WETLAND DETERMINATION & DELINEATION REPORT

for the

PROPOSED BURKE COUNTY WIND ENERGY CENTER
Burke County, North Dakota

Prepared for

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Wetland Determination & Delineation Report
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EXECUTIVE SUMMARY

Atwell, LLC (Atwell) was retained by Burke Wind, LLC (Burke Wind), a wholly-owned, indirect subsidiary of NextEra Energy Resources, LLC (NEER) to perform a wetland delineation for the proposed Burke County Wind Energy Center (WEC) located in Burke County, North Dakota (Project). The Project consists of approximately 68,719 acres (122.5 square miles) and is centered at approximately 48.755331°, -102.697716°.

If exceedances to Nation Wide Permit (NWP) thresholds are anticipated, planned activities that impact federal or state regulated or protected wetlands, watercourses, floodplains, or open water areas must be authorized by the appropriate regulatory agencies prior to Project activities taking place. Wetlands that are hydrologically connected, abutting, or adjacent to traditional navigable waters (TNW) are regulated by the U.S. Army Corps of Engineers (USACE). This report summarizes the wetland and non-wetland water features identified within the WEC.

This Executive Summary is intended to be taken in context with the complete report and is not designed to be used as a separate document. The following summarizes the findings of the wetland determination and delineation.

An initial Desktop Aerial Photographic Interpretation and Jurisdictional Review (Aerial Desktop Review) was conducted on the entire WEC, and consisted of reviewing Geographic Information Systems (GIS)-identified wetland features, interpreting topography and associated drainage patterns, position in the landscape, vegetative cover, and soils, to estimate jurisdictional status. Current and historic aerial photographs, US Geological Survey (USGS) Topographic maps, National Wetland Inventory (NWI) maps, National Hydrography Datasets (NHD), US Department of Agriculture – National Cooperative Soil Survey (USDA-NCSS) maps, Light Imaging Detection and Ranging (LiDAR)-derived 5-Foot Contours maps, Hydrologic Unit Code (HUC) 12 Sub Watershed Boundary Dataset maps, National Agriculture Imagery Program (NAIP) 1-Meter, 4-Band Multispectral Aerial Imagery (Red, Green, Blue, and Infrared) imagery, and Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) floodplain maps for the WEC were reviewed in order to evaluate the overall site characteristics of the WEC.

The results of the Aerial Desktop Review identified a total of 6,307 wetland features (9,570 acres), of which 57 features (68.34 acres) were identified as potentially jurisdictional.

Following the Aerial Desktop Review, a meeting was conducted with the USACE Bismarck office on December 13th, 2016 to discuss the results and findings. Based on the Aerial Desktop Review findings, it appears that approximately 90 percent of the wetlands within the WEC are likely isolated. It was determined at the USACE meeting that due to the large number of interpreted isolated wetlands, and Burke Wind's standard approach of avoidance and minimization of adverse impacts to wetland and non-wetland Waters of the US (WOUS), a Nationwide or an Individual Permit may not be required. The USACE requested that the client

conduct an in-field assessment of 20-30 wetlands to determine WOUS jurisdictional status and verify Aerial Desktop Review methods.

Potentially jurisdictional wetland WOUS features were selected for on-site assessment utilizing methods approved by the USACE during the December 13th, 2016 agency meeting with the goal of selecting an even distribution of potentially jurisdictional wetlands across all HUCs. Atwell conducted a wetland boundary and watercourse determination and delineation of a sample of the WEC on June 28th and June 29th of 2017 and examined a total of 11 parcels, containing 203 wetland features (191.22 acres). If a wetland feature appeared to have hydrological connectivity to a jurisdictional WOUS and exhibited wetland characteristics, the feature was delineated in accordance with the *Corps of Engineers Wetland Delineation Manual* (1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region* (Version 2.0 2010). During the field delineation, hydrophytic vegetation with indicator status, hydric soil characteristics, and hydrology were documented on data forms. The wetland boundary was mapped in the field with a Trimble Geo 7X GPS unit, and representative feature photographs were obtained. The results of the field reconnaissance determined that 201 (158.80 acres) of the wetlands identified during the Aerial Desktop Review are isolated non-jurisdictional wetlands because the wetlands lacked one or more of the required wetland characteristics. Wetland biologists identified and delineated two (2) wetlands (JDWL 1 [15.02 acres] and JDWL 2 [17.4 acres]) and determined that they are likely jurisdictional.

Based on the results of the site reconnaissance, Atwell recommends conducting a detailed determination and delineation within the parcels that contain proposed infrastructure in an effort to avoid potentially jurisdictional wetlands and non-wetland WOUS to the maximum extent practicable.

1.0 INTRODUCTION

Atwell, LLC (Atwell) was retained by Burke Wind, LLC (Burke Wind), a wholly-owned, indirect subsidiary of NextEra Energy Resources, LLC (NEER) to perform a wetland delineation for the proposed Burke County Wind Energy Center (WEC) located in Burke County, North Dakota (Project). The Project consists of approximately 68,719 acres (122.5 square miles) and is centered at approximately (48.755331°, -102.697716°). Refer to the *Site Location Map* in **Appendix I** for maps depicting the proposed WEC.

If exceedances to Nation Wide Permit (NWP) thresholds are anticipated, planned activities that impact federal or state regulated or protected wetlands, watercourses, floodplains, or open water areas must be authorized by the appropriate regulatory agencies prior to project activities taking place. The U.S. Army Corps of Engineers (UCACE) regulates hydrologically connected wetlands abutting, or adjacent to traditional navigable waters (TNW). This report summarizes the wetland and non-wetland water features identified within the WEC.

Methodology

Atwell conducted an initial Desktop Aerial Photographic Interpretation and Jurisdictional Review (Aerial Desktop Review) of the entire WEC to estimate jurisdictional status. The Aerial Desktop Review included: examination of Geographic Information Systems (GIS)-identified wetland features, interpretation of topography and associated drainage patterns, position in the landscape, vegetative cover, and soils. Current and historic aerial photographs, US Geological Survey (USGS) Topographic maps, National Wetland Inventory (NWI) maps, National Hydrography Datasets (NHD), US Department of Agriculture – National Cooperative Soil Survey (USDA-NCSS) maps, Light Imaging Detection and Ranging (LiDAR)-derived 5-Foot Contours maps, Hydrologic Unit Code (HUC) 12 Sub Watershed Boundary Dataset maps, National Agriculture Imagery Program (NAIP) 1-Meter, 4-Band Multispectral Aerial Imagery (Infrared) imagery, and Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) floodplain maps available for the WEC were also reviewed in order to evaluate overall site characteristics of the WEC. A map depicting potentially jurisdictional wetlands and non-wetland WOUS is located in the *Desktop Map located* **Appendix I**.

The following report discusses the findings and conclusions of the Aerial Desktop Review and the on-site wetland determination and delineation.

2.0 SITE DESCRIPTION

The 68,719-acre WEC is located approximately 11.5 miles southwest of Bowbells, Burke County, North Dakota (see the *Site Location Map* in **Appendix I)**. Overall, the WEC and surrounding vicinity is sparsely populated and supports a mix of grasslands and cultivated cropland/hayfields/pasturelands within an extensive prairie pothole wetland system. The primary land use within the region of the WEC is agricultural (cultivated crops and hay/pasture). Refer to **Appendix II** for representative photographs of the WEC.

The proposed Project would consist of a wind energy facility with a potential to produce up to 300 megawatts (MW) of energy with the construction of up to 133 Wind Turbine Generators (WTGs) including alternates. The Project also includes associated access roads, buried underground electrical collection lines, temporary laydown, an overhead electric transmission line, electric substation, and an operations and maintenance building.

The WEC is located mostly within the Level IV Northern Dark Brown Prairie (46h) ecoregion of the Level III Northern Glaciated Plains-46, and partially within the Level IV Northern Missouri Coteau (42d) ecoregion, of the Level III Northwestern Glaciated Plains ecoregion (Bryce et al. 1996). According to the EPA Ecoregion mapping data, these ecoregions are characterized by the two ecoregions below.

2.1 Ecoregions

2.1.1 Northern Glaciated Plains

The Northern Glaciated Plains ecoregion-46 is characterized by a flat to lightly rolling landscape composed primarily of glacial drift. The sub-humid conditions of this region allow for a transitional grassland area between tall and shortgrass prairies. High concentrations of temporary and seasonal wetlands produce optimal conditions for nesting and migration for a variety of waterfowl. Although glacial till is typically very fertile, overall agricultural production depends on annual climatic fluctuations. This Northern Dark Brown Prairie ecoregion (46h) differs in precipitation, soil, and vegetation characteristics. The soils developed under dry conditions and have low organic matter, giving them a lighter color. Crop and native grass production is generally lower than in ecoregions farther east (Bryce et al. 1996).

2.1.2 Northwestern Glaciated Plains

The Northwestern Glaciated Plains ecoregion - 42 marks the westernmost extent of continental glaciation. The young morainal landscape has significant microtopography with high wetland concentrations throughout this region. The Northern Missouri Coteau (42d) lies in a transition zone between a more boreal climate to the north and a more arid climate to the west. Willows (*Salix* sp.), trembling aspen (*Populus tremuloides*), and southern outliers of aspen parkland may occur at wetland margins. Rough fescue (*Festuca* sp.), also a northern species, appears in grassland associations throughout this region. Wetlands in this region typically dry out earlier in the summer than on the Missouri Coteau (42d) ecoregion located to the south and east. Mixed dryland agriculture is the major land use for this region (Bryce et al. 1996).

3.0 AERIAL DESKTOP REVIEW AND RESULTS

The results of the Aerial Desktop Review identified a total of 6,307 wetland features (9,570 acres), of which 57 features (68.34 acres) were identified as potentially jurisdictional. The Aerial Desktop Review consisted of reviewing wetland features within the WEC, interpreting topography and associated drainage patterns, and preliminarily estimating jurisdictional status. A map depicting potentially jurisdictional wetlands and non-wetland WOUS is located in the

Desktop Map within **Appendix I**. Tables of the interpreted isolated and potentially jurisdictional wetland features are located in **Appendix III**.

3.1. Aerial Photograph Review

Various online resources were accessed to review current and historic aerial imagery. Aerial photography datasets from the USGS (1995); National Aeronautics and Space Administration (NASA; 1995); USDA Farm Services Agency (2003, 2005, 2006, 2009, 2010, 2013, and 2016) were obtained, reviewed and interpreted to identify potential jurisdictional wetland and non-wetland WOUS, and other significant natural features within the proposed WEC. Visible landscape types observed included agricultural fields, undeveloped grassland, pasture/rangeland, wetlands, and non-wetland watercourses.

3.2. National Wetland Inventory Map Review

Atwell reviewed NWI maps to determine the likely presence, location, size, and type of wetlands that may be located within the proposed WEC. The U.S. Fish and Wildlife Service (USFWS) maintains and generates NWI maps through aerial photograph interpretation. Atwell generally notes that NWI maps may not accurately depict the extent or existence of wetland systems in a specific area, nor do the maps always correctly identify the wetlands present. Therefore, the NWI maps were supplemented with Atwell's aerial interpretation and the USFWS NWI features were utilized for preliminary analysis only.

3.3. USGS Topographic Map Review

The USGS 7.5 Minute Topographic Quadrangles indicate that elevations within the proposed Project range between approximately 2,159 and 2,502 feet above mean sea level (amsl). The proposed Project generally slopes from a primary southeast to northwest oriented ridgeline that drains to the northeast and southwest. The topographic maps depict numerous buildings and structures within the proposed WEC as well as a multiple roads. Water courses are also depicted but are limited to the northern boundary of the WEC.

3.4. National Hydrography Dataset (NHD)

The NHD is a digital dataset that contains features such as lakes, ponds, streams, rivers, canals, dams and stream gages. The data provided is designed for use in general mapping and in the analysis of surface water systems. NHD flowlines are important features in the NHD, as they contain flow direction and form a network. Atwell relied predominantly on NHD features to determine a significant nexus to a potentially jurisdictional WOUS.

3.5. US Department of Agriculture – National Cooperative Soil Survey Map

The USDA Natural Resources Conservation Service (NRCS) soil data for Burke County was reviewed to obtain an overall sense of the soil types likely observed within the WEC. The delineation of any wetland depends on three basic, interrelated parameters. These parameters are:

- the presence of hydrophytic vegetation (plants adapted to living in saturated soils),
- hydric soils (distinctive soil types that develop under saturated conditions), and

- wetland hydrology (the presence of water at or near the surface for a specific period of time).

The NRCS soils data provides a hydric soils rating. **Table 1** below provides a listing of the different soil types present within the WEC and their associated hydric rating. The term hydric indicates that the soil favors the growth and regeneration of hydrophytic (wetland) vegetation by its ability to hold water for extended periods of time. Refer to the *Hydric Soils Map* in **Appendix I**.

Table 1. Proposed Burke County WEC Soils – Burke County, North Dakota

Symbol	Soil Series	Hydric Rating	Acres	Percent
C135C	Zahl-Williams-Zahill complex, 6 to 9 percent slopes	Partially Hydric	13,926.80	20.27%
C165F	Zahl-Max-Parnell complex, 0 to 35 percent slopes	Partially Hydric	13,789	20.07%
C135D	Zahl-Williams loams, 9 to 15 percent slopes	Partially Hydric	13,624.70	19.83%
C132B	Williams-Zahl loams, 3 to 6 percent slopes	Partially Hydric	6,248.23	9.09%
C148C	Williams-Zahl-Parnell complex, 0 to 9 percent slopes	Partially Hydric	2,729.13	3.97%
C5A	Southam silty clay loam, 0 to 1 percent slopes	Partially Hydric	2,477.04	3.60%
C155F	Zahl-Max-Arnegard loams, 15 to 60 percent slopes	Partially Hydric	1,780.35	2.59%
C870E	Wabek-Lehr-Appam complex, 9 to 25 percent slopes	Partially Hydric	1,318.83	1.92%
C3A	Parnell silty clay loam, 0 to 1 percent slopes	Hydric	1,290.19	1.88%
2175	Zahl-Williams loams, 6 to 9 percent slopes	Partially Hydric	1,277.06	1.86%
C996	Water	Non-Hydric	1,172.93	1.71%
2031	Williams-Zahl loams, 3 to 6 percent slopes	Partially Hydric	1,027.19	1.49%
2176	Zahl-Williams loams, 15 to 60 percent slopes	Non-Hydric	969.8	1.41%
2081	Zahl-Williams loams, 9 to 15 percent slopes	Non-Hydric	941.64	1.37%
C424A	Nutley silty clay, low precipitation, 0 to 2 percent slopes	Partially Hydric	881.2	1.28%
C23A	Vallers, moderately saline-Parnell complex, 0 to 1 percent slopes	Partially Hydric	816.25	1.19%
C424B	Nutley silty clay, low precipitation, 2 to 6 percent slopes	Non-Hydric	504.26	0.73%
2014	Williams-Bowbells loams, 0 to 3 percent slopes	Non-Hydric	390.52	0.57%
C153E	Zahl-Max loams, 15 to 25 percent slopes	Partially Hydric	334.06	0.49%
C75A	Vallers loam, moderately saline, 0 to 1 percent slopes	Partially Hydric	271.23	0.39%
C272A	Hamerly-Tonka complex, 0 to 3 percent slopes	Partially Hydric	223.53	0.33%
2023	Williams-Niobell loams, 0 to 3 percent slopes	Partially Hydric	188.57	0.27%
C667B	Williams-Niobell loams, 3 to 6 percent slopes	Non-Hydric	179.74	0.26%
C667A	Williams-Niobell loams, 0 to 3 percent slopes	Partially Hydric	173.42	0.25%
C156F	Zahl-Max-Bowbells loams, 6 to 35 percent slopes	Partially Hydric	171.58	0.25%
C410C	Sakakawea-Tansem loams, 6 to 9 percent slopes	Non-Hydric	162.09	0.24%
C418B	Tansem-Sakakawea loams, 2 to 6 percent slopes	Non-Hydric	148.28	0.22%
2179	Noonan-Niobell loams, 0 to 6 percent slopes	Partially Hydric	152.6	0.22%
2015	Williams-Bowbells loams, 3 to 6 percent slopes	Partially Hydric	147.71	0.21%
C806B	Appam-Wabek complex, 2 to 6 percent slopes	Non-Hydric	128.9	0.19%
C877B	Wabek-Lehr complex, 2 to 6 percent slopes	Non-Hydric	130.76	0.19%
2177	Zahl-Williams-Vallers loams, 0 to 60 percent slopes	Partially Hydric	130.76	0.19%
C210A	Williams-Bowbells loams, 0 to 3 percent slopes	Partially Hydric	102.41	0.15%
C819A	Lehr-Wabek loams, 0 to 2 percent slopes	Non-Hydric	80.63	0.12%
C210B	Williams-Bowbells loams, 3 to 6 percent slopes	Partially Hydric	79.67	0.12%

Table 1. Proposed Burke County WEC Soils – Burke County, North Dakota

Symbol	Soil Series	Hydric Rating	Acres	Percent
C415A	Tansem loam, 0 to 2 percent slopes	Non-Hydric	74.93	0.11%
C410E	Sakakawea-Tansem loams, 9 to 25 percent slopes	Non-Hydric	70.35	0.10%
882	Hamerly-Tonka complex, 0 to 3 percent slopes	Partially Hydric	59.02	0.09%
C874C	Wabek-Appam complex, 6 to 9 percent slopes	Non-Hydric	59.24	0.09%
1871	Vallers loam, saline, 0 to 1 percent slopes	Partially Hydric	64.63	0.09%
2024	Williams-Niobell loams, 3 to 6 percent slopes	Partially Hydric	58.71	0.09%
2170	Divide loam, 0 to 2 percent slopes	Partially Hydric	52.51	0.08%
2181	Miranda-Noonan loams, 0 to 3 percent slopes	Partially Hydric	41.79	0.06%
C829A	Marysland loam, 0 to 1 percent slopes	Partially Hydric	31.43	0.05%
C557A	Miranda-Noonan loams, 0 to 3 percent slopes	Partially Hydric	31.86	0.05%
2186	Lehr-Wabek loams, 0 to 2 percent slopes	Non-Hydric	34.51	0.05%
2189	Wabek-Appam complex, 6 to 35 percent slopes	Non-Hydric	31.93	0.05%
C990F	Pits, gravel and sand, 0 to 60 percent slopes	Non-Hydric	27.13	0.04%
C825A	Divide loam, 0 to 2 percent slopes	Partially Hydric	17.78	0.03%
C665B	Noonan-Niobell-Williams loams, 0 to 6 percent slopes	Partially Hydric	17.51	0.03%
1978	Water	Partially Hydric	21.5	0.03%
2130	Williams-Zahl-Parnell complex, 0 to 9 percent slopes	Partially Hydric	18.44	0.03%
C580A	Harriet-Regan-Stirum complex, 0 to 2 percent slopes, occasionally flooded	Partially Hydric	4.74	0.01%
C313B	Lihen-Blanchard loamy fine sands, 0 to 6 percent slopes	Non-Hydric	4.18	0.01%
1427	Parnell silty clay loam, 0 to 1 percent slopes	Partially Hydric	5.53	0.01%
2169	Harriet, Regan, and Stirum soils, 0 to 2 percent slopes	Partially Hydric	7.13	0.01%
2188	Wabek-Lehr-Appam complex, 0 to 6 percent slopes	Non-Hydric	10.26	0.01%
674	Farnuf loam, 0 to 2 percent slopes	Non-Hydric	0.28	0.00%
2173	Marias silty clay, 0 to 3 percent slopes	Non-Hydric	1.2	0.00%
2182	Portal-Lihen fine sandy loams, 0 to 2 percent slopes	Non-Hydric	1.48	0.00%
2184	Williams-Zahl complex, 3 to 6 percent slopes	Partially Hydric	0.4	0.00%
		Total:	**68719.5 ac.**	**100%**

3.6. LiDAR-Derived 5-Foot Contours

One of the applications of LiDAR is for terrestrial laser scanning. Terrestrial scanning is most common as a topographic survey method and is highly accurate. Atwell obtained publicly-available LiDAR-derived 5-foot contours and produced topographic maps. When coupled with aerial imagery and the NHD dataset, Atwell was able to accurately and effectively determine potentially jurisdictional features exhibiting a defined bed and bank.

3.7. Hydrologic Unit Code (HUC) 12 Sub-Watershed Boundary Dataset

Watershed boundaries define the aerial extent of surface water drainage to a particular point/location. HUC-12 datasets identify boundaries to the smaller, more discrete, sub watershed level, and typically range from 10,000 to 40,000 acres in size. Atwell evaluated whether a wetland feature drains/flows to a potentially jurisdictional WOUS or if it drains/flows to a glaciated lake at a low area on the regional landscape because the WEC contains several thousand prairie potholes and larger glaciated lakes.

Six (Headwaters West Branch Short Creek, Headwaters East Branch Short Creek, City of Columbus, Black Slough, 090100071101, and Beaver Lake-East Branch Short Creek) of the 16 HUCs located within the WEC contain potentially jurisdictional waters. Refer to the *HUC Map* in **Appendix I**. Numerous unnamed tributaries are located within the aforementioned HUCs and generally flow in a north-northeast direction approximately fourteen miles into East Branch Short Creek (relatively permanent water [RPW]). Multiple wetlands within these HUCs are potentially jurisdictional because of potential hydrologic connectivity to WOUS. Refer to the *Wetland Desktop Review Map* located in **Appendix I.** Results from the Aerial Desktop Review indicated that Nine HUCs flow into non jurisdictional waters. A summary of each is below:

Headwaters White Earth Creek

The Headwaters White Earth Creek HUC is made up of 33,661 acres and is located in the southwestern-most portion of the WEC. In this HUC, water flows from the WEC in a southwesterly direction into an unidentified waterbody located in the southwestern portion of the WEC. This waterbody is not hydrologically connected to waters that could be construed as WOUS and is therefore isolated. Therefore, waterbodies within this watershed should be considered isolated and non-jurisdictional.

Red Lake

The Red Lake HUC is made up of 23,129 acres and is located in the southern portion of the WEC. All water flowing from this area generally flows to Red Lake south of the WEC and is in the central portion of the HUC. This waterbody is not hydrologically connected to waters that could be construed as WOUS and is therefore isolated. Therefore, waterbodies within this watershed should be considered isolated and non-jurisdictional.

Smishek Lake

The Smishek Lake HUC is made up of 41,424 acres and is located in the south-central portion of the WEC. Water flowing from this HUC generally flows south into Smishek Lake approximately six miles south of the WEC boundary. Wetlands within this portion of the WEC are located at the top of the HUC watershed and have frequent breaks and loss of connectivity. Therefore, waterbodies within this watershed should be considered isolated and non-jurisdictional.

Elbow Lake

The Elbow Lake HUC is made up of 37,205 acres and is located directly east of the Smishek Lake HUC. Water flowing from this HUC generally flows south towards Elbow Lake. Similar to the Smishek Lake HUC, wetlands within this portion of the WEC are located at the top of the watershed and have frequent breaks and loss of connectivity. Therefore, waterbodies within this watershed should be considered isolated and non-jurisdictional.

Ward Lake

The Ward Lake HUC is made up of 9,317 acres and is located in the southeastern portion of the WEC. Water in this HUC flows into five main catchment areas, Johnsons Lake, Jud Chrests Lake, Kirkland Lake, Ward Lake, and an unnamed waterbody in the southern portion of the watershed. Therefore, waterbodies within this watershed should be considered isolated and non-jurisdictional.

Thompson Lake
The Thompson Lake HUC is made up of 39,415 acres and is located in the southeastern portion of the WEC. Water associated with the WEC in this HUC generally flow into Swensen Slough and Thompson Lake. Therefore, waterbodies within this watershed should be considered isolated and non-jurisdictional.

Shockley Slough
The Shockley Slough HUC is made up of 21,990 acres and is located in the eastern-most portion of the WEC. Water associated with the WEC in this HUC generally flows to the southeast but does not follow any specific drainage way. Therefore, waterbodies within this watershed should be considered isolated and non-jurisdictional.

Upper Stoney Run Creek
The Upper Stoney Run Creek HUC is made up of 31,241 acres and is located on the eastern side of the WEC. Water associated with the WEC in this HUC generally flows to the northeast but does not follow any specific drainage way. Therefore, waterbodies within this watershed should be considered isolated and non-jurisdictional.

090100060606
The 090100060606 HUC is made up of 19,137 acres and is located within the far western portion of the WEC. Water associated with the WEC in this HUC generally flows to the southwest but does not follow any specific drainage way. Therefore, waterbodies within this watershed should be considered isolated and non-jurisdictional.

3.8. National Agriculture Imagery Program 1-Meter, 4-Band Multispectral Aerial Imagery (Infrared)

This particular multispectral imagery refers to images which contain color bands beyond the normal red, green, and blue values. Infrared aerial imagery is most useful for interpreting wetland hydrology in agricultural areas. In general, review of infrared aerial imagery for assessing wetland hydrology is more accurate in agricultural fields, as the "moisture signature" is visibly apparent. Atwell employed infrared imagery to determine possible wetland feature connection to an NHD watercourse.

3.9. FEMA FIRM Floodplain Map Review

The FEMA uses FIRMs to delineate special hazard areas and the risk premium zones applicable to the community. A review of FEMA FIRM (FEMA 2016) floodplain data was conducted to determine the presence, extent, location, and zone of floodplains which may be located within the proposed Project.

4.0 SITE RECONNAISSANCE & RESULTS

Following the Aerial Desktop Review a meeting was conducted with the USACE Bismarck office on December 13th, 2016 to discuss the results and findings of the Aerial Desktop Review. Based on the Aerial Desktop Review findings, it appears that approximately 90 percent of the wetlands within the WEC are likely isolated. The USACE meeting determined that a Nationwide or an Individual Permit may not be required for the Project due to the large number of isolated wetlands, and Burke Wind's standard approach of avoidance and minimization of adverse impacts to wetland and non-wetland Waters of the US (WOUS). The USACE requested that the client conduct an in-field assessment of 20-30 wetlands to determine WOUS jurisdictional status and verify Aerial Desktop Review methods..

Potentially jurisdictional wetland WOUS features were selected for on-site assessment utilizing methods approved by the USACE during the December 13th, 2016 agency meeting with the goal of selecting an even distribution of potentially jurisdictional wetlands across all HUCs. Atwell conducted a wetland boundary and watercourse determination and delineation of a sample of the WEC on June 28th and June 29th of 2017 and examined a total of 11 parcels, containing 203 wetland features (191.22 acres). If a wetland feature appeared to have hydrological connectivity to a jurisdictional WOUS and exhibited wetland characteristics, the feature was delineated in accordance with the Corps of Engineers Wetland Delineation Manual (1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region (Version 2.0 2010). During the field delineation, information documented on data forms included hydrophytic vegetation with indicator status, hydric soil characteristics, and hydrology. Wetland boundaries were mapped in the field with a Trimble Geo 7X GPS unit, and representative feature photographs were obtained. The results of the field reconnaissance determined that 201 (158.80 acres) of the wetlands identified during the Aerial Desktop Review are isolated non-jurisdictional wetlands, because they lack one or more of the required wetland characteristics. Wetland biologists identified and delineated two (2) wetlands (JDWL 1 [15.02 acres] and JDWL 2 [17.4 acres]) and determined that they are likely jurisdictional. The *Desktop Map*, representative photographs, and *Wetland Data Forms* depicting sample location conditions at the time of the site reconnaissance are provided in **Appendix I**, **Appendix II** and **Appendix IV**, respectively.

4.1. Wetlands

Jurisdictional Wetland 1 (JDWL 1)

JDWL 1 is located in the northwestern portion of the WEC; specifically southeast of the intersection of 96th Street NW and 99th Avenue NW. The wetland is located in an NWI mapped palustrine emergent (PEM) wetland area and is approximately 15.02 acres collectively. JDWL 1 is likely jurisdictional because it is hydrologically connected to an unnamed tributary with a defined bed and bank and an ordinary high water mark. The unnamed tributary then flows in a northeast direction to an unnamed rock quarry and eventually flows into RPW approximately 14 miles northeast.

The hydric soil indicator was Hydrogen Sulfide (A4) and 1 cm Muck (A9). Hydrology was also present. The dominant vegetation at this wetland was narrow-leaved cattail (*Typha angustifolia*). Refer to the *Wetland Data Forms* located in **Appendix IV**.

Jurisdictional Wetland 2 (JDWL 2)

JDWL 2 is located in the northwestern portion of the WEC and is directly southwest of the intersection of 96th Street NW and 99th Avenue NW. The wetland is located in an NWI mapped PEM wetland area and is approximately 17.2 acres. JDWL 2 is hydrologically connected to JDWL 1 (located directly to the east across 99th Avenue NW). The hydric soil indicator was Hydrogen Sulfide (A4) and 1 cm Muck (A9). Hydrology was also present. The dominant vegetation at this wetland was narrow-leaved cattail (*Typha angustifolia*). Refer to the *Wetland Data Forms* located in **Appendix IV**.

5.0 CONCLUSIONS

The information gathered from the Aerial Desktop Review and the results of the site reconnaissance indicate there is potentially jurisdictional wetland WOUS located within the WEC.

Atwell conducted a wetland boundary and watercourse determination and delineation of the WEC at a total of 11 parcels, containing 203 wetland features (191.22 acres). The results of the field reconnaissance determined that 201 (158.8 acres) of the wetlands identified during the Aerial Desktop Review are isolated non-jurisdictional wetlands, and lack one or more of the required wetland characteristics. Wetland biologists identified and delineated two (2) wetlands (JDWL 1 [15.02 acres] and JDWL 2 [17.4 acres]) and determined that they are likely jurisdictional.

Based on the results of the site reconnaissance, Atwell recommends conducting a detailed determination and delineation within the parcels that are proposed to contain infrastructure in an effort to avoid potentially jurisdictional wetlands and non-wetland WOUS to the maximum extent practicable.

REFERENCES

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COMMON WETLAND DEFINITIONS

Atypical wetland: This term refers to areas in which one or more parameters (vegetation, soil and/or hydrology) have been sufficiently altered by human activities or natural events to preclude the presence of wetland indicators of the parameter.

Emergent Wetland: Vegetative classification of a wetland system based on the dominant vegetation, consisting of rooted herbaceous plant species that have parts extending above a water surface.

100-year flood: A flood with a magnitude that has a 1% chance of occurring or being exceeded in any given year.

Floodplain: The area of land adjoining a river or steam that will be inundated by a 100-year flood.

Floodway: The channel of a river or stream and the portions of the floodplain adjoining the channel that is reasonably required to carry and discharge a 100-year flood.

Inland lake or stream: "…any natural or artificial lake, pond or impoundment which has a surface area of 5 acres or greater; a river, stream or creek which may or may not be serving as a drain; any body of water which has definite banks, a bed and visible evidence of a continued flow or continued occurrence of water…" as defined by Part 301, Inland Lakes and Streams, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended.

Hydric soil: Soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part (1991 National Technical Committee on Hydric Soils definition).

Hydrophytes: Plant species that grows in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content; plants typically found in wet habitats.

Scrub-Shrub Wetland: Vegetative classification of a wetland system based on the dominant vegetation consisting of woody plants less than 3 inches in diameter but greater than 3 feet in height.

Typical situation: That, which normally, usually, or commonly occurs.

Vernal Pool: Shallow, intermittently-flooded forested wetland, generally dry for most of the summer and fall.

Wooded (Forested) Wetland: Vegetative classification of a wetland system based on the dominant vegetation consisting of woody plants 3 inches in diameter or greater regardless of height.

Wetland: "…land characterized by the presence of water at a frequency and duration sufficient to support and that under normal circumstances does support wetland vegetation or aquatic life and is commonly referred to as a bog, swamp, or marsh…" as defined by Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451.

Wetland hydrology: Hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface at some time during the growing season.

Wetland Indicator Status:
OBL: Obligate wetland plant that occurs almost always, 99% of the time, in wetlands under natural conditions, but which rarely occur in non-wetlands.
FACW: Facultative wetland plant that occurs usually, 67% to 99% of the time, in wetlands, but also occurs 1% to 33% of the time in non-wetlands.
FAC: Facultative plant that occurs in both wetlands and non-wetlands 33% to 67% of the time.
FACU: Plant that occurs sometimes, 1% to 33% of the time, in wetlands but occurs more often, 67% to 99% of the time, in non-wetlands.

