

400 North Fourth Street
Bismarck, ND 58501
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July 27, 2016

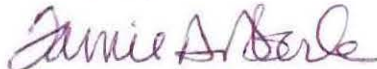
Executive Secretary
North Dakota Public Service Commission
State Capitol Building
600 E. Boulevard, Dept. 408
Bismarck, ND 58505

Re: Thunder Spirit Wind Project
Tree & Shrub Inventory Report
Case No. PU-15-592

Montana-Dakota Utilities Co. (Montana-Dakota), a Division of MDU Resources Group Inc., herewith submits an electronic copy of its Tree and Shrub Inventory Report in compliance with the Commission's Order in the above referenced case and in conjunction with the Tree and Shrub Mitigation Specifications issued in Case No. PU-11-601.

Montana-Dakota will submit the proposed replacement plan including the executed landowner forms by September 1, 2016.

Sincerely,



Tamie A. Aberle
Director of Regulatory Affairs

Attachments

Tree and Shrub Inventory Report

Thunder Spirit Wind Project

Case No. PU-15-592

Montana-Dakota Utilities Co.

July 27, 2016

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Scope of Work

HDR Engineering, Inc. (HDR) was retained by Montana-Dakota Utilities Co. (Montana-Dakota) to draft the Tree and Shrub Inventory Report and Tree and Shrub Replacement Plan for the Thunder Spirit Wind Project (Project). The North Dakota Public Service Commission (Commission) issued a *Findings of Fact, Conclusions of Law, and Order* on October 9, 2013 (including the *Tree and Shrub Mitigation Specifications (Appendix A)*) and a *Supplemental Order* on August 14, 2014 under Case No. PU-11-601. The Site Certificate was transferred to Montana-Dakota under Case No. PU-15-592. The Project consists of 43 2.5 MW wind turbines. In total, the gross generating capacity is 107.5MW. The Project is located about 2 miles north of Hettinger, North Dakota and consists of approximately 26,867 acres (42 square miles).

The tree and shrub field inventory was not completed by HDR. Montana-Dakota provided the tree and shrub inventory locations and data to HDR in two ArcGIS shapefiles. HDR understands that tree and shrub clearing has already occurred at the Project. Table 1 lists the locations of the tree inventory sites. The sites are also depicted in Figure 1.

Table 1: Tree and Shrub Site Inventory Locations

Section	Township	Range	Parcel ID	Closest Turbine	Site Identification Numbers
13	130N	96W	38	1	s-29, s-30
13	130N	96W	38	2	s-31
13	130N	96W	38	16	s-16, s-17, s-18
18	130N	95W	41	6	s-33, s-32
13	130N	96W	37	14	s-25, s-22, s-20
24	130N	96W	35	14	s-27, s-28
24	130N	96W	35	15	s-26, s-23, s-21
24	130N	96W	31	16	s-24, s-19
24	130N	96W	29	18	s-13, s-14, s-15, s-12
20	130N	95W	12	21	s-09
21	130N	95W	18	38	s-05, s-04, s-03, s-02, s-01
29	130N	95W	13	29	s-11, s-10, s-08, s-07
29	130N	95W	17	32	s-06

Results

Nine properties in the Thunder Spirit Wind Project had trees or shrubs inventoried and removed. Seven different tree and shrub species for a total of 32 individual trees and 37 shrubs were inventoried. A summary of the species and total count of trees and shrubs inventoried is included in Table 2. All inventoried trees and shrubs occurred within planted habitats.

Species of trees that were inventoried included chokecherry (*Prunus virginiana*), Siberian elm (*Fraxinus pennsylvanica*), unknown willow, green ash (*Fraxinus pennsylvanica*), and eastern cottonwood (*Populus deltoids*). Species of shrubs that were inventoried included western snowberry (*Symphoricarpos occidentalis hook*) and common snowberry (*Symphoricarpos albus*). Western snowberry, common snowberry, chokecherry, green ash, and eastern cottonwood are considered native species to North Dakota (USDA 2016). Siberian Elm is considered an invasive species in North Dakota. The willow trees are unknown because the species could not be identified.

