

Flying Cow Wind, LLC

Bitter Root Wetland & Waterbody Field and Desktop Survey Report Yellow Medicine County, Minnesota

PRESENTED BY MERJENT, INC.
November 8, 2017



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1.0 INTRODUCTION

Merjent, Inc. (Merjent), on behalf of Flying Cow Wind, LLC, conducted wetland and waterbody surveys in support of the proposed Bitter Root Wind Farm (Project) located in Yellow Medicine County, Minnesota, and Deuel County, South Dakota as illustrated in Appendix A. Field surveys took place on September 26 and 27, 2016; and October 23 through October 26, 2017. Upon completion of 2017 field surveys, Merjent prepared this Wetland & Waterbody Field Survey Report (Rev 1) (Report) to summarize field survey results for the current Project layout; this Report replaces the November 30, 2016 Wetland & Waterbody Field Survey Report (Rev 0) in its entirety.¹

1.1 PURPOSE OF SURVEYS

The surveys were conducted to address requirements under the current regulatory framework concerning wetlands and waterbodies.² There are three major wetland regulatory programs of statewide importance in Minnesota: the U.S. Army Corps of Engineers (USACE) Section 404 Program, the Minnesota Wetland Conservation Act (WCA) and the Minnesota Department of Natural Resources (DNR) Public Waters Permit Program.

The Minnesota Wetland Conservation Act of 1991 (WCA) requires local government units (LGUs) to implement the rules and regulations promulgated by the Board of Water and Soil Resources (BWSR) pertaining to wetland draining, filling and excavation. The LGU administering WCA for this project is the Yellow Medicine Soil and Water Conservation District.

Under the USACE Section 404 Program and the Minnesota Wetland Conservation Act, delineations are conducted using the USACE Wetlands Delineation Manual, Technical Report Y-87-1 (Environmental Laboratory 1987). Under the DNR Public Waters Permit Program, which regulates wetlands and waterbodies designated on the Minnesota Public Waters Inventory (PWI), the jurisdictional boundary of a PWI wetland or waterbody, is the Ordinary High Water Level (OHWL). The OHWL is determined using the DNR *Guidelines for Ordinary High Water Level (OHWL) Determinations* (1993).

The objectives of the wetland and waterbody surveys were to:

- 1) delineate wetland boundaries;
- 2) categorize wetland community types; and
- 3) locate and characterize waterbodies.

The information collected by these surveys will be used to assess the 2017 design of the Project layout so that impacts to wetlands and waterbodies can be further avoided or minimized. Information will also be used to calculate potential impacts of the facility design, which will be included in supplemental permit applications that will be prepared and submitted to applicable regulatory agencies for review, concurrence, and approval for issuance of any required permits if needed).

¹ This 2017 Report includes 2016 field survey data that applies to the current Project layout.

² The 2016 field surveys were conducted on an earlier layout of the Project. The Project layout was revised between November 2016 and late summer 2017 to address several landowner, engineering, environmental resource and design criteria. The updated 2017 Project layout also avoids and/or minimizes additional wetland and waterbody impacts compared to the 2016 Project layout.

Field surveys evaluated locations for proposed turbine pads, access roads, temporary turn improvements, a laydown yard, and an operations and maintenance facility. The survey corridor consisted of 250 feet wide (125 feet on either side of centerline) for access roads and turn improvements, and a 250-foot radius around all turbine locations. Temporary access road turn improvements and the laydown yard constitute a temporary impact but were included in the field survey since they are located within the field survey corridor. A desktop analysis was also conducted to evaluate locations for proposed collection lines and crane paths, and a proposed substation in South Dakota. Field surveys were not conducted along collection lines or crane paths, per correspondence with agencies on August 19, 2016, and October 13, 2017, as detailed below.

1.2 AGENCY CORRESPONDENCE

Merjent conducted a conference call on August 19, 2016, and a follow up email on October 13, 2017, with Kane Radel of the BWSR, and Ryan Malterud of the USACE to discuss the planned wetland survey work within Minnesota to confirm that the survey protocol would be acceptable for permitting under Section 404 and WCA. During the discussion it was confirmed that survey of wetlands would be conducted utilizing Trimble sub meter global positioning system (GPS) units, with no flag placement in the field. Components of the Project that would constitute only a temporary impact or no-loss, such as buried collector lines or temporary crane paths, would not require a field survey, but rather a desktop analysis of affected wetlands. Prior to conducting the 2017 field surveys, Merjent contacted the above parties to update them of changes to the Project layout and confirm the survey approach regarding desktop analysis for temporary impacts.

1.3 SURVEY NOMENCLATURE

Wetlands and waterbodies, as well as corresponding data forms and photographs, were named using a township-range-section naming convention. Each name is prefixed with a letter denoting its classification, as follows:

- w—denotes a wetland (shown in black font in Appendix D) and accompanying USACE data form and photograph (shown in blue font in Appendix D).
- n—denotes a USACE data form collected to document a National Wetland Inventory (NWI) area determined to be entirely upland (shown in green font in Appendix D).
- s—denotes a waterbody feature (shown in black font in Appendix D) and accompanying data form and photograph (shown in blue font in Appendix D).
- d—denotes a feature that has been desktop delineated (e.g., d-w-114n46w8-w02, d-s-144n46w35) (shown in black font in Appendix D).

2.0 METHODS

2.1 WETLANDS

Field crews conducted wetland surveys in accordance with the criteria and methods outlined in:

- the USACE Wetlands Delineation Manual, Technical Report Y-87-1 (Environmental Laboratory 1987);
- subsequent guidance documents (USACE 1991, 1992); and,
- Midwest Regional Supplements to the USACE Wetland Delineation Manual.

Merjent completed a desktop evaluation of available resources to prepare for the survey effort. Data reviewed as part of the desktop evaluation included:

- U.S. Geological Survey (USGS) topographic maps (1992);
- U.S. Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) soil survey data (1981);
- Revised National Wetland Inventory (NWI) data (2016); and
- recent aerial imagery (2010, 2013, 2015).

Merjent compiled the data on a base map of the wetland survey corridor and reviewed it prior to conducting field surveys. Appendix B includes an Index Map of the environmental survey corridor used to conduct the field and desktop review. Appendix C includes the NWI, PWI, USGS National Hydrography Dataset (NHD), and the Soil Survey Geographic Database (SSURGO) data and maps used to conduct the desktop review. Field surveyed and desktop reviewed wetlands and waterbodies, as well as sample point locations are provided in the Field and Desktop Wetland and Waterbody Delineation maps in Appendix D.

Merjent evaluated antecedent precipitation for the date of the site visits using the Minnesota Climatology Working Group Precipitation Worksheet Using Gridded Database for Fortier Township, Minnesota to determine antecedent precipitation for the three months prior to the date of the field surveys (September 25, 2016 and October 23, 2017). This analysis indicated that antecedent precipitation conditions were wet at the time of the field surveys in both 2016 and 2017. Appendix E includes the precipitation data and multi-month calculations.

