

Appendix Q

Decommissioning Plan



Wind Project Decommissioning Plan

Tatanka Ridge Wind Project

Prepared for
Tatanka Ridge Wind, LLC
a subsidiary of
Avangrid Renewables, LLC

May 2019

Tatanka Ridge Wind Project Decommissioning Plan

May 2019

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Certifications



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May 21, 2019

Date

1.0 Introduction

Tatanka Ridge Wind, LLC (Tatanka Ridge), a wholly owned subsidiary of Avangrid Renewables, LLC, is proposing to construct Tatanka Ridge Wind Project (Project) in Deuel County, South Dakota (Figure 1). The proposed project will generate up to 155 megawatts (MW) of electricity at rated capacity and will include construction of up to 56 turbines a combination of GE 2.82-127 and GE 2.3-116 wind turbine generators (WTG or turbine) Figure 2 shows the site layout.

This Decommissioning Plan report provides a description of the decommissioning and restoration phase of the Project, including a list of the primary wind farm components, dismantling and removal activities, and disposed or recycled materials. A summary of estimated costs and revenues associated with the decommissioning phase is also included.

1.1 Wind Farm Components

The main components of the proposed Project include:

- Turbines (tower, nacelle, hub, rotor, and three rotor blades per WTG)
- Turbine foundations
- Step-up transformers
- Access roads
- Crane pads
- Electrical collection system
- Meteorological (MET) tower
- Substation equipment and foundations
- Operation and maintenance (O&M) buildings and foundations

1.2 Expected Lifetime and Triggering Events

The anticipated Project life is 40 years from the date of construction. Depending on market conditions and Project viability, the turbines may be refitted with updated components, such as nacelles, towers, and/or blades to extend the life of the Project. In the event that the turbines are not retrofitted, or at the end of the Project's useful life, the turbines and associated components will be decommissioned and removed from the site.

Turbine components that have resale value may be sold in the wholesale market. Components with no wholesale value will be salvaged and sold as scrap for recycling or disposed at an offsite licensed solid waste disposal facility (e.g., landfill). Decommissioning activities will include removal of the turbines and associated components as listed in Section 1.1 and described in Section 2.

1.3 Decommissioning Sequence

Decommissioning activities are anticipated to be completed in an 18-month timeframe. Monitoring and site restoration may extend beyond this period to ensure successful revegetation and rehabilitation. The anticipated sequence of decommissioning and removal is described as follows; however, overlap of activities is expected:

- Conduct site investigation
- Contact land owners
- Conduct access assessment
- Conduct public road condition assessment
- Conduct site access road assessment
- Complete decommissioning permits application and notification
- Prepare site by site decommissioning sequence and schedule
- Negotiate decommissioning contractor terms and conditions
- Obtain necessary permits and approvals
- Provide Notice to Proceed for Decommissioning Contractor
 - Mobilize and prepare field staff yard and offices
 - Mobilize construction equipment (cranes, lowboys, graders, utility trucks, etc.)
 - Begin site access road maintenance and, where necessary, apply crushed rock to facilitate equipment access
 - Identify and secure laydown area at each site to process decommissioned equipment and material
 - Disconnect and secure electrical equipment from public power grid
 - Secure rotating machinery in preparation of disassembly
 - Begin fluid removal and processing
 - Mobilize crane(s)
 - Remove blades and place in laydown area for site processing
 - Remove nacelle and place in laydown area for processing. or alternately, load directly to shipping and move to remote site for processing

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- Disassemble tower and place in laydown area for site processing
 - Mobilize crane to next site (this may be overland if possible to negotiate with land owners to speed disassembly and avoid multiple over road transport and erection operations)
 - Process blades and load for disposal/recycle
 - Process tower and load for transport to scrap yard
 - Remove underground cable where surfaced
 - Remove tower foundation to a depth of 42 inches below final grade using approved means and methods
 - Haul tower foundation material to disposal site for reprocessing (concrete to be crushed, rebar for recycle)
 - Remove access road and surfacing (gravel) where required
 - Haul surfacing material to approved stockpile for reclaim or sale
 - Regrade site to appropriate contours
 - Prepare soil for seeding
 - Seed site
 - Complete final clean up

2.0 Decommissioning Components and Activities

The wind farm components and decommissioning activities necessary to restore the Project area, as near as practicable, to pre-construction conditions are described within this section. Tatanka Ridge will dismantle and remove all towers, turbine generators, transformers, overhead and underground cables, foundations, buildings, and ancillary equipment to a depth of 42 inches unless landowner agreements specify a greater depth. To the extent possible the permittees shall restore and reclaim the site to its pre-project topography and topsoil quality.