Table 2: Summary of Tree and Shrub Inventory

Growth Form	Common Name	Species	Invasive	Parcel 12	Parcel 13	Parcel 17	Parcel 18	Parcel 29	Parcel 31	Parcel 35	Parcel 37	Parcel 38	Parcel 41	Total
Trees – Planted	Western Snowberry	<i>Symphoricarpos occidentalis hook</i>	No		4	1	6	4	1	6	1	8	3	34
	Common Snowberry	<i>Symphoricarpos albus</i>	No					1			2			3
	Chokecherry	<i>Prunus virginiana</i>	No	7										7
	Siberian Elm	<i>Fraxinus pennsylvanica</i>	Yes	10										10
	Unknown Willow	N/A	No	8										8
	Green Ash	<i>Fraxinus pennsylvanica</i>	No	4										4
	Eastern Cottonwood	<i>Populus deltoides</i>	No	3										3
TOTAL	TREES			32										32
TOTAL	SHRUBS				4	1	6	5	1	6	3	8	3	37
GRAND TOTAL				32	4	1	6	5	1	6	3	8	3	69

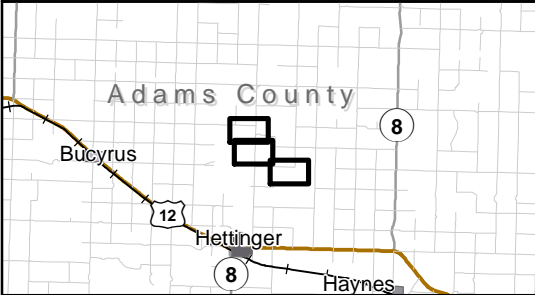
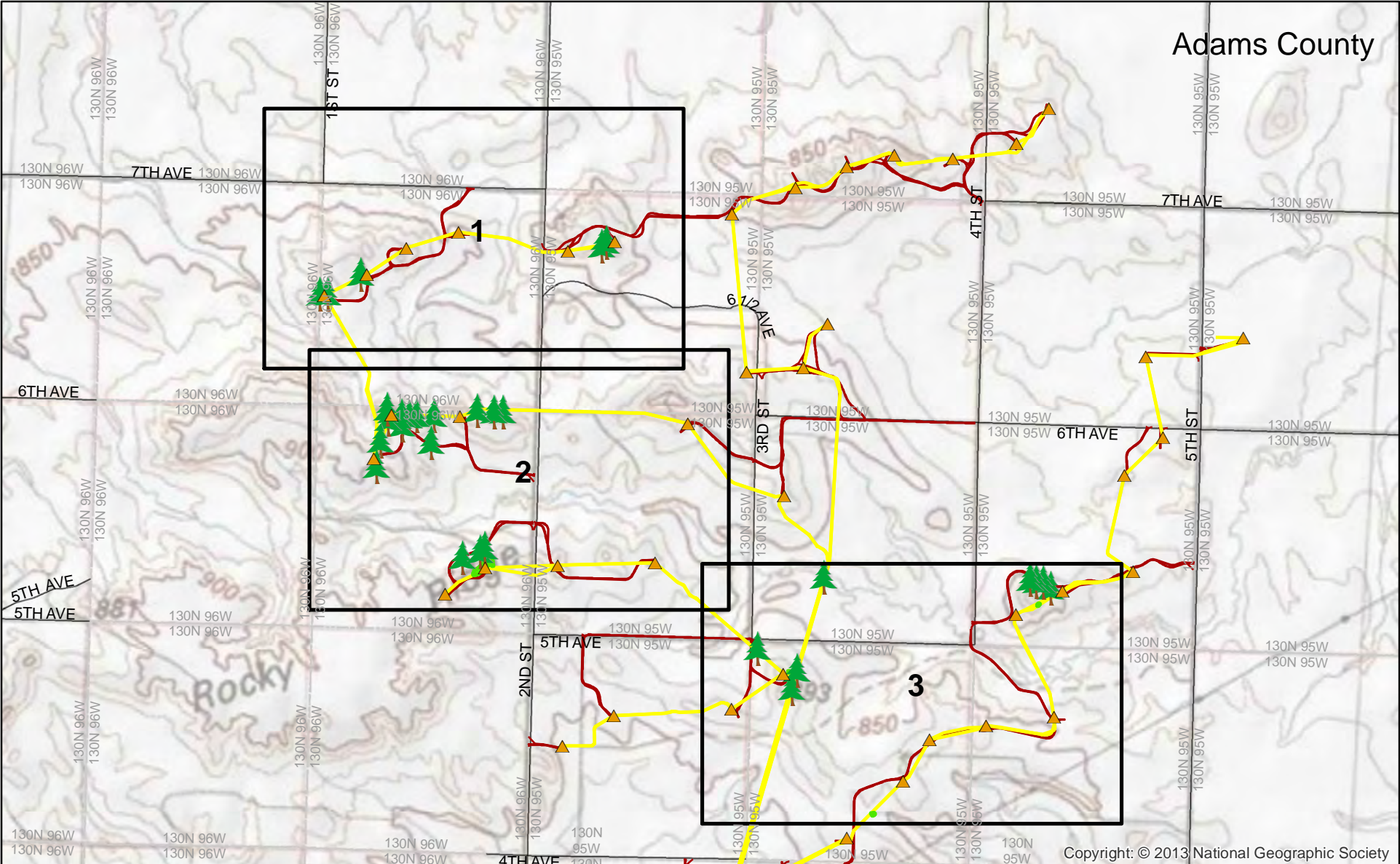
Recommendations