Field crews, comprised of staff from Merjent, as well as staff from Midwest Natural Resources, Inc., conducted on-site wetland delineations on September 26 & 27, 2016, and October 23 through October 26, 2017, using the three criteria technical approach (i.e., vegetation, soil, and hydrology) as defined in the 1987 Wetlands Delineation Manual and the Midwest Regional Supplement. According to procedures described in the 1987 Manual and Midwest Regional Supplements, field crews determined an area to be a wetland if under normal circumstances it reflects a predominance of:

- hydrophytic vegetation;
- hydric soils; and
- wetland hydrology (e.g., inundated or saturated soils).

Field crews located wetland sample points and boundaries and recorded the data using GPS technology. Data were then reviewed, geospatially corrected, and consolidated for impact analyses. Surveyed wetlands and waterbodies are depicted in maps provided in Appendix D. Wetlands are depicted with feature names in black font, and associated sample point names in blue font. The USACE forms collected for the sample points are provided in Appendix F. Photos were taken at each USACE data point and are provided in Appendix G.

Areas indicated in the revised NWI that were determined in the field to be entirely upland were documented. A USACE data sheet and photograph were collected for all such features to document the finding as upland.

2.2 WATERBODIES

Field crews identified, classified, and documented waterbodies in accordance with the Classification of Wetlands and Deepwater Habitats (Cowardin 1979). Field crews located and delineated waterbody boundaries with GPS technology, and collected the following attributes in the field to classify each waterbody:

- top of bank width and height;

- OHWL width and height;
- substrate type;
- estimated water velocity;
- channel slope;
- dominant riparian vegetation;
- waterbody name; and
- agency designation (if applicable).

Field crews identified OHWL, if present, per USACE Regulatory Guidance Letter 05-05. Field crews took photographs at each waterbody to record general conditions at the time of the field survey.

Merjent completed a desktop evaluation of available resources to prepare for the survey effort. Data reviewed as part of the desktop evaluation included the NHD and PWI maps (Appendix C).

2.3 DESKTOP ASSESSMENT

Merjent conducted a desktop assessment of wetland and waterbody resources within the Project area for the components of the Project that would constitute only a temporary impact or net no-loss (e.g., buried collector lines or crane paths), as discussed in Section 1.2. Desktop methodology was based on the July 1, 2016 USACE and BWSR Guidance for Offsite Hydrology/Wetland Determinations. An experienced wetland delineator reviewed the temporary impacts components within the Project area, using the following sources of publicly available data:

- ESRI ArcGIS Base Maps for aerial imagery;
- Google Earth time-lapsed aerial photography (1991-2015);
- USGS topographic maps (1992);
- USDA NRCS soil survey data (1981);
- Farm Service Agency imagery;
- Revised NWI data (2016);
- Revised National Hydrography Dataset (2011); and
- Minnesota Public Waters Inventory (PWI; 1996).

Results of this assessment are included in the Report, tables, and figures, and are indicated with a “d-” prefix in front of the feature name.

3.0 RESULTS

Field crews identified 29 wetlands and three waterbodies within the field survey corridor for proposed turbine pads, access roads, temporary turn improvements, a laydown yard, and an operations and maintenance facility for the current Project layout. Temporary access road turn improvements and the laydown yard constitute a temporary impact but were included in the field survey since they are located within the field survey corridor. Desktop review identified 26 wetlands and 12 waterbodies within the desktop review area for the components of the Project that would constitute only a temporary impact or net no-loss (i.e., temporary crane paths and underground collection lines). Potential impacts by the Project to the features surveyed are continuing to be assessed as design of the facility layout becomes further refined so that impacts might be further avoided or minimized. Once additional adjustments to the design has been completed, temporary and permanent impacts to wetlands and waterbodies, if any, will be determined and this information used in the permitting process.

All field surveyed wetlands were identified as Palustrine Emergent (PEM) and Scrub-Shrub (PSS) wetlands. Table 3.0-1 summarizes field surveyed wetland features; Table 3.0-2 summarizes the desktop delineated wetland features; Table 3.0-3 summarizes the field delineated waterbody features; and Table 3.0-4 summarizes the desktop delineated waterbody features.

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**Table 3.0-1
Field Delineated Wetlands Summary**

Feature ID	Page No. (Appx D)	Hydrologic Regime	Cowardin Classification	Circular 39 Classification	Eggers & Reed Classification
w-114n46w5-w01	3	A - Temp Flood	PEM	Type 1	Seasonally Flooded Basin
w-114n46w11-w01	5	A - Temp Flood	PEM	Type 1	Seasonally Flooded Basin
w-114n46w11-w02	5	A - Temp Flood	PEM	Type 1	Seasonally Flooded Basin
w-114n46w16-w01	6	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow
w-114n46w20-w01	9, 12	A - Temp Flood	PEM	Type 1	Seasonally Flooded Basin
w-114n46w20-w02	9, 12	A - Temp Flood	PEM	Type 1	Seasonally Flooded Basin
w-114n46w14-w01	7	A - Temp Flood	PEM	Type 1	Seasonally Flooded Basin
w-114n46w19-w01	11	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow
w-114n46w19-w02	11	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow
w-114n46w19-w03	11	A - Temp Flood	PEM	Type 1	Seasonally Flooded Basin
w-114n46w19-w04	11	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow
w-114n46w19-w05	11	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow
w-114n46w19-w06	11	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow
w-114n46w29-w01	16	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow
w-114n46w30-w01	16	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow
w-114n46w35-w01	18,19	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow
w-114n46w35-w02	19	C - Seasonally Flood	PEM	Type 3	Shallow Marsh
w-114n46w35-w05	19	A - Temp Flood	PEM	Type 1	Seasonally Flooded Basin
w-114n46w35-w06	19	A - Temp Flood	PEM	Type 1	Seasonally Flooded Basin
w-114n46w26-w01	14	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow
w-114n46w25-w01	15	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow
w-114n46w-21-w01	9, 12	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow
w-114n46w8-w02	3	B - Saturated	PSS	Type 6	Shrub-Carr
w-114n46w8-w03	3	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow
w-114n46w9-w02	4	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow
w-114n46w9-w03	4	B - Saturated	PSS	Type 6	Shrub-Carr
w-115n46w31-w01	1	B - Saturated	PSS	Type 6	Shrub-Carr
w-115n46w31-w02	1	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow
w-115n47w34-w01	1	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow

**Table 3.0-2
Desktop Delineated Wetlands Summary**

Feature ID	Page No. (Appx D)	Hydrologic Regime	Cowardin Classification	Circular 39 Classification	Eggers & Reed Classification
d-w-115n46w31-w03	1	A - Temp Flood	PEM	Type 1	Seasonally Flooded Basin
d-w-115n46w31-w04	2	A - Temp Flood	PEM	Type 1	Seasonally Flooded Basin
d-w-114n46w6-w01	2	A - Temp Flood	PEM	Type 1	Seasonally Flooded Basin
d-w-114n46w8-w04	3	C - Seasonally Flood	PEM	Type 3	Shallow Marsh
d-w-114n46w8-w05	3, 4	C - Seasonally Flood	PEM	Type 3	Shallow Marsh
d-w-114n46w8-w06	3, 4	B - Saturated	PFO	Type 2/7	Hardwood Swamp
d-w-114n46w9-w04	4	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow
d-w-114n46w9-w05	6	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow
d-w-114n46w9-w06	6	A - Temp Flood	PEM	Type 1	Seasonally Flooded Basin
d-w-114n46w11-w03	5, 7	A - Temp Flood	PEM	Type 1	Seasonally Flooded Basin
d-w-114n46w11-w04	5, 7	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow
d-w-114n46w16-w02	9	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow
d-w-114n46w15-w02	7	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow
d-w-114n46w15-w03	7	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow
d-w-114n46w14-w02	8	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow
d-w-114n46w19-w01	11	A - Temp Flood	PEM	Type 1	Seasonally Flooded Basin
d-w-114n46w20-w03	11	A - Temp Flood	PEM	Type 1	Seasonally Flooded Basin
d-w-114n46w20-w04	12	A - Temp Flood	PEM	Type 1	Seasonally Flooded Basin
d-w-114n46w22-w01	13	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow
d-w-114n46w30-w02	16	A - Temp Flood	PEM	Type 1	Seasonally Flooded Basin
d-w-114n46w29-w02	12	A - Temp Flood	PEM	Type 1	Seasonally Flooded Basin
d-w-114n46w29-w03	16	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow
d-w-114n46w29-w04	16	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow
d-w-114n46w28-w02	12	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow
d-w-114n46w28-w03	13	B - Saturated	PEM	Type 2	Fresh (Wet) Meadow
d-w-114n46w27-w01	13	A - Temp Flood	PEM	Type 1	Seasonally Flooded Basin

Table 3.0-3 Field Delineation Waterbody Summary			
Waterbody ID	Page No. (Appx D)	Cowardin Classification	Hydrologic Regime
s-114n46w16-a	6	R2UB	Perennial
s-114n46w27-a	18	Ditch	Intermittent
s-144n46w35-a	19	Ditch	Perennial

Table 3.0-4 Desktop Delineation Waterbody Summary			
Waterbody ID	Page No. (Appx D)	Cowardin Classification	Hydrologic Regime
d-s-114n46w9-a	3, 4	R4UB	Intermittent
d-s-114n46w9-b	6	R4UB	Intermittent
d-s-114n46w14-a	8	R4UB	Intermittent
d-s-114n46w14-b	8	R2UB	Perennial
d-s-114n46w30-a	16	Ditch	Ephemeral
d-s-114n46w29-a	12	R4UB	Intermittent
d-s-114n46w29-b	12, 17	R4UB	Intermittent
d-s-114n46w28-a	12, 17	R4UB	Intermittent
d-s-114n46w28-b	12	Ditch	Ephemeral
d-s-114n46w28-c	12, 17	Ditch	Ephemeral
d-s-114n46w28-d	12, 17	Ditch	Ephemeral
d-s-114n46w27-a	13	Ditch	Intermittent

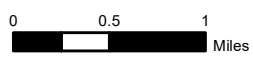
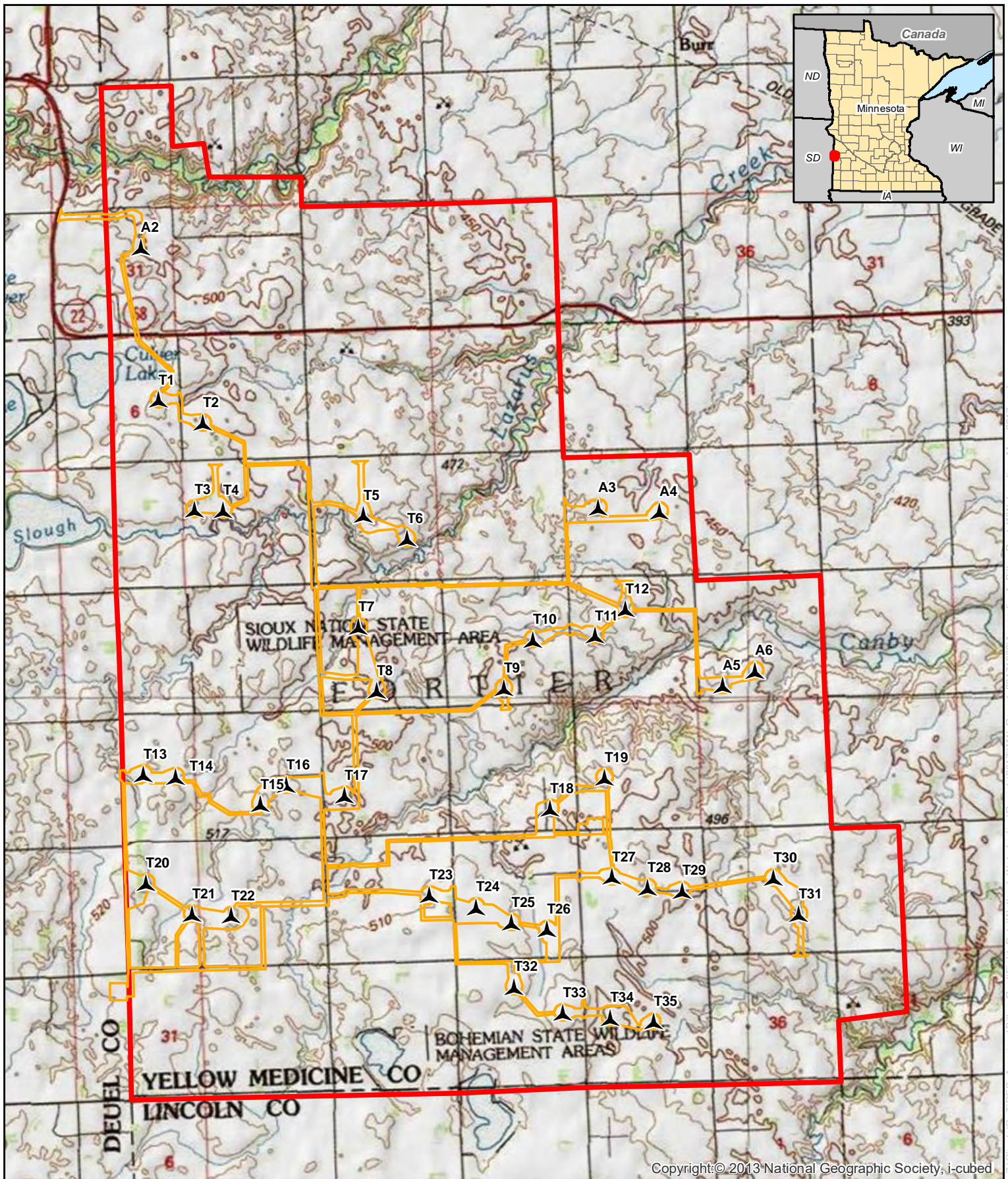
4.0 CONCLUSION

Wetland and waterbody delineations were conducted on September 26 & 27, 2016, and October 23 through 26, 2017, of the current Project layout in accordance with the 1987 Wetlands Delineation Manual and the Midwest Regional Supplement. This Report and supporting documentation is being submitted to the Yellow Medicine County Soil and Water Conservation District, the Minnesota BWSR, and the USACE for agency concurrence at this time. The data within this Report will be used as supporting documentation for required permits associated with the proposed Project.