Estimated quantities of materials to be removed and salvaged or disposed are included in this section. Public roads damaged or modified during the decommissioning and reclamation process shall be repaired upon completion of the Project.

2.1 Wind Farm System Overview

The Project will use a combination of GE127 2.82 MW and GE116 2.3 MW turbines with a total nameplate generating capacity of up to 155 MW. Table 1 presents a summary of the primary components included in this decommissioning plan.

Table 1 Primary Components of Wind Farm to be Decommissioned

Component	Quantity	Unit of Measure
Wind turbines (including one tower, one nacelle, one hub and one rotor with three rotor blades per turbine)	56	Each
Step-up transformers	56	Each
Wind turbine foundations	56	Each
Crane pads or mats	56	Each
Access roads	89,760	Lineal Feet (estimated)

2.2 Wind Turbine Generators

The GE127 2.82 MW model wind turbine generators are primarily comprised of a modular steel tower, nacelle, and rotor with three rotor blades attached to a hub. The hub height of the turbines will be 88.5 meters (m) with a 127 m rotor diameter. The GE116 2.3 MW model wind turbine generators have comparable components and share a similar platform, with a hub height of 90 m and with a 116 m rotor diameter. The components of both are modular in design, allowing for ease of construction, replacement, and disassembly during decommissioning. Turbine components in working condition may be refurbished and sold in a secondary market yielding greater revenue than selling as salvage material. For the purposes of this report, estimates will be based on the salvage value, as this will be the most conservative estimate of revenue.

Turbine Tower - The turbine towers are painted modular monopole steel structures approximately 88.5 to 90 m long. Each tower contains approximately 172 tons of salvageable steel. It is estimated that the tower sections will be cut down to transportable size and sent to a scrap metal facility for processing.

Nacelle - The nacelle sits at the top of the turbine tower and has an overall weight of approximately 75 tons including the bedplate. The nacelle is comprised of approximately 80% salvageable steel along with other non-salvageable materials. Non-salvageable material within the nacelle will be disposed in a landfill.

Hub, Rotor, and Rotor Blades - The rotor and hub (without blades) has a total weight of approximately 47 tons. It is mainly comprised of steel that will be salvaged along with the tower and nacelle. The rotor blades are constructed of non-metallic materials such as fiberglass, carbon fibers, and epoxies. These materials will likely have no salvage value and will be recycled for a cost.

Other Turbine Components - In addition to the main components previously described, each WTG contains other items such as ladders and platforms, anchor bolts, and internal electrical wiring that will have additional salvage value.

Decommissioning Activity - The wind turbines will be deactivated from the surrounding electrical system and made safe for disassembly. Improvements to access roads and crane pads will be completed to allow crane access to turbines for removal of components. Liquid wastes, including gear box oil and hydraulic fluids will be removed and properly disposed or recycled according to regulations current at the time of decommissioning. Control cabinets, electronic components, and internal electrical wiring will be removed and salvaged. The hub and rotors will be lowered to the ground as a unit for disassembly. The nacelle and turbine sections will be disassembled and removed in the reverse order of assembly.

2.3 Step-Up Transformers

After deactivation, oil will be drained and recycled or disposed at an approved solid waste management facility. The transformer will then be disassembled and removed. Depending on condition, the transformers may be sold for refurbishment and re-use. If not re-used, the transformer will be salvaged for raw materials.

2.4 Wind Turbine Foundations

Typical spread footing foundations utilized for the Project turbines will be predominantly located underground. Below the pedestal is the foundation base, a typically octagonal-shaped concrete structure. The entire foundation sits on supporting sub-grade typically around 10 feet below the ground surface. At the time of this report, foundation design has not yet been completed.

Concrete demolition will be completed on the upper 42 inches of the pedestal. This will include the anchor bolts, rebar, conduits, cables, and concrete to the required depth. The site will be back-filled

with clean fill and graded and the land contours restored as near as practicable to preconstruction conditions. Topsoil will be placed on the disturbed area and revegetated. The cost estimate for the excavation and removal of turbine foundations is conservatively based on the previous foundation design sizes. Material would be demolished and hauled to a landfill.

2.5 Collection System

The Project's electrical collection system will be overhead or located in cable trenches that will generally be buried at a depth more than 42 inches below the ground surface. The system voltage is 34.5 kilovolts (kV) and will run from the individual turbine step-up transformers to the Project substation.