Montana-Dakota will follow the Commission's *Tree and Shrub Mitigation Specifications* (Appendix A) for replacement. A tree and shrub replacement plan will be implemented based on the inventoried trees and shrubs prior to construction.

References

United States Department of Agriculture Natural Resources Conservation Service (USDA NRCS) 2015. Plants database. <http://plants.usda.gov/java/>. Accessed June 2016.

Figure 1: Tree and Shrub Inventory Map Book



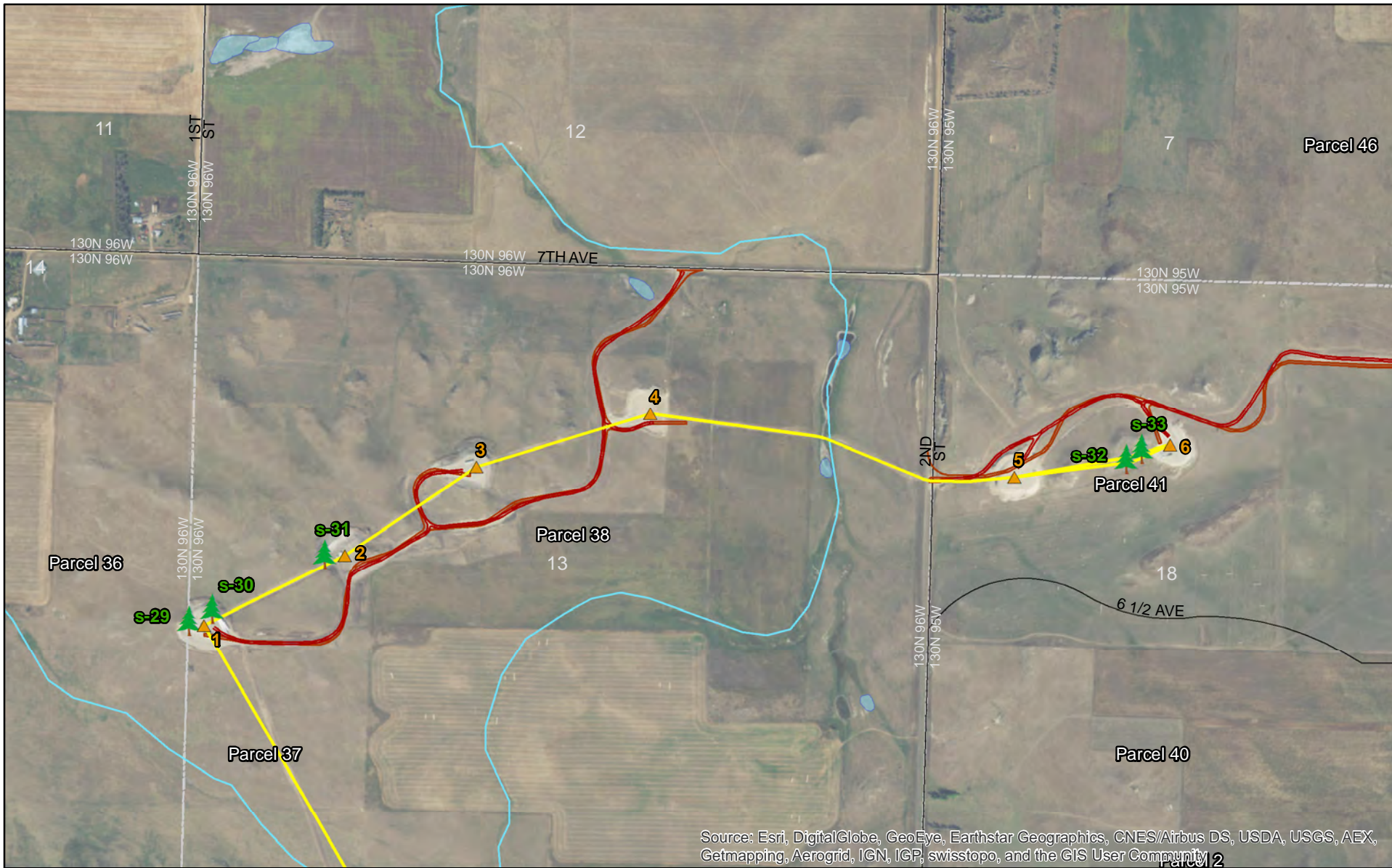
-  Tree and Shrub points
-  Tree and Shrub polygons
-  Turbines
-  Map Book Pages
-  Collector Lines
-  Access Roads
-  Roads