5.0 REFERENCES

- Cowardin, L.M., V. Carter, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Office of Biological Services. FWS/OBS-79/31. Washington, D.C. 20240.
- Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.
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- USACE. 1991. "Implementation of the 1987 Corps Wetland Delineation Manual," memorandum from John P. Elmore dated 27 August 1991.
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- USACE. 1997. "NRCS Field Indicators of Hydric Soils," memorandum from John F. Study dated 21 March 1997.
- USACE. 2010. "Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0)," J.S. Wakeley, R.W. Lichvar, and C.V. Noble (eds.). ERDC/EL TR-10-16 Vicksburg, MS: U.S. Army Engineer Research and Development Center.
- U.S. Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS). 1997. Hydrology Tools for Wetland Determination. Engineering Handbook, Part 650. Issued August 1997.
- USDA-NRCS. 2010. Field Indicators of Hydric Soils in the United States, Version 7.0. L.M. Vasilas, G.W. Hurt, and C.V. Noble (eds.). USDA-NRCS in cooperation with the National Technical Committee for Hydric Soils.
- USDA, Soil Conservation Service, Soil Survey.
- U.S. Geological Survey, Indiana 7.5 Minute Series (Topographic) Maps.

Appendix A
Location Map






1 inch = 1 miles



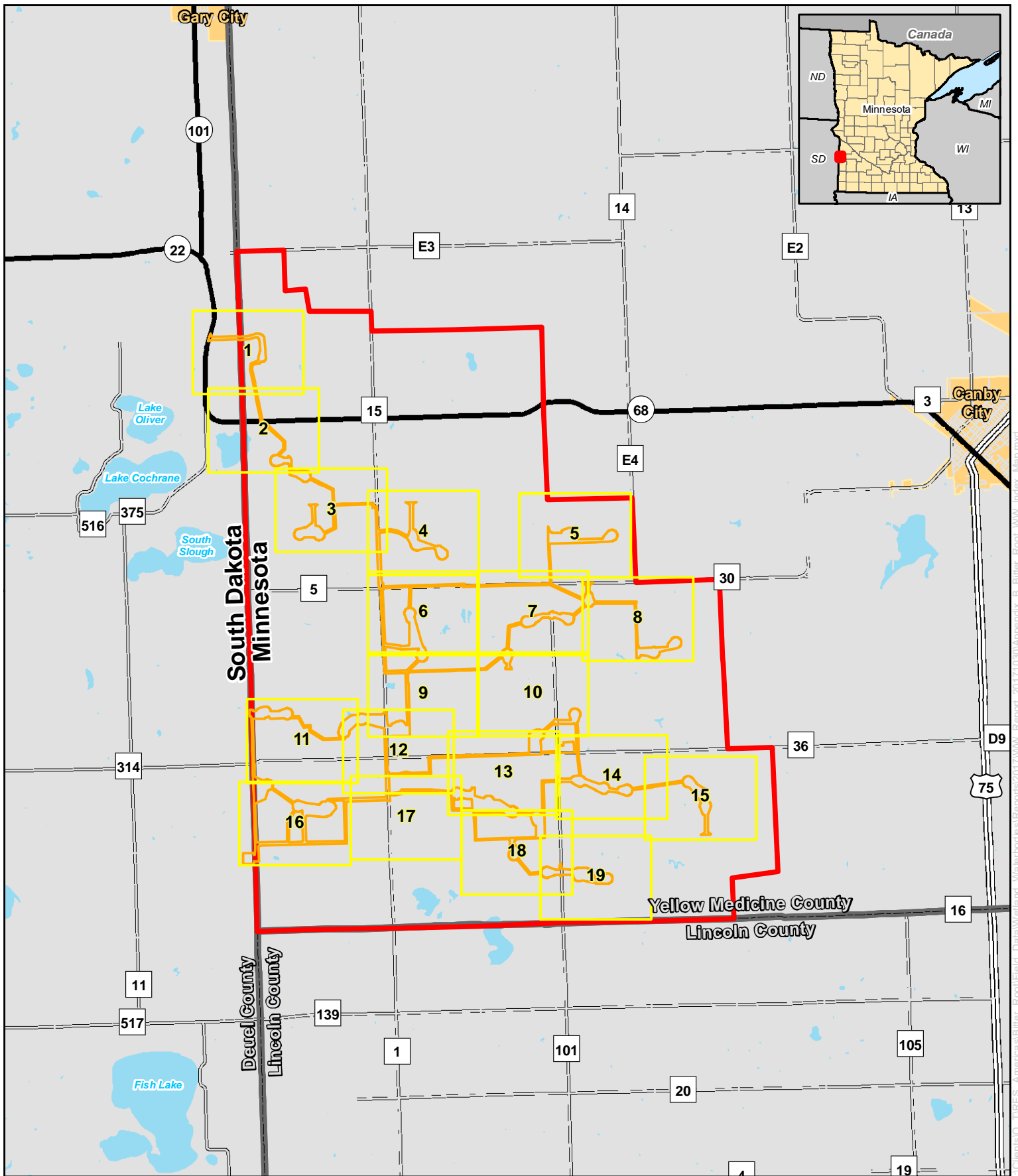
RES AMERICAS
powering change
For Environmental Review Purposes Only

Appendix A
Bitter Root Wind Farm
Flying Cow Wind, LLC
Project Location Map
Yellow Medicine County, Minnesota

-  Turbine Layout
-  Environmental Study Area
-  Project Boundary

Source: z:\Clients\Q_TILES_Americas\Bitter_Root\Fire\Data\Wetland_Data\Fire\Repor\2017\WWV_Report_2017\0300\Appendix_A_Bitter_Root_WW_Location_Map_2017.mxd
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Appendix B
Index Map