APPENDIX I

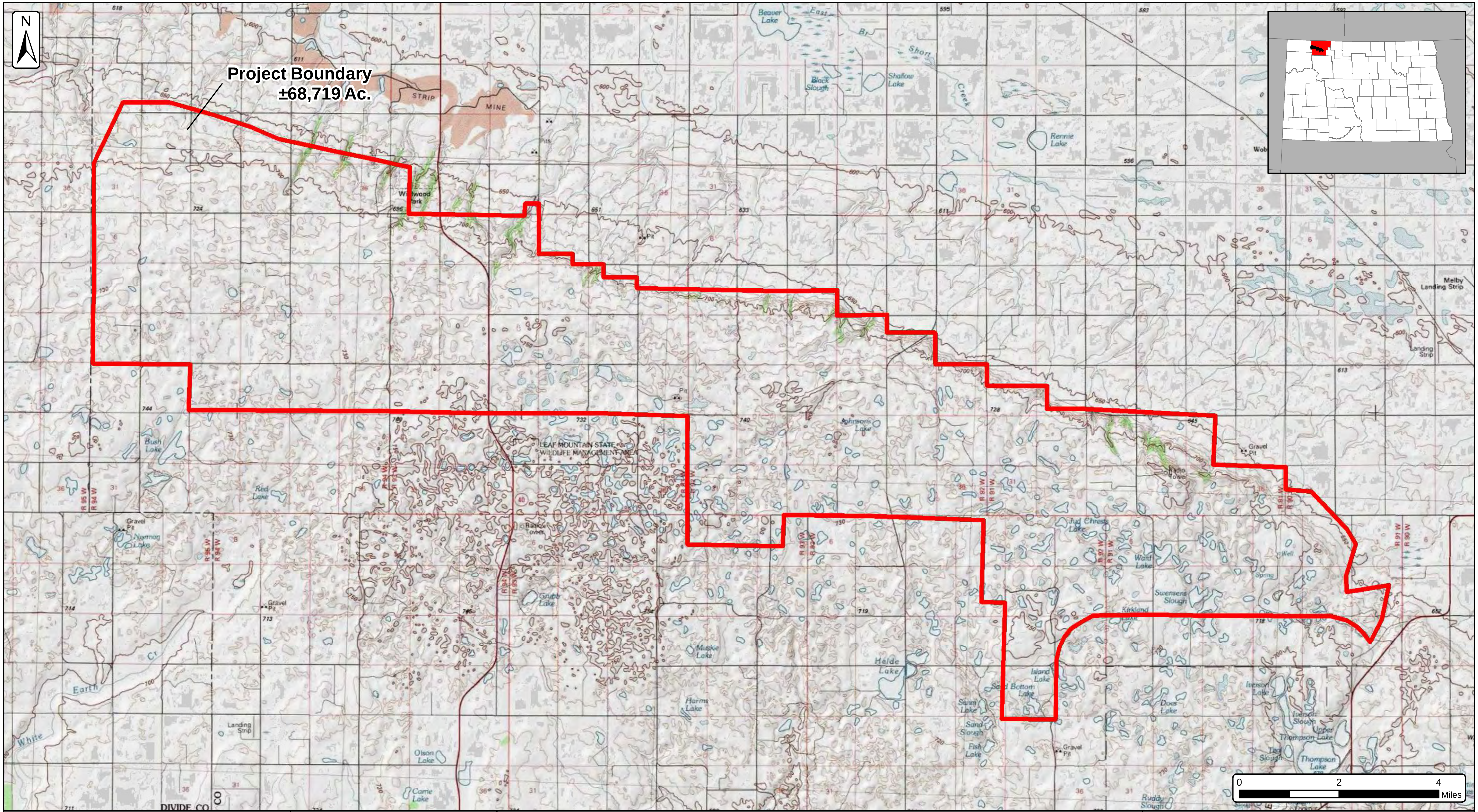
Site Location Map

Wetland Desktop Review Map

Desktop Map

Hydric Soils Map

Field Verified Potentially Jurisdictional Wetland Map



Burke County Wind Energy Center

Site Location Map

Burke County, North Dakota

Date: 7/19/2017

Client:

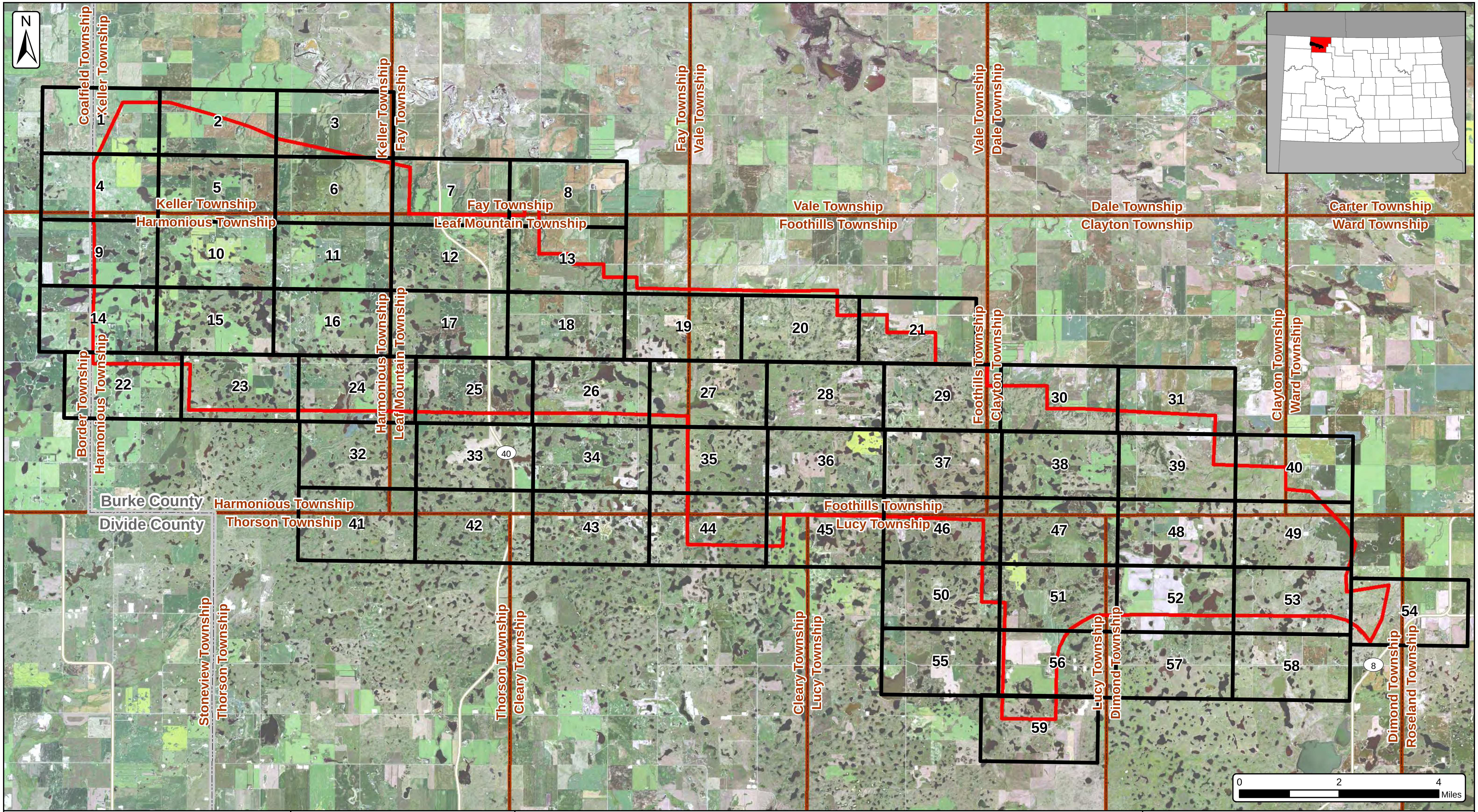
NEXTera ENERGY RESOURCES

Atwell, LLC Project: 16000947

Project Boundary 01/25/2017 (±68,719 Ac.)

SOURCE: USGS TOPOGRAPHIC QUADRANGLES
NOONAN SE (1949), COLUMBUS SW (1949), HAMLET (1974), BUSH LAKE (1974)
GRAND VIEW (1974), GRUBB LAKE (1974), HELDE LAKE (1974), THOMPSON LAKE (1974)
NOONAN (1949), ATCOAL (1981), COLUMBUS (1971), STAMPEDE (1948) PORTAL (1949),
FLAXTON (1948), COLUMBUS SE (1981), BEAVER LAKE (1948), RENNIE LAKE (1949), WOBURN (1948)

ATWELL



Burke County Wind Resource Area

Wetland Desktop Index Map

Burke County, North Dakota

Date: 7/15/2017

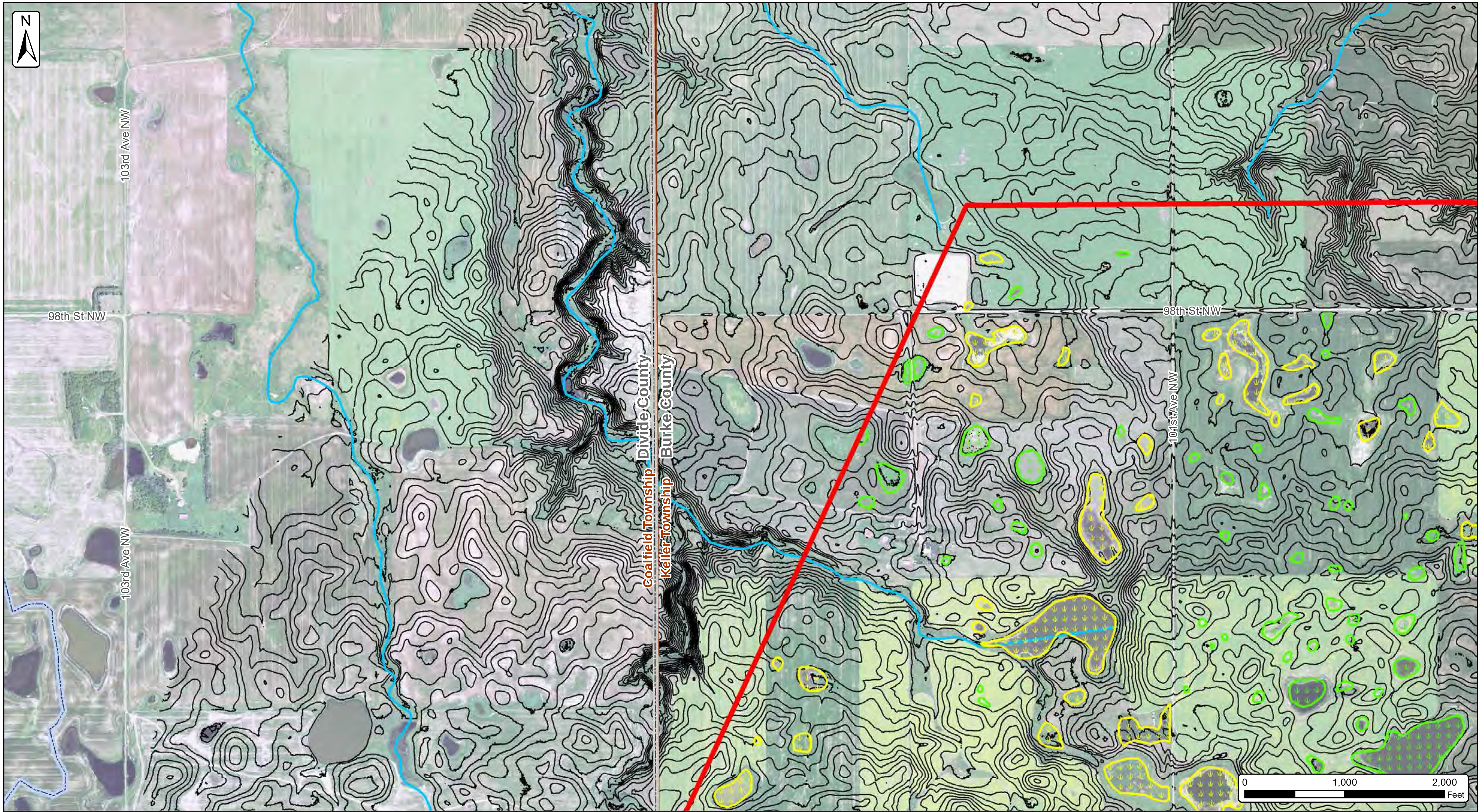
Client: NEXTera ENERGY RESOURCES

Atwell, LLC Project:16000947

- Map Index Pages
- Project Area (01/25/2017)
- County Boundary
- Township Boundary

SOURCE: USDA NAIP 2016 IMAGERY

ATWELL



Burke County Wind Resource Area

Wetland Desktop Review Map

Burke County, North Dakota

Date: 7/15/2017

Client:

NEXTera ENERGY RESOURCES

Atwell, LLC Project: 16000947

Project Area (01/25/2017)

5 ft. Contours (Interpolated from ND State Water Commission LiDAR)

Watercourses (NHD)

HUC 12 SubWatersheds

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Wetlands - Previously Identified as Likely Isolated (5,773 within Project Area)

Wetlands - Previously Identified as Likely Jurisdictional (259 within Project Area)

Townships

Counties

SOURCE: USDA NAIP 2016 IMAGERY

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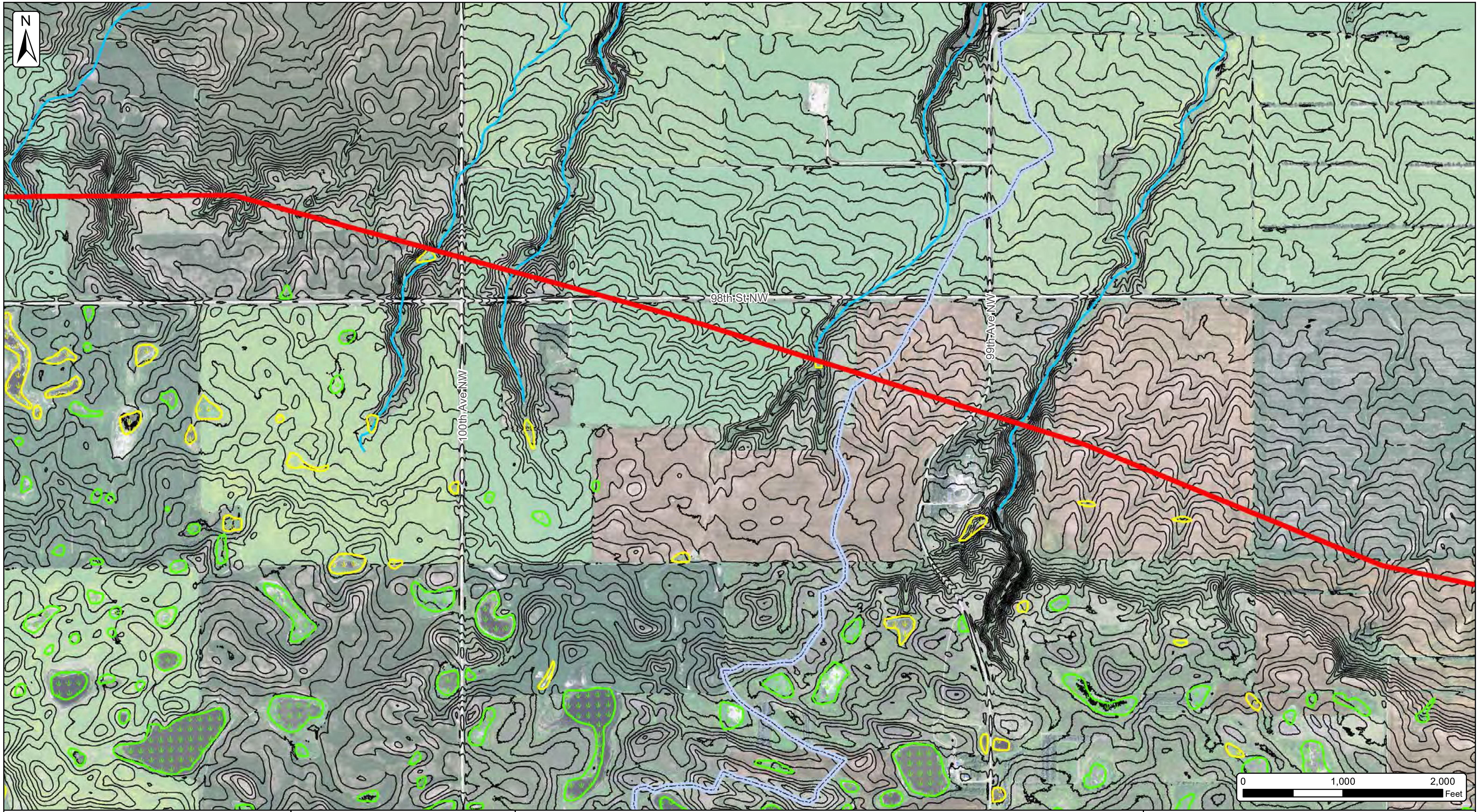

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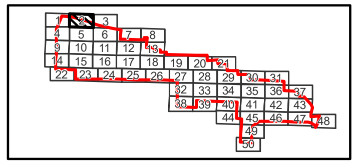

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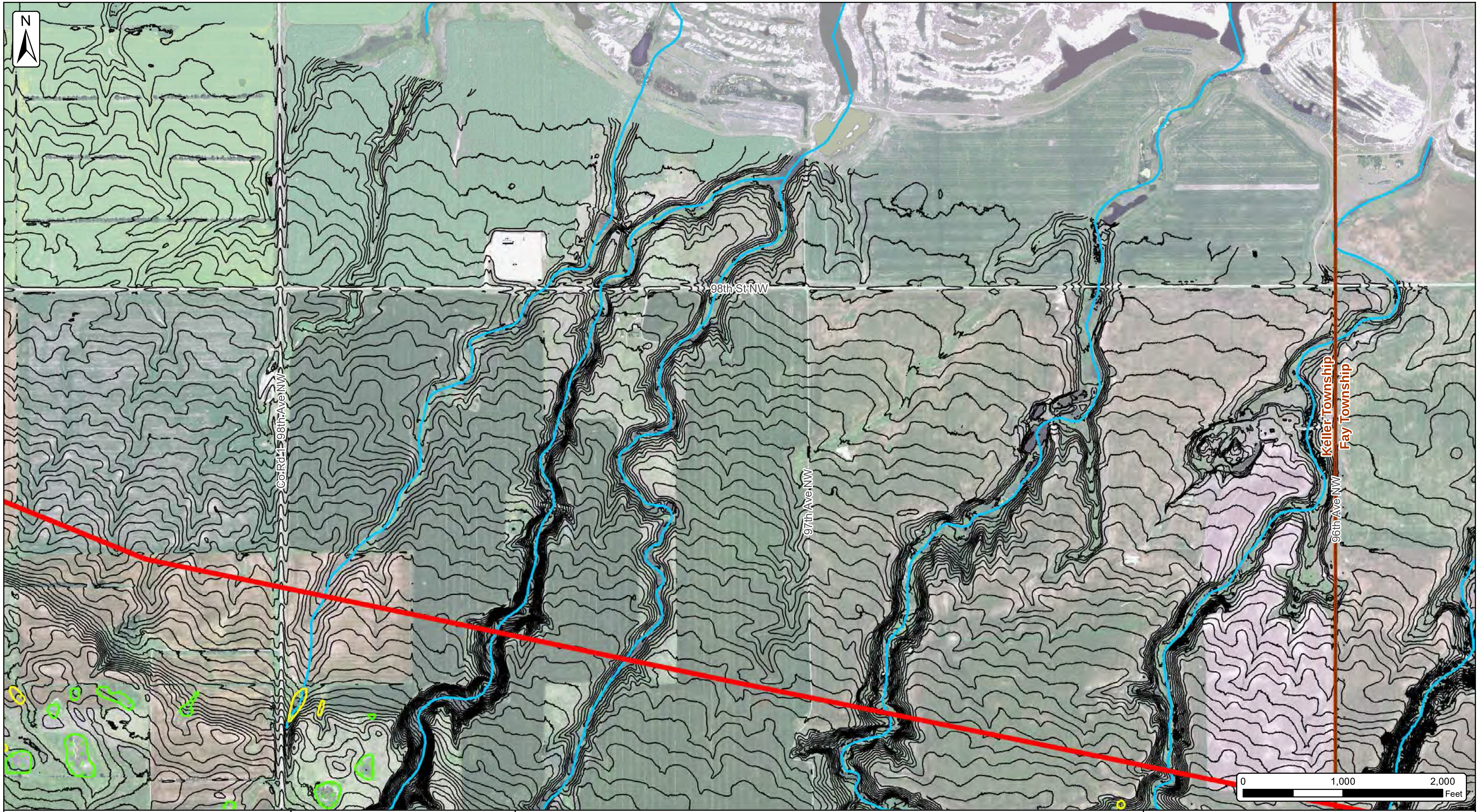

Burke County Wind Resource Area

Wetland Desktop Review Map

Burke County, North Dakota

Date: 7/15/2017 Page 3 of 50

Client: NEXTera ENERGY RESOURCES

Atwell, LLC Project: 16000947

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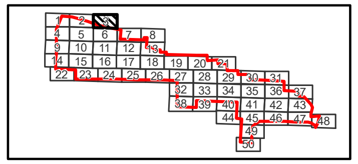

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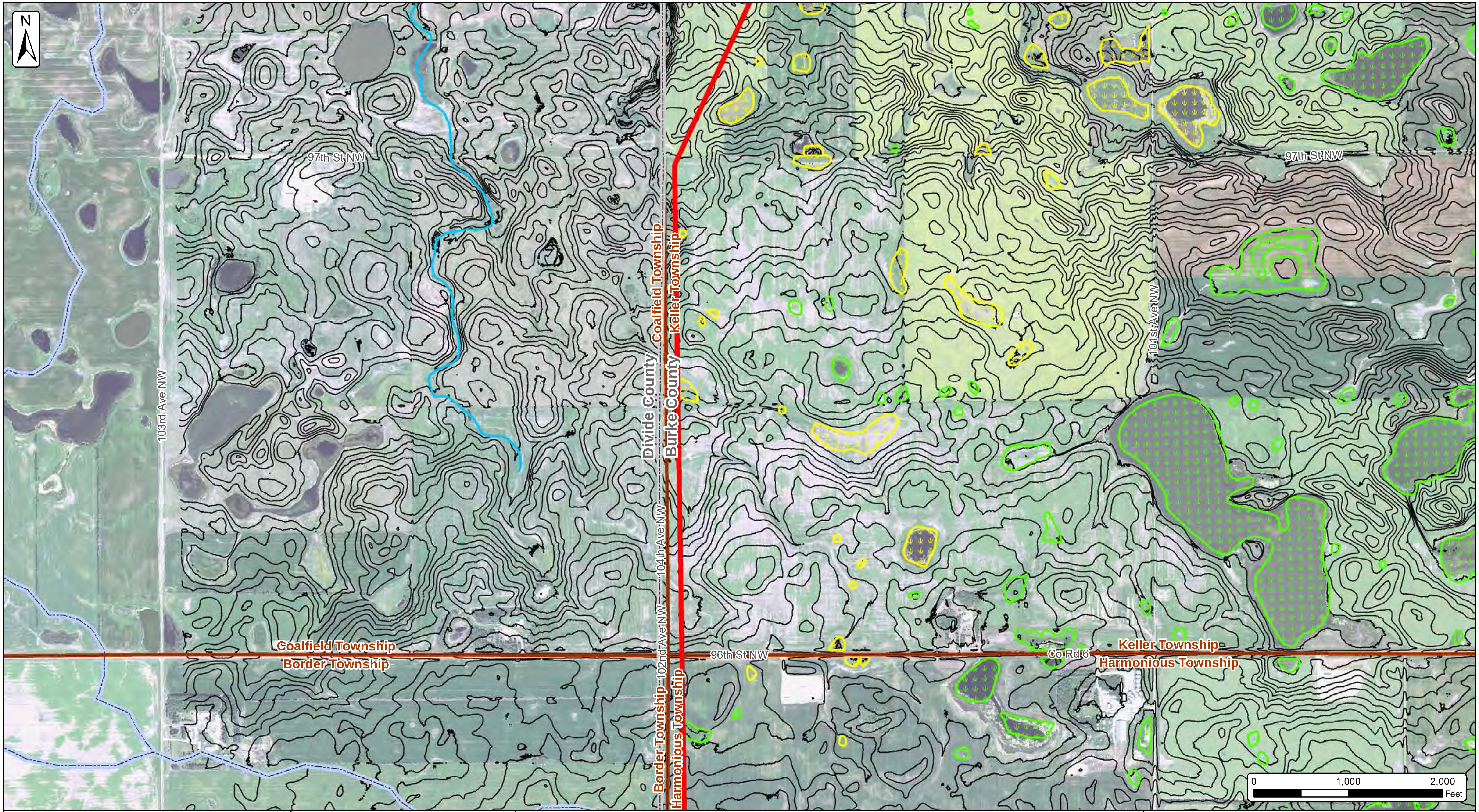

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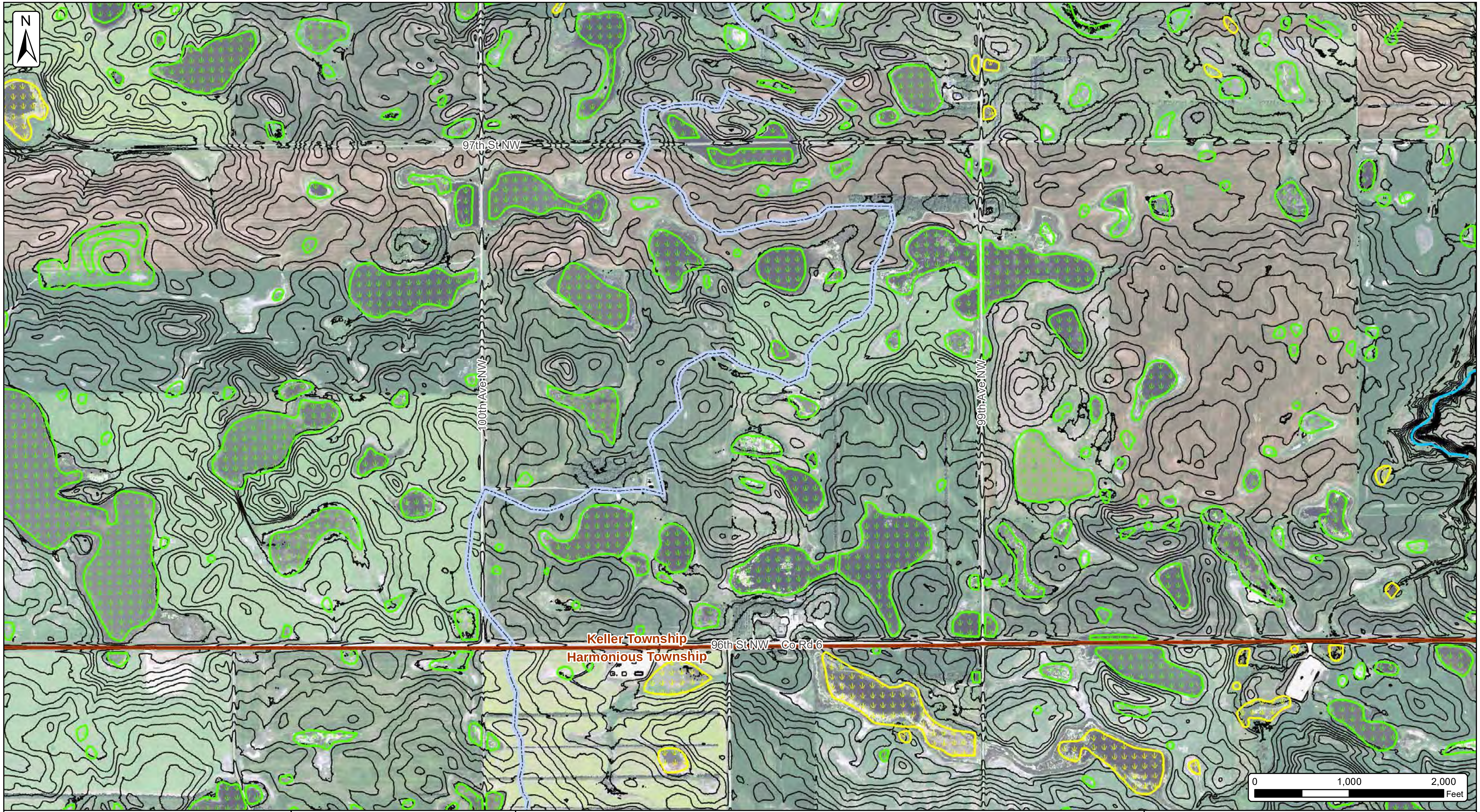

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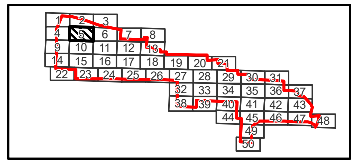

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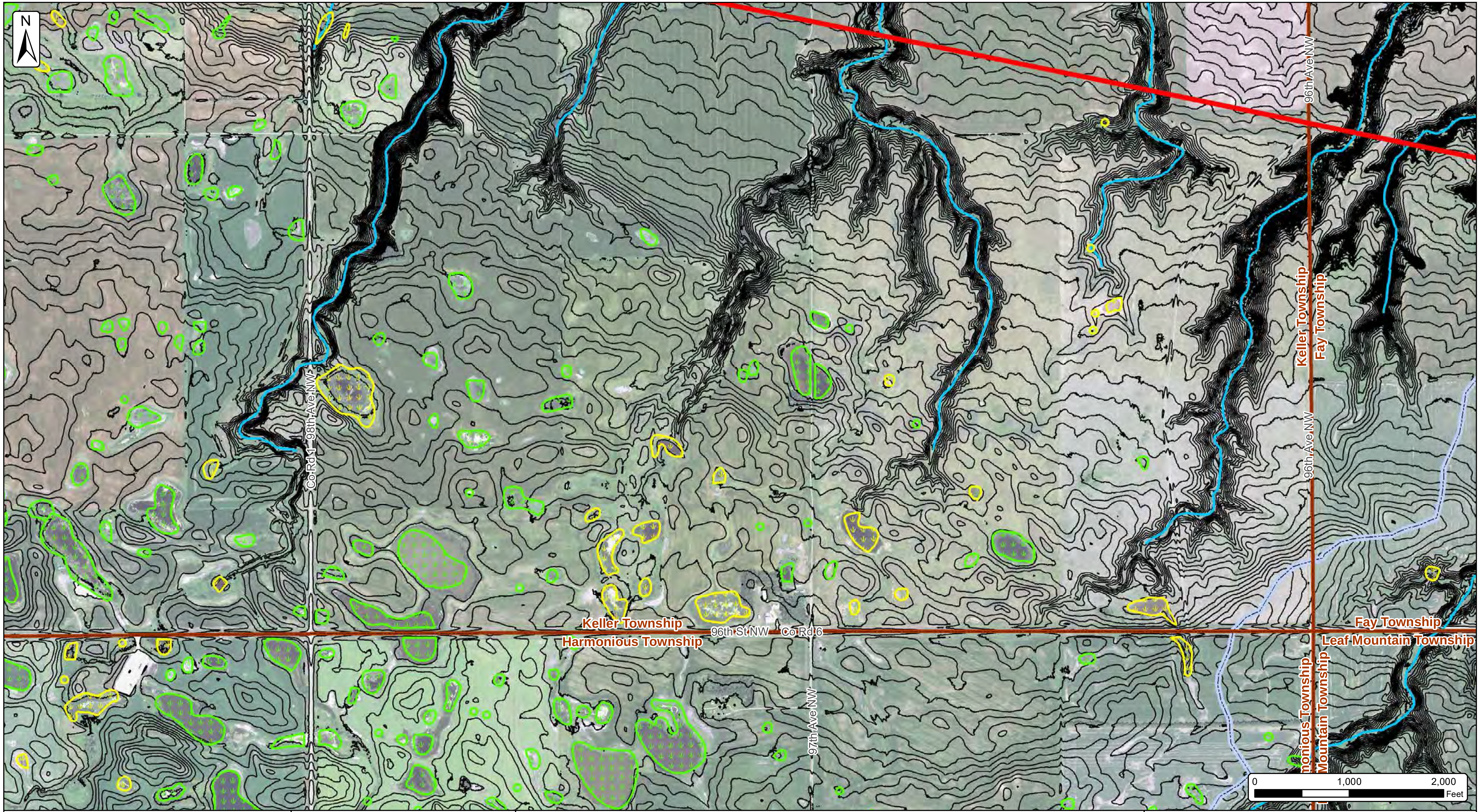

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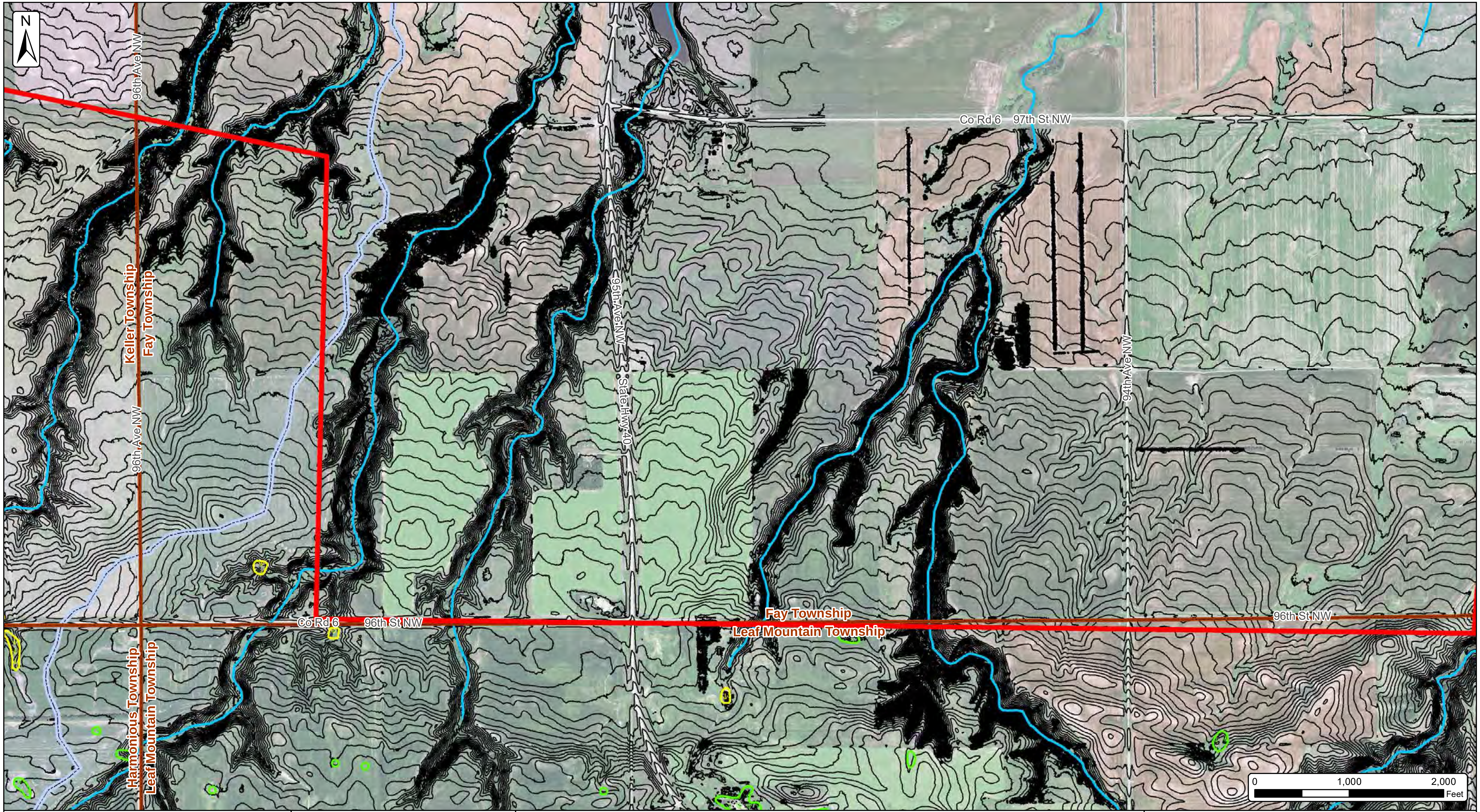