Tree and Shrub Inventory

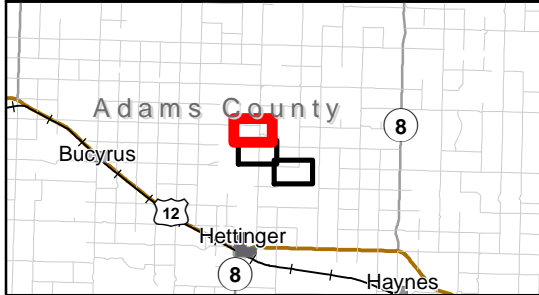
Overview


Scale: 1:40,000

Thunder Spirit
Wind Project



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



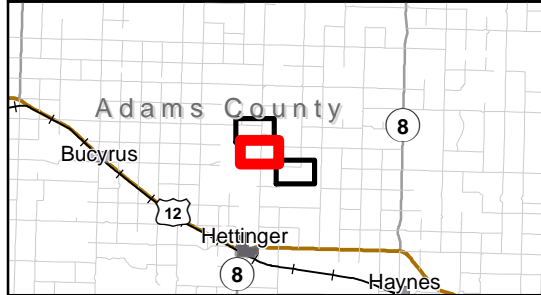
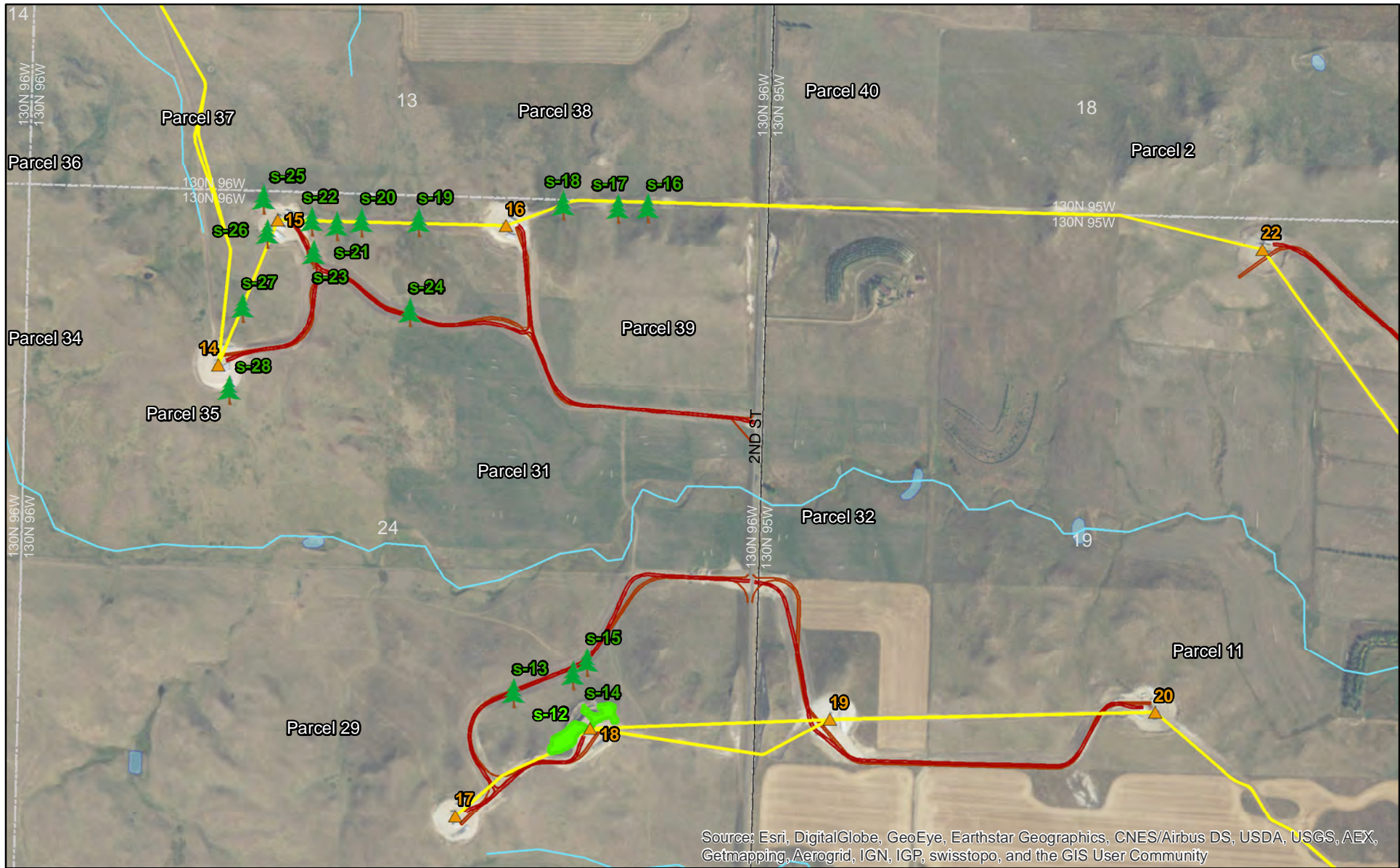
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|--|-------------------------|--|-----------------------|
| | Tree and Shrub points | | Roads |
| | Tree and Shrub polygons | | Stream |
| | Turbines | | Surface Water/Wetland |
| | Collector Lines | | |
| | Access Roads | | |