0 0.75 1.5
Miles

1 inch = 1.5 miles



For Environmental Review Purposes Only

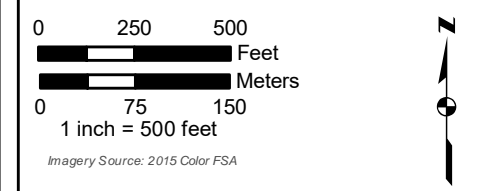
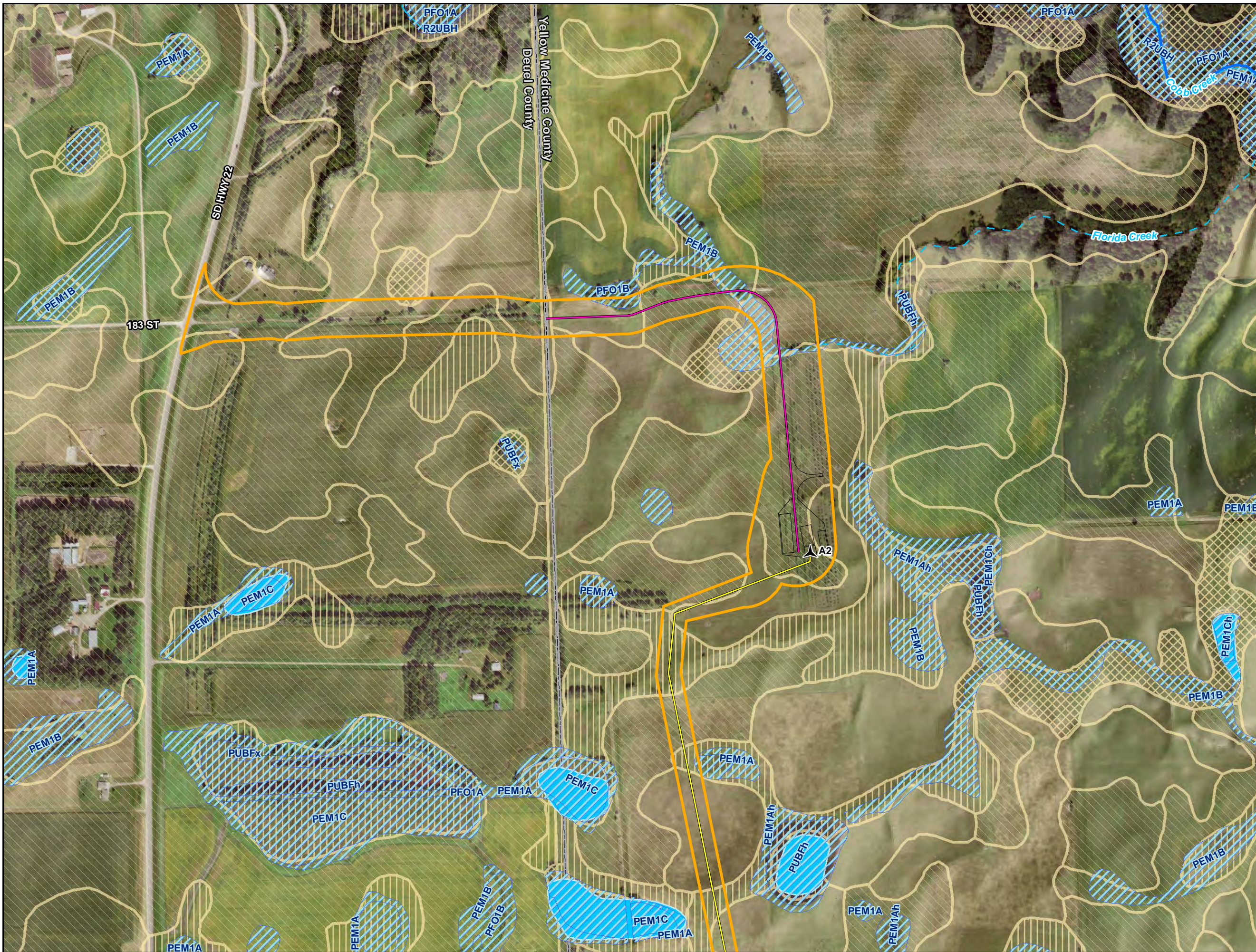


Appendix B
Bitter Root Wind Farm
Flying Cow Wind, LLC
Index Map
Yellow Medicine County, Minnesota

- MN Index Maps with Page #
- Environmental Study Area
- Project Boundary
- County Boundary

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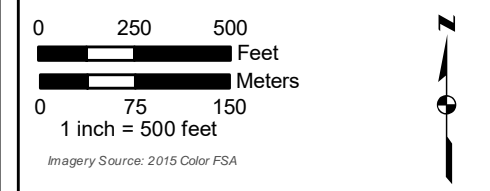
Appendix C
NWI, PWI, NHD, and SSURGO Map
Delineation Features Map



- Environmental Study Area
- Proposed Project Facilities**
- Proposed Turbine Location
- Proposed Turbine Pad Site
- Proposed Access Road
- Proposed Alternate Access
- Proposed Collection Line
- Proposed Facilities Boundary (OM Building and Laydown Yard)
- NWI - MNDNR Update
- Public Waters Inventory**
- Public Water Watercourse
- Public Water Basin/Wetland
- National Hydrography Dataset (NHD)**
- Perennial Stream
- Intermittent Stream
- Canal/Ditch
- Waterbody
- Hydric Soils (SSURGO)**
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)

Appendix C
Bitter Root Wind Farm
Flying Cow Wind, LLC
 NWI, PWI, NHD and SSURGO Map
 Yellow Medicine County, Minnesota

