous Tree	Two bald eagles seen with new materials in nest; no eggs or nestlings seen during surveys
2	Occupied active – Failed	Study Area	Good	Deciduous Tree	Two bald eagles seen at nest; One nesting seen on May 17; no eagles seen on June 18 after a 4-hour survey.

ID = identification.

See *Nest status* and *Nest condition* sections for definitions.

Non-Eagle Nests

One hundred two non-eagle raptor nests were documented within the Study Area across all surveys (Table 4). Thirty-three nests were documented within the Project Area and 69 were documented outside the Project Area, but within the Study Area (Table 4; Figure 3). Of the 33 nests found within the Project Area, 15 were determined to be occupied and active: eight red-tailed hawk nests, five Swainson's hawk nests, and two great horned owl nests. Three Swainson's hawk nests were determined to be occupied but inactive. Fifteen unknown non-eagle nests were determined to be unoccupied (Table 4, Figure 3). Of the 69 non-eagle raptor nests documented outside the Project Area but within the Study Area, 42 were determined to be occupied and active: 22 red-tailed hawk nests, 14 great horned owl nests, and six Swainson's hawk nests. Five nests were determined to be occupied but inactive: one red-tailed hawk nest, two Swainson's hawk nests, and two unknown non-eagle nests. Twenty-two unknown non-eagle nests were determined to be unoccupied (Table 4, Figure 3; Appendix B).

Table 4. Species and status of non-eagle raptor nests documented in the Longspur Wind Project Study Area in Morton, Mercer, and Oliver counties, North Dakota, from February – June 2025.

	Project Area			Buffer			
Species	**Occupied Active**	**Occupied Inactive**	**Unoccupied**	**Occupied Active**	**Occupied Inactive**	**Unoccupied**	**Total**
Red-tailed hawk	8	–	–	22	1	–	31
Great horned owl	2	–	–	14	–	–	16
Swainson's hawk	5	3	–	6	2	–	16
Unknown raptor	–	–	–	–	2	–	2
No species documented	–	–	15	–	–	22	37
Total	**15**	**3**	**15**	**42**	**5**	**22**	**102**

See *Nest Status* section for definitions.

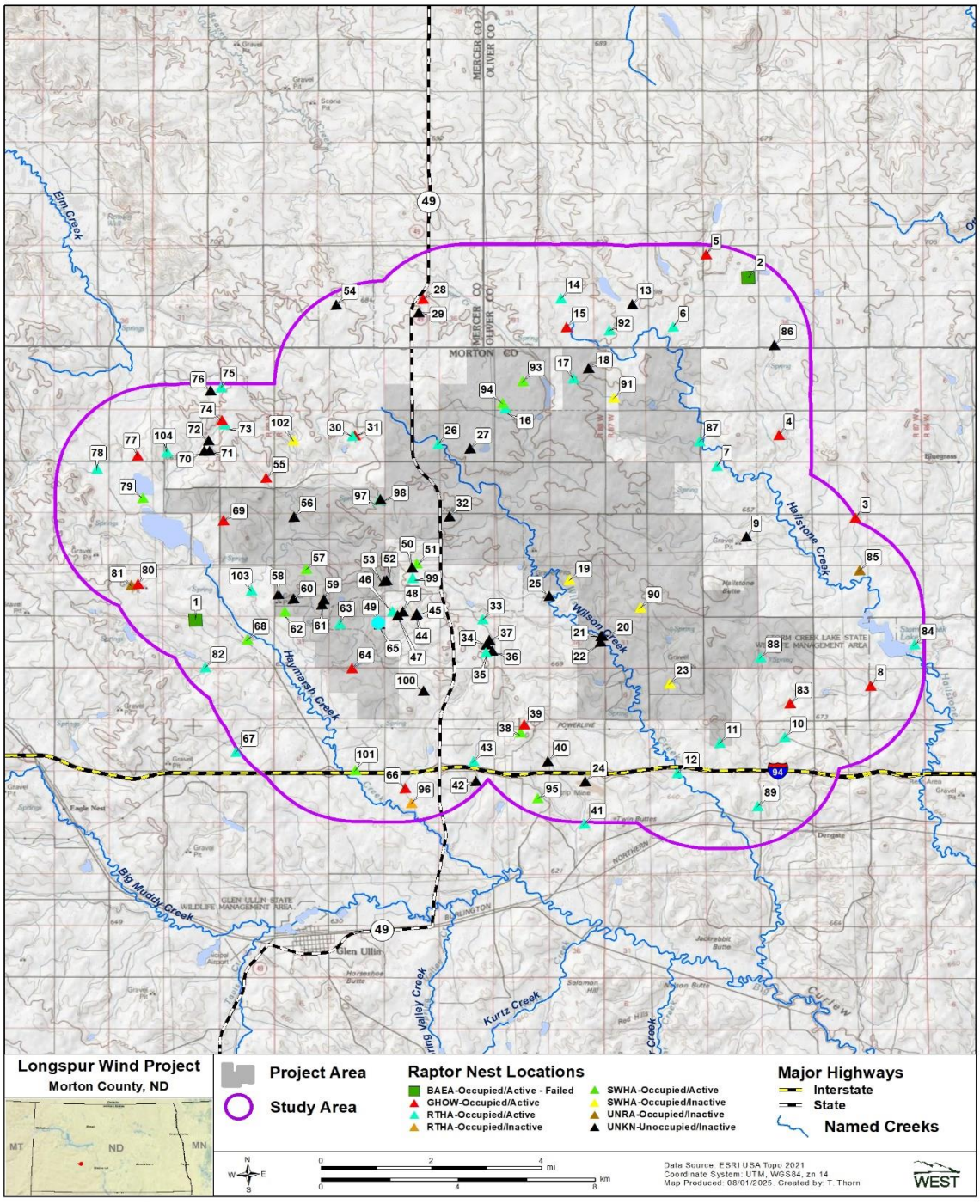

Figure 3. Location of raptor nests documented during the Longspur Wind Project raptor nest survey in Morton, Mercer, and Oliver counties, North Dakota, from February 2 – June 18, 2025.

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Appendix A. Bald Eagle Nest Photographs Recorded during the Raptor Nest Survey at the Longspur Wind Project Study Area in Morton, Mercer, and Oliver Counties, North Dakota, from February 2 – June 18, 2025



Appendix A1. Bald eagle Nest ID 1 with new material within the Study Area of the Longspur Wind Project, North Dakota.



Appendix A2. Adult bald eagle sitting in an incubating position during Survey 3 at Nest ID 2 within the Study Area of the Longspur Wind Project, North Dakota.

Appendix B. Non-eagle Raptor Nests Recorded during the Raptor Nest Survey at the Longspur Wind Project Study Area in Morton, Mercer, and Oliver Counties, North Dakota, from February 2 – June 18, 2025

Appendix B. Non-Eagle Raptor nests recorded during 2025 raptor nest surveys at the Longspur Wind Project Study Area in Mercer, Morton and Oliver counties, North Dakota.

Nest ID	Species	Substrate	Nest Status	Nest Condition
3	Great horned owl	Deciduous tree	Occupied/Active	Good
4	Great horned owl	Deciduous tree	Occupied/Active	Good
5	Great horned owl	Deciduous tree	Occupied/Active	Good
6	Red-tailed hawk	Deciduous tree	Occupied/Active	Good
7	Great horned owl	Deciduous tree	Occupied/Active	Good
8	Great horned owl	Deciduous tree	Occupied/Active	Good
9	No species recorded	Deciduous tree	Unoccupied	Fair
10	Great horned owl	Deciduous tree	Occupied/Active	Good
11	Great horned owl	Deciduous tree	Occupied/Active	Good
12	Great horned owl	Deciduous tree	Occupied/Active	Good
13	No species recorded	Deciduous tree	Unoccupied	Fair
14	Great horned owl	Deciduous tree	Occupied/Active	Good
15	Great horned owl	Deciduous tree	Occupied/Active	Good
16	Great horned owl	Deciduous tree	Occupied/Active	Good
17	Great horned owl	Deciduous tree	Occupied/Active	Good
18	No species recorded	Deciduous tree	Unoccupied	Fair
19	Swainson's hawk	Deciduous tree	Occupied/Inactive	Good
20	No species recorded	Deciduous tree	Unoccupied	Fair
21	No species recorded	Deciduous tree	Unoccupied	Fair
22	No species recorded	Deciduous tree	Unoccupied	Fair
23	Swainson's hawk	Deciduous tree	Occupied/Inactive	Good
24	No species recorded	Deciduous tree	Unoccupied	Fair
25	No species recorded	Deciduous tree	Unoccupied	Poor
26	Great horned owl	Deciduous tree	Occupied/Active	Good
27	No species recorded	Deciduous tree	Unoccupied	Poor
28	Great horned owl	Coniferous tree	Occupied/Active	Good
29	No species recorded	Deciduous tree	Unoccupied	Fair
30	Great horned owl	Deciduous tree	Occupied/Active	Good
31	Great horned owl	Deciduous tree	Occupied/Active	Good
32	No species recorded	Deciduous tree	Unoccupied	Poor
33	Great horned owl	Deciduous tree	Occupied/Active	Good
34	No species recorded	Deciduous tree	Unoccupied	Fair
35	Great horned owl	Deciduous tree	Occupied/Active	Good
36	No species recorded	Deciduous tree	Unoccupied	Poor
37	No species recorded	Deciduous tree	Unoccupied	Fair
38	Swainson's hawk	Deciduous tree	Occupied/Active	Good
39	Great horned owl	Deciduous tree	Occupied/Active	Good
40	No species recorded	Deciduous tree	Unoccupied	Good
41	Great horned owl	Deciduous tree	Occupied/Active	Good
42	No species recorded	Deciduous tree	Unoccupied	Fair
43	Great horned owl	Deciduous tree	Occupied/Active	Good
44	No species recorded	Deciduous tree	Unoccupied	Fair
45	No species recorded	Deciduous tree	Unoccupied	Fair
46	Great horned owl	Deciduous tree	Occupied/Active	Good
47	No species recorded	Deciduous tree	Unoccupied	Fair
48	No species recorded	Deciduous tree	Unoccupied	Fair
49	Swainson's hawk	Deciduous tree	Occupied/Active	Good
50	No species recorded	Deciduous tree	Unoccupied	Poor
51	Swainson's hawk	Deciduous tree	Occupied/Active	Good
52	No species recorded	Deciduous tree	Unoccupied	Fair
53	No species recorded	Deciduous tree	Unoccupied	Fair
54	No species recorded	Deciduous tree	Unoccupied	Fair

Appendix B. Non-Eagle Raptor nests recorded during 2025 raptor nest surveys at the Longspur Wind Project Study Area in Mercer, Morton and Oliver counties, North Dakota.

Nest ID	Species	Substrate	Nest Status	Nest Condition
55	Great horned owl	Deciduous tree	Occupied/Active	Good
56	No species recorded	Deciduous tree	Unoccupied	Fair
57	Swainson's hawk	Deciduous tree	Occupied/Active	Good
58	No species recorded	Deciduous tree	Unoccupied	Fair
59	No species recorded	Deciduous tree	Unoccupied	Fair
60	No species recorded	Deciduous tree	Unoccupied	Fair
61	No species recorded	Deciduous tree	Unoccupied	Poor
62	Swainson's hawk	Deciduous tree	Occupied/Active	Good
63	Red-tailed hawk	Deciduous tree	Occupied/Active	Good
64	Great horned owl	Deciduous tree	Occupied/Active	Good
65	No species recorded	Deciduous tree	Unoccupied	Fair
66	Great horned owl	Deciduous tree	Occupied/Active	Good
67	Red-tailed hawk	Deciduous tree	Occupied/Active	Good
68	Swainson's hawk	Deciduous tree	Occupied/Active	Good
69	Great horned owl	Deciduous tree	Occupied/Active	Good
70	No species recorded	Deciduous tree	Unoccupied	Fair
71	No species recorded	Deciduous tree	Unoccupied	Fair
72	No species recorded	Deciduous tree	Unoccupied	Poor
73	Red-tailed hawk	Deciduous tree	Occupied/Active	Good
74	Great horned owl	Deciduous tree	Occupied/Active	Good
75	Red-tailed hawk	Deciduous tree	Occupied/Active	Good
76	No species recorded	Deciduous tree	Unoccupied	Fair
77	great horned owl	Deciduous tree	Occupied/Active	Good
78	Red-tailed hawk	Deciduous tree	Occupied/Active	Good
79	Swainson's hawk	Deciduous tree	Occupied/Active	Good
80	Great horned owl	Deciduous tree	Occupied/Active	Good
81	Unidentified raptor	Deciduous tree	Occupied/Inactive	Good
82	Red-tailed hawk	Deciduous tree	Occupied/Active	Good
83	Great horned owl	Deciduous tree	Occupied/Active	Good
84	Red-tailed hawk	Deciduous tree	Occupied/Active	Good
85	Unidentified raptor	Deciduous tree	Occupied/Inactive	Good
86	No species recorded	Deciduous tree	Unoccupied	Fair
87	Red-tailed hawk	Deciduous tree	Unoccupied	Good
88	Red-tailed hawk	Deciduous tree	Occupied/Active	Good
89	Red-tailed hawk	Deciduous tree	Occupied/Active	Good
90	Swainson's hawk	Deciduous tree	Occupied/Inactive	Good
91	Swainson's hawk	Deciduous tree	Occupied/Inactive	Good
92	Red-tailed hawk	Deciduous tree	Occupied/Active	Good
93	Swainson's hawk	Deciduous tree	Occupied/Active	Good
94	Swainson's hawk	Deciduous tree	Occupied/Active	Good
95	Swainson's hawk	Deciduous tree	Occupied/Active	Good
96	Red-tailed hawk	Deciduous tree	Occupied/Inactive	Good
97	Red-tailed hawk	Deciduous tree	Occupied/Active	Good
98	No species recorded	Deciduous tree	Unoccupied	Fair
99	Red-tailed hawk	Deciduous tree	Occupied/Active	Good
100	No species recorded	Deciduous tree	Unoccupied	Fair
101	Swainson's hawk	Deciduous tree	Occupied/Active	Good
102	Swainson's hawk	Shrub	Occupied/Inactive	Good
103	Red-tailed hawk	Deciduous tree	Occupied/Active	Good
104	Red-tailed hawk	Deciduous tree	Occupied/Active	Good

ID = identification.

See *Nest status* and *Nest condition* sections for definitions.

Studies and Assessments

B8. Northern Long-eared Bat Desktop Study

Northern Long-eared Bat Desktop Habitat Assessment for the Longspur Wind Project in Morton County, North Dakota

Final Report

Prepared for:

Minnesota Power

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REPORT REFERENCE

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INTRODUCTION

Minnesota Power is developing the Longspur Wind Project (Project) in Morton County, North Dakota (Figure 1). Based on the Tier 2 Site Characterization Study (O'Neil and Piorkowski 2025) and an agency meeting conducted on December 4, 2024, Minnesota Power contracted Western EcoSystems Technology, Inc. (WEST), to conduct a desktop bat habitat assessment for the federally endangered northern long-eared bat (NLEB; *Myotis septentrionalis*) for the proposed Project. The NLEB was reclassified as endangered under the Endangered Species Act of 1973, effective March 31, 2023 (87 Federal Register 73488 [FR; 2022], 88 FR 4908 [2023]). The desktop assessment was completed in accordance with the US Fish and Wildlife Service's (USFWS's) *Range-Wide Indiana Bat and Northern Long-eared Bat Survey Guidelines* (Guidelines; 2024). The Guidelines for NLEB surveys recommend a desktop habitat assessment as part of the Phase 1 Initial Project Screening. The objective of this desktop assessment was to identify potentially suitable summer NLEB habitat within the proposed Project Area provided by Minnesota Power October 10, 2024 (Figure 1), to inform level of effort for presence/probable absence (P/A) surveys and general Project planning.

The Project is located in south-western North Dakota, approximately four miles (mi) north of Glen Ullin in Morton County (Figure 1). From a desktop review of the NLCD (2021), cultivated crops (56.3%) and grassland/herbaceous (32.3%) were identified as the primary land cover types within the Project Area, followed by a comparatively small proportion of shrub/scrub (4.5%), hay/pasture (4.1%), and developed land (2.3%). Twenty-nine acres (0.1%) of the Project Area is considered forest from NLCD (Table 1).

Table 1. Land cover types, coverage, and percent composition within the Longspur Wind Project Area in Morton County, North Dakota.

Cover Type	Acres	Percent
Cultivated Crops	14,604	56.3
Grassland/Herbaceous	8,371	32.3
Shrub/Scrub	1,172	4.5
Hay/Pasture	1,061	4.1
Developed	605	2.3
Wetland/Open Water	91	0.4
Forest	29	0.1
Barren	2	<0.1
Total[1]	**25,933**	**100**

[1.] Sums of values may not add to total value shown, due to rounding.
Source: National Land Cover Database 2021.

Northern Long-eared Bat Background

NLEBs prefer summer maternity habitat located in intact, interior forests with late successional characteristics (Carter and Feldhamer 2005, Timpone et al. 2010). Although the NLEB tends to favor intact forests, this species can also use relatively small forest patches connected by shelterbelts (Henderson and Broders 2008). NLEBs generally use roosts with a higher percentage

(usually 56−84%) of canopy cover and typically greater density of understory than other similar bat species (Carter and Feldhamer 2005, Lacki and Schwierjohann 2001, Timpone et al. 2010). NLEBs also tend to stay relatively close to forest features while foraging (Henderson and Broders 2008), generally preferring to forage in upland, mature forests above or below the canopy, but also using forest clearings, riparian forests, forested ponds, and forested flyways (Amelon and Burhans 2006, Foster and Kurta 1999). Based on a synthesis of ecological studies, the USFWS defines suitable NLEB roost trees as trees with a diameter at breast height of 3.0 inches (7.6 centimeters) or greater, with exfoliating bark, cracks, crevices, or cavities. Individual trees and shelterbelts can be considered suitable habitat if they exhibit the characteristics of a potential roost tree and are within 1,000 feet (ft; 305 meters) of other forested habitat (USFWS 2024a).

METHODS

The purpose of this assessment was to identify potentially suitable summer habitat for NLEB within the Project Area and a 1,000-ft buffer (collectively, Assessment Area; Figure 1). For the purposes of this assessment, NLEB potentially suitable summer habitat was defined as forest patches 5.0 acres (ac; 2.0 hectares [ha]) or greater in size and any forested areas within 1,000 ft of these patches (Western Area Power Administration 2024). Linear forest features, isolated trees, smaller forest stands (i.e., less than five ac in size), and loose assemblages of trees with variable amounts of canopy closure and shelterbelts located more than 1,000 ft from potentially suitable forested habitat were considered unsuitable habitat.

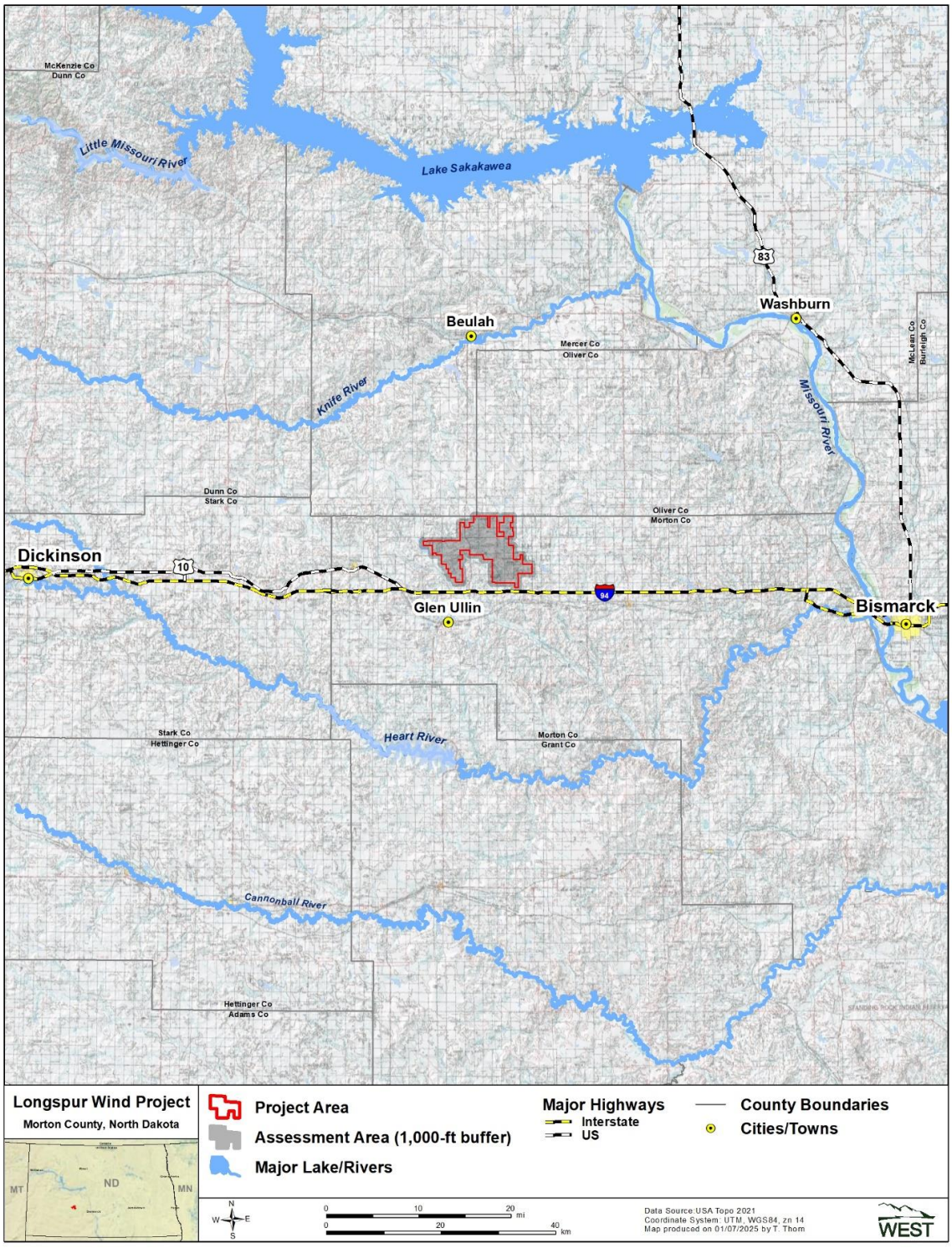

Figure 1. Location of the Longspur Wind Project Assessment Area in Morton, Mercer, and Oliver counties, North Dakota.

WEST completed the desktop assessment by reviewing the US Department of Agriculture National Resources Conservation Service Geospatial Data Gateway (2023) to manually digitize forested areas and associated forest shelterbelts and tree lines within the Assessment Area. All forest patches 5.0 ac or greater in size were digitized and considered potentially suitable summer NLEB habitat. A 1,000-ft buffer (hereafter Connected Habitat Buffer [CHB]) was applied to all digitized forest patches, and tree patches less than 5.0 ac that intersected the CHB were included as potentially suitable summer habitat (Figure 2). All resulting digitized forested habitats were visually assessed for biological accuracy by a permitted bat biologist to ensure that any missing forest habitat was incorporated and forest patch boundaries were adjusted, if necessary. The number of acres of potentially suitable summer habitat for the NLEB was calculated for the overall Assessment Area, and the Project Area, and 1,000-ft buffer individually.

RESULTS

The desktop assessment delineated two areas totaling 21.0 ac (8.5 ha) of potentially suitable NLEB summer habitat. Of this, 13.0 ac (5.3 ha) occurred within the Project Area and 8.0 ac (3.2 ha) occurred outside the Project Area (Figure 2).

CONCLUSION

Potentially suitable NLEB summer habitat was identified within the western portion of the Project Area (13.0 ac; Figure 2). Following the USFWS's Guidelines (2024), one detector site would be recommended for NLEB P/A surveys since the suitable summer habitat within the Project Area is less than 123 ac.

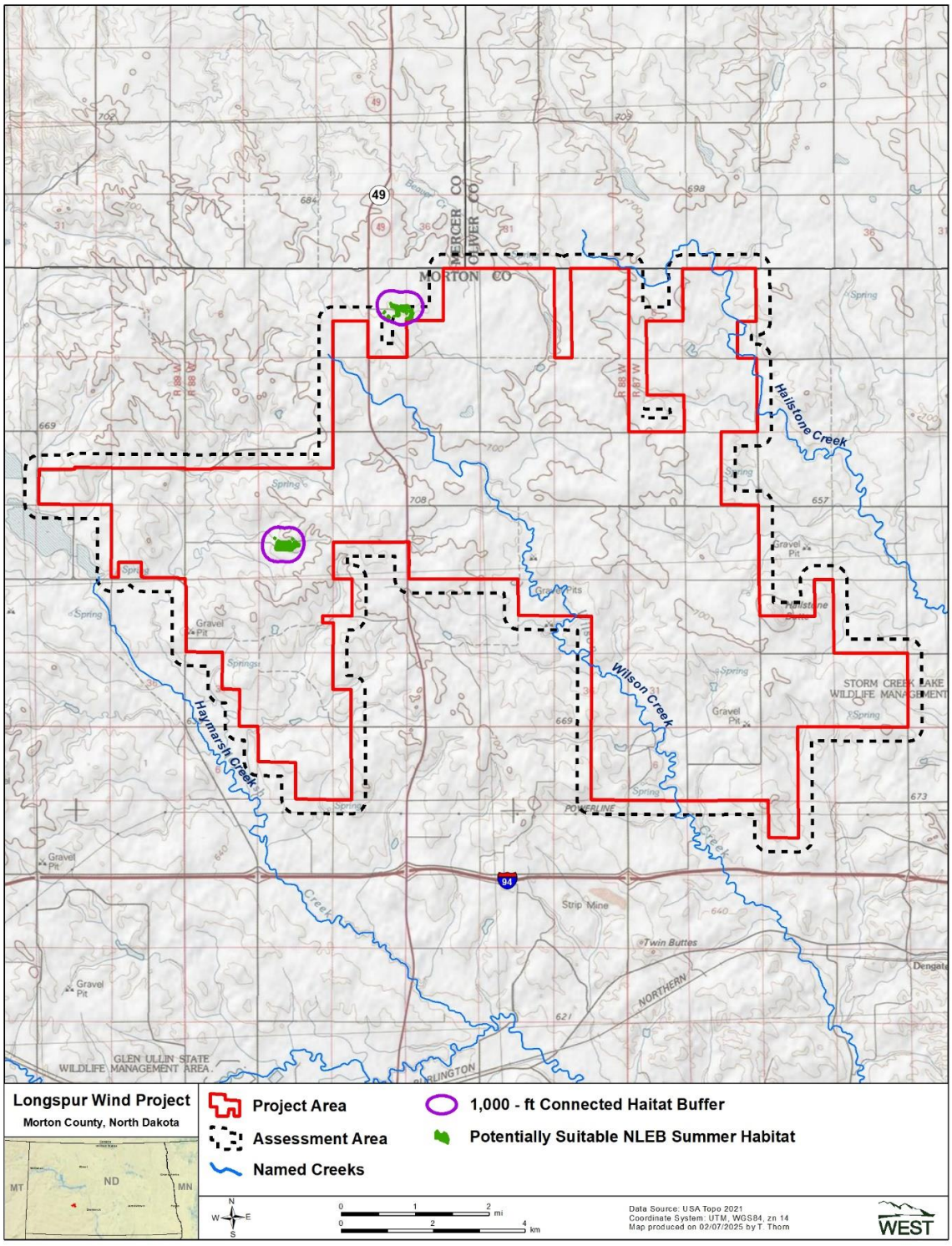

Figure 2. Potentially suitable northern long-eared bat summer habitat identified within the Longspur Wind Project Assessment Area in Morton, Mercer, and Oliver counties, North Dakota.

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Studies and Assessments

B9. Lek Surveys

Sharp-tailed Grouse Lek Surveys
Longspur Wind Project
Morton County, North Dakota

Final Report



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August 9, 2024

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INTRODUCTION

Minnesota Power is developing the Longspur Wind Project (Project) in Morton County, North Dakota. Minnesota Power contracted Western EcoSystems Technology, Inc. (WEST), to conduct sharp-tailed grouse (STGR; *Tympanuchus phasianellus*) lek surveys for the Project. The lek survey design was informed by the survey protocol described in North Dakota Game and Fish Department's (NDGFD's) *Management Plan and Conservation Strategies for Greater Sage-grouse in North Dakota* (Robinson 2014) and recommendations described in *Wind Energy Development in North Dakota: Best Management Practices* (NDGFD 2021).

The objectives of the STGR survey were to document the status of known leks, search for new lek locations, and estimate the maximum number of individuals present at each detected lek. This report describes the methods and results of the lek surveys conducted from April 3 – May 16, 2024.

STUDY AREA

The Project area is in the Level III Northwestern Great Plains Ecoregion (US Environmental Protection Agency 2012). The Northwestern Great Plains Ecoregion covers northeastern Wyoming, eastern Montana, western North Dakota, western South Dakota, and northern Nebraska. This ecoregion consists of semiarid rolling plains, punctuated by buttes and badlands, and is mainly used as cultivated cropland or rangeland. Elevation ranges from 2,080–2,480 feet (634–756 meters). The Study Area includes the Project area and a 2.0-mi (3.2-km) buffer extending out from the Project area (Figure 1). The topography and land cover within the Study Area are similar to those described in the Project area.

The Project area encompasses approximately 35,258 acres (14,268 hectares) and is located 54 miles (mi; 87 kilometer [km]) west of Bismarck, North Dakota (Figure 1). The Project area is mainly composed of cultivated crops (52%), followed by herbaceous (37%), shrub/scrub (5%), hay/pasture (4%), and developed land cover (2%; Table 1, Figure 2; National Land Cover Database 2021). Other land cover types each represent less than 1% of the Project area (Table 1).

METHODS

Following NDGFD guidance (NDGFD 2021), WEST conducted three rounds of ground-based lek surveys. Surveys were conducted from 30 minutes before sunrise until 1.5–2.0 hours after sunrise. Surveys were conducted on relatively calm mornings (winds less than 15 mi per hour [mph; 24 km per hour {kph}]) and on days with little or no precipitation.

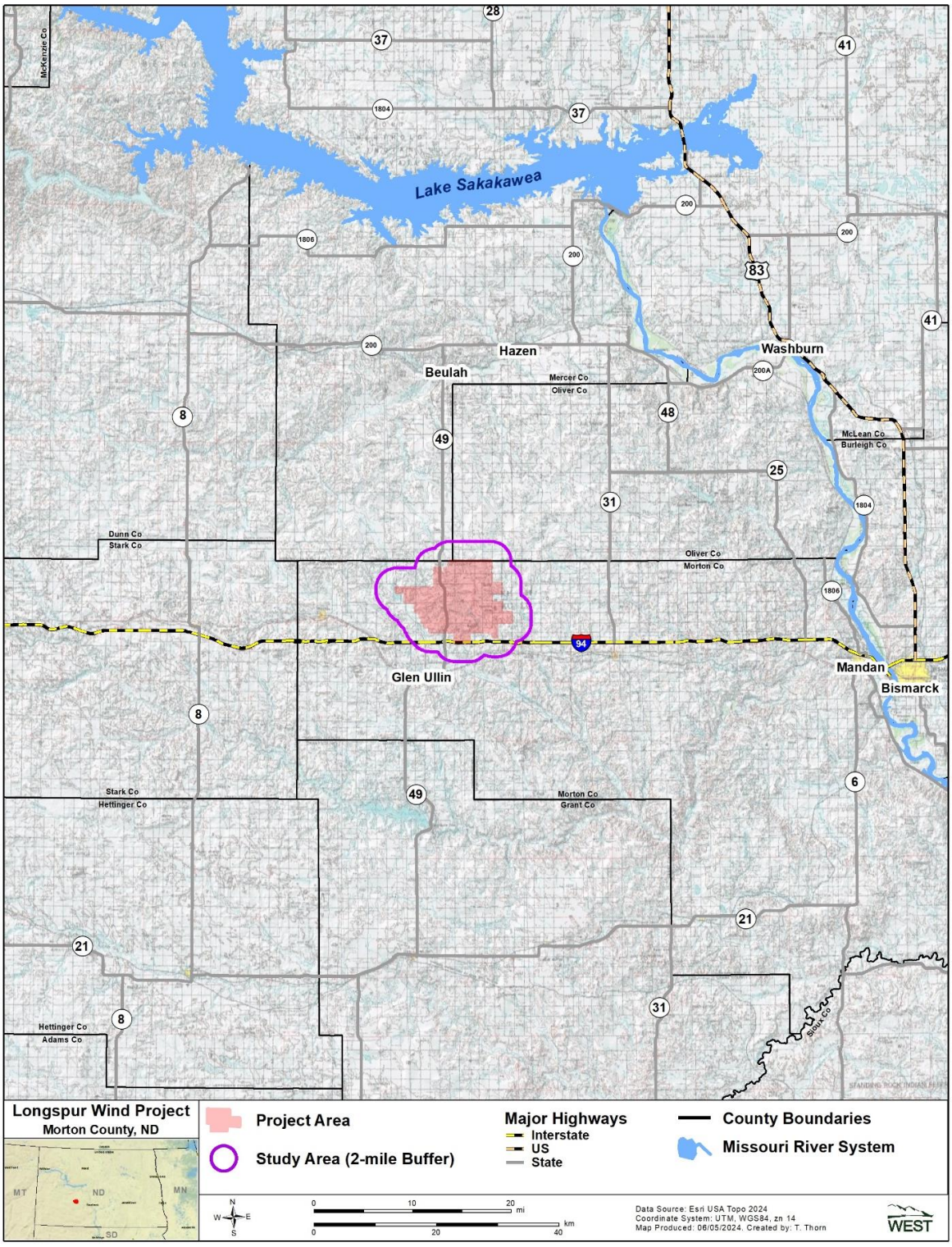

Figure 1. Sharp-tailed grouse lek Study Area at the Longspur Wind Project in Morton County, North Dakota, 2024.

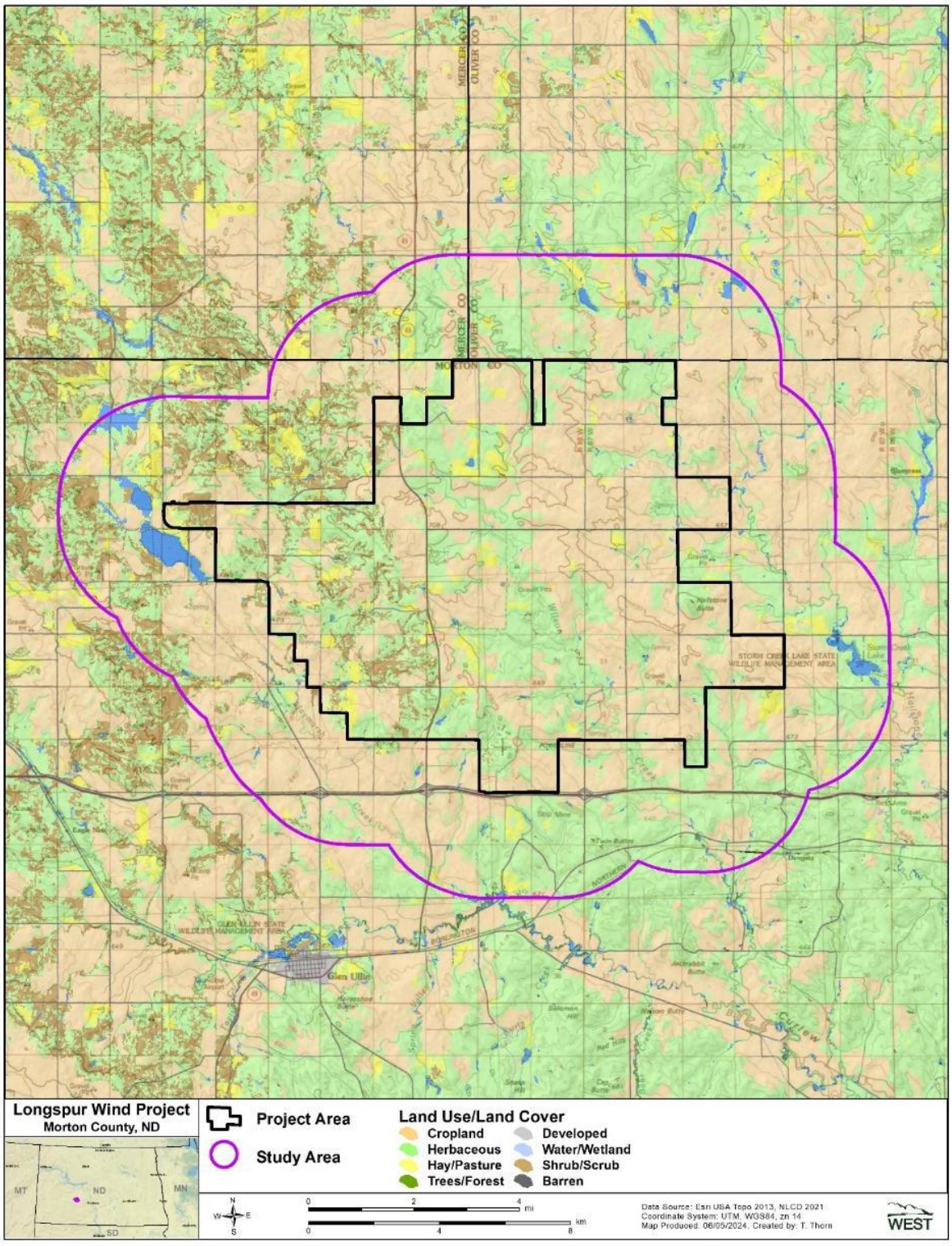

Figure 2. Land cover at the Longspur Wind Project in Morton County, North Dakota.

Table 1. Land cover types, coverage, and percent composition within the Study Area[1] at the Longspur Wind Project in Morton County, North Dakota.

	Project Area		2.0-mile Buffer	
Cover Type	**Acres**	**Percent**	**Acres**	**Percent**
Cultivated crops	18,317	52	25,969	47
Herbaceous	12,910	37	20,549	37
Shrub/scrub	1,716	5	3,605	7
Hay/pasture	1,345	4	2,108	4
Developed	794	2	1,826	3
Water/wetland	125	<1	1,278	2
Tree/forest	49	<1	127	<1
Barren land	2	<1	15	<1
Total[2]	**35,258**	**100**	**55,477**	**100**

1. Study Area includes the Project area plus the 2.0-mile buffer.

2. Sums of values may not add to the total value shown, due to rounding.

Sources: National Land Cover Database 2021.

Study Design

Searches for new leks consisted of driving publicly accessible roads and stopping to visually scan and listen in search of leks within the Study Area, as recommended by the NDGFD (2021). Surveys were conducted by trained field biologists, driving at slow speeds (25 mph [40 kph]) while looking and listening for STGR within the Study Area. Field biologists selected good vantage points, along publicly accessible roads and section line roads, based on considerations for safety, topography, and habitat type to stop and conduct surveys. Observation points were spaced approximately 0.5–1.0 mi (0.8–1.6 km) apart, and observers visually scanned and listened for displaying STGR for a minimum of five minutes at each point. The approximate location was recorded for active leks, and a count was conducted to estimate both the number and sex of STGR attending the lek.

Data Collection Methods and Terminology

Data collection included the location, species, number of each sex, activity, and courtship behavior. Each STGR lek was assigned a unique identification number. Additional data collected for each survey included start and stop time, cloud cover, temperature, and precipitation. Previously known leks (Piorkowski and Brazeal 2020; ALLETE Clean Energy 2016, unpublished) were classified as active if any STGR were observed. Newly discovered leks were considered active if two or more displaying male STGR were observed. Displaying was characterized as inflation of air sacs and associated sounds, aggressive face-off behavior between males, and/or rapid foot stomping and tail vibration. Locations where two or more male STGR were observed, but were not displaying, were not considered active. However, these observations were noted on field maps for reference in subsequent rounds of survey.

Data Management and Reporting

Quality Assurance and Quality Control

WEST implemented quality assurance and quality control measures at all stages of the survey, including in the field, during data entry and analysis, and report writing. All WEST field staff were trained in proper survey techniques prior to field surveys. Spatial data (i.e., lek location, field notes, etc.) was collected by tablet, and all other data was collected on paper datasheets. Data were reviewed before submission for data entry and after data were entered. If errors or anomalies were found, follow-up measures were implemented, including discussions and review of field data with biologists and/or the project manager. WEST used a rigorous review process. This review process included technical editing and content review, senior technical review, and a final review by the Project manager before delivery to Minnesota Power.

RESULTS

Three surveys rounds were conducted from April 3 – May 16, 2024. There were 13 active leks detected during ground-based surveys, including six previously known leks and seven newly discovered leks within the Project area and 2.0-mi buffer (Table 2, Figure 3). Within the Project area, six active leks were observed, with the majority (four) located along the eastern edge of the Project area (Figure 3). The majority (11) of the active leks within the Study Area were located within grasslands. No activity was observed at historic Lek ID 5 (Table 2, Figure 3). The average number of STGR observed at active leks during the 2024 survey season was 6.8 individuals. No other observations STGR were recorded during surveys.

Table 2. Sharp-tailed grouse lek survey results at the Longspur Wind Project in Morton County, North Dakota, 2024.

Lek ID	Year First Observed	Location	Number Observed[1]				2024 Status
			Male	Female	Unk	Total	
1*	2017	2-mile Buffer	2	–	1	3	Active
2*	2017	2-mile Buffer	20	–	5	25	Active
3*	2017	2-mile Buffer	–	–	4	4	Active
4*	2017	Project Area	4	–	4	8	Active
5*	2017	Project Area	–	–	-	-	Inactive
6*	2017	Project Area	2	–	1	3	Active
7*	2020	Project Area	3	–	7	10	Active
8	2024	2-mile Buffer	2	–	–	2	Active
9	2024	Project Area	4	2	–	6	Active
10	2024	2-mile Buffer	10	4	3	17	Active
11	2024	2-mile Buffer	3	–	–	3	Active
12	2024	2-mile Buffer	2	–	–	2	Active
13	2024	Project Area	2	–	–	2	Active
14	2024	Project Area	3	1	–	4	Active

[1] Maximum number observed across all rounds.

*Historic active lek

ID = identification, Unk = unknown.

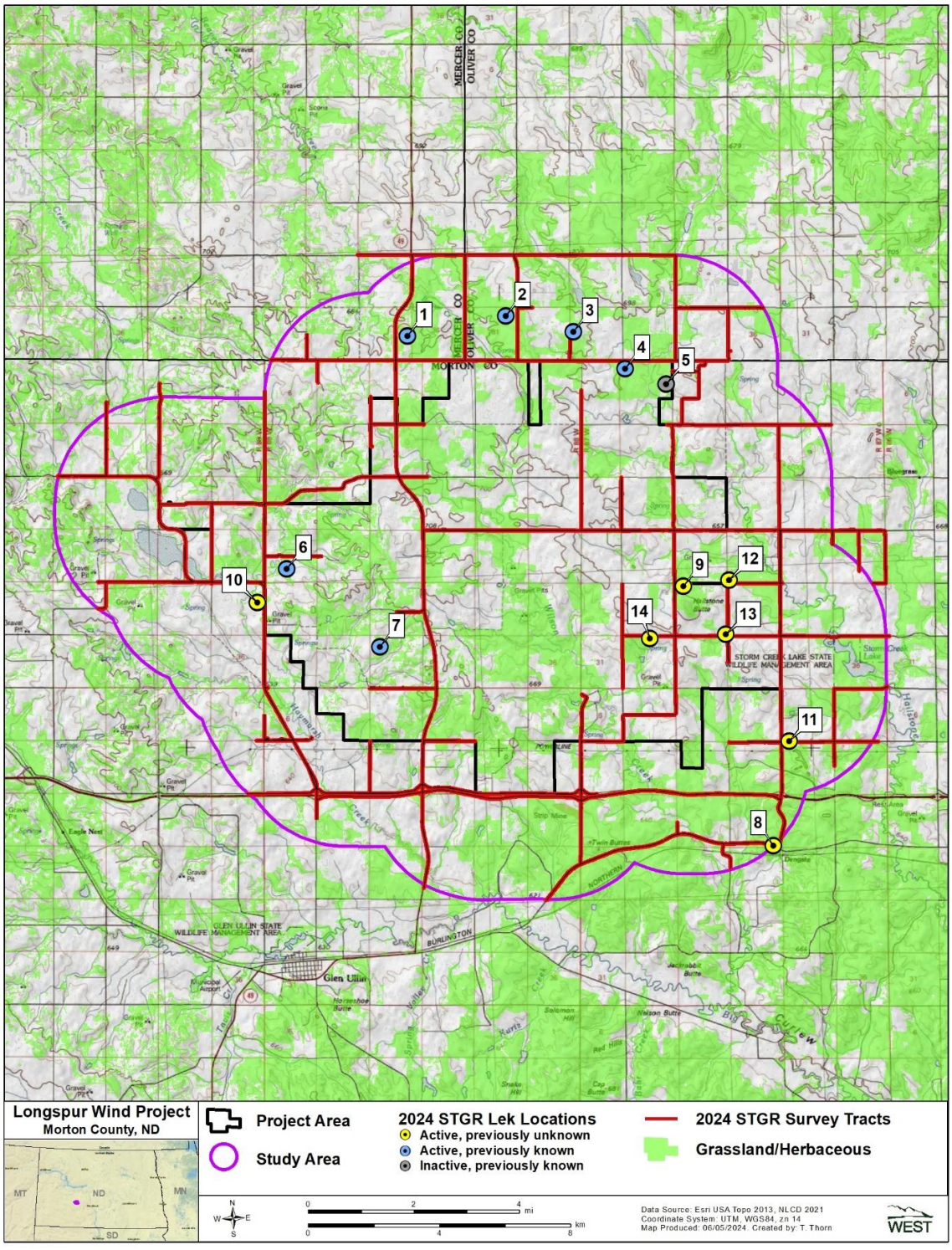

Figure 3. Sharp-tailed grouse lek locations observed during ground-based surveys from April 3 – May 16, 2024 at the Longspur Wind Project in Morton County, North Dakota.

DISCUSSION

NDGFD provides survey recommendations for STGR in the *Wind Energy Development in North Dakota: Best Management Practices* (NDGFD 2021). Sharp-tailed grouse surveys were completed from April 3 – May 16, 2024. The timeframe for which NDGFD recommends lek surveys is from March 15 – May 15 (NDGFD 2021). Surveys were one day longer than the recommended timeframe due to rain delays prior to the completion of the third round of surveys. Additionally, surveys followed NDGFD guidance by conducting a survey approximately every 0.5 mi but were constrained to publicly accessible roads and section line roads. However, this left survey gaps primarily within the central portion of the Project area as shown in Figure 3. WEST suggest if lek surveys are completed in subsequent years, additional access may need to be granted or an alternative survey strategy may need to be discussed with NDGFD for more complete coverage of the Study Area.

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Sharp-Tailed Grouse Lek Surveys
Longspur Wind Project
Morton County, North Dakota

Final Report



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INTRODUCTION

Minnesota Power is developing the Longspur Wind Project (Project) in Morton County, North Dakota (Project Area; Figure 1). Minnesota Power contracted Western EcoSystems Technology, Inc. (WEST), to conduct a second year of sharp-tailed grouse (*Tympanuchus phasianellus*; STGR) lek surveys throughout the Study Area (Figure 1). The Project Area was updated on October 7, 2024; however, to ensure consistency across survey years, 2025 surveys were conducted in the 2024 Study Area, which encompassed the larger 2024 project area and a two-mile buffer (Piorkowski and Wilson 2024). The lek survey design was informed by the survey protocol described in North Dakota Game and Fish Department's (NDGFD) *Management Plan and Conservation Strategies for Greater Sage-grouse in North Dakota* (Robinson 2014) and recommendations described in *Key Wind Energy Development in North Dakota: Best Management Practices* (NDGFD 2021).

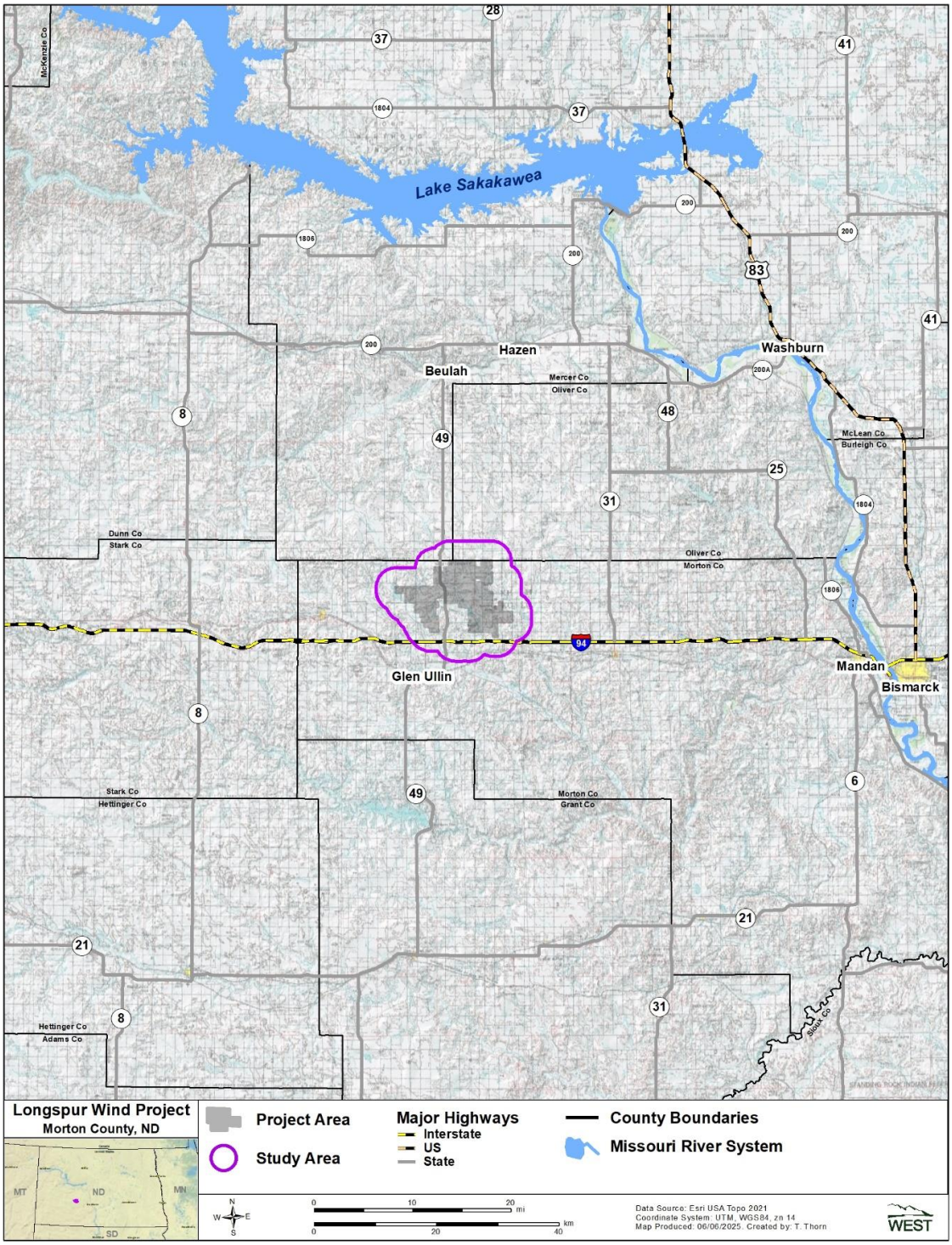
The objectives of the STGR survey were to document the status of known leks, search for new lek locations, and estimate the maximum number of individuals present at each detected lek. This report describes the methods and results for the second year of lek surveys conducted from March 20 – May 7, 2025.

STUDY AREA

The Study Area encompasses approximately 90,735 acres and is located 54 miles (mi) west of Bismarck, North Dakota (Figure 1). The Study Area is in the Level III Northwestern Great Plains Ecoregion (US Environmental Protection Agency 2012). This ecoregion consists of semiarid rolling plains, punctuated by buttes and badlands, and is mainly used as cultivated cropland or rangeland (USEPA 2013). Elevation within the Study Area ranges from 2,080–2,480 feet. The Study Area is mainly composed of croplands (49%), followed by herbaceous (37%), shrub/scrub (6%), hay/pasture (4%), and developed land cover (3%; Table 1, Figure 2; National Land Cover Database 2021). Other land cover types each represent less than 2% of the Study Area (Table 1). The 25,933-acre Project Area is located completely within the Study Area and is composed of similar land cover types to the Study Area, with slightly more cropland and less of each remaining land cover type (Table 1).

METHODS

Following NDGFD guidance (NDGFD 2021), WEST conducted three rounds of ground-based lek surveys. Surveys were conducted from 30 minutes before sunrise until 1.5–2.0 hours after sunrise. Surveys were conducted on relatively calm mornings (winds less than 15 mi per hour [mph]) and on days with little or no precipitation.



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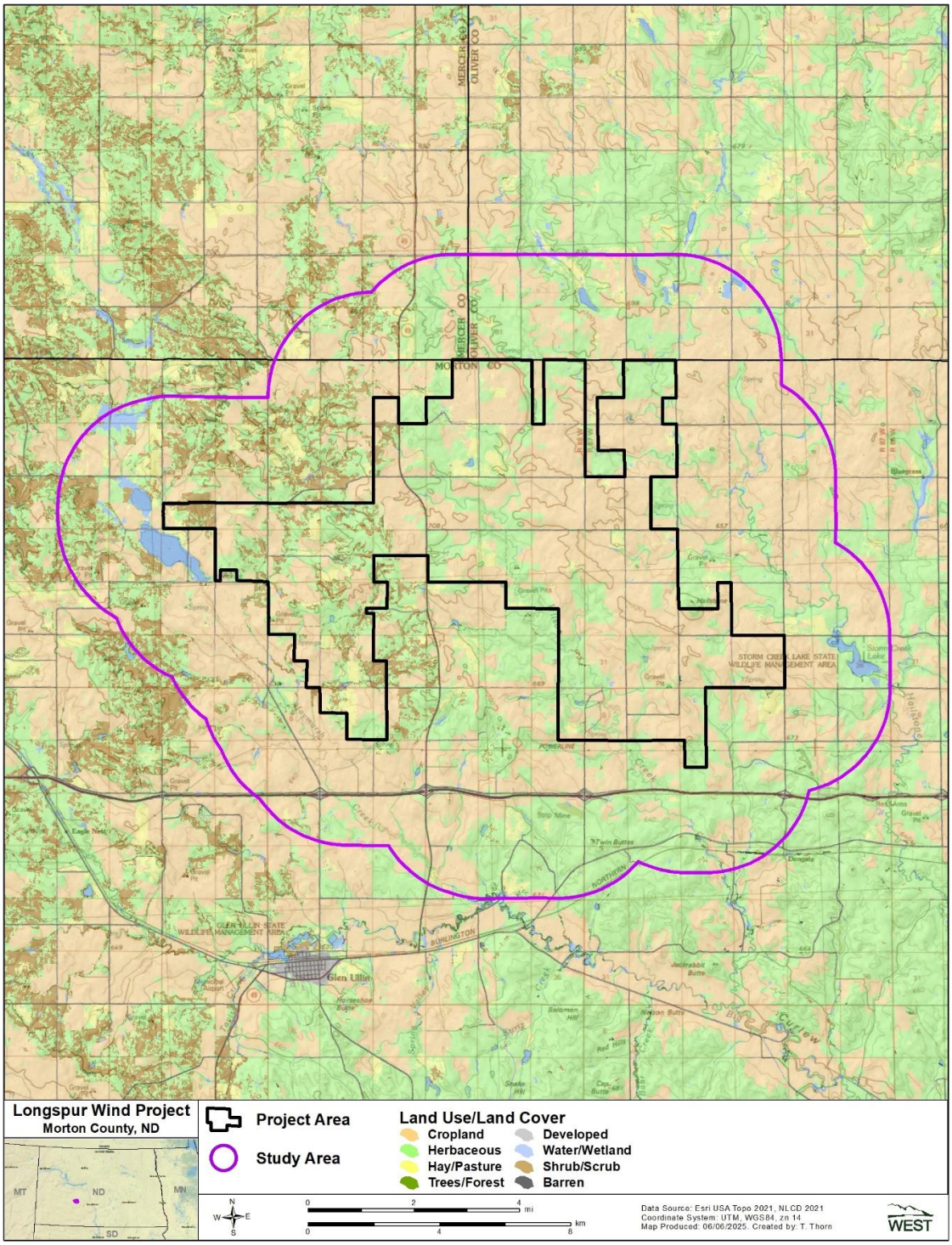

Figure 2. Land cover at the Longspur Wind Project in Morton County, North Dakota, 2025.