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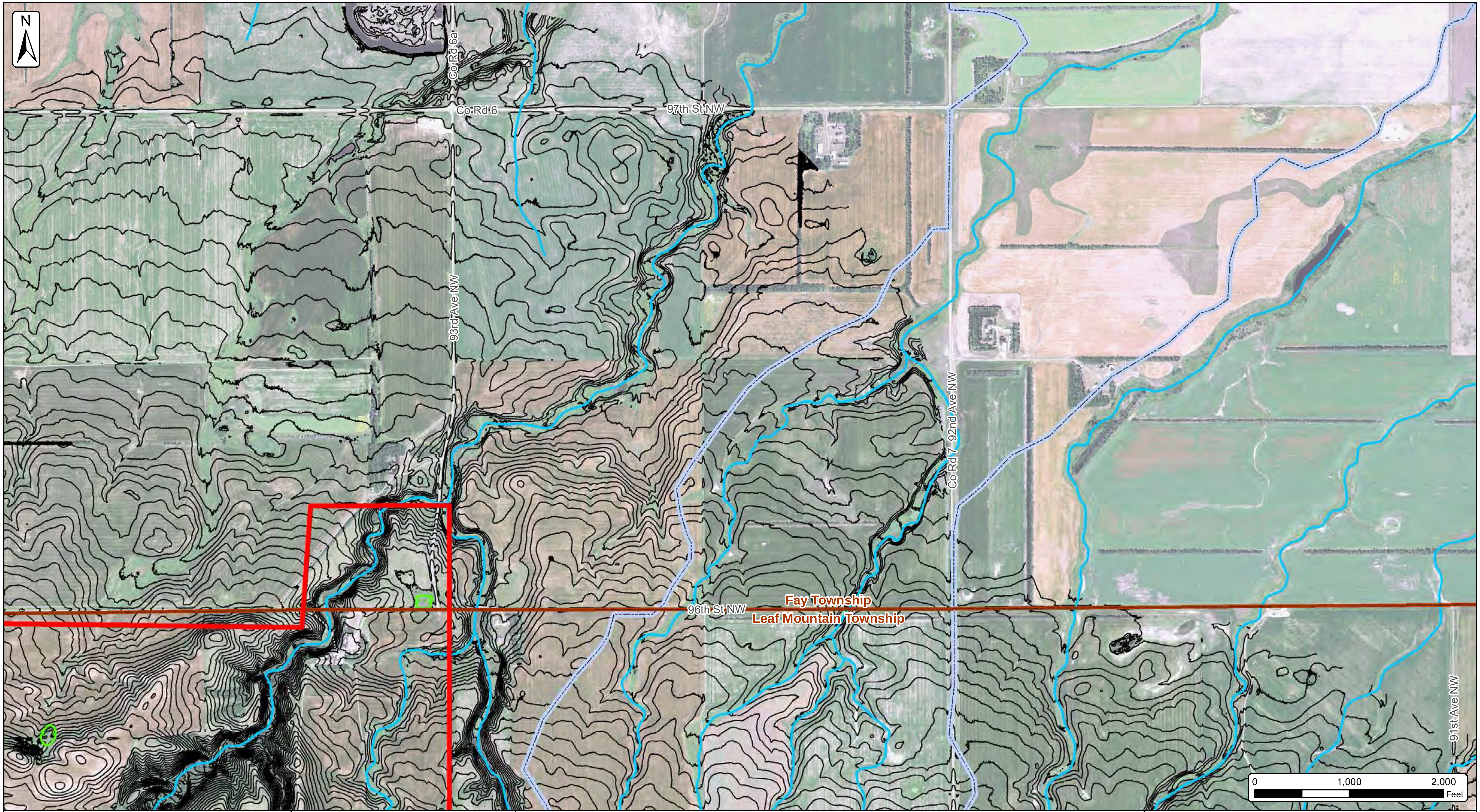

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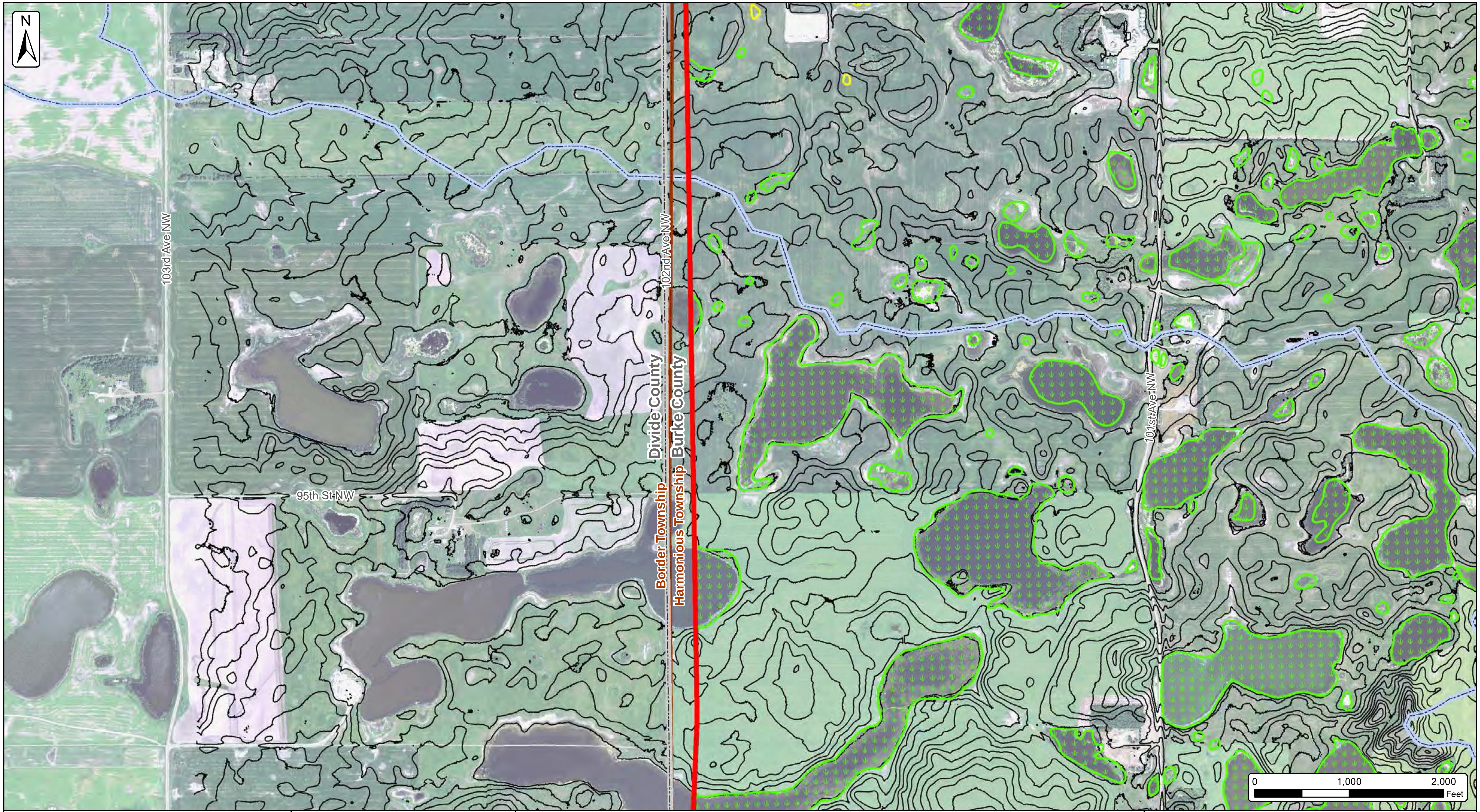

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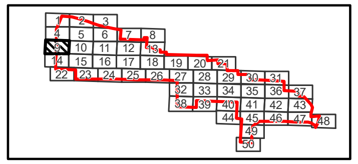

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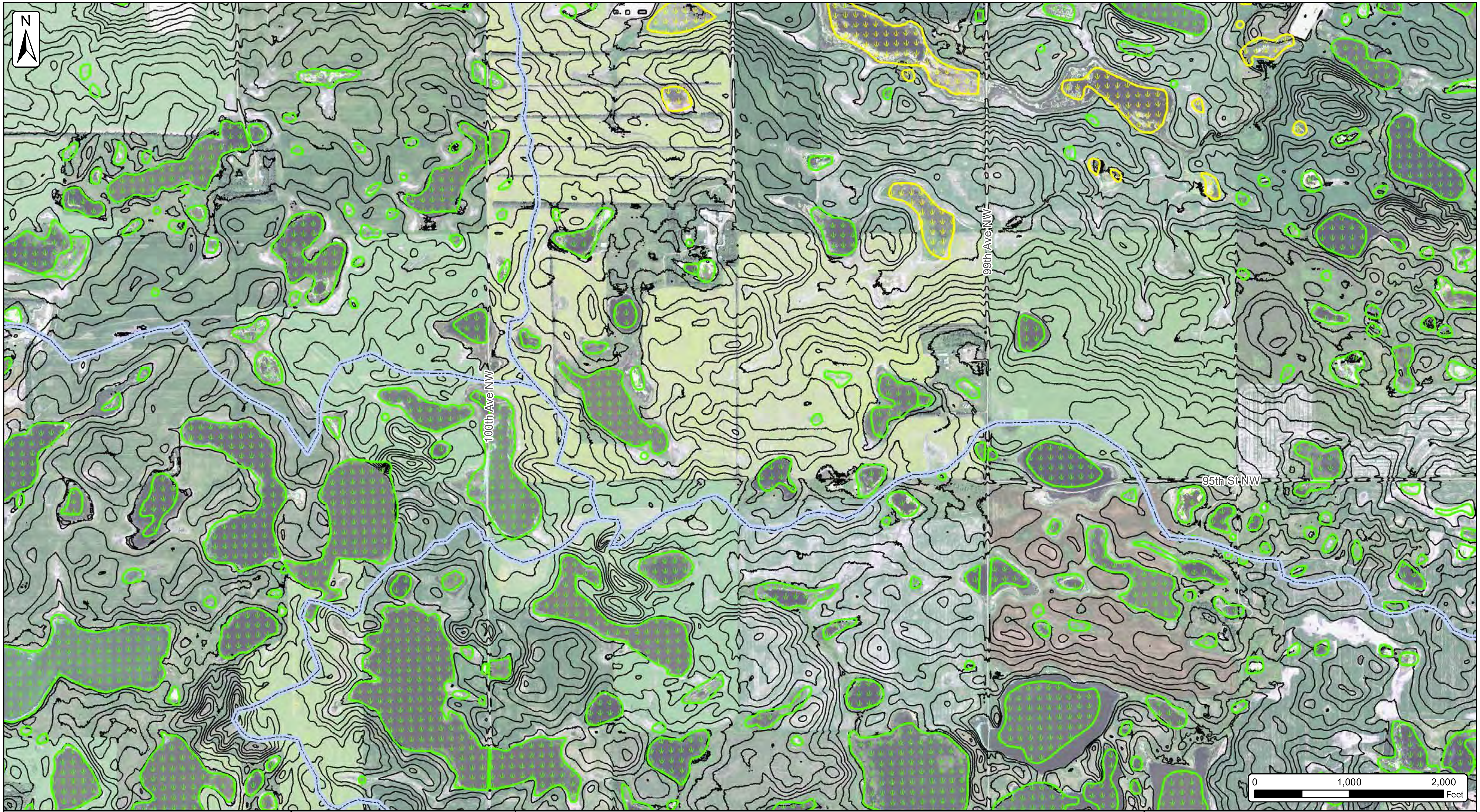

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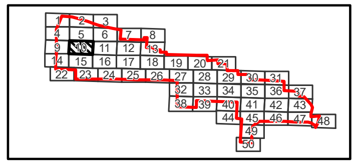

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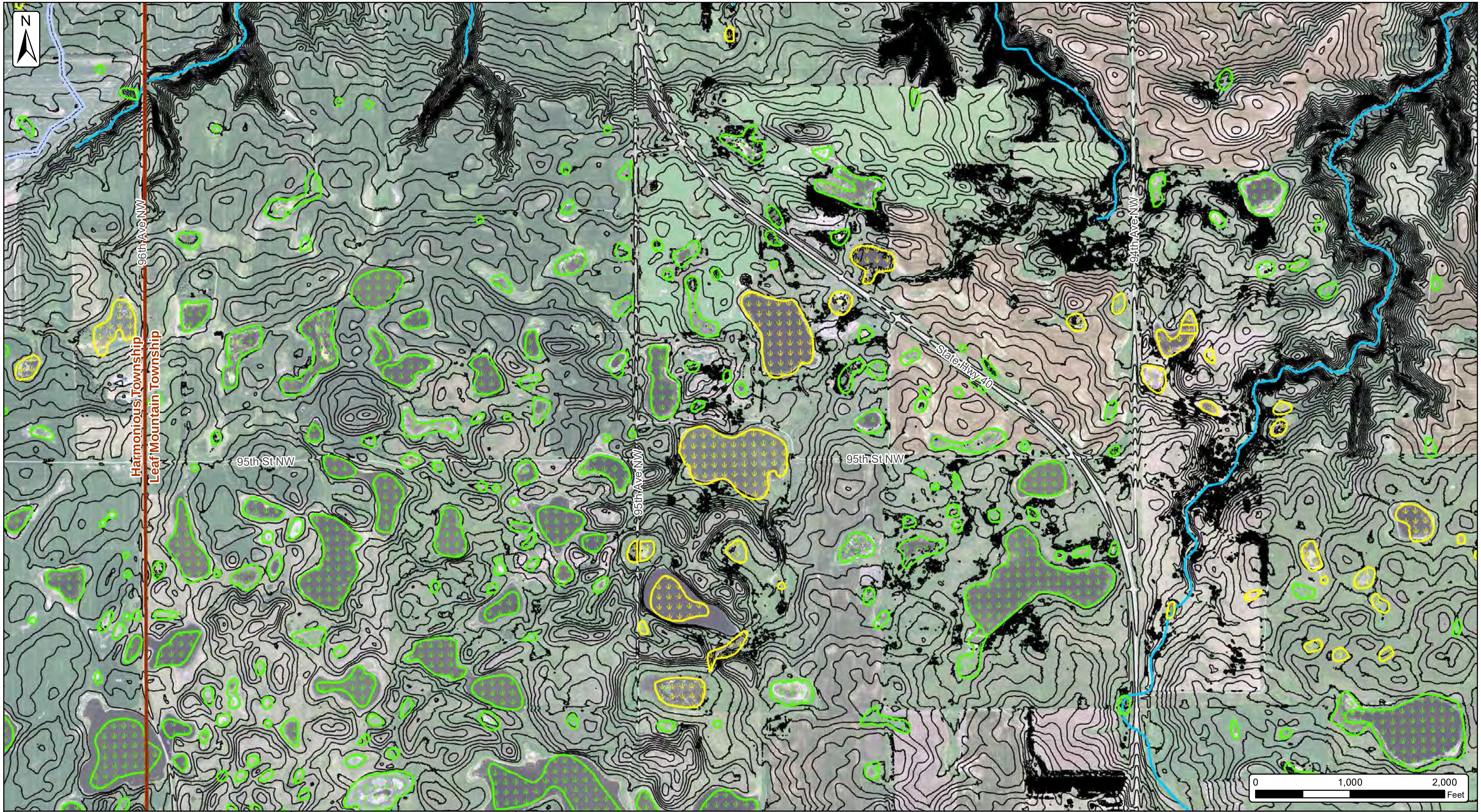

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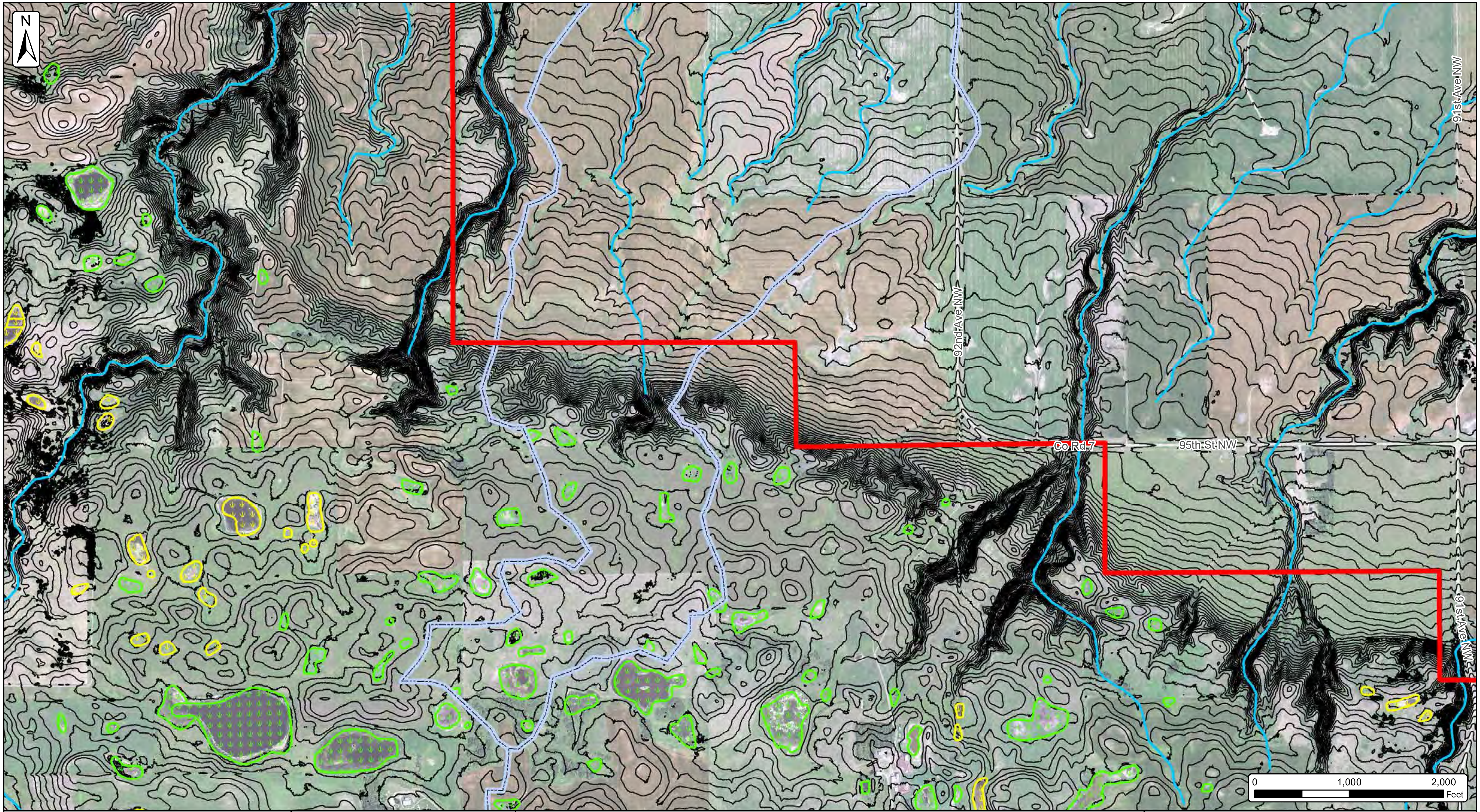

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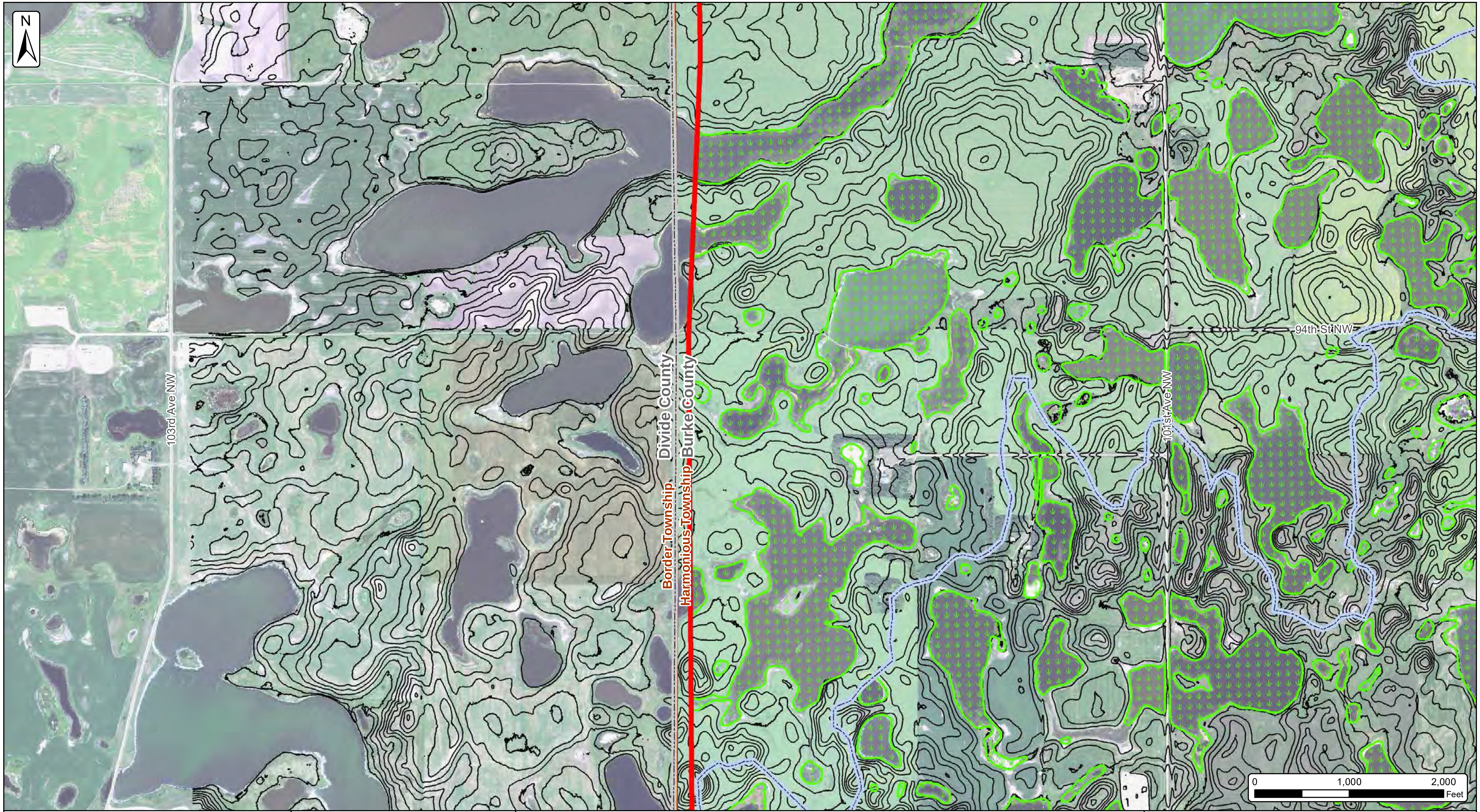

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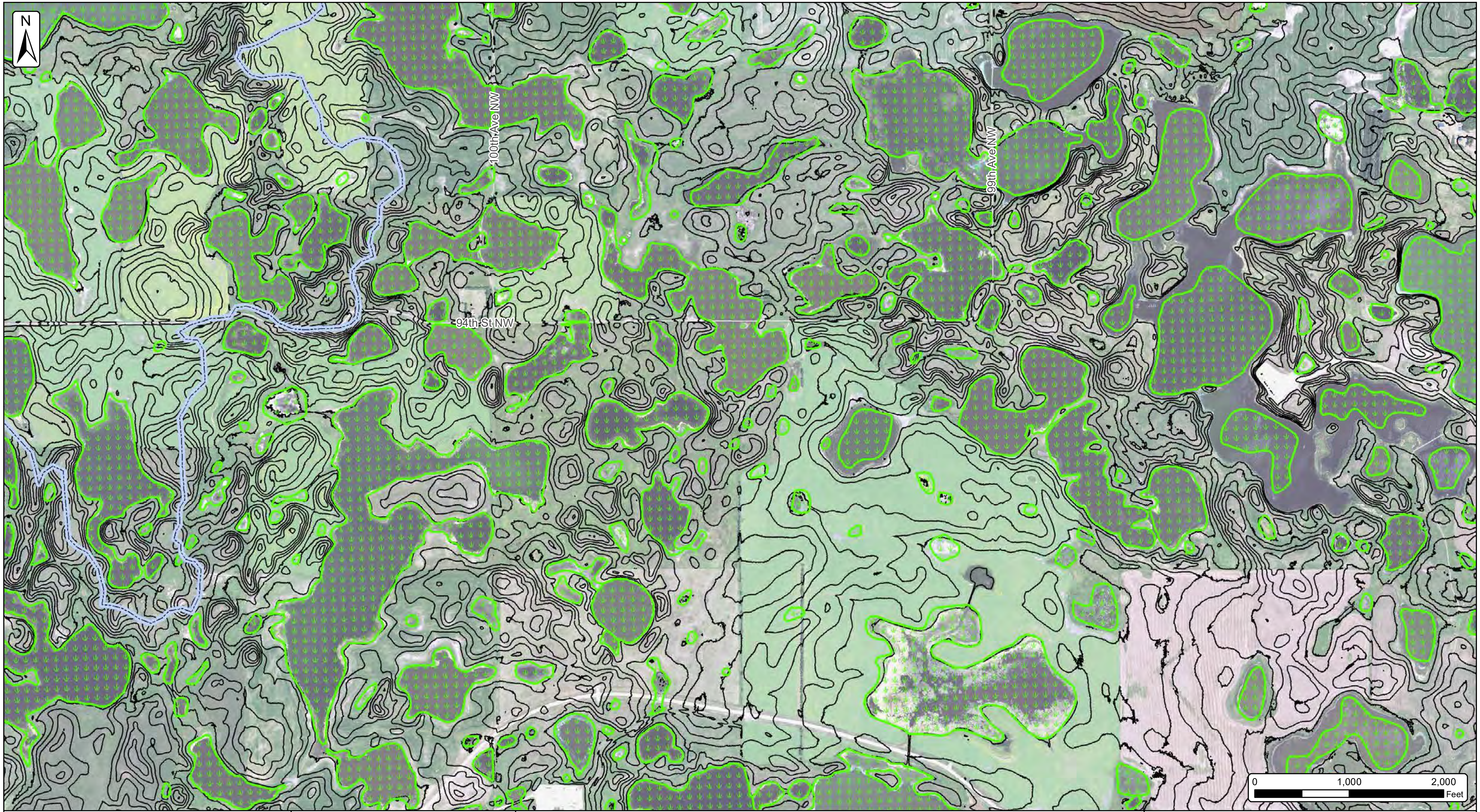

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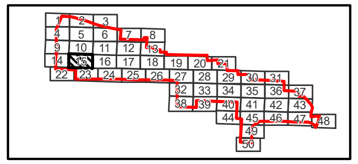

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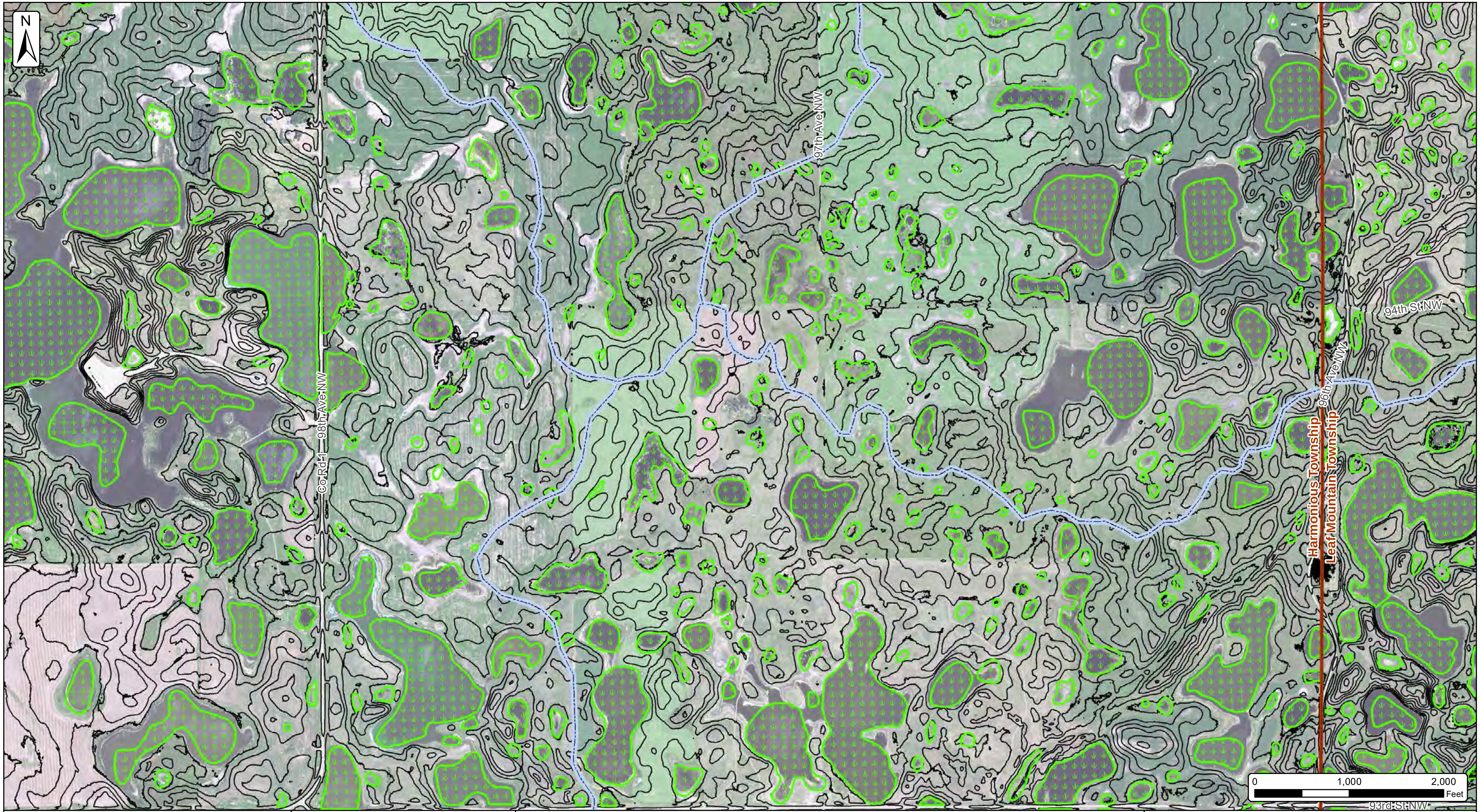

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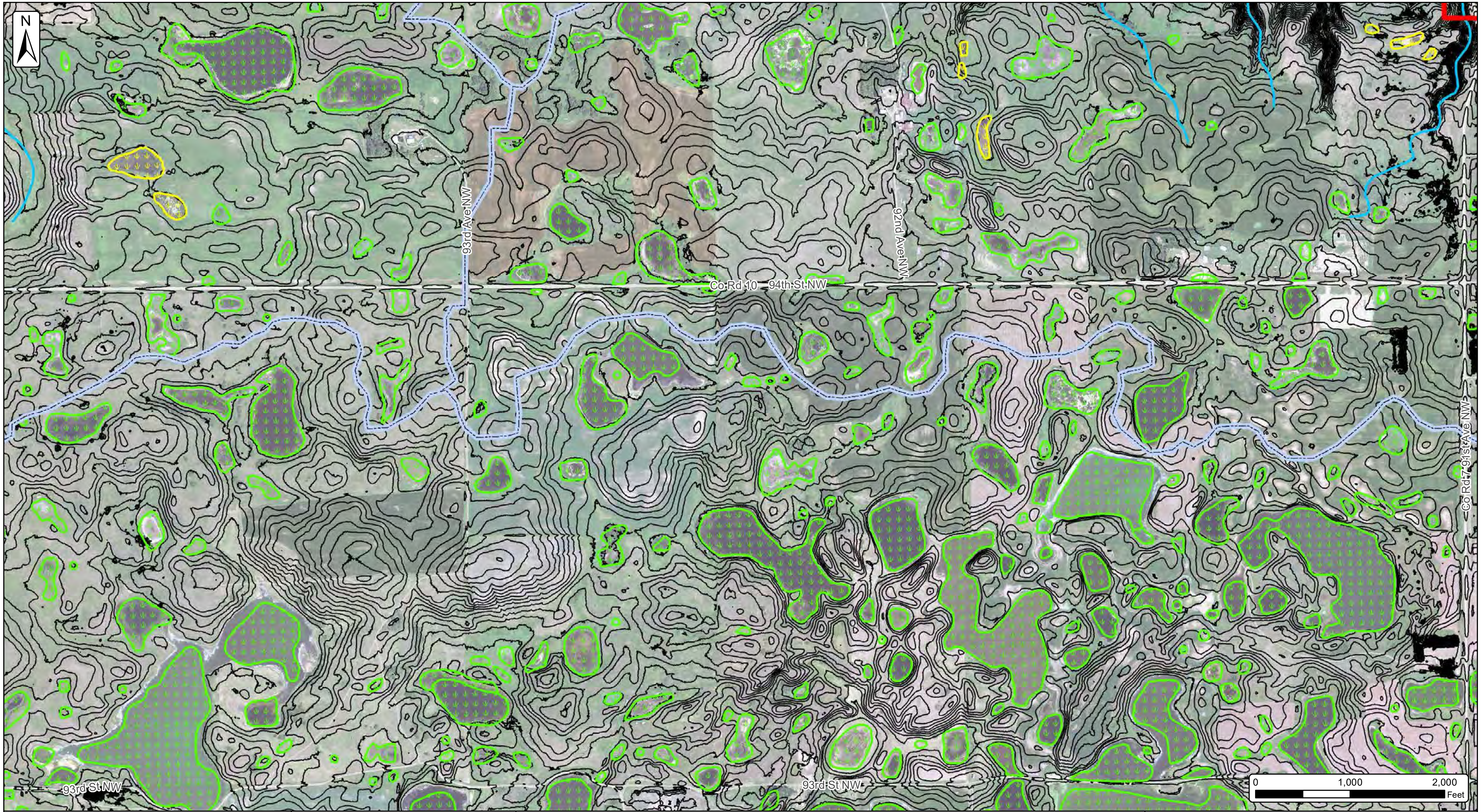