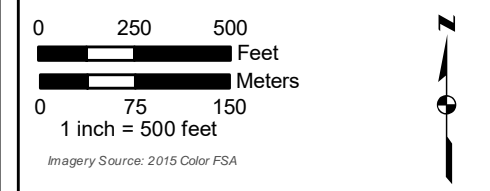
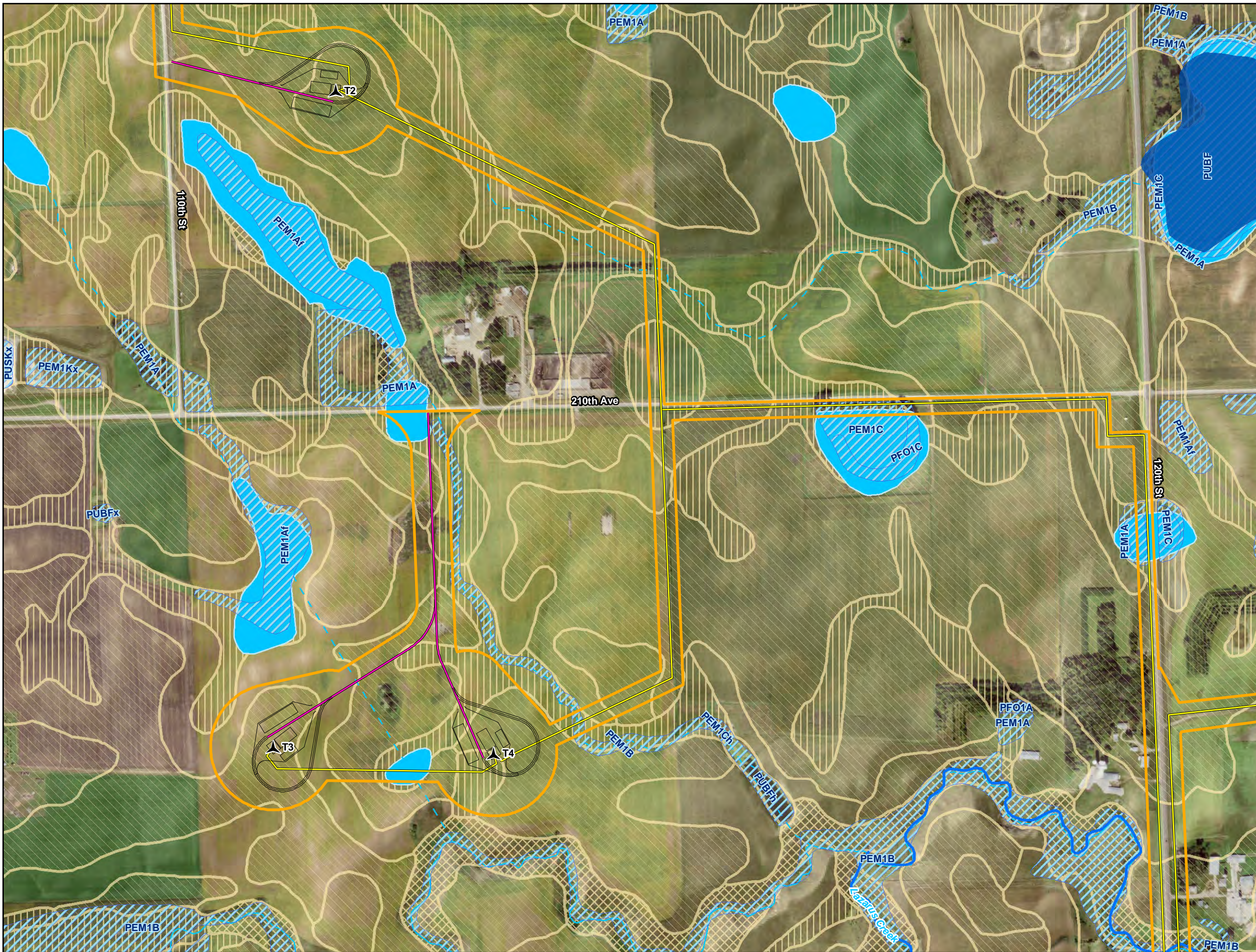
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- Proposed Turbine Pad Site
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- Proposed Alternate Access
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- Intermittent Stream
- Canal/Ditch
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- Hydric Soils (SSURGO)**
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Appendix C
Bitter Root Wind Farm
Flying Cow Wind, LLC
NWI, PWI, NHD and SSURGO Map
Yellow Medicine County, Minnesota

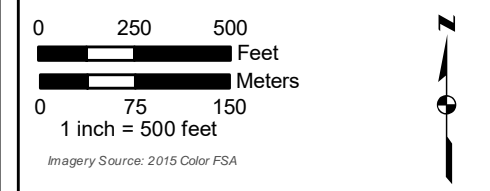
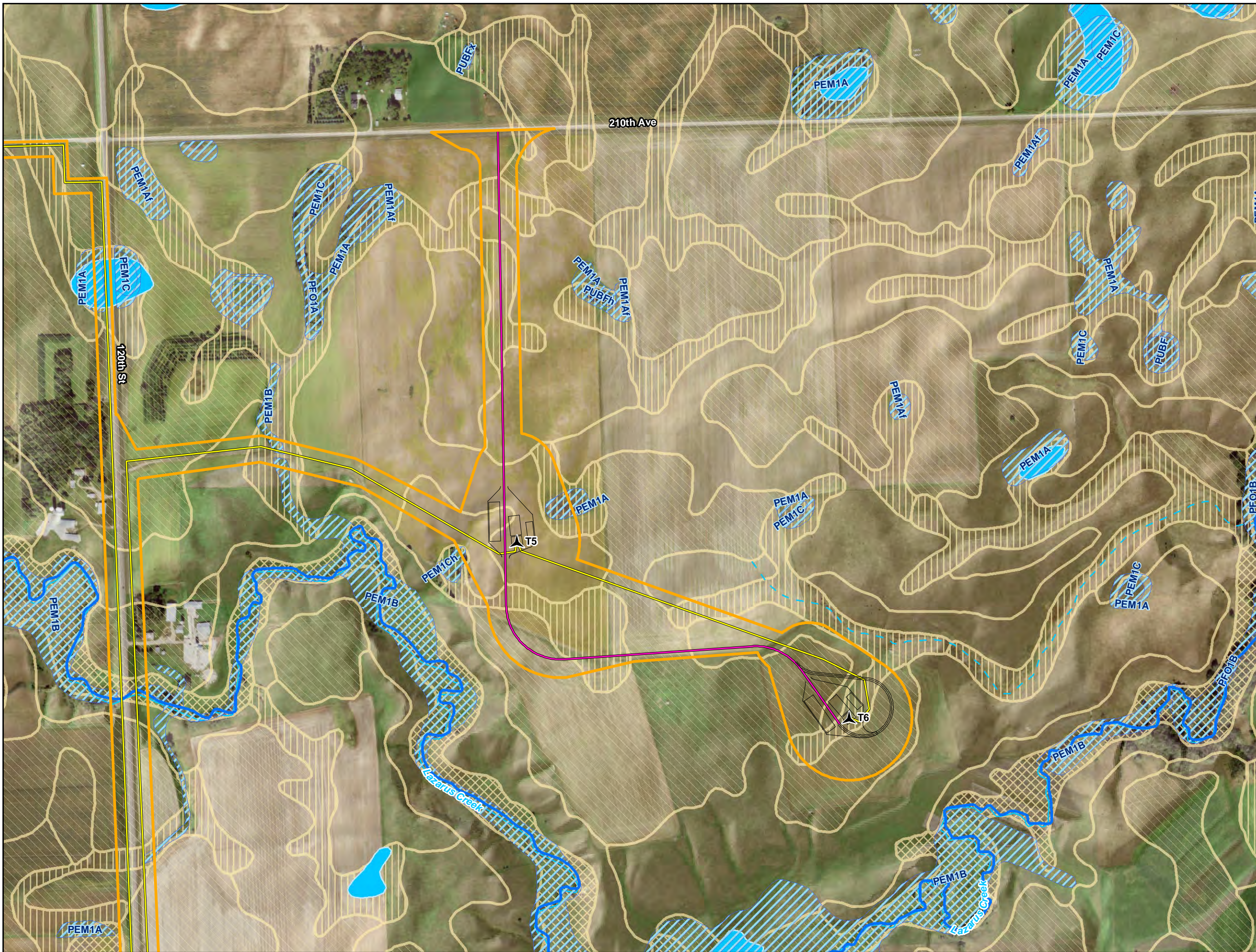
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- Intermittent Stream
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- Hydric Soils (SSURGO)**
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)