Tree and Shrub Inventory

Figure 1 - Page 1 of 3

Scale: 1:12,000

Thunder Spirit
Wind Project



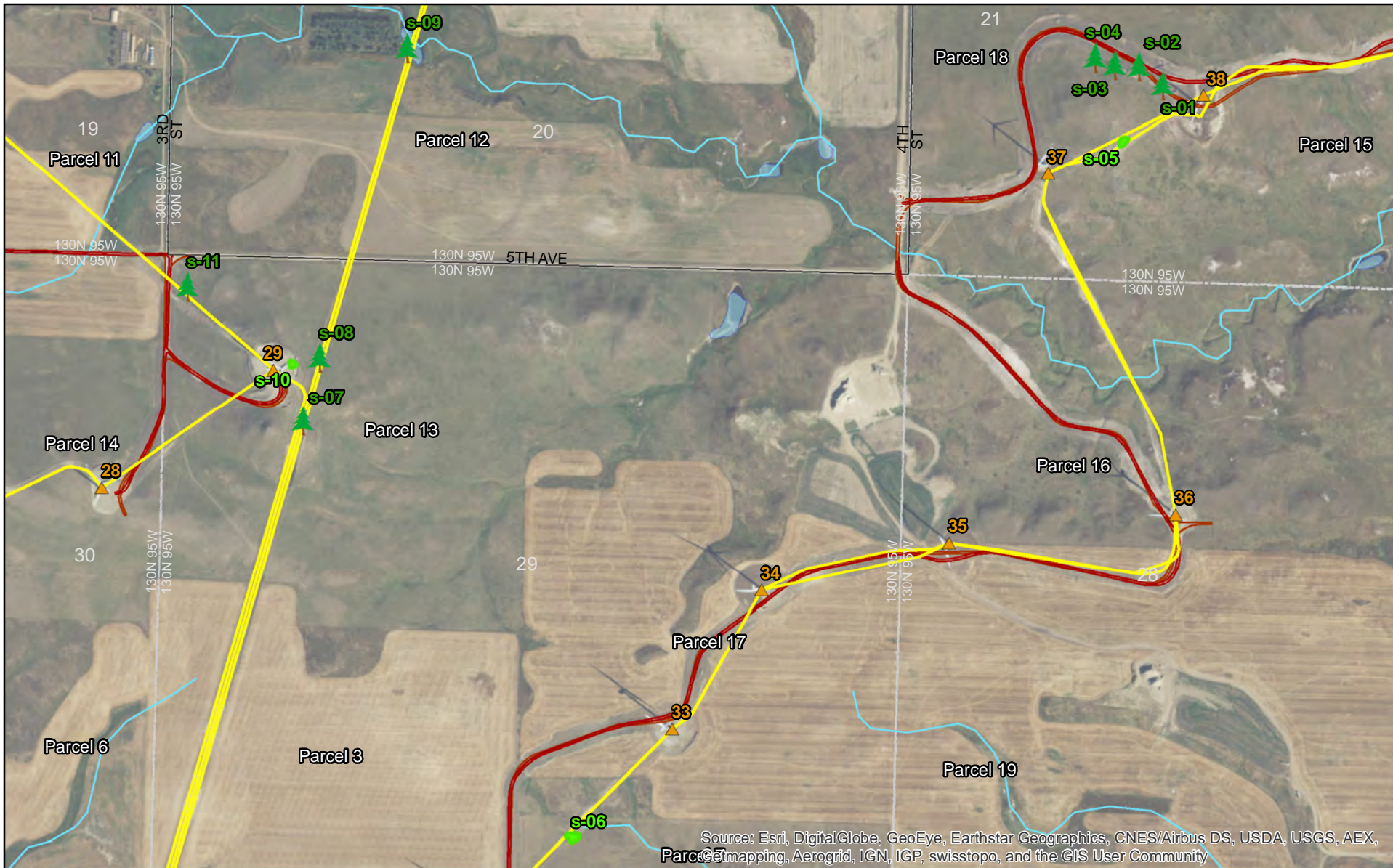
	Tree and Shrub points		Roads
	Tree and Shrub polygons		Stream
	Turbines		Surface Water/Wetland
	Collector Lines		
	Access Roads		