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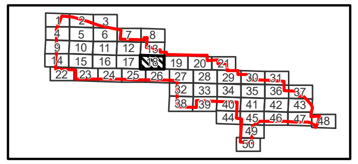

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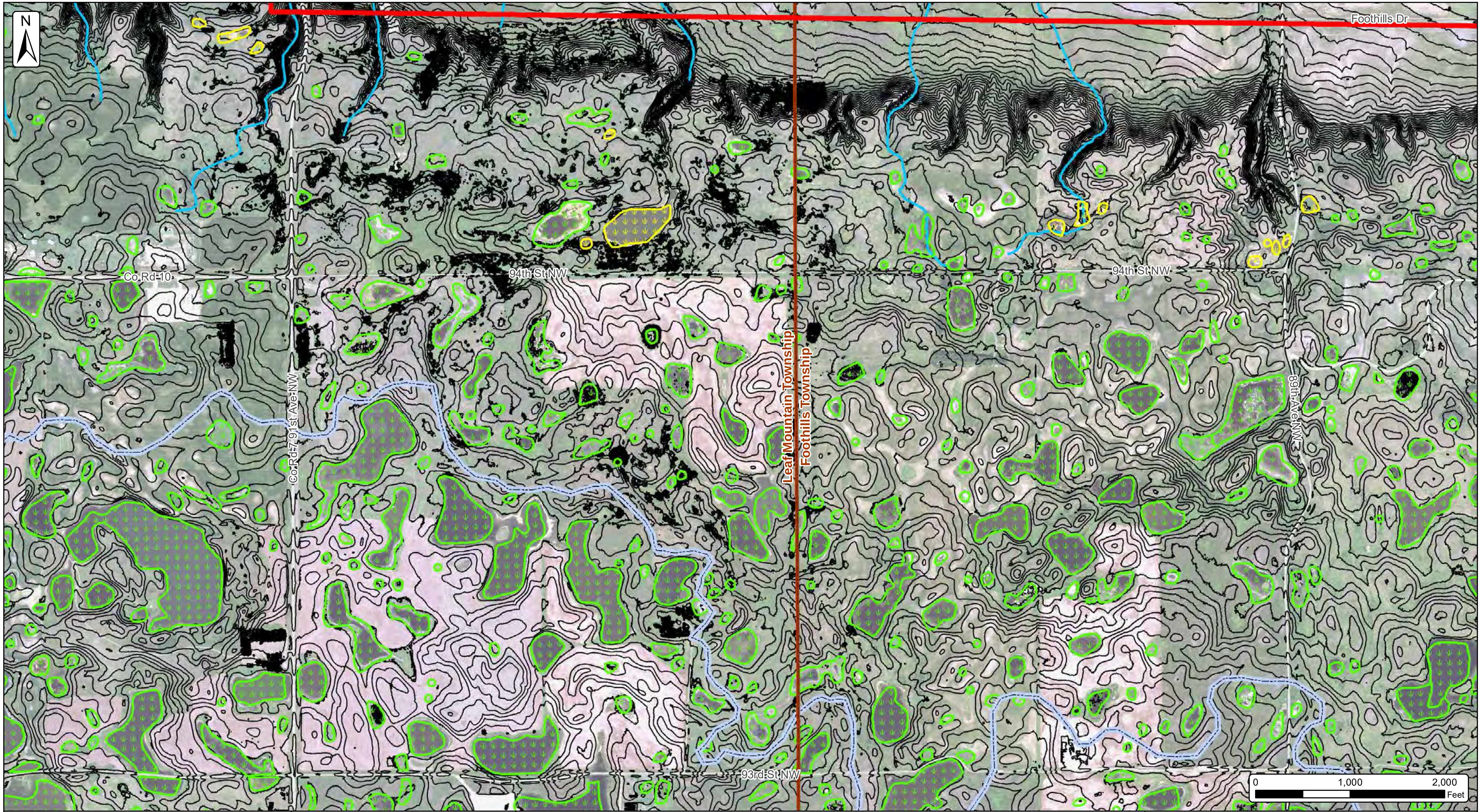

Burke County Wind Resource Area

Wetland Desktop Review Map

Burke County, North Dakota

Date: 7/15/2017

Client: NEXTera ENERGY RESOURCES

Atwell, LLC Project: 16000947

Project Area (01/25/2017)

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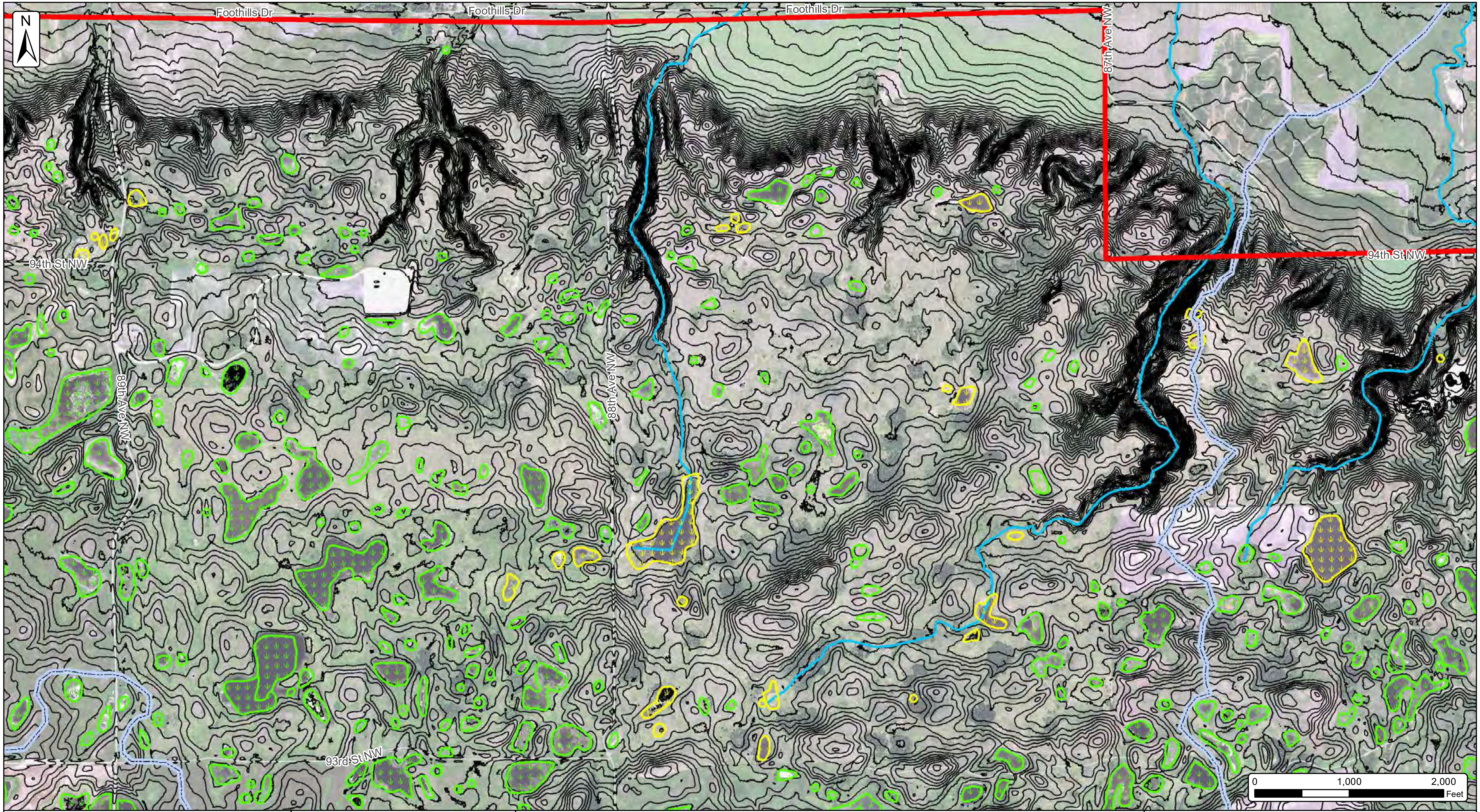

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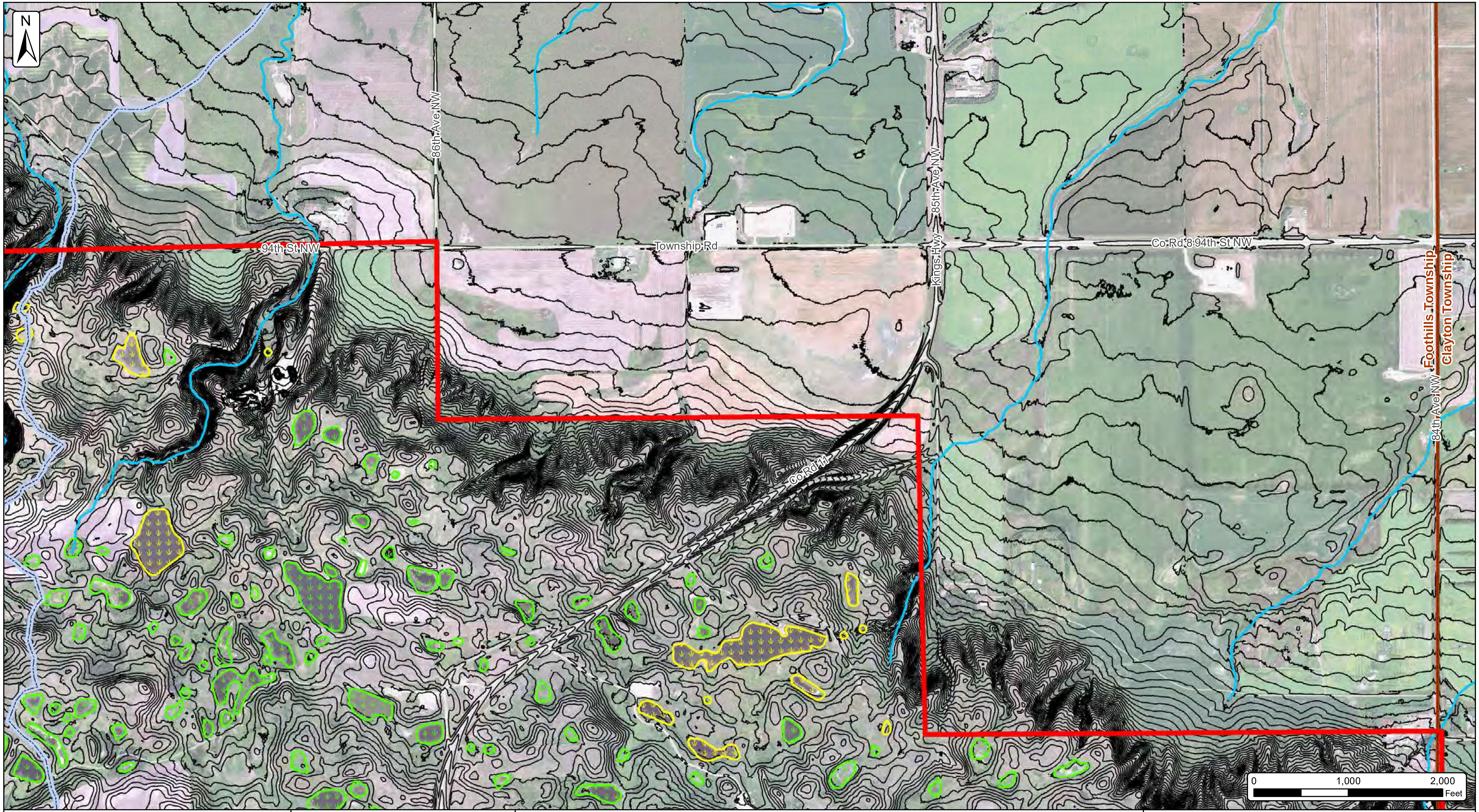

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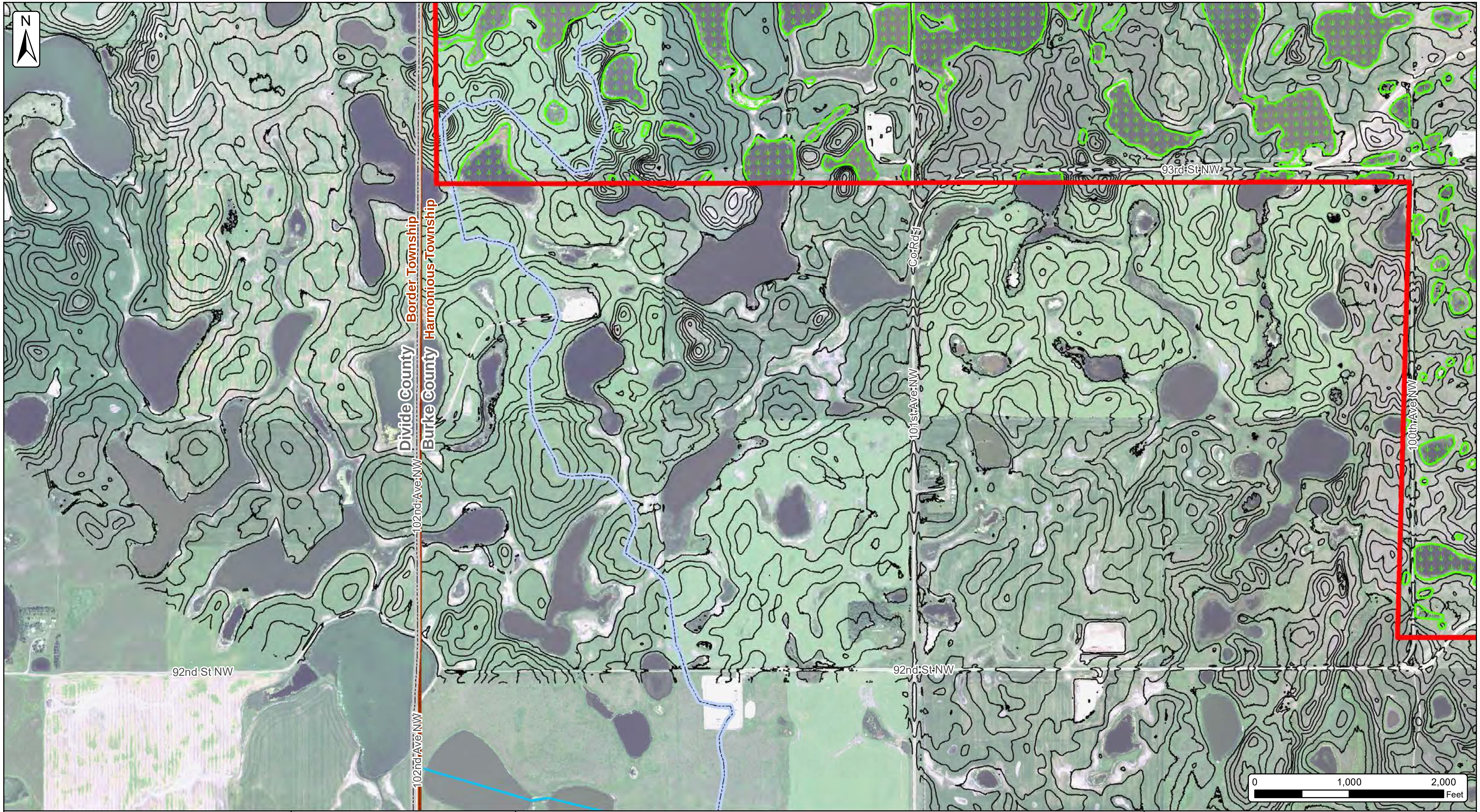

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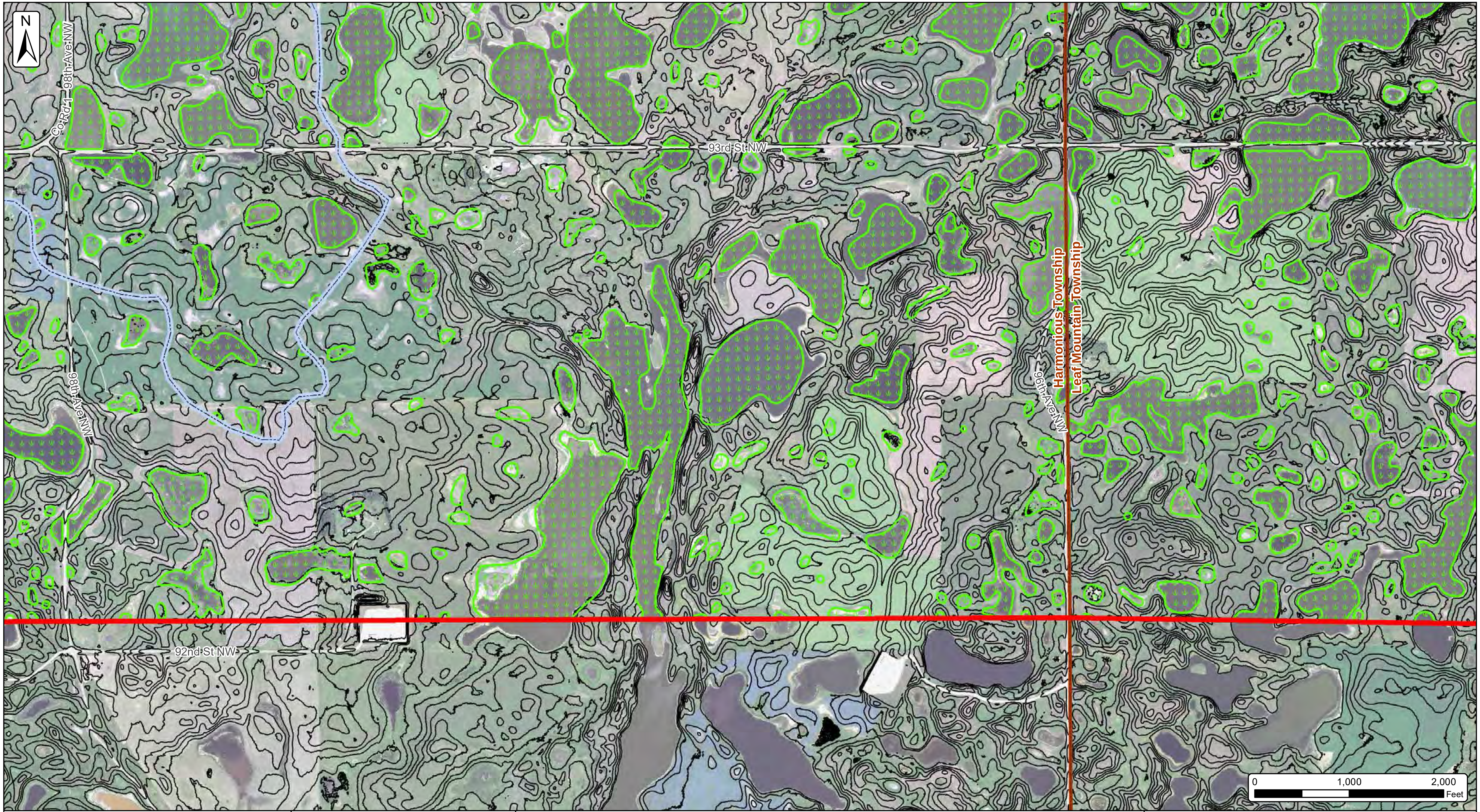

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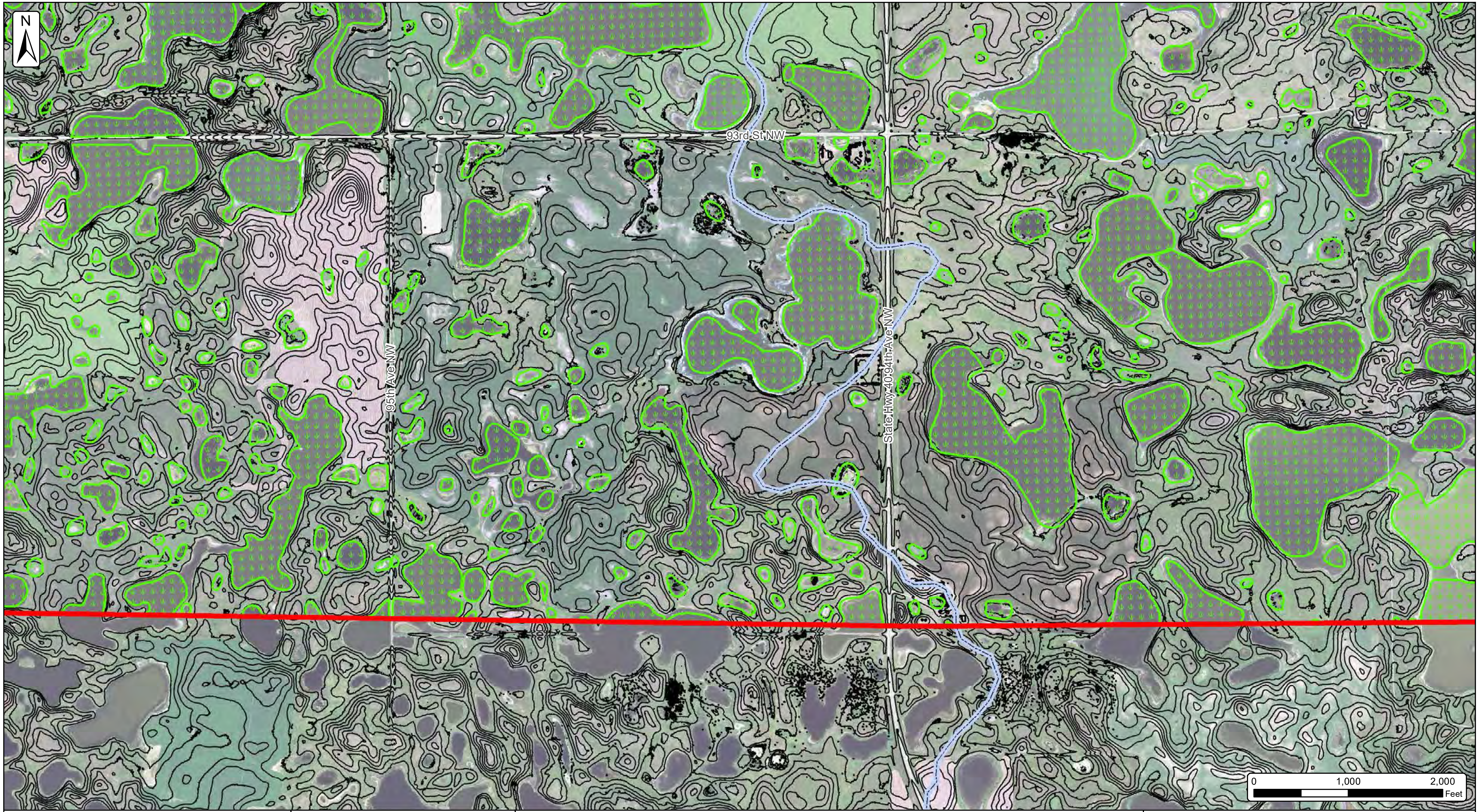

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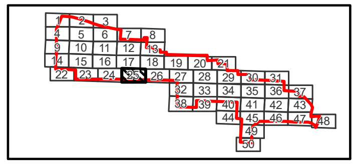

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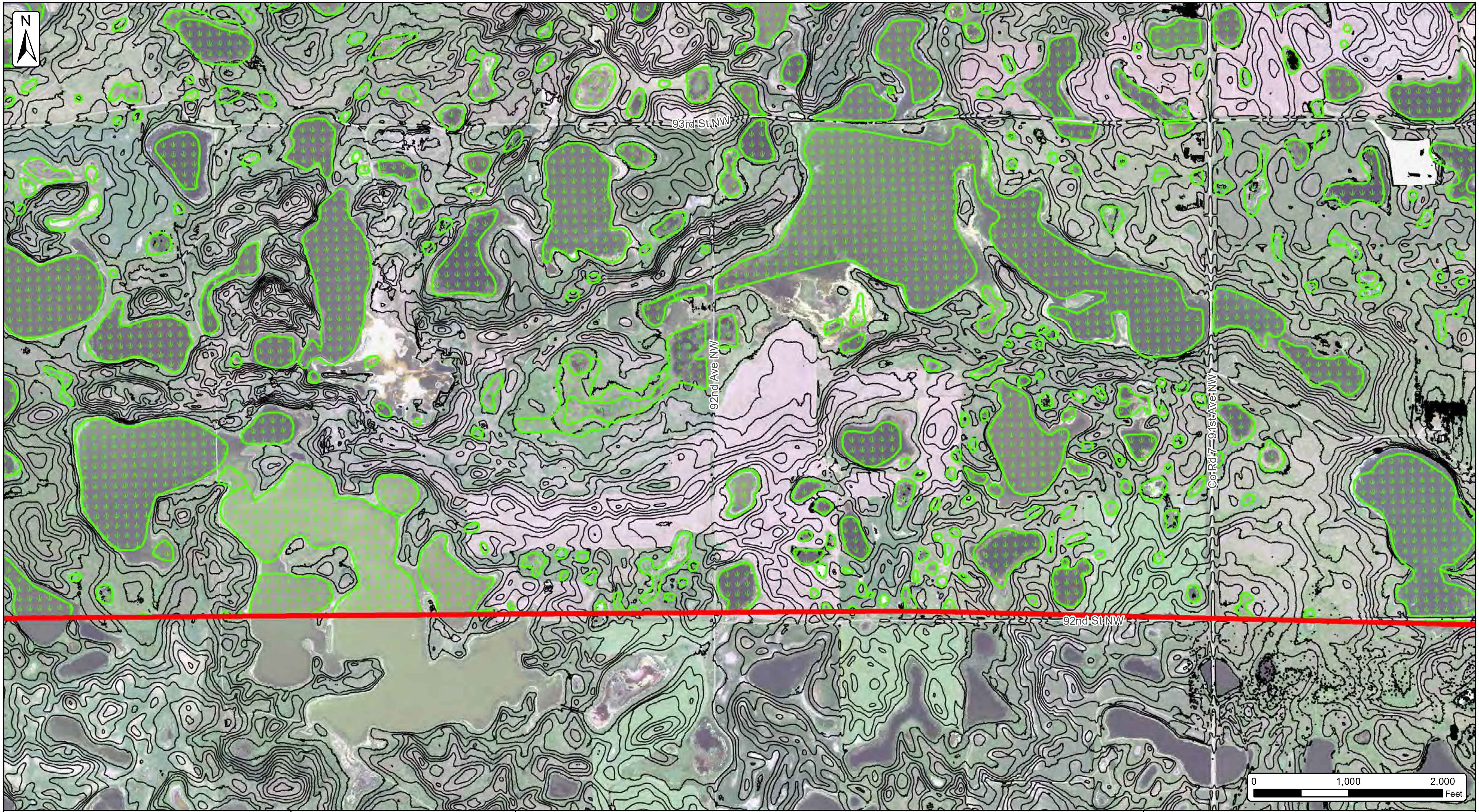

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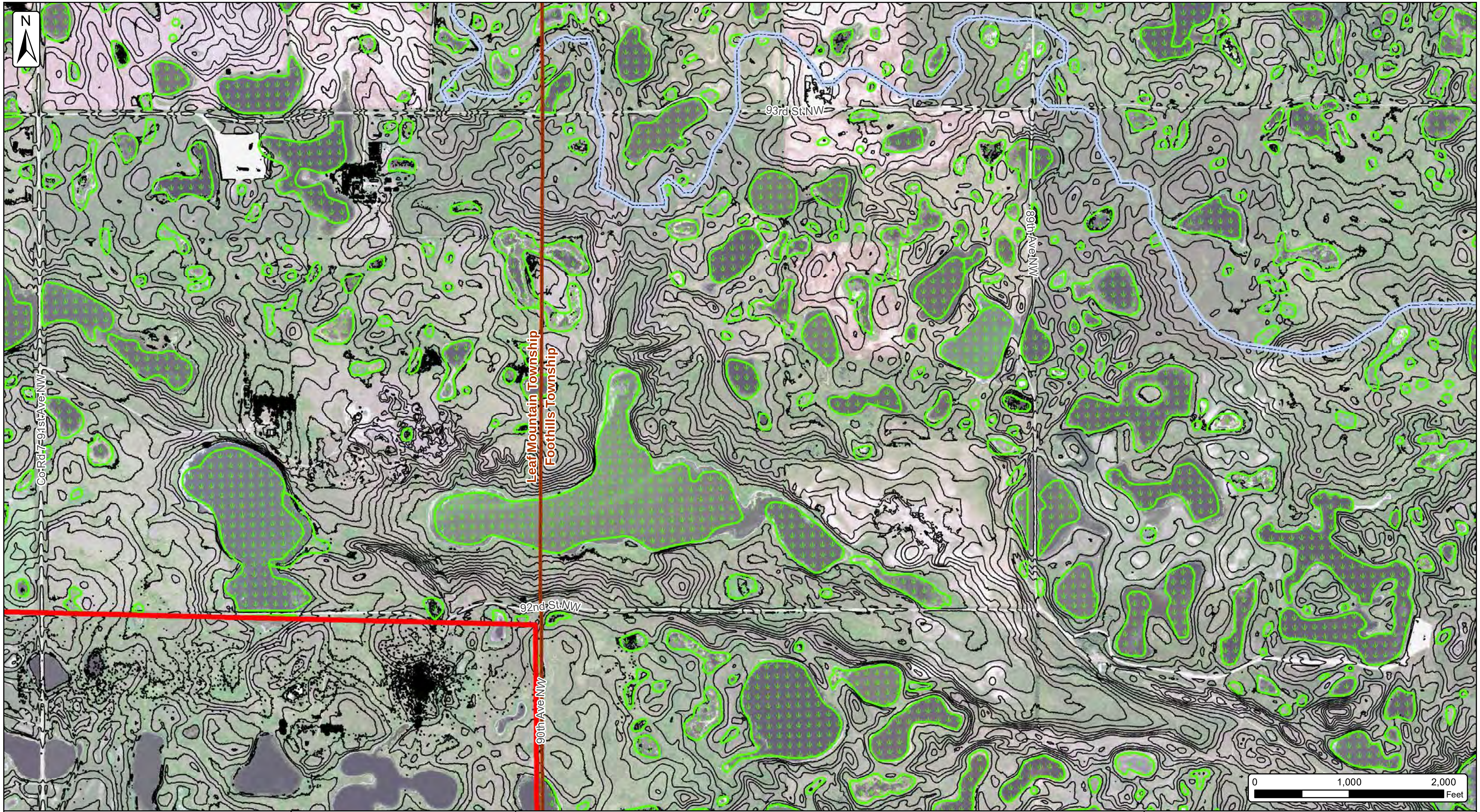

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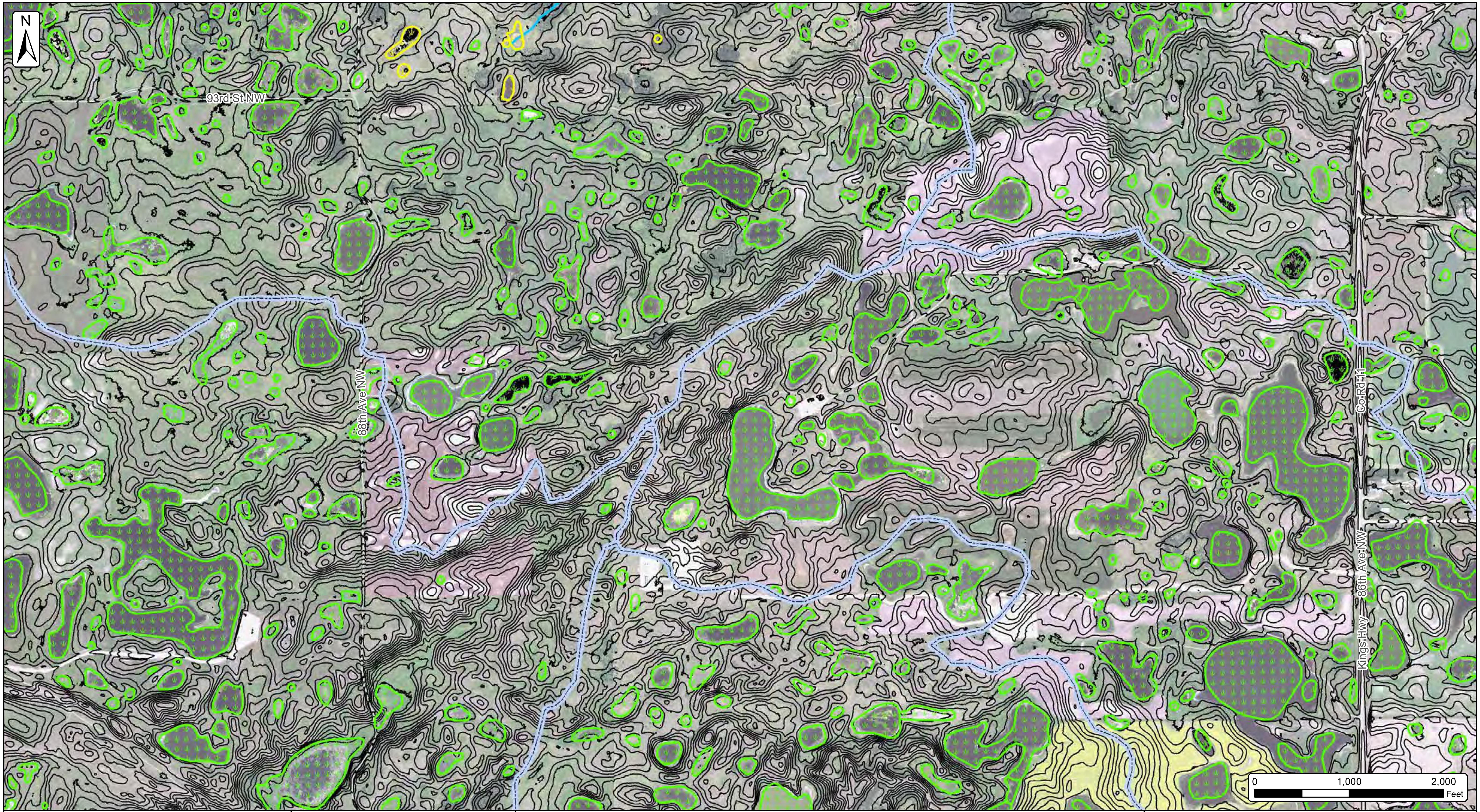