Table 1. Summary of land cover types, coverage, and percent composition within the Study Area at the Longspur Wind Project in Morton County, North Dakota, 2025.

	Study Area[1]		Project Area	
Cover Type	**Acres**	**Percent**	**Acres**	**Percent**
Cropland	44,287	49	14,604	56
Herbaceous	33,459	37	8,371	32
Shrub/scrub	5,321	6	1,172	5
Hay/pasture	3,453	4	1,061	4
Developed	2,619	3	605	2
Water/wetland	1,403	2	90	<1
Tree/forest	175	<1	28	<1
Barren	17	<1	2	<1
Total[2]	**90,735**	**100**	**25,933**	**100**

1. Study Area encompasses the 2024 Project Area plus a 2-mile buffer (Piorkowski and Wilson 2024).

2. Sums of values may not add to the total value shown, due to rounding.

Sources: Summarized from National Land Cover Database 2021.

Study Design

Historical lek locations were requested from NDGFD prior to surveys; however, no lek locations were known to occur in the Study Area (S. Johnson, NDGFD, pers. comm., December 13, 2024). Additionally, previous lek surveys conducted at the Project were used for historical reference (ALLETE Clean Energy 2016, unpublished; Piorkowski and Brazeal 2020, Piorkowski and Wilson 2024). Searches for new leks consisted of slowly driving along publicly accessible roads (25 mph) within the Study Area and stopping to visually scan for leks and listen for their calls, as recommended by the NDGFD (2021). Observation points were spaced approximately 0.5 mi apart (Figure 3) with a good view of the surrounding landscape and surveyed for a minimum of five minutes. The approximate location of detected leks was recorded, and a count was conducted to estimate both the number and sex of STGR attending the lek.

Data Collection Methods and Terminology

Data collection included the location, species, number of each sex, and courtship behavior. Each STGR lek was assigned a unique identification number. Additional data collected for each survey included start and stop time, cloud cover, temperature, precipitation, wind speed, and wind direction. Historical leks were classified as active if any STGR were observed. Newly discovered leks were considered active if two or more displaying male STGR were observed (Runia et al. 2021). Displaying was characterized as inflation of air sacs and associated sounds, aggressive face-off behavior between males, and/or rapid foot stomping and tail vibration. New locations where two or more male STGR were observed, but were not displaying, were not considered a lek. However, these observations were noted on field maps for reference in subsequent rounds of survey.

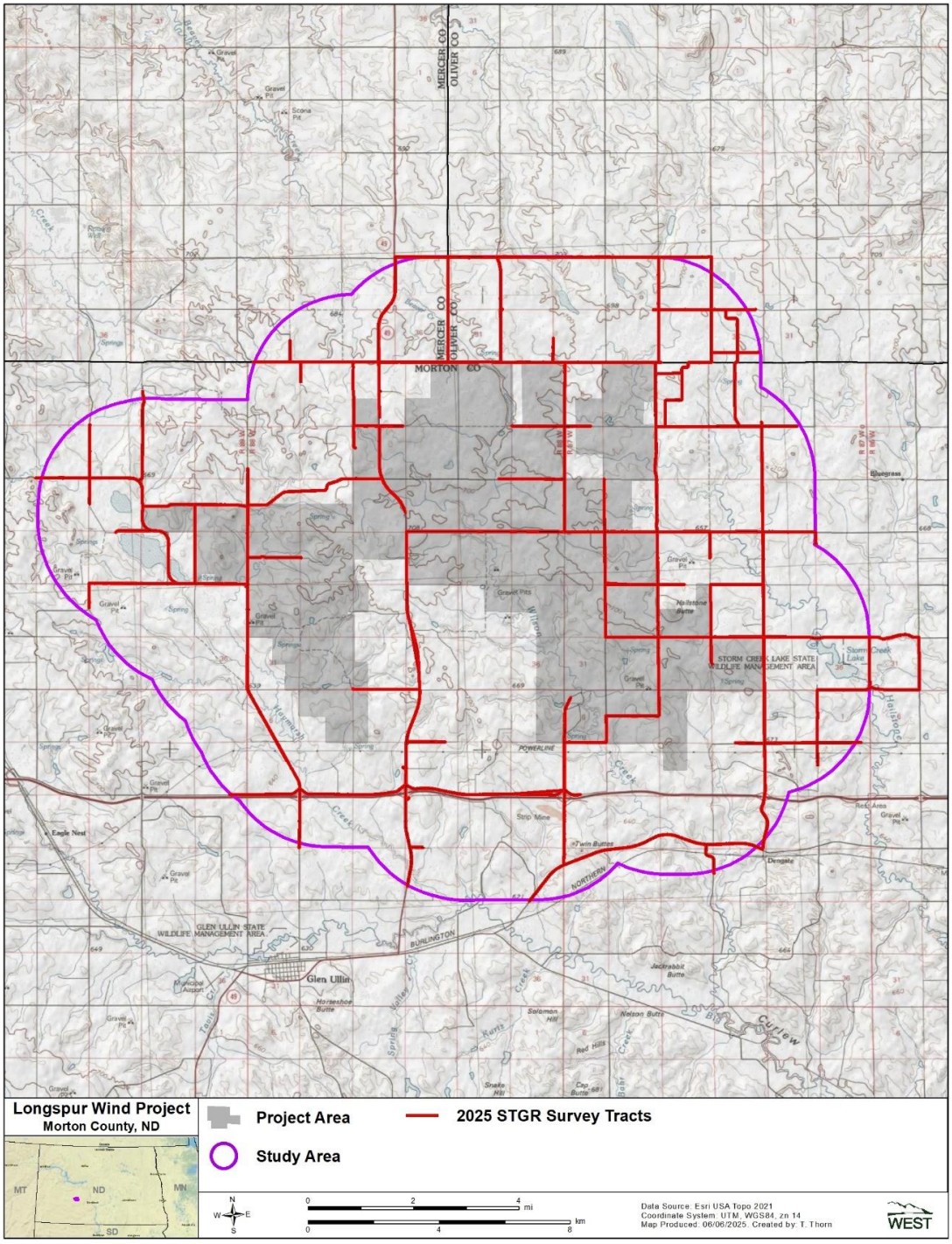

Figure 3. Ground-based lek survey efforts within the Study Area at the Longspur Wind Project in Morton County, North Dakota, 2025.

Data Management and Reporting

WEST implemented quality assurance and quality control measures at all stages of the survey, including in the field, during data entry and analysis, and report writing. All WEST field staff were trained in proper survey techniques prior to field surveys. Spatial data (e.g., lek location and survey tracks) were collected by tablet, and all other data were collected on paper datasheets. Data were reviewed before submission for data entry and after data were entered. If errors or anomalies were found, follow-up measures were implemented, including discussions and review of field data with biologists and/or the project manager. WEST used a rigorous review process. This review process included technical editing and content review, senior technical review, and a final review by the project manager before delivery to Minnesota Power.

RESULTS

Three surveys rounds were conducted from March 20 – May 7, 2025. Survey occurred during the following dates:

- Survey 1: March 20 – 26
- Survey 2: April 4 – 15
- Survey 3: April 29 – May 7

A total of twenty-two active leks were detected during ground-based surveys, including nine historical lek locations and 13 newly discovered leks (Table 2, Figure 4). Four active leks were located within the Project Area, and 18 were outside of the Project Area in the surrounding Study Area (Figure 4). No activity was observed at five previously known leks (Table 2, Figure 4).

The four active leks within the Project Area were documented in the southern half of the Project Area, with two located in NLCD grasslands (Figure 4). The majority (12) of the active leks outside of the Project Area but within the Study Area were located within NLCD grasslands (Figure 4). The average number of STGR observed at active leks during the 2025 survey season was approximately seven individuals.

Table 2. Sharp-tailed grouse lek survey results within the Study Area at the Longspur Wind Project in Morton County, North Dakota, in 2025.

Lek ID	Year First Observed	Study Area[1] Location	Number Observed[2]				2025 Status
			Male	Female	Unk	Total	
1*	2017	Study Area	4	–	10	14	Active
2*	2017	Study Area	7	–	–	7	Active
3*	2017	Study Area	–	–	2	2	Active
4*	2017	Project Area	–	–	–	–	Inactive
5*	2017	Project Area	–	–	–	–	Inactive
6*	2017	Project Area	–	–	–	–	Inactive
7*	2020	Study Area	6	5	3	14	Active
8*	2024	Study Area	3	1	–	4	Active
9*	2024	Study Area	–	–	7	7	Active
10*	2024	Study Area	2	–	–	2	Active
11*	2024	Study Area	–	–	–	–	Inactive
12*	2024	Study Area	–	–	–	–	Inactive
13*	2024	Project Area	5	–	–	5	Active
14*	2024	Project Area	3	–	–	3	Active
15	2025	Project Area	2	–	6	8	Active
16	2025	Study Area	4	–	–	4	Active
17	2025	Study Area	13	–	6	19	Active
18	2025	Study Area	3	–	3	6	Active
19	2025	Study Area	4	–	–	4	Active
20	2025	Study Area	6	–	8	14	Active
21	2025	Project Area	9	3	4	16	Active
22	2025	Study Area	2	–	–	2	Active
23	2025	Study Area	2	–	3	5	Active
24	2025	Study Area	2	–	1	3	Active
25	2025	Study Area	4	–	5	9	Active
26	2025	Study Area	2	–	–	2	Active
27	2025	Study Area	8	–	–	8	Active

1. Study Area designation includes all areas outside of the Project Area.

2. Maximum number observed across all rounds.

* Historical lek.

ID = identification, Unk = unknown.

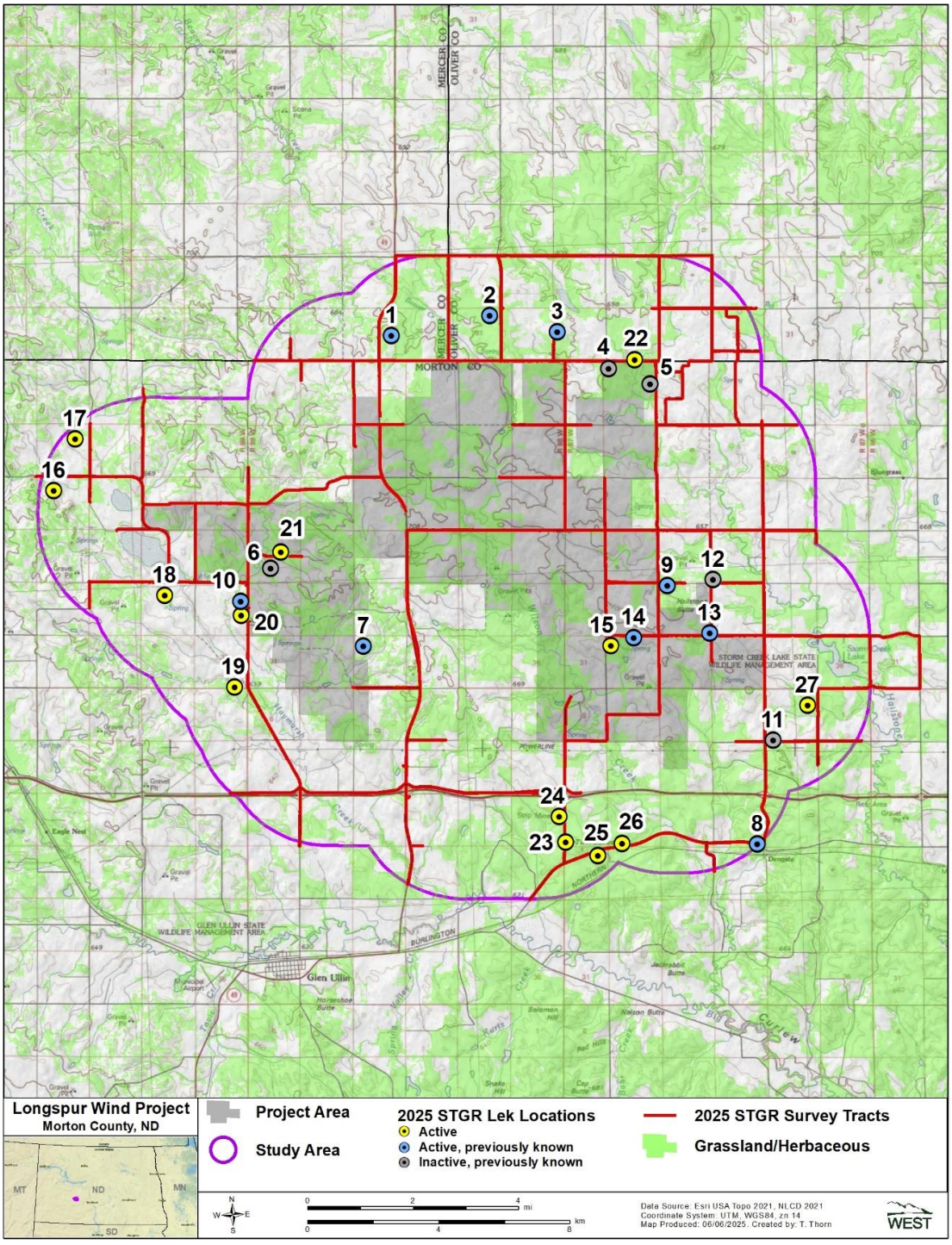

Figure 4. Sharp-tailed grouse lek locations observed within the Study Area during ground-based surveys at the Longspur Wind Project in Morton County, North Dakota, from March 20 – May 7, 2025.

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Studies and Assessments

B10. Whooping Crane Habitat Assessment

Whooping Crane Habitat Assessment
Longspur Wind Project
Morton County, North Dakota

Final Report



Prepared for:

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Appendix A. Predictor Variables Considered in the Development of Whooping Crane Niemuth Model

1 INTRODUCTION

Minnesota Power is developing the Longspur Wind Project (Project) in Morton County, North Dakota. Minnesota Power contracted Western EcoSystems Technology, Inc. (WEST), to conduct a whooping crane (*Grus americana*) stopover habitat assessment for the 25,933-acre Project Area (Figure 1). The objective of this assessment was to quantify the land use types and topography within the Project Area and assess the potential for whooping crane use as suitable stopover habitat.

Whooping cranes are endemic to North America and one of North America's largest birds, driven almost to extinction in the 1940s by hunting and habitat loss (US Fish and Wildlife Service [USFWS] 2013, 2024b; Urbanek and Lewis 2020). The only self-sustaining wild population of whooping cranes breeds in Wood Buffalo National Park in Canada and typically winters in the coastal marshes of Texas including in the Aransas National Wildlife Refuge (Urbanek and Lewis 2020). Surveys by the USFWS of the Aransas-Wood Buffalo (ARWB) population estimated 546 individuals during the 2022–2023 winter census (Butler et al. 2023). The ARWB population migrates between wintering and breeding habitat in the spring and fall, with 95% of whooping crane sightings occurring within a 183-mile (mi) wide corridor (Pearse et al. 2018).

During migration, whooping cranes stopover at resting and feeding locations, where they are typically found in shallow wetlands and marshes, edges and sandbars of shallow rivers, and agricultural fields near a water source (Baasch et al. 2019, Montana Fish, Wildlife and Parks [MFWP] 2024). During migratory stopovers, whooping cranes forage in wetlands and cultivated agricultural lands on invertebrates, small vertebrates, berries, and grains (Urbanek and Lewis 2020, Caven et al. 2021). Whooping cranes typically roost in shallow-water wetlands (Urbanek and Lewis 2020, MFWP 2024, NatureServe 2024, USFWS 2024b).

2 PROJECT AREA

The Project Area provided by Minnesota Power on October 10, 2024, encompasses approximately 25,933 acres (ac) and is located approximately five mi north of the city of Glen Ullin (Figure 1). The Project lies within the Level III Northwestern Great Plains ecoregion (US Environmental Protection Agency [USEPA] 2013). This ecoregion, historically dominated by grasslands, has been extensively converted for agricultural use (e.g., row crops and livestock grazing; USEPA 2012). Elevation within the Project Area ranges from approximately 2,080 to 2,480 feet. Topography within the Project Area is gently rolling to flat. The Project Area is located inside the ARWB population migration corridor within the portion containing 50% of whooping crane sightings and occurrences (Figure 1).

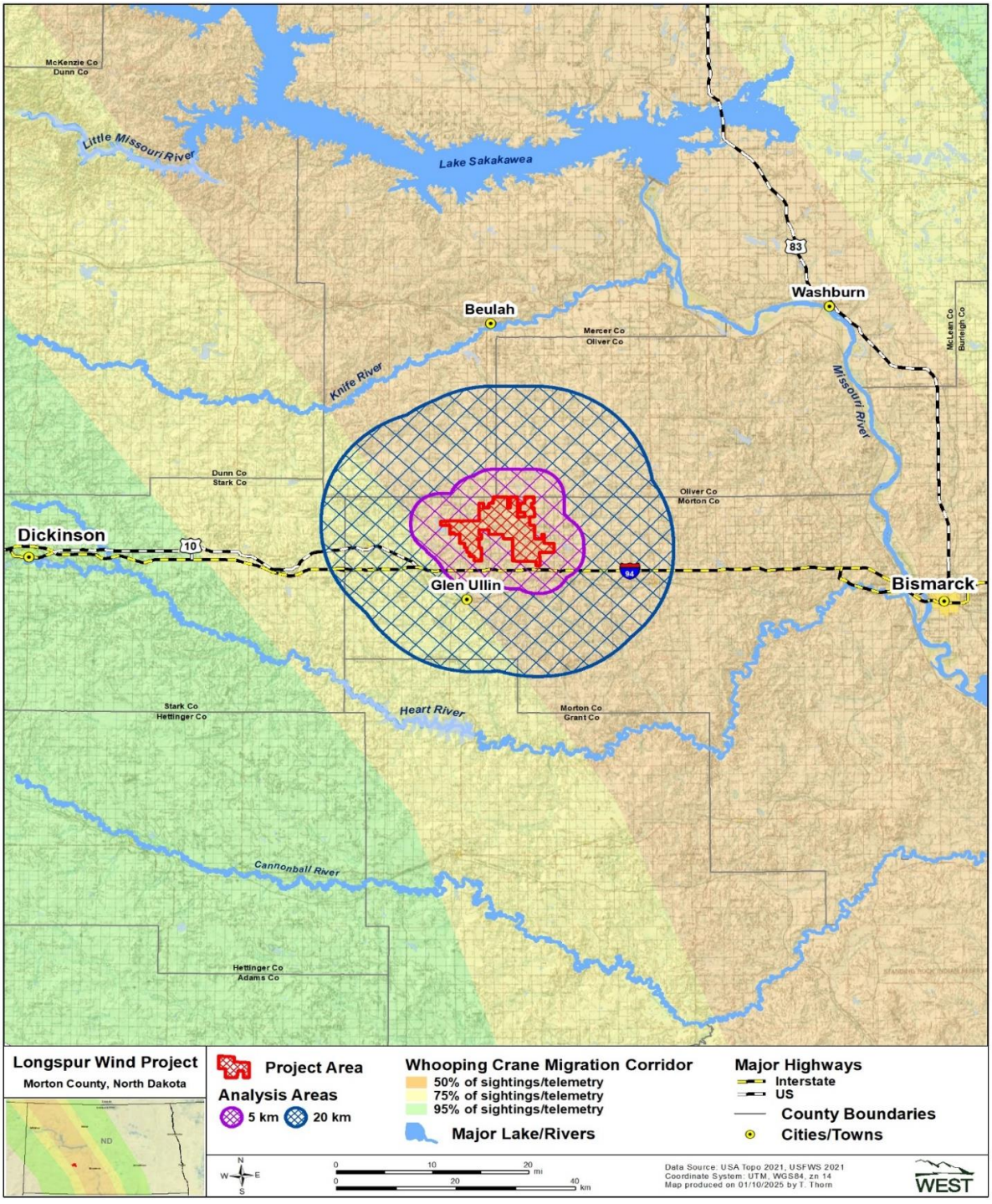

Figure 1 Location of the Longspur Wind Project in relation to the Whooping Crane Migration Corridor, North Dakota.

3 METHODS

For this analysis, WEST used the Relative Probability of Occurrence Model (hereafter Niemuth Model) and the Decile Model, developed specifically for North and South Dakota (Niemuth et al. 2018), for assessing potentially suitable whooping crane stopover habitat within the Project Area and separately for 5-kilometer (km) and 20-km analysis areas (Figure 1). The Niemuth Model and the Decile Model are preferred by the USFWS North Dakota Ecological Service Field Office (H. Edens, USFWS, pers. comm. 12/4/2024) to assess whooping crane stopover habitat use and are consistent with the North Dakota Game and Fish Department (NDGFD) preferred approach (NDGFD 2021). These two models were used independently to analyze wetland habitat suitability. WEST also used historical data provided by the USFWS (2024a) and Pearse et al (2020) to reference confirmed whooping crane sightings and marked telemetry locations from whooping cranes equipped with transmitters within the Project Area and associated 5-km and 20-km analysis areas.

3.1 Relative Probability of Occurrence Model

The Niemuth Model provides a numerically continuous (0–1.0) prediction of the relative probability of habitat use by whooping cranes. The model considered 12 predictor variables (Appendix A) that were analyzed and validated using Global Positioning System location data from whooping cranes equipped with radio-telemetry transmitters (Niemuth et al. 2018). This model was used to analyze the probability of whooping crane occurrence within the Project Area and associated 5-km and 20-km analysis areas.

3.2 Decile Model

The Decile Model divides the Niemuth Model into 10 equal areas referred to as deciles, to aid in conservation planning. A decile value of 1 indicates the highest probability of whooping crane occurrence and a value of 10 indicates the lowest probability of occurrence. This value system provides succinct thresholds, which allows land parcels to be identified and ranked for whooping crane conservation (Niemuth et al. 2018). The Decile Model was used to calculate acreages within each ranked decile within the separate Project Area and 5-km and 20-km analysis areas.

4 RESULTS

The most recently available data (USFWS 2024a, Pearse et al. 2020) indicate no whooping crane observations or telemetry locations have been documented within the Project Area. Three observations of whooping cranes and six telemetry locations have been observed within the 5-km Analysis Area, and three observations of whooping cranes and two telemetry locations have been observed within the 20-km Analysis Area (Figure 2). The entirety of the Project Area and majority of the 5-km and 20-km analysis areas are located within the portion of the migration corridor that contains 50% of the whooping crane sightings. The southwestern areas of the 5-km and 20-km

analysis areas include the portion of the migration corridor that contains 75% of the whooping crane sightings (Figure 2).

4.1 Relative Probability of Occurrence Model

Ninety-nine percent of the Project Area's relative probability ranges from 0–0.05 (Table 1), with the actual range being 0.0025–0.0602 on a scale of 0–1.0. Therefore, it is expected that habitat within the Project Area would have a maximum of approximately 6% probability of occurrence by whooping cranes during migration. Ninety-five percent of the 5-km Analysis Area and 98% of the 20-km Analysis Area are in the 0–0.05 relative probability of occurrence range (Table 1), with the actual ranges being 0.0015–0.0809 for the 5-km Analysis Area and 0.005–0.1294 for the 20-km Analysis Area. Therefore, it is expected that habitats within the 5-km and 20-km analysis areas will have a maximum of 8% and 12% probability (respectively) of occurrence by whooping cranes during migration (Table 1, Figure 2).

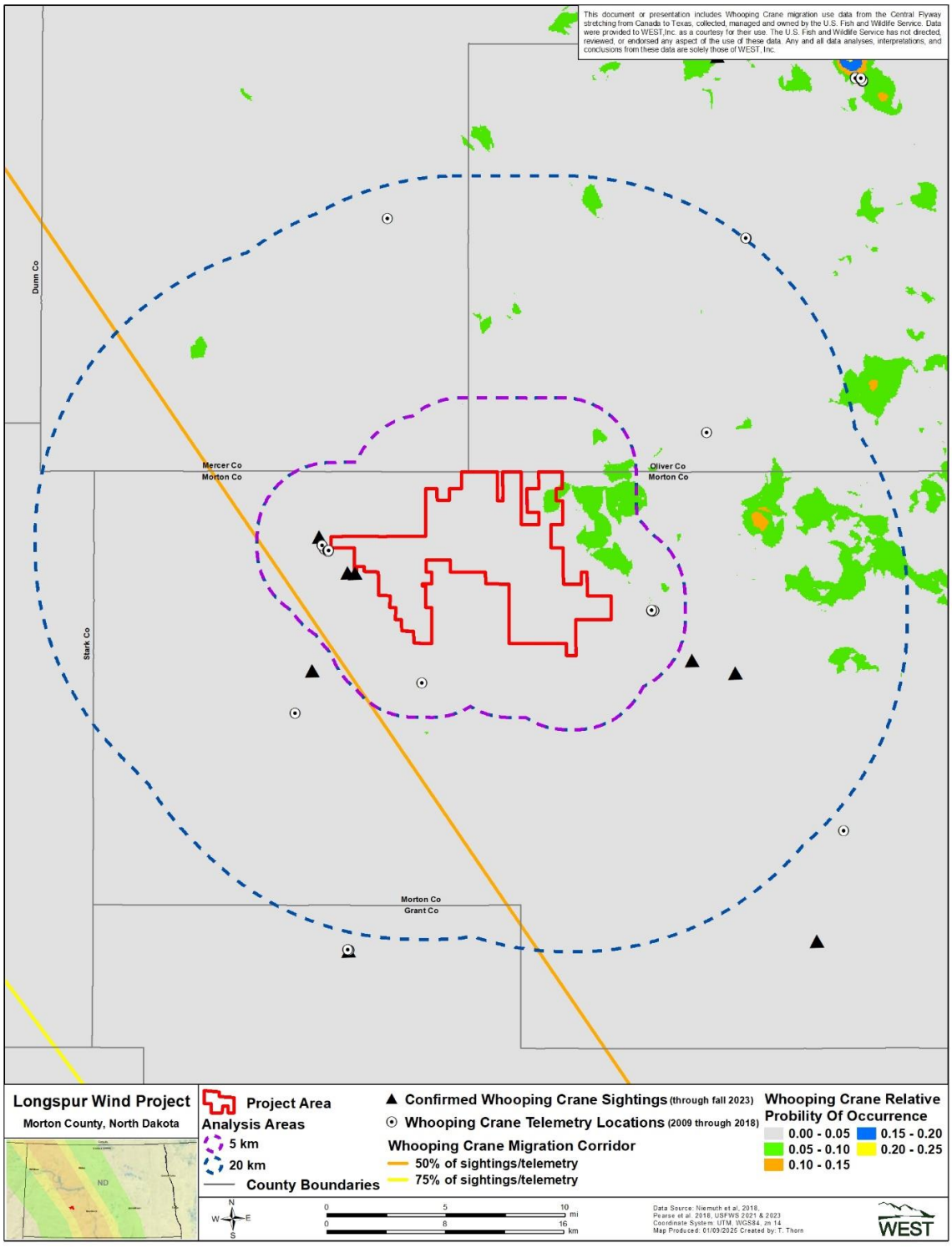

Figure 2. Relative probability of occurrence within the Project Area, 5-kilometer (km) Analysis Area, and 20-km Analysis Area of the Longspur Wind Project Area, Morton County, North Dakota.

Table 1. Acreage and percentage of each relative probability range within the Project Area, 5-km, and 20-km analysis areas of the Longspur Wind Project, Morton County, North Dakota.

Relative Probability Range	Project Area		5-km Analysis Arear		20-km Analysis Area	
	Acres	Percent	Acres	Percent	Acres	Percent[1]
0–0.05	25,545	99	90,844	95	470,716	98
0.05–0.10	388	1	4,667	5	11,299	2
0.10–0.15	–	–	–	–	316	< 1
Total	**25,933**	**100**	**95,511**	**100**	**482,331**	**100**

[1] Sums may not add to 100% due to rounding

km = kilometer.

4.2 Decile Model

Five decile values (2–6) are represented within the Project Area of which four (Deciles 2, 3, 4, and 5) represent greater than 99% of the Project Area (Table 2). Decile 4 is the most common decile within the Project Area (50%), followed by Decile 3 (35%), Decile 5 (9%), Decile 2 (6%), and Decile 6 (less than 1%). With more area assessed for each analysis area (Project Area, 5-km Analysis Area, and 20-km Analysis Area, respectively [Figure 3]), acreages of each decile represented also increased. However, Deciles 3 and 4 combined made up the majority of acreage in all three analyses (Table 2). The probability of whooping crane occurrence decreases from east to west in the Project Area and both analysis areas (Figure 3).

Table 2. Acres and percentage for each Decile value within the Project Area, 5-km, and 20-km analysis areas of the Longspur Wind Project, Morton County, North Dakota.

Decile	Project Area		5-km Analysis Area		20-km Analysis Area	
	Acres	Percent[1]	Acres	Percent	Acres	Percent
1	0	0	763	1	2,681	1
2	1,582	6	15,355	16	50,956	11
3	8,972	35	25,646	27	145,637	30
4	12,862	50	33,316	35	141,360	29
5	2,428	9	18,577	19	101,046	21
6	88	<1	1,855	2	38,169	8
7	–	–	–	–	2,474	1
8	–	–	–	–	8	<1
Total[1]	**25,933**	**100**	**95,511**	**100**	**482,331**	**100**

[1.] Sums may not add to 100% due to rounding.

km = kilometer.

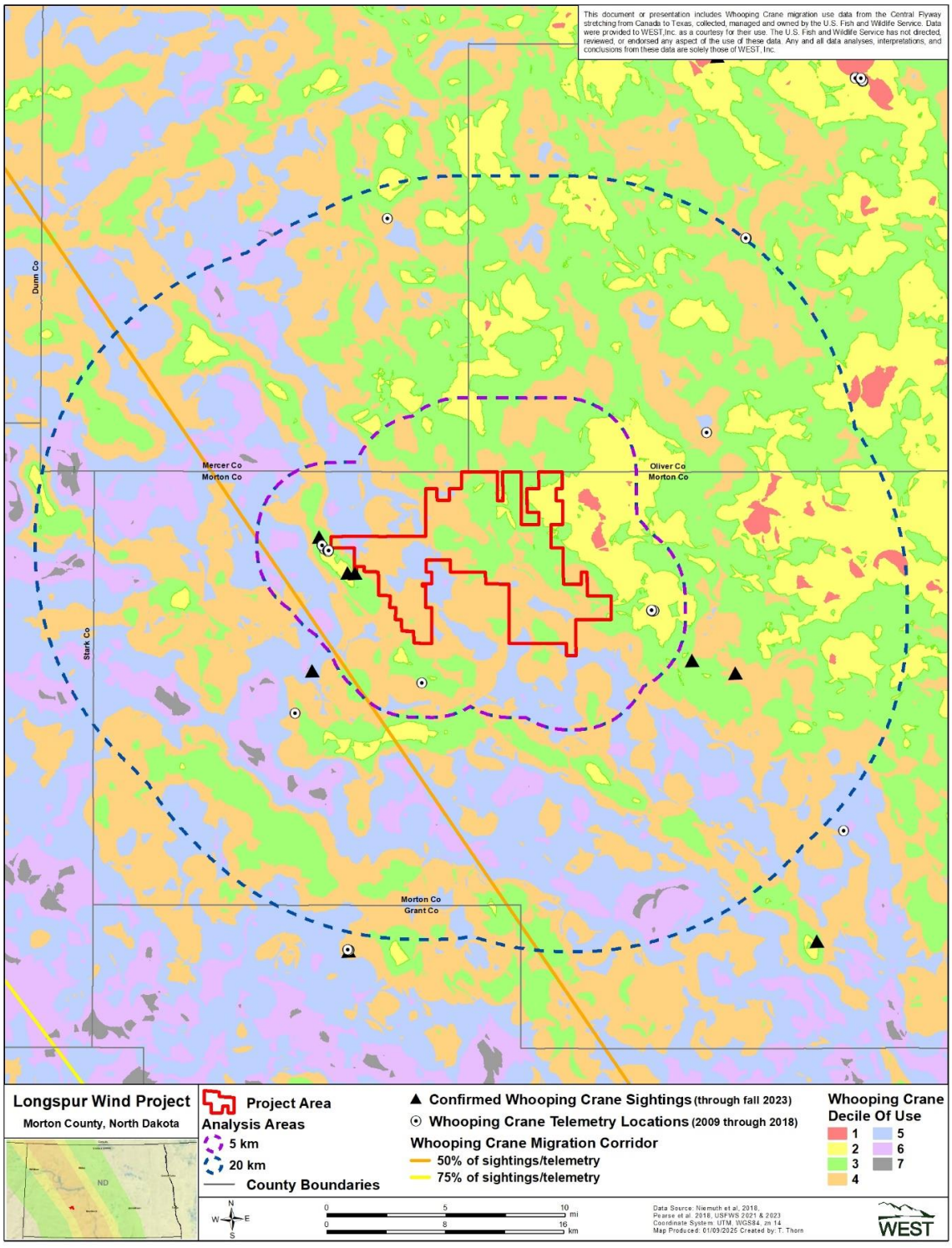

Figure 3. Decile of probability of whooping crane occurrence within the Project Area, 5-kilometer (km) Analysis Area, and 20-km Analysis Area of the Longspur Wind Project, Morton County, North Dakota.

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Appendix A. Predictor Variables Considered in the Development of Whooping Crane Niemuth Model

Appendix A. Predictor variables considered in the development of models relating sightings and occurrences of whooping cranes in North Dakota and South Dakota to geographic location, landscape-level habitat characteristics, and factors influencing detection (recreated from Niemuth et al. [2018]).

Predictor Variable	Definition	Justification
Distance to Centerline	Distance (km]) from centerline of whooping crane (*Grus americana*) migration corridor calculated from data	Whooping cranes generally follow a narrow migration corridor (Howe 1989, Tacha et al. 2010)
Wetland Area	Proportion of area within the buffer[1] comprised of all temporary, seasonal, semipermanent, permanent, and lacustrine wetlands as identified by the National Wetlands Inventory (NWI; Wilen and Bates 1995)	Whooping cranes use wetlands for roosting and foraging (Howe 1989, Johns et al. 1997, Austin and Richert 2005)
Wetland Variety	Number of different wetland water regimes (temporary, seasonal, semipermanent, permanent or lake, riverine) as identified by the NWI (Wilen and Bates 1995) processed to basins (Cowardin et al. 1995) within buffer[1]	Seasonal shifts in wetland use and presence of multiple wetlands in the vicinity of whooping crane stopover sites (Howe 1989, Johns et al. 1997, Austin and Richert 2005) suggest that wetland complexes might be important to whooping cranes
Wetland Number	Number of wetland basins as identified by the NWI (Wilen and Bates 1995) processed to basins (Cowardin et al. 1995) within buffer[1]	Wetlands used for roosting are generally large (Johns et al. 1997), but most prairie potholes and stock ponds are small (Kantrud et al. 1989); this variable evaluated whether multiple small wetlands of a given area were as attractive to whooping cranes as fewer large wetlands of the same area
Perennial Cover	Proportion of buffer comprised of grassland, hay fields, and shrubs as identified by the 2001 National Land Cover Database (NLCD; Homer et al. 2007) cover classes 71, 81, and 52	Perennial cover is common at or adjacent to roosting and feeding sites (Howe 1989, Johns et al. 1997, Austin and Richert 2005)
Cropland	Proportion of buffer comprised of cultivated crops as identified by the 2001 NLCD (Homer et al. 2007) cover class 82	Whooping cranes use agricultural fields for foraging (Howe 1989, Johns et al. 1997, Austin and Richert 2005)
Forest	Proportion of buffer comprised of forest cover as identified by the 2001 NLCD (Homer et al. 2007) cover classes 41, 42, and 43	Whooping cranes use sites with few trees (Johns et al. 1997, Austin and Richert 2005)
Distance to Increased Survey Effort	Distance (km) from 24 areas of known intensive whooping crane observation effort, including district offices of wildlife management agencies and wildlife refuges and fish hatcheries with permanent staff	Disproportionate numbers of whooping crane sightings are in proximity to refuges or other sites with knowledgeable observers (Howe 1989, Tacha et al. 2010)
Human Population Density	Number of people per 2.6 km, derived from US Census Bureau data (Seirup and Yetman 2006)	Human observers are necessary to detect and report whooping cranes; sightings are biased toward urban centers (Howe 1989)

Appendix A. Predictor variables considered in the development of models relating sightings and occurrences of whooping cranes in North Dakota and South Dakota to geographic location, landscape-level habitat characteristics, and factors influencing detection (recreated from Niemuth et al. [2018]).

Predictor Variable	Definition	Justification
Roads	Length (km) of roads (maintained gravel or better) identified by topologically integrated geographic encoding and referencing data (US Census Bureau 2011) within each buffer[1]	Whooping cranes avoid roads (Johns et al. 1997, Belaire et al. 2014), but roads may enable increased detection of whooping cranes
Terrain Roughness	Standard deviation of cells within buffer of digital elevation model with 30-m spatial resolution	Whooping cranes use wetlands with shallow shoreline slopes (Johns et al. 1997, Austin and Richert 2005); detection of whooping cranes may be influenced by topographic variation
Whooping Crane Population Size	Number of birds estimated to be in the Aransas–Wood Buffalo flock each year	Number of whooping cranes detected annually increased as population size increased during the analysis period

[1] Characteristics within buffers were calculated using circular moving windows with radii of 800, 1,200, and 1,600 m.

km = kilometer, m = meter.

Studies and Assessments

B11. Northern Long-eared Bat Presence/Absence Surveys

Bat Summer Presence/Probable Absence Surveys
Longspur Wind Project
Morton County, North Dakota

Final Report
July 12 – July 17, 2025



Prepared for:

Minnesota Power

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Prepared by:

Western EcoSystems Technology, Inc.

4007 State Street, Suite 109
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November 6, 2025

WEST

Confidential Business Information

EXECUTIVE SUMMARY

Minnesota Power is considering the development of the Longspur Wind Project (Project) in Morton County, North Dakota. Minnesota Power contracted Western EcoSystems Technology, Inc. (WEST), to conduct presence/probable absence mist-net surveys to determine if the federally listed, endangered northern long-eared bat (NLEB) occurred in the Project area during the 2025 summer maternity season.

The Project is approximately 25,933 acres (ac) and, using a desktop analysis of wooded habitat, WEST determined there to be 13 ac of potential suitable habitat for NLEB in the Project area. To meet US Fish and Wildlife Service (USFWS) recommendations, WEST surveyed one net site. A study plan for the surveys was provided to the USFWS on May 7, 2025, and site-specific authorization was provided on June 3, 2025.

WEST conducted mist-net surveys from July 12 – 17, 2025, following methods described in the USFWS *2024 Range-Wide Indiana Bat and Northern Long-eared Bat Survey Guidelines*. No bats (including federally threatened or endangered species) were captured during this study.

STUDY PARTICIPANTS

Elizabeth Baumgartner	Senior Manager, Reviewer
Martin Piorkowski	Project Manager
Kristina Hammond	Senior Bat Review
Andrew Burmester	Field Coordinator, Reviewer
Zeinab Haidar	Permitted Bat Biologist, Mist-net Crew Lead
Ciara Parenzin	Bat Biologist, Mist-net Technician
Renea Wilson	Report Writer
Terri Thorn	GIS Specialist
Addison Allen	Bat Project Coordinator
Kelsey Beck	Technical Editor

REPORT REFERENCE

Western EcoSystems Technology, Inc. (WEST). 2025. Bat Summer Presence/Probable Absence Surveys, Longspur Wind Project, Morton County, North Dakota. Final Report. July 12 – July 17, 2025. Prepared for Minnesota Power, Duluth, Minnesota. Prepared by WEST, Bismarck, North Dakota. November 6, 2025.

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INTRODUCTION

Minnesota Power is considering the development of the Longspur Wind Project (Project) in Morton County, North Dakota (Figure 1). Minnesota Power requested that Western EcoSystems Technology, Inc. (WEST), conduct presence/probable absence mist-net surveys to determine if the federally endangered northern long-eared bat (*Myotis septentrionalis*; NLEB) occurred in the Project area during the 2025 summer maternity season. Mist-net surveys were conducted following methods described in the US Fish and Wildlife Service (USFWS) *2024 Range-Wide Indiana Bat and Northern Long-eared Bat Survey Guidelines* (Guidelines; USFWS 2024). This report summarizes the results of surveys conducted from July 12 – 17, 2025.

A study plan for the surveys was provided to the USFWS on May 7, 2025, and site-specific authorization was provided on June 3, 2025 (L. Toso, USFWS North Dakota Field Office, pers. comm.; Appendix A).

METHODS

Habitat and Survey Effort

The Project area encompasses approximately 25,933 acres (ac), 13 ac of which was determined to be potentially suitable habitat using a combination of manually digitized forest areas and land use/land cover data (Figure 2; O'Neil and Piorkowski 2025). For non-linear projects, the USFWS Guidelines recommend one net site per 123 ac of suitable bat habitat within a project and surveyed for a minimum of 10 net-nights. A net site consists of multiple net-sets (defined as two poles with one to three stacked mist-nets with no gaps) at least 30 meters (m) apart, but within a 10 minutes' walk. A net-night was one net-set deployed for a minimum of five hours after sunset. Therefore, WEST conducted mist-net surveys at one net site (Figure 2), for 12 net-nights. Mist-net surveys were conducted over four non-consecutive calendar nights, with 2–4 net-sets deployed per night, to meet the minimum survey effort for the Project.

Mist-net Surveys

Mist-net surveys were conducted by individuals holding the proper state and federal endangered species recovery permits (ESPER1745522-1 [Z. Haidar]). Following the USFWS approved study plan (Appendix A), mist-netting occurred from July 12 – 17, 2025, to achieve the minimum 10 valid net-nights as described in the approved study plan. Net-sets were located in suitable habitat for NLEB and micro-sited in the field based on the best location available to improve capture probability of NLEBs (Appendix B and C).

Standard 2-ply, 50-denier, nylon mist-nets with a mesh size of 38 millimeters (mm) were used at all net-sets and placed in suitable NLEB habitat. Each net-set was positioned perpendicularly across flight corridors to fill the corridor from side-to-side and extended from ground-level up to the overhanging canopy, when possible. The net site and associated net-sets were located completely within the Project Boundary (Figure 2).

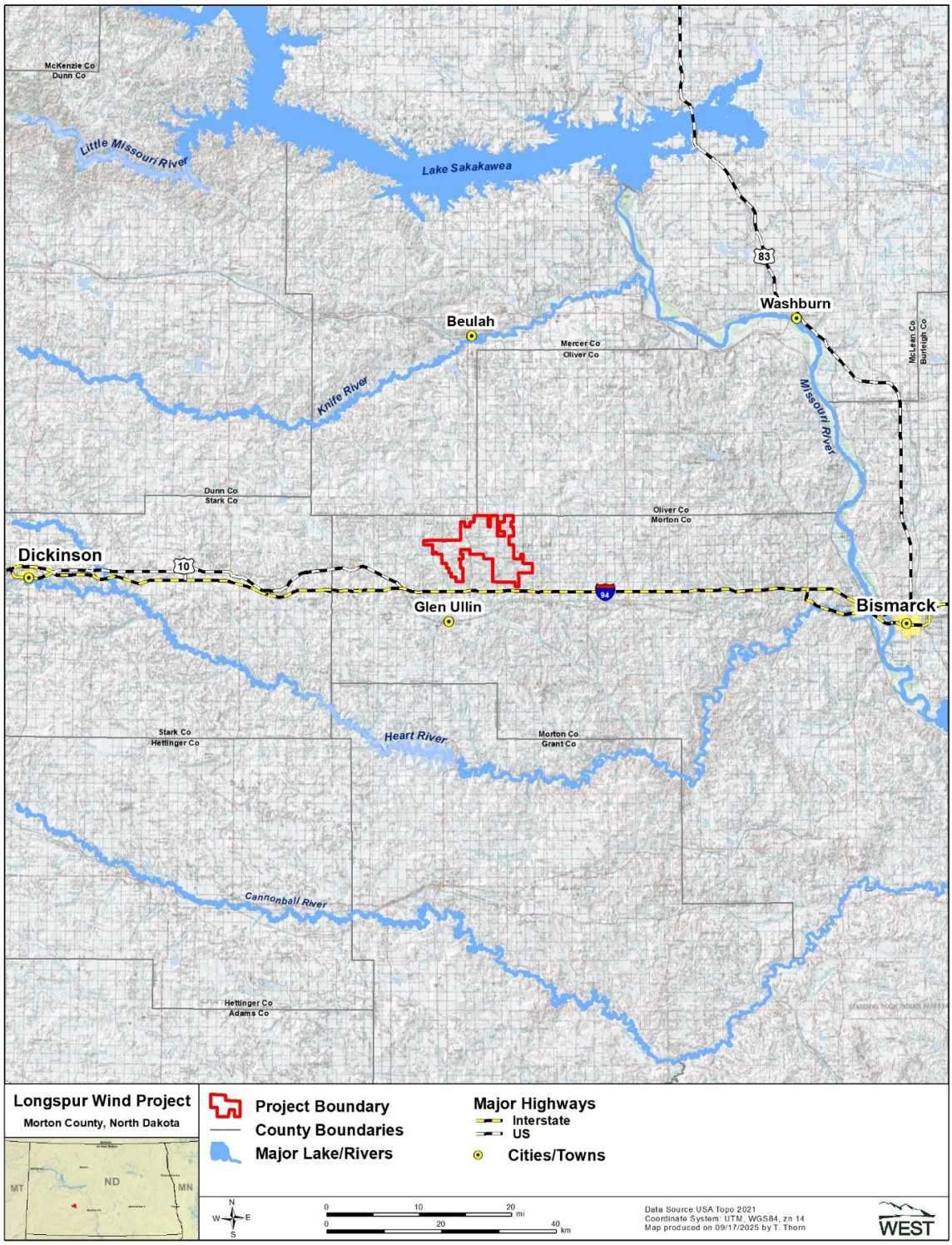

Figure 1. Location of the Longspur Wind Project, Morton County, North Dakota.

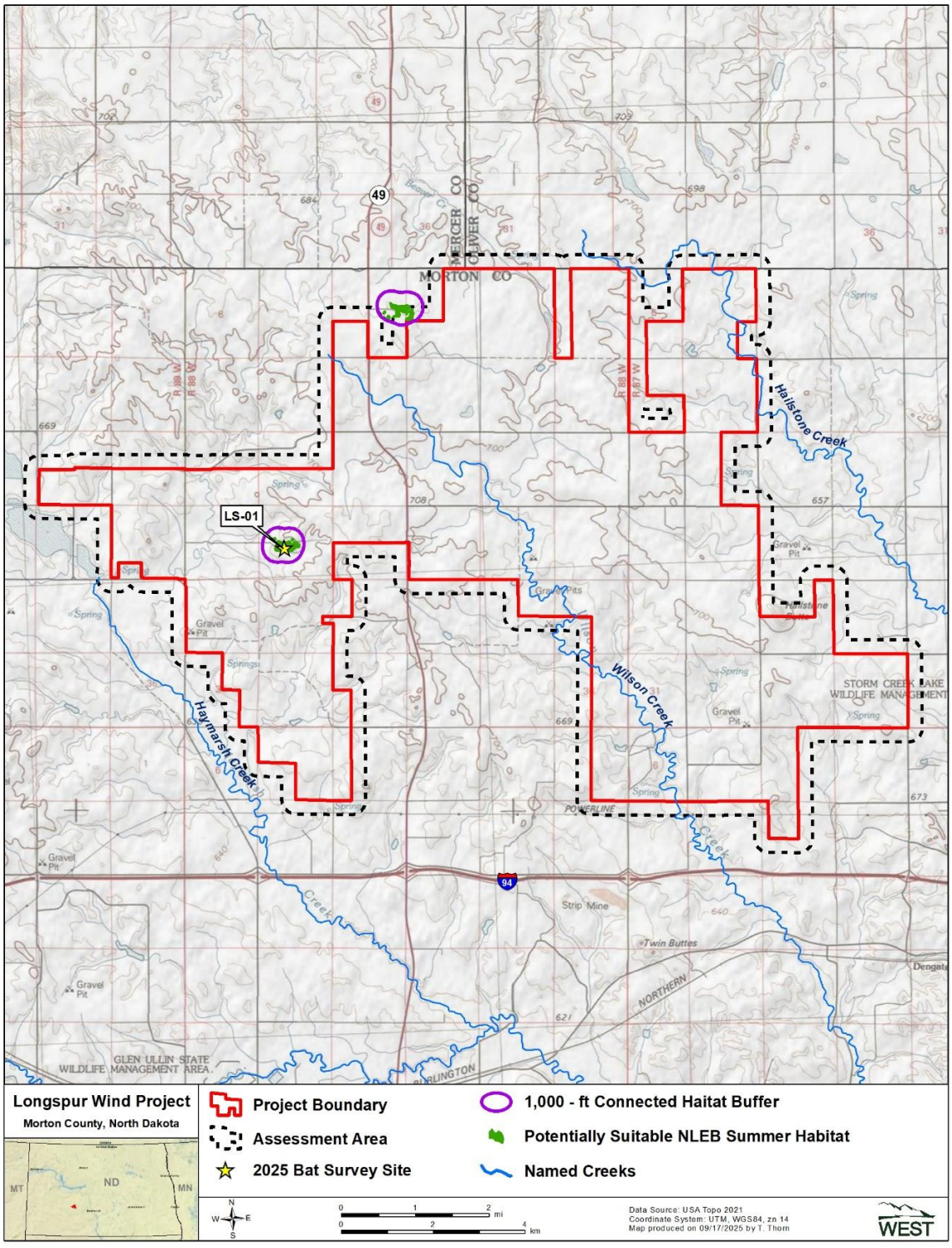

Figure 2. Forested habitat, connected northern long-eared bat (NLEB) habitat buffers, and survey location within the Longspur Wind Project, Morton County, North Dakota.

Biologists recorded the date, start and end time of surveys, site description, net-set dimensions, and weather data (e.g., temperature, cloud cover, wind speed, precipitation, and moon phase) at the net site. All net-set coordinates were recorded using a hand-held Global Positioning System-enabled tablet running Locus Pro software (Locus Map 2024).

For all captured bats, biologists identified each to species and recorded information on sex, age, reproductive condition, body mass (grams [g]), forearm length (mm), time of capture, net captured in, and capture status (recapture or new capture). Biologists recorded a Reichard Index score (0–3) to assess captured bats' exposure to white-nose syndrome (WNS; Reichard 2009). The USFWS WNS decontamination protocols were followed to prevent cross-contamination of captured bats with *Pseudogymnoascus destructans*, the fungus that causes WNS (WNS Disease Management Group 2024). Additionally, all field personnel used COVID-specific personal protective equipment and methods as described within USFWS guidelines and within individual USFWS permits. Biologists measured, processed, and released all non-target species, such as eastern red bats (*Lasiurus borealis*) and hoary bats (*L. cinereus*), within 15 min of capture. If NLEB were captured, they were held no more than 30 minutes to process and obtain any genetic material needed to confirm visual identification. All species of bats captured were photo-documented with voucher photographs. If captured, photos were taken of all NLEB and the first 10 individuals of little brown bat (*M. lucifugus*) captured at the site. The USFWS standardized permit reporting spreadsheets will be completed for all mist-net data and submitted to the USFWS per permit conditions.

RESULTS

Mist-net Surveys

Mist-netting occurred from July 12 – 17, with 2–4 net-sets deployed per night, for a total of 12 net-nights. However, surveys on the night of July 14 were considered invalid due to persistent lightning. Therefore, a total of 10 valid net-nights were completed, meeting the minimum level of effort required for the Project.

No bats (including federally threatened or endangered species) were captured during the survey period. These results indicated that NLEB were likely absent from the Project area. Net-set locations and descriptions are provided in Table 1. Appendices B, C, and D contain the following: map of net-set locations (Appendix B), photographs of net-sets (Appendix C), and field survey datasheets (Appendix D).

Table 1. Net-set locations and descriptions at the Longspur Wind Project, Morton County, North Dakota, from July 12 – 17, 2025.

		Coordinates*		
Net Site ID	Net-Set	Latitude	Longitude	Net-Set Description
LS-01	A	46.926376	-101.814394	Forested corridor
	B	46.926421	-101.815526	Forested corridor
	C	46.926475	-101.816620	Forested corridor
	D	46.926674	-101.817274	Forested corridor
	E	46.926171	-101.815054	Forested corridor
	F	46.927158	-101.818114	Forested corridor

* Latitude and longitudes are converted from collected Universal Transverse Mercator (UTM) coordinates in Zone 14, North American Datum 1983 (see Appendix D).

ID = identification.

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Appendix A. Site-specific Authorization for the Longspur Wind Project, Morton County, North Dakota.

U.S. Fish and Wildlife Service

Study Plan Form for Bat Surveys and Monitoring (v. 2.4)

PROJECT & SURVEY INFORMATION

Project Name: Longspur Wind Project

Proposed Survey Start Date: 2025

Project Proponent's Name (e.g., client/company/institution): Minnesota Power

Project Location: State(s): North Dakota

County(s): Morton County

Latitude: 46.942576°

Longitude: -101.756689°

REQUIRED: Attach shapefiles and/or Google Earth® KMZ files
(mapping must show project boundaries, impacted forest habitat (if known) and all proposed survey sites)
Files are attached: Yes ☑ No ☐
File link/URL (if applicable): See attachments

Project Summary. In the space provided below, please provide a description of the proposed action, including any activities that will permanently or temporarily alter the current environment and existing habitat features.

Minnesota Power contracted Western Ecosystems Technology, Inc. (WEST) to conduct Tier 3 surveys to support the Longspur Wind Project in Morton County, North Dakota. The Project Area is 25,933 acres and has a targeted commercial operation date of Spring 2026. The Project is within the range of the federally endangered northern long-eared bat (NLEB; M. septentrionalis). There are approximately 13 acres of potentially suitable roosting and/ or foraging forest habitat for NLEB within the Project Area. The objective of the proposed bat surveys is to determine presence/probable absence of NLEB during the summer maternity period.