Tree and Shrub Inventory

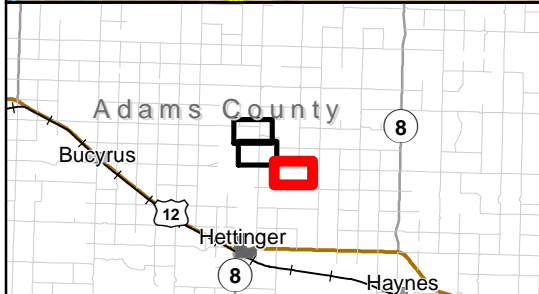
Figure 1 - Page 2 of 3

Scale: 1:12,000

**Thunder Spirit
Wind Project**



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Paragon, AeroGRID, IGN, IGP, swisstopo, and the GIS User Community




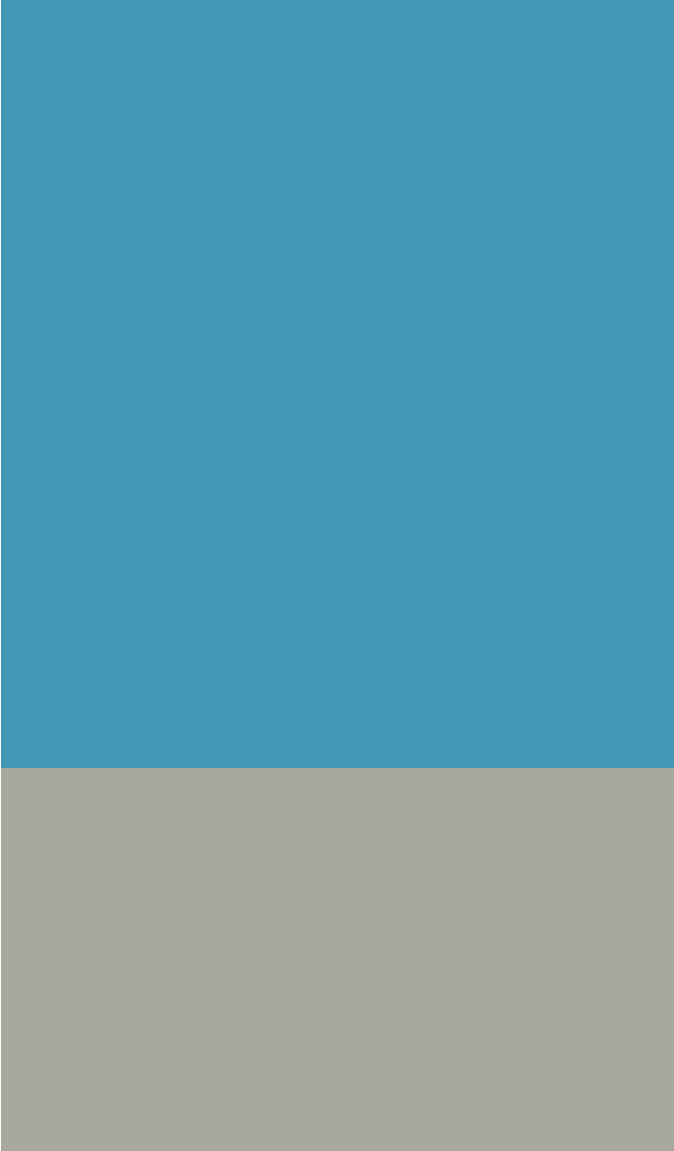
	Tree and Shrub points		Roads
	Tree and Shrub polygons		Stream
	Turbines		Surface Water/Wetland
	Collector Lines		
	Access Roads		