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Burke County, North Dakota

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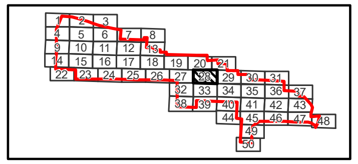

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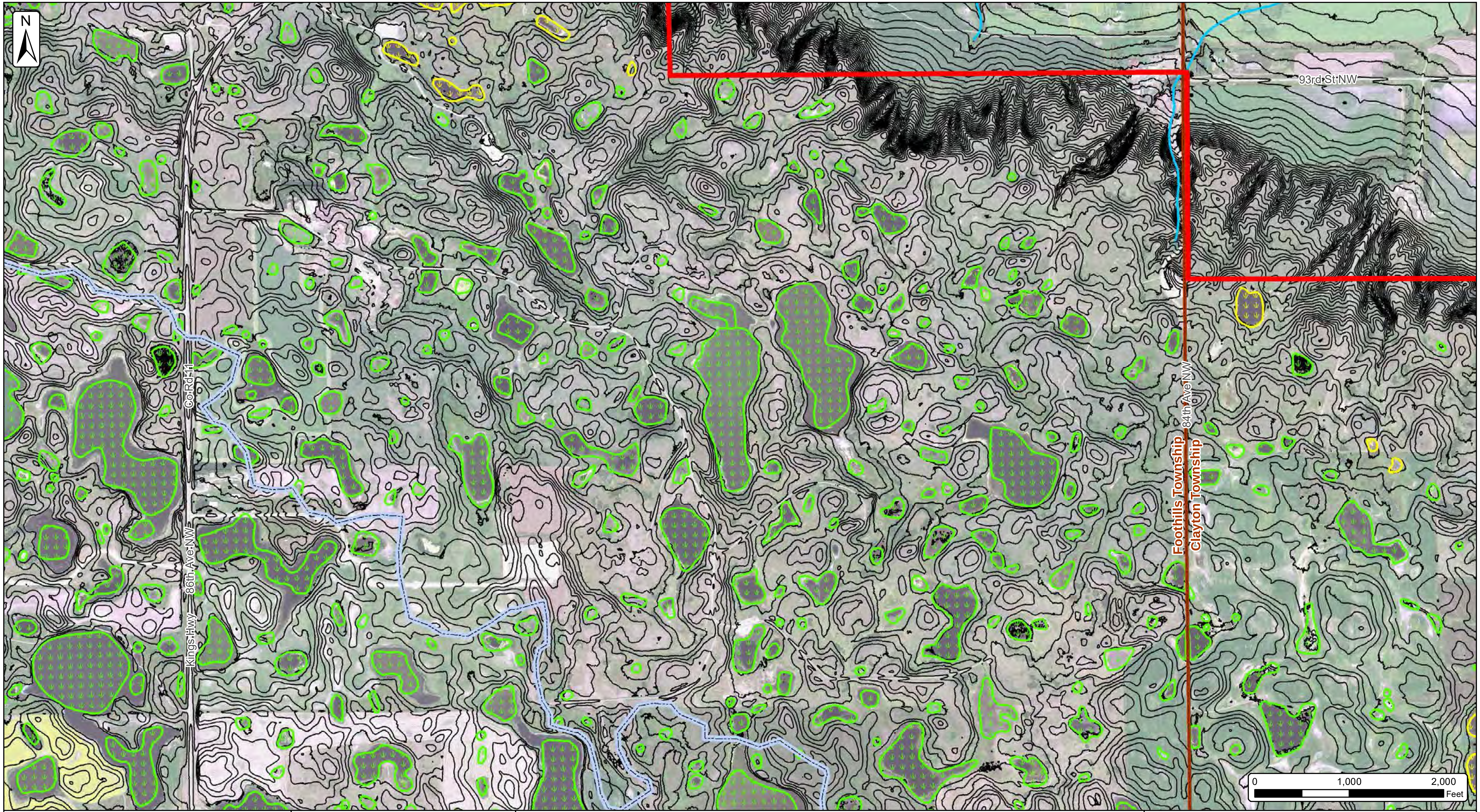

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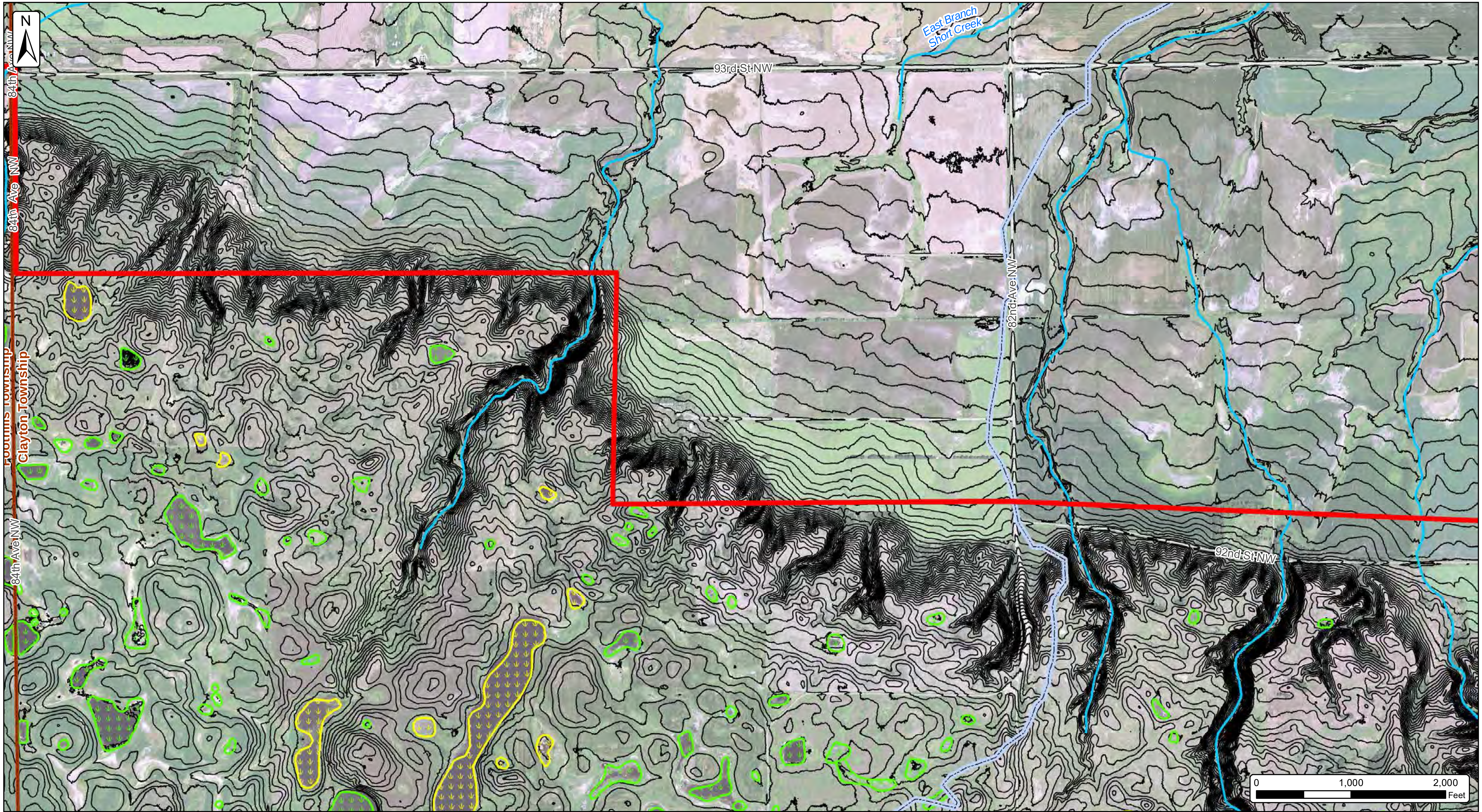

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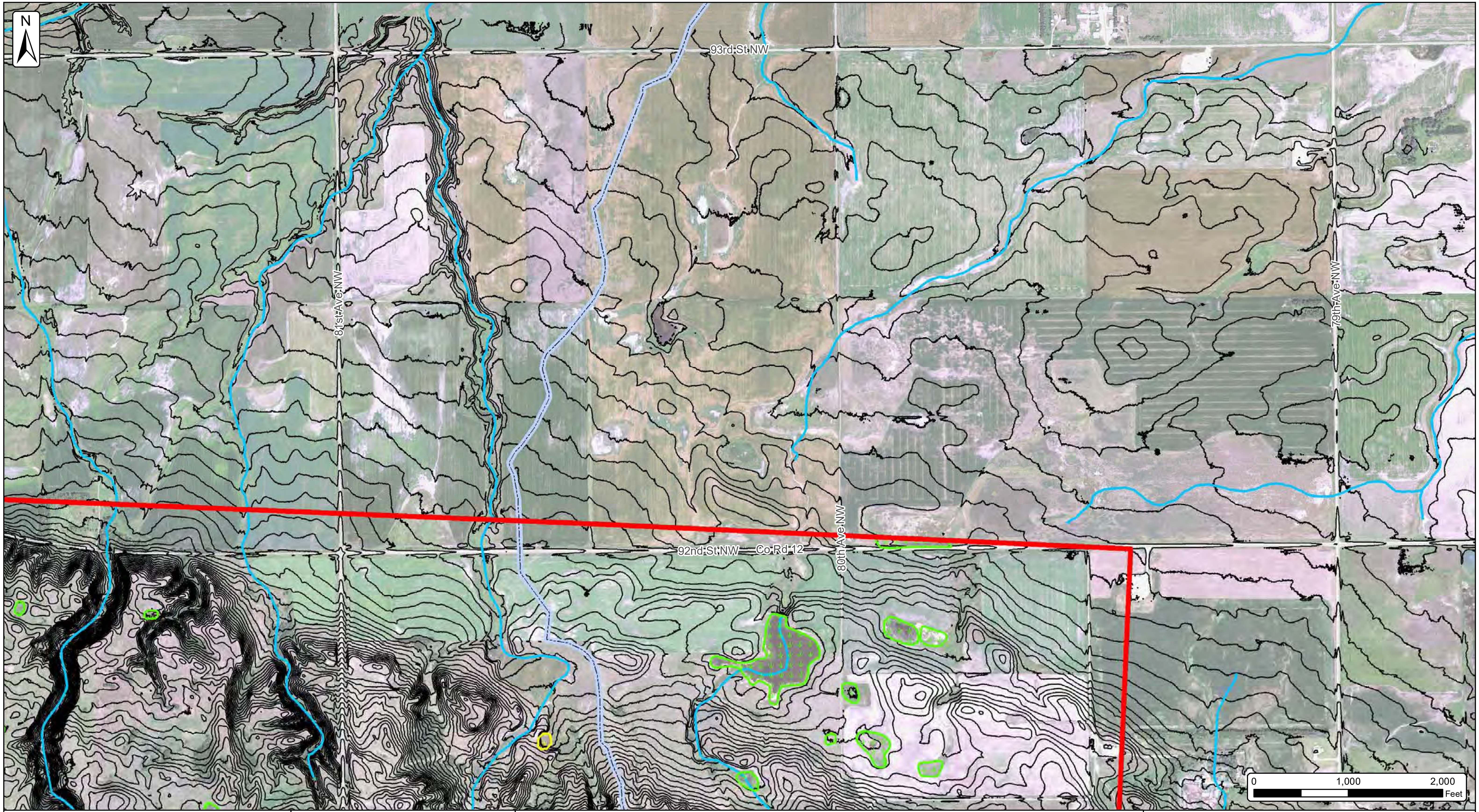

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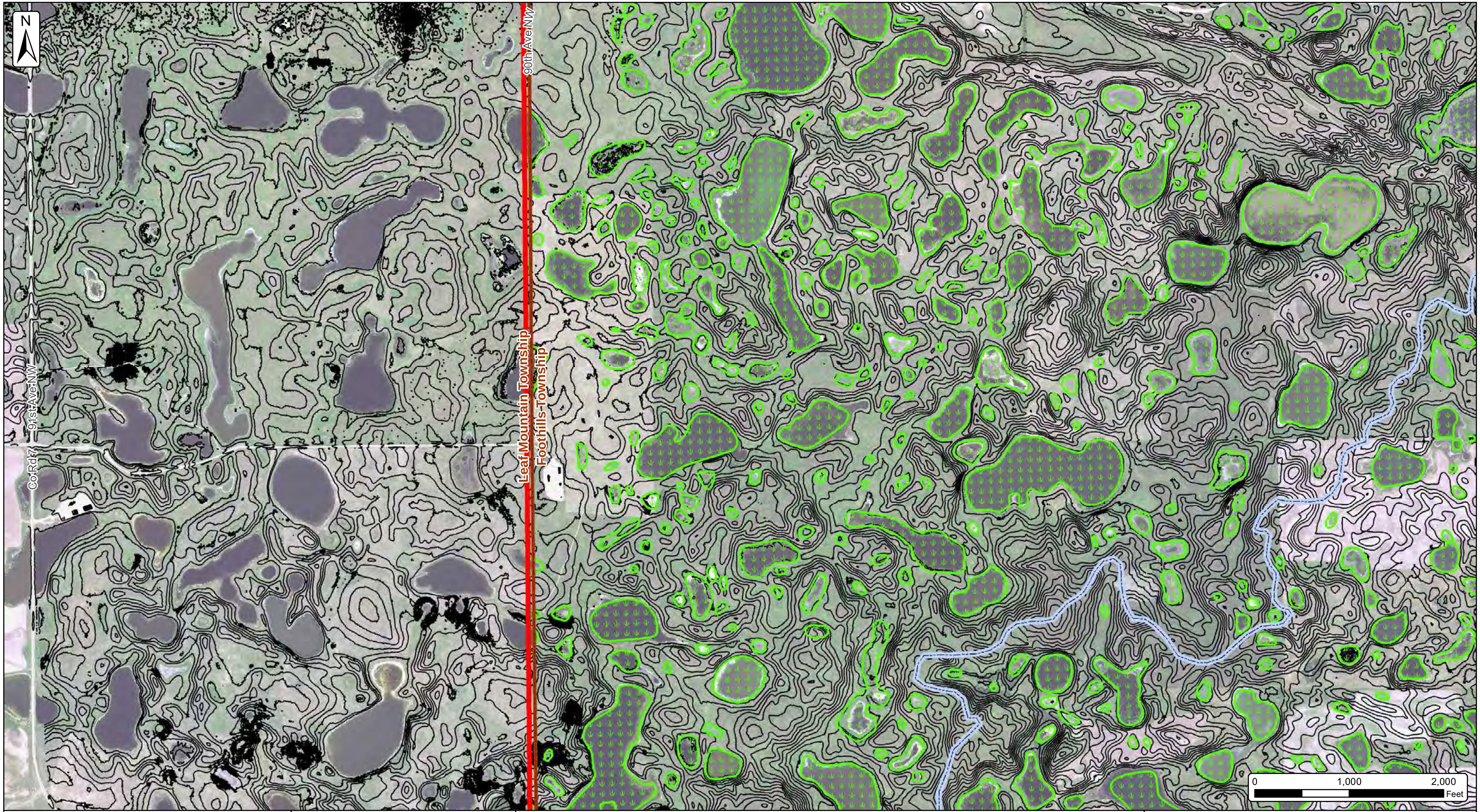

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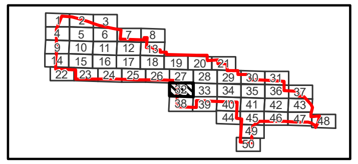

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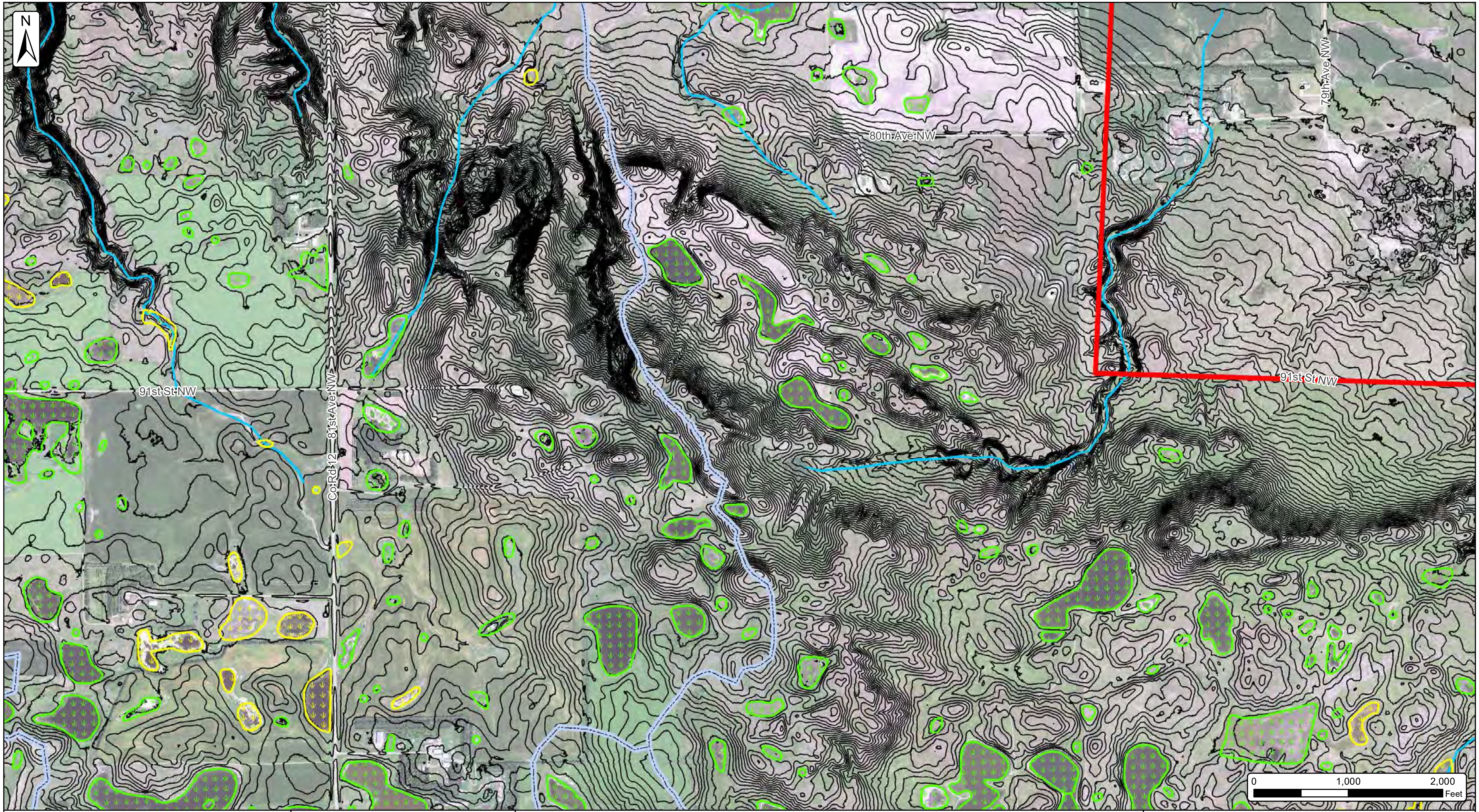

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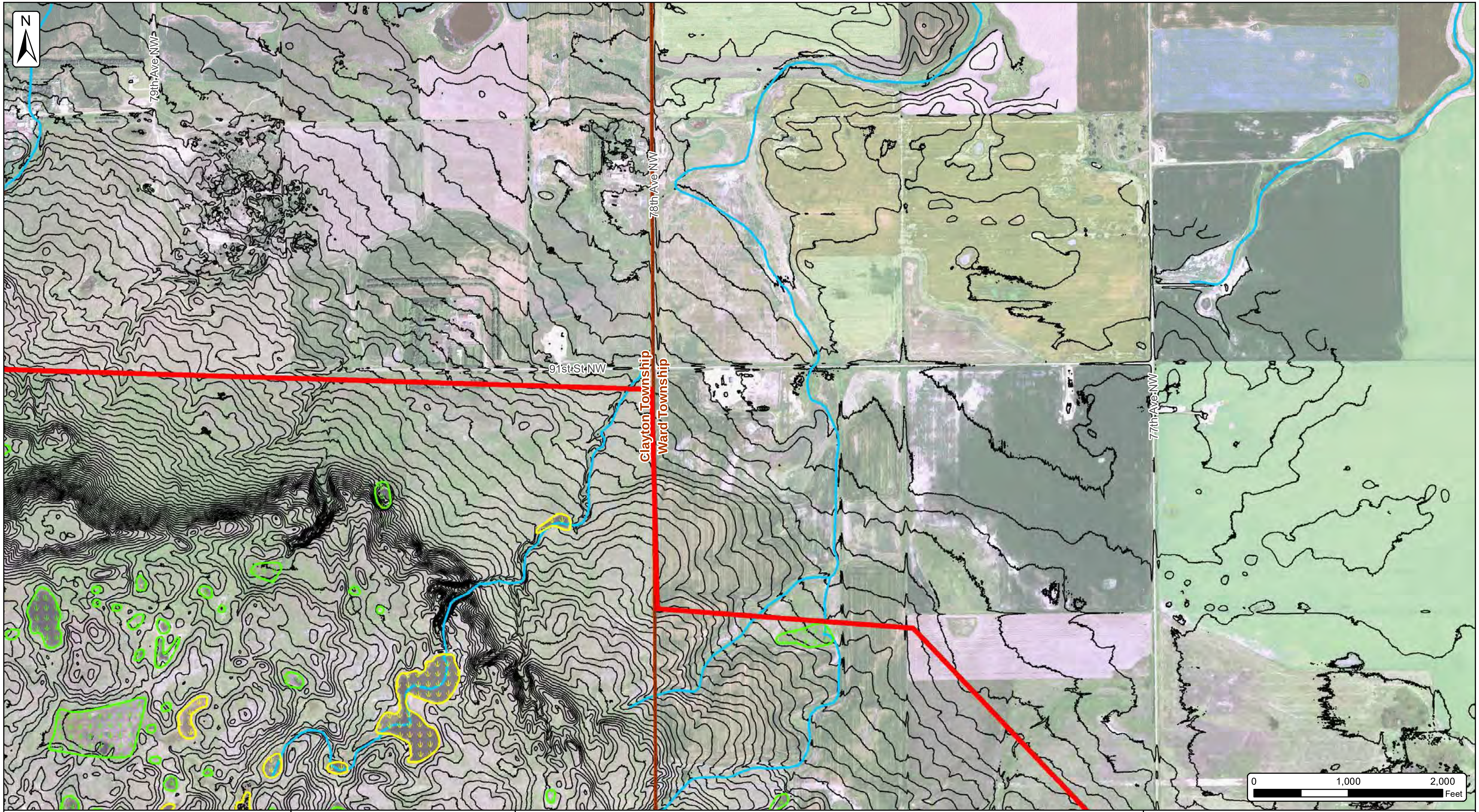

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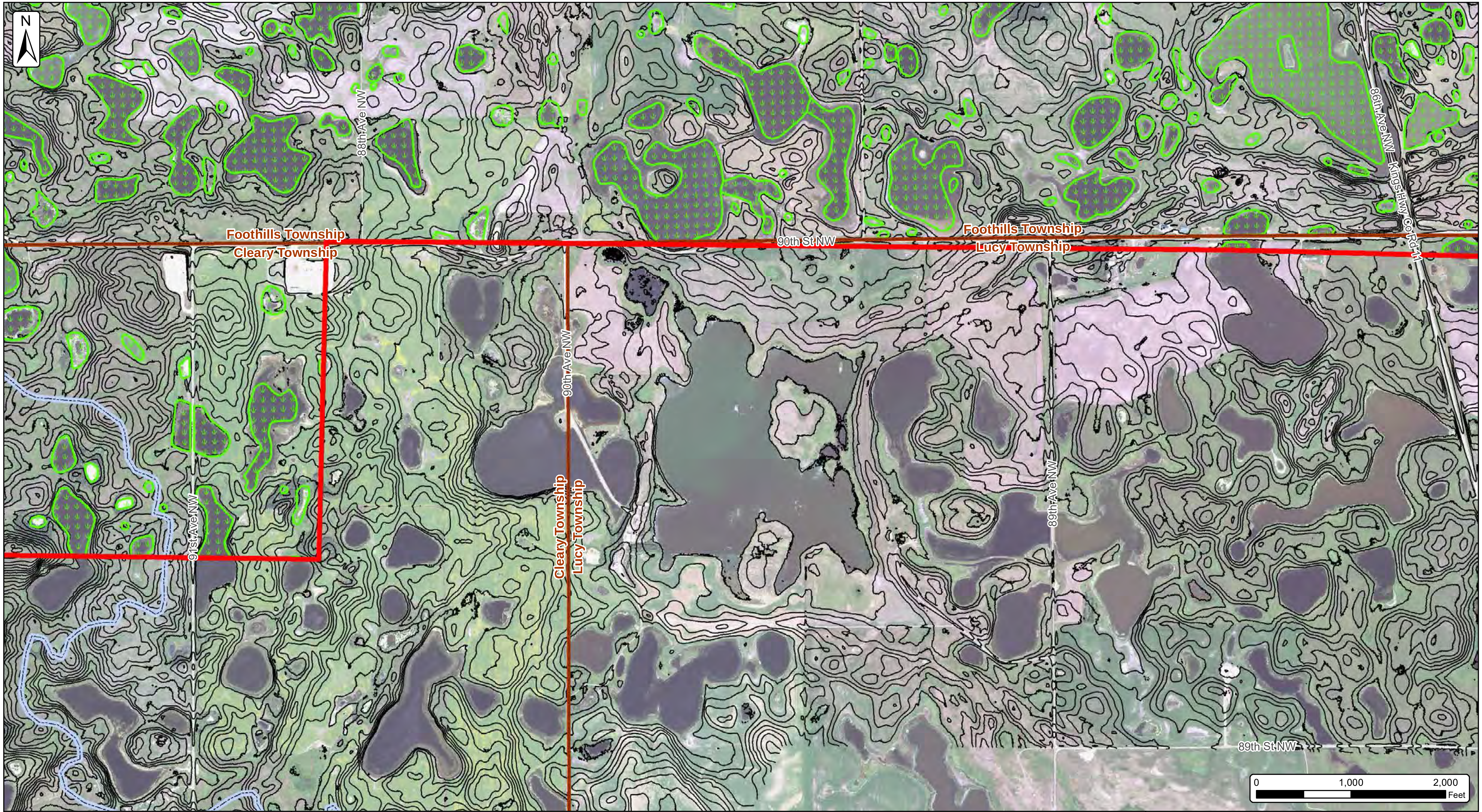

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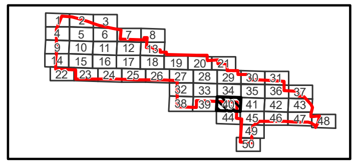

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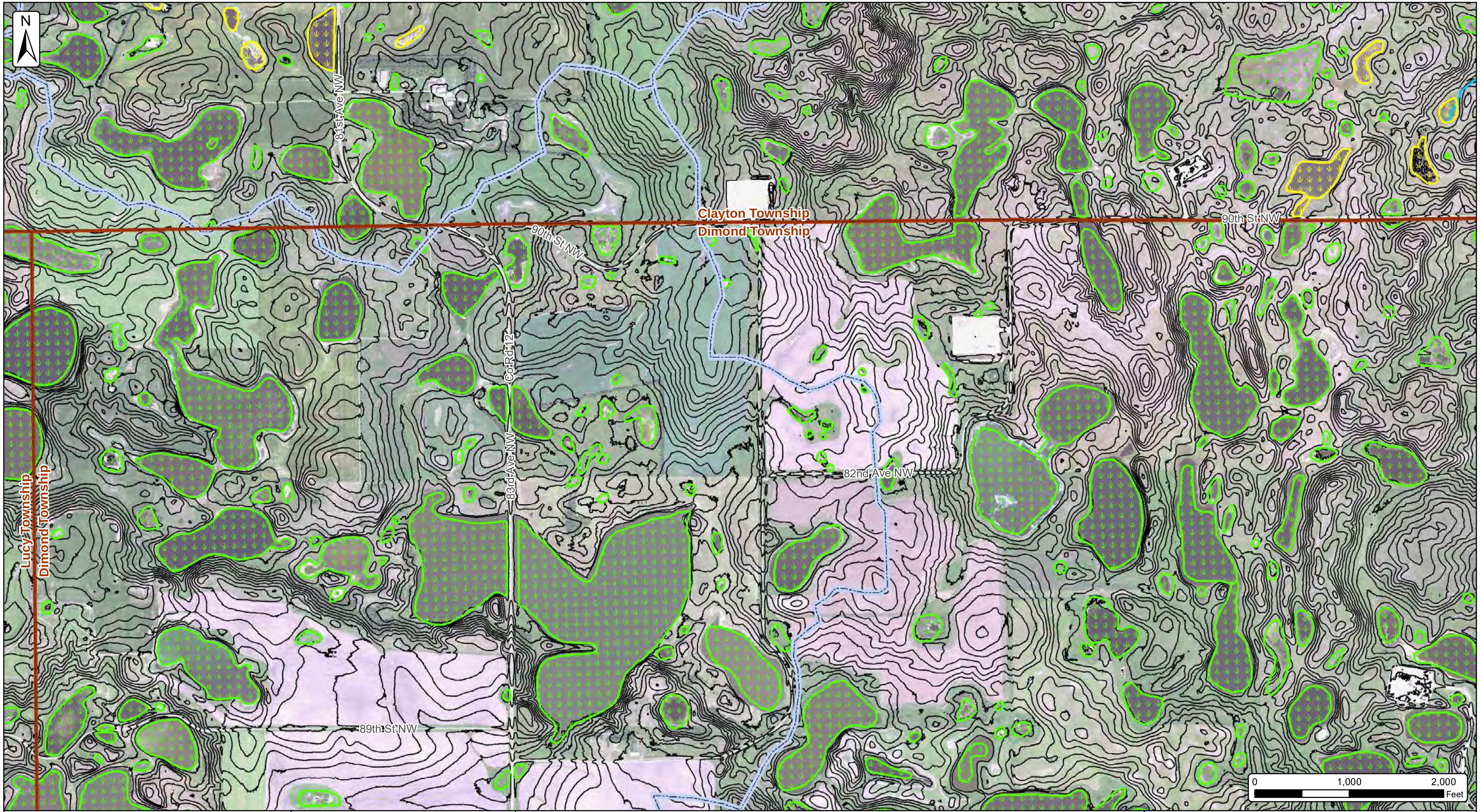

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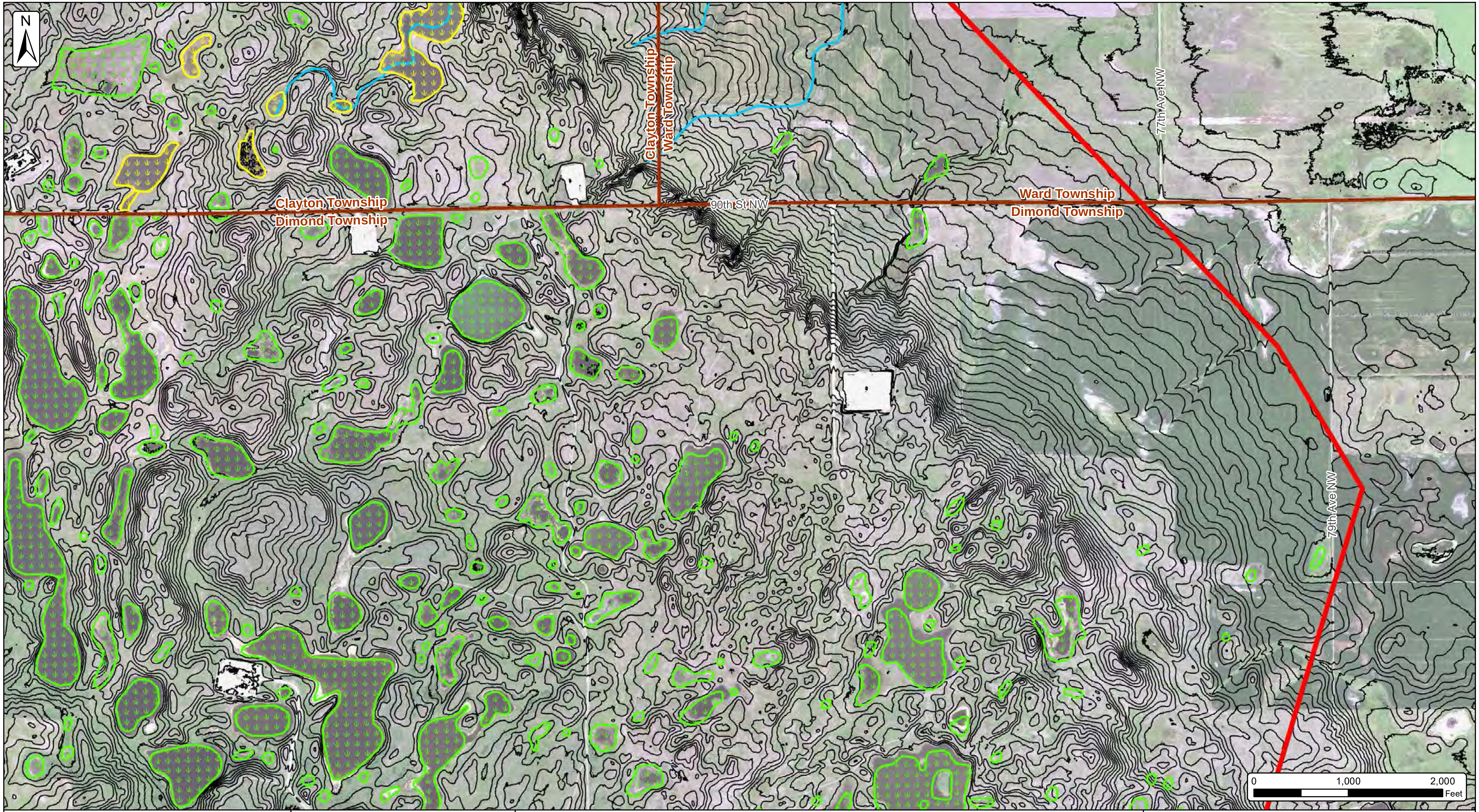