CONTACT INFORMATION

Project Manager/Primary Point of Contact (POC): Martin Piorkowski

Phone: 307-365-3361

Field Survey Crew Leader (if different from POC): Cailene Bovee

Cell Phone: 847-902-9630

Institution/Company Name: Western EcoSystems Technology Inc

Mailing Address: 415 W. 17th Street, Suite 200, Cheyenne, WY 82001

POC Email Address: mpiorkowski@west-inc.com

USFWS Sec. 10(a)(1)(A) Permit No.(s) (if applicable):

State Permit No.(s) (if applicable): ND Scientific Collection Permit #s: 20913; 20827; 20828; 20823; 20826; 20954; 20950; 21212

Have project proponents been informed that abiding by protective time-of-year restrictions (where available) may be sufficient to avoid take of federally listed bats and (in some cases) may negate the need for a bat survey? Yes ☑ No ☐

Have project proponents been informed that the Service does not require presence/probable absence surveys for federally listed species and that presence can be assumed in a project area containing suitable habitat? Yes ☑ No ☐

Will this survey be conducted on private or public lands? *(Check both if applicable)*: Private ☑ Public ☐

Has permission of all necessary landowners/managing agencies been obtained? Yes ☐ No ☑
If no, explain: Survey site has been identified and the developer is in the process of contacting landowners for access

Does this project have a federal nexus[1]? Yes ☐ No ☑ Unsure ☐

If yes, explain: _____

IPaC[2] Consultation Code (if applicable): N/A

Purpose of Survey: Official P/A Survey ☑ Research ☐ Monitoring ☐
Educational Outreach/Training ☐ Other: _____

Survey Target Species: Indiana bat (IBAT) ☐ Northern long-eared bat (NLEB) ■
Tricolored bat (TCB) ☐ Other: _____

Has a Phase-1 Habitat Assessment* of the project area been conducted? Yes ☑ No ☐
If yes, how was the habitat assessment conducted? Field ☐ Desktop ☑ Combo ☐
*(*if available, attach a written report)*

Is suitable habitat[3] present (or assumed present) for all "target" species? Yes ☑ No ☐

If no, explain: _____

Does this project fall within the outer-tier[4] of any "target" species known home range? Yes ☐ No ☐ Unsure ☑

If yes, which species: _____

Project Configuration

Is this project **linear** (>1 km in total length)? Yes ☐ No ☑ Combo ☐ Unsure ☐

If yes, how many 1-km sections containing suitable IBAT/NLEB habitat will be impacted? _____

Is this project **non-linear**? Yes ☑ No ☐ Combo ☐ Unsure ☐

If yes, how many acres of suitable IBAT/NLEB habitat is in the overall project area? 13

If yes, how many acres of suitable IBAT/NLEB habitat will be directly impacted/cleared? uncertain at this time

PROPOSED METHODS & SURVEY LEVEL OF EFFORT

Identify which method (acoustics, mist-netting, combination) proposed to be used: mist-netting

Has availability of high-quality sites for target species been assessed via ground-truthing to meet the required LOE?

Yes ☐ ☑ No *(If No, justify method selection)*:

WEST completed the desktop habitat assessment. The survey site was selected via desktop review by experienced and permitted bat biologists. The mist-net site will be ground-truthed by a permitted bat biologist prior to net deployment. We welcome evaluation and input from USFWS biologists.

[1] A project or action that is authorized, funded, and/or permitted by a federal agency.
[2] https://ipac.ecosphere.fws.gov/
[3] See Appendix A of the Bat Survey Guidelines regarding suitable habitat definitions.
[4] See Appendix G of the Bat Survey Guidelines regarding what constitutes "out-tier" of a known range.

ACOUSTICS

Total number of detector sites proposed to be surveyed: NA Number of detector nights/site: NA

Total number of detector nights for entire survey: NA

Total proposed number of calendar nights to complete the entire survey: NA

Detector(s) (Brand, Model): NA Microphone(s): directional ☐ omnidirectional ☐

Recording Format: Full Spectrum ☐ Zero-Crossing ☐

FWS-Approved[5] Acoustic Bat ID Software: **KaPro**: vers.___ Classifier, NA vers. ____ **BCID** vers._____
SonoBat: vers. _____ Classifier _____ Other:_____

Species to be included for automatic software ID classification analysis:

EPFU ☐ CORA ☐ COTO ☐ LABO ☐ LACI ☐ LANO ☐ LASE ☐ TABR ☐ MYCI ☐ MYEV ☐ MYGR ☐ MYLU ☐
MYLE ☐ MYSE ☐ MYSO ☐ MYTH ☐ MYVO ☐ NYHU ☐ PESU ☐ Others:_____

Will qualitative analysis (i.e., manual vetting) be used? Yes ☐ No ☐ Unsure ☐

Name(s) of qualified biologist(s) conducting qualitative/manual identifications (attach resume or link with qualifications):

_____

MIST-NETTING

Total number of net sites to be surveyed: 1 Total number of net nights/site: 10

Total number of net nights for entire survey (No. of sites X No. of net nights/site): 10

Total proposed number of calendar nights to complete the entire survey: 6 (pending no weather delays)

A) Maximum number of net set-ups that will be operated/checked (10-min interval) on a given calendar night at a given survey site: 4
B) Minimum Number of personnel present to operate/check X (see A) net set-ups on a given site: 2
C) Proposed Staffing Rate (A divided by B): 2

Staffing Rate

Number of Section 10-permitted biologists per net site (or state-permitted in USFWS R5): 1

Do you propose to band bats? Yes ☐ No ☑

If yes, please answer the following:

What species will be banded? COTO ☐ MYGR ☐ MYLU ☐ MYSE ☑ MYSO ☐ PESU ☐
Others:_____ All captured bats:_____
If banding *Myotis* sp. or PESU, specify band size: _____
Describe your proposed bands (color and letter-numbers) and banding scheme: no bands will be used. Bats (MYSE) will be temporarily marked with a non-toxic s
Will banding pliers be used? Yes ☐ No ☑

Will any biological samples be collected from captured bats (e.g., guano, hair, swab, wing punch)? Yes ☑ No ☐

If yes, explain: Opportunistic guano samples will be collected from MYSE. Bats will be handled in accordance with federal permits. Guano will only be collected from holding bags that the bats happened to drop while being held for processing.

Name of institution or facility to conduct DNA analysis: NAU Bat Ecology and Genetics Lab

[5] https://www.fws.gov/media/automated-acoustic-bat-id-software-programs

RADIO-TRACKING

Will any bats be radio-tagged and tracked? Yes☑ No☐

If yes, please answer following:

Which species will be radio-tagged? MYSE

Name of USFWS Section 10 permitted biologist(s) who will apply transmitter(s): Anyone under the list of Section 10 permittees listed above

Make/model and approximate weight of transmitter(s) to be used: LoTek PicoPip AG337 0.31g, Holohil LB-2X 0.27g

Manufacturer date and estimated life-span of transmitters to be used: 2021 or newer; up to 20 days (LoTek); up to 15 days (Holohil)

Frequency range (MHz) of transmitters (e.g., 150.xxx or 172.xxx): 172.xxx

If radio-tracking multiple targeted bats/species, what criteria will be used in selecting which bats will be tracked?
Transmitters will only be attached to adult female or juvenile MYSE of sufficient weight.

Will all radio-tagged bats be tracked (min. of 4-hrs. search effort/day) to their diurnal roosts for the minimum recommended period of 7 days? Yes☑ No☐

If no, explain: _____

Will night-time foraging data/telemetry be collected? Yes☐ No☑

Glue used for attaching transmitters: Type: Silicone-based Surgi Name: Uro-Bond III 5000

Manufacturer Urocare Products, In Other: Torbot

EMERGENCE SURVEYS

After diurnal roost sites of radio-tagged bats are identified, will emergence surveys be conducted at each identified roost (assuming landowner permission is obtained)? Yes☑ No☐

If yes, how many emergence surveys/roost? 2 per identified MYSE roost

Have you identified a small number (e.g., ≤10) of potentially suitable roost trees* that you propose to conduct emergence surveys for? Yes☐ No☑

*(*If yes, provide photographs of each tree documenting that all of the tree can be observed by the surveyor along with coordinates (lat/long and/or KML/shapefile) of all trees to be surveyed.)*

POTENTIAL HIBERNACULA SURVEYS

Are you aware of any known hibernacula used by the target species within the project area itself or nearby?

Yes☐ No☑ Unknown☐

If yes or unknown, list sites or explain: _____

Has your desktop analysis identified any natural or man-made features that could be used as a hibernaculum by any of the target bat species? Yes☐ No☑ Unknown☐

If yes, underground features (e.g., caves, mines, tunnels, bunkers, cisterns) present: Yes☐ No☐

If yes, above-ground features* (e.g., crawl spaces) present: Yes☐ No☐

If unknown, explain: _____

Are you requesting approval of a field survey for potential hibernacula at this time? Yes*☐ No☑

*(*If yes, attach a separate narrative explaining how the project area(s) will be surveyed for potential hibernacula.)*

Are you submitting the results of a Phase 1 Habitat Assessment of potentially suitable hibernacula identified from field surveys? Yes*☐ No☑

*(*If yes, provide a Phase 1 Habitat Assessment Data Sheet for each potential hibernaculum/portal(s)[6] identified to be surveyed.)*

[6] If multiple cave entrances/portals, please list all locations.

BRIDGE & CULVERT ASSESSMENTS

Will any bridges or culverts be surveyed for bat presence? Yes ☐ No ☑

If yes, please answer the following:

Structure type(s) (check all that apply): Bridge ☐ Culvert ☐ Other ☐
If "other", explain: _____

Survey methodology for structure(s) (check all that apply):
Visual inspection ☐ Guano collection ☐ Emergence survey ☐ Acoustics* ☐
Mist-net* ☐ Harp-trap* ☐ Other _____
*(*Due to site-specific conditions of structures, coordination with the local USFWS Field Office and appropriate state agency(ies) is necessary before proceeding with these survey methodologies)*

Will guano be collected and analyzed to confirm species ID? Yes ☐ No ☐
If "yes", name of institution/entity performing analysis: _____

Acknowledgment that USFWS bats & transportation structures virtual training materials[10] have been viewed: Yes ☐

ADDITIONAL SURVEY INFORMATION

Will the proposed bat survey deviate from the current version of the USFWS Survey Guidelines?[7] Yes ☐ No ☑

If yes, provide justification for any departures or modifications to the guidelines (if applicable) below:

I hereby acknowledge that the information being provided to the Service is accurate and complete as of today's date.

Signature: Martin Piorkowski Date: 6/1/2025

[7] Proposed surveys deviating from the current Range-wide Bat Survey Guidelines will only be accepted with a thoroughly described justification; coordinate with your local USFWS Field Office (https://www.fws.gov/our-facilities) for acceptable modifications.

********FOR U.S. FISH AND WILDLIFE SERVICE USE ONLY**********

United States Department of the Interior

Fish and Wildlife Service

General Ecological Services Field Office
Address
Phone

SITE-SPECIFIC AUTHORIZATION - BAT SURVEYS

Our Field Office has reviewed your study plan and found it to contain sufficient information for our approval. When signed, this statement serves as your site-specific authorization to conduct the proposed activities at the specified locations included in the attached Study Plan Form and supporting files and must be carried with your federal permit when conducting work for this project. All activities must be carried out with strict adherence to permit conditions and authorizations specified in your federal permit as well as your state permit(s) (if needed). The section 10(a)(1)(A) permit authorizing the activities (if applicable) must remain with the surveyor at all times. For proposed activities on private lands, this authorization is not valid without explicit private landowner permission.

In addition to the final survey report, please use the appropriate U.S. Fish and Wildlife Service (USFWS) bat survey data spreadsheet, available on the Range-wide Bat Survey Guidelines website[8], for reporting live capture and acoustic survey results. To mitigate the risk of viral transmission between bats and humans (e.g., SARS-CoV-2), USFWS requests anyone directly handling or working in close proximity to bats follow current guidelines prepared by the CDC[9] and IUCN Bat Specialist Group[10] in addition to the following the standard WNS decontamination protocols[11].

If the work expands beyond the scope of your original study plan or if there are adverse effects to bats that were not anticipated, cease all survey and/or research activities, and contact this office prior to continuing. Additionally, if a federally listed bat is captured, this USFWS Field Office must be notified within 48 hours .

Field Office POC: ND - Hanna Edens / SD - Silka Kempema
email: hanna_edens@fws.gov / silka_kempema@fws.gov **phone:**_____

Authorized as Proposed ■

Authorized with Conditions (see below)

Not Authorized. *(see comments)*

Signature: LUKE TOSO Digitally signed by LUKE TOSO Date: 2025.06.03 10:00:10 -07'00' **Date:**_____

[8] https://www.fws.gov/library/collections/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines
[9] https://www.cdc.gov/healthypets/covid-19/wildlife.html
[10] https://www.iucnbsg.org/uploads/6/5/0/9/6509077/amp_recommendations_for_researchers_final.pdf
[11] https://whitenosesyndrome.org/mmedia-education/national-wns-decontamination-protocol-u-s

Appendix B. Map of Net-Set Locations at the Longspur Wind Project, Morton County, North Dakota.



Appendix B. Net-set locations (A–F) at net site LS-01 for the Longspur Wind Project, Morton County, North Dakota.

Appendix C. Photographs of Net-Sets at the Longspur Wind Project, Morton County, North Dakota.



Appendix C1. Net-set LS-01-A, surveyed July 12 – 13, 2025, at the Longspur Wind Project, Morton County, North Dakota.



Appendix C2. Net-set LS-01-B, surveyed July 12 – 13, 2025, at the Longspur Wind Project, Morton County, North Dakota.



Appendix C3. Net-set LS-01-C, surveyed July 12 – 13, 2025, at the Longspur Wind Project, Morton County, North Dakota.



Appendix C4. Net-set LS-01-D, surveyed July 12 – 13, 2025, at the Longspur Wind Project, Morton County, North Dakota.



Appendix C5. Net-set LS-01-E, surveyed July 14 and 17, 2025, at the Longspur Wind Project, Morton County, North Dakota.



Appendix C6. Net-set LS-01-F, surveyed July 14 and 17, 2025, at the Longspur Wind Project, Morton County, North Dakota.

Appendix D. Mist-net Survey Datasheets for the Longspur Wind Project, Morton County, North Dakota.

Site Description and Weather Data Form

Location Information

Site ID:	Project:	State:
LS-01	Longspur	North Dakota
	Datum: NAD 83	County: Morton

Net Locations – Take pictures of each net set and distinguishing characteristics

Net ID (A,B,...)	Net Size (e.g. 3x9)	UTM Zone	Easting	Northing	Net Nights Used (1,2,...)	Canopy Cover (%)
A	3 x 12	14	285746	5200828	1, 2	40
B	3 x 6	14	285660	5200836	1, 2	50
C	3 x 9	14	285577	5200845	1, 2	50
D	3 x 9	14	285528	5200869	1, 2	80
E	3 x 18	14	285695	5200807	3	40
F	3 x 12	14	285466	5200925	3	0

Site Sketch

Should be drawn in a top-down view using map to assist with accuracy. Include all streams, roads, trails, and structures. Note all net locations using Net ID.



Net Night	Date (yyyy-mm-dd)	Biologists Present	Total Nets Open (#)	Sunset Time (24 Hour)	Moonrise Time	Moonset Time	[1] Moon Phase	Start Time	Start Temp (°F)	Start Wind Speed (mph)	Start Sky Code	Stop Time	Stop Temp	Stop Wind Speed	Stop Sky Code	Precip. During Survey (Yes/No)	Precip. Duration (min)	Night Complete (Yes/No)
1	2025-07-12	Z. Haidar, C. Parenzin	4	2140	2311	0744	G	2140	75	1	1	0240	56	7	0	No	0	Yes
2	2025-07-13	Z. Haidar, C. Parenzin	4	2140	2331	0901	G	2140	77	5	1	0245	62	5	1	No	0	Yes
3	2025-07-14	Z. Haidar, C. Parenzin	2	2139	2349	1018	G	2138	70	9	2	2215	67	20	2	No	0	No
4	2025-07-17	Z. Haidar, C. Parenzin	2	2136	0023	1411	H	2135	68	2	1	0235	62	5	4	Yes	15	Yes
5																		

Habitat Information

[2] Primary Habitat Surveyed:	Dominant Canopy Species:	Estimated Canopy Tree Age (DBH):	Additional Comments:
Upland Forest	Acer negundo Populus angustifolia	Early-successional (0-12 cm)	Lightning on 7/14
Forest Type: Mixed	**Preferred Roost Trees Present:** Unknown snag(s) with exfol. bark		

[1] New (N), Crescent (C), Half (H), Gibbous (G), Full (F) [2] Bridge, Bottomland Forest, Cave Entrance, Creek/Riparian, Field Edge, Mine Portal, Open Field, Pond, Structure, Upland Forest, or Other (Briefly Describe)

Bat Capture Data Form

Project: Longspur **State:** North Dakota **Survey Comments:**

Site ID: LS-01 **County:** Morton

Date: 2025-07-12 **Net Night:** 1

Biologist(s): Z. Haidar, C. Parenzin **Night Complete:** (Yes) No

#	Species (4 Letter Code)	Time (24 Hour)	Sex (M, F, U)	Age (A, J, U)	A Repro. Status	Reichard Score (0 - 3)	Right Forearm (mm)	Weight (g)	Ear Length* (mm)	Net ID (A, B,...)	Capture Height In Net (m)	Recapture (Yes / No)	B Band #	C Original Transmitter Frequency	Drifted Transmitter Frequency	D Bat ID (Site-Species #)	E Photos (None, Face, Calcar, Toes)	Comments
1	No bats																	
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		

[A] Male: (N) - non-reproductive, (TD) - testes-descended, (U) - unknown. Female: (N) - non-reproductive, (L) - lactating, (P) - pregnant, (PL) - post-lactating, (U) - unknown.
[B] Band RIGHT forearm on males, LEFT on females AND include letters.
[C] Original frequency: pre-assigned by manufacturer; Drifted frequency: final frequency prior to bat release.
[D] Bat ID: write Site ID – Species Code (with the sequential number of individuals of species captured; e.g. MN5-MYSO2). Only Myotis and target species are given a Bat ID.
[E] Take photos of 1) *ALL* MYSO/MYSE/MYLE/MYGR captured, 2) First several MYLU from each site, 3) One representative photo of each species captured.

* (U) – unknown is used exclusively when a bat escapes before the determination can be made.

*Ear Length – Western Region only

Bat Capture Data Form

Project: Longspur **State:** North Dakota **Survey Comments:**

Site ID: LS-01 **County:** Morton

Date: 2025-07-13 **Net Night:** 2

Biologist(s): Z. Haidar, C. Parenzin **Night Complete:** (Yes) No

#	Species 4 Letter Code	Time (24 Hour)	Sex (M, F, U)	Age (A, J, U)	A Repro. Status	Reichard Score (0 - 3)	Right Forearm (mm)	Weight (g)	Ear Length* (mm)	Net ID (A, B,...)	Capture Height In Net (m)	Recapture (Yes / No)	B Band #	C Original Transmitter Frequency	Drifted Transmitter Frequency	D Bat ID (Site-Species #)	E Photos (None, Face, Calcar, Toes)	Comments
1	No bats																	
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		

[A] Male: (N) - non-reproductive, (TD) - testes-descended, (U) - unknown. Female: (N) - non-reproductive, (L) - lactating, (P) - pregnant, (PL) - post-lactating, (U) - unknown.
[B] Band RIGHT forearm on males, LEFT on females AND include letters.
[C] Original frequency: pre-assigned by manufacturer; Drifted frequency: final frequency prior to bat release.
[D] Bat ID: write Site ID – Species Code (with the sequential number of individuals of species captured; e.g. MN5-MYSO2). Only Myotis and target species are given a Bat ID.
[E] Take photos of 1) ***ALL*** MYSO/MYSE/MYLE/MYGR captured, 2) First several MYLU from each site, 3) One representative photo of each species captured.

* (U) – unknown is used exclusively when a bat escapes before the determination can be made.

*Ear Length – Western Region only

Bat Capture Data Form

Project: Longspur **State:** North Dakota **Survey Comments:**

Site ID: LS-01 **County:** Morton

Date: 2025-07-14 **Net Night:** 3

Biologist(s): Z. Haidar, C. Parenzin **Night Complete:** Yes (No)

#	Species (4 Letter Code)	Time (24 Hour)	Sex (M, F, U)	Age (A, J, U)	A Repro. Status	Reichard Score (0 - 3)	Right Forearm (mm)	Weight (g)	Ear Length* (mm)	Net ID (A, B,...)	Capture Height In Net (m)	Recapture (Yes / No)	B Band #	C Original Transmitter Frequency	Drifted Transmitter Frequency	D Bat ID (Site-Species #)	E Photos (None, Face, Calcar, Toes)	Comments
1	No bats																	
2																		
3																		
4																		
5																		
6																		
7																		
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10																		
11																		
12																		
13																		
14																		
15																		

[A] Male: (N) - non-reproductive, (TD) - testes-descended, (U) - unknown. Female: (N) - non-reproductive, (L) - lactating, (P) - pregnant, (PL) - post-lactating, (U) - unknown.
[B] Band RIGHT forearm on males, LEFT on females AND include letters.
[C] Original frequency: pre-assigned by manufacturer; Drifted frequency: final frequency prior to bat release.
[D] Bat ID: write Site ID – Species Code (with the sequential number of individuals of species captured; e.g. MN5-MYSO2). Only Myotis and target species are given a Bat ID.
[E] Take photos of 1) *ALL* MYSO/MYSE/MYLE/MYGR captured, 2) First several MYLU from each site, 3) One representative photo of each species captured.

* (U) – unknown is used exclusively when a bat escapes before the determination can be made.

*Ear Length – Western Region only

Bat Capture Data Form

Project: Longspur _____ **State:** North Dakota

Site ID: LS-01 _____ **County:** Morton

Date: 2025-07-17 _____ **Net Night:** 4

Biologist(s): Z. Haidar, C. Parenzin **Night Complete:** (Yes) No

Survey Comments:
It began a light rain 20 minutes before closing and heavy rain 10 minutes before closing

#	Species (4 Letter Code)	Time (24 Hour)	Sex (M, F, U)	Age (A, J, U)	A Repro. Status	Reichard Score (0 - 3)	Right Forearm (mm)	Weight (g)	Ear Length* (mm)	Net ID (A, B,...)	Capture Height In Net (m)	Recapture (Yes / No)	B Band #	C Original Transmitter Frequency	Drifted Transmitter Frequency	D Bat ID (Site-Species #)	E Photos (None, Face, Calcar, Toes)	Comments
1	No bats																	
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		

[A] Male: (N) - non-reproductive, (TD) - testes-descended, (U) - unknown. Female: (N) - non-reproductive, (L) - lactating, (P) - pregnant, (PL) - post-lactating, (U) - unknown.
[B] Band RIGHT forearm on males, LEFT on females AND include letters.
[C] Original frequency: pre-assigned by manufacturer; Drifted frequency: final frequency prior to bat release.
[D] Bat ID: write Site ID – Species Code (with the sequential number of individuals of species captured; e.g. MN5-MYSO2). Only Myotis and target species are given a Bat ID.
[E] Take photos of 1) *ALL* MYSO/MYSE/MYLE/MYGR captured, 2) First several MYLU from each site, 3) One representative photo of each species captured.

* (U) – unknown is used exclusively when a bat escapes before the determination can be made.

*Ear Length – Western Region only

Studies and Assessments

B12. Dakota Skipper Habitat Survey

Dakota Skipper Habitat Survey
Longspur Wind Project
Morton County, North Dakota

Final Report
October 2025



Prepared for:

Minnesota Power

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Prepared by:

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December 2, 2025

WEST

Confidential Business Information

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REPORT REFERENCE

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INTRODUCTION

Minnesota Power is developing the Longspur Wind Project (Project) in Morton County, North Dakota (Figure 1). The Project Area (as updated October 7, 2024; Figure 1) is located within the known primary range of Dakota skippers (*Hesperia dacotae*; DASK; North Dakota Game and Fish Department [NDGFD] 2024). Minnesota Power contracted Western EcoSystems Technology, Inc. (WEST), to complete a DASK grassland habitat survey to inform Project planning. The survey included a desktop review and field surveys with the overall goal to determine whether suitable DASK larval habitat occurs within grassland areas under consideration for Project development (i.e., construction corridors). The determination for the presence of suitable DASK habitat followed current US Fish and Wildlife Service (USFWS) guidance and survey protocols in the *2024 Dakota Skipper (Hesperia dacotae) Survey Protocol* (Survey Guidance; USFWS 2024). Specific objectives of this effort were to identify, delineate, and map potential habitat (reproductive and/or nectar habitats) for DASK, hereafter DASK habitat.

The DASK, federally listed in 2014 as threatened under the Endangered Species Act of 1973 as amended (USFWS 2014) and classified as a Species of Conservation Priority Level II in North Dakota (Dyke et al. 2015), is known or believed to occur in Morton, Mercer, and Oliver counties intersected by the Study Area (USFWS 2023, 2024b; NDGFD 2024; see *Methods* for definition). Recovery efforts for the species are directed at tracts of native (untilled) prairie supporting an adequate abundance of the requisite native forbs and grasses and encompass conservation efforts focused on management of grasslands for native prairie vegetation, research on prescribed burn and livestock grazing practices, and protection of remaining tracts of undisturbed (unbroken) prairie habitats (USFWS 2018, 2021, 2025).

PROJECT AREA

The Project Area encompasses 25,933 acres (ac) in southwestern North Dakota, approximately four miles north of Glen Ullin in Morton County along with a generation tie (gen-tie) line that extends north of the Project Area 0.3 miles into Mercer County (Figure 1). The Project is within the Northwestern Great Plains Level III and the Missouri Plateau Level IV ecoregions, which encompass much of western North Dakota (US Environmental Protection Agency [USEPA] 2012, 2013). This ecoregion consists of semi-arid rolling plains punctuated by buttes and badlands. The primary land uses include cultivated crops and livestock grazing. The Missouri Plateau ecoregion's rolling to somewhat flat topography was mostly unaffected by glaciation, with natural vegetation primarily consisting of semiarid grasses, including western wheatgrass (*Pascopyrum smithii*), green needlegrass (*Nassella viridula*), blue grama (*Bouteloua gracilis*), and buffalograss (*B. dactyloides*; Bryce et al. 1998). Although large areas of the Missouri Plateau ecoregion have been converted to agricultural crop production (i.e., common wheat [*Triticum aestivum*], alfalfa [*Medicago sativa*], corn [*Zea mays*], and soybeans [*Glycine max*]), areas of unbroken native grasslands remain, which are typically used for livestock grazing (USEPA 2012, 2013; US Department of Agriculture [USDA] National Agricultural Statistics Service 2024).

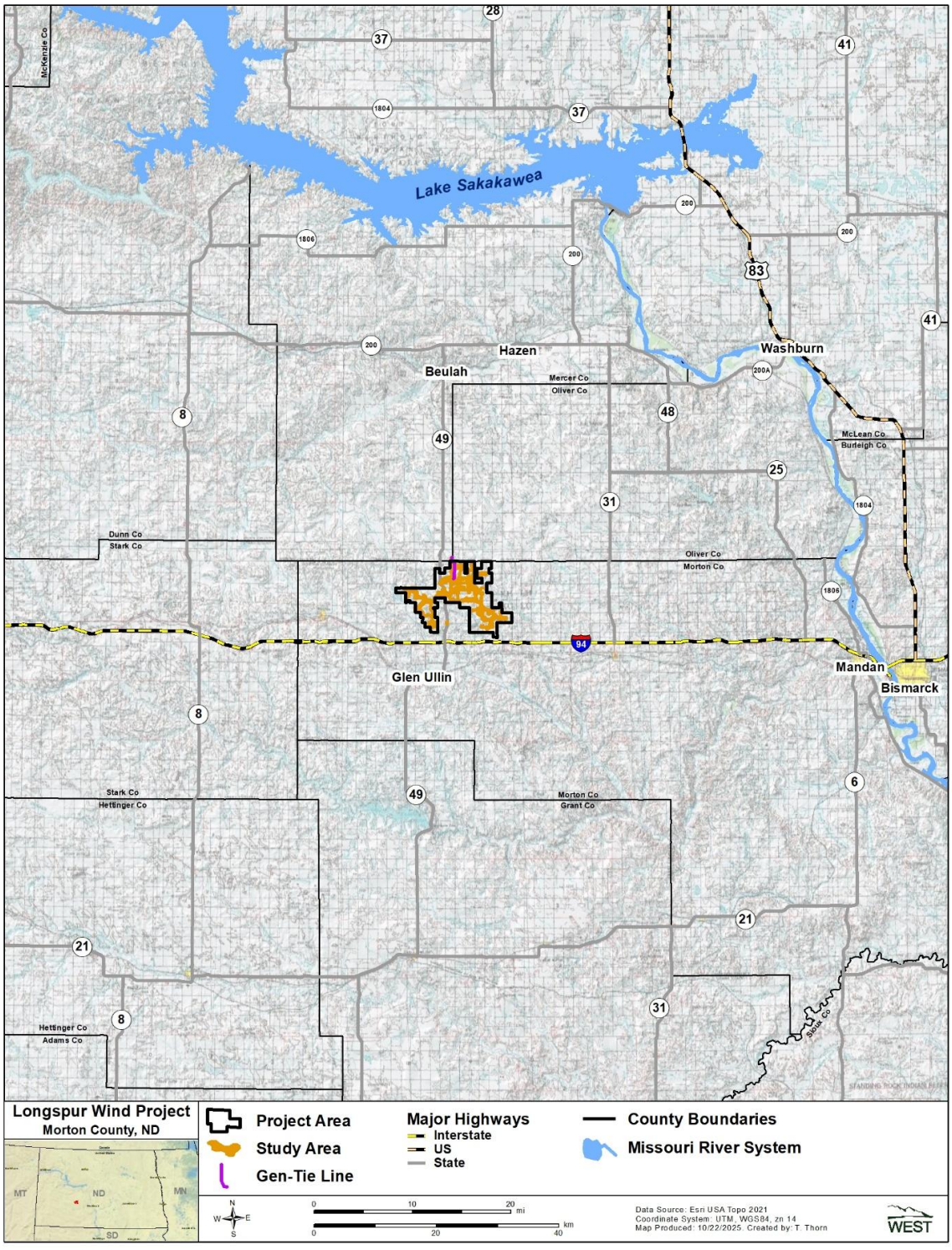

Figure 1. Location of the Longspur Wind Project Area and Dakota Skipper Habitat Study Area in Morton, Mercer, and Oliver counties, North Dakota.

METHODS

All potential unbroken grassland parcels (polygons) with the potential to be directly or indirectly affected by the construction and/or operation of the Project were included in the potential habitat survey effort. WEST relied upon the results of a previous grassland assessment (Piorkowski et al. 2024) and the September 17, 2025, proposed infrastructure site plan (Site Plan) provided by Minnesota Power, to inform the 2025 DASK habitat survey design. The Study Area for this effort was defined by a 250-meter buffer around the Site Plan that encompasses all temporary and permanent construction impacts following the Survey Guidance (USFWS 2024). This includes both the Project Area and the associated gen-tie line for the Project and their 250 m buffers in Morton, Mercer, and Oliver counties. The Dakota skipper Survey Area includes unbroken grasslands or grasslands within the 50% potential habitat from the Barnes et al. (2023) DASK model (Barnes Model) within the Study Area (Figure 2). Desktop and field methods used for this survey are described below.

Desktop Review

Before conducting the 2025 field surveys, WEST reviewed results from earlier field surveys that identified unbroken grasslands (Piorkowski et al. 2024), compiled Barnes Model outputs for parcels within the 50% potential habitat, and noted gaps in geospatial grassland data and information essential to DASK habitat and life history requirements. WEST also completed a desktop review for any spatial gaps of existing land cover features within the Study Area using current aerial imagery (USDA Farm Production and Conservation Business Center 2024), existing land cover data (National Land Cover Database 2021), Cropland Data Layers (USDA National Agricultural Statistics Service 2024), and NDGFD's native prairie layer (2017). This compilation and review, conducted using ArcGIS 10.7 (Environmental Systems Research Institute, Redlands, California), resulted in a digital data layer of polygons delineating unbroken grassland cover as potential DASK habitat to guide field survey efforts (Survey Area).

Field Surveys

Pedestrian botanical field surveys were conducted within unbroken grasslands (where access was granted) to evaluate potential DASK habitat identified during the desktop review within the Survey Area. DASK habitat surveys were completed in accordance with the Survey Guidance (USFWS 2024).

Three qualified WEST DASK biologists completed habitat surveys by walking/meandering transects following topographic contours and habitat transitions through each of the accessible unbroken grassland polygons within the Survey Area (Figure 2). For those unbroken grasslands where access was not granted or located outside of the Project Area, visual inspections were conducted, to the extent possible, from multiple locations surrounding each parcel along publicly accessible roads to identify grassland features and plant species composition associated with DASK habitat (i.e., signs of previous disturbance and presence of requisite plant species typical of suitable DASK habitat).

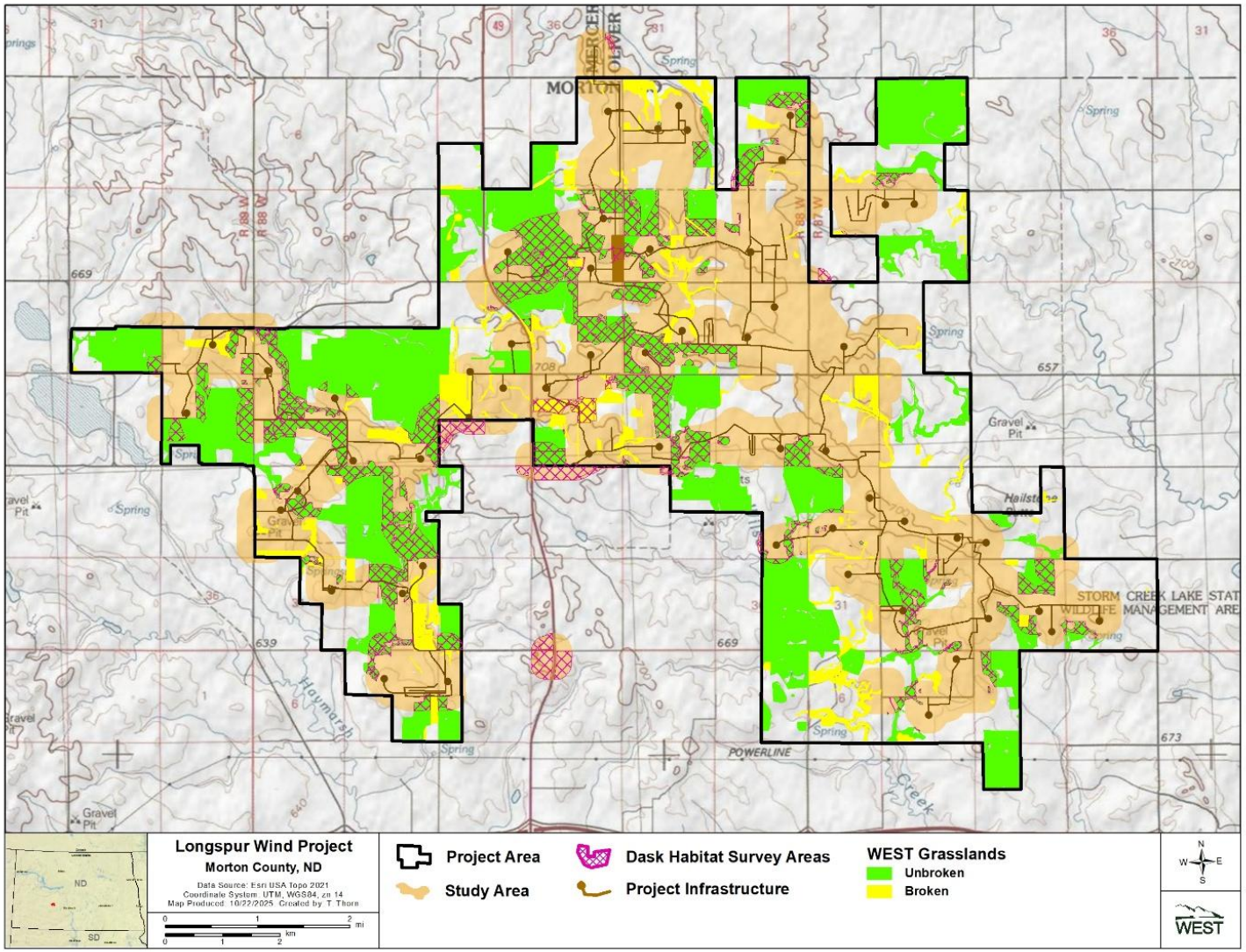

Figure 2. Dakota skipper larval habitat Survey Area for the Longspur Wind Project in Morton, Mercer, and Oliver Counties, North Dakota, August 4 – October 2, 2025.

The level of existing grassland disturbance was assessed based on several factors, consisting of topography, vegetative composition (e.g., abundance and distribution of invasive species indicating past disturbance), soil condition, presence of wetlands and drainages, and presence of large rocks or rock piles within each grassland polygon. When applicable, suitable DASK larval habitat (see below) was delineated with an Android tablet using the Arc GIS Field Maps application and a built-in Global Positioning System receiver, and representative photos were taken to depict characteristics of each grassland polygon (Appendix A). Dominant plant species identified in each grassland polygon were recorded, along with notes on abundance of requisite plant species for DASK. The field survey was conducted from August 4 – October 2, 2025.

Definitions and Terminology

DASK, a prairie obligate species, requires nectar-producing native flowers and native grasses to sustain its lifecycle. According to the 2024 Survey Guidance, DASK habitat is characterized by two types of prairie habitat. The first type of habitat (i.e., Type A) typically occurs in relatively low, wet, high quality tall grass prairie dominated by big (*Andropogon gerardii*) and little bluestem (*Schizachyrium scoparium*), with wood lily (*Lilium philadelphicum*), bluebell bellflower (*Campanula rotundifolia*), mountain deathcamas/smooth camas (*Zigadenus elegans*), candle anemone (*Anemone cylindrica*), and black-eyed Susan (*Rudbeckia hirta*) being the indicator nectar plant species. The second type of habitat (Type B) is relatively dry, upland mixed-grass prairie dominated by big and little bluestem grasses and needle/porcupine grasses (*Hesperostipa* spp.) and supports extensive stands of purple coneflower (*Echinacea angustifolia*), upright prairie coneflower (*Ratibida columnifera*), and common gaillardia/blanketflower (*Gaillardia aristata*). Type B habitat may have other native grass species, such as prairie dropseed (*Sporobolus heterolepis*) or western wheatgrass. Larvae require grass components of mixed-grass prairie that include bluestem grasses and needlegrasses, while adults require nectar sources. Therefore, suitable DASK habitat includes nectar-producing forbs as well as a sufficient abundance of bunchgrasses to support the reproductive needs of the species.

Only habitat parcels within the Survey Area were delineated and classified as suitable DASK habitat, as described by the USFWS (USFWS 2024). Suitable DASK habitat, for the purposes of the surveys, was defined as native, unbroken grassland containing the necessary (requisite) plant species associated with supporting and sustaining larval survival and the reproductive ecology of the species (USFWS 2018, 2024a). Sites were classified as non-suitable DASK habitat when they were characterized as having low densities of requisite plant species, low ground cover, and/or a preponderance of missing requisite plant species.

Data Management

WEST implemented quality assurance and quality control (QA/QC) measures at all stages of the assessment, including during the desktop review, in the field, during data compilation, and during report writing. Data were reviewed by field staff before they were submitted for compilation and analysis. If any errors, omissions, or problems were identified, follow-up QA/QC measures were implemented, including discussions and review of field data with the field staff and/or Project Manager. Data were exported as a shapefile from the Field Maps application. The resulting

shapefile was updated as needed based on field notes. WEST retained all field notes, spatial files, and electronic data files under secure conditions for reference.

RESULTS

Approximately 7,813 ac of native, unbroken grasslands were previously identified during the grassland habitat assessment (Piorkowski et al. 2024; Figure 2). Of these, 2,965 ac were identified as potential DASK habitat (Type B) that were surveyed during August and October 2025 (Figures 3a–3e). An estimated 2,692 ac were surveyed via pedestrian surveys while 273 ac were surveyed from public roads due to access restrictions. There were 17 individual patches of suitable DASK habitat identified), resulting in 20.96 ac within the surveyed grasslands (Table 1; Figures 3a–3e). No suitable DASK habitat was identified in grasslands visually surveyed from public roads.

Table 1. Areas identified as suitable Dakota skipper larval habitat within the Longspur Wind Project Survey Area in Morton, Mercer, and Oliver counties, North Dakota, August 4 – October 2, 2025.

DASK Area ID	Survey Date	Acres	Species Observed
1	10/1/2025	1.40	Little bluestem, needle and thread grass, prairie sand reed, Kentucky bluegrass
2	10/1/2025	1.76	Little bluestem, needle and thread grass, prairie sand reed, Kentucky bluegrass
3	10/1/2025	0.69	Little bluestem, needle and thread grass, prairie sand reed, Kentucky bluegrass
4	8/15/2025	3.71	Little bluestem, dotted gayfeather, purple coneflower, purple prairie clover
5	10/1/2025	3.03	Little bluestem, needle and thread grass, prairie sand reed, Kentucky bluegrass
6	8/15/2025	0.45	Little bluestem, side-oats grama, purple coneflower, needlegrasses
7	8/4/2025	0.40	Big bluestem, little bluestem, purple coneflower, white sage
8	10/2/2025	3.95	Little bluestem, prairie sand reed, purple coneflower, purple prairie clover
9	8/15/2025	0.88	Little bluestem, purple coneflower, side-oats grama
10	8/15/2025	0.57	Little bluestem, side-oats grama, purple coneflower
11	10/2/2025	0.66	Little bluestem, prairie sand reed, purple coneflower, purple prairie clover
12	10/2/2025	0.35	Little bluestem, prairie sand reed, western wheatgrass, purple coneflower
13	10/2/2025	0.61	Little bluestem, sideoats grama, big bluestem, purple coneflower
14	10/2/2025	0.44	Little bluestem, sideoats grama, big bluestem, purple coneflower
15	10/2/2025	1.12	Little bluestem, sideoats grama, big bluestem, purple coneflower
16	10/2/2025	0.36	Little bluestem, sideoats grama, big bluestem, purple coneflower
17	8/15/2025	0.56	Little bluestem, side-oats grama, purple coneflower
	Total[1]	**20.96**	

[1.] Sums of values may not add to total value shown due to rounding.

DASK = Dakota skipper; ID = identification.

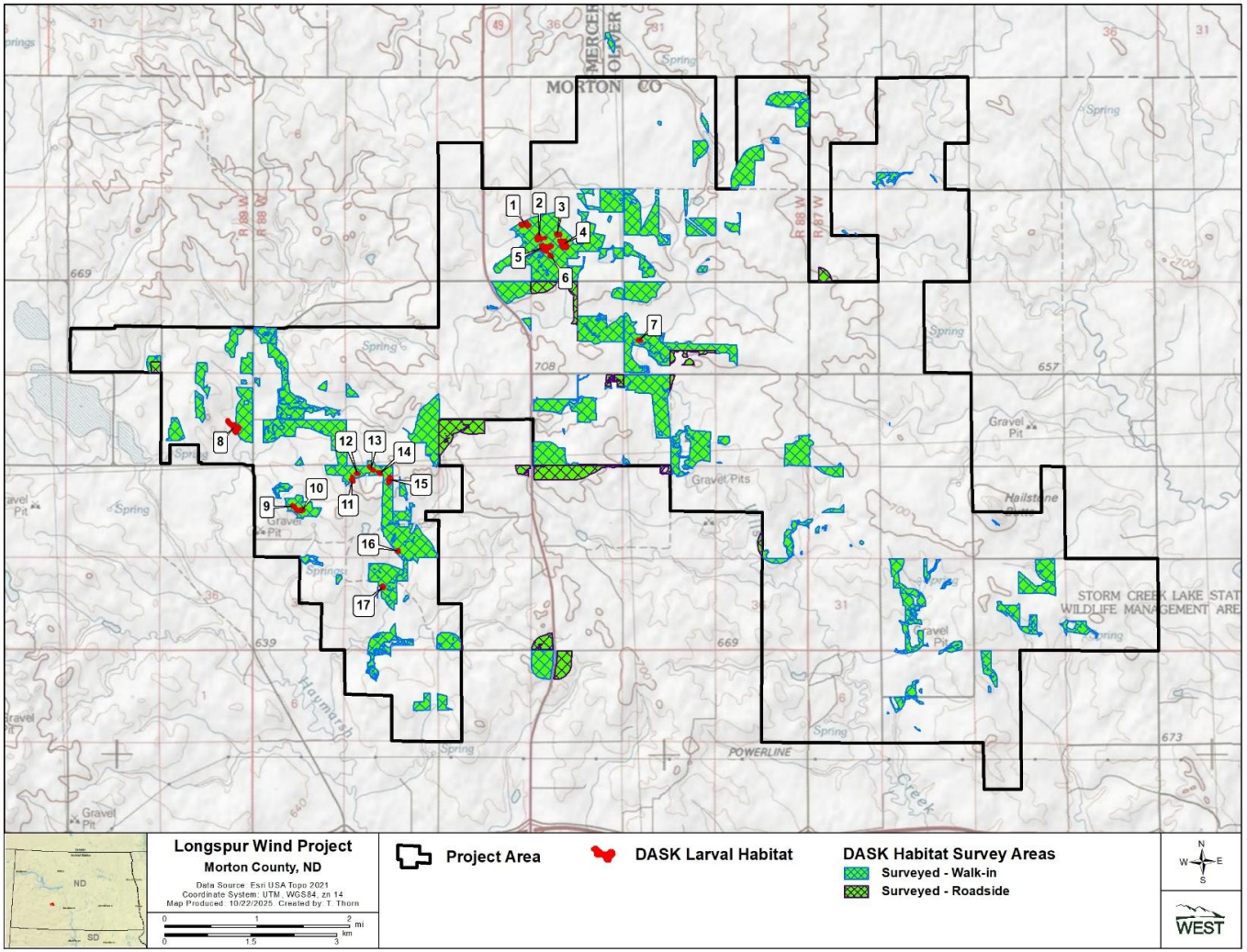

Figure 3a. Dakota skipper (DASK) larval habitat patch locations within the Longspur Wind Project Survey Area in Morton, Mercer, and Oliver Counties, North Dakota, August 4 – October 2, 2025.

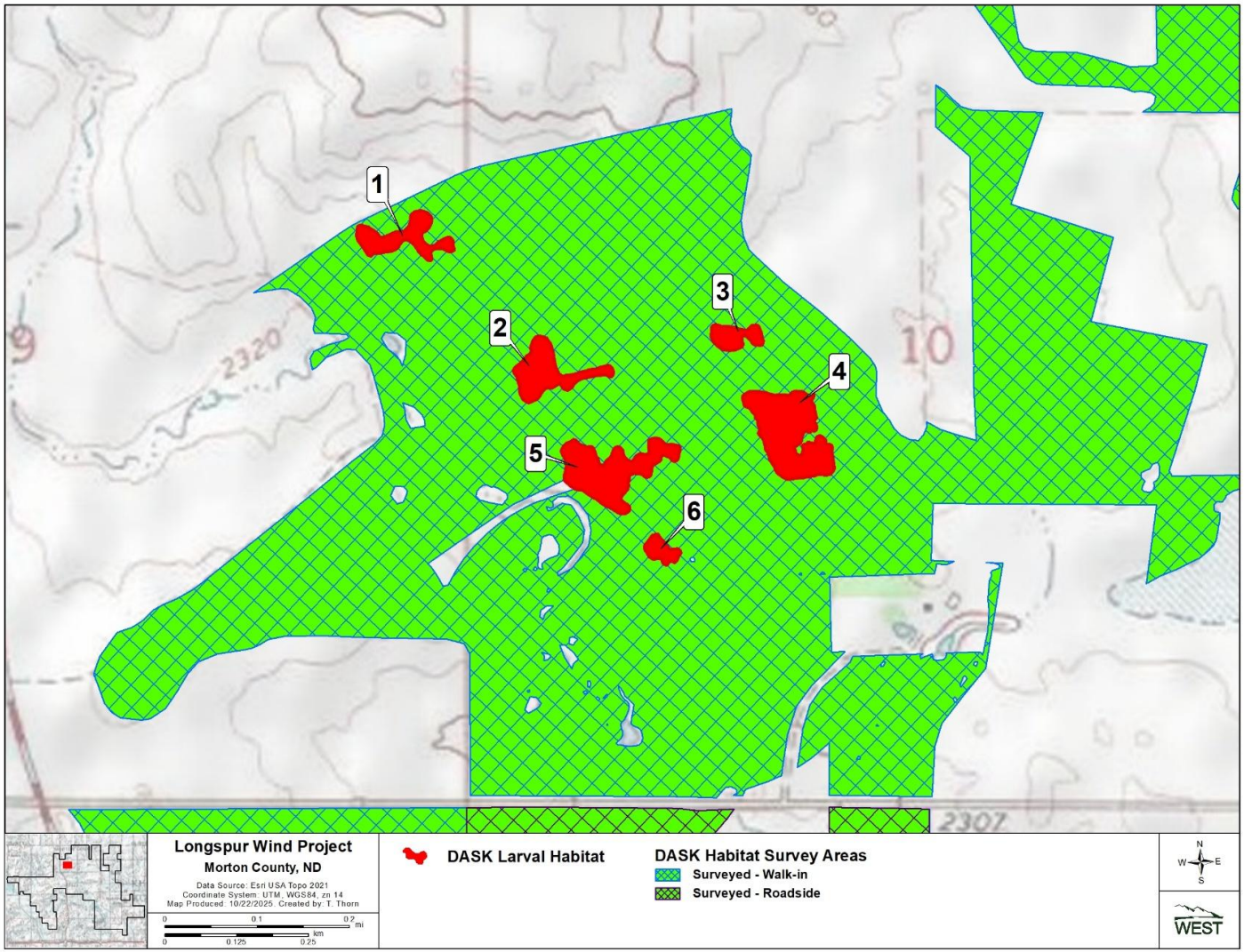

Figure 3b. Dakota skipper (DASK) larval habitat patch locations in the northern portion of the Longspur Wind Project Survey Area in Morton County, North Dakota, August 4 – October 2, 2025.

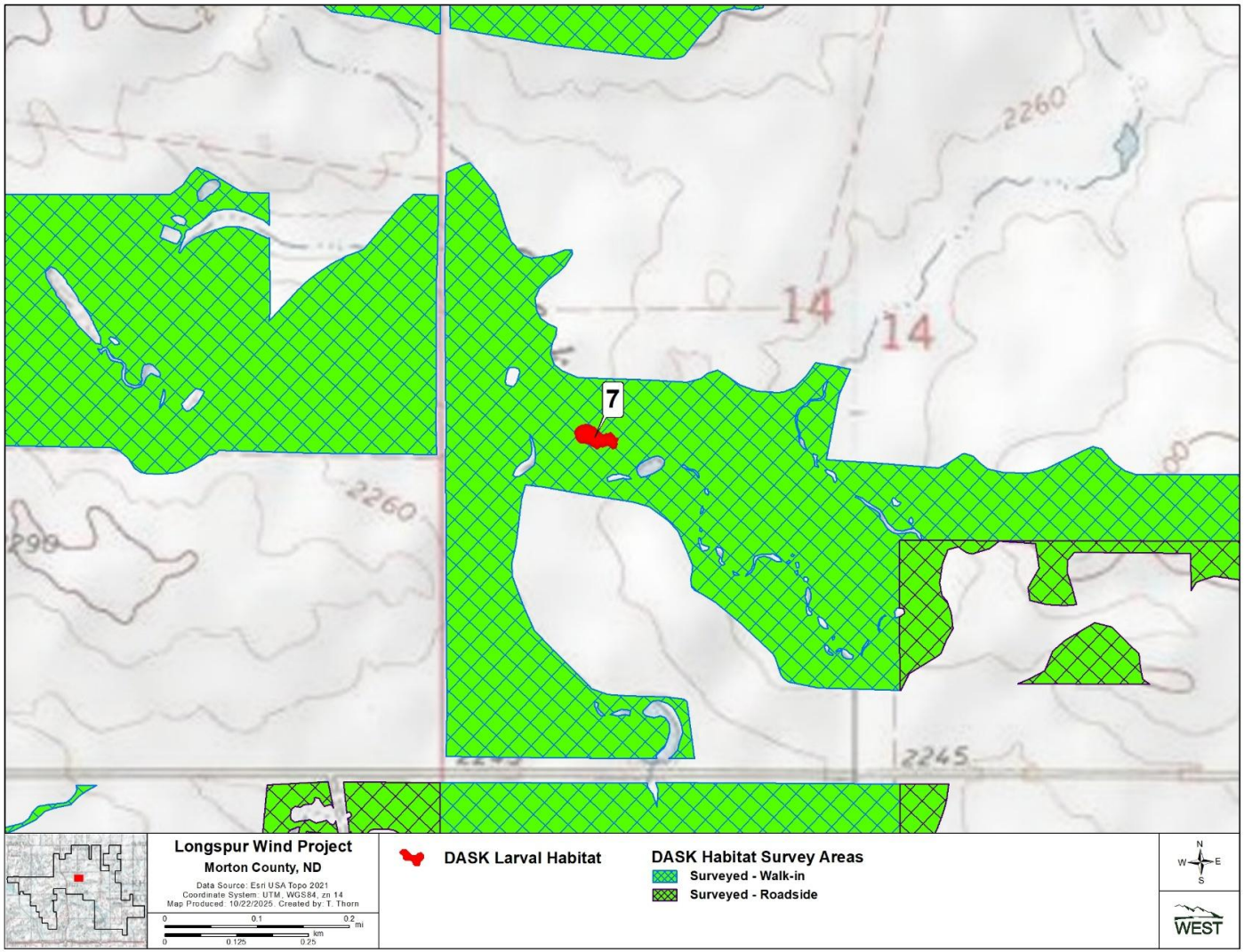

Figure 3c. Dakota skipper (DASK) larval habitat patch locations in the central portion of the Longspur Wind Project Survey Area in Morton County, North Dakota, August 4 – October 2, 2025.

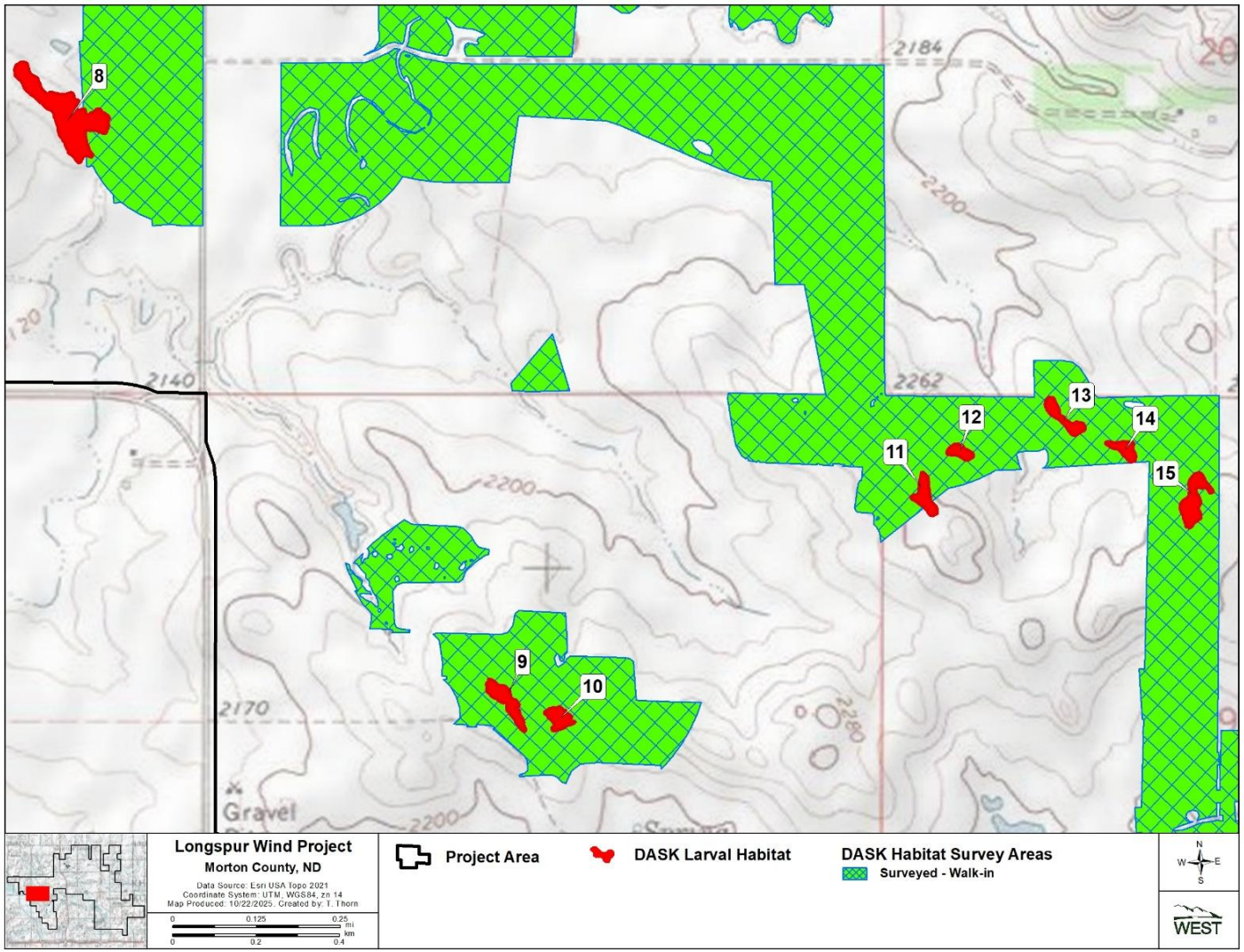

Figure 3d. Dakota skipper (DASK) larval habitat patch locations in the western portion of the Longspur Wind Project Survey Area in Morton County, North Dakota, August 4 – October 2, 2025.