Tree and Shrub Inventory

Figure 1 - Page 3 of 3

Scale: 1:12,000

**Thunder Spirit
Wind Project**



A

Tree and Shrub Mitigation Specifications



STATE OF NORTH DAKOTA

PUBLIC SERVICE COMMISSION

**Montana-Dakota Utilities Co., a Division of MDU Resources
Group, Inc.**

Case No. PU-11-601

Case No. PU-15-592

Thunder Spirit Wind Farm Project

Siting Application

Tree and Shrub Mitigation Specifications

Inventory

1. Trees and shrubs anticipated to be cleared, including those that are considered invasive species or noxious weeds (e.g., *Caragana arborescens*, *Elaeagnus angustifolia*, *Rhamnus cathartica*, *Tamarix chinensis*, *T. parviflora*, *T. ramosissima*, *Ulmus pumila*), must be inventoried before cutting. The inventory must record the location, number, and species of trees and shrubs.
 2. In windbreaks, shelterbelts and other planted areas, trees or shrubs anticipated to be cleared, regardless of size, must be inventoried for replacement.
 3. In native growth areas, trees anticipated to be cleared that are 1 inch diameter at breast height (dbh) or greater must be inventoried for replacement.
 4. In native growth areas, shrubs anticipated to be cleared in the permanent right-of-way must be inventoried for replacement.
 5. In native growth areas outside the permanent right-of-way, shrubs must be cut flush with the surface of the ground, taking care to leave the naturally occurring seed bank and root stock intact. If soil disturbance is necessary, the native topsoil must be preserved and replaced after construction. Shrubs must be allowed to regenerate naturally where native topsoil is preserved and replaced. Where native topsoil is not preserved and replaced, shrubs anticipated to be cleared must be inventoried for replacement.
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6. In native growth areas, trees and shrubs may be inventoried by actual count or by a sampling method that will properly represent the woody vegetation population. A sampling plan developed by the company, filed with the North Dakota Public Service Commission (Commission) and approved prior to the start of construction must define the sampling method to be used for trees, for tall shrubs and for low shrubs. The data from the sample plots must be extrapolated to the total acreage of the wooded area to be cleared to determine the species and quantity of trees and shrubs to be replaced.

Clearing for Construction

7. Trees and shrubs must be selectively cleared, leaving mature trees and shrubs intact where practical.
8. The maximum width of clear cuts through windbreaks, shelterbelts and all other wooded areas is 50 feet, unless otherwise approved by the Commission.
9. If the area of trees or shrubs actually cleared differs from the area inventoried, the difference in number of trees and shrubs to be replaced must be noted on the inventory.

Replacement

10. Prior to tree and shrub replacement, documentation identifying the number and variety of trees and shrubs removed, as well as the mitigation plan for the proposed number, variety, type, location and date of replacement plantings, must be filed with the Commission for approval.
 11. Two 2-year-old saplings must be planted for every one tree removed. Two shrubs (stem cuttings) must be planted for every one shrub removed.
 12. Except in the case of invasive or noxious species, trees and shrubs must be replaced by the same species or similar species, suitable for North Dakota growing conditions as recommended by the North Dakota Forest Service. Invasive or noxious species must be replaced by similar non-invasive or non-noxious species suitable for North Dakota growing conditions as recommended by the North Dakota Forest Service.
 13. Landowners must be given the option of having replacement trees and shrubs planted on the landowner's property, either on or off the right-of-way. The landowner must also be
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given the opportunity to waive those options in writing in order to have replacement trees and shrubs planted off the landowner's property.

14. At the conclusion of the project, documentation identifying the actual number, variety, type, location and date of the replacement plantings must be filed with the Commission.
 15. Tree and shrub replacements must be inspected annually, in September, for three years. The first annual inspection must be at least one year from the anniversary date of the original plantings. A report of each annual inspection must be submitted to the Commission by October 1 of each year, documenting the condition of plantings and any woodlands work completed as of September of each year. If after the third annual report the survival rate is less than 75%, the Commission may order additional planting(s).
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