The Project collection system would not interfere with farming activities when placed 42 inches or more below ground surface. Hence, complete cable removal is not required at decommissioning to restore the wind farm site to its former use. Cables 42 inches or more below ground surface will be completely deactivated and abandoned in place. Minimal decommissioning costs are associated with the collection system and are included in the turbine decommissioning estimate. If, at the time of decommissioning, the salvage value of the underground cable exceeds the cost of extraction and restoration, the cables may be removed and salvaged.

2.6 Crane Pads

Crane pads will be located at the base of each turbine to support the large cranes necessary for assembly and disassembly of the turbines. Pads will be approximately 60 feet by 80 feet and consist of compacted native soils and approximately one half foot of base fill. After decommissioning activities are completed, the crane pad aggregate will be removed and the areas filled with native soil, as necessary. Land will be graded and pre-construction contours restored to the extent practicable. Restoration will likely be performed in conjunction with the turbine foundation and/or access road restoration. Soils compacted during de-construction activities will be de-compacted (ripped to 18 inches), as necessary, to restore the land to preconstruction land use. Labor for trucking and equipment is the primary expense for the crane pad removal.

2.7 Access Roads

The Project includes construction of roads to provide access from public roads to the turbine sites. The final width of the roads is approximately 16 feet, widening near the turbine base. The total length of Project access roads is approximately 17 miles. During the initial construction of the wind farm, the existing soils will be graded to match the typical contour of the adjacent land and compacted. The estimated quantity of these materials is provided in Table 2.

Table 2 Typical Access Road Construction Materials

Item	Number	Unit
Geotextile	180,000	Square Yards
Aggregate Course	53,200	Cubic Yards

Tatanka Ridge will remove all access roads unless an affected landowner requests otherwise. Tatanka Ridge will record any agreement for removal to a lesser depth or for no removal with the County and show the locations of all such foundations. Tatanka Ridge will submit all such agreements with affected landowners to the County prior to completion of restoration activities. Tatanka Ridge will restore the Project within 18 months after expiration of the issued permit, or upon earlier termination of operation of the Project. The estimate assumes 75% of the roads are to be removed and returned to preconstruction state. Decommissioning activities include the removal and stockpiling of aggregate materials onsite for salvage preparation. Local townships or farmers may accept the material prior to processing for use on local roads or field access roads; however, for the purpose of this estimate it is conservatively assumed that all materials will be removed from the Project area.

Following removal of aggregate, the access road areas will be graded, de-compacted (ripped to 18 inches), back-filled with native soils, as needed, and land contours restored as near as practicable to preconstruction conditions.

While there would likely be some salvage value for the aggregate surface material, this estimate assumes any costs of material to be removed from the site to be offset by those gained by secondary sales. Therefore, no salvage value for aggregate has been estimated.

2.8 Project Substation

All equipment, conductors, transformers, steel, wiring, and fencing is to be removed. Footings, underground cabling, and aggregate will be removed from the substation site to a depth of 42 inches. Electrical equipment may have value on the secondary market for refurbishment or scrap. Steel and foundations are to be removed and brought to the landfill. Cost of demolishing the substation was based on crews and a scheduled timeframe. No salvage cost was given to the substation.

2.9 Topsoil Restoration and Revegetation

Project sites that have been excavated and back-filled will be graded as previously described to restore land contours as near as practicable to preconstruction conditions. Topsoil will be placed on disturbed areas and seeded with appropriate vegetation to reintegrate it with the surrounding environment. Soils compacted during de-construction activities will be de-compacted, as necessary, to restore the land to preconstruction land use.

3.0 Decommissioning Cost Estimate Summary

Expenses and revenues associated with decommissioning the Project will be dependent on labor costs and market value of salvageable materials at the time of decommissioning. For the purposes of this report, approximate mid-2018 to early-2019 average market values were used to estimate labor expenses. Fluctuation and inflation of the salvage values or labor costs were not factored into the estimates.

3.1 Decommissioning Expenses and Revenues

Project decommissioning will incur costs associated with the disassembly, removal, excavation, and restoration of the proposed wind turbine sites and support infrastructure as described in Section 2. Table 3 summarizes the estimates for activities associated with the major components of the Project.

Revenue from decommissioning the Project will be realized through the sale of wind farm components and construction materials. Turbine components may be sold within a secondary market or as salvage. For purposes of this report, estimated recovery values were based on the salvage value, as this is the more conservative estimate of revenue.

The market value of both steel and copper fluctuate daily, although in the long term, both have generally trended upward. Steel prices are generally more stable than copper. Salvage value estimates were based on a current average price of steel and copper derived from sources including material processing companies and American Metals Market index. The price used to value the steel used in this report is \$170 per ton. This factors in a 10-year steel average, scrap yard handling, and processing to mill size (two feet by five feet), and milling. The value of copper, \$2.10 per pound (\$4,200 per ton) and the value of aluminum at \$.47 per pound (\$940 per ton) were used in this report. The nacelle was assumed to have approximately 80% salvageable steel content; the hub, gearbox and tower 90%. Table 3 summarizes the potential salvage value for the wind turbine components, transformer, and construction materials.