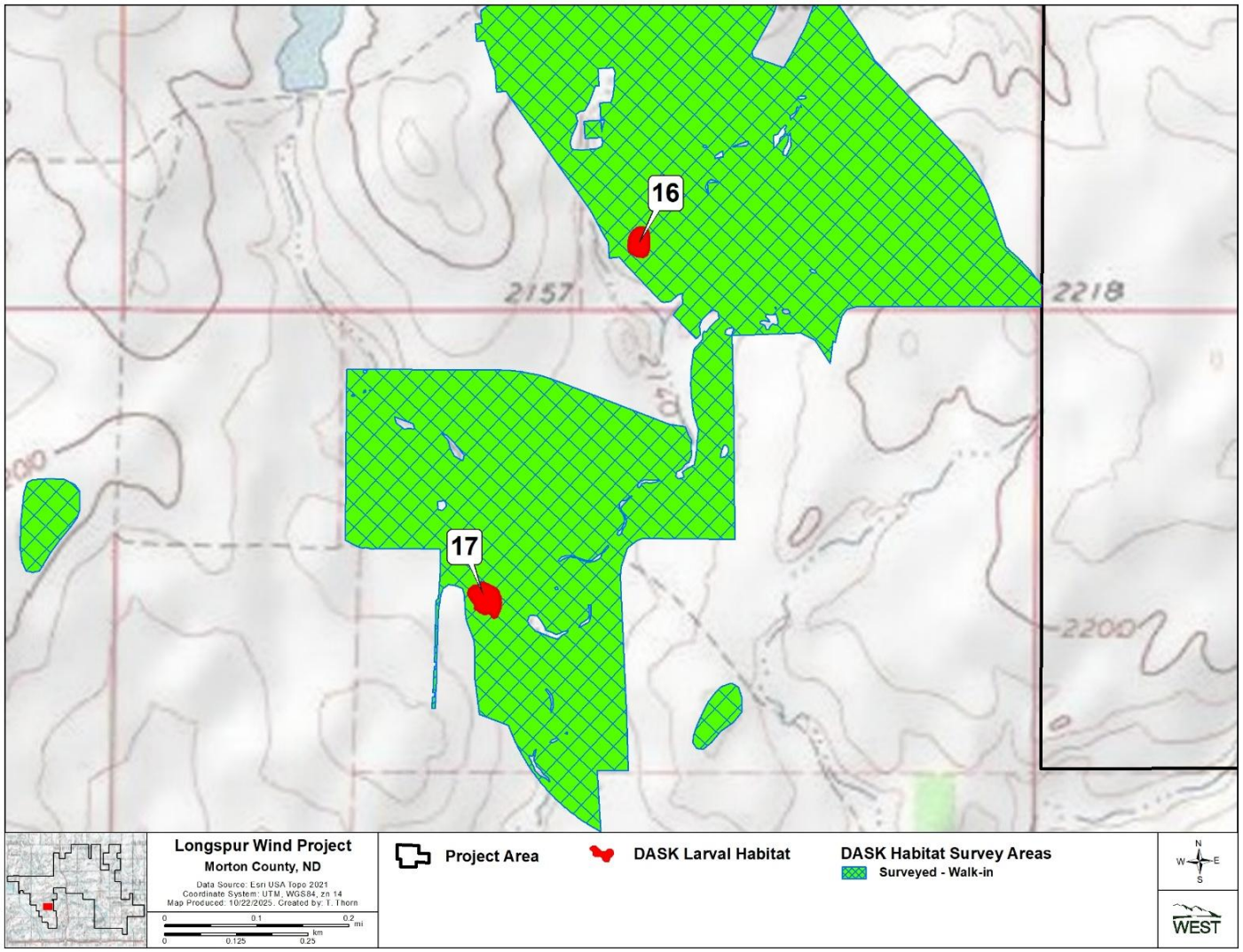

Figure 3e. Dakota skipper (DASK) larval habitat patch locations in the southwestern portion of the Longspur Wind Project Survey Area in Morton County, North Dakota, August 4 – October 2, 2025.

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Appendix A. Representative Photographs Taken During the Dakota Skipper Habitat Survey Conducted for the Longspur Wind Project Area in Morton County, North Dakota, August 4 – October 2, 2025.



Appendix A1. Suitable Dakota skipper (DASK) habitat located on a hilltop at DASK Area ID 1 with patches of purple coneflower, dotted blazing star, and fringed prairie sagewort at the Longspur Wind Project Area in Morton County, North Dakota, August 4 – October 2, 2025.



Appendix A2. Suitable Dakota skipper (DASK) habitat located on a hilltop at DASK Area ID 2 with patches of purple coneflower, dotted blazing star, and fringed prairie sagewort at the Longspur Wind Project Area in Morton County, North Dakota, August 4 – October 2, 2025.



Appendix A3. Suitable Dakota skipper (DASK) habitat located on a hilltop at DASK Area ID 8 with patches of pasque flower and fringed prairie sagewort at the Longspur Wind Project Area in Morton County, North Dakota, August 4 – October 2, 2025.



Appendix A4. Representative photo of Dakota skipper non-habitat grasslands dominated by smooth brome at the Longspur Wind Project Area in Morton County, North Dakota.



Appendix A5. Representative photo of Dakota skipper non-habitat grasslands dominated by blue grama with wheat fields in background at the Longspur Wind Project Area in Morton County, North Dakota.

Studies and Assessments

B13. 2025 Avian Use Survey

Avian Use Study
Longspur Wind Project
Morton County, North Dakota

Final Report
September 2024 – August 2025



Prepared for:

Minnesota Power

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December 11, 2025

WEST

Confidential Business Information

EXECUTIVE SUMMARY

Minnesota Power contracted Western EcoSystems Technology, Inc. (WEST), to conduct a pre-construction baseline avian use study at the Longspur Wind Project (Project). The principal objective of the avian use study was to evaluate species composition and seasonal use of the Project by large and small birds, with particular focus on eagles and species of concern. Consistent with the US Fish and Wildlife Service's (USFWS's) *Permits for Incidental Take of Eagles and Eagle Nests; Final Rule*, study methodology was based on the recommendations in the USFWS's *Land-Based Wind Energy Guidelines*, Appendix C(1)(a) of the USFWS's *Eagle Conservation Plan Guidance*, and North Dakota Game and Fish Department's *Key Wind Energy Development in North Dakota Best Management Practices*.

Surveys were conducted once per month from September 21, 2024 – August 27, 2025, at 26 avian use survey locations (plots). Each survey was 70 minutes (min) and consisted of a 10-min count for small birds within a 100-meter (m) radius, followed by a 60-min count for large birds (including eagles) within an 800-m radius. Eagle data (regardless of distance or height from the observer) were collected on a minute-to-minute basis to record eagle exposure minutes, defined as the minutes during which an eagle was flying within 800 m and below 200 m..

In total, 306 avian use surveys were conducted. One bald and one golden eagle were observed in December 2024, resulting in five bald eagle exposure minutes and three golden eagle exposure minutes during 306 survey hours. Mean eagle flight height was less than 25 m for both the bald eagle and golden eagle observations, indicating that observed eagles flew below the rotor swept height (RSH) of proposed turbines at 25-150 m. No additional federally listed endangered, threatened, or candidate species were recorded during surveys. Nineteen observed species were listed as North Dakota Species of Greatest Conservation Need, nine of which are also listed as Birds of Conservation Concern, and six species are also listed as Species of Habitat Fragmentation Concern.

Forty-one species of large birds and 40 species of small birds were recorded during surveys. Overall mean use for large birds was 4.06 observations/800-m radius plot/60-min survey and was driven by waterfowl observations in the spring (54.1%) and upland game bird observations in the fall (62.0%) and winter (75.7%). Mean flight heights for large birds ranged from two to 114 m, with initial flight heights of waterbirds (76.7%) and large corvids (60.0%) recorded most frequently within the RSH of proposed turbines. Overall mean use for small birds was 8.4 observations/100-m radius plot/10-min survey and was driven by grassland/sparrow observations in the winter (98.0%) and blackbird/orioles in the fall, summer, and spring (69.9%, 65.3%, and 64.2%, respectively). Mean flight heights for small birds ranged from two to six m. Blackbirds/orioles were the only small bird subtype observed with initial flight heights (12.0%) extending into the RSH of 25–150 m.

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INTRODUCTION

Minnesota Power is developing the approximately 202-megawatt Longspur Wind Project (Project) in Morton County, North Dakota (Figure 1). To support the development of the Project, Minnesota Power contracted Western EcoSystems Technology, Inc. (WEST), to conduct a pre-construction avian use study within the Project. Consistent with the US Fish and Wildlife Service's (USFWS's) *Permits for Incidental Take of Eagles and Eagle Nests; Final Rule* (2024 Eagle Rule; 2024; 89 Federal Register 9920 [2024]), study methodology was based on the recommendations in the USFWS's *Land-Based Wind Energy Guidelines* (WEG; 2012), Appendix C(1)(a) of the USFWS's *Eagle Conservation Plan Guidance* (ECPG; 2013a), and the *Wind Energy Development in North Dakota: Best Management Practices* (ND BMPs; North Dakota Game and Fish Department [NDGFD] 2021).

The objective of the study was to evaluate species composition and seasonal use of the Project by large and small birds, with particular focus on eagles and species of concern (SOC) with additional spatial use patterns recorded for eagles. This report provides a summary of the results from the first year of avian use surveys at the Project.

PROJECT DESCRIPTION

The Project encompasses 25,933 acres in Morton County, North Dakota, approximately four miles (mi) north of Glenn Ullin (Figure 1). The Project is located entirely within the Northwestern Great Plains Level III and the Missouri Plateau Level IV ecoregions (US Environmental Protection Agency [USEPA] 2012, 2013). The Missouri Plateau ecoregion's rolling to somewhat flat topography was mostly unaffected by glaciation, with natural vegetation primarily consisting of semiarid grasses, including western wheatgrass (*Pascopyrum smithii*), green needlegrass (*Nassella viridula*), blue grama (*Bouteloua gracilis*), and buffalograss (*B. dactyloides*; Bryce et al. 1998). Although large areas of the Missouri Plateau ecoregion have been converted to agricultural crop production (i.e., spring wheat [*Triticum aestivum*], alfalfa [*Medicago sativa*], corn [*Zea mays*], and soybeans [*Glycine max*]), areas of unbroken native grasslands remain, which are typically used for livestock grazing (USEPA 2012, 2013).

According to the National Land Cover Database (2024) the main land cover types are cultivated crops (56.3%) and grassland/herbaceous (32.3%), followed by a comparatively small proportion of shrub/scrub (4.5%), hay/pasture (4.1%), and developed land (2.3%). Each remaining land cover type comprises less than 0.5% of the area within the Project boundary (Table 1, Figure 2).

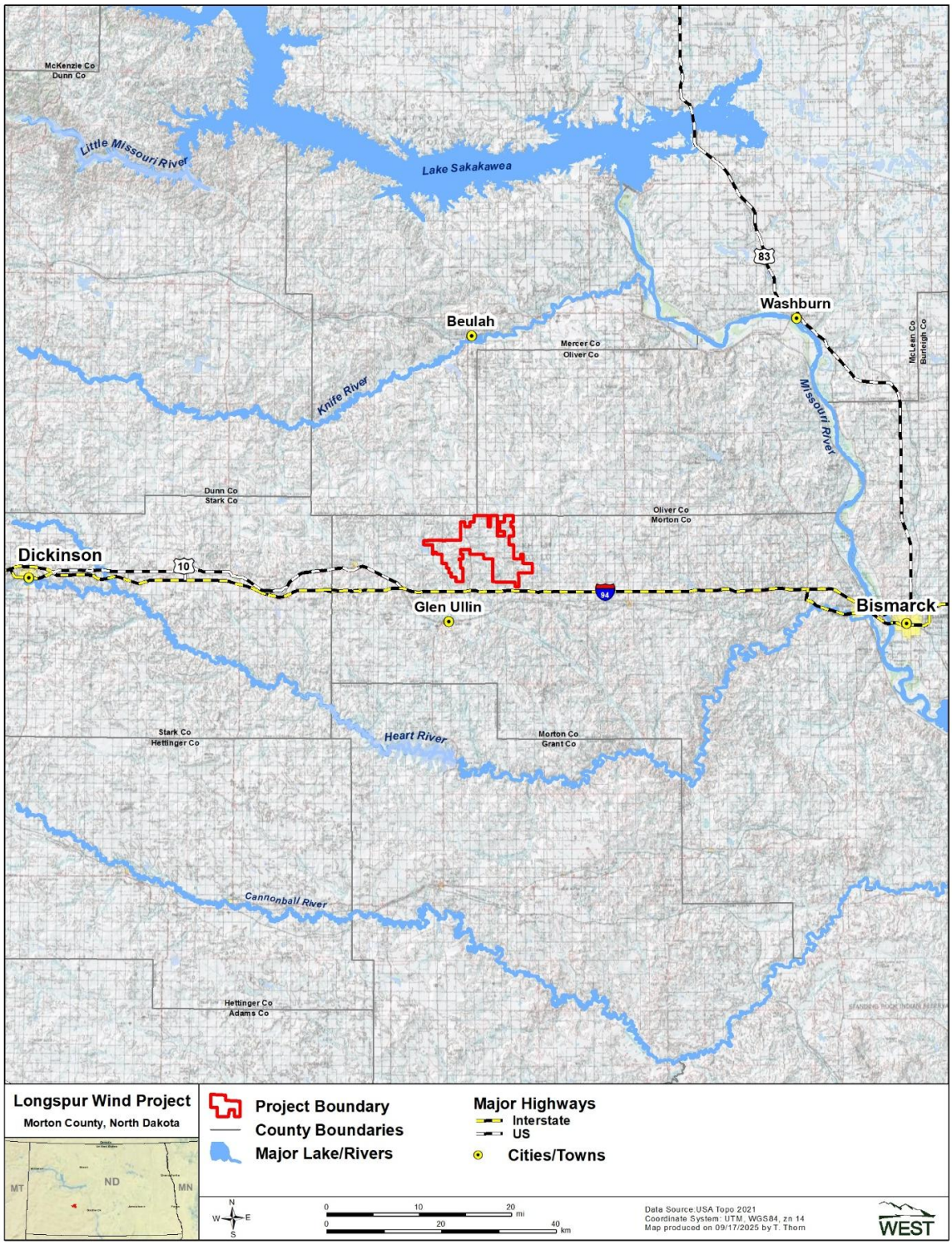

Figure 1. Location of the Longspur Wind Project in Morton County, North Dakota.

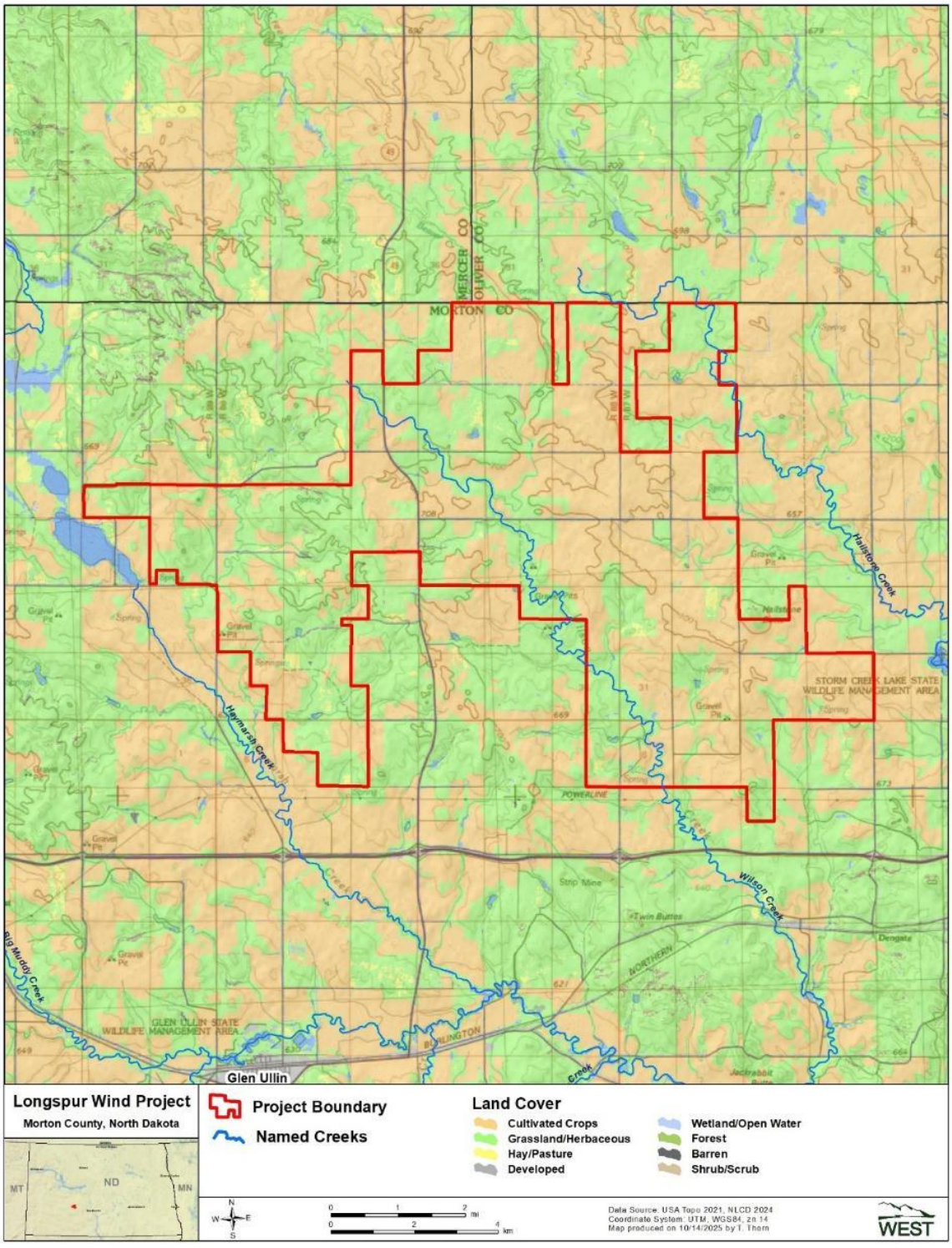

Figure 2. Land cover at the Longspur Wind Project in Morton County, North Dakota.

Table 1. Land cover types, coverage, and percent composition within the Longspur Wind Project in Morton County, North Dakota.

Land Cover Type	Coverage (acres)	Percent Composition
Cultivated Crops	14,604	56.3
Grassland/Herbaceous	8,371	32.3
Shrub/Scrub	1,172	4.5
Hay/Pasture	1,061	4.1
Developed	605	2.3
Wetland/Open Water	91	0.4
Forest	29	0.1
Barren	2	<0.1
Total[1]	**25,933**	**100**

[1.] Sums of values may not add to total value shown due to rounding.

Sources: National Land Cover Database 2024.

METHODS

The study design and survey methods for birds recorded in this study primarily followed guidance in the ECPG because of the need to collect information on eagles. Guidance from the WEG as well as the ND BMPs were followed to collect information on other birds. The methods described below were common for all birds (i.e., large and small birds, eagles, and other SOC), except as noted. Eagles and SOC were of primary focus for this Project and presented first in the *Results* section.

SOC were defined in the WEG as any species either a) listed as an endangered or threatened, proposed endangered or threatened, candidate for listing, and under review species under the Endangered Species Act of 1973 (ESA), subject to the Migratory Bird Treaty Act of 1918, or Bald and Golden Eagle Protection Act of 1940 (BGEPA); or b) are designated by federal or state law, regulation, or other formal process for protection and/or management by the relevant agency or other authority (i.e., NDGFD Species of Greatest Conservation Need [SGCN]); and 2) are determined to be possibly affected by the Project (USFWS 2012).

Five avian species that are federally listed or protected under the BGEPA have the potential to occur in the Project: whooping crane (*Grus americana*; federally endangered), piping plover (*Charadrius melodus*; federally threatened), rufa red knot (*Calidris canutus rufa*; federally threatened), bald eagle (BGEPA), and golden eagle (BGEPA). Additionally, 46 species listed as either North Dakota SGCN, Species of Habitat Fragmentation Concern (SHFC), and/or USFWS Birds of Conservation Concern (BCC) also have the potential to occur in the Project (USFWS 2013b, 2021; NDGFD 2025).

Large birds are defined as waterbirds, waterfowl, shorebirds, gulls/terns, diurnal raptors (i.e., Buteo spp., eagles, *Falco* spp., northern harrier), owls, vultures, upland game birds, doves/pigeons, and large corvids. Small birds are defined as passerines and woodpeckers.

Study Design

To determine survey locations, a minimum convex polygon (MCP) was established around the hazardous areas (i.e., rotor radius) of proposed turbine locations (Figure 3). A grid with 1-mi by 1-mi cells was laid over the MCP, and grid cells were randomly selected using a spatially balanced sampling design referred to as Balance Acceptance Sampling (Brown et al. 2015) The center of each plot (survey point) was placed within randomly selected grid cells that maximized viewsheds with public road access. Each survey point, centered within a circular plot, had an 800-meter (m) radius for large birds and 100-m radius for small birds (Reynolds et al. 1980, USFWS 2013a). Twenty-six survey locations (plots) were selected to be spatially representative of the Project, and this established area covered 36.0% of the Project MCP (Figure 3; ECPG 2013). .

Surveys were conducted once per month from September 21, 2024 – August 27, 2025, as specified in the ECPG. Seasons were defined as fall (September 1 – November 30), winter (December 1 – February 28), spring (March 1 – May 31), and summer (June 1 – August 31). Surveys were conducted during daylight hours as specified in the ECPG. Survey times were randomized to cover all daylight hours during a season. Surveys were conducted under all weather conditions, except when visibility was less than 800 m horizontally and 200 m vertically (USFWS 2013a), or when access to survey locations was limited due to road conditions or other factors.

Survey Methods

All Birds

Surveys at each survey point were conducted for a period of 70 minutes (min), with only small birds recorded during the first 10 min of the survey period out to a 100-m radius, and only large birds (excluding eagles) recorded for the remaining 60 min of the survey period out to an 800-m radius. Eagles were recorded at all distances and heights during the 60-min large bird survey following the ECPG (see *Eagles* below). Observations of groups of birds (one or more birds) were recorded for each survey along with the date, start and end time, and weather (i.e., temperature, wind speed, wind direction, precipitation, and percent cloud cover). If during surveys, the biologist lost sight of a group for more than a minute, or if the same bird species returned to the plot during the survey period, but the biologist was unsure if it was the same group, a new observation was recorded. In addition to the above information, the following data were also recorded for each group of birds observed:

- Observation number
- Observation time
- Species (or best possible identification)
- Number of individuals
- Sex and age class (if possible)
- Distance from survey point to the nearest 5-m interval (first and closest)
- Flight height above ground level (AGL) to the nearest 5-m interval (first, lowest, and highest)

- Flight direction (first observed)
- Habitat
- Activity (e.g., flying, perched)
- Observation type (visual or aural)
- Flight paths and perch locations of eagles, federally threatened and endangered species, and other SOC

Eagles

Data were collected based on the recommendations in the ECPG if a golden, bald, or unidentified eagle was observed during the survey period. Biologists recorded eagle behavior (i.e., flight height, distance from observer, activity) each minute (eagle minute), at the top of the minute, to provide an instantaneous count for every eagle observed. Data were recorded whether the eagle was flying below 200 m AGL or within 800 m of the plot at any time during the minute for additional analysis (see *Statistical Analysis* below). Age class (juvenile [first year], immature [second year], sub-adult [third to fourth year], or adult [at least fifth year]) was also recorded, when it was possible to differentiate.

Incidental Observations

Incidental observations were wildlife seen outside the standardized avian use surveys but within the Project area and were focused on SOC and species not yet recorded during surveys. Data recorded for incidentally observed species were similar to data recorded during scheduled surveys; however, incidental observations are not included in analyses of data and summary statistics.

Data Management

Data Compilation and Storage

A WEST-developed Microsoft® SQL Server database was used to store, organize, and retrieve survey data. Project data were keyed into the electronic database using a pre-defined format to facilitate subsequent quality assurance and quality control (QA/QC) and data analysis. WEST retained all data forms and electronic data files for reference.

Quality Assurance and Quality Control

WEST implemented QA/QC measures at all stages of the study, including in the field, during data entry and analysis, and report writing. Multiple reviews were conducted as QA/QC measures throughout the study-life cycle. Following surveys, biologists were responsible for inspecting data forms for completeness, accuracy, and legibility. If errors or anomalies were found within the data, follow-up measures were implemented, including discussions and review of field data with field technicians and/or Project Managers. If any errors, omissions, or problems were identified in later stages of analysis or report writing, they were traced back to the raw data forms where appropriate changes and measures were implemented and documented.

Reporting and Review Process

WEST's reporting and review process included technical editing and content review, senior technical review, and a final review by the Project Manager before delivery to the client.

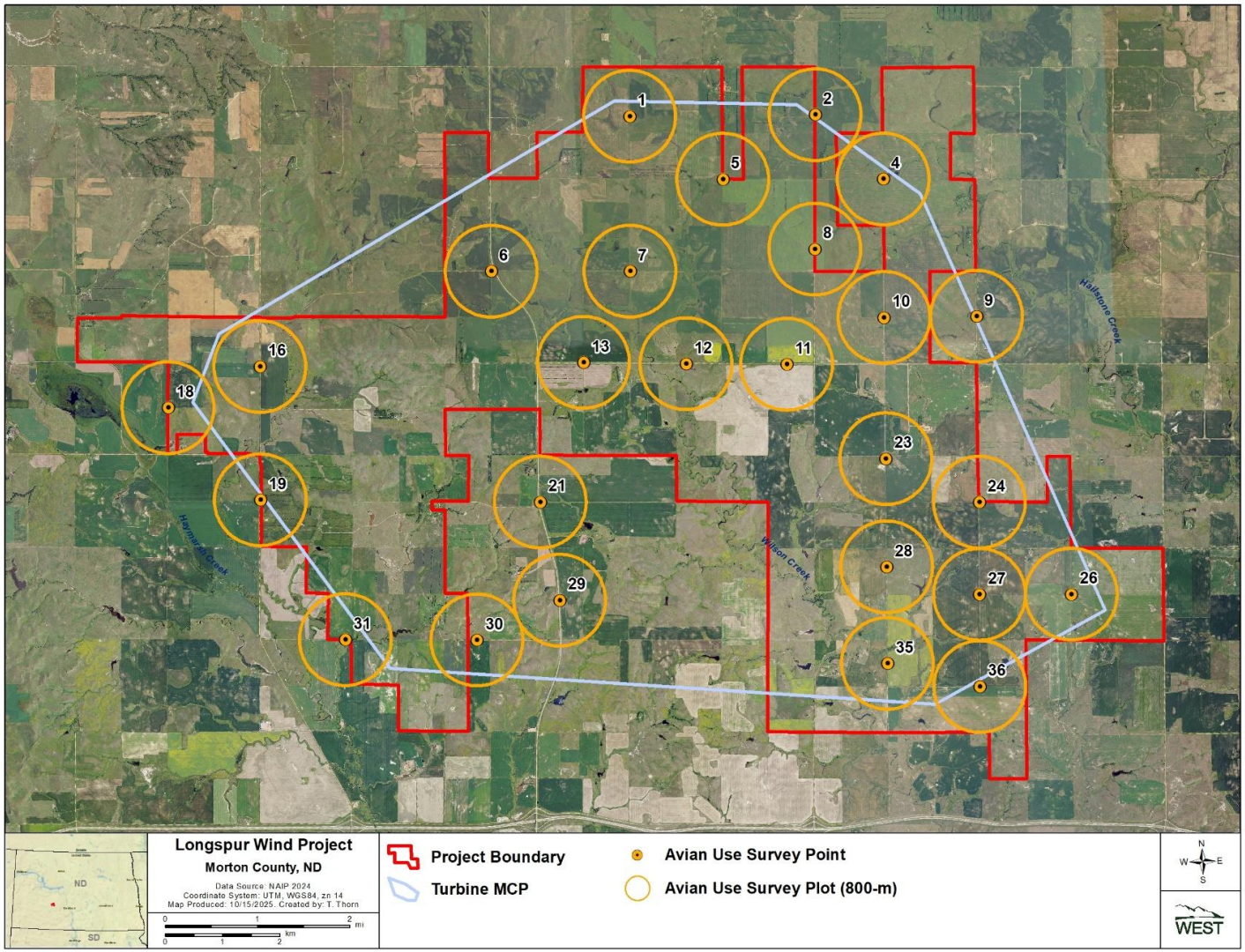

Figure 3. Avian use survey points and plots at the Longspur Wind Project in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

Statistical Analysis

A *visit* was defined as one complete survey effort of all plots within the Project boundary, which could occur across multiple dates. Subsequent visits did not overlap, and each full visit was completed within a single season (e.g., spring). If unforeseen conditions prevented all plots from being surveyed during a visit, then a visit may not include a complete survey of all plots.

A *survey* was defined as a single 10-min or 60-min count of birds. In some cases, a count of bird observations may represent repeated observations of the same individual. Only observations within the plot were included for statistical analysis.

Species richness was defined as a count of species observed within a plot during avian use surveys and reported both seasonally and overall, across all seasons. Groups of unidentified species were included in species richness if a species from that bird type was not otherwise recorded.

Mean Use, Percent of Use, and Frequency of Occurrence

Mean use was the average number of birds observed per plot per survey. Small bird use (i.e., observations per 100-m radius plot per 10-min survey) and large bird use (i.e., observations per 800-m radius plot per 60-min survey) was calculated by: 1) summing birds per plot per visit, 2) averaging number of birds across plots within a visit, and 3) averaging number of birds across visits within a season. Overall mean use was calculated as a weighted average of values by the number of days in each season. *Percent of use* was calculated as the percentage of small or large bird use that was attributable to a particular bird type or species. *Frequency of occurrence* was calculated as the percent of surveys in which a particular bird type or species was observed.

Mean use and frequency of occurrence described different aspects of relative abundance, in that mean use was based on the number of birds (i.e., large groups of the same type of bird can produce high estimates), whereas frequency of occurrence was based on the number of groups of the same type of bird (i.e., it was not influenced by the group's size). Qualitative comparisons were made with these metrics among bird types, seasons, and survey points to help illustrate temporal and spatial avian use of the Project. The top five bird types (top five sub-types for small birds) were depicted graphically to show the dominant patterns in mean use, percent of use, and frequency of occurrence.

Flight Height

Flight heights were important metrics to assess relative potential exposure to turbine blades and were used to calculate the percentage of large birds and small birds initially observed flying within the rotor-swept height (RSH) of proposed turbines. A RSH of 25–150 AGL was assumed for the purpose of the analysis. Flight height recorded during the initial observation was used to calculate the percentage of birds flying within the RSH and mean flight height.

Spatial Variation

Mean use was calculated by survey point for large birds and small birds to make spatial comparisons among the survey points. Additionally, flight paths and perched locations of eagles and federally listed species were mapped, if observed, during large bird use surveys to qualitatively show potential areas of concentration of flight paths and consistent flight patterns within the Project area compared to Project area characteristics (e.g., environmental, or topographic features).

Eagles

Data were collected during each minute eagles were observed to assess potential risk to eagles. The area of risk, or *risk cylinder*, was defined as the area within 800 m of the survey point and below 200 m AGL during the 60-min survey period. *Eagle exposure minutes* (referred to as eagle-minutes in the 2024 Eagle Rule and ECPG) were defined as the number of minutes an eagle was observed in flight within the risk cylinder. The time eagles were observed inside and outside the risk cylinder was defined as *total minutes*. Eagle exposure minutes per observation hour were reported by plot and month to enable spatial and temporal assessments of eagle exposure minutes recorded in the Project area. Data collected on perched eagles and those outside the risk cylinder were not considered eagle exposure minutes; however, they were considered in the total minutes.

Eagle observations (rather than minutes) were also summarized to provide flight heights (see *Flight Height*) and flight path maps (See *Spatial Variation*). Perch locations and flight paths of all eagles were mapped to qualitatively assess areas of eagle use within the Project area.

RESULTS

Overall, 306 avian use surveys were conducted for large birds and 306 for small birds within the Project area. Large bird species richness was highest during spring (24 species), followed by fall (21), summer (19), and winter (eight; Table 2). Small bird species richness was highest during summer (24), followed by spring (22), fall (17), and winter (six; Table 2). Six surveys were missed for both large birds and small birds. Heavy snow prevented two surveys during winter and spring: Survey Point 28 in February and Survey Point 31 in March. Additionally, flooding and poor road conditions prevented four surveys during the summer: Survey Point 23 in June and survey points 28, 31, and 36 in July

Large and small bird study results are summarized below and are supplemented by the appendices, which present species-level detail on the following: scientific names and numbers of groups and observations seen during surveys (Appendix A); avian use, percent of use, and frequency of occurrence within the plot by season (Appendix B); and mean use by survey point (Appendix C).

Table 2. Summary of survey effort and species richness, by season and overall, during avian use surveys at the Longspur Wind Project in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

Season	# Visits	# Surveys Conducted	Species Richness*	
			Large Bird	Small Bird
Fall	3	78	21	17
Winter	3	77	8	6
Spring	3	77	24	22
Summer	3	74	19	24
Overall	**12**	**306**	**41**	**40**

* Species richness was analyzed for large and small birds separately.

Species of Concern

Eagles

Mean Use

One bald eagle was observed during surveys in winter (Table 3), resulting in a mean use of 0.01 observations/800-m radius plot/60-min survey for winter (Appendix B1). Bald eagles were only observed in winter (zero observations in fall, spring, and summer; Appendix A1). Overall, bald eagle mean use was less than 0.01 observations/800-m radius plot/60-min survey (Appendix B1).

One golden eagle was observed in winter (Table 3), resulting in an overall mean use of 0.01 observations/800-m radius plot/60-min survey for the winter (Appendix B1). Golden eagles were only observed in winter (zero observations in fall, spring, and summer; Appendix A1). Overall golden eagle mean use was less than 0.01 observations/800-m radius plot/60-min survey (Appendix B1).

Eagle Exposure Minutes

Bald eagles were only recorded in December, resulting in five eagle exposure minutes of eight total minutes from one bald eagle observation during 306 survey hours (Table 3). Bald eagle exposure minutes per survey hour were 0.19 in December (Table 3). Bald eagle exposure minutes per survey hour were only recorded at Survey Point 1 (0.42 exposure minutes/survey hour; Figure 4a).

Golden eagles were only recorded in December, resulting in three eagle exposure minutes and total minutes from one golden eagle observation during 306 survey hours (Table 4). Golden eagle exposure minutes per survey hour 0.12 in December. (Table 4). Golden eagle exposure minutes per survey hour were only recorded at Survey Point 35 (0.25 exposure minutes/survey hour; Figure 4b).

Table 3. Bald eagle exposure minutes and observations, by month, recorded during avian use surveys at the Longspur Wind Project in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

Month	Eagle Exposure Min[1]	Total Min[2]	Eagle Observations[3]	Total Observations[4]	Survey Hours	Eagle Exposure Min per Survey Hour
September	0	0	0	0	26	0
October	0	0	0	0	26	0
November	0	0	0	0	26	0
December	5	8	1	1	26	0.19
January	0	0	0	0	26	0
February	0	0	0	0	25	0
March	0	0	0	0	26	0
April	0	0	0	0	25	0
May	0	0	0	0	26	0
June	0	0	0	0	25	0
July	0	0	0	0	23	0
August	0	0	0	0	26	0
Total	**5**	**8**	**1**	**1**	**306**	**0.02**

1. Eagle exposure minutes (min) = minutes of eagles in flight within the risk cylinder (the area within 800 meters [m] of the center of the survey location and below 200 m above ground level) during the 60-min survey period.
2. Total minutes = minutes inside and outside the risk cylinder.
3. Eagle observations = observations of eagles within the risk cylinder
4. Total observations = eagle observations inside and outside the risk cylinder.
5. Value represents an average across months, rather than a sum.

Table 4. Golden eagle exposure minutes and observations, by month, recorded during avian use surveys at the Longspur Wind Project in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

Season	Eagle Exposure Min[1]	Total Min[2]	Eagle Observations[3]	Total Observations[4]	Survey Hours	Eagle Exposure Min per Survey Hour
September	0	0	0	0	26	0
October	0	0	0	0	26	0
November	0	0	0	0	26	0
December	3	3	1	1	26	0.12
January	0	0	0	0	26	0
February	0	0	0	0	25	0
March	0	0	0	0	26	0
April	0	0	0	0	25	0
May	0	0	0	0	26	0
June	0	0	0	0	25	0
July	0	0	0	0	23	0
August	0	0	0	0	26	0
Total	**3**	**3**	**1**	**1**	**306**	**0.01**

1. Eagle exposure minutes (min) = minutes of eagles in flight within the risk cylinder (the area within 800 meters [m] of the center of the survey location and below 200 m above ground level) during the 60-min survey period.
2. Total minutes = minutes inside and outside the risk cylinder.
3. Eagle observations = observations of eagles within the risk cylinder.
4. Total observations = eagle observations inside and outside the risk cylinder.
5. Value represents an average across months, rather than a sum.

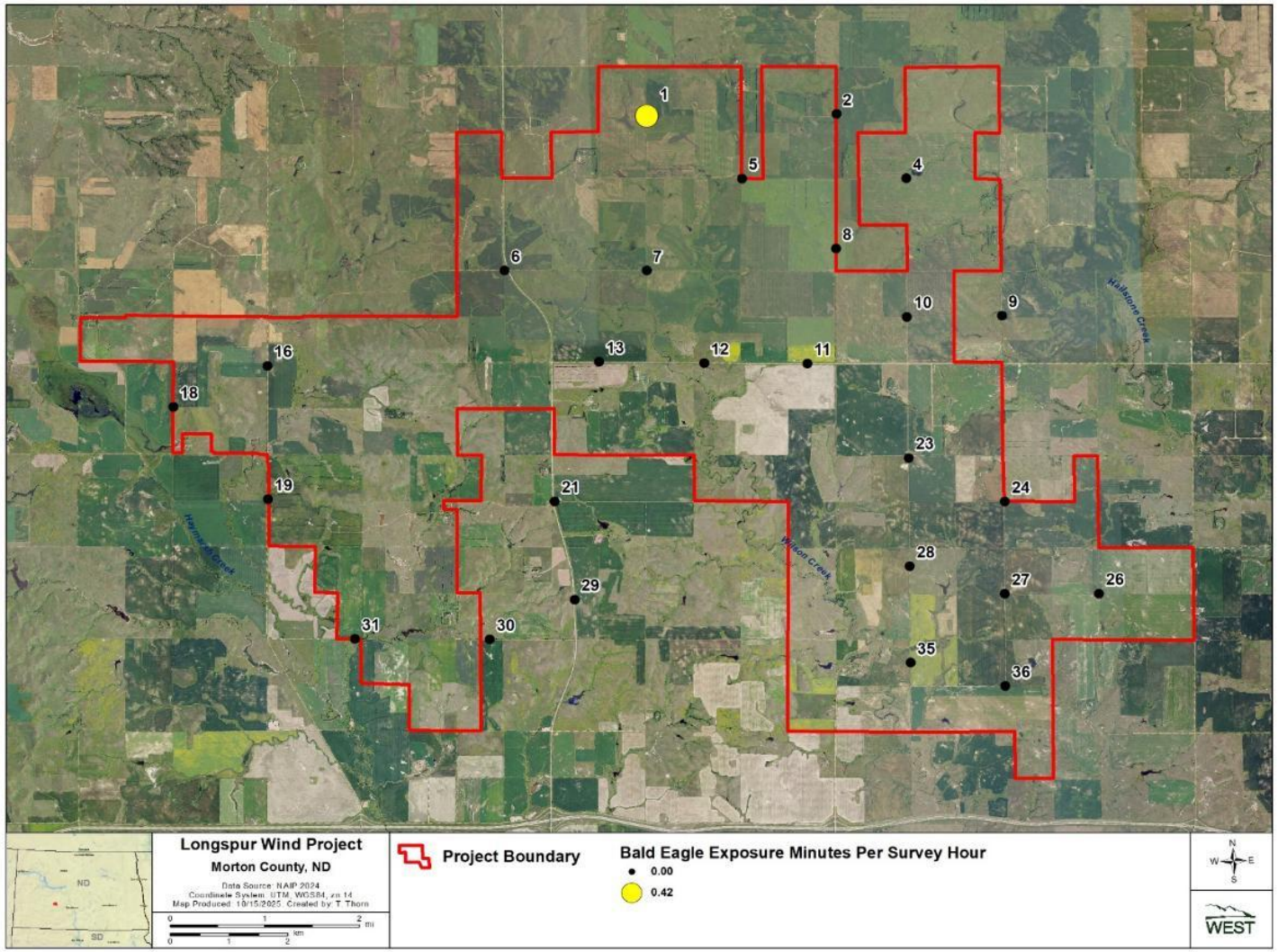

Figure 4a. Bald eagle exposure minutes per survey hour at the Longspur Wind Project in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

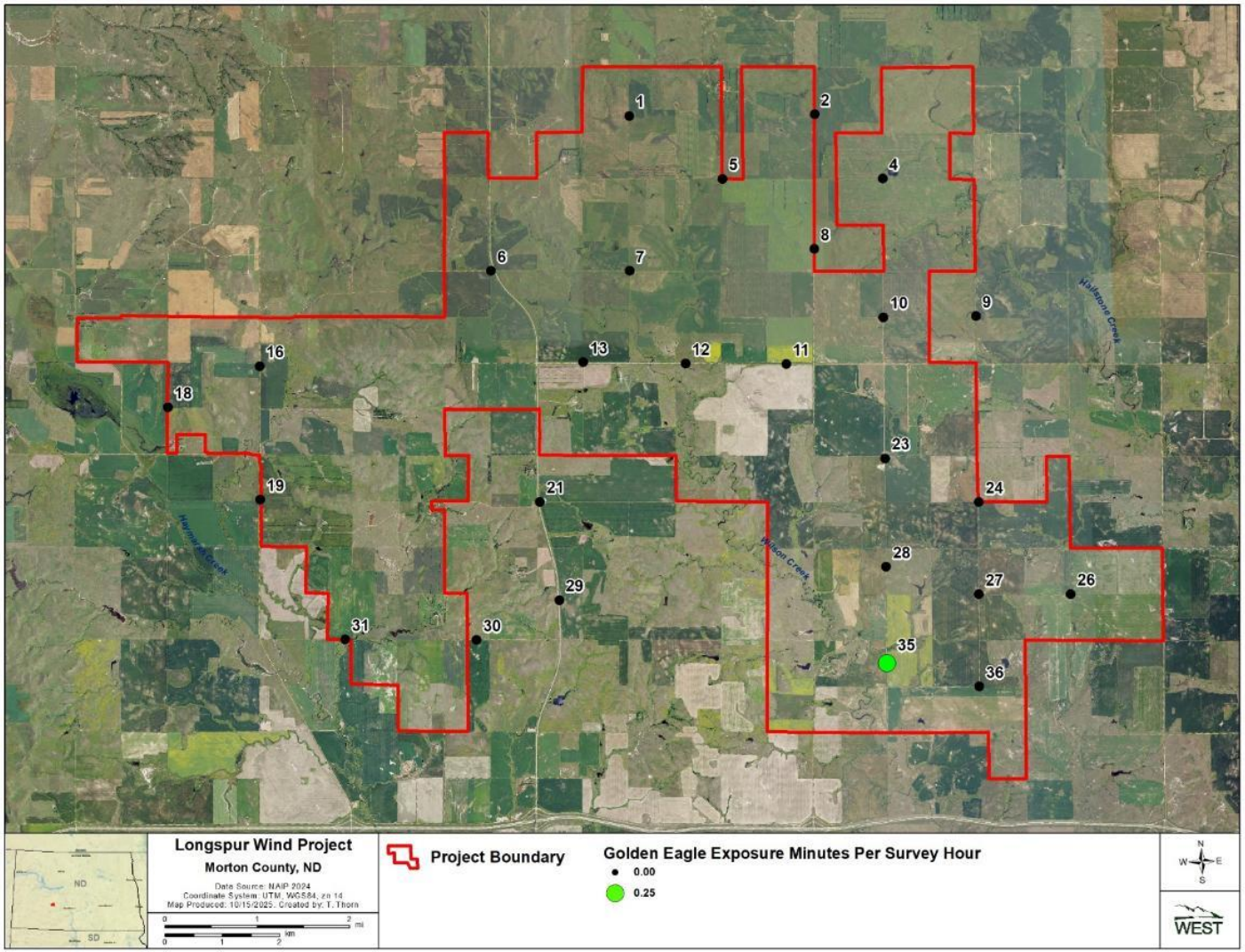

Figure 4b. Golden eagle exposure minutes per survey hour at the Longspur Wind Project in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

Eagle Flight Height

Initial eagle flight heights were recorded entirely below 25 m, with no initial flight heights observed within the RSH (25–150 m) or above 150 m (Table 5).

Table 5. Flight height characteristics, by large bird types[1] and diurnal raptor subtypes, recorded during 60-minute large bird surveys at the proposed Longspur Wind Project in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

Bird Type/Subtype	# Groups Flying	# Obs Flying	% Obs Flying	Estimated Mean Flight Height (m)	% within Estimated Flight Height Categories		
					<25 m	25–150 m[2]	>150 m
Diurnal Raptors	**52**	**55**	**79.7**	**37**	**78.2**	**14.5**	**7.3**
Buteo spp.	*25*	*28*	*71.8*	*68*	*60.7*	*25.0*	*14.3*
Eagles	*2*	*2*	*100*	*13*	*100*	*0*	*0*
Falco spp.	*10*	*10*	*83.3*	*7*	*100*	*0*	*0*
Northern Harrier	*15*	*15*	*100*	*8*	*93.3*	*6.6*	*0*
Other Raptors	*0*	*0*	*0*	*NA*	*NA*	*NA*	*NA*
Doves/Pigeons	**23**	**73**	**66.4**	**5**	**100**	**0**	**0**
Gulls/Terns	**5**	**8**	**88.9**	**13**	**75.0**	**25.0**	**0**
Large Corvids	**3**	**5**	***62.5***	**29**	**40.0**	**60.0**	**0**
Owls	**0**	**0**	**0**	**NA**	**NA**	**NA**	**NA**
Rails/Coots	**0**	**0**	**0**	**NA**	**NA**	**NA**	**NA**
Shorebirds	**27**	**39**	**31.5**	**9**	**89.7**	**10.3**	**0**
Upland Game Birds	**39**	**290**	**56.6**	**2**	**100**	**0**	**0**
Vultures	**1**	**1**	***100***	**5**	**100**	**0**	**0**
Waterbirds	**5**	**43**	**100**	**114**	**4.7**	**76.7**	**18.6**
Waterfowl	**33**	**293**	**82.8**	**33**	**21.8**	**44.0**	**34.1**
Large Birds Overall	**188**	**807**	**65.2**	**22**	**63.9**	**22.2**	**13.9**

1. 800-meter (m) radius plot for large birds.

2. The assumed rotor-swept height for potential collision with a turbine blade, or 25–150 m above ground level.

Zeroes and NA values indicate that the species was observed but was not flying.

obs = observations.

All metrics were developed based on First Activity and First Flight Height.

Spatial Variation

For both bald and golden eagles, only one observation was recorded for each species during surveys, which did not provide adequate information to determine spatial patterns.

Mean Use by Survey Point

Mean bald eagle use was 0.08 observations/800-m radius plot/ 60-min survey at Survey Point 1 and golden eagle use was 0.08 observations/800-m radius plot/60-min survey at Survey Point 35 (Appendix C1). Both survey points 1 and 35 were sited in areas containing cultivated crop and herbaceous/grassland.

Flight Paths

Eagle flight paths were mapped in the Project boundary (Figure 5). The single bald eagle was first recorded south of Survey Point 1 flying north, before landing on the ground and remaining perched for three min. It then took flight, heading west-northwest, until out of view from the survey point.

The single golden eagle was first recorded approximately 200 m north of the surveyor at Survey Point 35, flying due east until out of view from the survey point (Figure 5).

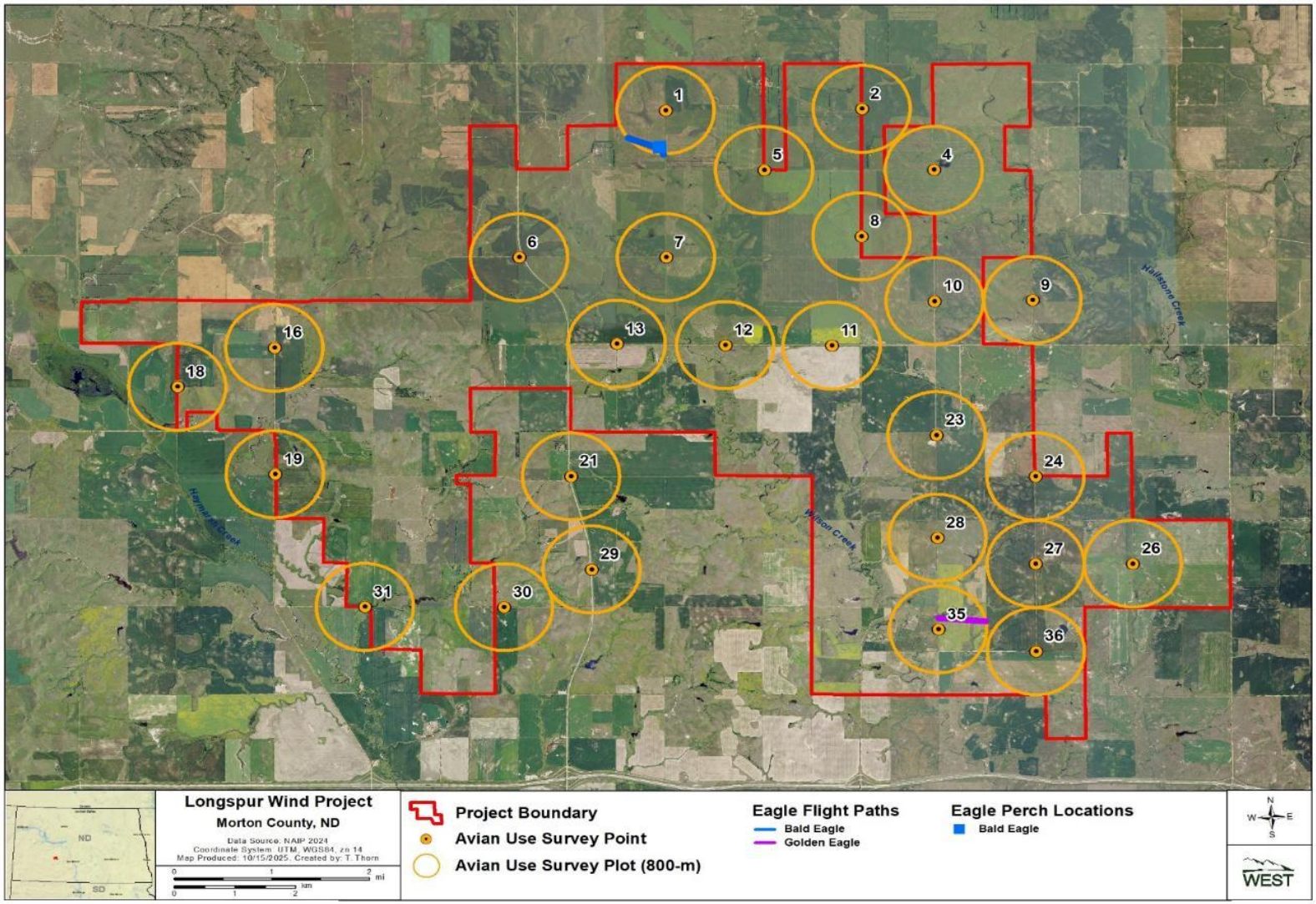

Figure 5. Eagle flight paths at the Longspur Wind Project in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

Federally and State-protected Species

Twenty SOC were recorded within the Project area (Table 6). Two species are federally protected under the BGEPA, bald (four observations) and golden eagle (one). No additional species federally listed as endangered, threatened, or candidate species under the ESA were recorded during surveys. Nineteen species are listed as North Dakota SGCN, nine of which are also listed as BCC. Additionally, six species are listed SHFC. Horned lark (385 observations; SGCN) and western meadowlark (185; SGCN), both small birds, accounted for a majority (76.2%) of all SOC observed during surveys (Table 6). The most commonly observed large bird SOC were marbled godwit (34 observations; SGCN, BCC), upland sandpiper (33; SGCN, SHFC), and sharp-tailed grouse (22; SGCN, SHFC; Table 6).

Table 6. Observations of species of concern observed during surveys or as incidental bird observations recorded at the Longspur Wind Project in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

			Surveys		Incidental		Total	
Species	**Scientific Name**	**Status**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
bald eagle	*Haliaeetus leucocephalus*	BGEPA	1	1	3	3	4	4
golden eagle	*Aquila chrysaetos*	BGEPA, BCC	1	1	0	0	1	1
American kestrel	*Falco sparverius*	SGCN	11	11	1	1	12	12
black tern	*Chlidonias niger*	BCC, SGCN	2	4	0	0	2	4
bobolink	*Dolichonyx oryzivorus*	BCC, SHFC SGCN	2	3	0	0	2	3
brown thrasher	*Toxostoma rufum*	SGCN	1	1	0	0	1	1
canvasback	*Aythya valisineria*	SGCN	2	4	0	0	2	4
chestnut-collared longspur	*Calcarius ornatus*	BCC, SHFC SGCN	1	2	0	0	1	2
ferruginous hawk	*Buteo regalis*	BCC, SGCN	2	2	0	0	2	2
grasshopper sparrow	*Ammodramus savannarum*	BCC, SHFC SGCN	2	2	0	0	3	3
horned lark	*Eremophila alpestris*	SGCN	105	385	7	14	112	399
lark bunting	*Calamospiza melanocorys*	BCC, SGCN	3	35	0	0	3	35
loggerhead shrike	*Lanius ludovicianus*	SGCN	1	1	0	0	1	1
marbled godwit	*Limosa fedoa*	BCC, SGCN	24	34	0	0	24	34
northern harrier	*Circus hudsonius*	BCC, SHFC, SGCN	15	15	2	2	17	17
northern pintail	*Anas acuta*	SGCN	1	2	0	0	1	2
sharp-tailed grouse	*Tympanuchus phasianellus*	SHFC, SGCN	4	22	0	0	4	22
upland sandpiper	*Bartramia longicauda*	SHFC, SGCN	25	33	0	0	25	33
western meadowlark	*Sturnella neglecta*	SGCN	97	185	9	10	106	195
Wilson's phalarope	*Phalaropus tricolor*	SGCN	1	1	0	0	1	1
black tern	*Chlidonias niger*	BCC, SGCN	2	4	0	0	2	4
Total			**303**	**748**	**22**	**30**	**326**	**778**

grps = groups; obs = observations; BCC = Birds of Conservation Concern (US Fish and Wildlife Service 2021); BGEPA = Bald and Golden Eagle Protection Act of 1940;; SGCN = North Dakota Species of Greatest Conservation Need (NDGFD 2025); SHFC = Species of Habitat Fragmentation Concern(USFWS 2013b).