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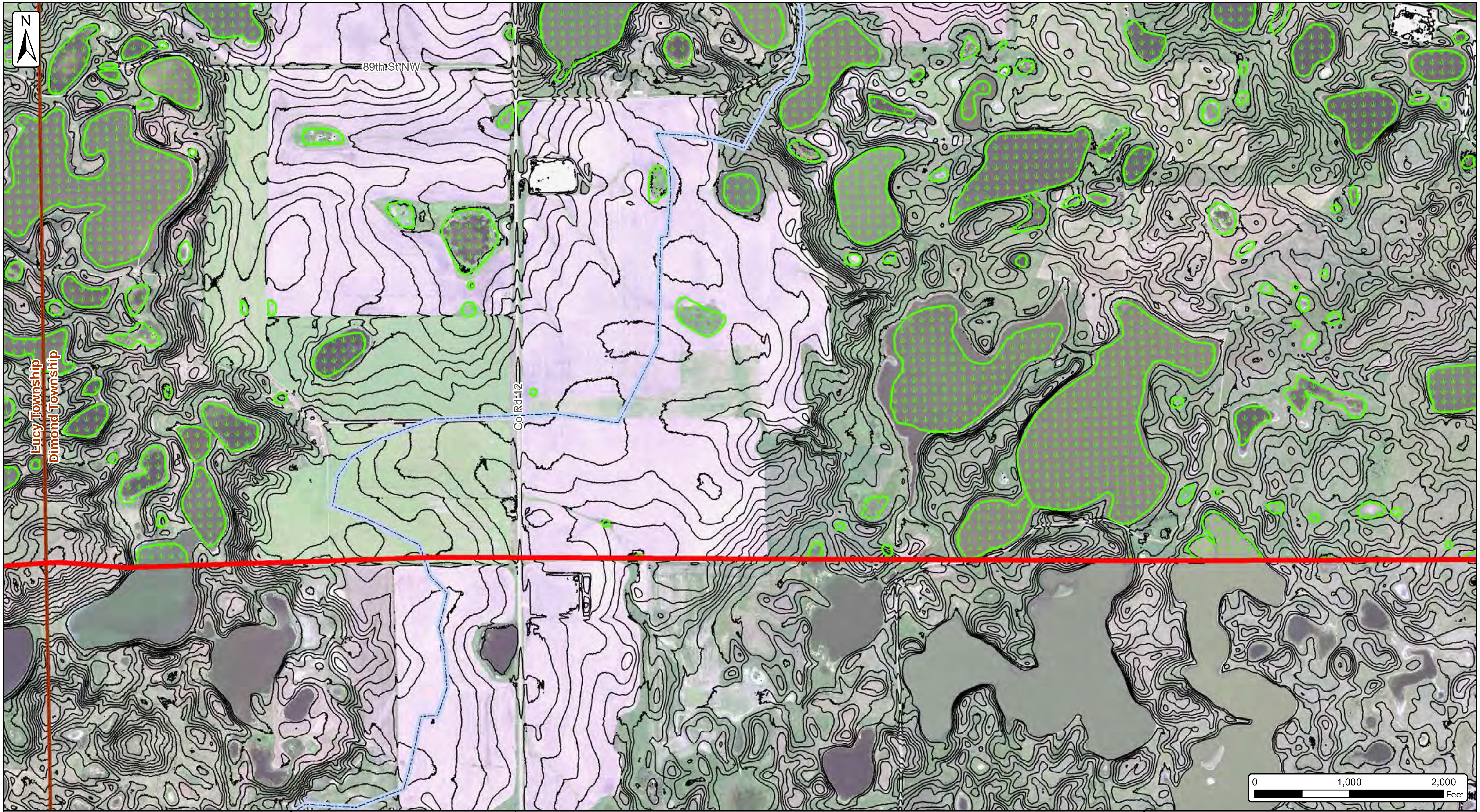

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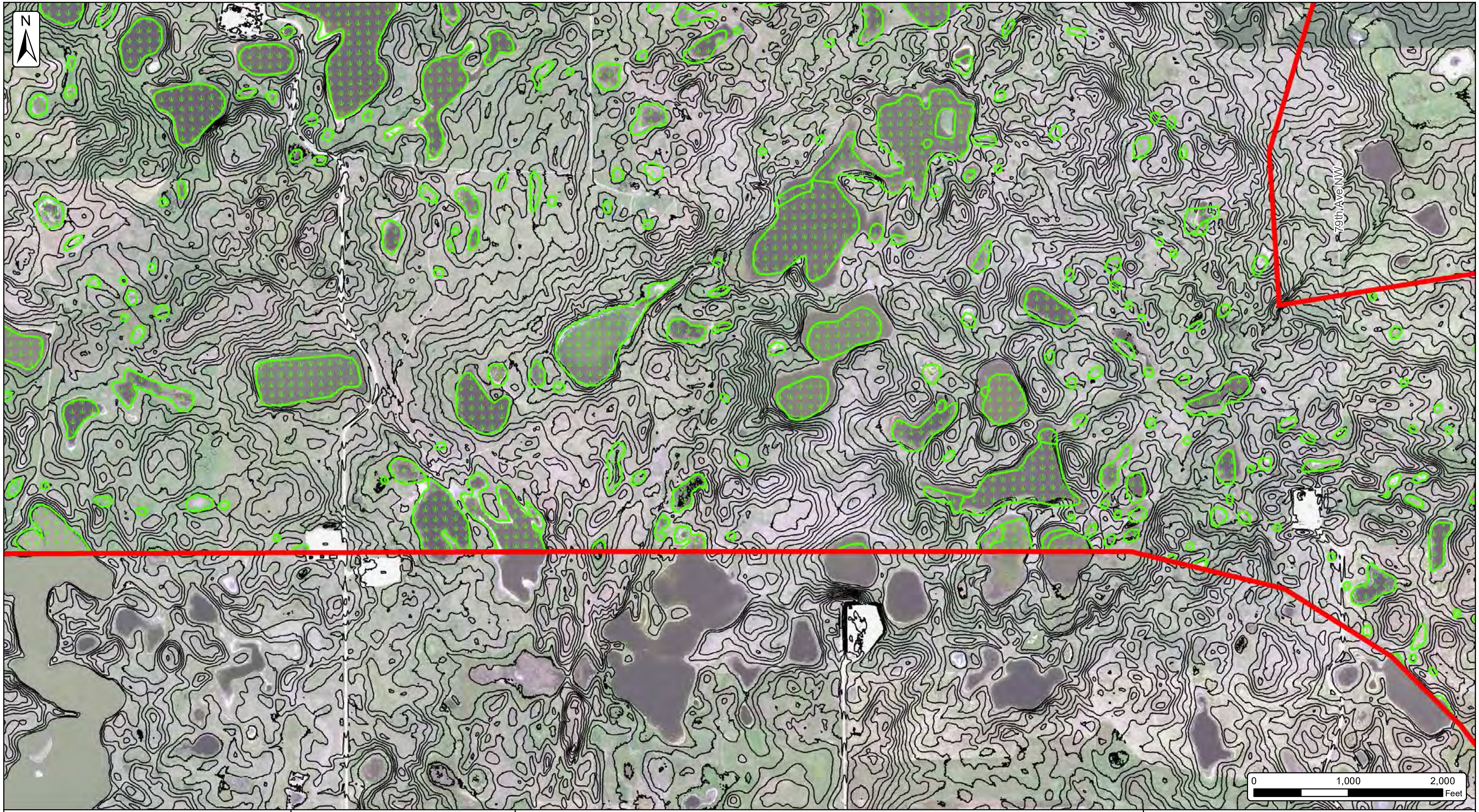

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Client:

NEXTera ENERGY RESOURCES

Atwell, LLC Project: 16000947

Project Area (01/25/2017)

5 ft. Contours (Interpolated from ND State Water Commission LiDAR)

Watercourses (NHD)

HUC 12 SubWatersheds

Approximate Wetlands (NWI with Aerial Interpretation using NAIP 2015 Imagery)

Wetlands - Previously Identified as Likely Isolated (5,773 within Project Area)

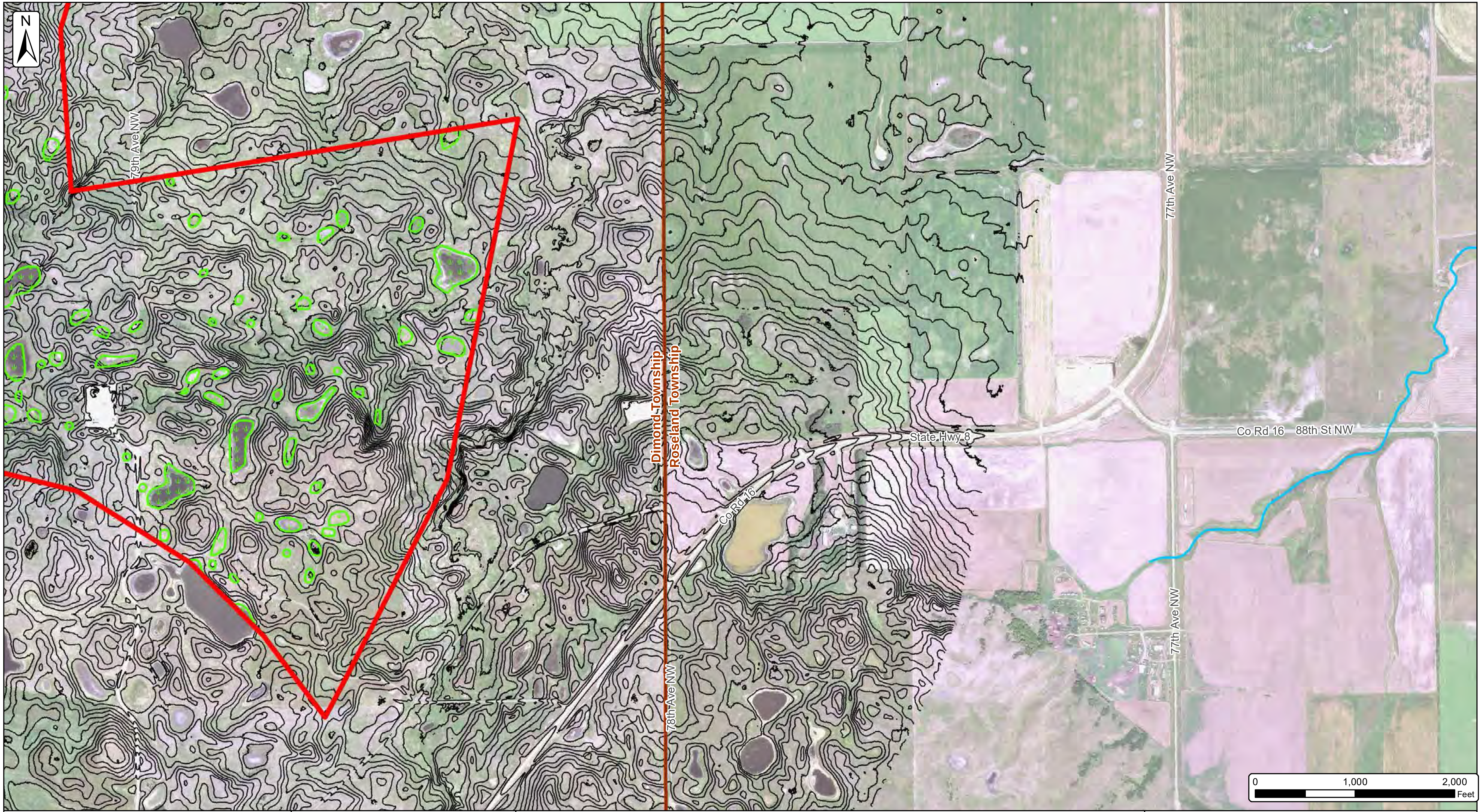
Wetlands - Previously Identified as Likely Jurisdictional (259 within Project Area)

Townships

Counties

SOURCE: USDA NAIP 2016 IMAGERY

ATWELL



Burke County Wind Resource Area

Wetland Desktop Review Map

Burke County, North Dakota

Date: 7/16/2017

Client: NEXTera ENERGY RESOURCES

Atwell, LLC Project: 16000947

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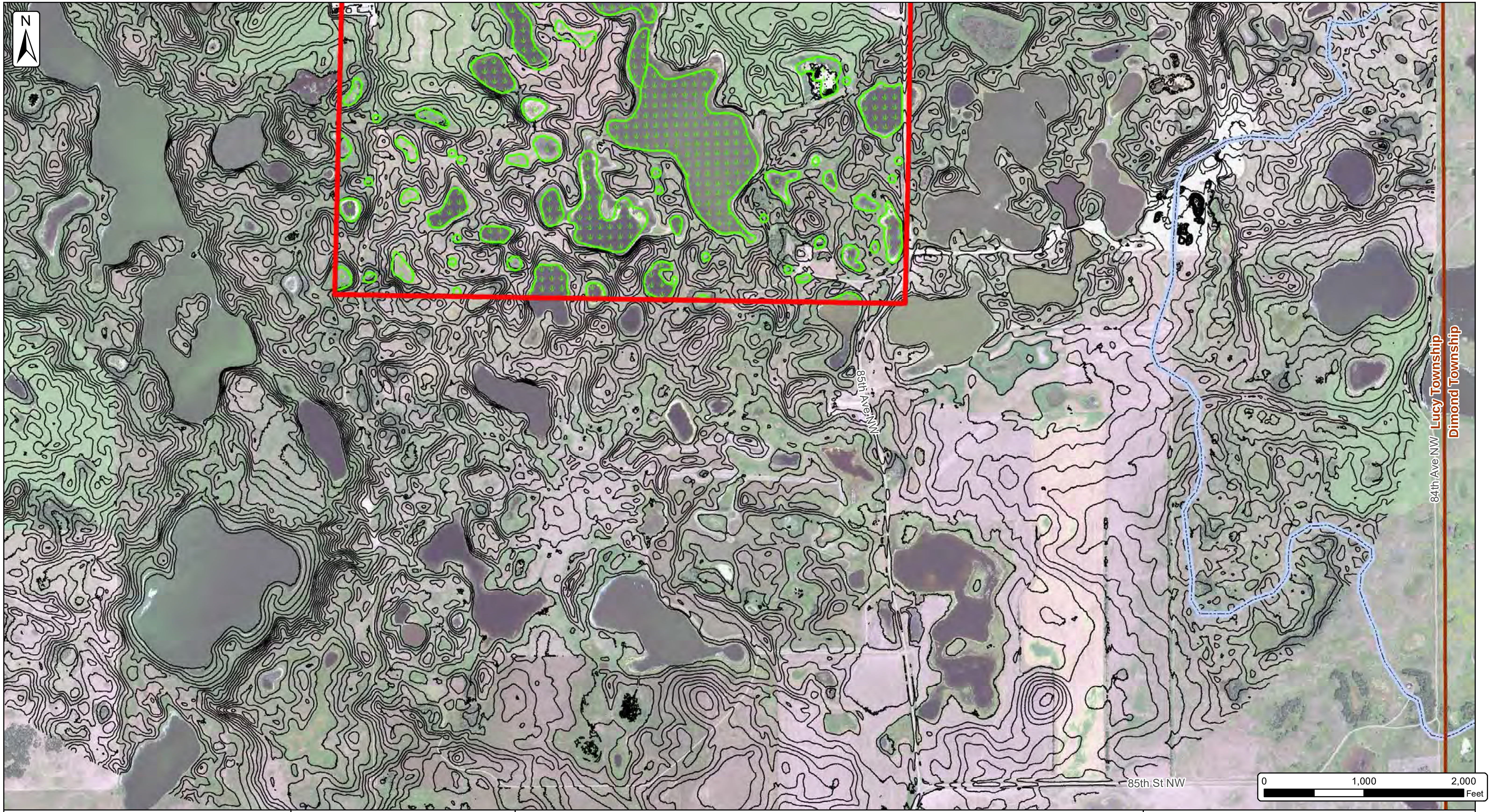

Burke County Wind Resource Area

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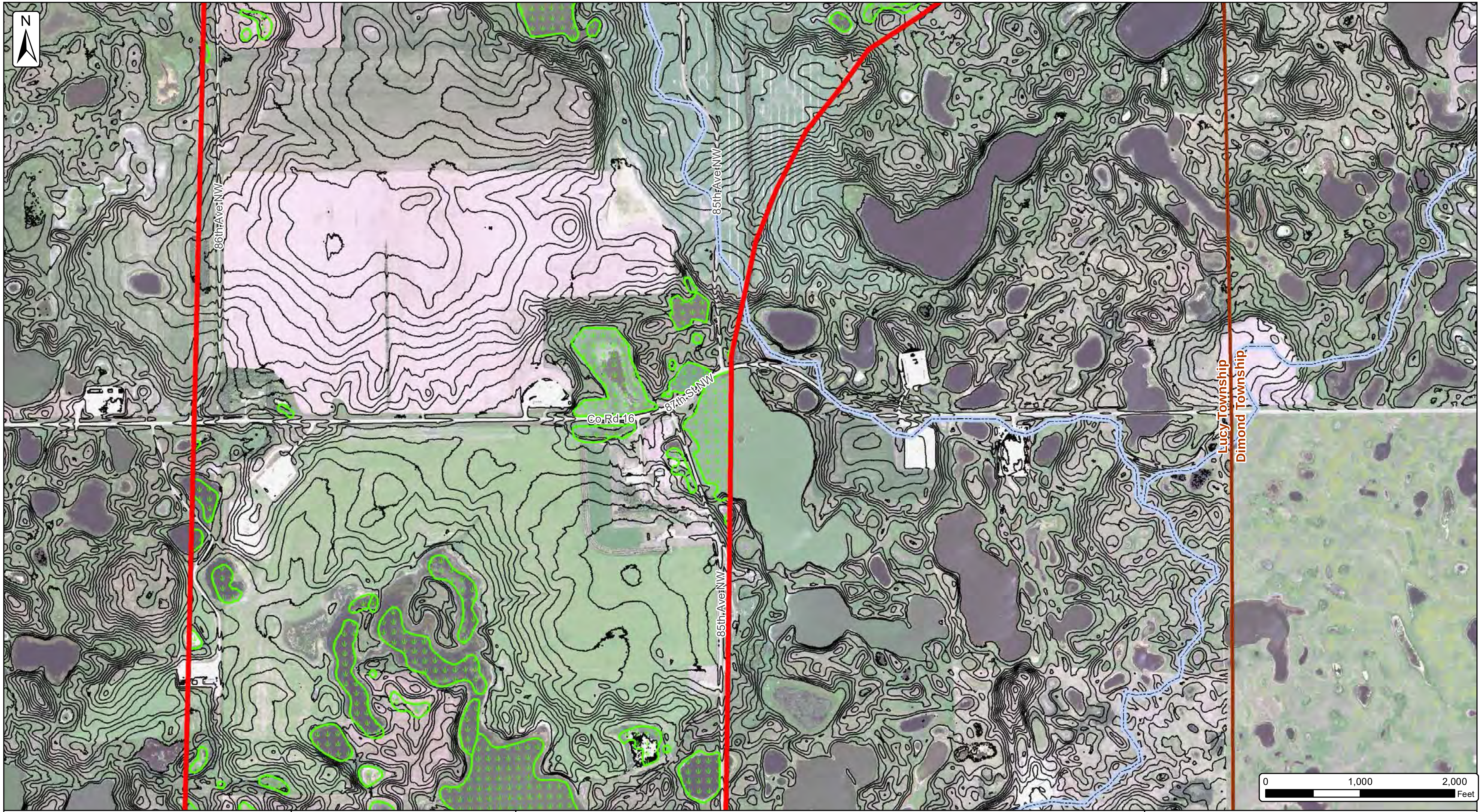

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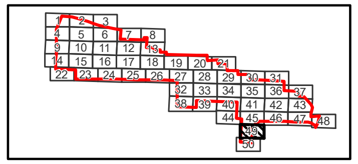

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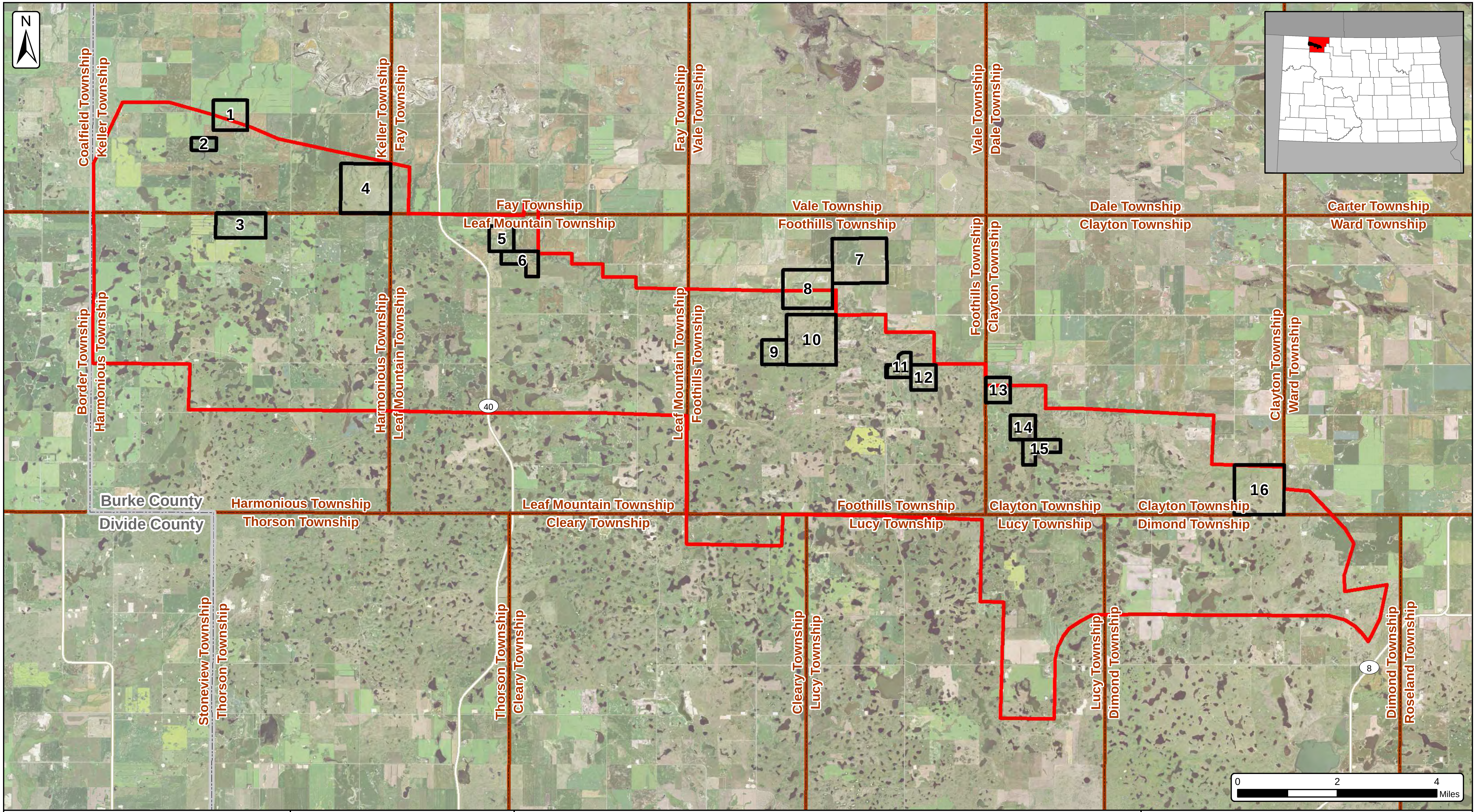


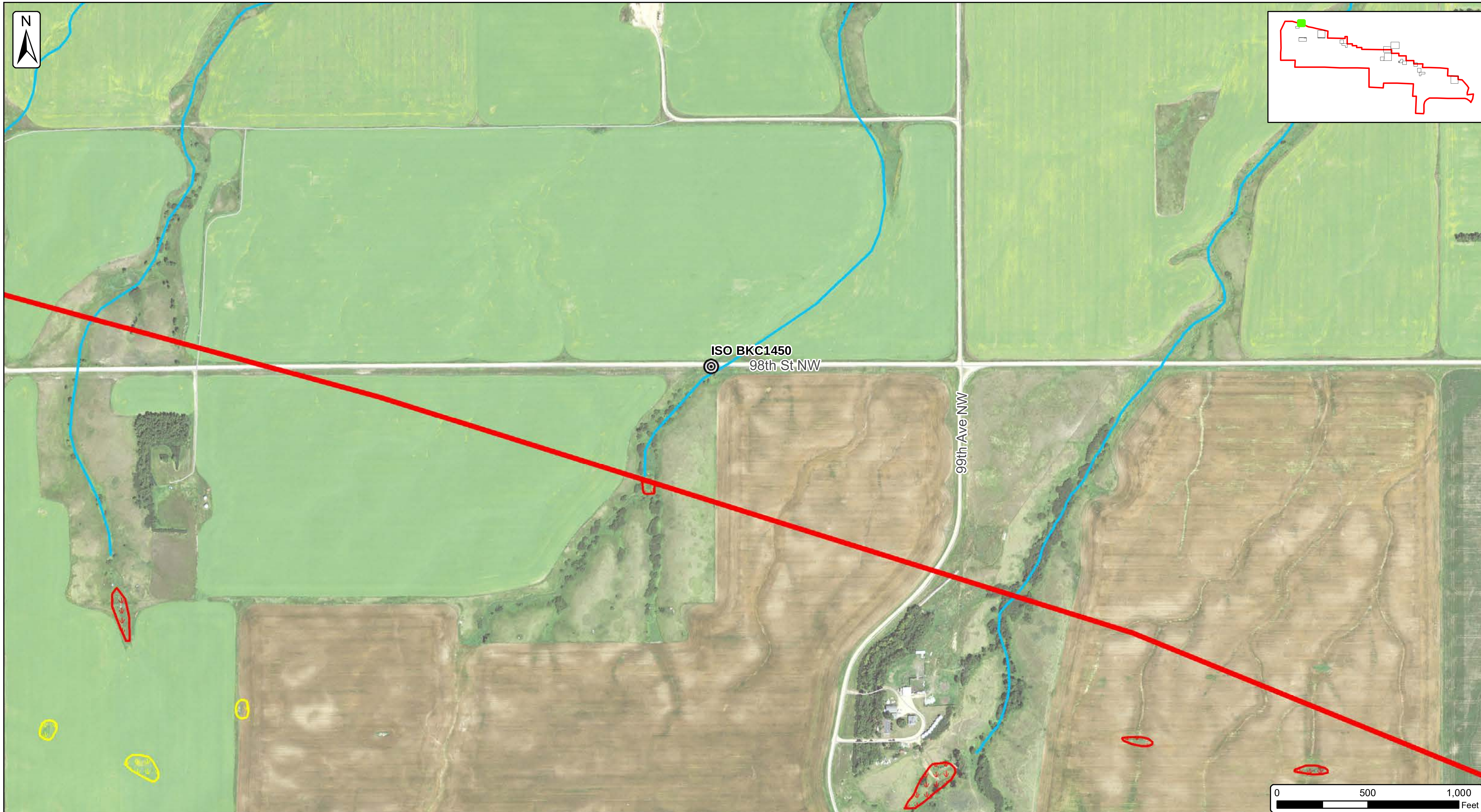
Burke County Wind Energy Center
Wetland Determination and Delineation Index Map
Burke County, North Dakota
Date: 07/20/2017

Client:
NEXTera ENERGY RESOURCES
Atwell, LLC Project: 16000947

Parcel Boundary with Page Number
Project Area 01/25/2017 (±68,719 Ac.)
County Boundary
Township Boundary

SOURCE: USDA NAIP 2016 IMAGERY

ATWELL



Burke County Wind Energy Center

Wetland Determination and Delineation Map

Burke County, North Dakota

Date: 7/20/2017

Page 1 of 16

Client:

NEXTera ENERGY RESOURCES

Atwell, LLC Project: 16000947

Upland/Wetland Delineation Data Points

Watercourses (NHD)

Transect

Wetlands-Previously Identified as Likely Isolated (Aerial Interpretation- NAIP 2015)

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Project Area 01/25/2017 (±68,719 Ac.)