Table 3 Estimated Decommissioning Expenses and Revenues

Activity	Decommission or Salvage	Unit	Number	Cost or Salvage Price per Unit	Total
Overhead and management (includes estimated permitting required; 8%)	Decommission	Lump Sum	1	\$531,000	\$ 531,000
Mobilization and demobilization (6%)	Decommission	Lump Sum	1	\$398,000	\$ 398,000
Access Road Prep	Decommission	Lump Sum	1	\$42,000	\$ 42,000
Crane Mob and Operations	Decommission	Each	56	\$31,071	\$ 1,740,000
Tower Disassembly	Decommission	Each	56	\$30,250	\$ 1,694,000
Blade Demo & Recycling	Decommission	Each	56	\$14,000	\$ 784,000
Turbine Foundation Removal	Decommission	Each	56	\$15,839	\$ 887,000
Collector Line Removal	Decommission	Lump Sum	1	\$38,000	\$ 38,000
Site Restoration (Roads, Turbine & Aux Sites)	Decommission	Lump Sum	1	\$1,314,000	\$ 1,314,000
O & M Removal	Decommission	Lump Sum	1	\$55,000	\$ 55,000
Substation Demo	Decommission	Lump Sum	1	\$71,000	\$ 71,000
MET Tower Demo	Decommission	Lump Sum	1	\$15,000	\$ 15,000
Contingency	Decommission	Percent	20%	\$1,514,000	\$ 1,514,000
Turbine tower (steel) (total per 56 turbines)	Salvage	Tons per turbine	155	(\$170)	(\$1,475,600)
Nacelle (steel) (total per 56 turbines)	Salvage	Tons per nacelle	67	(\$170)	(\$637,840)
Rotor hub (total per 56 turbines)	Salvage	Tons per hub	31	(\$170)	(\$295,120)
Generator/gearbox (total per 56 turbines)	Salvage	Tons per Gen	19	(\$170)	(\$180,880)
Transformer (total per 56 turbines)	Salvage	Per turbine	1	(\$3,600)	(\$201,600)
Copper (total per 56 turbines)	Salvage	Tons per turbine	5.3	(\$4,200)	(\$1,246,560)
Aluminum (total per 56 turbines)	Salvage	Tons per turbine	2	(\$940)	(\$105,280)
Oil disposal	Salvage	Per turbine	1	\$1,000	\$56,000
Collector line (aluminum)	Salvage	Lump Sum	1	(\$7,100)	(\$7,100)

3.2 Net Decommissioning Cost Summary

The following is a summary of the net estimated cost to decommission the Project, using the information detailed in Sections 3.2 and 3.3. Estimates are based on 2018 prices, with no market fluctuations or inflation considered.

Table 4 Net Decommissioning Summary

Item	Cost
Decommissioning expenses	\$9,083,000
Potential revenue - salvage value of turbine components and recoverable materials	(\$4,093,980)
Net Decommissioning Cost	\$4,989,020
Per Turbine Decommissioning Cost (based on 56 turbines)	\$89,090

This engineer's estimate produces a conservative estimate of the cost of decommissioning the Project based on the following considerations:

1. Limited design work has been completed.
2. Quantities based on design work completed.
3. This concept-level (Class IV, per AACEI cost estimate classification system 17R-97) cost estimate is based on engineering of 1-15% design and is meant for feasibility uses. Costs will change with further design changes. Class IV estimates are typically used for project screening, determination of feasibility, concept evaluation, and preliminary budget approval. The estimated accuracy range for the Total Project Cost as the project is defined is -20% to +30%. The accuracy range is based on professional judgment considering the level of design completed, the complexity of the project and the uncertainties in the project as scoped.

3.3 Financial Assurance

Tatanka Ridge will commit to a parent guarantee for financial assurance adequate to pay the entire cost of the decommissioning process. Decommissioning costs will be re-evaluated after the first year of facility operation, then every ten years following. The initial inflation rate will be 2.5% and will be considered when decommissioning costs are re-evaluated.

3.4 Salvage Value

Salvage values are considered to be the most variable component of the decommissioning study. Depending on the material, equipment, and salvage opportunities, the means and methods used by the contractor would vary from scrapping materials completely to selling equipment in the secondary market and processing materials and equipment, onsite or at a facility, for future use or scrap value.