Large Birds

In total, 41 identified species of large birds were observed or heard over the 306 hours of surveys during the survey period (Appendix A1).

Mean Use, Percent of Use, and Frequency of Occurrence

Mean use, percent of use, and frequency of occurrence were calculated, by season, for large bird types (Figures 6a–c) and species (Table 7; Appendix B1). Large bird overall mean use was 4.06 observations/800-m radius plot/60-min survey (averaged; Table 7). Large bird mean use was highest during spring (6.26) and fall (5.26), and lowest in summer (3.02) and winter (1.68; Figure 6a, Table 7). The higher mean use in spring was driven mostly by waterfowl observations (54.1%) during spring migration. Upland game birds contributed to most of the mean use observed during fall (62.0%) and winter (75.7%), while a combination of upland game birds (33.2%) and doves/pigeons (33.3%) contributed to most of the mean use observed in summer (Table 7, Figure 6b).

Large bird frequency of occurrence varied among seasons, with upland game birds most frequently observed during fall (33.3%) and winter (26.1%). During spring surveys, upland game birds and shorebirds were most frequently observed (59.9% and 53.5% respectively), while waterfowl were only observed during 26.1% of all surveys in spring. During the summer, upland game birds (36.9%), doves/pigeons (30.4%), and shorebirds (28.5%) were most frequently observed during surveys (Figure 6c, Table 7; Appendix B1).

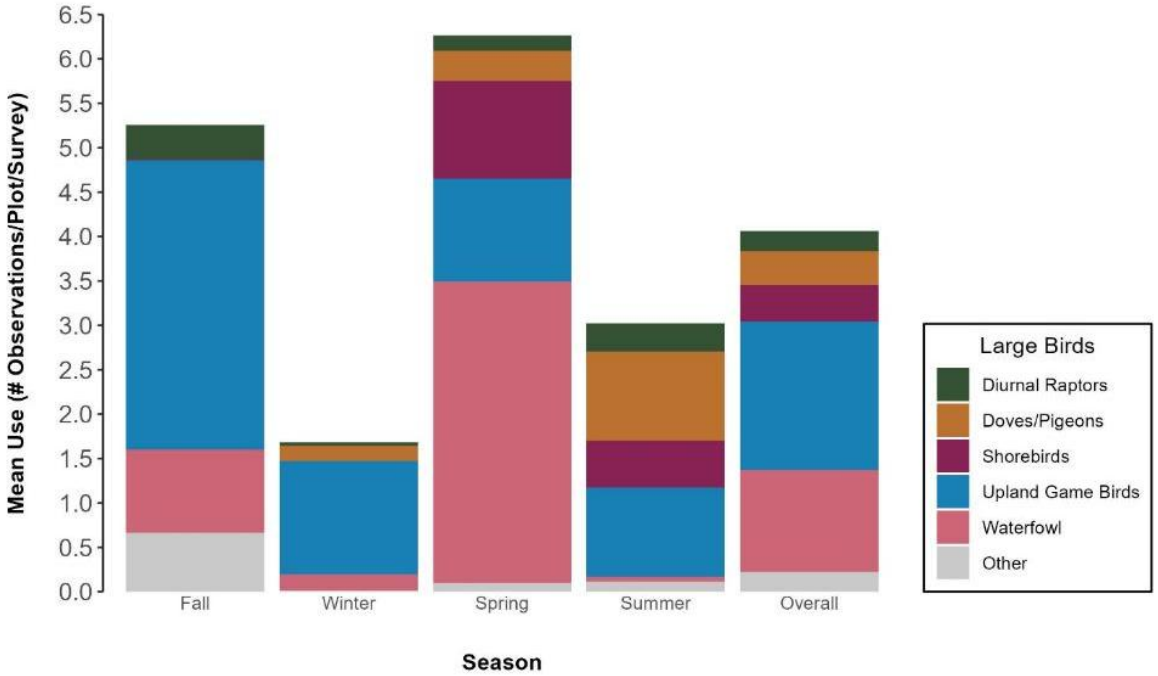

Figure 6a. Large bird mean use (observations/plot/60-minute survey), by season and bird type, at the Longspur Wind Project in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

Table 7. Mean use (number of birds/plot[1]/800-minute survey), percent of total use (%), and frequency of occurrence (%) for each bird type and subtype, by season, during avian bird use surveys at the Longspur Wind Project in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

	Mean Use				% of Use				% Frequency			
Type/Subtype	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**
Diurnal Raptors	**0.38**	**0.04**	**0.17**	**0.31**	**7.3**	**2.3**	**2.7**	**10.4**	**25.6**	**2.6**	**11.7**	**26.0**
Buteo spp.	*0.13*	*0.01*	*0.09*	*0.29*	*2.4*	*0.8*	*1.4*	*9.6*	*11.5*	*1.3*	*6.5*	*23.4*
Eagles	*0*	*0.03*	*0*	*0*	*0*	*1.5*	*0*	*0*	*0*	*2.6*	*0*	*0*
Falco spp.	*0.08*	*0*	*0.07*	*0.01*	*1.5*	*0*	*1.1*	*0.4*	*7.7*	*0*	*5.3*	*1.3*
Northern Harrier	*0.17*	*0*	*0.01*	*0.01*	*3.2*	*0*	*0.2*	*0.4*	*14.1*	*0*	*1.3*	*1.3*
Other Raptors	*0.01*	*0*	*0*	*0*	*0.2*	*0*	*0*	*0*	*1.3*	*0*	*0*	*0*
Doves/Pigeons	**0**	**0.17**	**0.34**	**1.00**	**0**	**10.2**	**5.5**	**33.3**	**0**	**2.6**	**11.8**	**30.4**
Gulls/Terns	**0**	**0**	**0.07**	**0.06**	**0**	**0**	**1.0**	**1.8**	**0**	**0**	**3.9**	**4.1**
Large Corvids	**0.06**	**0.01**	**0.03**	**0**	**1.2**	**0.8**	**0.4**	**0**	**3.8**	**1.3**	**2.6**	**0**
Owls	**0.01**	**0**	**0**	**0**	**0.2**	**0**	**0**	**0**	**1.3**	**0**	**0**	**0**
Rails/Coots	**0.06**	**0**	**0.01**	**0.01**	**1.2**	**0**	**0.2**	**0.4**	**1.3**	**0**	**1.3**	**1.3**
Shorebirds	**0.01**	**0**	**1.10**	**0.53**	**0.2**	**0**	**17.5**	**17.6**	**1.3**	**0**	**53.5**	**28.5**
Upland Game Birds	**3.26**	**1.27**	**1.16**	**1.00**	**62.0**	**75.7**	**18.5**	**33.2**	**33.3**	**26.1**	**59.9**	**36.9**
Vultures	**0**	**0**	**0**	**0.01**	**0**	**0**	**0**	**0.4**	**0**	**0**	**0**	**1.3**
Waterbirds	**0.53**	**0**	**0**	**0.03**	**10.0**	**0**	**0**	**1.0**	**5.1**	**0**	**0**	**1.4**
Waterfowl	**0.94**	**0.19**	**3.39**	**0.06**	**17.8**	**11.1**	**54.1**	**1.8**	**12.8**	**2.7**	**26.1**	**2.8**
Large Birds Overall	**5.26**	**1.68**	**6.26**	**3.02**	**100**	**100**	**100**	**100**	**NA**	**NA**	**NA**	**NA**

1. 800-meter radius plot for large birds.

NA = not applicable.

Sums of values may not equal totals shown due to rounding.

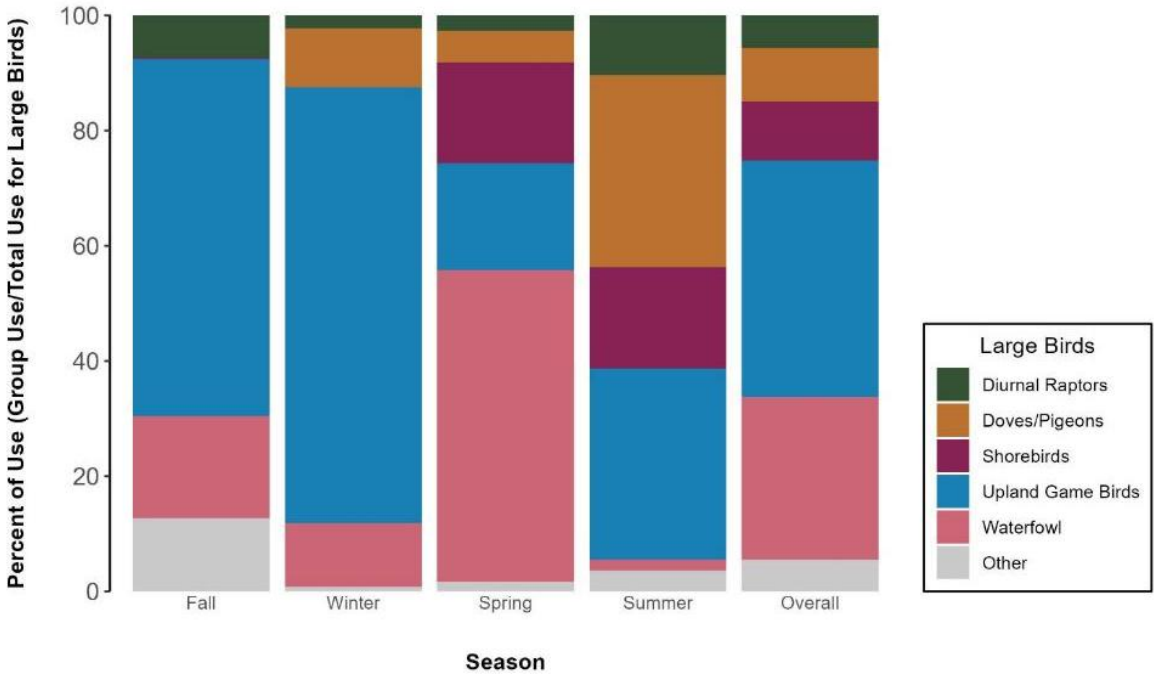

Figure 6b. Large bird percent of use, by season and bird type, at the Longspur Wind Project in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

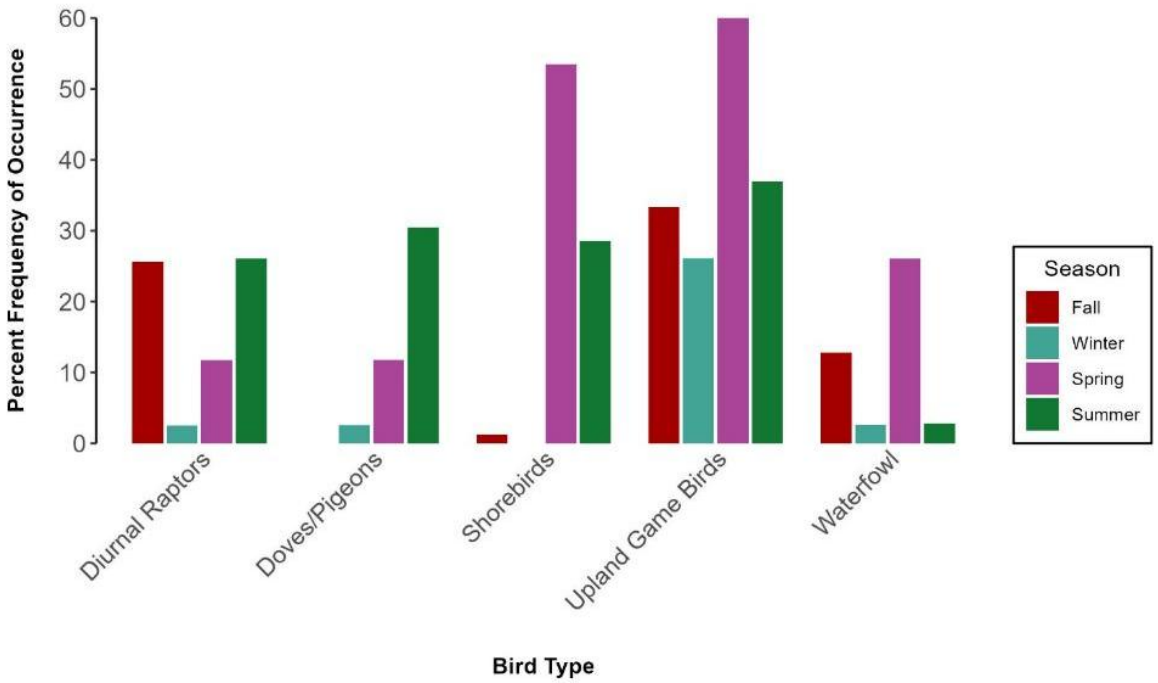

Figure 6c. Large bird frequency of occurrence, by season and bird type, at the Longspur Wind Project in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

Large Bird Mean Flight Height

Mean large bird initial flight heights ranged from two m for upland game birds to 114 m for waterbirds. Waterbirds (76.7%), large corvids (60.0%), and waterfowl (44.0%) initial flight heights were recorded most frequently within the RSH (25–150 m; Table 5). Initial flight heights generally were less than 25 m for most other bird types, and only three bird types were initially observed flying above 150 m: waterfowl (34.1%), waterbirds (18.6%), and diurnal raptors (7.3%; Table 5).

Spatial Variation

Mean Use by Survey Point

Large bird use ranged from 1.00 observations/800-m radius plot/60-min survey to 13.50 across survey points (Appendix C1). Only six survey points had a mean use greater than 5.00, and three survey points (2, 4, and 30) had a mean use greater than 10.00. The higher use at survey points 4 and 30 were driven primarily by upland game birds, and waterfowl contributed to most of the mean use observed at Survey Point 2. High use by these two bird types could have been a result of localized feeding opportunities. Similarly, upland game birds or waterfowl were the main contributors to mean use for the three additional survey points with a mean use greater than 5.0 (survey points 16, 21, and 35; Figure 7; Appendix C1).

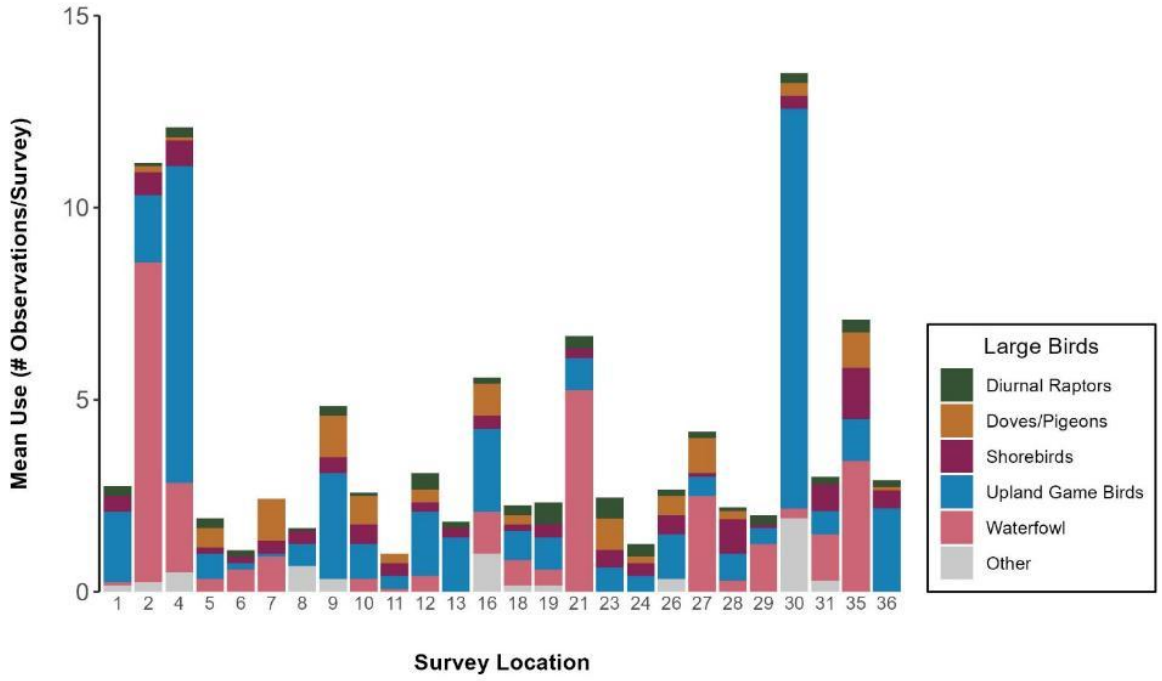

Figure 7. Large bird mean use (observations/plot/60-minute survey), by survey point and bird type, at the Longspur Wind Project in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

Small Birds

In total, 40 species of small birds were observed or heard over the 51 hours of surveys during the survey period (Appendix A2).

Mean Use, Percent of Use, and Frequency of Occurrence

Mean use, percent of use, and frequency of occurrence were calculated by season for small bird types (Figures 8a–c) and species (Appendix B2). Small bird mean use was highest during fall (10.55), followed by winter (8.35), summer (7.62), and spring (7.11; Figure 8a; Appendix B2). Overall small bird mean use was 8.4 observations/100-m radius plot/10-min survey (averaged; Appendix B2). Passerines dominated the composition of species groups observed during all surveys, with blackbirds/orioles comprising the majority of mean use in fall (69.9%), spring (64.3%), and summer (65.3%), and grassland/sparrows comprising the majority of use during winter (98.0%; Figure 8b).

Similarly, blackbirds/orioles and/or grassland/sparrows were the most frequently observed subgroups in all seasons. Blackbirds/orioles were observed during 20.5% of fall surveys, 76.8% of spring surveys, and 47.7% of summer surveys. Grassland/sparrows were observed during 51.3% of fall surveys, 34.9% of winter surveys, 54.6% of spring surveys, and 45.7% of summer surveys (Figure 8c; Appendix B2).

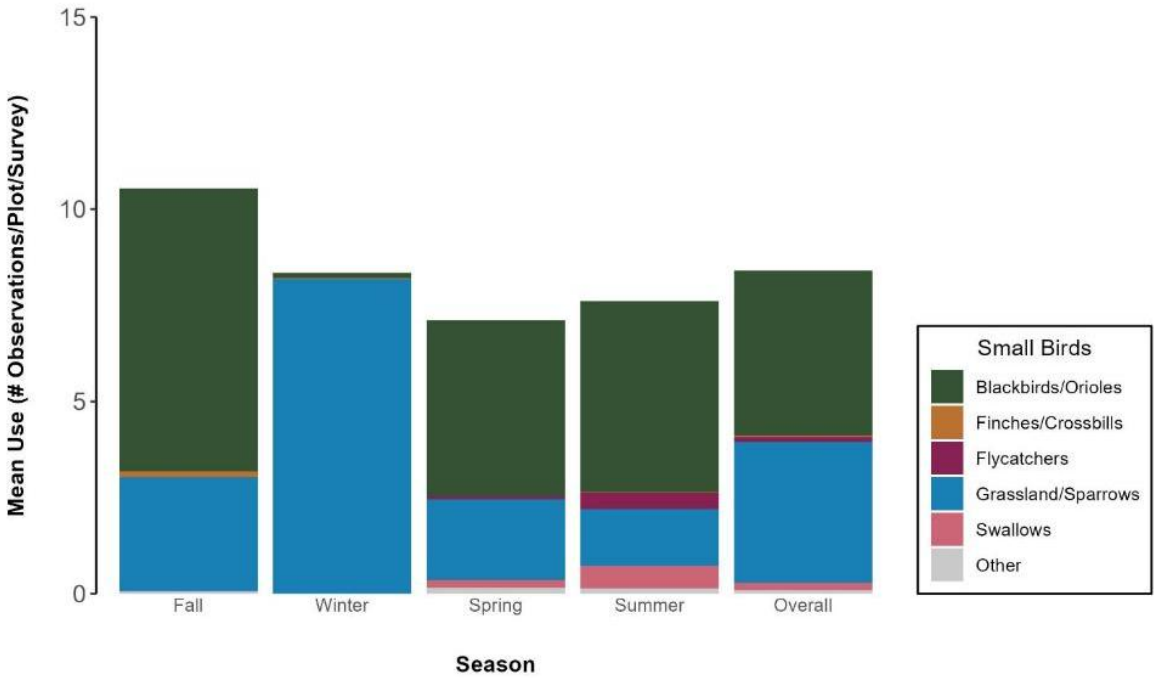

Figure 8a. Small bird mean use (observations/plot/10-minute survey), by season and bird type, at the Longspur Wind Project in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

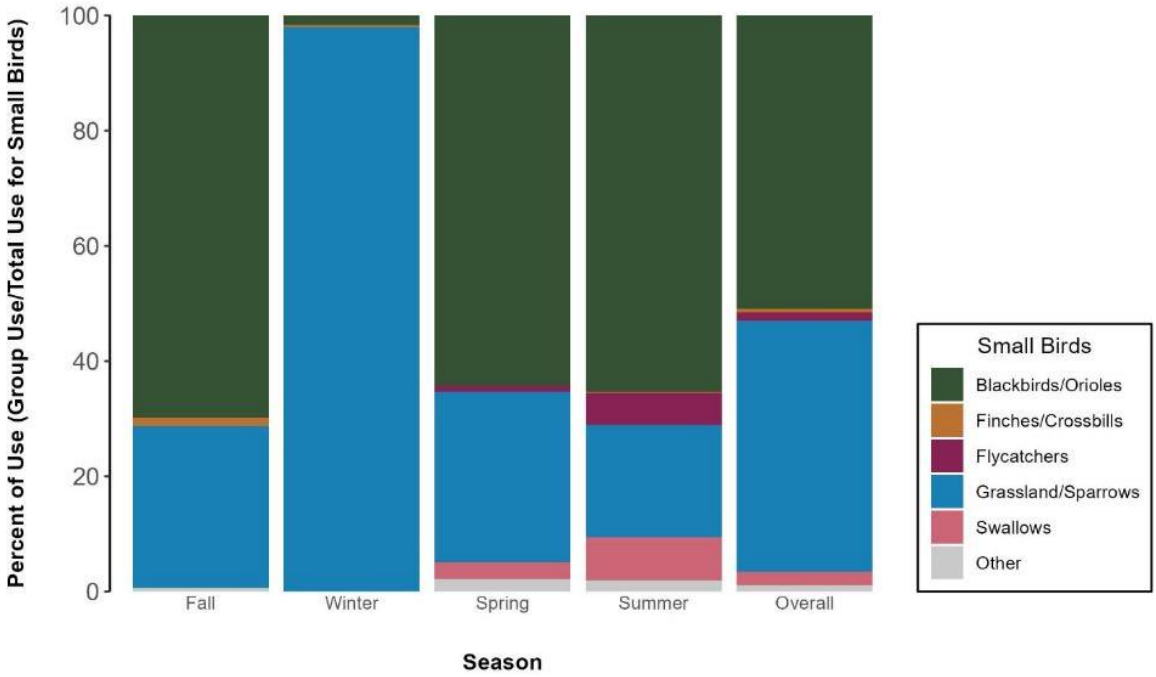

Figure 8b. Small bird percent of use, by season and bird type, at the Longspur Wind Project in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

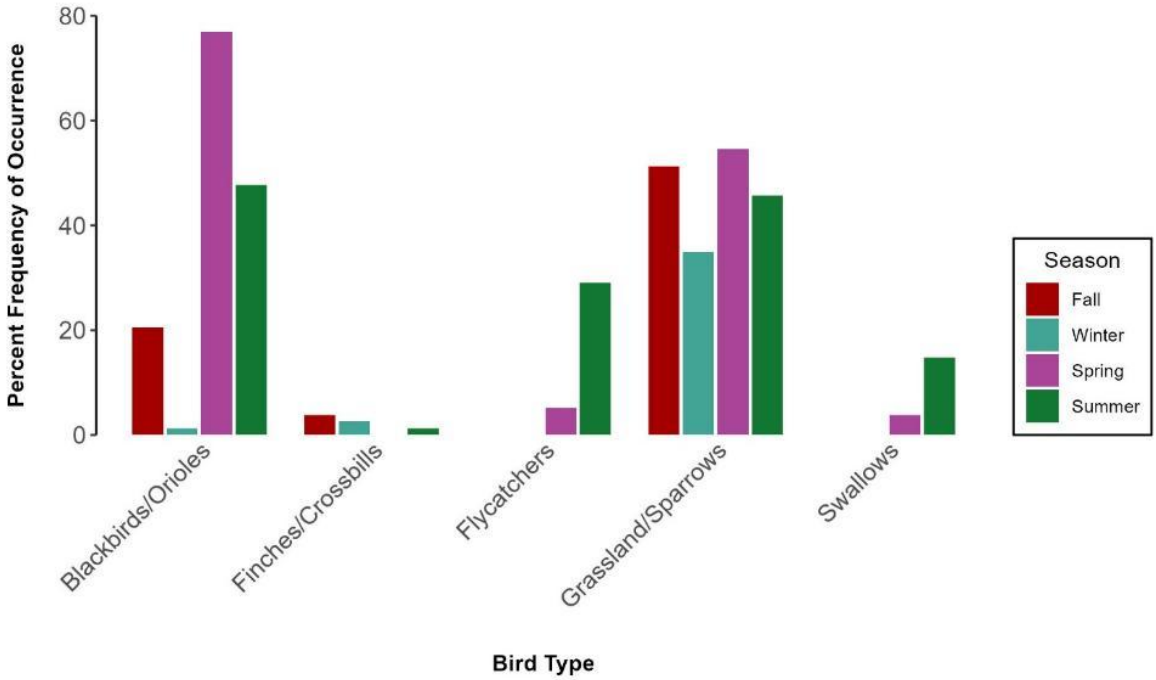

Figure 8c. Small bird frequency of occurrence, by season and bird type, at the Longspur Wind Project in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

Small Bird Mean Flight Height

Mean small bird initial flight heights ranged from two m for flycatchers to six m for finches/crossbills and blackbirds/orioles (Table 8). Most small birds (93.7%) were initially observed flying below 25 m, with only one subtype (blackbirds/orioles; 12.0%) initially observed flying within the RSH (25–150 m; Table 8).

Table 8. Small bird group and individual observation flight height characteristics, by bird type[1] and passerine subtype, during avian use surveys at the Longspur Wind Project area in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

Bird Type/Subtype	# Groups Flying	# Obs Flying	% Obs Flying	Mean Flight Height (m)	% within Flight Height Categories		
					<25 m	25–150 m[2]	> 150 m
Passerines	**204**	**1,894**	**73.6**	**5**	**93.7**	**6.3**	**0**
Blackbirds/Orioles	*92*	*1,001*	*76.8*	*6*	*88.0*	*12.0*	*0*
Finches/Crossbills	*4*	*8*	*57.1*	*6*	*100*	*0*	*0*
Flycatchers	*17*	*22*	*59.5*	*2*	*100*	*0*	*0*
Grassland/Sparrows	*72*	*801*	*70.4*	*4*	*100*	*0*	*0*
Mimids	*1*	*1*	*100*	*6*	*100*	*0*	*0*
Shrikes	*0*	*0*	*0*	*NA*	*NA*	*NA*	*NA*
Swallows	*16*	*58*	*100*	*3*	*100*	*0*	*0*
Thrushes	*0*	*0*	*0*	*NA*	*NA*	*NA*	*NA*
Warblers	*2*	*3*	*30.0*	*3*	*100*	*0*	*0*
Woodpeckers	**0**	**0**	**0**	**NA**	**NA**	**NA**	**NA**
Small Birds Overall	**204**	**1,894**	**73.4**	**5**	**93.7**	**6.3**	**0**

1. 100-meter (m) radius plot for small birds.

2. The assumed rotor-swept height for potential collision with a turbine blade, or 25–150 m above ground level.

Zeroes and NA values indicate that the species was observed but was not flying.

obs = observations

All metrics are developed based on First Activity and First Flight Height.

Spatial Variation

Mean Use by Survey Point

Small bird use ranged from 2.33 observations/100-m radius plot/10-min survey to 49.70 across survey points (Appendix C2). Mean use at Point 28 (49.70) was more than twice as high as use recorded at any other point due to two groups of Brewer's blackbirds totaling 450 individuals observed on September 21, 2024, likely migrating. Mean use at Points 26 and 18 was also relatively high (21.00 and 19.67, respectively), with mean use driven by grassland/sparrows at Point 26 and blackbirds/orioles at Point 18 (Figure 9; Appendix C2).

Incidental Observations

Five avian species categorized as species of concern were incidentally observed during the study period (Table 9). Three bald eagles were observed outside of the survey period but within the Project boundary. Given they were not recorded within a plot and during the 60-min survey, they were recorded as incidental and not included in the analysis. The species with the highest number of incidental observations were horned lark (14 observations) and western meadowlark (10; Table

9). All species observed incidentally were also observed during standardized surveys (Table 9; Appendices A1 and A2).

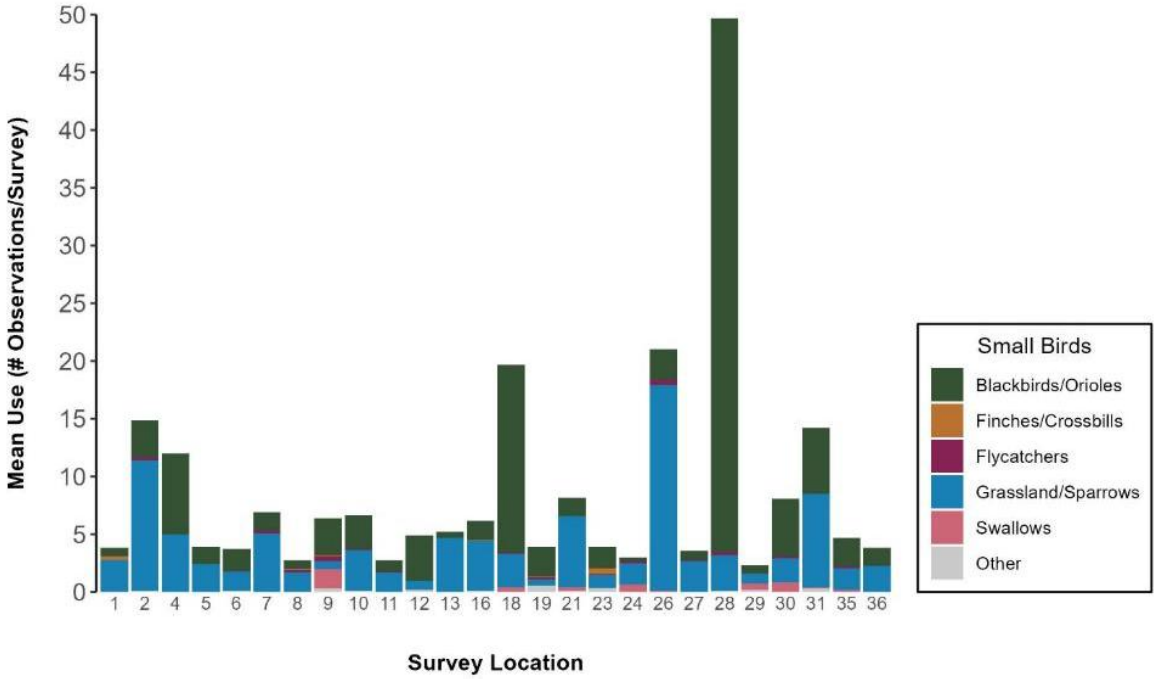

Figure 9. Small bird mean use (observations/plot/10-minute survey), by survey point, at the Longspur Wind Project in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

Table 9. Incidental species of concern observed at the Longspur Wind Project in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

Species	Scientific Name	# grps	# obs
American kestrel	*Falco sparverius*	1	1
bald eagle	*Haliaeetus leucocephalus*	3	3
horned lark	*Eremophila alpestris*	7	14
northern harrier	*Circus hudsonius*	2	2
western meadowlark	*Sturnella neglecta*	9	10
Total	**5 species**	**22**	**30**

grps = groups; obs = observations.

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Appendix A. All Birds Observed, by Season, at the Longspur Wind Project, Morton County, North Dakota, during Standardized Avian Use Surveys, September 21, 2024 – August 27, 2025

Appendix A1. Summary of all groups and individual observations of large birds, regardless of distance from the observer, by bird type and species, during avian use surveys at the Longspur Wind Project in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

Type/Subtype/Species	Scientific Name	Fall		Winter		Spring		Summer		Total	
		# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs
Diurnal Raptors		**29**	**30**	**4**	**4**	**12**	**13**	**21**	**23**	**66**	**70**
Buteo spp.		*9*	*10*	*2*	*2*	*6*	*7*	*19*	*21*	*36*	*40*
ferruginous hawk	*Buteo regalis*	0	0	0	0	2	2	0	0	2	2
red-tailed hawk	*Buteo jamaicensis*	7	7	1	1	3	4	13	13	24	25
rough-legged hawk	*Buteo lagopus*	0	0	1	1	0	0	0	0	1	1
Swainson's hawk	*Buteo swainsoni*	2	3	0	0	1	1	6	8	9	12
Eagles		*0*	*0*	*2*	*2*	*0*	*0*	*0*	*0*	*2*	*2*
bald eagle	*Haliaeetus leucocephalus*	0	0	1	1	0	0	0	0	1	1
golden eagle	*Aquila chrysaetos*	0	0	1	1	0	0	0	0	1	1
Falco spp.		*6*	*6*	*0*	*0*	*5*	*5*	*1*	*1*	*12*	*12*
American kestrel	*Falco sparverius*	5	5	0	0	5	5	1	1	11	11
merlin	*Falco columbarius*	1	1	0	0	0	0	0	0	1	1
Northern Harrier		*13*	*13*	*0*	*0*	*1*	*1*	*1*	*1*	*15*	*15*
northern harrier	*Circus hudsonius*	13	13	0	0	1	1	1	1	15	15
Other Raptors		*1*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*1*
unidentified raptor	–	1	1	0	0	0	0	0	0	1	1
Doves/Pigeons		**0**	**0**	**2**	**13**	**10**	**26**	**22**	**71**	**34**	**110**
mourning dove	*Zenaida macroura*	0	0	0	0	10	26	22	71	32	97
rock pigeon	*Columba livia*	0	0	2	13	0	0	0	0	2	13
Gulls/Terns		0	0	0	0	3	5	3	4	6	9
black tern	*Chlidonias niger*	0	0	0	0	1	2	1	2	2	4
ring-billed gull	*Larus delawarensis*	0	0	0	0	2	3	1	1	3	4
unidentified gull	–	0	0	0	0	0	0	1	1	1	1
Large Corvids		**3**	**5**	**1**	**1**	**2**	**2**	**0**	**0**	**6**	**8**
American crow	*Corvus brachyrhynchos*	1	1	0	0	2	2	0	0	3	3
black-billed magpie	*Pica hudsonia*	0	0	1	1	0	0	0	0	1	1
common raven	*Corvus corax*	2	4	0	0	0	0	0	0	2	4
Owls		**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**
great horned owl	*Bubo virginianus*	1	1	0	0	0	0	0	0	1	1
Rails/Coots		**2**	**5**	**0**	**0**	**1**	**1**	**1**	**1**	**4**	**7**
American coot	*Fulica americana*	2	5	0	0	0	0	0	0	2	5
sora	*Porzana carolina*	0	0	0	0	1	1	1	1	2	2
Shorebirds		**1**	**1**	**0**	**0**	**63**	**84**	**26**	**39**	**90**	**124**
killdeer	*Charadrius vociferus*	0	0	0	0	13	14	12	24	25	38
marbled godwit	*Limosa fedoa*	0	0	0	0	17	27	7	7	24	34

Appendix A1. Summary of all groups and individual observations of large birds, regardless of distance from the observer, by bird type and species, during avian use surveys at the Longspur Wind Project in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

Type/Subtype/Species	Scientific Name	Fall		Winter		Spring		Summer		Total	
		# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs
upland sandpiper	*Bartramia longicauda*	0	0	0	0	20	28	5	5	25	33
Wilson's phalarope	*Phalaropus tricolor*	0	0	0	0	1	1	0	0	1	1
Wilson's snipe	*Gallinago delicata*	1	1	0	0	12	14	2	3	15	18
Upland Game Birds		**48**	**254**	**23**	**97**	**54**	**89**	**33**	**72**	**158**	**512**
gray partridge	*Perdix perdix*	9	70	5	30	9	16	8	24	31	140
ring-necked pheasant	*Phasianus colchicus*	36	163	18	67	45	73	24	47	123	350
sharp-tailed grouse	*Tympanuchus phasianellus*	3	21	0	0	0	0	1	1	4	22
Vultures		**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**1**	**1**
turkey vulture	*Cathartes aura*	0	0	0	0	0	0	1	1	1	1
Waterbirds		**4**	**41**	**0**	**0**	**0**	**0**	**1**	**2**	**5**	**43**
great blue heron	*Ardea herodias*	0	0	0	0	0	0	1	2	1	2
great egret	*Ardea alba*	1	2	0	0	0	0	0	0	1	2
sandhill crane	*Antigone canadensis*	3	39	0	0	0	0	0	0	3	39
Waterfowl		**12**	**73**	**2**	**14**	**34**	**263**	**2**	**4**	**50**	**354**
blue-winged teal	*Spatula discors*	0	0	0	0	2	9	0	0	2	9
bufflehead	*Bucephala albeola*	0	0	0	0	1	1	0	0	1	1
Canada goose	*Branta canadensis*	2	3	2	14	14	205	0	0	18	222
canvasback	*Aythya valisineria*	0	0	0	0	1	2	1	2	2	4
mallard	*Anas platyrhynchos*	1	5	0	0	13	37	1	2	15	44
northern pintail	*Anas acuta*	0	0	0	0	1	2	0	0	1	2
northern shoveler	*Spatula clypeata*	0	0	0	0	1	3	0	0	1	3
redhead	*Aythya americana*	0	0	0	0	1	4	0	0	1	4
snow goose	*Anser caerulescens*	2	45	0	0	0	0	0	0	2	45
tundra swan	*Cygnus columbianus*	2	10	0	0	0	0	0	0	2	10
unidentified duck	–	5	10	0	0	0	0	0	0	5	10
Overall		**100**	**410**	**32**	**129**	**179**	**483**	**110**	**217**	**421**	**1,239**

grps = groups; obs = observations.

Appendix A2. Summary of all groups and individual observations of small birds, regardless of distance from the observer, by bird type and species, during avian use surveys at the Longspur Wind Project in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

		Fall		Winter		Spring		Summer		Total	
Type/Subtype/Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Passerines		**105**	**819**	**47**	**649**	**181**	**546**	**160**	**560**	**493**	**2,574**
Blackbirds/Orioles		*26*	*575*	*1*	*11*	*108*	*350*	*64*	*368*	*199*	*1,304*
bobolink	*Dolichonyx oryzivorus*	0	0	0	0	0	0	2	3	2	3
Brewer's blackbird	*Euphagus cyanocephalus*	2	450	0	0	4	10	2	5	8	465
brown-headed cowbird	*Molothrus ater*	1	22	0	0	15	50	11	28	27	100
common grackle	*Quiscalus quiscula*	0	0	0	0	5	7	2	8	7	15
European starling	*Sturnus vulgaris*	1	4	1	11	1	3	0	0	3	18
red-winged blackbird	*Agelaius phoeniceus*	2	65	0	0	24	156	22	253	48	474
rusty blackbird	*Euphagus carolinus*	2	9	0	0	0	0	0	0	2	9
western meadowlark	*Sturnella neglecta*	18	25	0	0	57	112	22	47	97	184
yellow-headed blackbird	*Xanthocephalus xanthocephalus*	0	0	0	0	2	12	3	24	5	36
Finches/Crossbills		*4*	*11*	*2*	*2*	*0*	*0*	*1*	*1*	*7*	*14*
American goldfinch	*Spinus tristis*	4	11	2	2	0	0	1	1	7	14
Flycatchers		*0*	*0*	*0*	*0*	*5*	*6*	*23*	*31*	*28*	*37*
eastern kingbird	*Tyrannus tyrannus*	0	0	0	0	3	4	18	25	21	29
Say's phoebe	*Sayornis saya*	0	0	0	0	0	0	1	1	1	1
western kingbird	*Tyrannus verticalis*	0	0	0	0	2	2	4	5	6	7
Grassland/Sparrows		*74*	*232*	*44*	*636*	*57*	*162*	*50*	*108*	*225*	*1,138*
American pipit	*Anthus rubescens*	0	0	0	0	1	14	0	0	1	14
American tree sparrow	*Spizelloides arborea*	0	0	0	0	1	2	0	0	1	2
chestnut-collared longspur	*Calcarius ornatus*	0	0	0	0	0	0	1	2	1	2
chipping sparrow	*Spizella passerina*	0	0	0	0	2	2	0	0	2	2
dark-eyed junco	*Junco hyemalis*	0	0	1	50	0	0	0	0	1	50
fox sparrow	*Passerella iliaca*	1	4	0	0	0	0	0	0	1	4
grasshopper sparrow	*Ammodramus savannarum*	1	1	0	0	0	0	2	2	3	3
horned lark	*Eremophila alpestris*	37	74	23	185	24	66	21	60	105	385
house sparrow	*Passer domesticus*	0	0	0	0	0	0	1	1	1	1
Lapland longspur	*Calcarius lapponicus*	9	112	4	22	0	0	0	0	13	134
lark bunting	*Calamospiza melanocorys*	0	0	0	0	3	35	0	0	3	35
lark sparrow	*Chondestes grammacus*	0	0	0	0	1	1	0	0	1	1
Savannah sparrow	*Passerculus sandwichensis*	5	5	0	0	2	2	0	0	7	7
snow bunting	*Plectrophenax nivalis*	5	15	16	379	0	0	0	0	21	394
song sparrow	*Melospiza melodia*	0	0	0	0	0	0	1	1	1	1
vesper sparrow	*Pooecetes gramineus*	1	1	0	0	23	40	24	42	48	83
white-crowned sparrow	*Zonotrichia leucophrys*	3	6	0	0	0	0	0	0	3	6

Appendix A2. Summary of all groups and individual observations of small birds, regardless of distance from the observer, by bird type and species, during avian use surveys at the Longspur Wind Project in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

		Fall		Winter		Spring		Summer		Total	
Type/Subtype/Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
unidentified sparrow	–	12	14	0	0	0	0	0	0	12	14
Mimids		*0*	*0*	*0*	*0*	*0*	*0*	*1*	*1*	*1*	*1*
brown thrasher	*Toxostoma rufum*	0	0	0	0	0	0	1	1	1	1
Shrikes		*0*	*0*	*0*	*0*	*1*	*1*	*0*	*0*	*1*	*1*
loggerhead shrike	*Lanius ludovicianus*	0	0	0	0	1	1	0	0	1	1
Swallows		*0*	*0*	*0*	*0*	*3*	*16*	*13*	*42*	*16*	*58*
bank swallow	*Riparia riparia*	0	0	0	0	0	0	1	1	1	1
barn swallow	*Hirundo rustica*	0	0	0	0	2	14	12	41	14	55
tree swallow	*Tachycineta bicolor*	0	0	0	0	1	2	0	0	1	2
Thrushes		*0*	*0*	*0*	*0*	*6*	*10*	*1*	*1*	*7*	*11*
American robin	*Turdus migratorius*	0	0	0	0	6	10	1	1	7	11
Warblers		*1*	*1*	*0*	*0*	*1*	*1*	*7*	*8*	*9*	*10*
common yellowthroat	*Geothlypis trichas*	0	0	0	0	1	1	5	6	6	7
yellow warbler	*Setophaga petechia*	0	0	0	0	0	0	2	2	2	2
yellow-rumped warbler	*Setophaga coronata*	1	1	0	0	0	0	0	0	1	1
Woodpeckers		**3**	**4**	**0**	**0**	**0**	**0**	**1**	**1**	**4**	**5**
northern flicker	*Colaptes auratus*	3	4	0	0	0	0	1	1	4	5
Overall		**108**	**823**	**47**	**649**	**181**	**546**	**161**	**561**	**497**	**2,579**

grps = groups; obs = observations.

Appendix B. Mean Use, Percent of Use, and Frequency of Occurrence for All Birds during Avian Use Surveys at the Longspur Wind Project in Morton County, North Dakota, from September 21, 2024 – August 27, 2025

Appendix B1. Large bird mean use (number of large birds/plot[1]/60-minute survey), percent of use (%), and frequency of occurrence (%), by season, during avian use surveys at the Longspur Wind Project in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

	Mean Use				% of Use				% Frequency			
Type/Subtype/Species	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**
Diurnal Raptors	**0.38**	**0.04**	**0.17**	**0.31**	**7.3**	**2.3**	**2.7**	**10.4**	**25.6**	**2.6**	**11.7**	**26.0**
Buteo spp.	*0.13*	*0.01*	*0.09*	*0.29*	*2.4*	*0.8*	*1.4*	*9.6*	*11.5*	*1.3*	*6.5*	*23.4*
ferruginous hawk	0	0	0.03	0	0	0	0.4	0	0	0	1.3	0
red-tailed hawk	0.09	0	0.05	0.18	1.7	0	0.8	5.9	9.0	0	3.8	16.5
rough-legged hawk	0	0.01	0	0	0	0.8	0	0	0	1.3	0	**0**
Swainson's hawk	0.04	0	0.01	0.11	0.7	0	0.2	3.7	2.6	0	1.3	8.4
Eagles	*0*	*0.03*	*0*	*0*	*0*	*1.5*	*0*	*0*	*0*	*2.6*	*0*	*0*
bald eagle	0	0.01	0	0	0	0.8	0	0	0	1.3	0	0
golden eagle	0	0.01	0	0	0	0.8	0	0	0	1.3	0	**0**
Falco spp.	*0.08*	*0*	*0.07*	*0.01*	*1.5*	*0*	*1.1*	*0.4*	*7.7*	*0*	*5.3*	*1.3*
American kestrel	0.06	0	0.07	0.01	1.2	0	1.1	0.4	6.4	0	5.3	1.3
merlin	0.01	0	0	0	0.2	0	0	0	1.3	0	0	0
Northern Harrier	*0.17*	*0*	*0.01*	*0.01*	*3.2*	*0*	*0.2*	*0.4*	*14.1*	*0*	*1.3*	*1.3*
northern harrier	0.17	0	0.01	0.01	3.2	0	0.2	0.4	14.1	0	1.3	1.3
Other Raptors	*0.01*	*0*	*0*	*0*	*0.2*	*0*	*0*	*0*	*1.3*	*0*	*0*	*0*
unidentified raptor	0.01	0	0	0	0.2	0	0	0	1.3	0	0	*0*
Doves/Pigeons	**0**	**0.17**	**0.34**	**1.00**	**0**	**10.2**	**5.5**	**33.3**	**0**	**2.6**	**11.8**	**30.4**
mourning dove	0	0	0.34	1.00	0	0	5.5	33.3	0	0	11.8	*30.4*
rock pigeon	0	0.17	0	0	0	10.2	0	0	0	2.6	0	0
Gulls/Terns	**0**	**0**	**0.07**	**0.06**	**0**	**0**	**1.0**	**1.8**	**0**	**0**	**3.9**	**4.1**
black tern	0	0	0.03	0.03	0	0	0.4	1.0	0	0	1.3	1.4
ring-billed gull	0	0	0.04	0.01	0	0	0.6	0.4	0	0	2.6	1.3
unidentified gull	0	0	0	0.01	0	0	0	0.4	0	0	0	*1.3*
Large Corvids	**0.06**	**0.01**	**0.03**	**0**	**1.2**	**0.8**	**0.4**	**0**	**3.8**	**1.3**	**2.6**	**0**
American crow	0.01	0	0.03	0	0.2	0	0.4	0	1.3	0	2.6	*0*
black-billed magpie	0	0.01	0	0	0	0.8	0	0	0	1.3	0	0
common raven	0.05	0	0	0	1.0	0	0	0	2.6	0	0	*0*
Owls	0.01	0	0	0	0.2	0	0	0	1.3	0	0	0
great horned owl	0.01	0	0	0	0.2	0	0	0	1.3	0	0	*0*
Rails/Coots	**0.06**	**0**	**0.01**	**0.01**	**1.2**	**0**	**0.2**	**0.4**	**1.3**	**0**	**1.3**	**1.3**
American coot	0.06	0	0	0	1.2	0	0	0	1.3	0	0	0
sora	0	0	0.01	0.01	0	0	0.2	0.4	0	0	1.3	1.3
Shorebirds	**0.01**	**0**	**1.10**	**0.53**	**0.2**	**0**	**17.5**	**17.6**	**1.3**	**0**	**53.5**	**28.5**
killdeer	0	0	0.18	0.33	0	0	2.9	10.9	0	0	16.9	16.4
marbled godwit	0	0	0.35	0.09	0	0	5.6	3.1	0	0	22.2	9.3

Appendix B1. Large bird mean use (number of large birds/plot[1]/60-minute survey), percent of use (%), and frequency of occurrence (%), by season, during avian use surveys at the Longspur Wind Project in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

	Mean Use				% of Use				% Frequency			
Type/Subtype/Species	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**
upland sandpiper	0	0	0.37	0.07	0	0	5.8	2.2	0	0	24.9	6.7
Wilson's phalarope	0	0	0.01	0	0	0	0.2	0	0	0	1.3	0
Wilson's snipe	0.01	0	0.18	0.04	0.2	0	2.9	1.4	1.3	0	15.7	2.8
Upland Game Birds	**3.26**	**1.27**	**1.16**	**1.00**	**62.0**	**75.7**	**18.5**	**33.2**	**33.3**	**26.1**	**59.9**	**36.9**
gray partridge	0.90	0.40	0.21	0.34	17.1	23.6	3.3	11.2	11.5	6.6	11.7	10.9
ring-necked pheasant	2.09	0.88	0.95	0.65	39.8	52.1	15.2	21.6	29.5	22.2	58.6	32.9
sharp-tailed grouse	0.27	0	0	0.01	5.1	0	0	0.4	2.6	0	0	1.3
Vultures	**0**	**0**	**0**	**0.01**	**0**	**0**	**0**	**0.4**	**0**	**0**	**0**	**1.3**
turkey vulture	0	0	0	0.01	0	0	0	0.4	0	0	0	1.3
Waterbirds	**0.53**	**0**	**0**	**0.03**	**10.0**	**0**	**0**	**1.0**	**5.1**	**0**	**0**	**1.4**
great blue heron	0	0	0	0.03	0	0	0	1.0	0	0	0	1.4
great egret	0.03	0	0	0	0.5	0	0	0	1.3	0	0	0
sandhill crane	0.50	0	0	0	9.5	0	0	0	3.8	0	0	0
Waterfowl	**0.94**	**0.19**	**3.39**	**0.06**	**17.8**	**11.1**	**54.1**	**1.8**	**12.8**	**2.7**	**26.1**	**2.8**
blue-winged teal	0	0	0.12	0	0	0	1.8	0	0	0	2.6	0
bufflehead	0	0	0.01	0	0	0	0.2	0	0	0	1.3	0
Canada goose	0.04	0.19	2.63	0	0.7	11.1	42.0	0	2.6	2.7	15.5	0
canvasback	0	0	0.03	0.03	0	0	0.4	0.9	0	0	1.3	1.3
mallard	0.06	0	0.48	0.03	1.2	0	7.7	1.0	1.3	0	13.1	1.4
northern pintail	0	0	0.03	0	0	0	0.4	0	0	0	1.3	0
northern shoveler	0	0	0.04	0	0	0	0.6	0	0	0	1.3	0
redhead	0	0	0.05	0	0	0	0.9	0	0	0	1.3	0
snow goose	0.58	0	0	0	11.0	0	0	0	2.6	0	0	0
tundra swan	0.13	0	0	0	2.4	0	0	0	1.3	0	0	0
unidentified duck	0.13	0	0	0	2.4	0	0	0	5.1	0	0	0
Overall	**5.26**	**1.68**	**6.26**	**3.02**	**100**	**100**	**100**	**100**	**NA**	**NA**	**NA**	**NA**

[1.] 800-meter radius plot for large birds.

NA = not applicable.

Sums of values may not equal totals shown due to rounding.

Appendix B2. Small bird mean use (number of small birds/plot[1]/10-minute survey), percent of use (%), and frequency of occurrence (%), by season, during avian use surveys at the Longspur Wind Project in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

	Mean Use				% of Use				% Frequency			
Type/Subtype/Species	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**
Passerines	**10.50**	**8.35**	**7.11**	**7.61**	**99.5**	**100**	**100**	**99.8**	**62.8**	**36.3**	**84.6**	**80.4**
Blackbird/Orioles	*7.37*	*0.14*	*4.57*	*4.98*	*69.9*	*1.7*	*64.2*	*65.3*	*20.5*	*1.3*	*768*	*47.7*
bobolink	0	0	0	0.04	0	0	0	0.5	0	0	0	2.7
Brewer's blackbird	5.77	0	0.13	0.07	54.7	0	1.8	0.9	1.3	0	5.2	2.7
brown-headed cowbird	0.28	0	0.65	0.37	2.7	0	9.1	4.9	1.3	0	19.4	14.6
common grackle	0	0	0.09	0.11	0	0	1.3	1.4	0	0	6.5	2.7
European starling	0.05	0.14	0.04	0	0.5	1.7	0.5	0	1.3	1.3	1.3	0
red-winged blackbird	0.83	0	2.05	3.42	7.9	0	28.8	44.9	2.6	0	31.2	28.8
rusty blackbird	0.12	0	0	0	1.1	0	0	0	1.3	0	0	0
western meadowlark	0.32	0	1.46	0.65	3.0	0	20.5	8.5	15.4	0	69.1	30.3
yellow-headed blackbird	0	0	0.15	0.32	0	0	2.2	4.2	0	0	2.6	4.1
Finches/Crossbills	*0.14*	*0.03*	*0*	*0.01*	*1.3*	*0.3*	*0*	*0.2*	*3.8*	*2.6*	*0*	*1.3*
American goldfinch	0.14	0.03	0	0.01	1.3	0.3	0	0.2	3.8	2.6	0	1.3
Flycatchers	*0*	*0*	*0.08*	*0.42*	*0*	*0*	*1.1*	*5.6*	*0*	*0*	*5.1*	*29.0*
eastern kingbird	0	0	0.05	0.35	0	0	0.7	4.6	0	0	3.8	25.1
Say's phoebe	0	0	0	0.01	0	0	0	0.2	0	0	0	1.3
western kingbird	0	0	0.03	0.06	0	0	0.4	0.8	0	0	2.6	5.2
Grassland/Sparrows	*2.97*	*8.17*	*2.12*	*1.48*	*28.1*	*98*	*29.7*	*19.4*	*51.3*	*34.9*	*54.6*	*45.7*
American pipit	0	0	0.19	0	0	0	2.6	0	0	0	1.3	0
American tree sparrow	0	0	0.03	0	0	0	0.4	0	0	0	1.3	0
chestnut-collared longspur	0	0	0	0.03	0	0	0	0.3	0	0	0	1.3
chipping sparrow	0	0	0.03	0	0	0	0.4	0	0	0	2.6	0
dark-eyed junco	0	0.64	0	0	0	7.7	0	0	0	1.3	0	0
fox sparrow	0.05	0	0	0	0.5	0	0	0	1.3	0	0	0
grasshopper sparrow	0.01	0	0	0.03	0.1	0	0	0.3	1.3	0	0	2.7
horned lark	0.95	2.38	0.86	0.81	9.0	28.6	12.1	10.7	35.9	20.7	31.1	28.9
house sparrow	0	0	0	0.01	0	0	0	0.2	0	0	0	1.3
Lapland longspur	1.44	0.29	0	0	13.6	3.5	0	0	11.5	5.3	0	0
lark bunting	0	0	0.45	0	0	0	6.3	0	0	0	3.8	0
lark sparrow	0	0	0.01	0	0	0	0.2	0	0	0	1.3	0
Savannah sparrow	0.06	0	0.03	0	0.6	0	0.4	0	3.8	0	2.7	0
snow bunting	0.19	4.86	0	0	1.8	58.2	0	0	6.4	19.3	0	0
song sparrow	0	0	0	0.01	0	0	0	0.2	0	0	0	1.4
vesper sparrow	0.01	0	0.52	0.59	0.1	0	7.3	7.7	1.3	0	28.6	33.5
white-crowned sparrow	0.08	0	0	0	0.7	0	0	0	3.8	0	0	0

unidentified sparrow	0.18	0	0	0	1.7	0	0	0	7.7	0	0	0
Mimids	*0*	*0*	*0*	*0.01*	*0*	*0*	*0*	*0.2*	*0*	*0*	*0*	*1.3*
brown thrasher	0	0	0	0.01	0	0	0	0.2	0	0	0	1.3
Shrikes	*0*	*0*	*0.01*	*0*	*0*	*0*	*0.2*	*0*	*0*	*0*	*1.3*	*0*
loggerhead shrike	0	0	0.01	0	0	0	0.2	0	0	0	1.3	0
Swallows	*0*	*0*	*0.21*	*0.57*	*0*	*0*	*2.9*	*7.5*	*0*	*0*	*3.8*	*14.8*
bank swallow	0	0	0	0.01	0	0	0	0.2	0	0	0	1.3
barn swallow	0	0	0.18	0.56	0	0	2.5	7.3	0	0	2.6	13.5
tree swallow	0	0	0.03	0	0	0	0.4	0	0	0	1.3	0
Thrushes	*0*	0	0.13	0.01	0	0	1.8	0.2	*0*	*0*	*7.8*	*1.4*
American robin	0	0	0.13	0.01	0	0	1.8	0.2	0	0	7.8	1.4
Warblers	*0.01*	*0*	*0.01*	*0.11*	*0.1*	*0*	*0.2*	*1.5*	*1.3*	*0*	*1.3*	*8.3*
common yellowthroat	0	0	0.01	0.08	0	0	0.2	1.1	0	0	1.3	6.9
yellow warbler	0	0	0	0.03	0	0	0	0.4	0	0	0	2.8
yellow-rumped warbler	0.01	0	0	0	0.1	0	0	0	1.3	0	0	0
Woodpeckers	**0.05**	**0**	**0**	**0.01**	**0.5**	**0**	**0**	**0.2**	**2.6**	**0**	**0**	**1.3**
northern flicker	0.05	0	0	0.01	0.5	0	0	0.2	2.6	0	0	1.3
Overall	**10.55**	**8.35**	**7.11**	**7.62**	**100**	**100**	**100**	**100**	**NA**	**NA**	**NA**	**NA**

[1.] 100-meter radius plot for small birds.