Township Boundary

SOURCE: USDA NAIP 2016 IMAGERY

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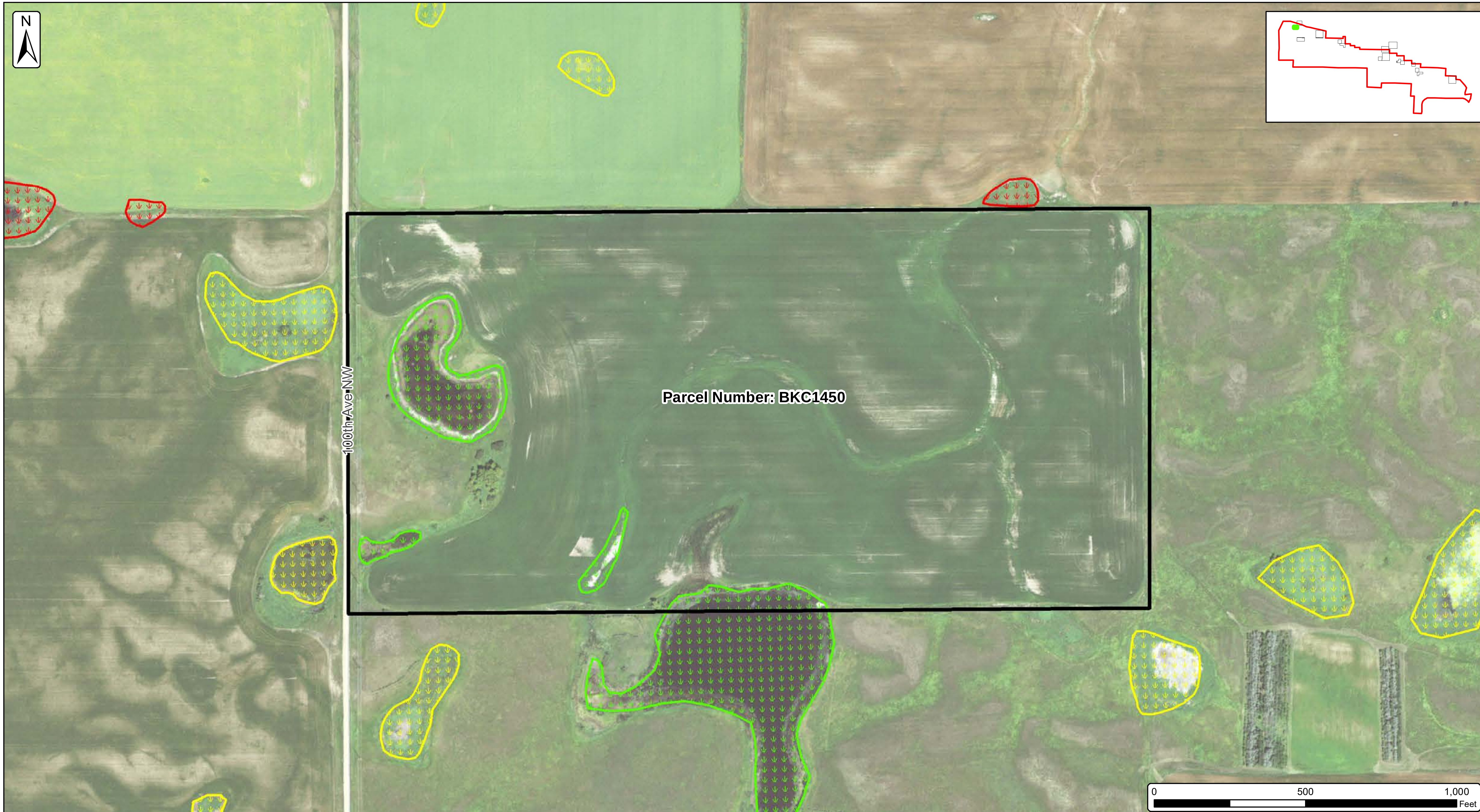

Burke County Wind Energy Center

Wetland Determination and Delineation Map

Burke County, North Dakota

Date: 7/20/2017 **Page 2 of 16**

Client: NEXTera ENERGY RESOURCES

Atwell, LLC Project: 16000947

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SOURCE: USDA NAIP 2016 IMAGERY

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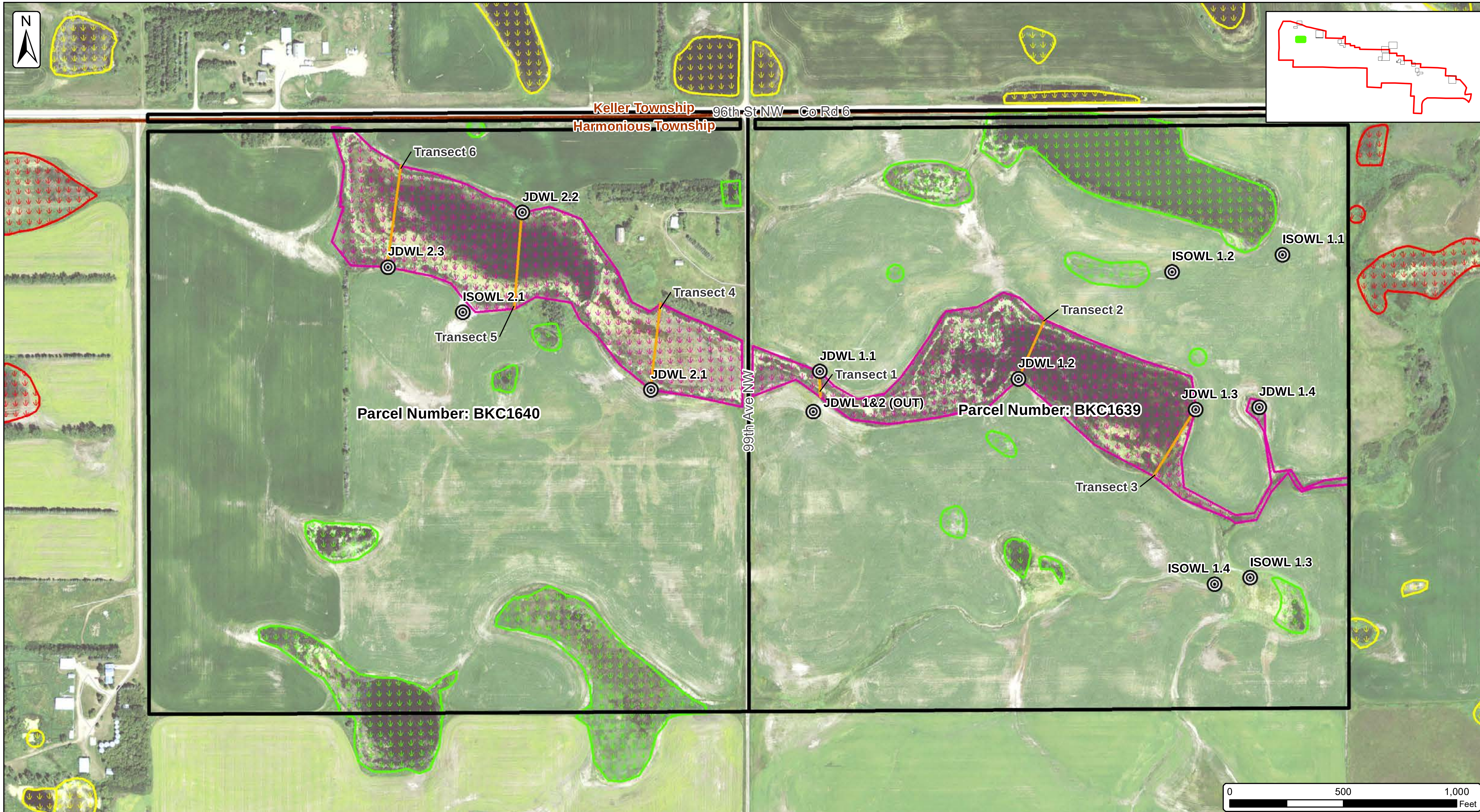

Burke County Wind Energy Center

Wetland Determination and Delineation Map

Burke County, North Dakota

Date: 7/20/2017 **Page 3 of 16**

Client: NEXTera ENERGY RESOURCES

Atwell, LLC Project: 16000947

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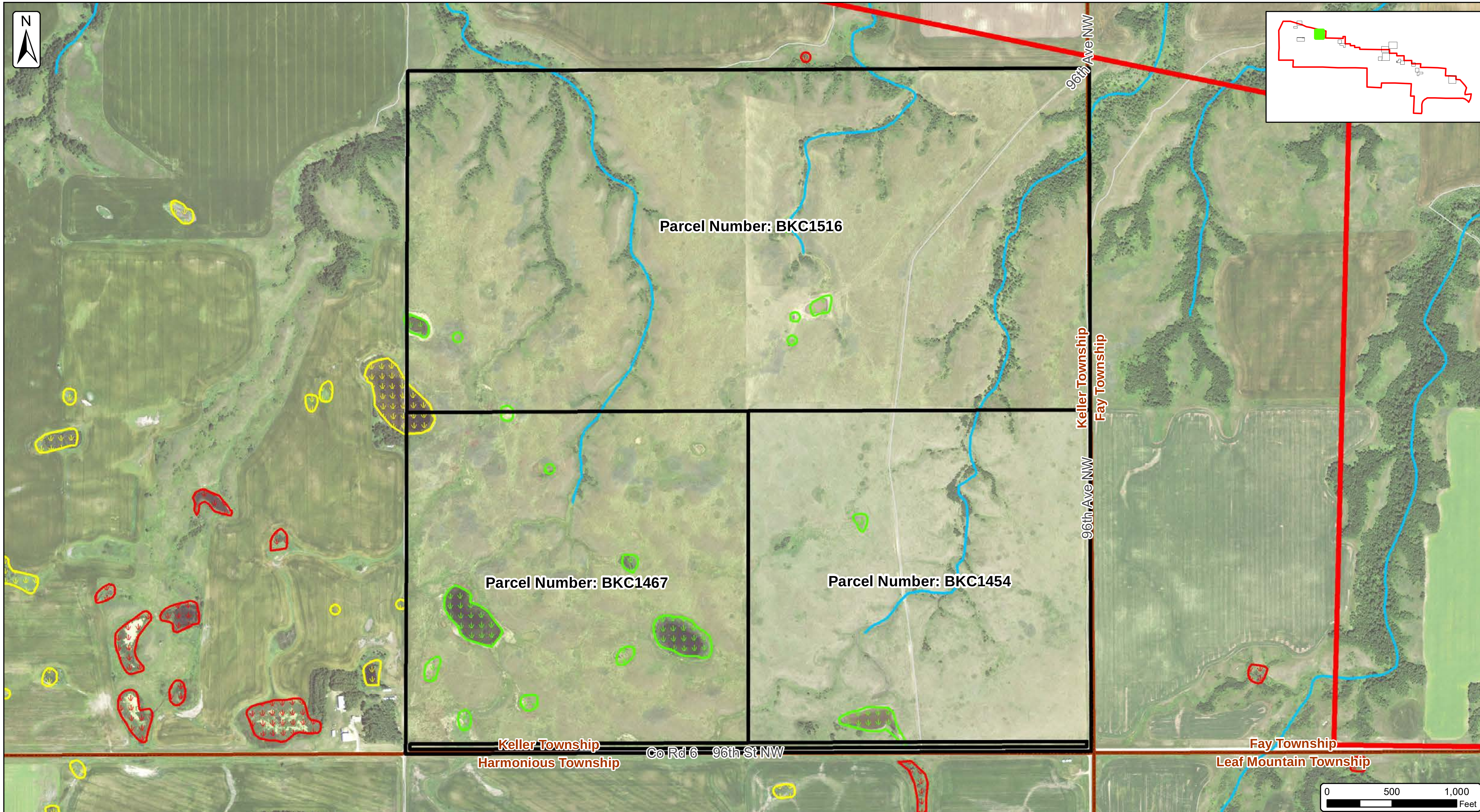

Burke County Wind Energy Center

Wetland Determination and Delineation Map

Burke County, North Dakota

Date: 7/20/2017

Page 4 of 16

Client: NextEra Energy Resources

Atwell, LLC Project: 16000947

Upland/Wetland Delineation Data Points
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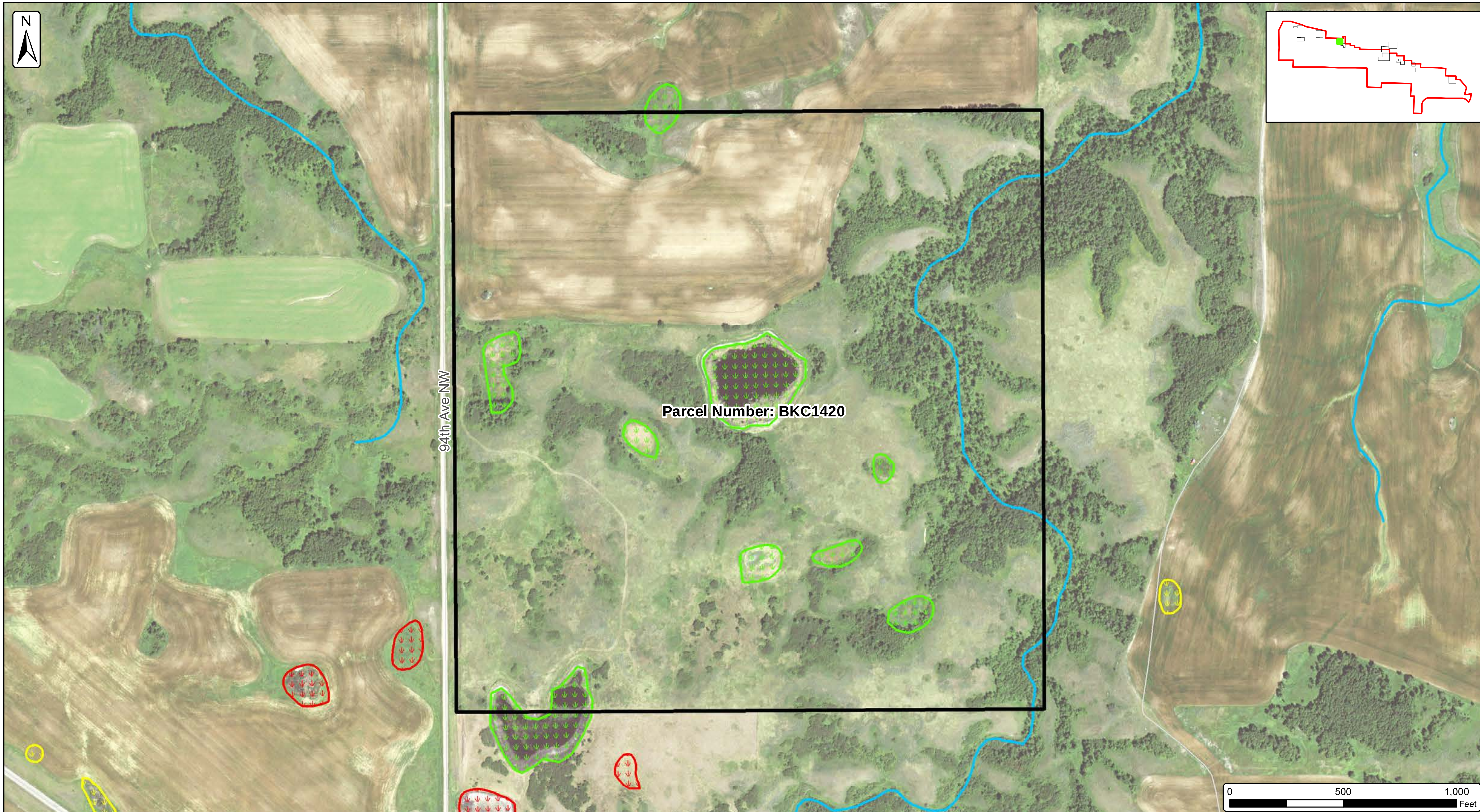

Burke County Wind Energy Center

Wetland Determination and Delineation Map

Burke County, North Dakota

Date: 7/20/2017

Client: NEXTera ENERGY RESOURCES

Atwell, LLC Project: 16000947

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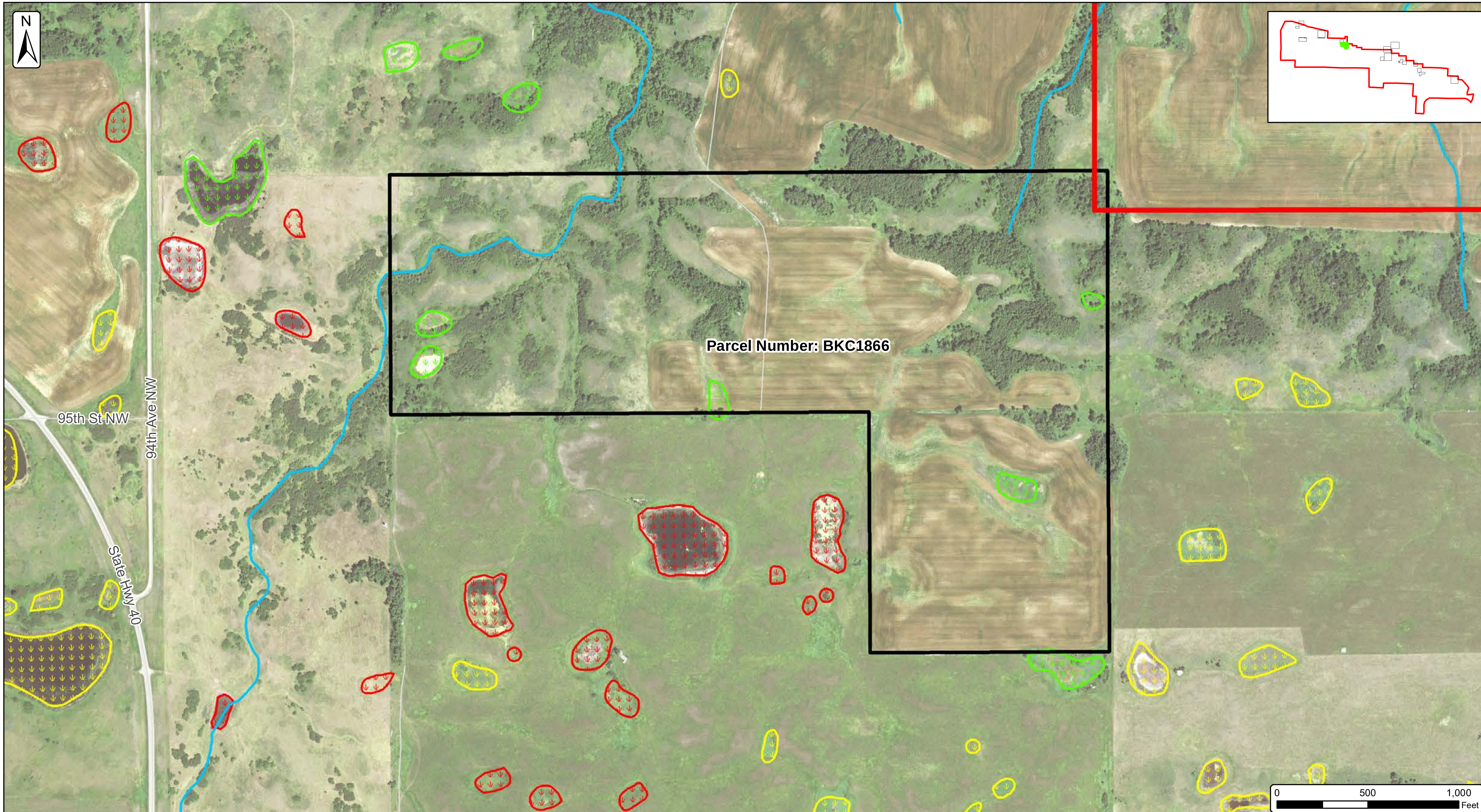

Burke County Wind Energy Center

Wetland Determination and Delineation Map

Burke County, North Dakota

Date: 7/20/2017

Client: NEXTera ENERGY RESOURCES

Atwell, LLC Project: 16000947

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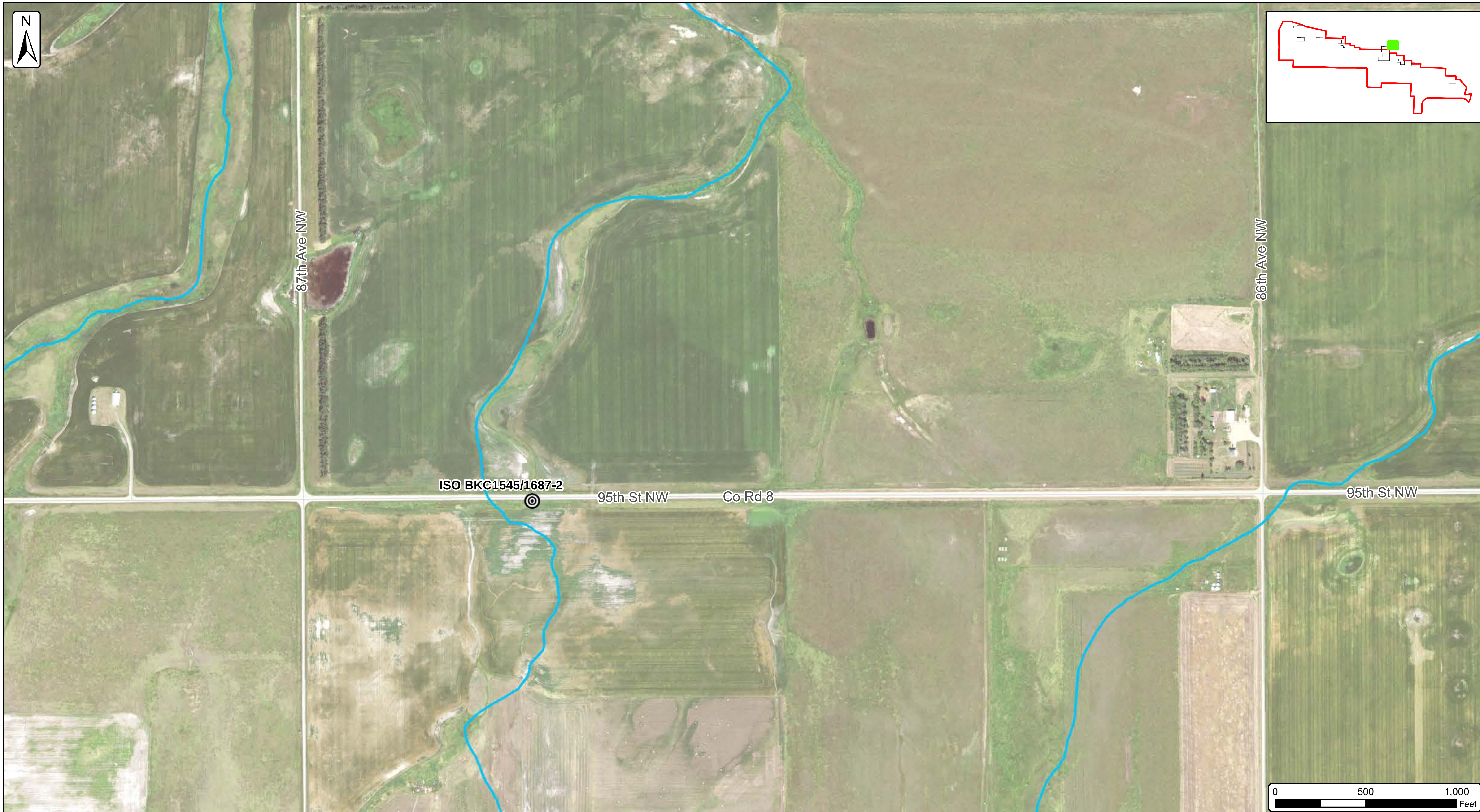

Burke County Wind Energy Center

Wetland Determination and Delineation Map

Burke County, North Dakota

Date: 7/20/2017

Client: NEXTera ENERGY RESOURCES

Atwell, LLC Project: 16000947

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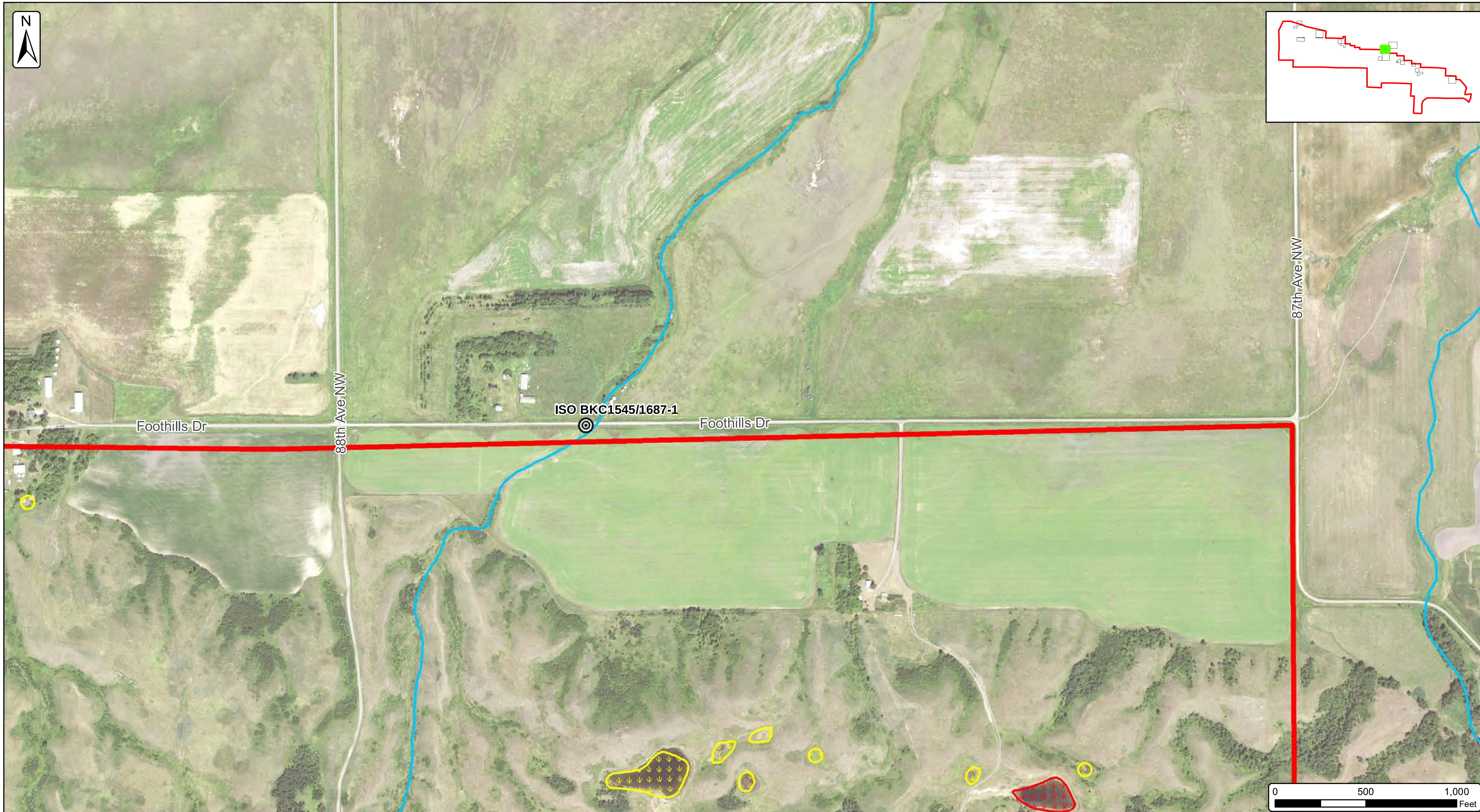

Burke County Wind Energy Center

Wetland Determination and Delineation Map

Burke County, North Dakota

Date: 7/20/2017

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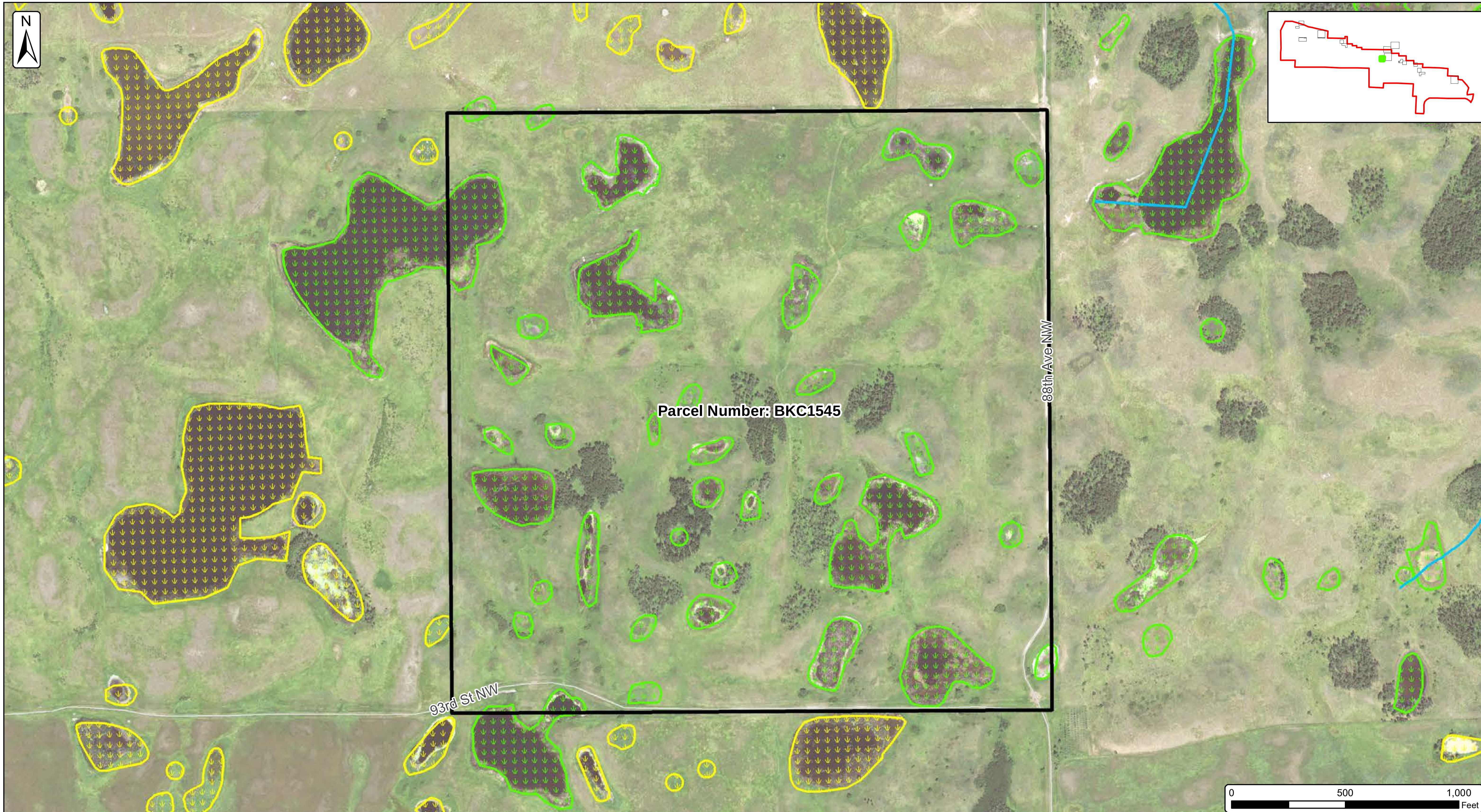

Burke County Wind Energy Center

Wetland Determination and Delineation Map

Burke County, North Dakota

Date: 7/20/2017

Page 9 of 16

Client:

NEXTera ENERGY RESOURCES

Atwell, LLC Project: 16000947

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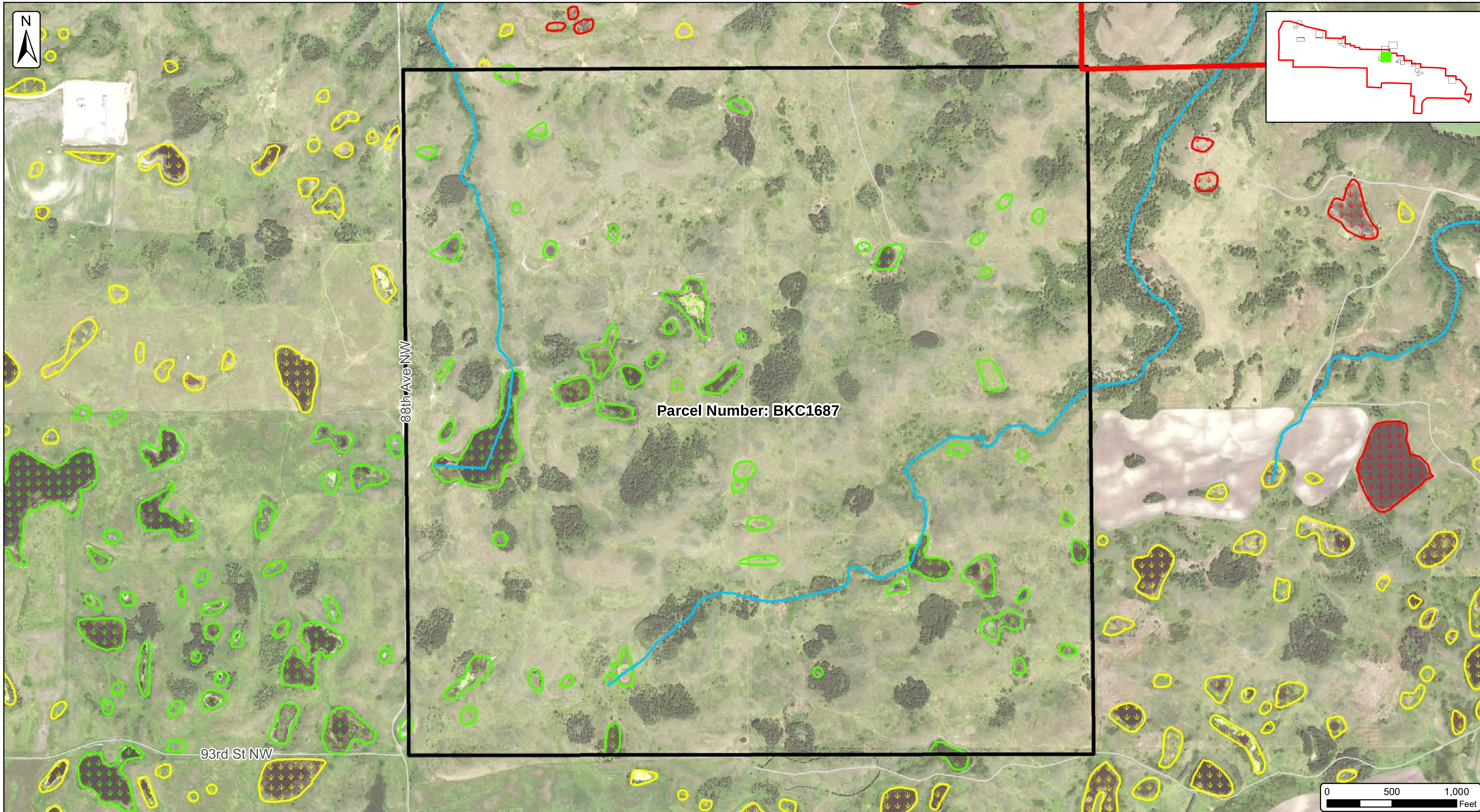

Burke County Wind Energy Center

Wetland Determination and Delineation Map

Burke County, North Dakota

Date: 7/20/2017

Page 10 of 16

Client: NEXTera ENERGY RESOURCES

Atwell, LLC Project: 16000947

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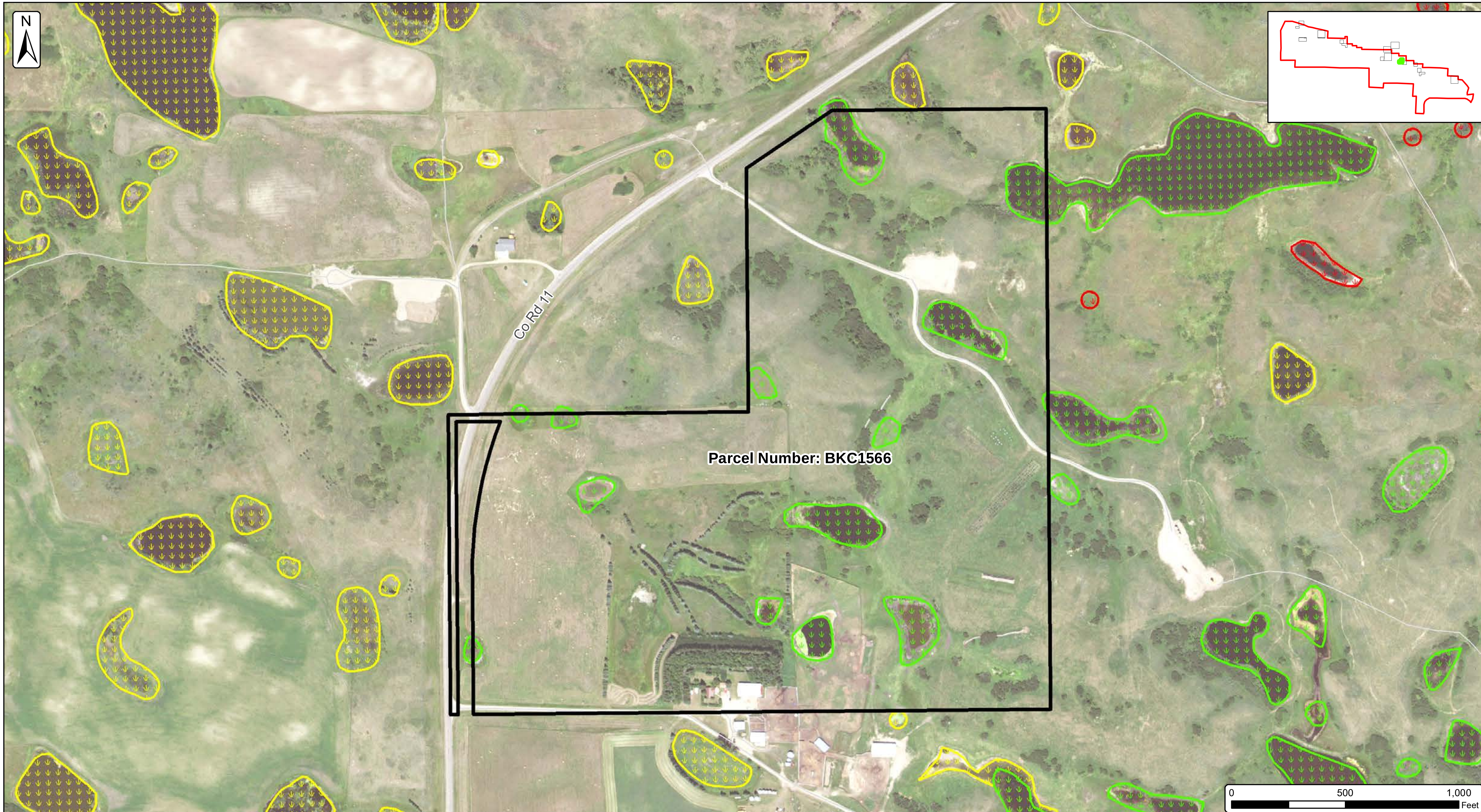