Appendix C
Bitter Root Wind Farm
Flying Cow Wind, LLC
 NWI, PWI, NHD and SSURGO Map
 Yellow Medicine County, Minnesota

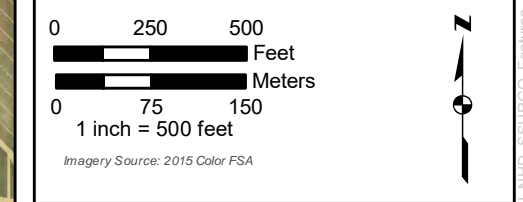
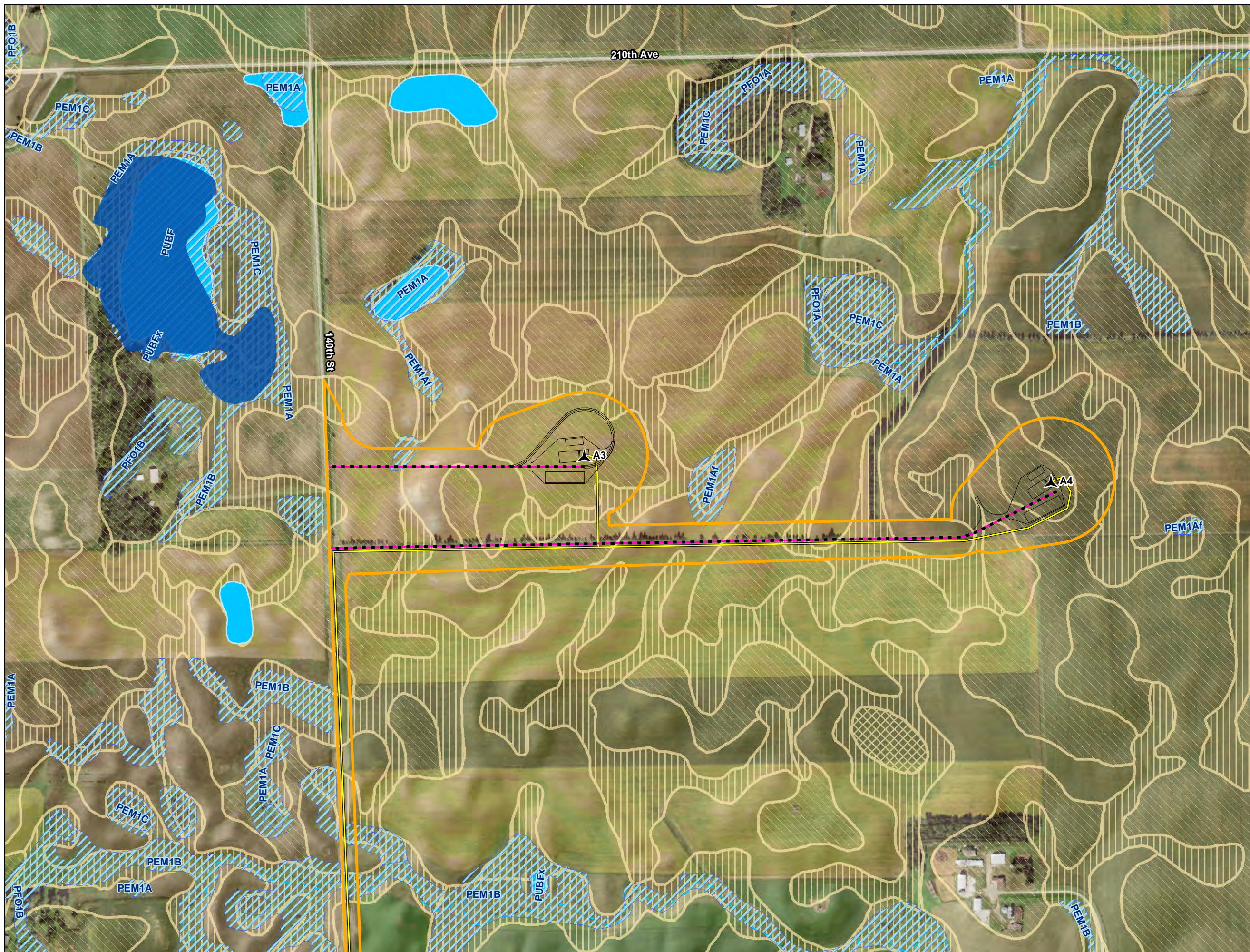
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- Environmental Study Area
- Proposed Project Facilities**
- Proposed Turbine Location
- Proposed Turbine Pad Site
- Proposed Access Road
- Proposed Alternate Access
- Proposed Collection Line
- Proposed Facilities Boundary (OM Building and Laydown Yard)
- NWI - MNDNR Update
- Public Waters Inventory**
- Public Water Watercourse
- Public Water Basin/Wetland
- National Hydrography Dataset (NHD)**
- Perennial Stream
- Intermittent Stream
- Canal/Ditch
- Waterbody
- Hydric Soils (SSURGO)**
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)