NA = not applicable.

Sums of values may not equal totals shown due to rounding.

Appendix C. Mean Use by Survey Point for All Birds during Avian Use Surveys at the Longspur Wind Project, Morton County, North Dakota, from September 21, 2024 – August 27, 2025

Appendix C1. Large bird mean use (number of large birds/60-minute survey), by survey point, observed at the Longspur Wind Project during avian use surveys in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

	Survey Point												
Bird Type	**1**	**2**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**16**
Diurnal Raptors	**0.25**	**0.08**	**0.25**	**0.25**	**0.17**	**0**	**0.08**	**0.25**	**0.08**	**0**	**0.42**	**0.17**	**0.17**
Buteos	*0.17*	*0.08*	*0*	*0.25*	*0.08*	*0*	*0*	*0.25*	*0*	*0*	*0.17*	*0.08*	*0.08*
Eagles	*0.08*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Falco spp.	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0.08*	*0*	*0.17*	*0.08*	*0*
Northern Harrier	*0*	*0*	*0.25*	*0*	*0.08*	*0*	*0.08*	*0*	*0*	*0*	*0.08*	*0*	*0.08*
Other Raptors	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Doves/Pigeons	**0**	**0.17**	**0.08**	**0.50**	**0**	**1.08**	**0**	**1.08**	**0.75**	**0.25**	**0.33**	**0**	**0.83**
Gulls/Terns	**0.17**	**0.08**	**0**	**0**	**0**	**0**	**0**	**0.08**	**0**	**0**	**0**	**0**	**0**
Large Corvids	**0**	**0.17**	**0.08**	**0**	**0**	**0**	**0**	**0.17**	**0**	**0**	**0**	**0**	**0**
Owls	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Rails/Coots	**0**	**0**	**0.42**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Shorebirds	**0.42**	**0.58**	**0.67**	**0.17**	**0.17**	**0.33**	**0.33**	**0.42**	**0.50**	**0.33**	**0.25**	**0.25**	**0.33**
Upland Game Birds	**1.83**	**1.75**	**8.25**	**0.67**	**0.17**	**0.08**	**0.58**	**2.75**	**0.92**	**0.33**	**1.67**	**1.42**	**2.17**
Vultures	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.08**	**0**	**0**	**0**	**0**	**0**
Waterbirds	**0**	**0**	**0**	**0**	**0**	**0**	**0.67**	**0**	**0**	**0**	**0**	**0**	**1**
Waterfowl	**0.08**	**8.33**	**2.33**	**0.33**	**0.58**	**0.92**	**0**	**0**	**0.33**	**0.08**	**0.42**	**0**	**1.08**
All Large Birds	**2.75**	**11.17**	**12.08**	**1.92**	**1.08**	**2.42**	**1.67**	**4.83**	**2.58**	**1.00**	**3.08**	**1.83**	**5.58**

Sums of values may not equal totals shown due to rounding.

Appendix C1 (*continued*). Large bird mean use (number of large birds/60-minute survey), by survey point, observed at the Longspur Wind Project during avian use surveys in Morton County, North Dakota, from September 21, 2024 – August 21, 2025.

	Survey Point												
Bird Type	**18**	**19**	**21**	**23**	**24**	**26**	**27**	**28**	**29**	**30**	**31**	**35**	**36**
Diurnal Raptors	**0.25**	**0.58**	**0.33**	**0.55**	**0.33**	**0.17**	**0.17**	**0.10**	**0.25**	**0.25**	**0.20**	**0.33**	**0.18**
Buteos	*0.25*	*0.58*	*0.17*	*0.27*	*0.17*	*0.08*	*0.17*	*0.10*	*0*	*0.17*	*0*	*0.17*	*0*
Eagles	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0.08*	*0*
Falco spp.	*0*	*0*	*0.08*	*0.18*	*0.17*	*0*	*0*	*0*	*0.17*	*0.08*	*0*	*0*	*0*
Northern Harrier	*0*	*0*	*0*	*0.09*	*0*	*0.08*	*0*	*0*	*0.08*	*0*	*0.20*	*0.08*	*0.18*
Other Raptors	*0*	*0*	*0.08*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Doves/Pigeons	**0.25**	**0**	**0**	**0.82**	**0.17**	**0.50**	**0.92**	**0.20**	**0**	**0.33**	**0**	**0.92**	**0.09**
Gulls/Terns	**0.17**	**0**	**0**	**0**	**0**	**0.08**	**0**	**0**	**0**	**0.17**	**0**	**0**	**0**
Large Corvids	**0**	**0**	**0**	**0**	**0**	**0.25**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Owls	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.10**	**0**	**0**

Appendix C1 (*continued*). Large bird mean use (number of large birds/60-minute survey), by survey point, observed at the Longspur Wind Project during avian use surveys in Morton County, North Dakota, from September 21, 2024 – August 21, 2025.

	Survey Point												
Bird Type	**18**	**19**	**21**	**23**	**24**	**26**	**27**	**28**	**29**	**30**	**31**	**35**	**36**
Rails/Coots	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0.20**	**0**	**0**
Shorebirds	**0.17**	**0.33**	**0.25**	**0.45**	**0.33**	**0.50**	**0.08**	**0.90**	**0.08**	**0.33**	**0.70**	**1.33**	**0.45**
Upland Game Birds	**0.75**	**0.83**	**0.83**	**0.64**	**0.42**	**1.17**	**0.50**	**0.70**	**0.42**	**10.42**	**0.60**	**1.08**	**2.18**
Vultures	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Waterbirds	**0**	**0.17**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1.75**	**0**	**0**	**0**
Waterfowl	**0.67**	**0.42**	**5.25**	**0**	**0**	**0**	**2.50**	**0.30**	**1.25**	**0.25**	**1.20**	**3.42**	**0**
All Large Birds	**2.25**	**2.33**	**6.67**	**2.45**	**1.25**	**2.67**	**4.17**	**2.20**	**2.00**	**13.50**	**3.00**	**7.08**	**2.91**

Sums of values may not equal totals shown due to rounding.

Appendix C2. Small bird mean use (number of small birds/10-minute survey), by survey point, observed at the Longspur Wind Project during avian use surveys in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

	Survey Point												
Bird Type	**1**	**2**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**16**
Passerines	**3.83**	**14.75**	**12.00**	**3.92**	**3.75**	**6.92**	**2.75**	**6.33**	**6.67**	**2.75**	**4.92**	**5.25**	**6.17**
Blackbirds/Orioles	*0.75*	*3.17*	*7.00*	*1.50*	*1.92*	*1.58*	*0.75*	*3.25*	*2.92*	*1.00*	*3.92*	*0.58*	*1.67*
Finches/Crossbills	*0.33*	*0*	*0*	*0*	*0*	*0*	*0.08*	*0.08*	*0*	*0*	*0*	*0*	*0.08*
Flycatchers	*0*	*0.25*	*0*	*0*	*0.08*	*0.25*	*0.25*	*0.42*	*0.08*	*0.08*	*0*	*0*	*0*
Grassland/Sparrows	*2.75*	*11.33*	*5.00*	*2.42*	*1.67*	*5.08*	*1.67*	*0.67*	*3.58*	*1.67*	*0.83*	*4.67*	*4.33*
Mimids	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0.08*	*0*	*0*	*0*	*0*	*0*
Shrikes	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Swallows	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1.67*	*0*	*0*	*0*	*0*	*0*
Thrushes	*0*	*0*	*0*	*0*	*0.08*	*0*	*0*	*0.08*	*0*	*0*	*0*	*0*	*0*
Warblers	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0.08*	*0*	*0.08*	*0*	*0*	*0*
Woodpeckers	**0**	**0.08**	**0**	**0**	**0**	**0**	**0**	**0.08**	*0*	*0.08*	*0*	*0.08*	*0*
All Small Birds	**3.83**	**14.83**	**12.00**	**3.92**	**3.75**	**6.92**	**2.75**	**6.42**	**6.67**	**2.75**	**4.92**	**5.25**	**6.17**

Sums of values may not equal totals shown due to rounding.

Appendix C2 (*continued*). Small bird mean use (number of small birds/10-minute survey), by survey point, observed at the Longspur Wind Project during avian use surveys in Morton County, North Dakota, from September 21, 2024 – August 27, 2025.

	Survey Point												
Bird Type	**18**	**19**	**21**	**23**	**24**	**26**	**27**	**28**	**29**	**30**	**31**	**35**	**36**
Passerines	**19.67**	**3.92**	**8.17**	**3.64**	**3.00**	**21.00**	**3.58**	**49.70**	**2.33**	**8.08**	**14.20**	**4.67**	**3.82**
Blackbirds/Orioles	*16.25*	*2.58*	*1.58*	*1.82*	*0.33*	*2.58*	*0.83*	*46.20*	*0.75*	*5*	*5.70*	*2.42*	*1.55*
Finches/Crossbills	*0*	*0.08*	*0*	*0.55*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Flycatchers	*0.08*	*0.17*	*0*	*0.09*	*0.17*	*0.50*	*0.08*	*0.30*	*0*	*0.17*	*0*	*0.17*	*0*
Grassland/Sparrows	*2.92*	*0.50*	*6.17*	*1.09*	*1.83*	*17.83*	*2.67*	*3.10*	*0.83*	*2.08*	*8.10*	*1.92*	*2.27*
Mimids	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Shrikes	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0.10*	*0*	*0*	*0*	*0*	*0*
Swallows	*0.42*	*0*	*0.33*	*0*	*0.67*	*0.08*	*0*	*0*	*0.58*	*0.83*	*0.10*	*0.17*	*0*
Thrushes	*0*	*0.58*	*0.08*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Warblers	*0*	*0*	*0*	*0.09*	*0*	*0*	*0*	*0*	*0.17*	*0*	*0.30*	*0*	*0*
Woodpeckers	**0**	**0**	**0**	**0.27**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
All Small Birds	**19.67**	**3.92**	**8.17**	**3.91**	**3.00**	**21.00**	**3.58**	**49.70**	**2.33**	**8.08**	**14.20**	**4.67**	**3.82**

Sums of values may not equal totals shown due to rounding.

APPENDIX C
Agency Notification Letters and Correspondence

Agency Notification Letters and Responses

C1. Agency Notification Letter Templates

Month, Day, Year

VIA U.S. Mail

Name
Agency
Title
Address
Address

Re: Longspur Wind Project
Morton and Mercer Counties, North Dakota
Request for Agency Comments

Dear Name:

Minnesota Power, an operating division of ALLETE, Inc., is proposing to construct an approximately 200 megawatt wind energy conversion facility, known as the Longspur Wind Project (Project), in Morton and Mercer Counties, North Dakota. The Project will include a 2.5-mile-long, 230-kilovolt (kV) transmission line (gen-tie line) to connect the Project's substation in Morton County to the existing Tri-County 230 kV substation in Mercer County, which will also serve as the Project's Point of Interconnection.

Minnesota Power plans to submit applications for a Certificate of Site Compatibility and a Certificate of Corridor Compatibility for the Project to the North Dakota Public Service Commission (ND PSC) in the fall of 2025. The Project is anticipated to be in operation before the end of 2027.

The Project's permanent facilities will include:

- Approximately 45 wind turbines and associated equipment
- Access roads to wind turbine locations
- Electrical collection lines
- A Project substation
- 2.5-mile 230kV Transmission Line
- An operations and maintenance facility
- Aircraft detection lighting system
- Up to two permanent meteorological towers

The Project's temporary facilities will include:

- Staging/laydown areas for construction activities
- Improvements to existing roads for transport and access during construction
- Crane paths between turbines during construction

The purpose of this letter is to provide notification of the proposed Project per Section 69-06-01-05 of the North Dakota Administrative Code. Minnesota Power is soliciting 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 Study Area that Minnesota Power should consider as it

moves forward with Project development. In addition, we ask that you provide information regarding any applicable permits that may be required from your office.

Minnesota Power respectfully requests your response within 30 days of receipt of this letter. Copies of all correspondence received in response to this letter will be included with the ND PSC application. Minnesota Power requests review of the Study Area shown within the legal descriptions provided in the table below and on the attached map.

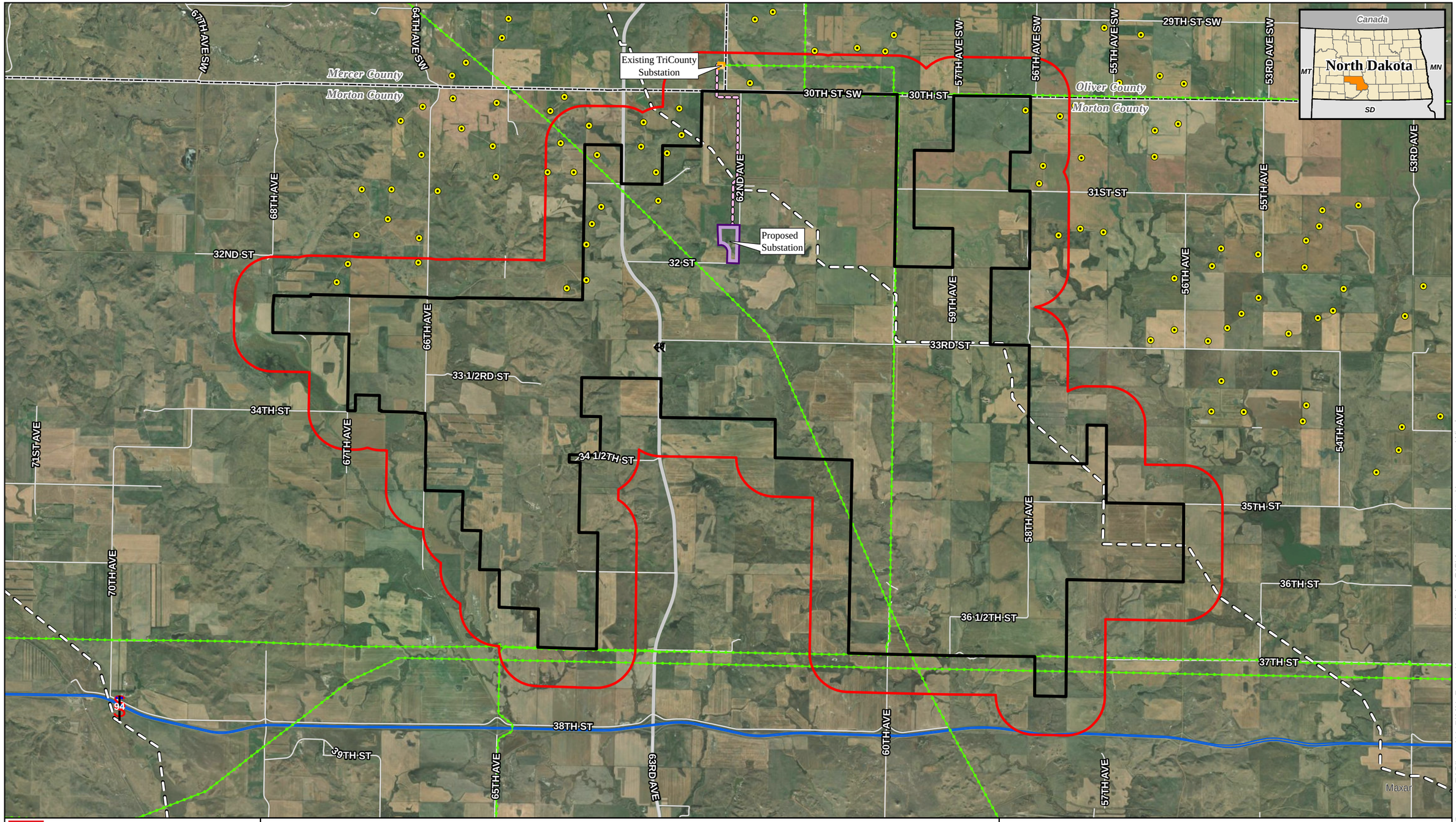
County	Township	Range	Section(s)
Mercer	141 North	87 West	31, 32, 33, 34, 35
	141 North	88 West	36
Morton	139 North	87 West	2, 3, 4, 5, 6, 7, 8, 9
	139 North	88 West	1, 4, 5, 6, 7, 8, 9, 12
	140 North	87 West	4, 5, 6, 7, 8, 9, 16, 17, 18, 19, 20, 21, 22, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35
	140 North	88 West	1, 2, 3, 4, 5, 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, 33, 34, 35, 36
	140 North	89 West	13, 14, 15, 22, 23, 24, 25, 26, 36

If further information is desired or if you have comments regarding the Project, please contact me at the address below, at 218-355-3569, or at djanke@mnpower.com.

Sincerely,

Drew Janke
Environmental Compliance Specialist II
Minnesota Power | ALLETE Inc.

Enclosure: Project Overview Map



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For Environmental Review Purposes Only

4

Longspur Wind Project

Minnesota Power

Project Area

Morton County, North Dakota

- Minnesota Power's Project Study Area
- Project Boundary
- Proposed Substation
- Existing TriCounty Substation
- Existing Wind Turbine
- Proposed Gen-Tie Route
- Existing Pipeline
- Existing Transmission Line
- County Boundary

Source: Z:\Clients\M_P\MN_Power\Longspur_Wind\ArcGIS\Agency_Letters\Longspur_Wind.aprx

Date: (5/30/2025)

Agency Notification Letters and Responses

C2. North Dakota Aeronautics Commission

From: Erwin, Grant
To: Drew Janke (MP)
Cc: Wanner, Kyle C.
Subject: [EXTERNAL MAIL] Minnesota Power - Longspur Wind Project
Date: Tuesday, July 8, 2025 2:18:01 PM
Attachments: image001.png
MinnPower proposed wind facility.pdf

You don't often get email from gerwin@nd.gov. Learn why this is important

Think Before You Click

[EXTERNAL EMAIL] This email was sent from someone outside the company.

Don't let cyber threats cloud our summer! Remember not to click links, download attachments, or reply with personal information unless you recognize the sender and know the content is safe.

Good afternoon, Mr. Janke.

My name is Grant Erwin, airport planner with the North Dakota Aeronautics Commission (NDAC). You recently informed us of the Longspur Wind Project, a proposed wind energy conversion facility in Morton & Mercer Counties. Attached is the proposal as we received.

Currently, NDAC has no comments regarding the proposed project area. We monitor airspace surrounding our local public airports and study any possible obstructions or structures that could pose a safety risk to pilots navigating the surrounding airspace. The closest public airport to the project area is Glen Ullin Regional Airport (D57). The closest boundary of the study area is approximately 3.7 nautical miles from the airfield. At this distance, there are no dangers or obstructions to any protected surfaces at the airport. Other airports near to the project area are Beulah Municipal (95D), and Mercer County Regional (KHZE) airports. At distances of approximately 15.7 nautical miles and 19.4 nautical miles respectively, NDAC has no concerns regarding the airspace & protected surfaces for these airports.

If you haven't already, I highly recommend contacting the three airport authorities mentioned above. Please share project information with them. I also recommend contacting the Federal Aviation Administration (FAA) as well, to keep them informed of the project and proposed wind turbine locations as the project progresses. I have listed my best contacts for each entity below.

- Glen Ullin Regional Airport: Gene Glasser, Chair
  - cgene@westriv.com
  - 701-226-1147

- Beulah Municipal Airport: Shawn Morten, Manager
  - smorten@dakotahelicopters.com
  - 701-870-4100
- Mercer County Regional Airport: Steve Frovarp, Manager
  - Steve_nd@hotmail.com
  - 701-880-9989
- FAA: Travis Schmit, Program Manager
  - Travis.l.schmit@faa.gov
  - 701-323-7392

Best Regards,

Grant Erwin
Airport Planner
ND Aeronautics Commission
Phone: (701) 328-9655 (office)
(701) 595-3856 (mobile)
Email: gerwin@nd.gov



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July 25, 2025 **VIA Email**

Shawn Morten
Beulah Municipal Airport
Airport Manager
6220 County 20
Beulah, ND 58523
smorten@dakotahelicopters.com

Re: Longspur Wind Project
Morton and Mercer Counties, North Dakota

Dear Mr. Morten:

Minnesota Power, an operating division of ALLETE, Inc., is proposing to construct an approximately 200-megawatt wind energy conversion facility, known as the Longspur Wind Project (Project), in Morton and Mercer Counties, North Dakota. The Project will include a 2.5-mile-long, 230-kilovolt (kV) transmission line (gen-tie line) to connect the Project's substation in Morton County to the existing Tri-County 230 kV substation in Mercer County, which will also serve as the Project's Point of Interconnection.

Grant Erwin, an airport planner with the North Dakota Aeronautics Commission, recently communicated there are no foreseen concerns with this proposed Project. Based on your proximity to the Longspur Project Study Area, Minnesota Power is soliciting any input you may have regarding any sensitive resources, current or planned development, or property interests in or around the Study Area that Minnesota Power should consider as it moves forward with Project development.

The Project's permanent facilities will include:

- Approximately 45 wind turbines and associated equipment
- Access roads to wind turbine locations
- Electrical collection lines
- A Project substation
- 2.5-mile 230kV Transmission Line
- An operations and maintenance facility
- Aircraft detection lighting system
- Up to two permanent meteorological towers

The Project's temporary facilities will include:

- Staging/laydown areas for construction activities
- Improvements to existing roads for transport and access during construction
- Crane paths between turbines during construction

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AN ALLETE COMPANY

The table below displays the legal descriptions associated with the Study Area as shown in the attached map.

County	Township	Range	Section(s)
Mercer	141 North	87 West	31, 32, 33, 34, 35
	141 North	88 West	36
Morton	139 North	87 West	2, 3, 4, 5, 6, 7, 8, 9
	139 North	88 West	1, 4, 5, 6, 7, 8, 9, 12
	140 North	87 West	4, 5, 6, 7, 8, 9, 16, 17, 18, 19, 20, 21, 22, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35
	140 North	88 West	1, 2, 3, 4, 5, 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, 33, 34, 35, 36
	140 North	89 West	13, 14, 15, 22, 23, 24, 25, 26, 36

Minnesota Power plans to submit applications for a Certificate of Site Compatibility and a Certificate of Corridor Compatibility for the Project to the North Dakota Public Service Commission (ND PSC) in the fall of 2025. The Project is anticipated to be in operation before the end of 2027.

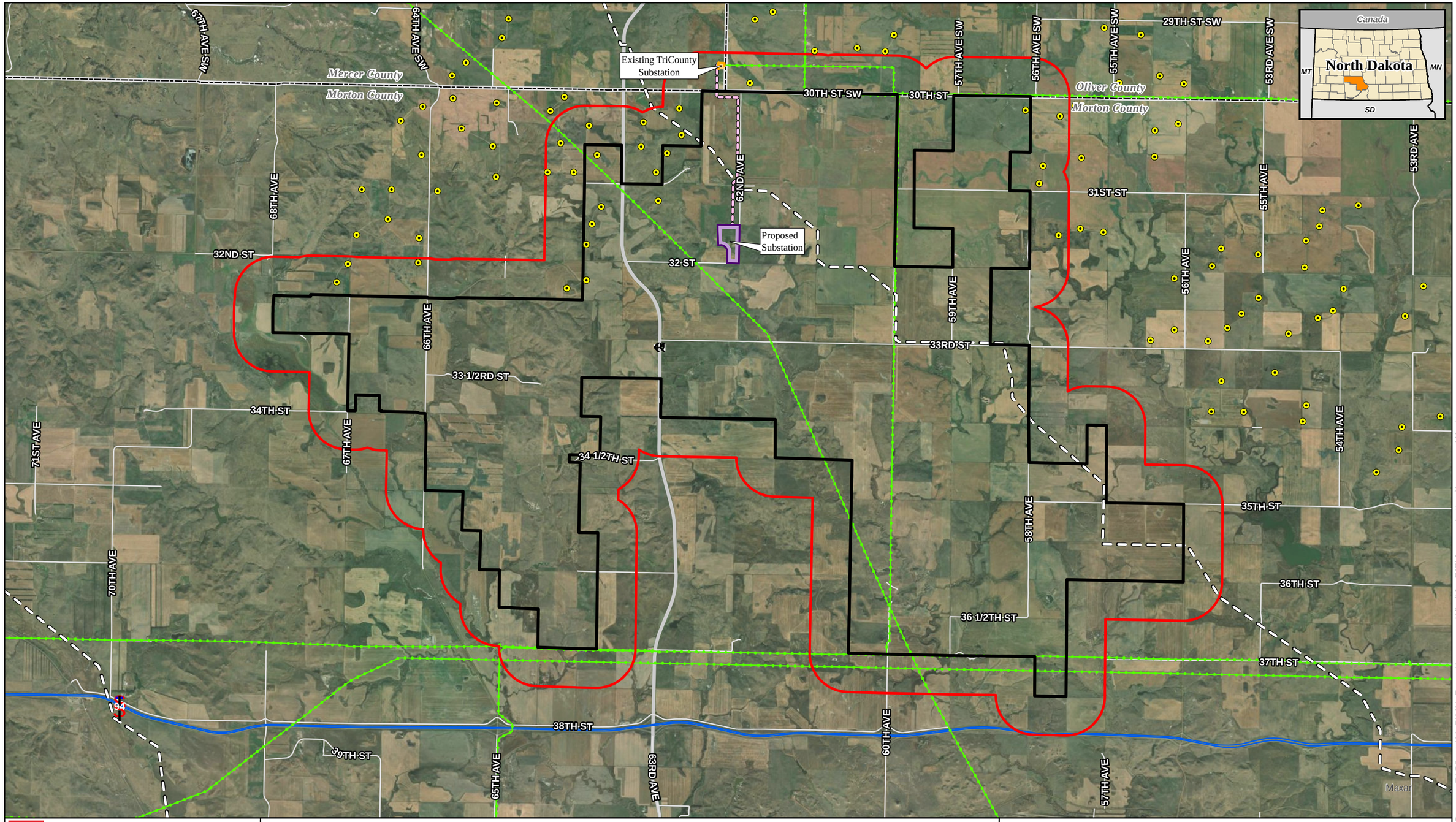
Copies of all correspondence received in response to this letter will be included with the ND PSC application.

If you have any questions, concerns, or information that may be of assistance in development of the Project, please contact me at the address below, at 218-355-3569, or at djanke@mnpower.com.

Sincerely,

Drew Janke
Environmental Compliance Specialist II
Minnesota Power | ALLETE Inc.

Enclosure: Project Overview Map



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For Environmental Review Purposes Only

Longspur Wind Project

Minnesota Power

Project Area

Morton County, North Dakota

- Minnesota Power's Project Study Area
- Project Boundary
- Proposed Substation
- Existing TriCounty Substation
- Existing Wind Turbine
- Proposed Gen-Tie Route
- Existing Pipeline
- Existing Transmission Line
- County Boundary

Source: Z:\Clients\M_P\MN_Power\Longspur_Wind\ArcGIS\Agency_Letters\Longspur_Wind.aprx

Date: (5/30/2025)

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AN ALLETE COMPANY

July 25, 2025 **VIA Email**

Steve Frovarp
Mercer County Regional Airport
Airport Manager
P.O. Box 507
Hazen, ND 58545
Steve_nd@hotmail.com

Re: Longspur Wind Project
Morton and Mercer Counties, North Dakota

Dear Mr. Frovarp:

Minnesota Power, an operating division of ALLETE, Inc., is proposing to construct an approximately 200-megawatt wind energy conversion facility, known as the Longspur Wind Project (Project), in Morton and Mercer Counties, North Dakota. The Project will include a 2.5-mile-long, 230-kilovolt (kV) transmission line (gen-tie line) to connect the Project's substation in Morton County to the existing Tri-County 230 kV substation in Mercer County, which will also serve as the Project's Point of Interconnection.

Grant Erwin, an airport planner with the North Dakota Aeronautics Commission, recently communicated there are no foreseen concerns with this proposed Project. Based on your proximity to the Longspur Project Study Area, Minnesota Power is soliciting any input you may have regarding any sensitive resources, current or planned development, or property interests in or around the Study Area that Minnesota Power should consider as it moves forward with Project development.

The Project's permanent facilities will include:

- Approximately 45 wind turbines and associated equipment
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- Aircraft detection lighting system
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The Project's temporary facilities will include:

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- Crane paths between turbines during construction

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	140 North	87 West	4, 5, 6, 7, 8, 9, 16, 17, 18, 19, 20, 21, 22, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35
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	140 North	89 West	13, 14, 15, 22, 23, 24, 25, 26, 36

Minnesota Power plans to submit applications for a Certificate of Site Compatibility and a Certificate of Corridor Compatibility for the Project to the North Dakota Public Service Commission (ND PSC) in the fall of 2025. The Project is anticipated to be in operation before the end of 2027.

Copies of all correspondence received in response to this letter will be included with the ND PSC application.

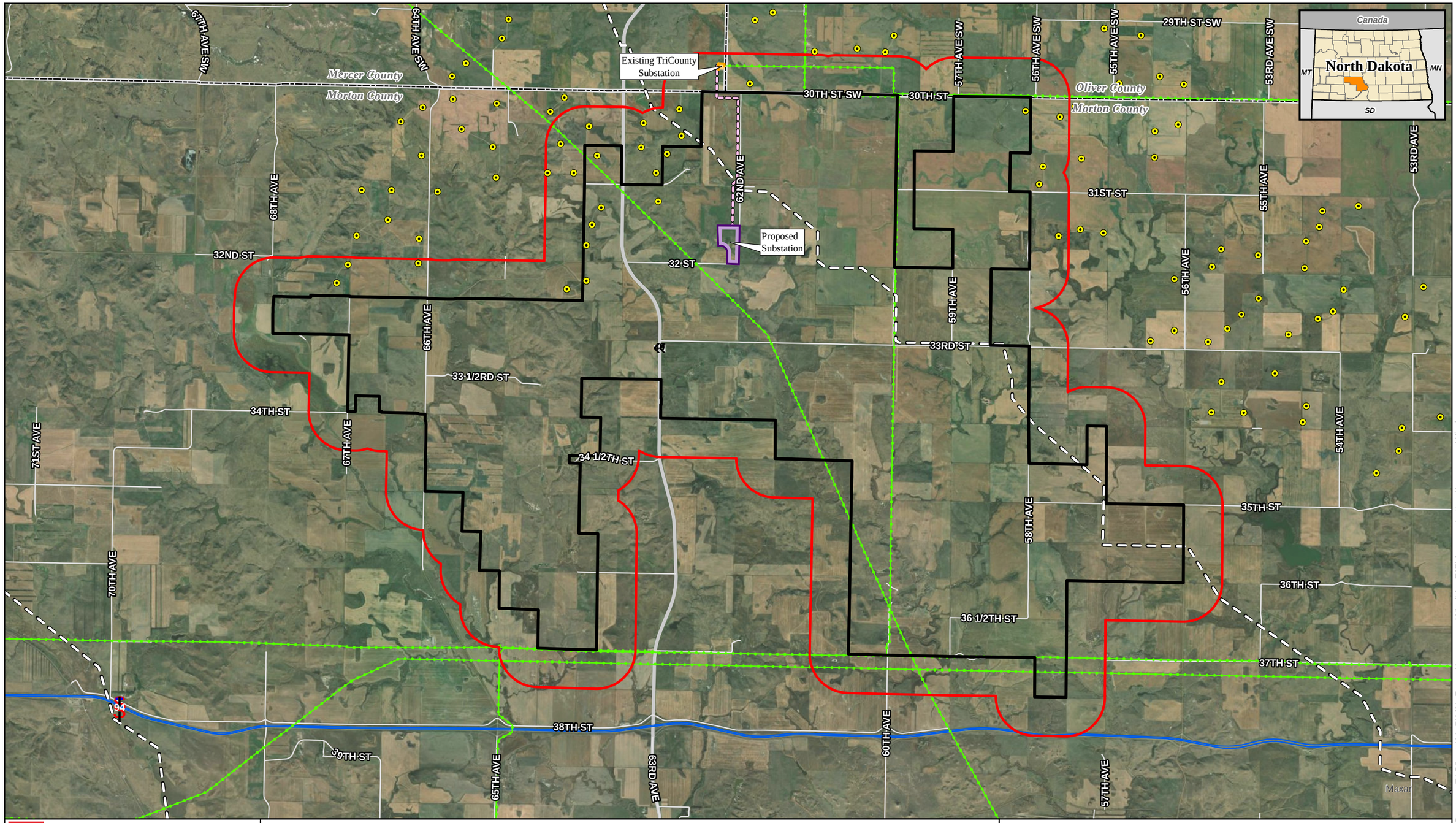
If you have any questions, concerns, or information that may be of assistance in development of the Project, please contact me at the address below, at 218-355-3569, or at djanke@mnpower.com.

Sincerely,

Drew Janke

Drew Janke
Environmental Compliance Specialist II
Minnesota Power | ALLETE Inc.

Enclosure: Project Overview Map



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For Environmental Review Purposes Only

4

Longspur Wind Project

Minnesota Power

Project Area

Morton County, North Dakota

- Minnesota Power's Project Study Area
- Project Boundary
- Proposed Substation
- Existing TriCounty Substation
- Existing Wind Turbine
- Proposed Gen-Tie Route
- Existing Pipeline
- Existing Transmission Line
- County Boundary

Source: Z:\Clients\M_P\MN_PowerLongspur_Wind\ArcGIS\Agency_Letters\Longspur_Wind.aprx

Date: (5/30/2025)

minnesota power
AN ALLETE COMPANY

July 25, 2025 **VIA Email**

Gene Glasser
Glen Ullin Regional Airport
Airport Manager
P.O. Box 306
Glen Ullin, ND 58631
cgene@westriv.com

Re: Longspur Wind Project
Morton and Mercer Counties, North Dakota

Dear Mr. Glasser:

Minnesota Power, an operating division of ALLETE, Inc., is proposing to construct an approximately 200-megawatt wind energy conversion facility, known as the Longspur Wind Project (Project), in Morton and Mercer Counties, North Dakota. The Project will include a 2.5-mile-long, 230-kilovolt (kV) transmission line (gen-tie line) to connect the Project's substation in Morton County to the existing Tri-County 230 kV substation in Mercer County, which will also serve as the Project's Point of Interconnection.

Grant Erwin, an airport planner with the North Dakota Aeronautics Commission, recently communicated there are no foreseen concerns with this proposed Project. Based on your proximity to the Longspur Project Study Area, Minnesota Power is soliciting any input you may have regarding any sensitive resources, current or planned development, or property interests in or around the Study Area that Minnesota Power should consider as it moves forward with Project development.

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The Project's temporary facilities will include:

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- Crane paths between turbines during construction

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The table below displays the legal descriptions associated with the Study Area as shown in the attached map.

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	139 North	88 West	1, 4, 5, 6, 7, 8, 9, 12
	140 North	87 West	4, 5, 6, 7, 8, 9, 16, 17, 18, 19, 20, 21, 22, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35
	140 North	88 West	1, 2, 3, 4, 5, 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, 33, 34, 35, 36
	140 North	89 West	13, 14, 15, 22, 23, 24, 25, 26, 36

Minnesota Power plans to submit applications for a Certificate of Site Compatibility and a Certificate of Corridor Compatibility for the Project to the North Dakota Public Service Commission (ND PSC) in the fall of 2025. The Project is anticipated to be in operation before the end of 2027.

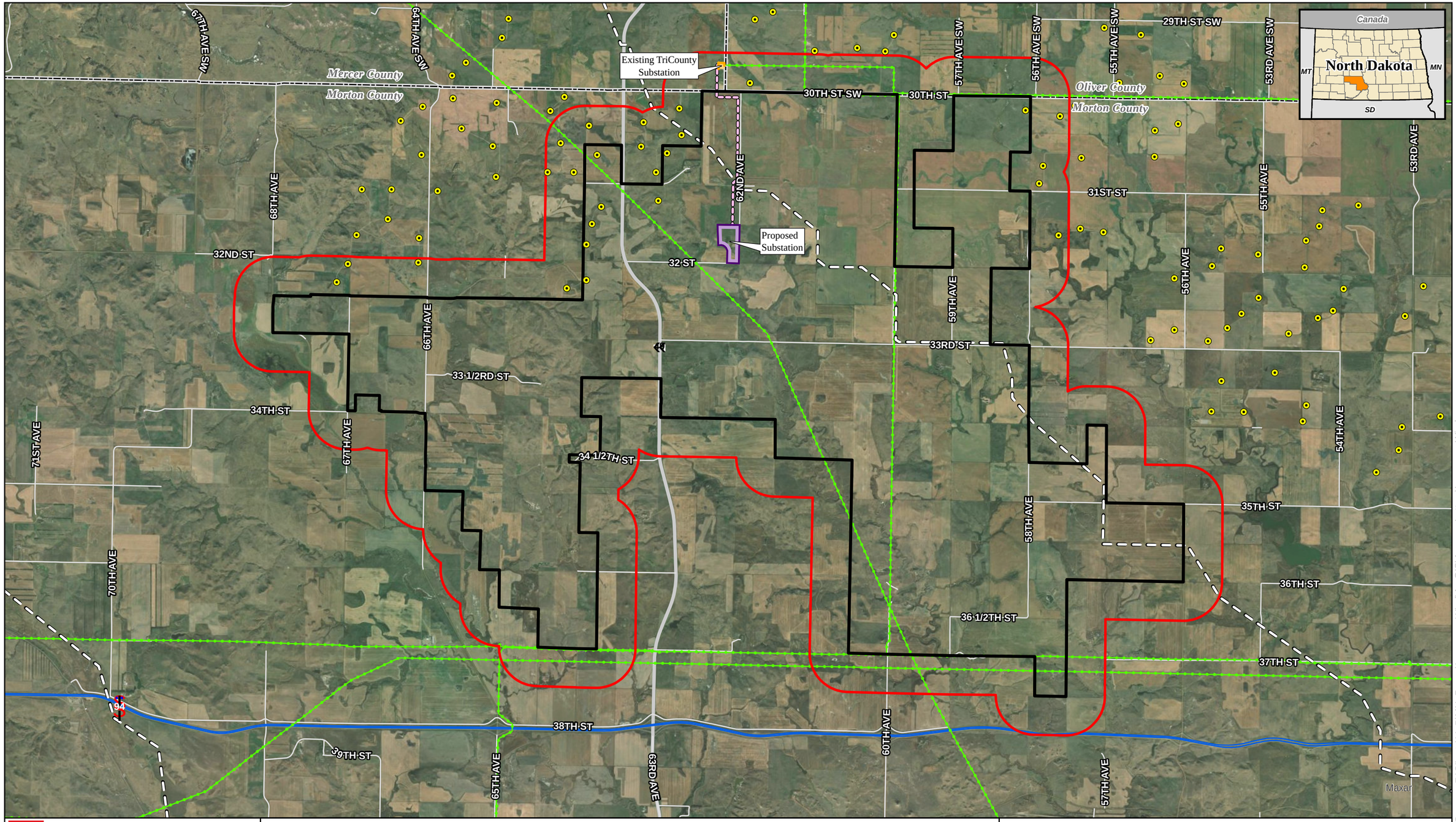
Copies of all correspondence received in response to this letter will be included with the ND PSC application.

If you have any questions, concerns, or information that may be of assistance in development of the Project, please contact me at the address below, at 218-355-3569, or at djanke@mnpower.com.

Sincerely,

Drew Janke
Environmental Compliance Specialist II
Minnesota Power | ALLETE Inc.

Enclosure: Project Overview Map



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For Environmental Review Purposes Only

4

Longspur Wind Project

Minnesota Power

Project Area

Morton County, North Dakota

- Minnesota Power's Project Study Area
- Project Boundary
- Proposed Substation
- Existing TriCounty Substation
- Existing Wind Turbine
- Proposed Gen-Tie Route
- Existing Pipeline
- Existing Transmission Line
- County Boundary

Source: Z:\Clients\M_P\MN_Power\Longspur_Wind\ArcGIS\Agency_Letters\Longspur_Wind.aprx

Date: (5/30/2025)

Agency Notification Letters and Responses

C3. North Dakota Department of Transportation

NORTH Dakota | Transportation
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July 14, 2025

Drew Janke
Environmental Compliance Specialist
Minnesota Power/ALLETE Inc.
30 West Superior Street
Duluth, MN 55802-2093

LONGSPUR WIND PROJECT MORTON AND MERCER COUNTIES, NORTH DAKOTA

We have reviewed your June 18, 2025, letter.

This project should have no adverse effect on the North Dakota Department of Transportation highways.

However, if because of this project any work needs to be done on highway right of way, appropriate permits and risk management documents will need to be obtained from the Department of Transportation District Engineer, Larry Gangl at 701-328-6955.

JON KETTERLING, P.E., DIRECTOR – OFFICE OF PROJECT DEVELOPMENT

57/jk/js
c: Larry Gangl, Bismarck District Engineer

Agency Notification Letters and Responses

C4. State Historical Society of North Dakota

July 8, 2025

Drew Janke
Minnesota Power
30 W Superior St
Duluth, MN 55802-2093

SHSND Ref: 25-9058 Longspur Wind Project in Mercer, Morton, and Oliver Counties, North Dakota

Dear Drew,

We reviewed your preliminary information on SHSND Ref: 25-9058 Longspur Wind Project in Mercer, Morton, and Oliver Counties, North Dakota. We recommend survey for cultural resources as follows:

- A current Class I: Literature Search to determine any previously recorded cultural resources in the project area, provide background research, allow predictions of the types and distribution of expected cultural resources, and identify preservation and/or research priorities.

- A Class II (reconnaissance) and Class III (intensive) survey by a permitted architectural historian for standing buildings and structures (including cemeteries) over 45 years old in the visual Area of Potential Effect (APE). This is within a two-mile radius of individual turbine locations. The purpose is to evaluate any architectural or structural features that may be eligible for nomination to the National Register of Historic Places or the State Historic Sites Registry. At least three out of the seven aspects of integrity used to evaluate historic properties could be impacted by the proposed project: the setting, feeling, and association of historic sites.

- A Class III intensive archaeological survey of all areas of direct impact including crane paths, met towers, access roads, turbine locations and staging areas, unless the footprint has been recently surveyed for cultural resources.

Thank you for the opportunity to review this project to date. We look forward to review of the Class II/Class III surveys. Please include the SHSND reference number listed above in any further correspondence for this specific project. If you have any questions, please contact Lorna Meidinger, Lead Historic Preservationist, at (701) 328-2089 or lbmeidinger@nd.gov.

Sincerely,

for William D. Peterson, PhD
Director, State Historical Society of North Dakota

25-9058

Agency Notification Letters and Responses

C5. North Dakota Parks and Recreation Department

NORTH Dakota | Parks & Recreation
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July 10, 2025

Minnesota Power
30 West Superior Street
Duluth, MN 55802

Re: Longspur Wind Project – Morton and Mercer Counties

Dear Drew,

The North Dakota Parks and Recreation Department (NDPRD) has reviewed the above referenced proposed Longspur Wind Project in Morton and Mercer Counties, North Dakota.

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 project does not appear to affect any properties protected under Section 6(f) of the LWCF.

A North Dakota Natural Heritage biological conservation database query determines whether 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, one animal species of concern was documented within or immediately adjacent to the project site. Refer to the attached map and spreadsheet for additional details.

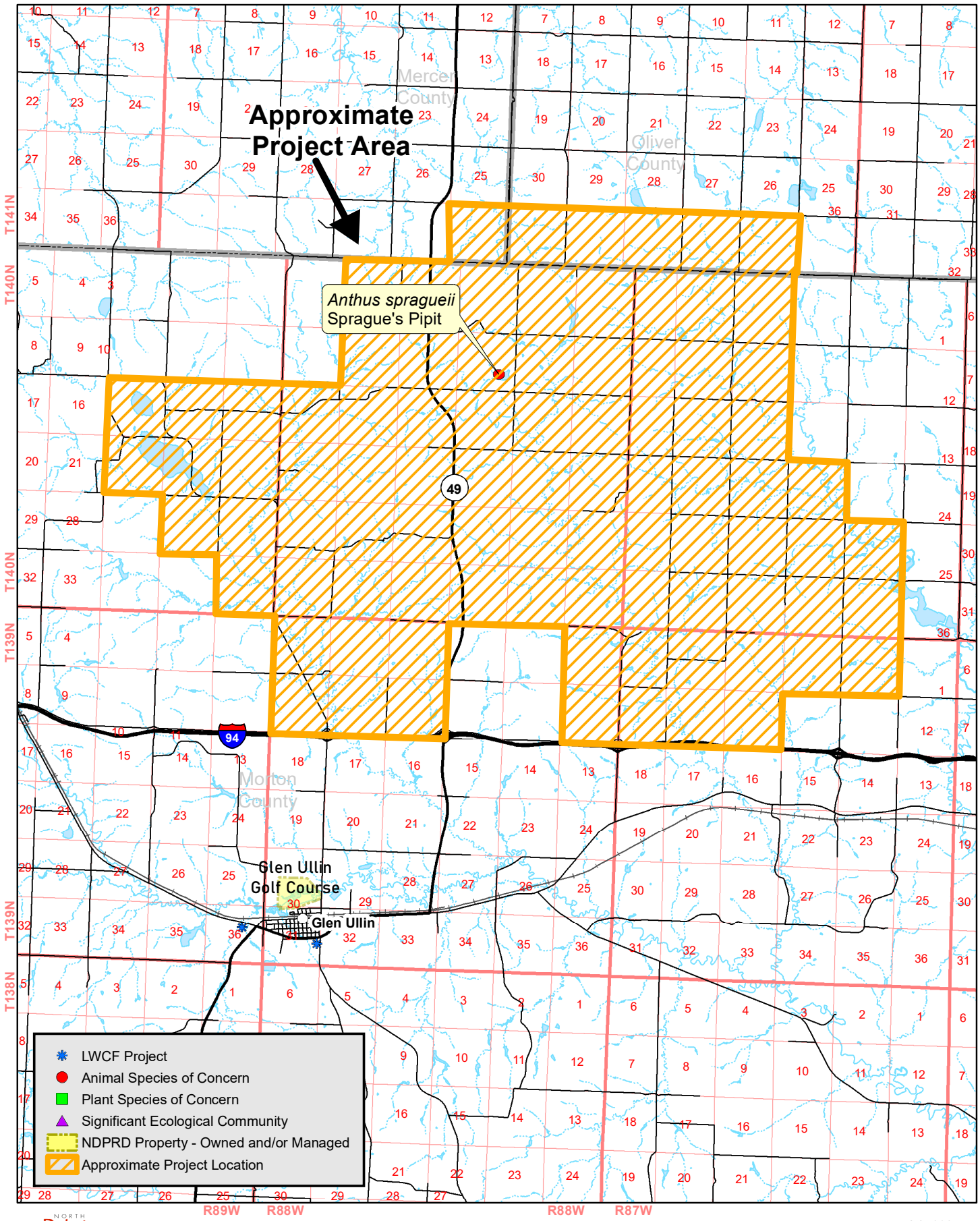
We appreciate your commitment to rare plant, animal, and ecological community conservation, management, and inter-agency cooperation. For additional information, please contact Kathy Duttenhefner at 701-328-5370, 701-220-3377 (cell), or kgduttenhefner@nd.gov.

Thank you for the opportunity to comment on the proposed project.

Sincerely,
Kathy Duttenhefner
Kathy Duttenhefner, Chief Natural Resources Division

604 E Boulevard Ave Dept. 750 | Bismarck, ND 58505
PHONE: 701-328-5357 | FAX: 701-328-5363 | EMAIL: parkrec@nd.gov | WEBSITE: www.parkrec.nd.gov

North Dakota Parks and Recreation Department
North Dakota Natural Heritage Inventory



NORTH Dakota | Parks & Recreation

July 2025

Longspur Wind 001007

North Dakota Natural Heritage Inventory
Rare Animal and Plant Species and Significant Ecological Communities

State Scientific Name	State Common Name	State Rank	Global Rank	Federal Status	Township Range Section	County	Last Observation	Estimated Representation Accuracy	Precision
Anthus spragueii	Sprague's Pipit	S3	G4	C	140N088W - 10	Morton	1976-05		S

Agency Notification Letters and Responses

C6. North Dakota Department of Water Resources

From: Yrkoski, Kyle
To: Drew Janke (MP)
Subject: [EXTERNAL MAIL] Longspur Wind Project Morton and Mercer Counties, ND
Date: Friday, July 25, 2025 10:16:18 AM
Attachments: image001.png
image002.png
image003.png
Longspur Wind Project Morton and Mercer Counties, ND[8].docx
4071_001.pdf
4072_001.pdf

You don't often get email from kyrkoski@nd.gov. Learn why this is important

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[EXTERNAL EMAIL] This email was sent from someone outside the company.

Don't let cyber threats cloud our summer! Remember not to click links, download attachments, or reply with personal information unless you recognize the sender and know the content is safe.

Drew,

Please find attached our comment letter regarding the Longspur Wind Project Morton and Mercer Counties, ND.

Please let me know that you received this.

Thanks

Kyle Yrkoski
Planner III, Planning & Education Division

701.328.4970(d) 701.328.3696(f) kyrkoski@nd.gov www.dwr.nd.gov

NORTH Dakota | Water Resources
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701.328.2750 • dwr@nd.gov • 1200 Memorial Highway • Bismarck, ND 58504

NORTH Dakota | Water Resources
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July 15, 2025

Mr. Drew Janke

Minnesota Power
30 West Superior Street
Duluth, Minnesota 55802-2093
djanke@mnpower.com
218-355-3569

Dear Mr. Janke,

This is in response to your request for a review of the environmental impacts associated with the Longspur Wind Project, located in Morton and Mercer Counties, North Dakota.

The proposed project has been reviewed by Department of Water Resources (DWR), and the following comments are provided:

- 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 any future projects identified in the plan, a water permit will be required per North Dakota Century Code § 61-04-02. Please consult with the DWR Water Appropriation Division if you have any questions at (701) 328-2754 or appropinfo@nd.gov.

- The DWR Regulatory Division's Engineering and Permitting Section reviewed the project location and determined no drainage permits, or construction permits for dikes, diversions, or restorations are likely required so long as no watercourses are modified (i.e., deepened, widened, rerouted, etc.) and no ponds, sloughs, lakes, sheetwater, or any series thereof, with a drainage area of 80 acres or more are drained. North Dakota Stream Crossing Design Standards (N.D.A.C. art. 89-14) apply to stream crossings within a constructed or reconstructed highway, street, or road as defined in N.D.A.C. § 89-14-01-02. For more information, 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 FEMA National Flood Insurance Program (NFIP) floodplains identified or mapped where the proposed project is to take place. No permits relative to the NFIP are likely required based on the current 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.

Thank you for the opportunity to provide review comments. Should you have further questions, please contact me at 701-328-4970 or kyrkoski@nd.gov.

Sincerely,

Kyle Yrkoski
Planner III

KY:mg/1570

Agency Notification Letters and Responses

C7. North Dakota Department of Environmental Quality

NORTH Dakota | Environmental Quality
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July 21, 2025

Drew Janke
Environmental Compliance Specialist II
Minnesota Power
30 West Superior St.
Duluth, MN 55802-2093

Re: Longspur Wind Project in Mercer and Morton Counties

Dear Mr. Janke:

The North Dakota Department of Environmental Quality (Department) has reviewed the information concerning the above-referenced project received at the Department on June 23, 2025, with respect to possible environmental impacts.

1. Necessary measures should be taken to minimize fugitive dust emissions created during construction activities. Any complaints that may arise should 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 involving the building and removal of structures over waters of the state (i.e., bridges and culverts) will inspect equipment for oil, gas, diesel, antifreeze, hydraulic fluid, and other petroleum leaks. Leaks will be repaired and equipment cleaned prior to being allowed onsite. Precautions will be employed to prevent deconstruction material from entering the water. Remove from the water and bank all material belonging to the original bridge within 14 days of project completion. Protect upland, riparian, and adjacent vegetation, except where it is being removed. Exposed riparian areas should be revegetated preferably with native species following completion of work. All riprap must be clean, free from rebar, rubbish, and wood, and of the appropriate size and shape to withstand the energy of the water.

4. 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 has been developed for the Elm Creek watershed in the area of the project (Assessment Unit ND-10130201-045-S_00). Additionally, a plan to address *E. coli* impairment is in place for Hailstone Creek in the Danzig Dam watershed (Assessment Unit ND-10130203-041-S_00). The Wilson Creek watershed (Assessment Unit ND-10130203-046-S_00) also is listed as impaired for *E. coli* under Section 303(d) of the Federal CWA. Stormwater runoff from the project should not contribute to the impairment if the appropriate practices are in place to manage sanitary waste.

5. The construction project overlies the Elm Creek aquifer. 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.

6. 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. 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,

Karl Rockeman, P.E., Deputy Director
North Dakota Department of Environmental Quality

KR:ll
Attach.

Construction and Environmental Disturbance Requirements

The following are the minimum requirements of the North Dakota Department of Environmental Quality (Department) 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.

Agency Notification Letters and Responses

C8. North Dakota Geological Survey

Alex Luman (MP)

From: Anderson, Fred J. <fjanderson@nd.gov>
Sent: Thursday, June 26, 2025 2:42 PM
To: Drew Janke (MP)
Subject: [EXTERNAL MAIL] N.D. Geological Survey: Comments on the Proposed Longspur Wind Project Morton and Mercer Counties, North Dakota

You don't often get email from fjanderson@nd.gov. Learn why this is important

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Don't let cyber threats cloud our summer! Remember not to click links, download attachments, or reply with personal information unless you recognize the sender and know the content is safe.