Burke County Wind Energy Center

Wetland Determination and Delineation Map

Burke County, North Dakota

Date: 7/20/2017 **Page 11 of 16**

Client:

NEXTera ENERGY RESOURCES

Atwell, LLC Project: 16000947

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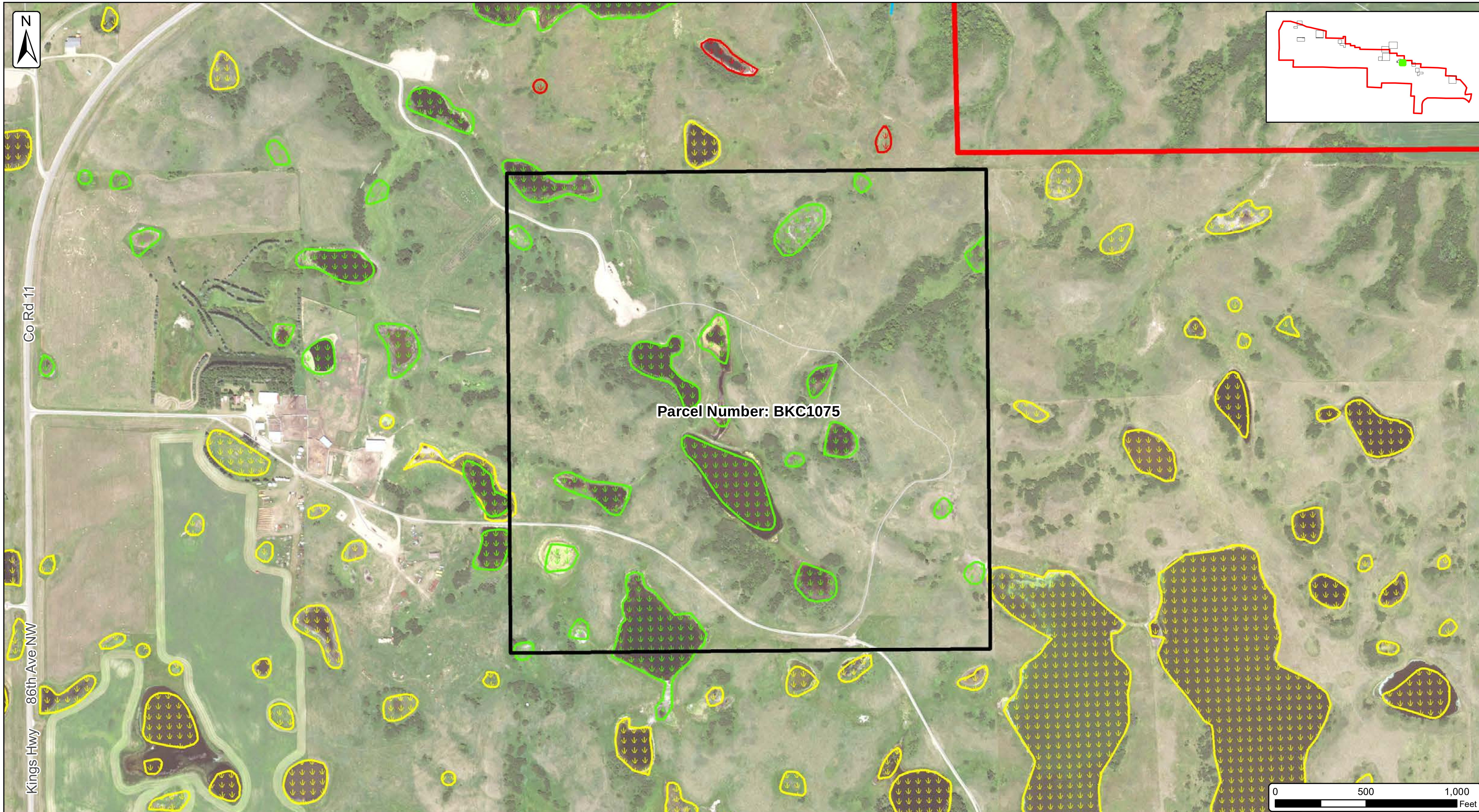

Burke County Wind Energy Center

Wetland Determination and Delineation Map

Burke County, North Dakota

Date: 7/20/2017

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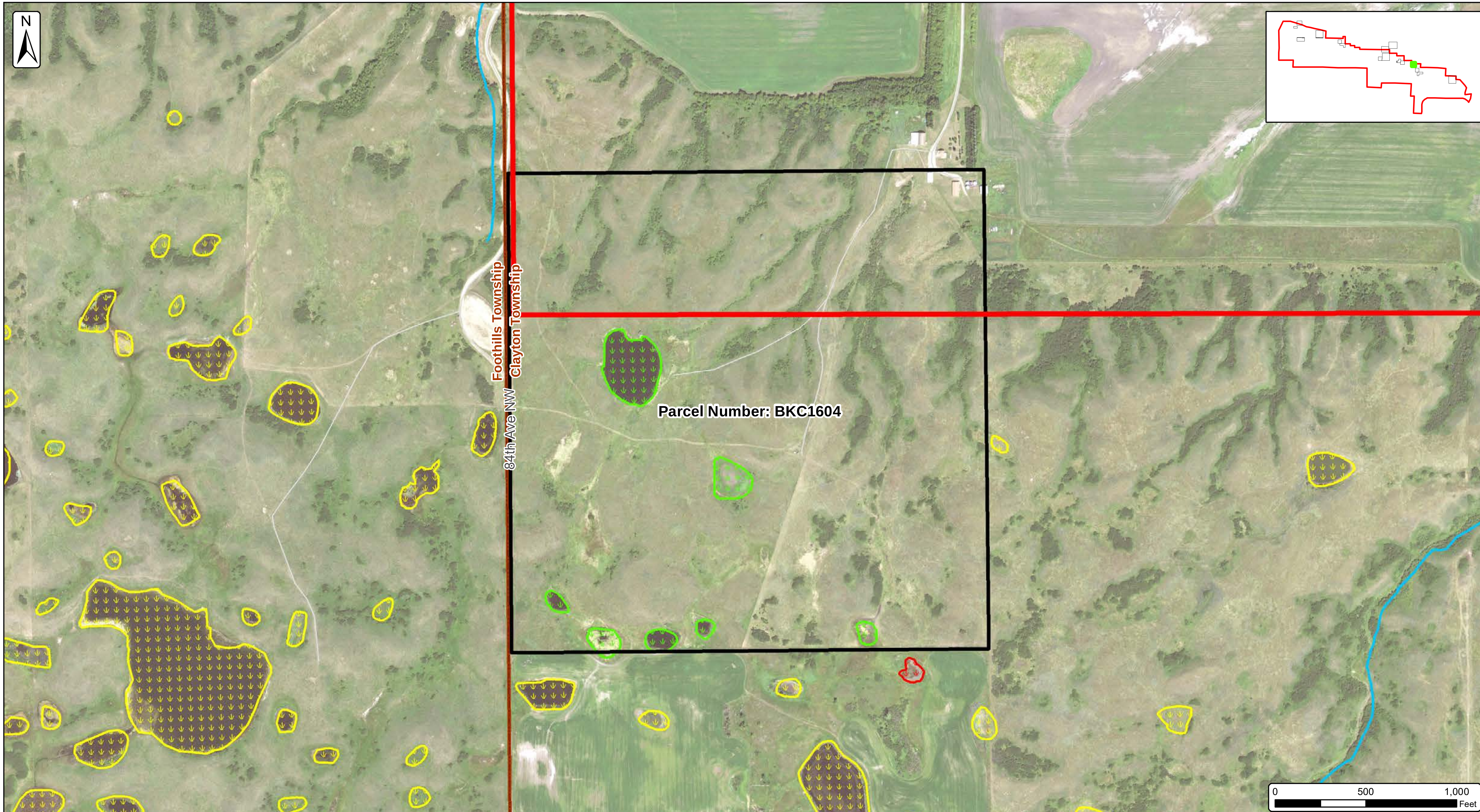

Burke County Wind Energy Center

Wetland Determination and Delineation Map

Burke County, North Dakota

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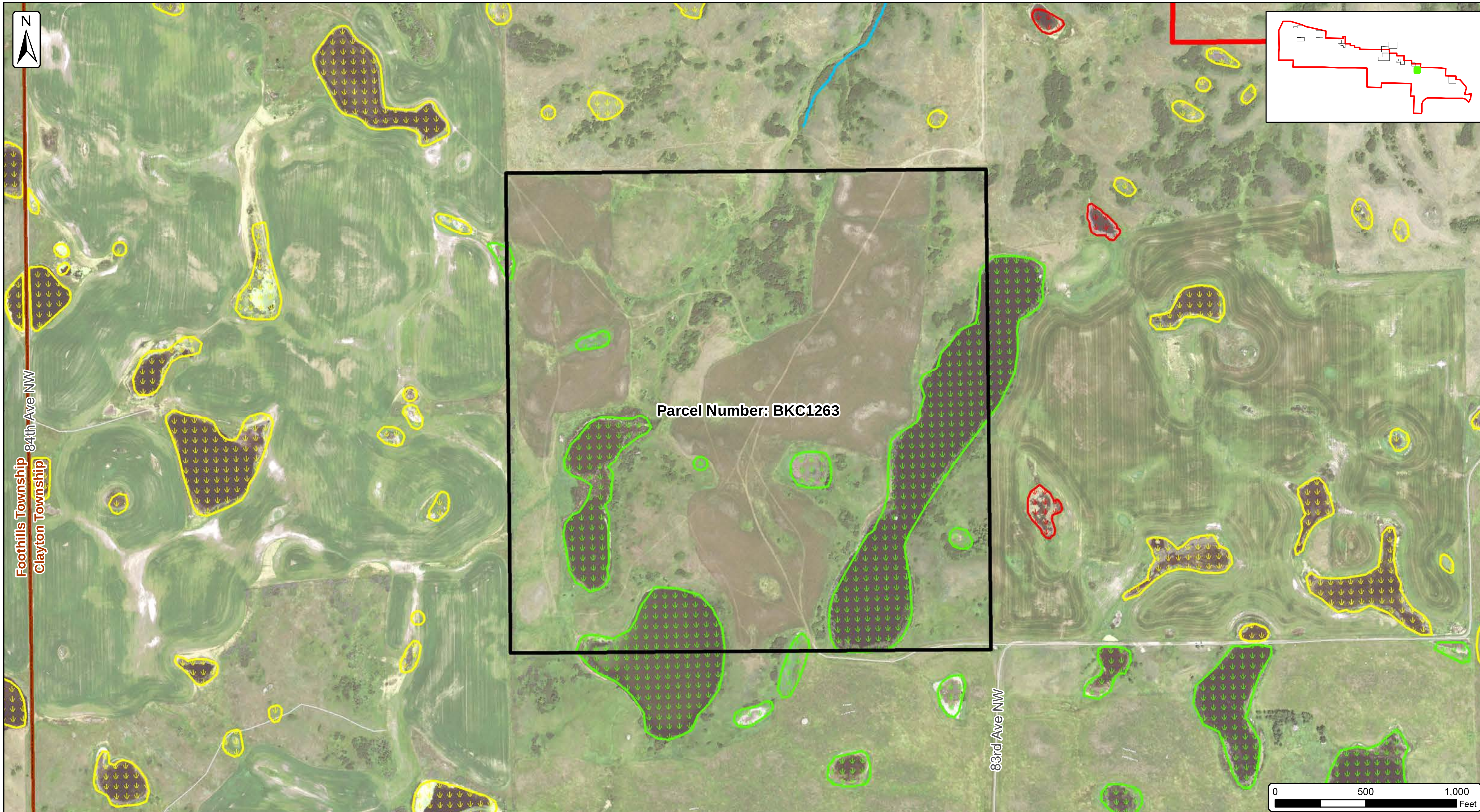

Burke County Wind Energy Center

Wetland Determination and Delineation Map

Burke County, North Dakota

Date: 7/20/2017

Page 14 of 16

Client: NEXTera ENERGY RESOURCES

Atwell, LLC Project: 16000947

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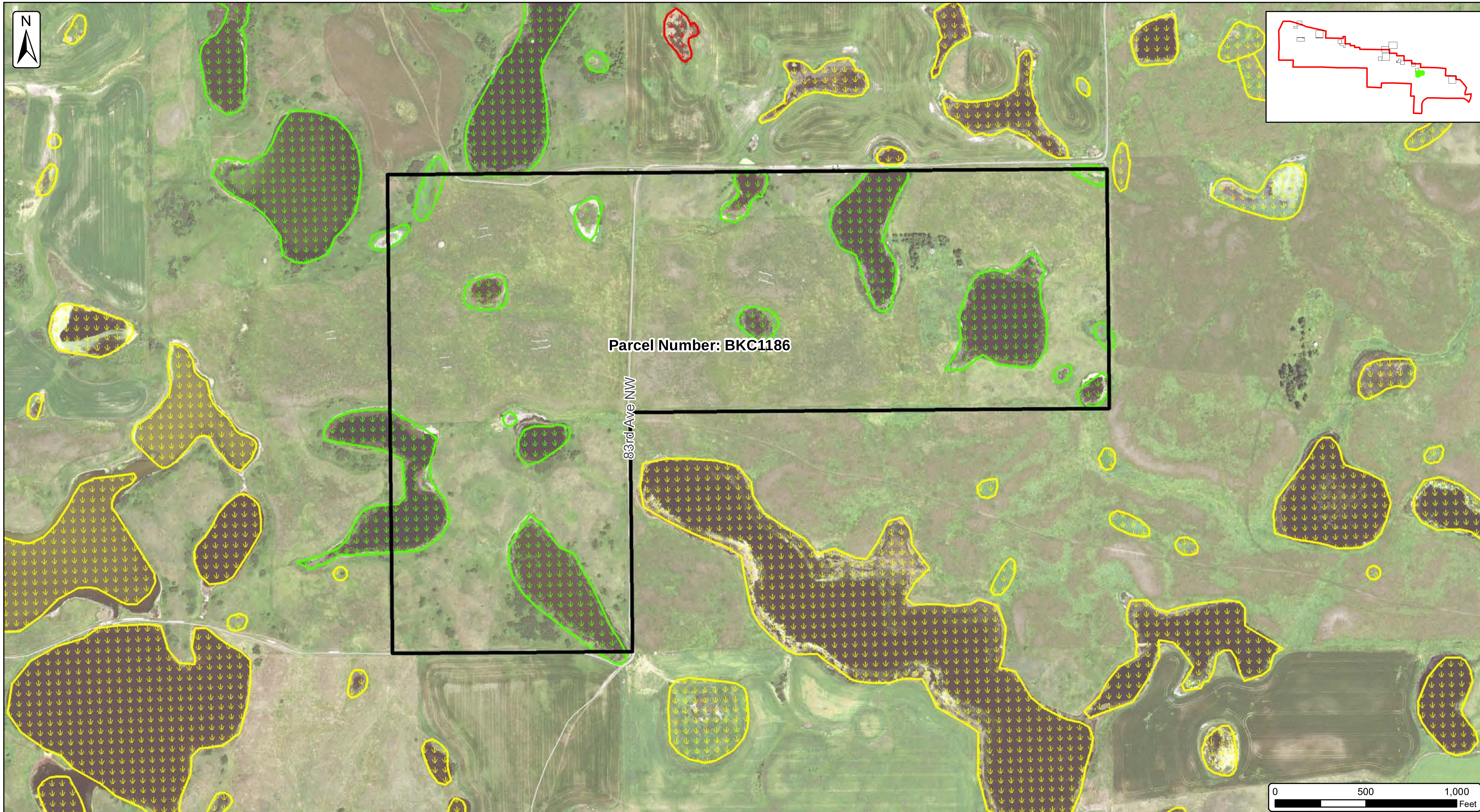

Burke County Wind Energy Center

Wetland Determination and Delineation Map

Burke County, North Dakota

Date: 7/20/2017 **Page 15 of 16**

Client: NextEra Energy Resources

Atwell, LLC Project: 16000947

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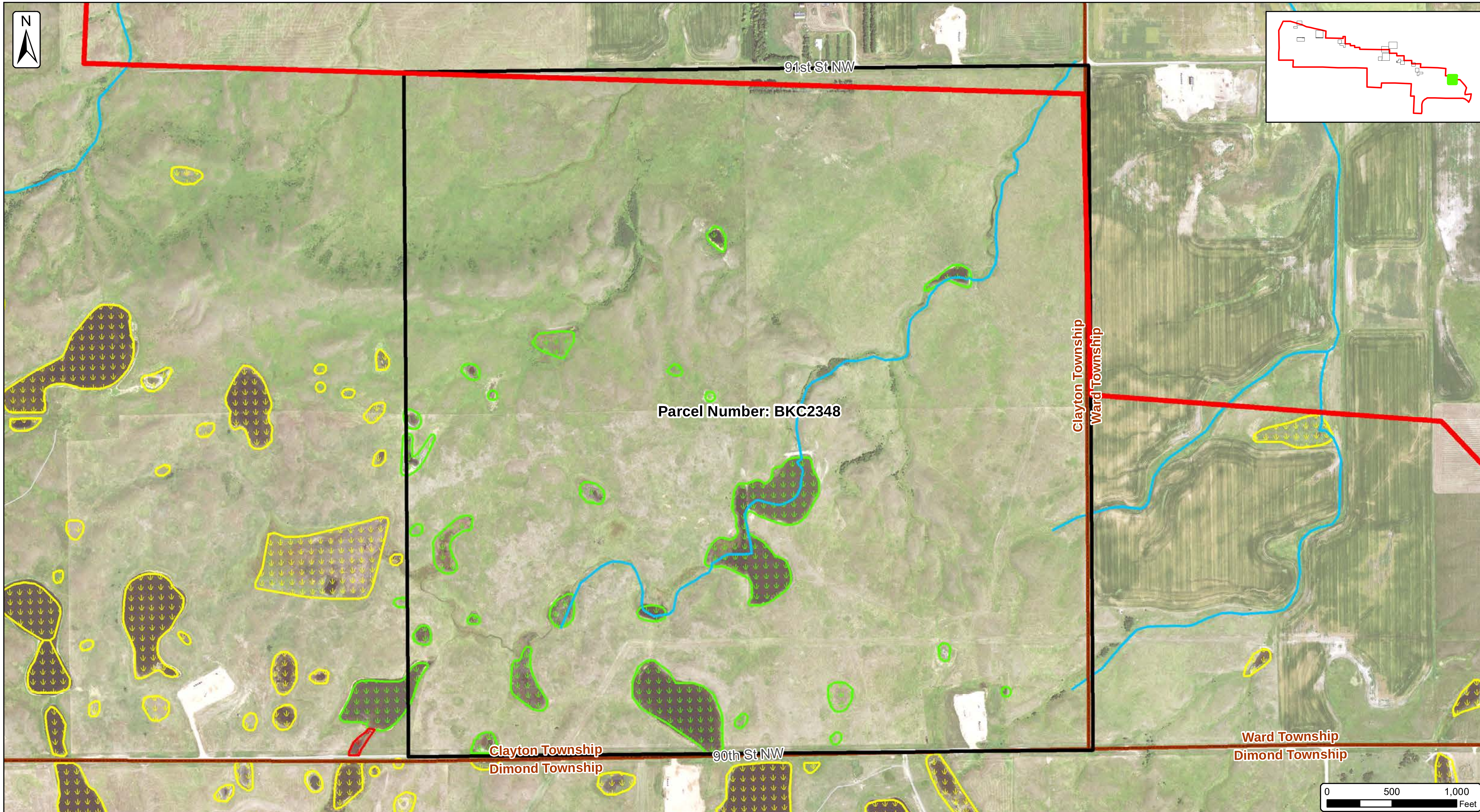

Burke County Wind Energy Center

Wetland Determination and Delineation Map

Burke County, North Dakota

Date: 7/20/2017

Client: NEXTera ENERGY RESOURCES

Atwell, LLC Project: 16000947

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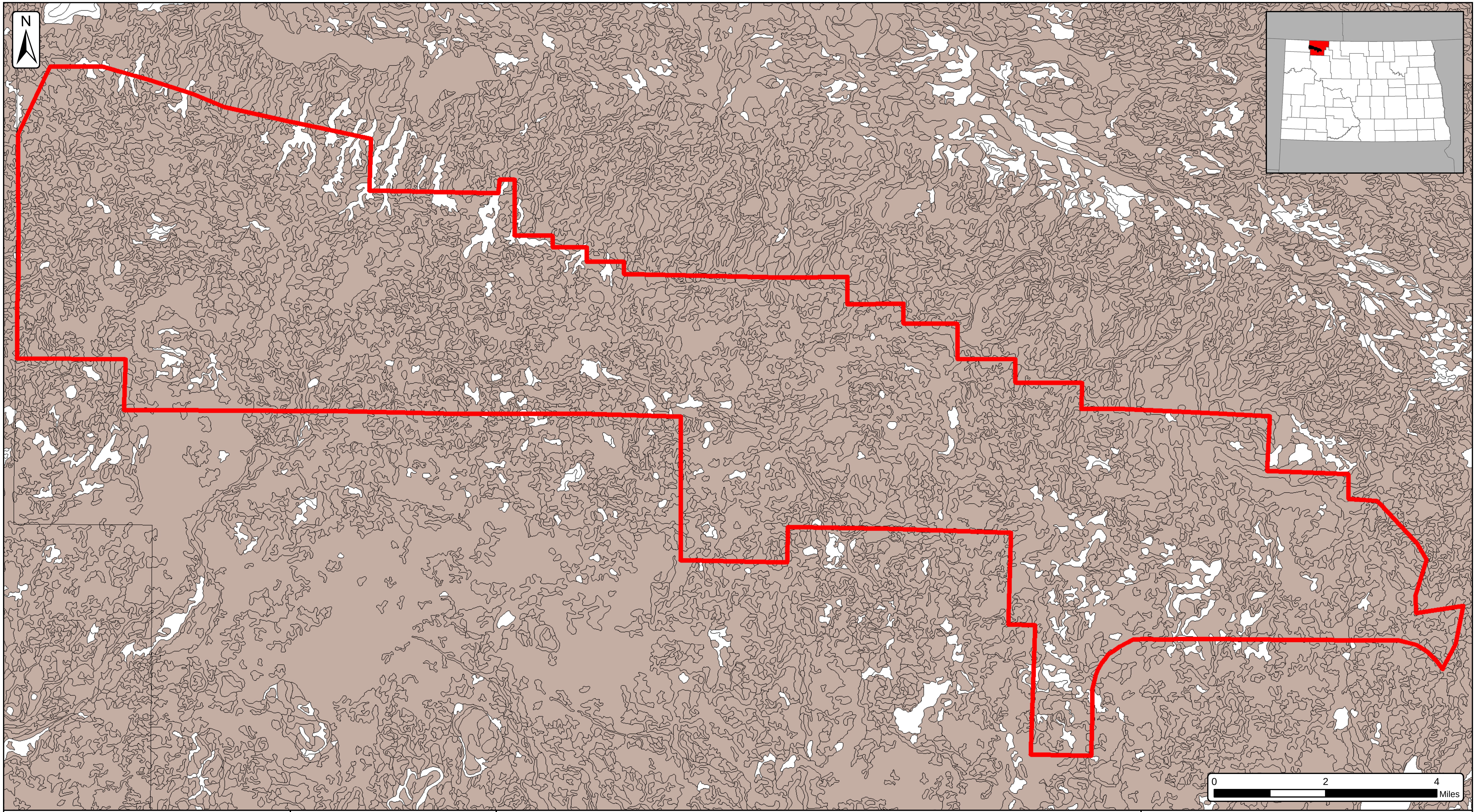


Burke County Wind Energy Center

Hydric Soils Map

Burke County, North Dakota

Date: 7/19/2017

Client:

NEXTera ENERGY RESOURCES

Atwell, LLC Project:16000947

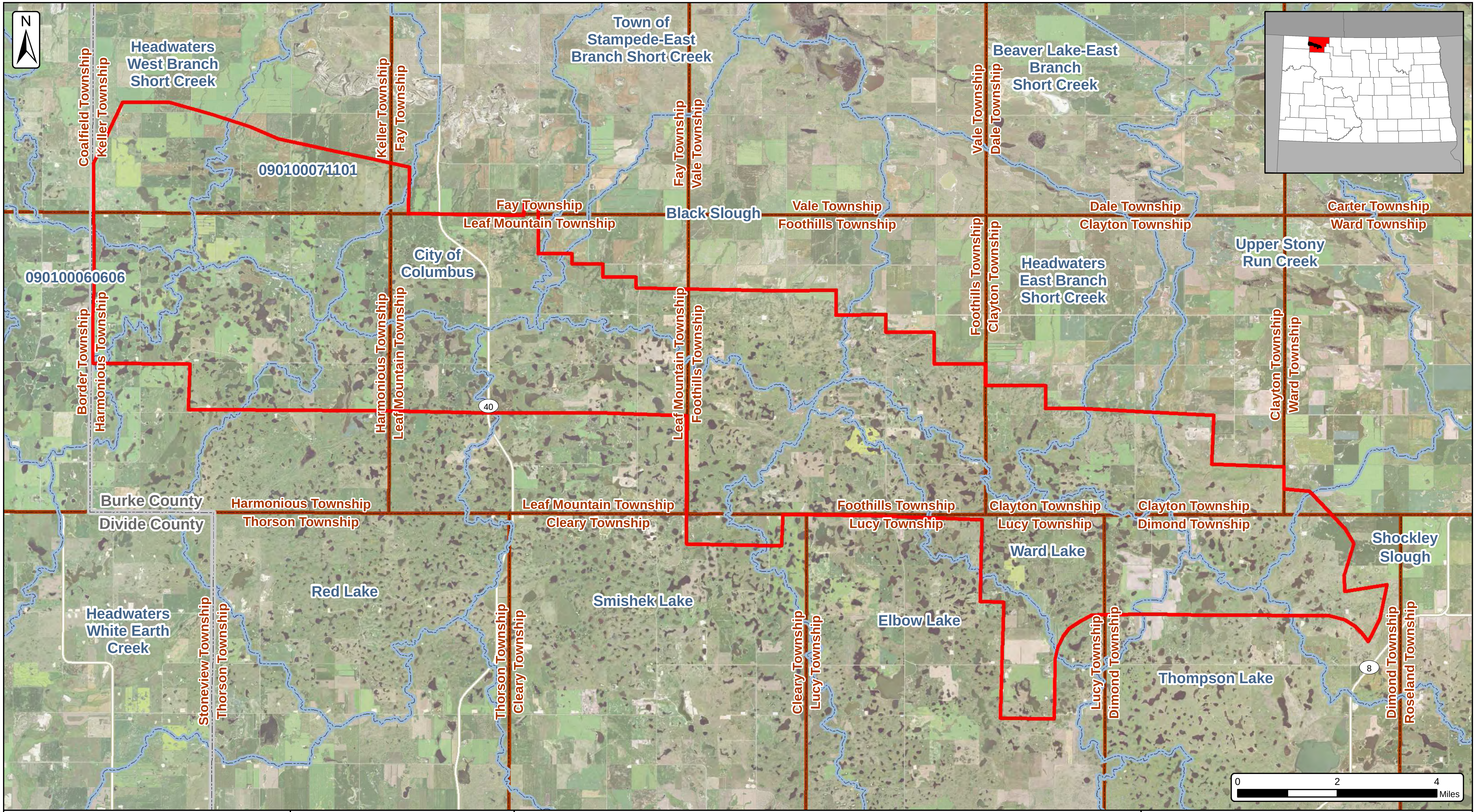
Project Boundary 01/25/2017 (±68,719 Ac.)

Partially Hydric or Hydric Soils

Non-Hydric Soils

SOURCE: NRCS SSURGO SOIL DATABASE

ATWELL



Burke County Wind Energy Center

Hydrologic Unit Code (HUC) 12 SubWatersheds Map

Burke County, North Dakota

Date: 07/21/2017

Client: NEXTera ENERGY RESOURCES

Atwell, LLC Project: 16000947

HUC 12 SubWatersheds

Project Area 01/25/2017 (±68,719 Ac.)

County Boundary

Township Boundary

SOURCE: USDA NAIP 2016 IMAGERY

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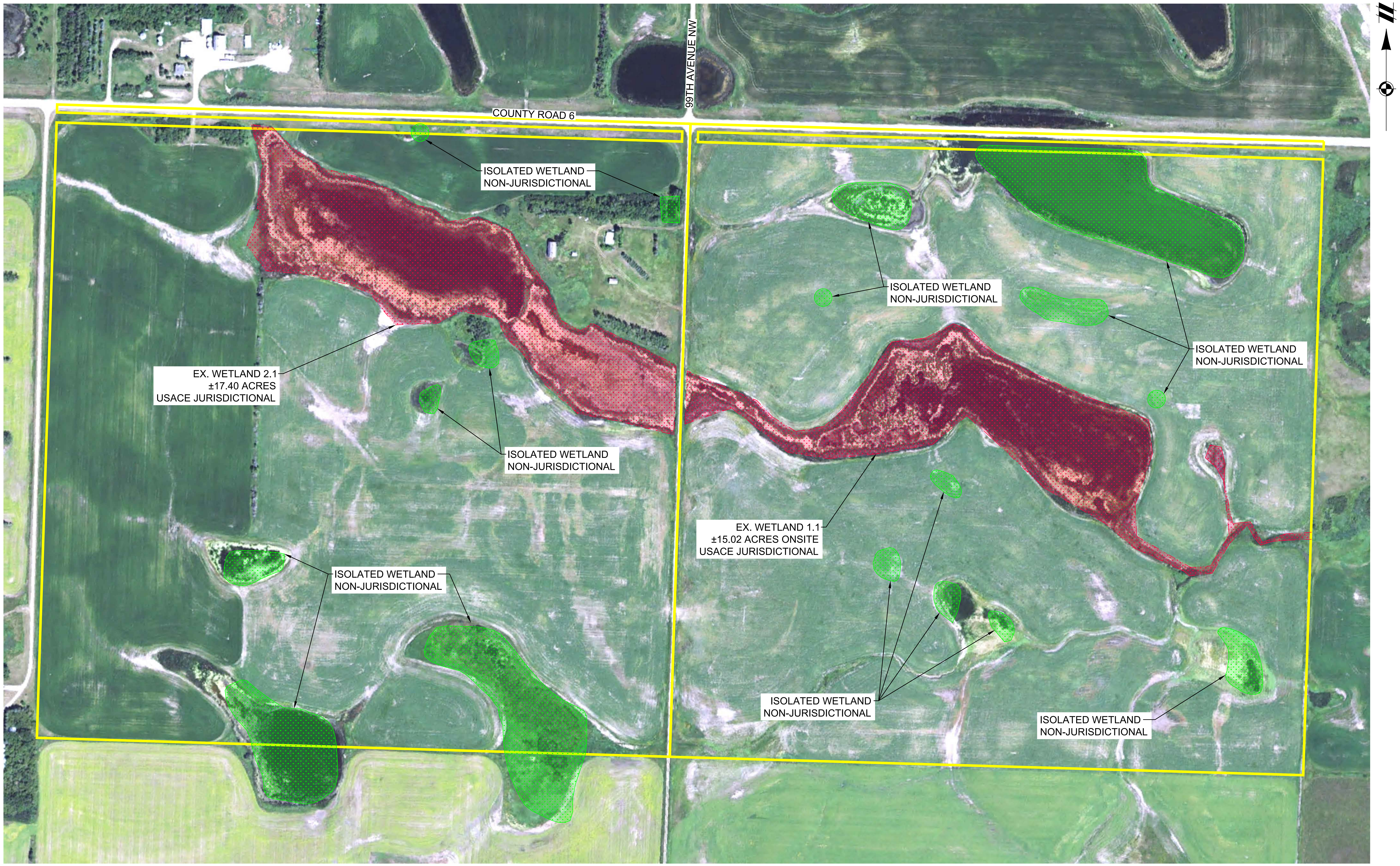

LEGEND

APPROXIMATE PARCEL BOUNDARY

DELINEATED JURISDICTIONAL WETLAND

FIELD VERIFIED ISOLATED WETLAND

NOTE: THIS ILLUSTRATION IS AN APPROXIMATE DEPICTION OF THE WETLANDS THAT APPEAR TO BE LOCATED ON THE SUBJECT PROPERTY AS DELINEATED BY ATWELL ON JUNE 29-30, 2017. THE USACE HAS THE FINAL AUTHORITY ON THE EXTENT OF JURISDICTIONAL WETLANDS, LAKES, AND STREAMS IN THE STATE OF NORTH DAKOTA.

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Know what's below.
Call before you dig.

THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

NOTICE:
CONSTRUCTION SITE SAFETY IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR; NEITHER THE OWNER NOR THE ENGINEER SHALL BE EXPECTED TO ASSUME ANY RESPONSIBILITY FOR SAFETY OF THE WORK, OF PERSONS ENGAGED IN THE WORK, OF ANY NEARBY STRUCTURES, OR OF ANY OTHER PERSONS.

ATWELL
866.850.4200 www.atwell-group.com
TWO TOWNE SQUARE, SUITE 700
SOUTHFIELD, MI 48076
248.447.2000

SECTIONS: 03-04
TOWN 161 NORTH, RANGE 94 WEST
HARMONIOUS TOWNSHIP
BURKE COUNTY, NORTH DAKOTA

CLIENT
BURKE WIND, LLC
BURKE COUNTY WIND ENERGY CENTER
WETLAND LOCATION MAP

DATE
JULY 10, 2017

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REVISIONS

SCALE 0 100 200
1" = 200 FEET

DR. BS | CH. --
P.M. BT
BOOK --
JOB 16000947
SHEET NO.
01

CAD FILE: 16000947WLM.DWG