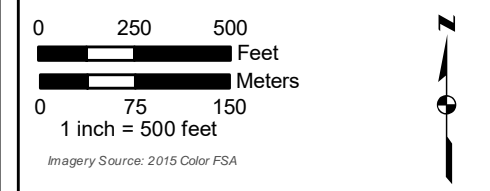
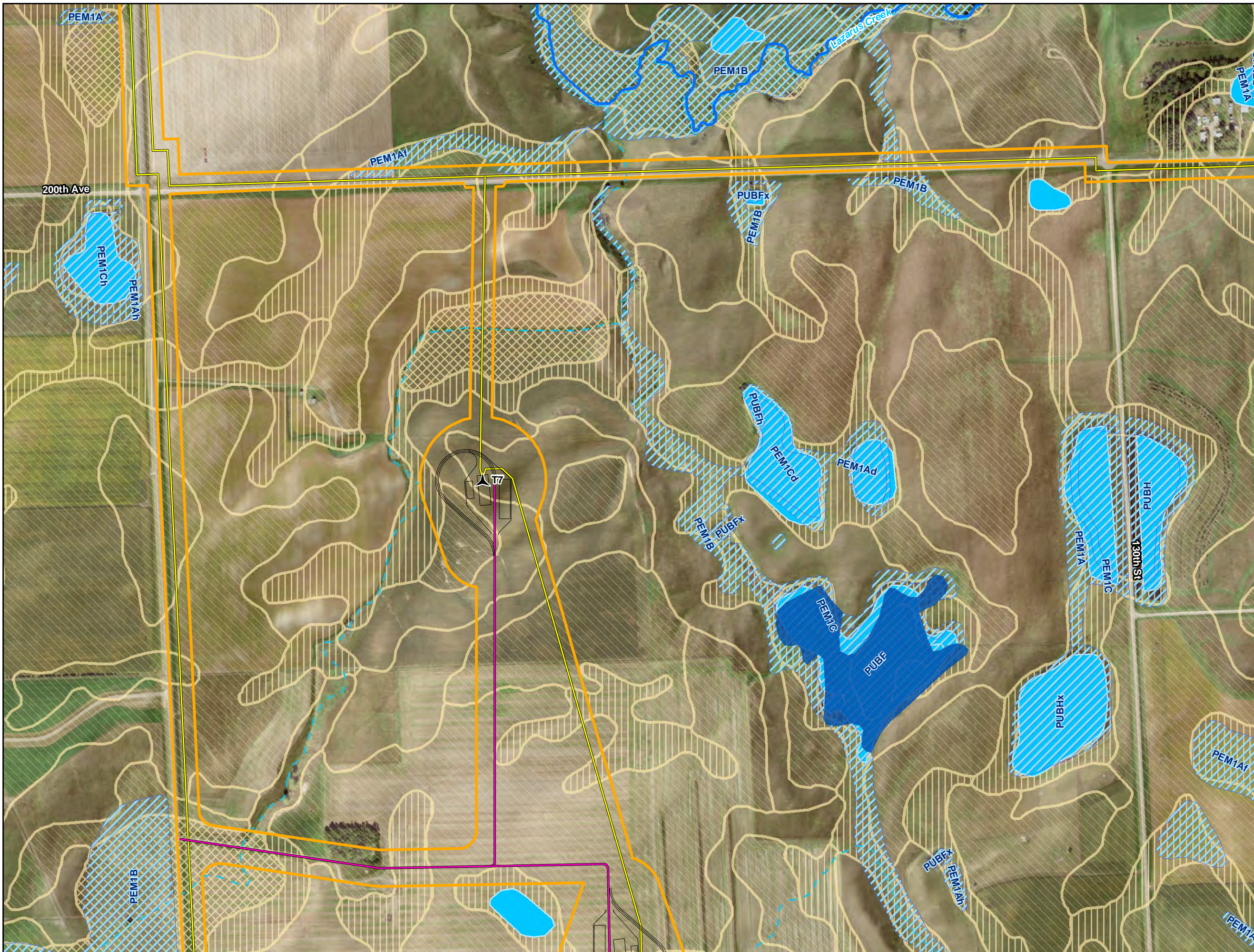
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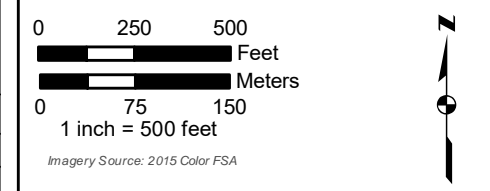
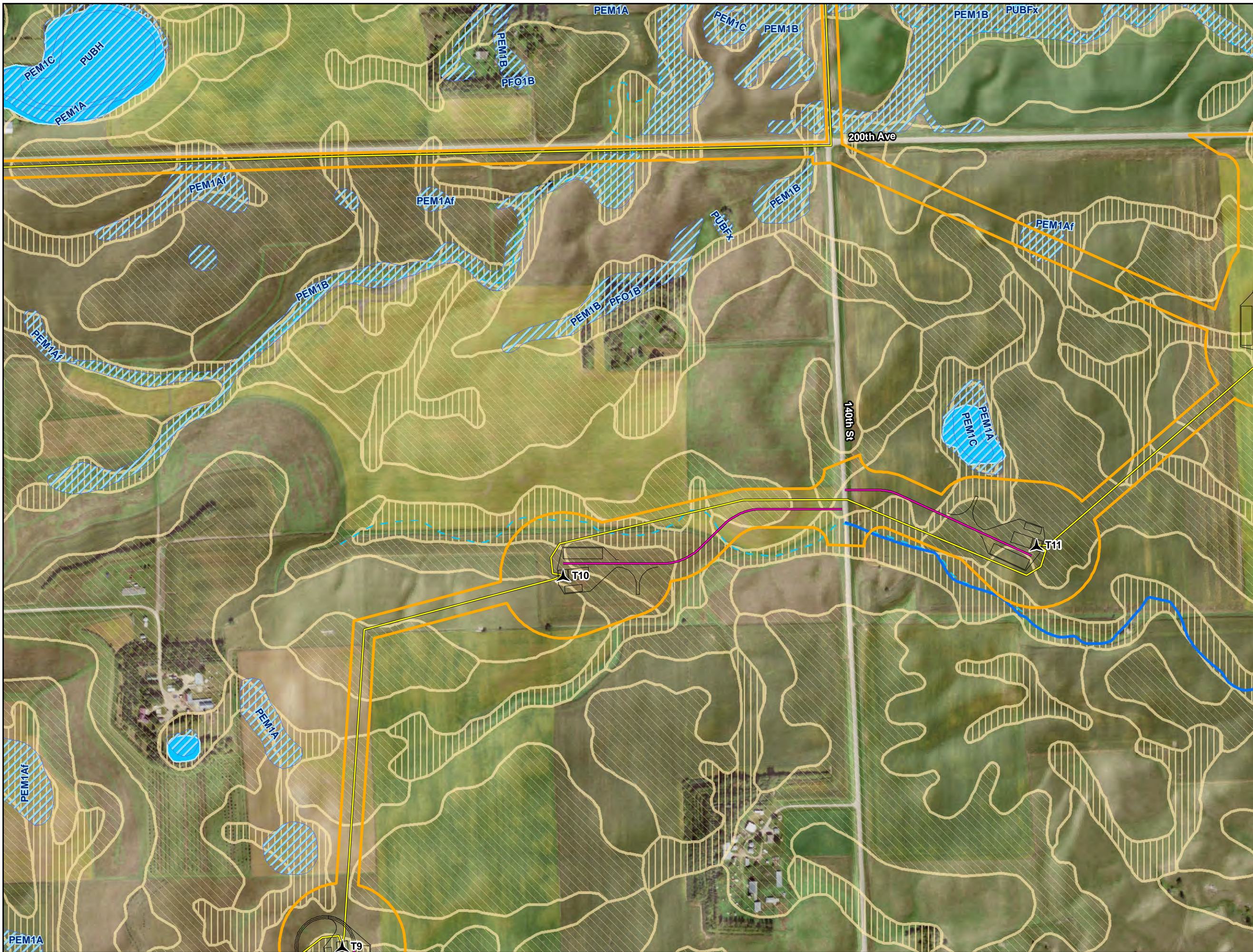
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