Dear Mr. Janke,

The NDGS appreciates the opportunity to review and provide comment on this proposed energy infrastructure development project.

We compared the proposed project study area footprint to our recent landslide mapping work and noted that there are several landslide areas mapped in the study area.

Most of these areas are found in the southeastern portion of the proposed project study area with several concentrated along Wilson Creek in northwestern Morton County.

These areas should be avoided whenever possible as potential locations for any structures or towers.

All our landslide maps and data sets are available on our website at: https://www.dmr.nd.gov/dmr/ndgs/landslides

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

Regards,

Fred J. Anderson
Surface Geology Section Manager

701.328.8000 (O) . fjanderson@nd.gov . www.dmr.nd.gov

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Agency Notification Letters and Responses

C9. National Telecommunications and Information Administration

UNITED STATES DEPARTMENT OF COMMERCE
National Telecommunications and Information Administration
Washington, D.C. 20230

October 4, 2024

Mr. Frank O'Brien
COMSEARCH
19700 Janelia Farm Blvd.
Ashburn, VA 20147

Re: Longspur Wind Energy Project: Morton, ND

Dear Mr. O'Brien,

In response to your request on August 14, 2024, the National Telecommunications and Information Administration provided to the federal agencies represented in the Interdepartment Radio Advisory Committee (IRAC) the plans for the wind turbine proposal for the Longspur Wind Energy Project located in Morton County, North Dakota.

After a 45+ day period of review, *one reviewing agency*, Department of Energy had *concerning issues* with turbine construction in the designated build areas. Their concerns are outlined here:

Commerce has completed our review of the subject wind farm proposal and found the project area is 67.7 km W of KBIS Bismarck, ND NEXRAD and is within the notification zone of that radar. However, there will be low impact and only the lowest elevation angle can be contaminated. Further contact with the developer is requested only if the project area changes or the turbine heights increase by 10 meters or more. The POC for these discussions is Bill Ward Field Requirements Branch Chief/Radar Operations Center phone numbers: (405) 573-8806 or (405) 325-2120, bill.ward@noaa.gov.

Energy has completed our review of the subject wind farm proposal and found the Longspur Wind Energy Project, located in Morton, ND, has potential for impact to Western Area Power Administration operations. It is requested that Comsearch coordinate turbine placement with: Adrian Schmitz, Western Area Power Administration, U.S. Department of Energy, 12155 W. Alameda Parkway, Lakewood, CO 80228b, (720) 962-7389, aschmitz@wapa.gov.

SUBJECT: Re: Longspur Wind Energy Project: Morton, ND
DATE: October 4, 2024

While the IRAC agencies did not identify any concerns regarding radio frequency blockage, this does not eliminate the need for the wind energy facilities to meet any other requirements specified by law related to these agencies. For example, this review by IRAC does not eliminate any need that may exist to coordinate with the Federal Aviation Administration concerning flight obstruction.

Thank you for the opportunity to review these proposals.

Sincerely,

JOHN MCFALL
Digitally signed by JOHN MCFALL
Date: 2024.10.09 14:57:55 -04'00'

John R. McFall
Deputy Chief, Spectrum Services Division
Office of Spectrum Management

Agency Notification Letters and Responses

C10. United States Department of Agriculture

USDA
United States Department of Agriculture

Natural Resources
Conservation Service

Bismarck State Office
PO Box 1458
Bismarck, ND
58502-1458

Voice 701.530.2000
Fax 855-813-7556

July 2, 2025

Drew Janke
Minnesota Power
30 West Superior Street
Duluth, MN 55802-2093

Dear Mr. Janke:

The Natural Resources Conservation Service (NRCS) has reviewed your letter dated June 18, 2025, regarding the Minnesota Power Longspur Wind Project, Morton and Mercer Counties, North Dakota.

Farmland Protection Policy Act

NRCS has a major responsibility with the Farmland Protection Policy Act (FPPA) in documenting conversion of farmland (i.e., Prime, Statewide Importance and/or Local Importance) to non-agricultural use when a federal funding source is utilized. There is no mention of the proposed project being supported by federal funding; therefore, FPPA does not apply, and no further action is needed.

Wetlands

The Wetland Conservation Provisions of the 1985 Food Security Act, as amended, provide that if a USDA participant converts a wetland for the purpose or to have the effect of making agricultural production possible, loss of USDA benefits could occur. NRCS has developed the following guidelines for the installation of permanent structures where wetlands occur. If these guidelines are followed the impacts to the wetland will be considered minimal allowing USDA participants to continue to receive USDA benefits. The following are the requirements:

- Disturbance to the wetland must be temporary.
- No drainage of wetland is allowed (temporary or permanent).
- Mechanized landscaping necessary for installation is kept to a minimum and preconstruction contours are maintained.
- Temporary side cast material must be placed in such a manner not to be dispersed in the wetland.
- All trenches must be backfilled to the original wetland bottom elevation.

NRCS recommends that impacts to wetlands be avoided.

USDA is an equal opportunity provider, employer, and lender.

If you have additional questions pertaining to FPPA, please contact Lance Duey, Assistant State Soil Scientist, NRCS, Bismarck, North Dakota, at (701) 530-2109.

Sincerely,

SUSAN SAMSON LIEBIG

Digitally signed by SUSAN SAMSON LIEBIG
Date: 2025.07.02 08:19:25 -05'00'

SUSAN SAMSON-LIEBIG
Acting State Soil Scientist

Agency Notification Letters and Responses

C11. North Dakota Department of Game and Fish

USFWS, NDGFD, WEST, and Minnesota Power – Longspur Wind Project Introduction

Attendees:

USFWS:	Hanna Edens
NDGFD:	Bruce Kreft, Elisha Mueller
WEST:	Martin Piorkowski, Nicholas O'Neil
Merjent:	Dan Flo, Mandy Bohnenblust
MN Power/ALLETE:	Ben Reister, Scott Monroe, Mitchell Bettenhausen, John Hollingsworth Chris Aepelbacher, Mike French, Drew Janke, Alex Luman

Location: NDGFD Conference Room & Teams Meeting (Virtual)
Date/Time: December 4, 2024; 10:00 – 11:00 AM (CST)

Summary of Meeting:

Minnesota Power (MN Power) requested a wildlife agency meeting with US Fish and Wildlife Service (USFWS) and North Dakota Game and Fish Department (NDGFD) on December 4, 2024. The objectives of this meeting were to introduce the Longspur Wind Project (Project) in Morton County, North Dakota to the wildlife agencies and to provide survey results from completed studies and to propose upcoming surveys and studies at the Project. Western EcoSystems Technology, Inc. (WEST) added that a secondary objective of this meeting was to gain any feedback on proposed studies and their designs. A PowerPoint presentation accompanied this meeting for visualization of data and proposed survey efforts.

<u>Project Overview and Timeline</u>

- MN Power Introduced the Project to the USFWS and NDGFD and explained that the Project had been under development over the last decade under different Project names. Project development resumed in early 2024 with the intention to file for permits in 2025 with Public Service Commission (PSC) permitting in mid-late 2025. Targeted construction is anticipated in Q2 of 2026 with commercial operations beginning in Q4 2027.

- WEST explained that although there had been wildlife and habitat work completed at the Project previously, these studies were getting older, and that proposed work would use previously collected information to inform new and updated studies at the Project to provide current data within the new Longspur Wind Project area.

- NDGFD asked if MN Power/ALLETE were aware of any impending changes to wind development with changing of federal administration. MN Power/ALLETE could not say for certain but discussed only small changes were observed in 2017 during similar administration changes.

Previous Study Review

- WEST discussed studies conducted at the Project in 2024 including aerial eagle nest surveys and sharp-tailed grouse lek surveys. Avian use surveys started in September 2024, but no results were discussed during this meeting.

- One aerial survey was conducted within the Project area and a 2-mile buffer of the Project area focused specifically on eagle nests. Two occupied and active bald eagle nests were observed within the 2-mi buffer surrounding the Project but not within the Project area.

- Three rounds of sharp-tailed grouse surveys were conducted following NDGFD Best Management Practices. Thirteen 13 active leks were identified of which six were historic leks from previous survey efforts and seven were new leks. Of the historic leks, none had moved significantly from their originally documented locations.

Proposed Studies with Discussion

- WEST discussed ten proposed and ongoing studies at the Project and a Wildlife Conservation Strategy through early 2026.

    - Following the Wind Energy Guidance (2012), A Tier 2 Site Characterization Study (SCS) is currently in development. NDGFD emphasized that North Dakota's Species of Conservation Priority (SCP) is a tiered level based on funding. WEST indicated that for the SCS the draft Species of Greatest Conservation Need (SGCN; available on the NDGFD website) would be used, and all species of greatest conservation need should be considered when reporting on this analysis. NDGFD stated that the updated State Wildlife Action Plan (SWAP) with the SGCN is expected to be released sometime in mid- to late-2025.

    - Grassland assessment is in development and expands and updates data collected and field verified in 2020. NDFGD was interested in seeing if WEST could discuss grassland conversion rate within the Project using data gathered in 2020 and 2024.

    - The whooping crane habitat assessment will include a more comprehensive approach using the Niemuth Model data layers and an additional Project buffer based on recent literature and to align with habitat stopover assessments in other regions of the migration corridor.

    - Eagle and raptor nest surveys are planned in 2025 following USFWS Region 6 guidance.

    - A second year of sharp-tailed grouse lek surveys are planned in 2025 following NDGFD BMP's using the same design as 2024 surveys.

    - Avian use surveys are ongoing and expected to occur through 2026 for two years of data collection. These surveys cover approximately 36% of the current Project

area and include both a 10-minute small bird surveys and 60-minute eagle and large bird survey at each survey location. Eagle data will be collected using the data standards described in the Eagle Conservation Plan Guidance.

- General bat activity acoustic surveys are planned for 2025. These will occur using two acoustic units with two microphones each at up to two MET towers. Qualitative review for northern long-eared bat and little brown bat calls are planned. USFWS briefly discussed the intended study design for bat activity surveys with WEST and asked if detectors could be placed lower than 3 meters and if there was a measurable difference between 1.5 and 3 meters. WEST did not know if there were differences between the two heights but indicated that 1.5 meter was typical as it is generally a height that is high enough above grass or crop height to avoid significant insect noise.

- A northern long-eared bat habitat assessment planned for 2025 following current USFWS survey guidance. WEST requested information from USFWS on what habitat features the assessment should include for northern long-eared bat habitat. WEST explained that the Project is on the western edge of the northern long-eared bat range and the previously used 10-acre minimum patch size for habitat may not be the best starting point considering the recently finalized USFWS guidance. USFWS recommended starting with an assessment of where trees are located within the Project and what species/size of tree looked like in these features for further discussion with the USFWS. USFWS referenced a Montana graduate student that had found northern long-eared bats roosting in eight cm willows, which smaller than what is typical for the species. NDGFD acknowledged there is less data on the North Dakota populations compared to the eastern populations.

- Northern long-eared presence/probable absence surveys are planned for 2025 following current survey guidance and results from the NLEB habitat assessment. Study plan will be provided to USFWS prior to survey for approval and authorization.

- Dakota skipper larval habitat surveys are planned for 2025, if infrastructure is proposed within 250m of unbroken grassland, and will follow USFWS 2024 guidance. NDGFD asked what steps WEST and MN Power/ALLETE were taking with siting should critical habitat be found late into construction planning/development. WEST emphasized to the service that the intention of the surveys was to inform avoidance of habitat rather than necessitate presence/absence surveys.

- A Wildlife Conservation Strategy (WCS) is proposed to be developed in mid- to late-2025 and updated with completion of wildlife studies and site development. NDGFD asked that information from wildlife studies be provided to them as soon as possible so that they can submit their comments 30 days prior to the PSC permit

hearing. USFWS echoed the same request. WEST plans to have a draft WCS 100 days prior to the PSC permit hearing, which should provide adequate time for NDGFD to review and submit their comments. WEST additionally stated that individual reports can be provided as well, if needed.

Timeline and Next Steps

- WEST showed a proposed timeline for studies at the Project as well as next steps to prepare for siting and permitting.

    - WEST proposed upcoming meetings (annual) with the agencies to discuss survey results and avoidance and minimization measures being implemented at the Project. NDGFD asked that the Project's turbine layout be provided once available as well to inform impact avoidance taken by the Project.

    - MN Power/WEST also plans to set up a meeting with the ND Department of Agriculture (NDDA) to introduce the Project and discuss implementation of a voluntary offset strategy.

Additional Discussions

- NDGFD followed up after the presentation to see if the Project is considering mitigation funds with the NDDA or if they would pursue independent mitigation funding. MN Power is waiting to see what guidance is provided by the NDDA before committing to mitigation funding/plans.

- NDGFD asked about considering cumulative impacts going forward. PCM data is dated on existing infrastructure near the Project so effects could be difficult to assess. NDGFD clarified this question was not intended to be addressed or investigated by MN Power, but the Agency is considering if cumulative impacts analysis is warranted or if further investigation is needed.

- USFWS reminded WEST and MN Power that the regal fritillary is proposed for listing through the Endangered Species Act and should be considered when conducting grassland and DASK assessments.

- NDFGD emphasized that they are most interested in the habitat and impacts analysis outlined in their BMPs for permit review/comments. NDGFD suggested that WEST/MN Power complete the avian habitat offset analysis described in those BMPs using site collected data. NDGFD would likely defer to the site-specific data, focused on unbroken grasslands, even if their analysis only included the modeled grassland data.

- NDGFD confirmed that turbine placement should avoid any grasslands within a 2-mile buffer of grouse leks. The goal is to conserve grasslands (i.e., nesting habitat) within 2-miles of leks over concerns of disturbing leks in crop fields as most grouse nest within 2-mile of a lek location. However, NDGFD would prefer avoidance of grasslands wherever

possible though they provided the opportunity to discuss other options if this was not feasible.

Schedule/Action Items

- WEST and MN Power will be scheduling a meeting with NDDA for discussion of voluntary offsets in the near future (likely before the end of January 2025).

- A copy of the meeting's notes will be provided for review with the wildlife agencies. Additionally, a PDF of the PowerPoint presentation will accompany these meeting notes for reference.

NORTH Dakota | Game and Fish
Be Legendary.

June 29, 2025

Drew Janke
Environmental Compliance Specialist II
Minnesota Power | ALLETE Inc.
20 West Superior Street
Duluth, Minnesota 55802-2093

RE: Proposed Longspur Wind Project, Morton and Mercer County, ND

Dear Drew:

Thank you for reaching out to the North Dakota Game and Fish Department (Department) in request of agency input on the proposed Longspur Wind Project. We would like to use this opportunity to provide some early guidance recommendations and to encourage continued coordination as the project progresses.

First and foremost, native prairie (prairie that has not been plowed or broken in any way) is the most endangered ecosystem in North Dakota and one of the most endangered ecosystems worldwide. As a prairie state, the majority of our native species are linked to and dependent on healthy grasslands. Disturbance, fragmentation, and loss of native prairie have adversely impacted a wide variety of species and these negative impacts only continue to compound as more development takes place across the landscape.

Many of North Dakota's declining resident and migratory species are becoming more and more dependent on the remaining tracts of unbroken prairie. This habitat supports 62 Species of Greatest Conservation Need and 55 Species of Greatest Information Need identified in the Draft North Dakota State Wildlife Action Plan (North Dakota Game and Fish Department, 2025). Grassland dependent species have experienced drastic declines, such as the state bird of North Dakota, the Western Meadowlark, whichh has decreased by approximately 48% globally and the monarch butterfly which has declined by over 80% since the 1990s. The loss and fragmentation of native prairie in the project area may further negatively impact these declining species, making avoidance and minimization efforts a necessary priority.

Wetlands are another productive wildlife habitat in North Dakota, supporting 39 Species of Greatest Conservation Need and 18 Species of Greatest Information Need, as well as a considerable number of waterfowl, shorebirds and cranes throughout the year. The grassland-wetland mosaic of North Dakota is often referred to as the "Duck Factory" for its high-quality nesting habitat and the vast number of ducks produced. Therefore, it's important to prioritize protecting this productive habitat for both its local and national importance.

Finally, though the Department believes the best way to protect our species of conservation priority is by taking a habitat-focused approach, we would also like to reiterate the following species-specific concerns.

- Nearly 31% of the entire Sharp-tailed Grouse population falls within North Dakota and declines to the state's population will likely lead to range-wide population declines. Sharp-tailed Grouse are a high-valued upland game bird, and because research indicates that prairie grouse may be adversely affected by energy development, it is vital that lek surveys be conducted to understand the risk associated with development.
- Bats are long-lived, reproduce slowly, and migrate long distances, making them particularly susceptible to wind development. Acoustic surveys should begin at a minimum of two years pre-construction to assess the risk the project poses to local and migrating bat populations.
- The Whooping Crane's migration corridor centers along the east side of the Missouri River. The project falls within the 50% core migration corridor and there is core stopover habitat to the east and south. The U.S. Fish and Wildlife Habitat and Population Evaluation Team's (HAPET) Whooping Crane model should be used to evaluate risk associated with development to migrating Whooping Cranes.
- The Bald Eagle population and number of nest sites is increasing significantly in North Dakota. The number of nest sites has increased from 10 known sites in the year 2000 to more than 350 in the year 2023. Due to the continual increase and selection of non-traditional nest sites, it is possible that Bald Eagle nests may be found anywhere across the state where large trees are present. Therefore, it is recommended that searches for raptor nests be conducted during the breeding season to understand the risk associated with development.

The Department has a number of resources available for the benefit of the developer and consultant, including Best Management Practices (BMPs) (https://gf.nd.gov/sites/default/files/publications/wind-energy-development-bmp.pdf) . These BMPS include recommendations for responsible development of both turbines and transmission lines, as well as pre and post construction monitoring recommendations. The Department also has available maps and information on native habitats, priority areas, and sensitive species. Geospatial data can be found here https://gf.nd.gov/wildlife/data . Finally, the Department also recommends working with the U.S. Fish and Wildlife Service, as any state recommendations do not relieve the developer of its obligations to comply with any applicable federal regulations.

As we continue to address the challenges of stemming the decline of our state's most sensitive species, we cannot endorse the disturbance, fragmentation, and loss of the remaining high value habitats essential to Species of Greatest Conservation Need without recommending that suitable replacement or offsets be applied back onto the landscape. Ensuring these habitats remain on the landscape is the only way to stem the decline of these species and prevent listings through the Endangered Species Act, which could impact both the state and its citizens. The Department has stressed the importance of following the best available science in determining impacts and voluntary offsets. The best science addressing North Dakota resources are Loesch et al. 2013, Shaffer and Buhl 2016, and Shaffer et al. 2019; these papers should be

used to help guide ALLETE in understanding impacts and developing a voluntary offset package, if one is deemed appropriate. For Further guidance on estimating grassland impacts, there are also resources on the NDGFD website, which can be found at: https://gf.nd.gov/sites/default/files/publications/ndgf-desktop-approach-grasslands-2021.pdf .

As ALLETE moves forward with this project, the Department requests to remain informed. To accurately analyze the project and provide valuable feedback to the PSC, it is important that the Department receives all documents, including wildlife surveys, spatial data, a Wildlife Conservation Strategy (WCS or BBCS), and any voluntary offsets being proposed 100 days prior to the hearing date.

Thank you for the opportunity to provide input. We hope to remain informed as the project moves forward.

Sincerely,

Bruce Kreft
Chief, Conservation and Communications Division

CC. Luke Toso, USFWS
Steven Kahl, ND PSC

Agency Notification Letters and Responses

C12. North Dakota Department of Agriculture

For your additional reference, I have also attached corresponding letters from Agriculture Commissioner Goehring to the ND Public Service Commission in relation to the Badger and Oliver Wind Projects, as well as relevant ND statutes and administrative rules. I also attached a word document of a previous finalized MOU.

Moreover, earlier this year the Legislature granted the Agriculture Commissioner the authority to purchase and hold easements on behalf the State (see attached applicable mitigation program ND statutes). Additionally, we are in the process of amending our administration rules accordingly. We'd be happy to discuss these potential administrative rule amendments with you.

We have also created a sample draft conservation easement template (attached). We strived to make it concise, straightforward, and easy to understand – with an emphasis on continuing working lands.

Additionally, we extended our consulting services contract with West Eco Systems Technology through current fiscal biennium. West will be able to provide us technical expertise as we continue to develop and implement our program. I've cc'ed Kevin Shelly from West on this email. We hope he can be on the call tomorrow afternoon.

Now that the Agriculture Commissioner has statutory authority to purchase and hold conservation easements, beginning in the Spring, 2026, we intend to locate, negotiate, and purchase a number of long-term conservation easements in and around North Dakota (using funds from the Mitigation fund you have indicated you wish to contribute to). As you know, these conservation easements are to be limited in duration to the life of the energy facility, as close to the energy facility as feasibly possible, be working lands conservation easements, and, as appropriate, be similar habitat (i.e., grasslands to grasslands, wetlands to wetlands).

In relation to your specific project, if you happen to know of any landowners in the areas of Morton and Mercer counties who might have land suitable for a working lands conservation easement, we are absolutely open to making contact with them – either later on this winter or early next spring.

Thank you and I look forward to chatting with you tomorrow (Friday) afternoon at 2:00 pm.

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
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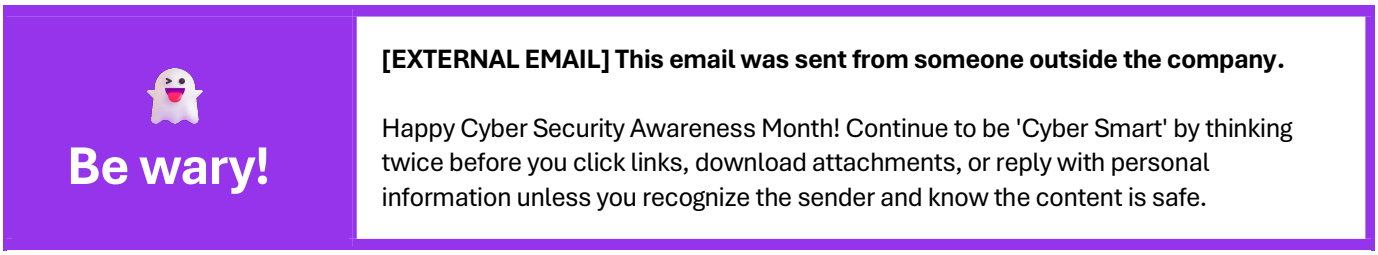
Alex Luman (MP)

From: Bialke, Joseph P. <bialkej@nd.gov>
Sent: Thursday, October 30, 2025 2:25 PM
To: Alex Luman (MP)
Cc: Miller, Adam M.; Mitchell Bettenhausen (ACE); Drew Janke (MP); Kevin Shelley
Subject: [EXTERNAL MAIL] Grassland Compensatory Mitigation for Longspur Wind Project - Teams call tomorrow afternoon (Friday) at 2:00 pm - October 31
Attachments: Mitigation Progam Statutes (effective March 27, 2025).pdf; mitigation fund admin rules - eff 7.1.24.pdf; NDDA working lands mitigation program conservation easement_deed (8.21.2025).pdf; BADGER - ND Dept of Ag MOU (Grassland and Wetland Impact).docx; Letter to PSC.pdf; NDDA - Badger Wind MOU dtd 2.29.24_MDC_Final.pdf; Letter to PSC Commissioner Christmann, dtd 12.29.23 re Oliver Wind IV Project.pdf; NDDA-Oliver Wind IV MOU (Final).pdf; Longspur Wind Project Notice - North Dakota Department of Agriculture Mitigation Program

Importance: High

Follow Up Flag: Follow up
Flag Status: Completed



Alex

Thanks for the below email and our congenial phone conversation this morning.

As discussed, we welcome your interest in the North Dakota Department of Agriculture (NDDA) Working Lands Mitigation Program.

Additionally, thank you for your verbal open public records request to the NDDA. I am responding back to you on behalf of NDDA.

In your open public records request, you requested, in summary:

- a template document/MoU examples related to recent program participation of wind power energy companies in the NDDA Working Lands Mitigation Program

Attached are documents responsive to your request. Any charges or fees associated with NDDA responding to this request for open public records are waived.

Appendix D
County Applications and Approvals

County Applications and Approvals

D.1 Minnesota Power Special Use Permit Application

Wind Energy Facility Special Use Permit Application

LONGSPUR WIND PROJECT

MORTON COUNTY, NORTH DAKOTA



PREPARED BY:

Merjent, Inc.



1 Main Street SE, Suite 300

Minneapolis, Minnesota 55414

September 2025

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ABBREVIATIONS AND TERMS

ADLS	Aircraft Detection Lighting System
kV	kilovolt
LPS	lightning protection system
MET	meteorological towers
MISO	Midwest Independent System Operator
mph	miles per hour
MRO	Midwest Reliability Organization
MW	megawatts
NDGFD	North Dakota Game and Fish Department
O&M	operations and maintenance
POI	Point of Interconnection
Project	Longspur Wind Energy Project
PSC	North Dakota Public Service Commission
SHSND	State Historical Society of North Dakota
SUP	Special Use Permit
UDP	Unanticipated Discovery Plan
USFWS	U.S. Fish and Wildlife Service

1.0 INTRODUCTION

The Longspur Wind Project, wholly owned by Minnesota Power, (Longspur Wind) is submitting this application for a Special Use Permit (SUP) to construct the Longspur Wind Energy Project (Project). The proposed Project is located in Morton County, North Dakota and will have a nameplate capacity of approximately 202.5 megawatts (MW). The Project consists of up to 45 wind turbines, 12 alternative wind turbine locations, access roads, electrical collection lines and communication systems, a substation (Longspur Substation), one Aircraft Detection Lighting System (ADLS) radar tower, an operations and maintenance (O&M) facility, a laydown yard, and one permanent meteorological (MET) tower.

The Project will be located entirely within Morton County, with the exception of the transmission line. The 230-kilovolt (kV) transmission line (Transmission Line) will connect the Project's substation in Morton County to the existing Tri-County 230 kV substation in Mercer County, which will also serve as the Project's Point of Interconnection (POI). The transmission line is approximately 2.3 miles long, of which approximately 2.0 miles will be located in Morton County. In accordance with the Morton County Land Use Code, the transmission line falls under the public utilities exemption; therefore, it is not included in this SUP application.

Minnesota Power is an investor-owned public utility headquartered in Duluth, Minnesota. Minnesota Power supplies retail electric service to 150,000 retail customers, including some of the nation's largest industrial customer operations, and wholesale electric service to 14 municipalities in a 26,000-square-mile electric service territory located in northeastern Minnesota. Minnesota Power's transmission network is interconnected with the regional transmission grid to promote reliability. Minnesota Power is a member of the Midwest Independent System Operator (MISO) and the Midwest Reliability Organization (MRO).

Minnesota Power operates a 1,600 MW peak demand system with electric power generation in the form of renewable wind, solar, and hydropower generation facilities, as well as coal, biomass, and natural gas-fired power plants in Minnesota, and wind energy generation facilities in North Dakota. Minnesota Power also purchases electricity from independent power producers and other public utilities. Minnesota Power delivers 550 MW of electricity to Minnesota Power's service area via its 465-mile-long HVDC +/-250-kV transmission line (HVDC Line), which includes substations and a conversion facility near Center, North Dakota.

1.1 Compliance with the Morton County Land Use Code

This SUP application demonstrates that the Project meets the conditions set forth in the Morton County Land Use Code adopted on September 8, 2014, and amended on March 13, 2025 (Land Use Code)**.** Appendix A includes the Morton County Unified Development Application for the Project.

Longspur Wind will also comply with all applicable North Dakota Public Service Commission (PSC) siting requirements and plans to submit applications for a Certificate of Site Compatibility (wind project) and a Certificate of Corridor Compatibility and Route Permit (Transmission Line) to the PSC in the fourth quarter of 2025.

1.2 Project Area

The Project Area identified below includes the locations where Longspur Wind has obtained easement agreements to construct wind turbines and associated facilities. The Project Area was selected to include all areas necessary for Longspur Wind to optimize the wind resource while avoiding and minimizing impacts to environmental resources. The Project Area encompasses approximately 26,100 acres and has obtained easements in Morton County in the areas identified in Table 1 (see Figure 1).

Table 1 Project Area Legal Description

County	Township Name	Township	Range	Section(s) [1]
Morton	Morton Unorganized Territory	139 N	87 W	4, 5, 6, 9
			88 W	1, 4, 5
		140 N	87 W	5, 6, 7, 8, 17, 18, 19, 20, 28, 29, 30. 31. 32. 33, 34
			88 W	1, 2, 3, 4, 9 – 33, 36
			89 W	13, 14, 24

[1] Note that locations within the Project Area may be located within the Section but may not encompass the entire Section.

1.3 Project Schedule

The commercial operation date is dependent upon permitting, equipment deliveries, and other development activities. Longspur Wind is targeting construction to begin in Q3 2026, provided all pre-construction permits and approvals have been obtained.

1. **Permits:** Longspur Wind is responsible for undertaking all required environmental studies and will obtain all permits and licenses that are required following issuance of the Certificate of Site Compatibility and Certificate of Corridor Compatibility and Route Permit. Obtaining county permits is a critical priority for the Project and will allow Longspur Wind to move forward with other commitments on the Project.

2. **Equipment Procurement, Manufacture, and Delivery:** Longspur Wind equipment orders are in process and equipment will be delivered at or around the beginning of construction and will continue through the construction phase.

3. **Construction:** Construction is scheduled to begin as early as Q3 2026, subject to obtaining necessary permits, road restrictions, and weather. The engineering, procurement, and construction contractor will be responsible for completing all construction, including roads, wind turbine assembly, electrical, and communications work. Construction will take approximately one year to complete.

4. **Testing Operations:** Longspur Wind anticipates testing to begin between Q3 and Q4 2027.

5. **Commercial Operation:** Longspur Wind anticipates commercial operation of the Project to begin producing energy in Q4 2027.

2.0 PROJECT EQUIPMENT DESCRIPTION

The Project expects to use up to 45 wind turbines with a capacity of up to 5 MW per turbine and 12 alternative turbine locations. Exact turbine models are subject to change to ensure selection of a turbine that is both cost effective and optimizes land and wind resources. The final turbine type selection may affect the number and configuration of the turbine array.

To the extent reasonably possible, Longspur Wind will use materials, colors, textures, and locations that will blend the Project into the natural setting and existing environment and in compliance with Section 5-180 of the Land Use Code.

2.1 Wind Turbine Generators

The wind turbine will have up to a 370.7-foot-high hub height and a maximum height of 638.2 feet from the base of the tower to the tip of the upright blade. The turbines are designed to begin operation in wind speeds of 6.7 miles per hour (mph) and will reach the rated capacity at a wind speed of 24.6 mph.

2.2 Turbine Rotors

Each rotor will consist of three blades mounted to a rotor hub. The hub is attached to the nacelle, which houses the gearbox, generator, brake, cooling system, and other electrical and mechanical systems. The selected wind turbine will have an up to 534.8-foot rotor diameter with a swept area of 224,640.5 square feet.

2.3 Turbine Towers

The tower is described as cylindrical/conical or tubular steel tower with flange connections. The towers are designed with the majority of internal welded connections replaced by magnet supports to create a predominantly smooth-walled tower. Magnets provide load support in a horizontal direction and internals, such as platforms, ladders, etc., are supported vertically (that is, in the gravitational direction) by a mechanical connection. The smooth tower design reduces the required steel thickness, rendering the tower lighter compared to one with all internals welded to the tower shells. Surfaces are coated for protection against corrosion. All welds are made by automatically controlled power welding machines and ultrasonically inspected during manufacturing per American National Standards Institute specifications.

Each turbine can be accessed through a lockable steel door at the entrance platform approximately 9.8 feet above ground level. Access to the top platform in the tower is by a ladder or service lift. Access to the nacelle from the top platform is by ladder. Access to the transformer room in the nacelle is controlled by a lock. Interior lights are factory installed at interval points from the base of the tower to the tower top. The turbine is equipped with lights in the tower, nacelle and hub. The main controller is placed in the tower bottom of the turbine.

2.4 Turbine Lightning Protection

Lightning and ground protection for all wind farm equipment is designed and constructed to be compliant with all applicable National Electrical Code and National Electrical Safety Code requirements. Each turbine will be grounded and shielded to protect against lightning. The grounding system will be installed during foundation work, will be designed for local soil conditions, and will be in accordance with local utility or code requirements. The electrical components will also be protected.

Each wind turbine has a lightning protection system (LPS), which helps protect the wind turbine against the physical damage caused by lightning strikes. The LPS consists of five main parts: lightning receptors on blades, down conducting system, protection against overvoltage and overcurrent, and shielding against magnetic and electrical fields.

2.5 Electrical Collection System

The electricity generated by each turbine is stepped up to a power collection line voltage of 34.5 kV via a transformer mounted inside the nacelle of each wind turbine. The electricity generated at each turbine will be collected by a system of underground power collection lines within the Project Area and brought to the Longspur Substation. The Longspur Substation will step up the voltage from 34.5 kV to 230 kV, enabling it to be transmitted along overhead transmission lines.

Communication lines will be placed parallel to underground power collection lines and terminate at the O&M building.

2.6 Electrical Power Transmission Lines

The Transmission Line (2.0 miles of which will be in Morton County) will convey power from the planned Longspur Wind energy collection substation in Morton County to the POI at the existing Tri-County Substation in Mercer County. The Transmission Line will have minimum interference with farming and irrigation operations and is an exempted use under the Land Use Code.

2.7 Access Roads

Access to each turbine will be facilitated by a compacted gravel road. Access roads have been sited in consultation with landowners to avoid or minimize impacts to land use and the environment. The access roads will be approximately 16 feet wide (total easement width is approximately 25-30 feet) and constructed with locally sourced gravel, if available. The access roads will support the size and weight of maintenance vehicles.

2.8 Associated Facilities

In addition to wind turbines, the Project includes access roads, an underground electrical collection system, an underground SCADA communication system, the Longspur Substation, an O&M building, one ADLS radar tower, and one MET towers. The turbine-generated electricity is transmitted to a nacelle-mounted transformer, where it is converted to the 34.5 kV collection line voltage. The underground collection line system transmits the electricity to the collection substation, where it is converted to the Transmission Line voltage of 230 kV. Longspur Wind will construct a 2.3-mile-long, 230-kV Transmission Line to connect the Longspur Substation to the existing Tri-County 230 kV substation in Mercer County, which will also serve as the POI.

3.0 WIND ENERGY FACILITY REGULATIONS (MORTON COUNTY LAND USE CODE, SECTION 5-180)

Longspur Wind will comply with all Morton County Land Use Code standards and State of North Dakota siting requirements. The following section is a description of how the Project will comply with all Standards for Wind Energy Facilities in Section 5-180 of the Land Use Code (see Figures 2 – 5).

3.1 Standards

3.1.1 Appearance Standards (Code Section 5-180.b.1)

The proposed wind turbine generators will be installed on tubular, monopole-type towers that will be painted a non-reflective, non-obtrusive color and will not display any advertising except for reasonable identification of the manufacturer or Project operator. Turbines will also be marked with a visible identification number to assist with provision of emergency services.

Buildings and related structures at the Project will, to the extent reasonably possible, use materials, colors, textures, and locations that will blend the Project to the natural setting and existing environment.

Except for lighting required by the Federal Aviation Administration and PSC, wind turbine generators within the Project will not be artificially lit.

3.1.2 Construction and Maintenance Standards (Code Section 5-180.b.2)

Construction of the Project will require new aggregate-surfaced access roads. After the construction phase and during operation of the Project, the access roads will be used by O&M crews while inspecting and servicing the wind turbines. The access roads will be between towers, offset as necessary to allow for adequate access. One road will be required for each string of turbines. Although a 25- to 30-foot-wide disturbance area is likely during construction, the permanent access roads will primarily be low profile to allow cross-travel by farm equipment and will be approximately 16 feet wide. The permanent access roads will be maintained during the operation of the Project and unless otherwise requested by the landowner, will be returned to their original condition upon Project decommissioning.

The location and construction of the Project's access roads and other infrastructure shall, to the extent reasonably possible, minimize disruption to farmland, the landscape, and agricultural operations within the county. Prior to construction, Longspur Wind will make arrangements (including obtaining permits) for road use access road intersections, maintenance and repair of damages with the governmental jurisdiction with authority over each road. Longspur Wind and its representatives have and will continue to coordinate efforts with the county road engineer through the development process.

Longspur Wind will promptly repair or replace any fences or gates removed or damaged during all phases of the Project's life unless otherwise negotiated with the affected landowner. Additionally, the Project will provide for continuity in electric fence circuits when installing gates where electric fences are present. Where necessary or requested by landowners, the Project will construct gates or fences such as those around the collection substation.

The Project will be responsible for all maintenance associated with the turbines and private roads accessing the turbines during Project operation. Additionally, Longspur Wind will enter into a road maintenance agreement with the Morton County Road Department to ensure that all County roads used during construction are repaired or restored to a condition at least equal to the road condition prior to construction of the Project. Prior to construction, the Project will contact the Morton County Engineer and request an inspection of the haul routes. Additionally, the Project will abide by all state and local overweight requirements outlined in North Dakota Century Code Chapter 39-12, including obtaining permits.

Longspur Wind will take into account and avoid all drainage tiles during all phases of Project life. If drainage tiles are broken or damaged by the Project, Longspur Wind will promptly repair or replace all damaged drainage tiles unless otherwise negotiated with the affected landowner.

Longspur Wind will minimize tree removal and will not remove groves of trees or shelter belts without written approval of the impacted landowner.

Longspur Wind will site laydown yards at least 0.5 mile from the nearest occupied dwelling; however, this setback may be waived, if stated in writing, by both the owners and inhabitants (if different).

3.1.3 Public Safety Standards (Code Section 5-180.b3)

Prior to construction, Longspur Wind will prepare and provide fire protection and medical emergency plans to local emergency and medical service providers including rural fire district, Sheriff's Department, Emergency Management, and local emergency medical service providers having jurisdiction over the area.

Each wind tower will be marked with a visible identification number to assist with provision of emergency services, and Longspur Wind will file with the Morton County Emergency Manager a wind energy facility map identifying wind turbine locations and numbers.

Longspur Wind will provide educational material to landowners within the site boundaries and, upon request, to interested persons about the Project and any restrictions or dangers associated with the Project. Longspur Wind also provide any necessary safety measures, such as warning signs and gates for traffic control or to restrict public access to turbine access roads, substations, and wind turbines. Longspur Wind will comply with provisions outlined in their public safety plan.

Within 24 hours of an occurrence, Longspur Wind will notify the Morton County Emergency Manager of any extraordinary event. Extraordinary events include, but shall not be limited to, fires, tower collapse, thrown blade, collector or feeder line failure, or injured wind turbine facility worker or private person. Longspur Wind, within 30 calendar days of the occurrence, will submit a report to the County Emergency Manager describing the cause of the occurrence and the steps taken to avoid future occurrences.

3.1.4 Collector System Standards (Code Section 5-180.b4)

The Project collectors and communication cables will be placed underground to a depth of at least 4 feet when located on private property and placed within or adjacent to the land necessary for wind turbine access roads, unless otherwise negotiated with the affected landowner. Collectors and communication cables placed on private property will be in accordance with the easement negotiated with the affected landowner. No overhead feeder lines (overhead collectors or communication cables) will be used as part of the Project.

Longspur Wind will be responsible for compliance with all federal, state, and local laws applicable to the generation, storage, transportation, clean-up, and disposal of hazardous wastes generated during any phase of the Project’s life.

Longspur Wind will site the substation so that it is set back from the nearest occupied dwelling by at least 0.5 mile; however, this setback may be waived, if stated in writing, by both the owners and inhabitants (if different).

3.1.5 Turbine Setback Standards (Code Section 5-180.b5)

The setbacks used in designing the Project comply with or exceed those required by Morton County Land Use Code setbacks for wind turbines, the PSC wind energy-specific exclusion area setbacks per North Dakota Administrative Code Section 69-06-08-01(2) and North Dakota Century Code Section 49-22-05.1, and vendor standards, including a 1,900-foot setback from inhabited nonparticipating residences. Table 2

lists the Morton County Land Use Code setbacks used in designing the Project. The distances are based on the largest wind turbine. The largest contemplated wind turbine will measure up to 638.2 feet from the base of the tower to the tip of the upright blade.

Longspur Wind is requesting a Variance from Morton County's Land Use Code's setback distance of 1.1 times the height of the turbine plus 75 feet under Section 5-180.b.5.C for the Project's associated Transmission Line. Longspur wind will be the owner and operator of the line. The Project does however meet the PSC's setback requirement of 1.1 times the height of the turbine for the Transmission Line.

The Project will work with local entities to ensure Morton County's Land Use Code's setback standards are met. The Project layout has been designed to comply with the County's setbacks; however, if turbines are within the setback zone from aboveground communication or electrical lines. Minnesota Power will work with utilities to bury their communication or electrical lines. If setback requirements cannot be met alternative turbines will be selected.

Table 2 Turbine Setback Standards Designated by the Morton County Land Use Code

Setback Type	Setback Distance in Land Use Code	Setback Distance as Applied to Project
Occupied dwelling, commercial building, publicly used structure or facility, or state and county park	1.25 x height of the turbine or 1,320 feet, whichever is greater	1,320 feet
State park and county park	0.5 mile	0.5 mile
Interstate, state, or county road; or above-ground communication or electrical lines; or railroad right-of-way	1.1 x height of the turbine plus 75 feet from the centerline of the existing right-of-way or object	777 feet
Section lines	Turbine shall be set back 100 feet	100 feet
Setback from the wind energy facility perimeter	1.5 x height of the turbine[1]	957.3 feet

[1] A variance may be granted if an authorized representative or agent of the applicant and those affected parties of adjoining properties with associated wind rights sign a formal and binding agreement expressing all parties' support for a variance that may reduce the setback requirements.

Longspur Wind understands that Morton County has many sensitive sites, and the Board of County Commissioners may ask Longspur Wind to avoid these sites in granting an SUP.

3.2 Minimum Ground Clearance (Code Section 5-180.c)

Longspur Wind understands that the blade tip of any wind turbine shall, at its lowest point, have ground clearance of no less than 70 feet. The final wind turbine model will have a ground clearance of 103.3 feet.

3.3 Additional Requirements (Code Section 5-180.d)

Longspur Wind will provide the below outlined additional application requirements identified in the Land Use Code. Longspur Wind will not operate the Project in a manner that will cause interference to existing microwave, television, radio telecommunications, or navigation interference contrary to Federal Communications Commission regulations or any federal, state, or local laws. In the event the wind turbine facility or its operations cause such interference as described in this section, Longspur Wind shall take measures necessary to correct the problem within thirty (30) calendar days.

3.3.1 Electromagnetic Interference (Code Section 5-180.d1)

Longspur Wind worked with Comsearch and completed an assessment of microwave signal patterns, television, radio, and telecommunications in the Project Area (Appendix B).

3.3.1.1 Microwave Signal Patterns

There are three microwave beam paths within the Project Area. Longspur Wind will avoid all beam paths by placing turbines outside of the exclusion zones.

3.3.1.2 Television

There are 22 records, for operating television stations within 150 kilometers of the Project. Longspur Wind will avoid siting turbines where there is a clear line of sight to the station. In the event that television services are interrupted due to the Project, Longspur Wind will work with affected landowners to mitigate impacts.

3.3.1.3 AM and FM Radio

No AM or FM stations were found within 30 kilometers of the Project. Longspur Wind does not anticipate any effects to AM or FM radio within the Project Area.

3.3.2 Archeological Resource Survey and Consultation (Code Section 5-180.d2)

Longspur Wind is under the purview of the PSC. An archaeological resource survey was performed in 2024 and 2025 and the results will be submitted to the State Historical Society of North Dakota (SHSND) for review and comment. The results of the surveys will be described in detail in the Project's applications to the PSC, and the response from SHSND will be provided to Morton County, when received, as support for the SUP. All identified archaeological sites will be avoided by the Project's design and construction. The Project will adopt an Unanticipated Discovery Plan (UDP), and any unknown archaeological sites or human remains that are found during construction will be managed in accordance with the UDP, as well as state and federal laws.

3.3.3 Biological Resources Survey (Code Section 5-180.d3)

Longspur Wind is under the purview of the PSC. Longspur Wind, in consultation with the U.S. Fish and Wildlife Service (USFWS) and the North Dakota Game and Fish Department (NDGFD), has conducted a preconstruction inventory of existing wildlife management areas, scientific and natural areas, recreation areas, native prairies and forests, wetlands, and any other biologically sensitive areas and wildlife resources, particularly birds and bats, within the Project Area. The Project has also performed assessments for the presence of federally listed or threatened species, and other protected species, such as migratory birds. The results of the surveys will be discussed in detail in the Project's applications to the PSC and submitted to the USFWS and NDGFD upon completion. Summaries of the survey results and agency consultations will be provided to the Zoning Administrator prior to Project construction.

3.4 Road Use Arrangements (Code Section 5-180.e)

Prior to construction, Longspur Wind will make satisfactory arrangements (including obtaining permits) for road use, access roads, intersections, maintenance and repair of damages with the governmental jurisdiction with authority over each road. Longspur Wind will notify the County Engineer of such arrangements upon request.

3.5 Changes to Permit (Code Section 5-180.g)

After a special use permit has been granted, Longspur Wind will obtain authorization for any minor changes in the location or character of wind turbine facilities and structures in writing from the Zoning Administrator.

3.6 Restoration of Property (Code Section 5-180.f)

Longspur Wind understands that County Code Section 5-180.f. requires that Longspur Wind (or the owner at the time) remove all structures to a depth of three feet below pre-construction grade within 6 months of termination or abandonment of Project leases/easements; however, Longspur Wind requests application of the PSC's decommissioning rules, which allow for up to 24 months for completion of decommissioning after a facility's abandonment or end of useful life. North Dakota Administrative Code § 69-09-09-04.

3.7 Change in Ownership (Code Section 5-180.h)

Prior to any change in ownership or controlling interest in the Project, an application will be made to the Morton County Board of County Commissioners, requesting that county permits be transferred to the new owner, as applicable.

4.0 MORTON COUNTY COMPREHENSIVE PLAN AND OTHER CONSIDERATIONS

Consistent with the general requirements for SUPs, Longspur Wind has taken into consideration the Morton County Comprehensive Plan as well as the health and safety of the public and the works and residents in the area. The Project will not be detrimental to the use or development of properties adjacent to the Project and the Project Area in general.

In addition, the positive economic impact of wind development lasts throughout the life of the Project and benefits landowners, local government, school districts, and local business.

4.1 Morton County Comprehensive Plan Considerations (Code Section 10-040(b)(1)

Longspur Wind is consistent with the goals and objectives of the Morton County 2045 Comprehensive Plan (adopted February 2018). Energy remains one of the largest industries in the state of North Dakota and is a primary sector industry for Morton County. Wind energy is a relatively new part of the energy sector in Morton County but is a growing component with an ongoing revenue that benefits landowners, government, and school districts. Additionally, wind energy projects take advantage of the area's abundant wind resource while allowing the surrounding land to remain in active agricultural use.

The Project helps to further Morton County Comprehensive Plan Goal 1: Agricultural and Ranch Lands are Preserved for those Uses, with an objective that "development occurs within appropriate, designated areas, which are identified in this Plan as Growth-Priority Areas." The Project can offer agricultural landowners an additional revenue stream, while allowing them to maintain the land's current use. The Project is also consistent with Goal 6: The Morton County Economy is Diversified and Growing, including Objective 6.1: to "ensure that land use policies support the development of uses that contribute to economic growth", as all applicable County Land Use codes will be complied with. Lastly, the Project will be sited to avoid sensitive water resources and special flood hazard areas, to the extent feasible. As such, it supports Goal 7: Chosen Locations for Development in Morton County do not Increase Potential Hazards to Public Health and Safety; particularly Objective 7.1 that "susceptibility of development to known sources of water damage is minimized."

4.2 Health and Safety Considerations (Code Section 10-040(b)(2)

Longspur Wind provides additional Project related information within the scope of the Morton County approval process as it relates to the health and safety of its residents and those in and around the Project Area.

Development of this Project is compatible with current land uses because it is proposed for an area with a relatively sparse population and it is located in an open agricultural area. Additionally, this electricity will be generated without impacting surface or groundwater, without obstructing current farming practices, without creating noxious airborne discharge, and with minimal impact to Morton County natural resources or area public services.

4.2.1 Noise

North Dakota Administrative Code Article 69-06-08-01(4) specifies that sound levels within 100 feet of an inhabited residence or community building may not exceed 45 dBA, unless waived in writing by the owner.

Longspur Wind is conducting an acoustic analysis to evaluate sound levels resulting from the operation of wind turbines to ensure that sound levels will not exceed state requirements.

4.2.2 Shadow Flicker

Neither the State of North Dakota nor Morton County currently set forth a standard for shadow flicker; therefore, Longspur Wind is using industry guidance, and the PSC's accepted standard of no more than 30 hours of shadow flicker per year at an occupied residence. Longspur Wind is conducting an analysis of shadow flicker to calculate the total amount of time (hours and minutes per year) that shadow flicker could occur at receptors. Longspur Wind will make every attempt to meet the industry standard of no more than 30 hours of shadow flicker per year at an occupied residence.

4.2.3 Water Supply

Construction and operation of the Project will not have an impact on the local water supply. The abandonment of wells is not required for this Project, and it will not require appropriation of surface water or permanent dewatering. Temporary dewatering of groundwater may be required during construction of turbine foundations. If required, a National Pollution Discharge Elimination System permit would be obtained and a Stormwater Pollution Prevention Plan would be developed.

The Project will not require water to generate electricity; however, the O&M building will require a water supply line for the use of sinks and toilets and an equipment wash station. The Project will have no impact on aquifers in Morton County or the Project Area.

APPENDIX A

MORTON COUNTY APPLICATION

MORTON COUNTY UNIFIED DEVELOPMENT APPLICATION

Application submitted for (check all that apply):

- ☐ Long-Form Subdivision
- ☐ Short-Form Subdivision
- ☐ Zoning Map Amendment
- ☑ Special Use Permit
- ☐ Variance
- ☐ Subdivision Plat Vacation
- ☐ Exempt Division of Land

PROPERTY INFORMATION

Name of Plat/Proposal: Longspur Wind		
Legal Description of Property (section, township, lot, etc.): See Section 1.2 in supplemental information		
Address of Property: N/A	Number of lots: See supplemental information	Total Acreage: 26,100
Proposal/Reason for Request: See supplemental information	Existing Zone is: Agricultural	
	Proposed Zone is: Agricultural	

Property in Special Flood Hazard Area (circle one): Yes ☐ No ☑

As defined by FEMA. Also known as "100-Year Floodplain"

CONTACT INFORMATION

Applicant/Developer

Name: Alexander Luman	Phone: 218-355-3029	Email: aluman@mnpower.com
Mailing Address: 30 West Superior St, Duluth, MN 55802		

Property owner (if different than applicant/developer)

Name:	Phone:	Email:
Mailing Address:		

Contact Person/Agent (if different than applicant/developer)

Name:	Phone:	Email:
Mailing Address:		

By signing, I attest that this application is complete, accurate, and submitted with the required information as outlined in the attached checklist. I understand the regulations of the Morton County Land Use Code as they pertain to this request(s). I certify that all owners of property described herein have signed or ratified this application. I hereby request favorable consideration of the above described development proposal:

Applicant's Signature	Date: 09/29/2025	Property Owner's Signature	Date
Additional Owner's Signature	Date	Additional Owner's Signature	Date

Applications are not complete until all required submittals have been received

All applications are due by 5:00 p.m. 21 calendar days prior to the Planning and Zoning Commission meeting.

MORTON COUNTY DEVELOPMENT APPLICATION CHECKLIST

The following checklist and all required materials must be submitted with an application. Applications for multiple items (e.g. subdivision and rezoning) must meet all requirements for each item.

Long-Form Subdivision

Morton County Land Use Code, Section 10-020

Submitted with application for preliminary plat

- ☐ Pre-application meeting with county staff on date: _____
  During the meeting, county planner or engineer may request additional information about the proposal to be submitted before the public hearing. Presenting a sketch plan at this meeting is helpful, but optional.
- ☐ Fee of: $400.00 for 2 – 10 lot subdivisions
  $600.00 for 11 – 20 lot subdivisions
  $800.00 for subdivisions of 21 lots and over
- ☐ Digital copy of preliminary plat (pdf format, full size)
- ☐ Preliminary plat checklist, completed by applicant.
- ☐ Confirmation that consultation with the following parties has been initiated:
  - Missouri West Water System or SouthWest Water
  - Custer Health Department (for sanitation)
  - U.S. Postal Service (for mail delivery methods)
  - Mor Gran Sou (for electricity).
- ☐ Fringe Area Roadway Master Plan corridors within or adjacent to site (if any).

Submitted to seek final plat approval

- ☐ Digital copy of final plat (pdf format, full size)
- ☐ Final plat checklist, completed by applicant.
- ☐ Stormwater Management Plan.
- ☐ Shapefile of data in plat, including lot lines, roadway rights-of-way, and easement boundaries. (in NAD 1983 StatePlane North Dakota South).

Submitted after approval and before recordation of plat

- ☐ One final plat on mylar at 24"x 36" or 24"x 30" in accordance with checklist.
- ☐ Three additional full-sized hard-copies of the final plat with signatures.

Short-Form Subdivision

Morton County Land Use Code, Section 10-030

Submitted with application for plat

- ☐ Fee of $200.00
- ☐ Digital copy of final plat (pdf format, full size)
- ☐ Final plat checklist, completed by applicant.
- ☐ Fringe Area Roadway Master Plan corridors within or adjacent to site (if any).

Submitted after approval and before recordation of plat

- ☐ One final plat on mylar at 24"x 36" or 24"x 30" in accordance with checklist.
- ☐ Shapefile of data in plat, including lot lines, roadway rights-of-way, and easement boundaries (in NAD 1983 StatePlane North Dakota South).
- ☐ Three additional full-sized hard-copies of the final plat with signatures.

Zoning Map Amendment *Submitted with application*

Morton County Land Use Code, Section 10-080

- ☐ Fee of $200.00
- ☐ Locational description of area requested for zone change (unless submitted with plat)
- ☐ Written reason for requested zone change (unless submitted with plat)

Variance *Submitted with application*

Morton County Land Use Code, Section 10-060

- ☐ Fee of $200.00
- ☐ Written letter of hardship stating reason for variance request
- ☐ Digital copy of site plan (pdf format, full size) drawn to scale, of proposed improvement requiring variance

Special Use Permit *Submitted with application*

Morton County Land Use Code, Section 10-040

- ☑ Fee of:
  1. 0.001 x Total Project Cost with up to $1000.00 down at the time of application and the balance required before the building permit is issued

     or

  2. $300.00, whichever is greater.
- ☑ Digital copy of site plan (pdf format, full size) at 1" = 20' or larger scale, if integral to request.
- ☐ For temporary uses, a plan for compliance with all code requirements, including mitigation of impacts during use and remediation after use.

Subdivision Plat Vacation *Submitted with application*

Morton County Land Use Code, Section 10-090

- ☐ Fee of: $200.00 for 1 lot subdivision
  $400.00 for 2 – 10 lot subdivisions
  $600.00 for 11 – 20 lot subdivisions
  $800.00 for subdivisions of 21 lots and over
- ☐ Plat of public grounds proposed to be vacated.
- ☐ Notarized petition signed by all adjoining property owners. Petition must include plat and reason for vacation.

Exempt Division of Land *Submitted with application*

Morton County Land Use Code, Section 7-030

- ☐ Plat of Irregular Description or legal description for the subdivision.
- ☐ Any required easements or dedications of right-of-way.

APPENDIX B

COMSEARCH STUDIES

Wind Power GeoPlanner™

AM and FM Radio Report

Longspur



Prepared on Behalf of
ALLETE

August 14, 2024

COMSEARCH
A CommScope Company

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2. Summary of Results - 1 -

3. Impact Assessment - 3 -

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1. Introduction

Comsearch analyzed AM and FM radio broadcast stations whose service could potentially be affected by the proposed Longspur Wind Project in Morton County, North Dakota

2. Summary of Results

Project Information

Name: Longspur
County: Morton
State: North Dakota

Number of Turbines: TBD
Blade Diameter: TBD
Tip Height: 192 meters



Figure 1: Area of Interest

AM Radio Analysis
Comsearch found no database records[1] for AM stations within approximately 30 kilometers of the project.

FM Radio Analysis
Comsearch found no database records[2] for FM stations within approximately 30 kilometers of the project.

[1] Comsearch makes no warranty as to the accuracy of the data included in this report beyond the date of the report. The data presented in this report is derived from the AM/FM station's FCC license and governed by Comsearch's data license notification and agreement located at http://www.comsearch.com/files/data_license.pdf.

[2] Comsearch makes no warranty as to the accuracy of the data included in this report beyond the date of the report. The data presented in this report is derived from the AM/FM station's FCC license and governed by Comsearch's data license notification and agreement located at http://www.comsearch.com/files/data_license.pdf.

3. Impact Assessment

The exclusion distance for AM broadcast stations varies as a function of the antenna type and broadcast frequency. For directional antennas, the exclusion distance is calculated by taking the lesser of 10 wavelengths or 3 kilometers. For non-directional antennas, the exclusion distance is simply equal to 1 wavelength. Potential problems with AM broadcast coverage are only anticipated when AM broadcast stations are located within their respective exclusion distance limit from wind turbine towers. A search radius of 30 km found no AM station records. As there were no stations found within 3 kilometers of the project, which is the maximum possible exclusion distance based on a directional AM antenna broadcasting at 1000 KHz or less, the project should not impact the coverage of local AM stations.

The coverage of FM stations is generally not sensitive to interference due to wind turbines, especially when large objects (e.g., wind turbines) are located in the far field region of the radiating antenna to avoid the risk of distorting its radiation pattern. A search radius of 30 km found no FM station records. At this distance there should be adequate separation to avoid radiation pattern distortion.

4. Recommendations

Since no impact on licensed and operational AM or FM broadcast stations was identified in our analysis, no recommendations or mitigation techniques are required for this project.

5. Contact

For questions or information regarding the AM and FM Radio Report, please contact:

Contact person:	David Meyer
Title:	Senior Manager
Company:	Comsearch
Address:	21515 Ridgetop Circle, Suite 300, Sterling, VA 20166
Telephone:	703-726-5656
Fax:	703-726-5595
Email:	David.Meyer@CommScope.com
Web site:	www.comsearch.com

Wind Power GeoPlanner™

Communication Tower Study

Longspur



Prepared on Behalf of
ALLETE

August 14, 2024

COMSEARCH
A CommScope Company

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2. Summary of Results - 1 -

3. Discussion of Separation Distances - 3 -

4. Conclusions - 3 -

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1. Introduction

This Communication Tower Study was performed for the Longspur project in Morton County, North Dakota to identify the tower structures as well as FCC-licensed communication antennas that exist in and around the project area. This information is useful in the planning stages of the wind energy facilities to identify turbine setbacks and to prevent disruption to the services provided by the tenants on the towers. This data can be used in support of the wind energy facilities communications needs in addition to avoiding any potential impact to the current communications services provided in the region.

2. Summary of Results

The communication towers and antennas in the study area were derived from a variety of sources including the FCC's Antenna Structure Registration (ASR) database, Universal Licensing System (ULS), national and regional tower owner databases, and the local planning and zoning boards. The data[1] was imported into GIS software and the structures mapped in the wind energy area of interest. Each tower location is identified with a unique ID number associated with detailed structure and contact information provided in a spreadsheet attachment.

One tower structure and four communication antennas were identified within or near the Longspur project area using the data sources described in our methodology above. The structure found is not registered with the FCC and contains two microwave antennas licensed to Basin Electric Power Cooperative. The remaining two antennas may be located on a variety of structure types such as guyed towers, monopoles, silos, rooftops or portable structures. The specific type of structure would normally need to be determined by an on-site visit.

Detailed information about the tower structures and communication antennas is provided in Table 1 and Table 2 including location coordinates, structure height above ground level, and owner-operator name[2].

A discussion of turbine setback distances is provided in section three.

[1] Comsearch makes no warranty as to the accuracy of the data included in this report beyond the date of the report. The data provided in this report is governed by Comsearch's data license notification and agreement located at http://www.comsearch.com/files/data_license.pdf.

[2] Please note that this report analyzes all known operators on the towers from data sources available to Comsearch. Unidentified operators may exist on the towers due to unlicensed or federal government systems, mobile phone operators with proprietary locations, erroneous data on the FCC license, and other factors beyond our control.

ID	Tower ID	Callsign	Service Type	Licensee	Antenna Height AGL (m)	Latitude (NAD83)	Longitude (NAD83)
1		WQUW925	Land Mobile	Pleasant Ridge LLP	21.3	46.941417	-101.884111
2	TOWER001	WEH426	Microwave	Basin Electric Power Cooperative	10.67-53.34	46.967778	-101.791278
3	TOWER001	WQEL369	Land Mobile	Basin Electric Power Cooperative	42.4	46.967778	-101.791250
4		WSE246	Land Mobile	PELTZ, LYLE	26	46.952778	-101.696250

Table 1: Summary of Communication Antennas

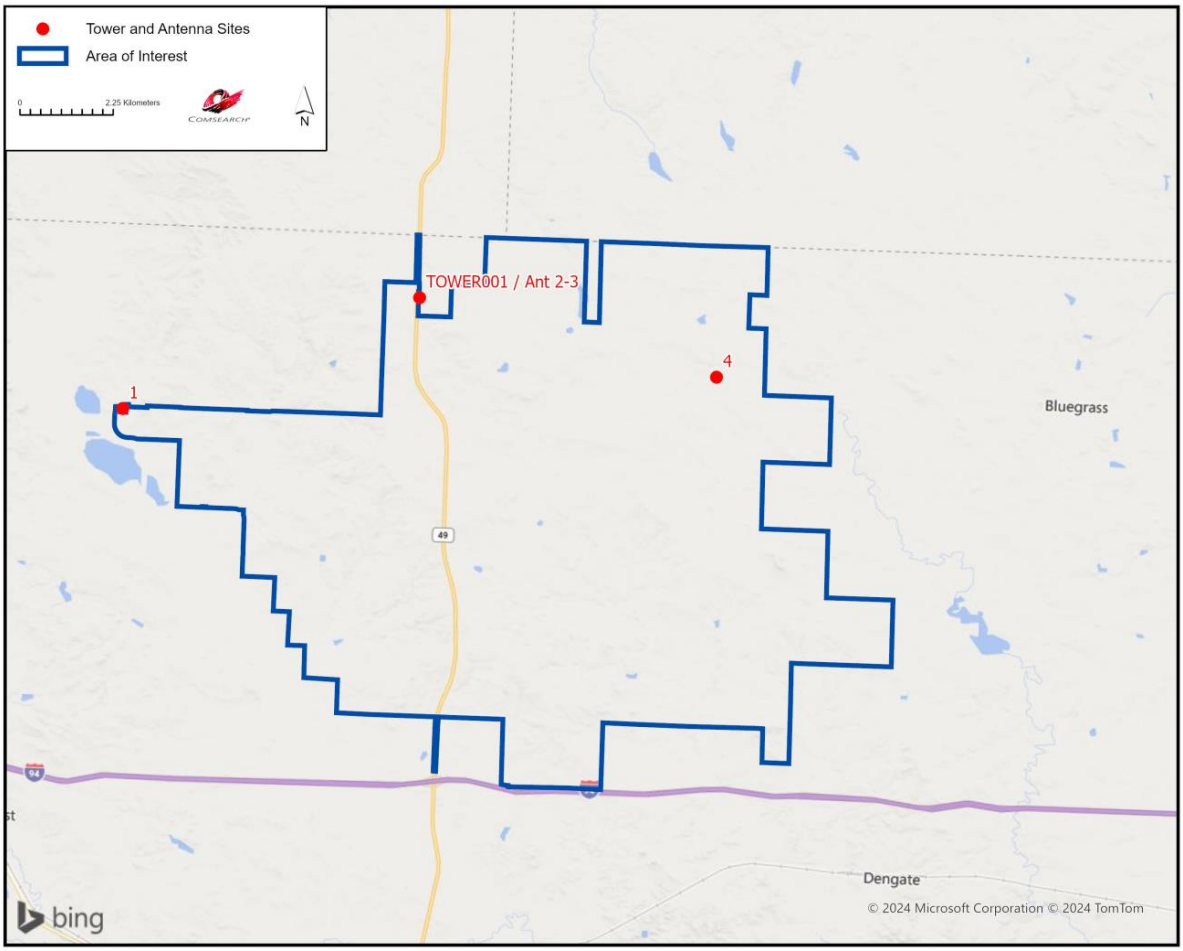

Figure 1: Communication Towers and Antennas within or near the Area of Interest

3. Discussion of Separation Distances

In planning the wind energy turbine locations, a conservative approach would dictate not locating any turbines in close proximity to existing tower structures to avoid any possible impact to the communications services provided by the structures. Reasonable distance between communication towers and wind turbine towers is a function of two things: (1) the physical turning radius of the wind turbine blades and (2) the characteristics of the communication systems on the communication tower.

Since wind turbine blades can rotate 360º in both the vertical and horizontal planes, the first consideration of separation distance to other structures is clearance of the rotating blades. If the blade radius is 80 meters, then a separation distance greater than 80 meters is necessary. From a practical standpoint, a setback distance greater than the maximum height of the turbine is necessary to ensure a “fall” safety zone in the unlikely event of a turbine tower failure. Setback requirements for “fall” safety are typically specified by the local zoning ordinances.

The separation distance required based on the characteristics of the communication systems will vary depending on the type(s) of communication antennas located on the tower. For example, AM, FM and TV communication antennas should be separated by distances that allow for normal coverage. For RADAR and microwave systems, line-of-sight (LOS) is used as the criteria for separation distance as well as the physical clearance necessary for the turbine blades. For land mobile, mobile phone, and wireless Internet systems, setback distances are based on FCC interference emissions from electrical devices according to their respective frequency bands.

4. Conclusions

Our study identified one structures and four communication antennas within or near the project area. They are used for microwave and land mobile services in the area.

5. Contact Us

For questions or information regarding the Communication Tower Study, please contact:

Contact person:	David Meyer
Title:	Senior Manager
Company:	Comsearch
Address:	21515 Ridgetop Circle, Suite 300, Sterling, VA 20166
Telephone:	703-726-5656
Fax:	703-726-5595
Email:	David.Meyer@CommScope.com
Web site:	www.comsearch.com

Wind Power GeoPlanner™

Microwave Study

Longspur



Prepared on Behalf of
ALLETE

August 13, 2024

COMSEARCH
A CommScope Company

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3. Fresnel Zone Analysis - 2 -

4. Conclusion - 5 -

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1. Introduction

Microwave bands that may be affected by the installation of wind turbine facilities operate over a wide frequency range (900 MHz – 23 GHz). Comsearch has developed and maintains comprehensive technical databases containing information on licensed microwave networks throughout the United States. These systems are the telecommunication backbone of the country, providing long-distance and local telephone service, backhaul for cellular and personal communication service, data interconnects for mainframe computers and the Internet, network controls for utilities and railroads, and various video services. This report focuses on the potential impact of wind turbines on licensed, proposed and applied non-federal government microwave systems.

2. Project Overview

Project Information

Name: Longspur
County: Morton
State: North Dakota

Number of Turbines: TBD
Blade Diameter: TBD
Tip Height: 192 meters



Figure 1: Area of Interest

3. Fresnel Zone Analysis

Methodology

Our obstruction analysis was performed using Comsearch's proprietary microwave database, which contains all non-government licensed, proposed and applied paths from 0.9 - 23 GHz[1]. First, we determined all microwave paths that intersect the area of interest[2] and listed them in Table 1. These paths and the area of interest that encompasses the planned turbine locations are shown in Figure 2.

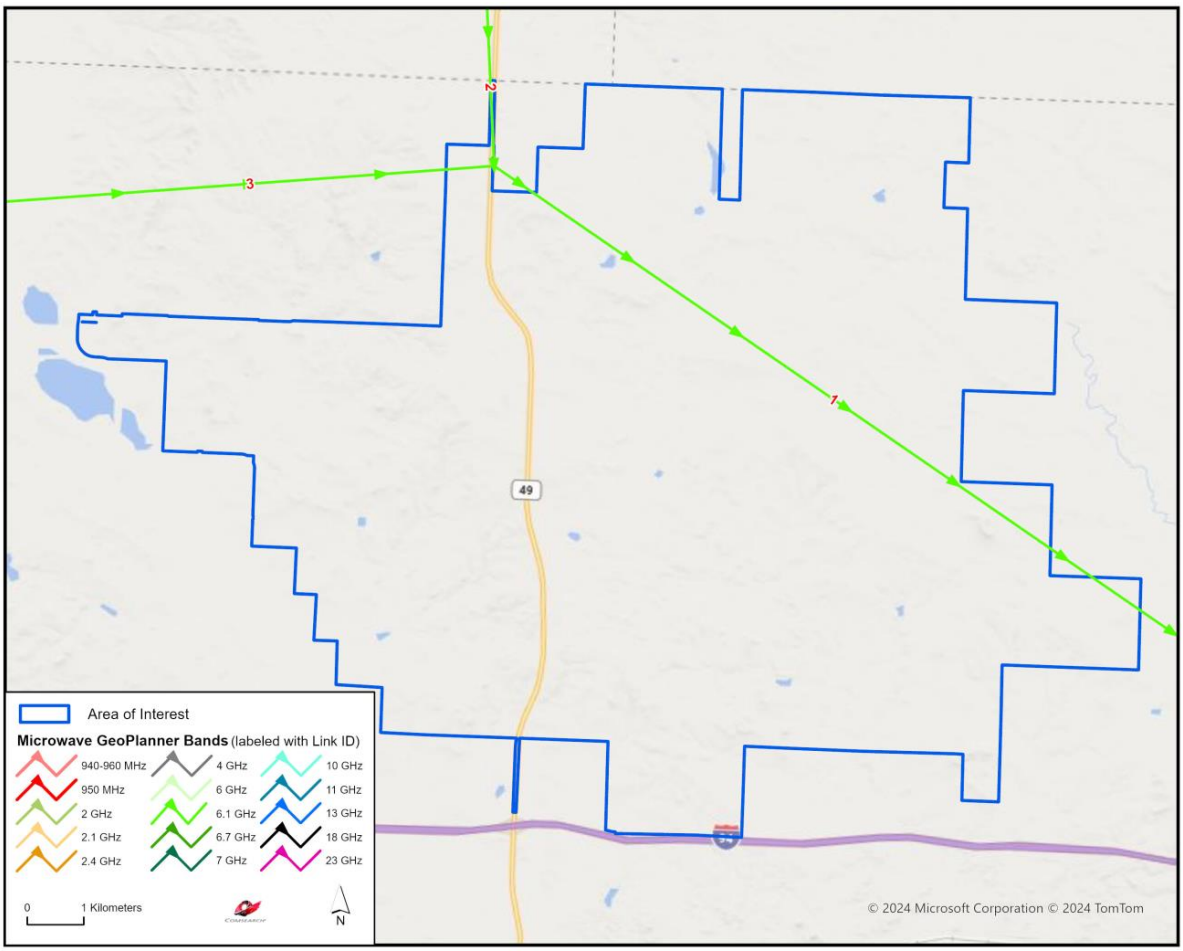


Figure 2: Microwave Paths that Intersect the Area of Interest

[1] Please note that this analysis does not include unlicensed microwave paths or federal government paths that are not registered with the FCC.

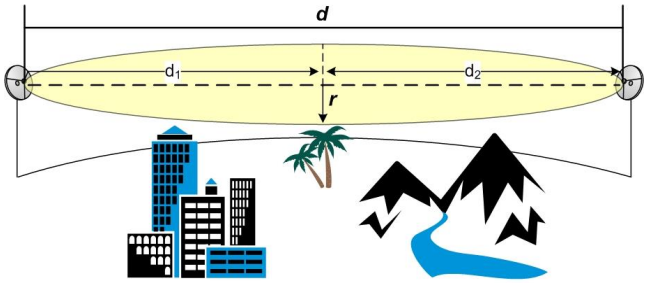
[2] We use FCC-licensed coordinates to determine which paths intersect the area of interest. It is possible that as-built coordinates may differ slightly from those on the FCC license.

ID	Status	Callsign 1	Callsign 2	Band	Path Length (km)	Licensee
1	Licensed	WEH426	WEH428	6.1 GHz	34.89	Basin Electric Power Cooperative
2	Licensed	WEH427P	WEH426	6.1 GHz	44.83	Basin Electric Power Cooperative
3	Licensed	WHJ617	WEH426	6.1 GHz	46.80	Basin Electric Power Cooperative

Table 1: Summary of Microwave Paths that Intersect the Area of Interest
(See enclosed mw_geopl.xlsx for more information and
GP_dict_matrix_description.xls for detailed field descriptions)

Next, we calculated a Fresnel Zone for each path based on the following formula:

$$r \cong 17.3\sqrt{\frac{n}{F_{GHz}}\left(\frac{d_1 d_2}{d_1 + d_2}\right)}$$



Where,

r	=	Fresnel Zone radius at a specific point in the microwave path, meters
n	=	Fresnel Zone number, 1
F_{GHz}	=	Frequency of microwave system, GHz
d_1	=	Distance from antenna 1 to a specific point in the microwave path, kilometers
d_2	=	Distance from antenna 2 to a specific point in the microwave path, kilometers

The calculated Fresnel Zone shows the narrow area of signal swath and is calculated for each microwave path in the project area. In general, this is the area where the planned wind turbines should be avoided, if possible. Likewise, Comsearch recommends that an area directly in front of each microwave antenna should be avoided. This corresponds to the Consultation Zone which measures 1 kilometer along the main beam of the antenna and 24 ft (7.3 meters) wide. A depiction of the individual Fresnel and Consultation Zones is shown in Figure 3, and is also included in the shapefiles[3,4].

[3] The ESRI® shapefiles enclosed are in NAD 83 UTM Zone 14 projected coordinate system.

[4] Comsearch makes no warranty as to the accuracy of the data included in this report beyond the date of the report. The data provided in this report is governed by Comsearch's data license notification and agreement located at http://www.comsearch.com/files/data_license.pdf.

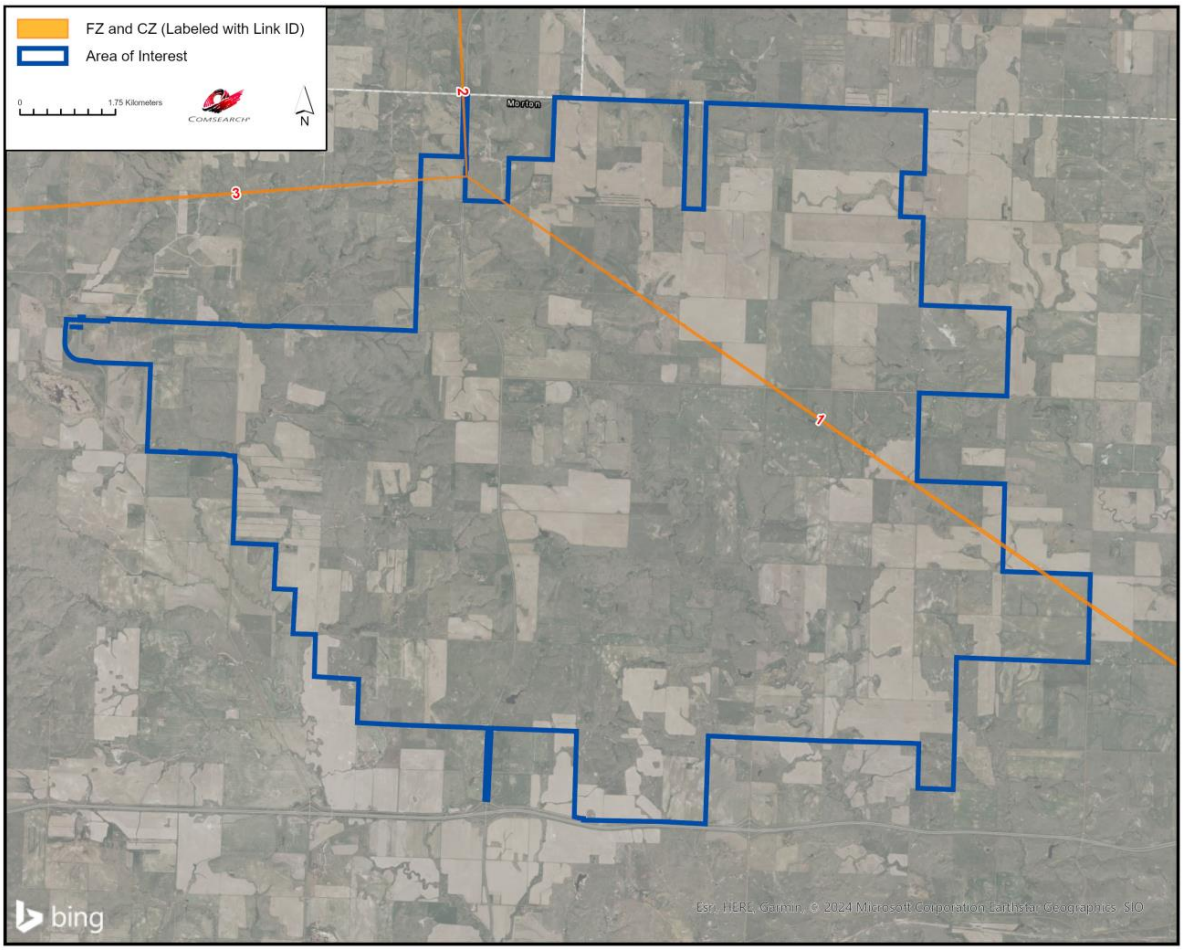


Figure 3: Fresnel and Consultation Zones in the Area of Interest

Discussion of Potential Obstructions

Total Microwave Paths	Paths with Affected Fresnel Zones	Total Turbines	Turbines intersecting Fresnel Zones
3	N/A	N/A	N/A

For this project, turbine locations were not provided; thus we could not determine if any potential obstructions exist between the planned wind turbines and the incumbent microwave paths. If the latitude and longitude values for turbine locations are provided, Comsearch can identify where a potential conflict might exist.

4. Conclusion

Our study identified three microwave paths intersecting the Longspur project area. The Fresnel and Consultation Zones for these microwave paths were calculated and mapped. We recommend that all turbines be sited in locations that will not encroach on these exclusion zones.

5. Contact

For questions or information regarding the Microwave Study, please contact:

Contact person: David Meyer
Title: Senior Manager
Company: Comsearch
Address: 21515 Ridgetop Circle, Suite 300, Sterling, VA 20166
Telephone: 703-726-5656
Fax: 703-726-5595
Email: David.Meyer@CommScope.com
Web site: www.comsearch.com

Wind Power GeoPlanner™

Off-Air TV Analysis

Longspur



Prepared on Behalf of
ALLETE

August 14, 2024

COMSEARCH
A CommScope Company

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1. Introduction

Off-air television stations broadcast signals from terrestrially-based facilities directly to television receivers. Comsearch identified those off-air stations whose service could potentially be affected by the proposed Longspur wind project in Morton County, North Dakota. Comsearch then examined the coverage of the stations and the communities in the area that could potentially have degraded television reception due to the location of the proposed wind turbines.

2. Summary of Results

The proposed wind energy project area and local communities are depicted in Figure 1, below.



Figure 1: Wind Farm Project Area and Local Communities

To begin the analysis, Comsearch compiled all off-air television stations[1] within 150 kilometers of the proposed turbines. TV stations at a distance of 150 kilometers or less are the most likely to provide off-air coverage to the project area and neighboring communities. These stations are listed in Table 1, on the next page, and a plot depicting their locations is provided in Figure 2. There are a total of 22 database records for stations within approximately 150 kilometers of the proposed turbines. All stations are currently licensed and operating, eight of which are low-power stations or translators. Translator stations are low-power stations that receive signals from distant broadcasters and retransmit the signal to a local audience. These stations serve local audiences and have limited range, which is a function of their transmit power and the height of their transmit antenna.

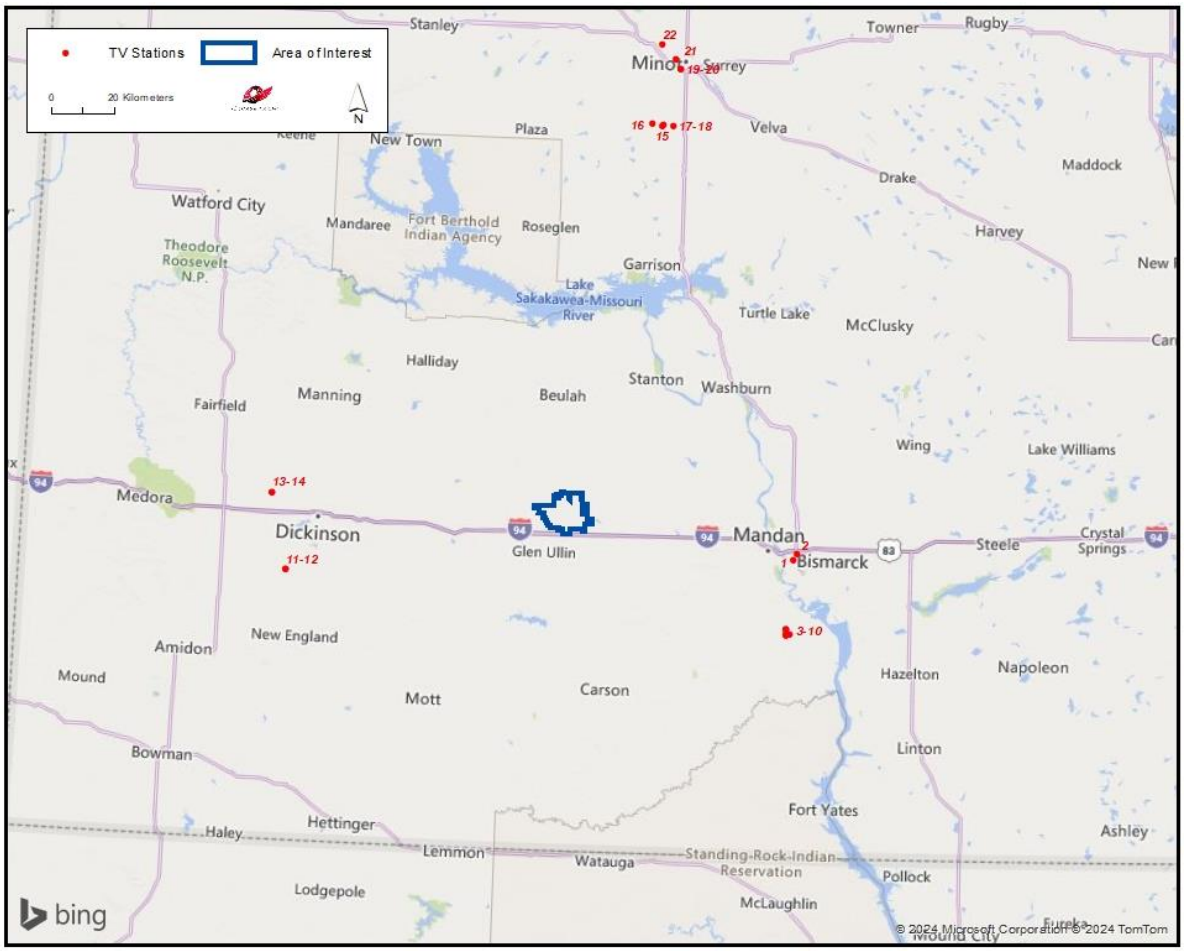


Figure 2: Plot of Off-Air TV Stations within 150 Kilometers of Proposed Turbines

[1] Comsearch makes no warranty as to the accuracy of the data included in this report beyond the date of the report. The data presented in this report is derived from the TV station's FCC license and governed by Comsearch's data license notification and agreement located at http://www.comsearch.com/files/data_license.pdf.

ID	Call Sign	Status	Service[2]	Channel	Transmit ERP[3] (kW)	Latitude (NAD 83)	Longitude (NAD 83)	Distance to the Area of Interest (km)
1	KXBK-LD	LIC	LPD	15	3.0	46.805667	-100.785083	65.72
2	K28MS-D	LIC	LPD	28	2.0	46.825417	-100.767111	66.79
3	K23OL-D	LIC	LPD	23	2.0	46.605639	-100.807333	70.95
4	KFYR-TV	LIC	DTV	31	500.0	46.605639	-100.807333	70.95
5	K35PO-D	LIC	LPD	35	15.0	46.605639	-100.807333	70.95
6	KXMB-TV	LIC	DTV	12	19.1	46.589722	-100.806111	71.85
7	KXMB-TV	STA	DTV	12	10.6	46.589722	-100.806111	71.85
8	KBMY	LIC	DTV	17	75.0	46.587500	-100.805833	71.99
9	KBME-TV	LIC	DTV	22	97.3	46.589722	-100.800833	72.21
10	KNDB	LIC	DTV	26	50.0	46.589722	-100.794444	72.64
11	KDSE	LIC	DTV	9	30.3	46.726389	-102.916389	82.04
12	KXMA-TV	LIC	DTV	19	150.0	46.726389	-102.916389	82.04
13	KQCD-TV	LIC	DTV	7	11.3	46.948056	-102.990833	84.12
14	K28QT-D	LIC	LPD	28	15.0	46.948056	-102.990833	84.12
15	KNDM	LIC	DTV	24	50.0	48.053889	-101.434722	120.70
16	KSRE	LIC	DTV	15	84.0	48.050611	-101.390750	120.89
17	KMCY	LIC	DTV	14	40.0	48.053056	-101.385278	121.24
18	KXMC-TV	LIC	DTV	13	16.1	48.050000	-101.342778	121.53
19	KMOT	LIC	DTV	10	7.69	48.215556	-101.318611	139.92
20	K18NW-D	LIC	LPD	18	15.0	48.215556	-101.318611	139.92
21	K35MM-D	LIC	LPD	35	0.9	48.242000	-101.340750	142.50
22	K21GQ-D	LIC	LPD	21	2.0	48.283222	-101.404083	146.25

Table 1: Off-Air TV Stations within 150 Kilometers of Proposed Turbines

[2] Definitions of service and status codes:
ACA - Analog Class A
DCA - Digital Class A
DRT - Digital Replacement Translator
DT - ETL testing
DTS - Distributed Transmission System
DTV - Full Service Television
DTX - Digital TV Auxiliary
LPA - Low Power Analog TV
LPD - Low Power Digital TV
LPT - Digital TV Translator
LPX - Analog TV Translator
TS - Legacy Service for Analog TV Auxiliary
TV - Analog TV legacy

LIC – Licensed and operational station
CP – Construction permit granted
CP MOD – Modification of construction permit
APP – Application for construction permit, not yet operational
STA – Special transmit authorization, usually granted by FCC for temporary operation

[3] ERP = Transmit Effective Radiated Power

3. Impact Assessment

Based on a contour analysis of the licensed stations within 150 kilometers of the Longspur, it was determined that nine of the full-power digital stations, identified below in Table 2, may have their reception disrupted in and around the project. The areas primarily affected would include TV service locations within 10 kilometers of the turbines that have clear line-of-sight (LOS) to a proposed wind turbine but not to the respective station. After the wind turbines are installed, communities and homes in these locations may have degraded reception of these stations. This is due to multipath interference caused by signal scattering as TV signals are reflected by the rotating wind turbine blades and mast.

ID	Call Sign	Status	Service	Channel	Transmit ERP (kW)	Latitude (NAD 83)	Longitude (NAD 83)	Distance to the Area of Interest (km)
4	KFYR-TV	LIC	DTV	31	500.0	46.605639	-100.807333	70.95
6	KXMB-TV	LIC	DTV	12	19.1	46.589722	-100.806111	71.85
7	KXMB-TV	STA	DTV	12	10.6	46.589722	-100.806111	71.85
8	KBMY	LIC	DTV	17	75.0	46.587500	-100.805833	71.99
9	KBME-TV	LIC	DTV	22	97.3	46.589722	-100.800833	72.21
10	KNDB	LIC	DTV	26	50.0	46.589722	-100.794444	72.64
11	KDSE	LIC	DTV	9	30.3	46.726389	-102.916389	82.04
12	KXMA-TV	LIC	DTV	19	150.0	46.726389	-102.916389	82.04
13	KQCD-TV	LIC	DTV	7	11.3	46.948056	-102.990833	84.12

Table 2: Licensed Off-Air TV Stations Subject to Degradation

4. Recommendations

While TV signals are reflected by wind turbines, which can cause multipath interference to the TV receiver, modern digital TV receivers have undergone significant improvements to mitigate the effects of signal scattering. When used in combination with a directional antenna, it becomes even less likely that signal scattering from wind farms will cause interference to digital TV reception.

Nevertheless, signal scattering could still impact certain areas currently served by the TV station mentioned above, especially those that would have line-of-sight to at least one wind turbine but not to the station antenna. In the unlikely event that interference is observed in any of the TV service areas, it is recommended that a high-gain directional antenna be used, preferably outdoors, and oriented towards the signal origin in order to mitigate the interference.

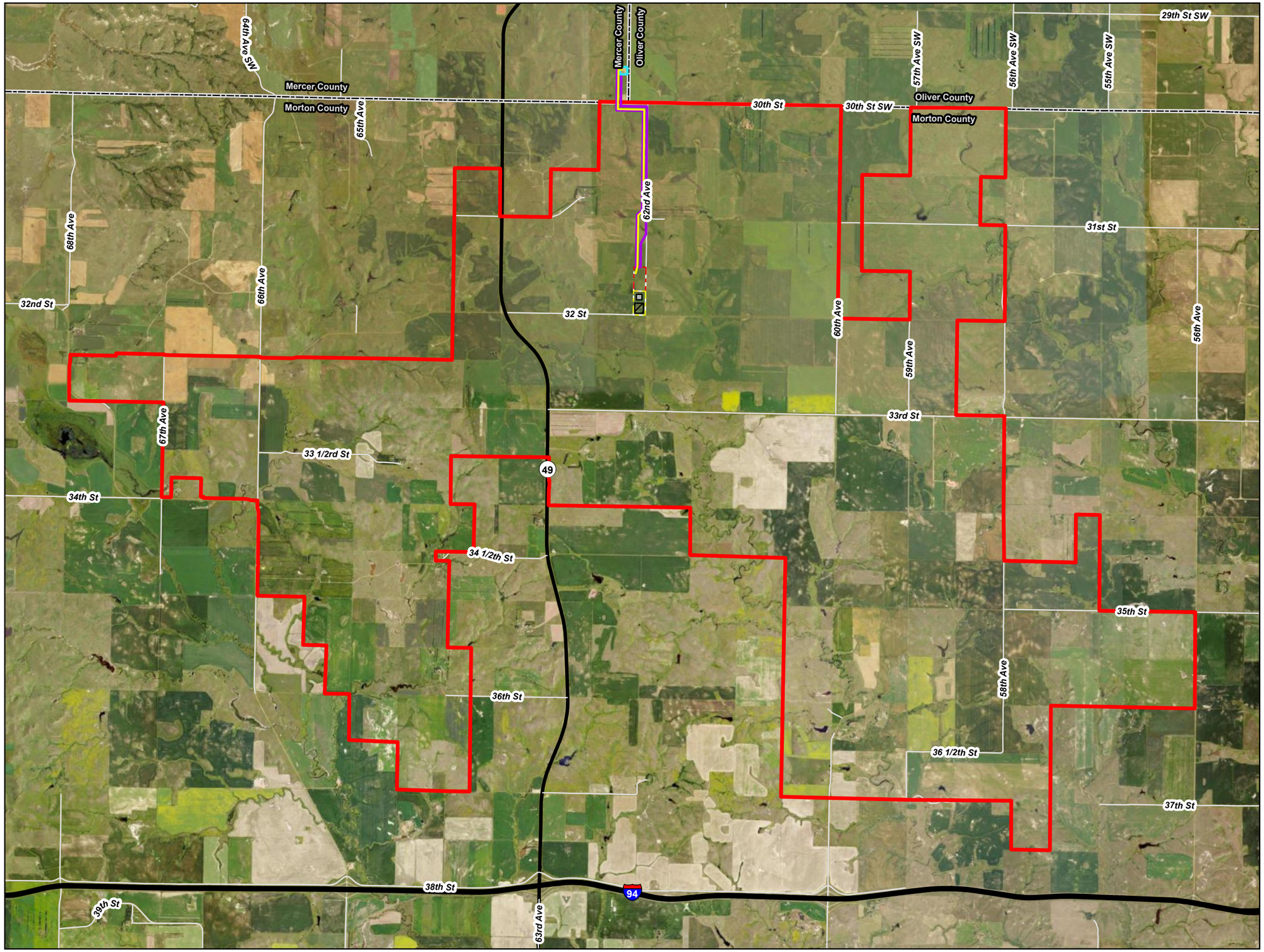
Both cable service and direct broadcast satellite service will be unaffected by the presence of the wind turbine facility and may be offered to those residents who can show that their off-air TV reception has been disrupted by the presence of the wind turbines after they are installed.

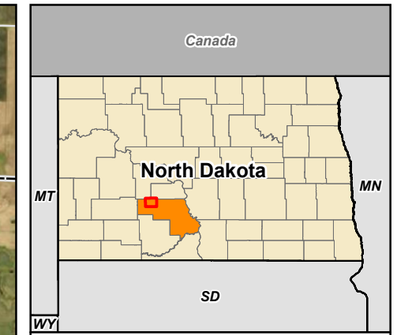
5. Contact

For questions or information regarding the Off-Air TV Analysis, please contact:

Contact person:	David Meyer
Title:	Senior Manager
Company:	Comsearch
Address:	21515 Ridgetop Circle, Suite 300, Sterling, VA 20166
Telephone:	703-726-5656
Fax:	703-726-5595
Email:	David.Meyer@CommScope.com
Web site:	www.comsearch.com

FIGURES





0 0.5 1 Miles

1:60,000

N W E S

- Project Area
- Transmission Line Project Corridor
- Transmission Line Project Route
- Longspur Substation
- Existing TriCounty Substation
- O&M Facility
- O&M Building
- Construction Laydown Yard
- County Boundary

Figure 1
Project Location

Longspur Wind Project

Minnesota Power

Morton County, North Dakota

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For Environmental Review Purposes Only

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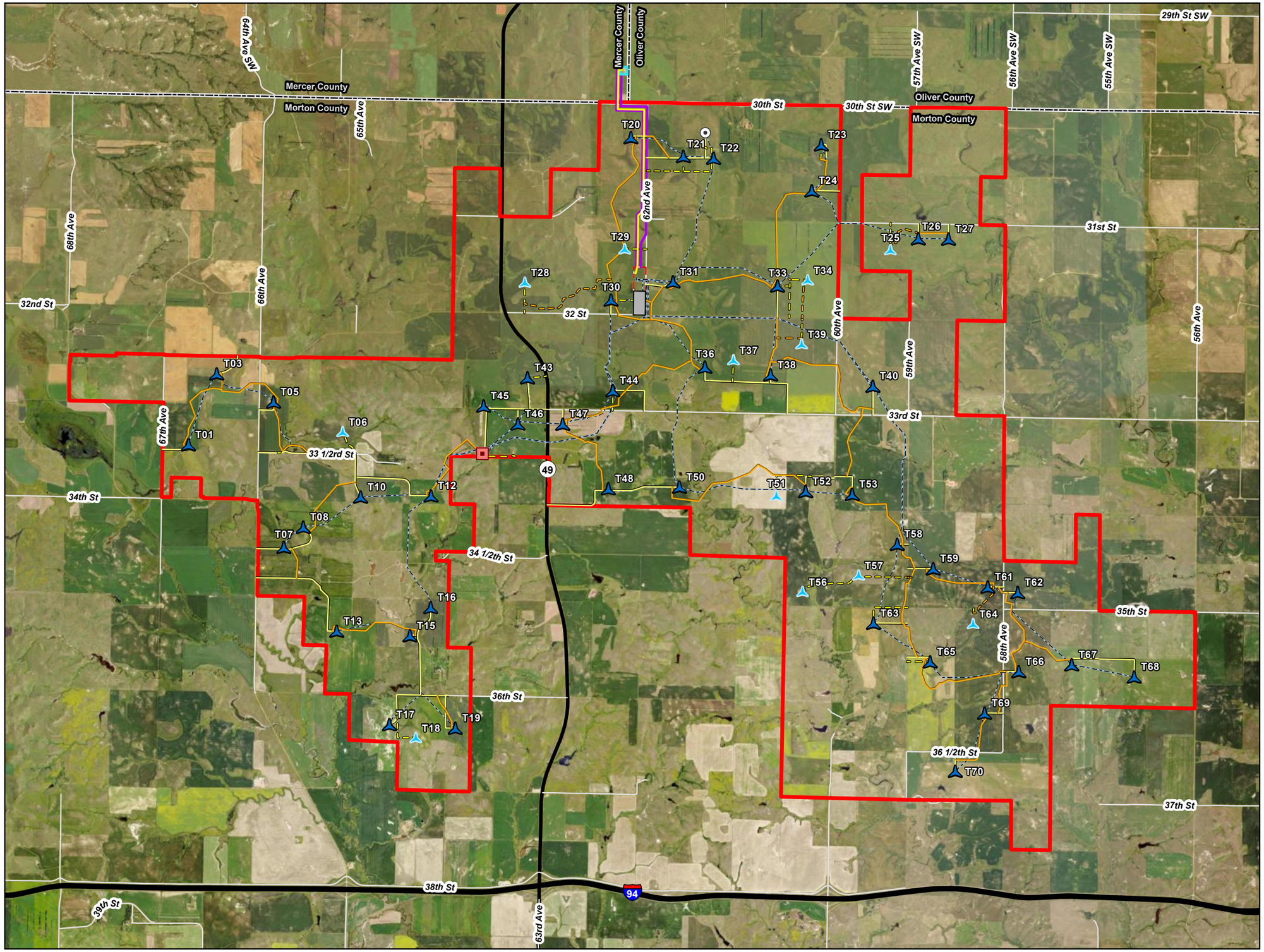

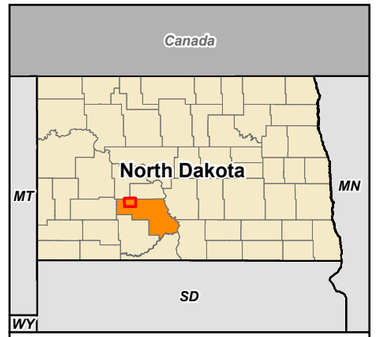

0 0.5 1 Miles

1:60,000

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W E
S

- Proposed Primary Turbine
- Proposed Alternate Turbine
- Proposed Met Tower
- Proposed ADLS
- Transmission Line Project Route
- Collection Line
- Primary Crane Path
- Alternate Crane Path
- Primary Access Road
- Alternate Access Road
- Transmission Line Project Corridor
- Project Area
- O&M Facility
- O&M Building
- Longspur Substation
- Existing TriCounty Substation
- Construction Laydown Yard
- County Boundary

Figure 2
Preliminary Layout

Longspur Wind Project

Minnesota Power

Morton County, North Dakota

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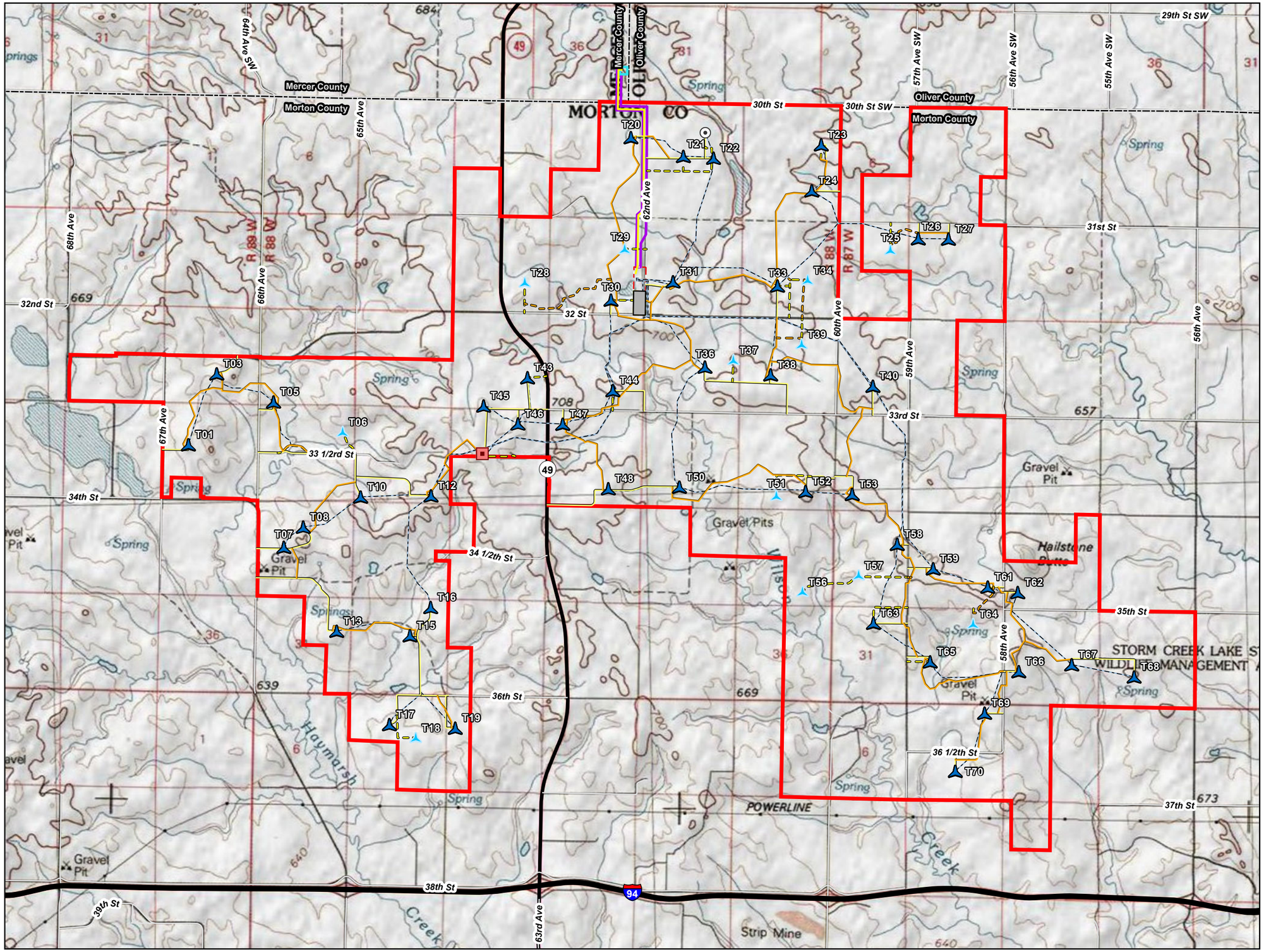

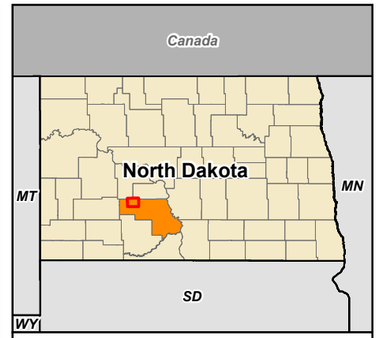

0 0.5 1 Miles

1:60,000

N
W E
S

- Proposed Primary Turbine
- Proposed Alternate Turbine
- Proposed Met Tower
- Proposed ADLS
- Transmission Line Project Route
- Collection Line
- Primary Crane Path
- Alternate Crane Path
- Primary Access Road
- Alternate Access Road
- Existing TriCounty Substation
- Transmission Line Project Corridor
- Project Area
- Longspur Substation
- O&M Facility
- O&M Building
- Construction Laydown Yard
- County Boundary

Figure 3
Preliminary Layout - Topographic

Longspur Wind Project

Minnesota Power

Morton County, North Dakota

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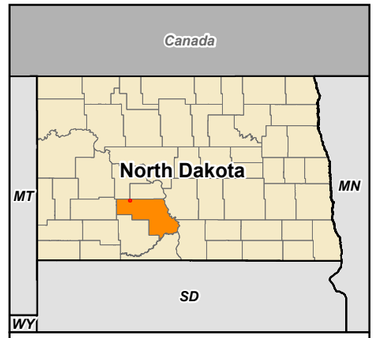

0 250 500 Feet

1:6,000

N
W E
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- Proposed Primary Turbine
- Proposed Alternate Turbine
- Transmission Line Project Route
- Collection Line
- Primary Access Road
- Alternate Access Road
- Primary Crane Path
- Alternate Crane Path
- Transmission Line Project Corridor
- Longspur Substation
- O&M Facility
- O&M Building
- Construction Laydown Yard

Figure 4
Longspur Substation

Longspur Wind Project

Minnesota Power

Morton County, North Dakota

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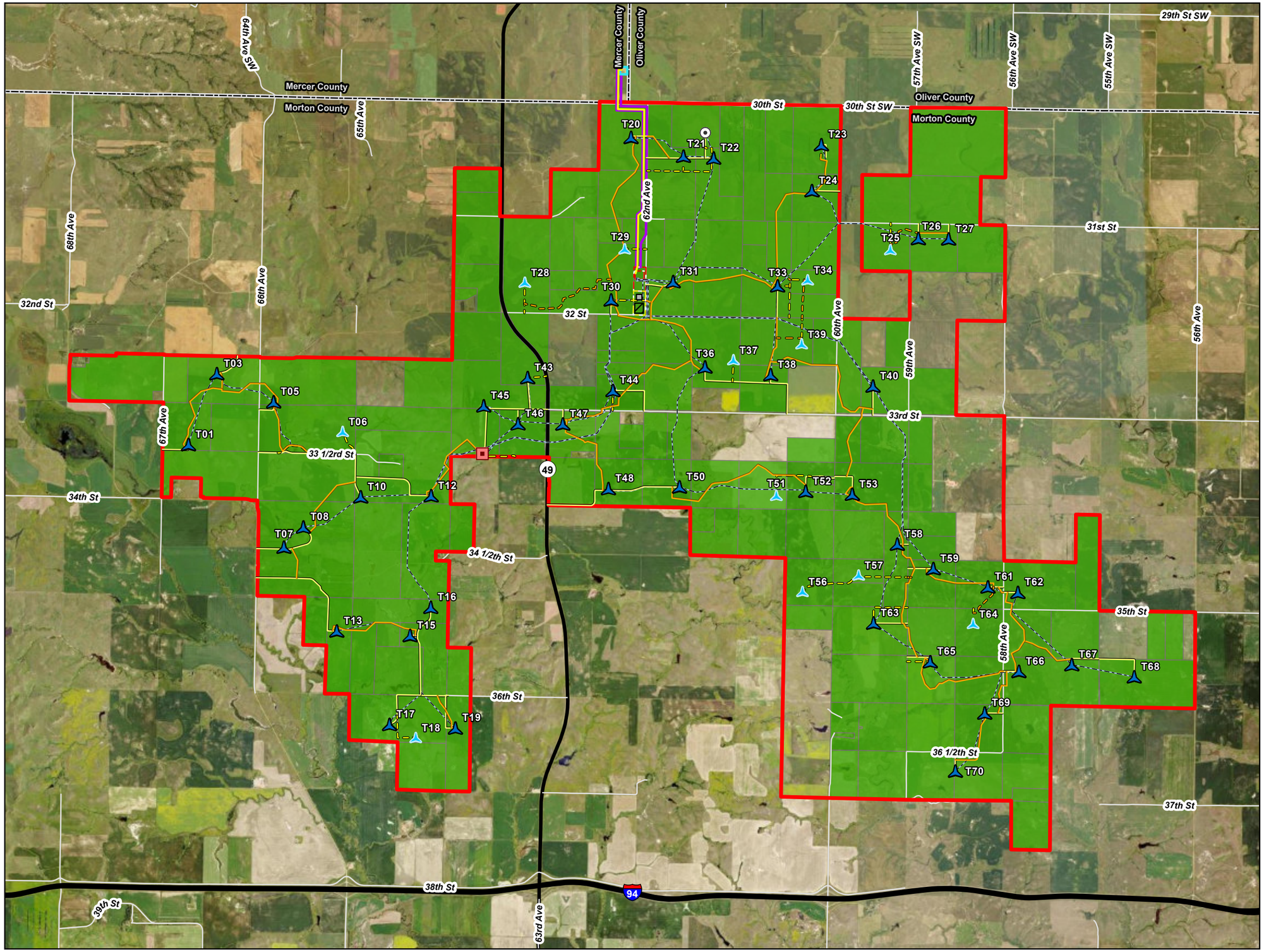

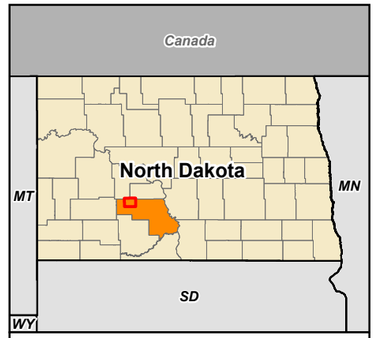

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N W E S

- Proposed Primary Turbine
- Proposed Alternate Turbine
- Proposed Met Tower
- Proposed ADLS
- Transmission Line Project Route
- Primary Access Road
- Alternate Access Road
- Primary Crane Path
- Alternate Crane Path
- Collection Line
- Transmission Line Project Corridor
- Project Area
- O&M Facility
- O&M Building
- Longspur Substation
- Existing TriCounty Substation
- Construction Laydown Yard
- Participating Parcel
- County Boundary

Figure 5
Preliminary Layout
Participating Parcels

Longspur Wind Project

Minnesota Power

Morton County, North Dakota

Source: C:\Clients\M_P\MN_Power\Longspur_Wind\Arcgis\Permitting\SUP_Morton_Co\Longspur_Fig5_MortonCo_SUP.aprx

Date: (11/14/2025)

For Environmental Review Purposes Only

County Applications and Approvals

D.2 Morton County Special Use Permit Approval

MORTON COUNTY

STATE OF NORTH DAKOTA

PERMIT NO. PZ25-SU-C

Morton County Special Use Permit

The Morton County Board of County Commissioners has granted a Special Use Permit to allow a Wind Energy Facility use, known as the Longspur Wind Project, on approximately 26,000 acres in Sections 13, 14, 24, Township 140N, Range 89W; Sections 1-4, 9-26, 28-33, 36 Township 140N, Range 88W; Sections 5-8, 17-20, 28-34, Township 140N, Range 87W; Sections 4-6, 9 Township 139N, Range 87W; Sections 1, 4 & 5, Township 139N, Range 88W; Morton County, North Dakota.

This permit is subject to the following conditions:

1) Wind project components may not be developed or installed on properties that lie within the Residential zoning district, even though such properties may lie within the proposed project boundary.
2) The applicant must solicit letters of acknowledgement from all parties that hold major infrastructure easements (i.e. oil and gas pipelines, or similar) within the project boundary. Letters should state any concerns or special considerations regarding impacts of the project on existing infrastructure. These letters should be submitted to the Zoning Administrator as soon as practicable and at least 90 days prior to the start of construction.
3) All lighting shall be shielded to direct light toward the ground, unless otherwise required by another permitting authority.
4) Prior to the start of construction, the applicant must develop and execute a road use agreement that meets the satisfaction of the County Engineer.

Permissions granted are for the project, as described, in materials presented to Morton County on September 29, 2025 and according to the version of the project map submitted to Morton County on November 14, 2025.

Permissions granted by this permit do not supersede other applicable federal, state and local regulations.

Approved by the Morton County Board of County Commissioners on November 25, 2025

Attest:

Natalie Pierce
Director of Planning and Zoning