Assumptions in the salvage values were based on current conditions and processing applications. Many materials that are non-recyclable will likely be sent to a landfill, such as concrete debris, wood, or turbine blades.

3.4.1 Pricing assumptions

Material salvage pricing is derived from the American Metals Market Index. Prices below are quoted from scrap yards based on current market prices. The steel price is a 10-year market average. In order to capitalize on these prices, material would need to be shipped to a mill and be cut to size prior to shipment. In this case, most components were assumed to be disassembled in a process similar to erection and cut to shippable size onsite. Ability to reclaim all scrap at this pricing is not likely. Some factor is taken in the pricing to account for an assumed grade of scrap.

The following pricing assumptions were used to calculate scrap and waste value. Weights are in gross tons:

- Steel \$170/ton
- Copper \$4,200/ton
- Aluminum \$940/ton

Salvage weight has been estimated, scaled, or has been taken from manufacturer's technical data sheets. Some resale value of components is likely. In this case, certain transformers and electrical components would be considered to have immediate value on the market because of their longer design life. It is likely that newer components may be installed during the lifetime of the wind farm due to maintenance or failure of older components. This estimate does not make attempts to quantify resale of equipment to a secondary market, rather it makes the assumption that all salvage costs will come from scrapping of raw materials.

3.5 Markups

The following typical contractor markups were applied to the Demolition Cost Estimate only:

- Contractor Project Management/Overhead 8%
- Mobilization/Bond/Insurance 6%

3.6 Escalation Rate

Barr Engineering Co. (Barr) has not changed, scaled, or accounted for escalation of costs in the future. Considering the volatility of several markets, construction, energy, and labor, an update to this cost estimate prior to actual decommissioning is recommended. This study quantifies the Project in today's current market and estimates cost in 2019 dollars.

3.7 Estimate Classification

This concept-level (Class IV, per AACEI cost estimate classification system 17R-97) cost estimate is based on engineering of 1-15% design and is meant for feasibility uses. Costs will change with further design changes. Class IV estimates are typically used for project screening, determination of feasibility, concept evaluation, and preliminary budget approval. The estimated accuracy range for the Total Project Cost as the project is defined is -20% to +30%. The accuracy range is based on professional judgment considering the level of design completed, the complexity of the Project, and the uncertainties in the Project as scoped.

3.8 Cost Resources

The following is a list of the various cost resources used in the development of the cost estimate:

- 2019 R.S. Means
- American Metals Market Index
- Barr historical data
- Vendor quotes on scrap and shipping associated costs
- Estimator judgment

3.9 Estimate Methodology

Costs were built up from crews and equipment over an estimated schedule as well as contacting industry professionals for quotes and pricing. Some items, such as the MET tower costs, were lump sum allowances based on similar decommissioning studies.

3.10 Labor Costs

The estimate is based upon national labor rates.

3.11 Sales Tax

This demolition contract estimate has been assumed to not incur any sales tax.

3.12 Soft Costs

The cost estimate does not include any soft costs. Soft costs that would likely be associated with the Project would be engineering, design, permitting, land, legal, and other fees.

3.13 Major Assumptions

The estimate is based on the assumption the work will be done on a competitive bid basis and the contractor will have a reasonable amount of time to complete the work. All contractors are equal, with a

reasonable project schedule, no overtime, work performed as under a single contract, and no liquidated damages.

This estimate was prepared in February 2019. As with all estimates, it represents a snapshot in time of what is known about the Project and expected to occur. The commodities and energy markets are active at this point in time. Changes in either could have dramatic effects on this estimate. Therefore, this estimate should be viewed in that light and if more than 180 days have passed or there have been significant changes in the commodity markets, this estimate should be updated and reevaluated.

- Commodity prices for steel, copper, and aluminum were sourced from the AMM cost index and adjusted based on discussions with scrap vendors. (Different types and grades of metals will vary pricing.)
- The site is readily accessible.
- Only minor repairs to access roads will be necessary to accommodate crane access.
- Turbine blades will be disposed or recycled. Materials will be brought to an approved disposal site within 60 miles.
- Only turbine foundation pedestal sections and a portion of the footing is to be removed to 42 inches below grade.
- 90% of tower steel was estimated to be recoverable.
- 40% of the generator weight is salvageable copper.
- Aluminum ladders, internals, and platforms are estimated to be 2 ton per turbine.
- Contractor will be allowed to stage construction to obtain the most efficient workflow possible.
- Contractor will not be required to perform work using the same means or methods used to produce this estimate.
- Contractor will be allowed to use the most appropriate, safest, and efficient methods available to them at the time of performing the work.
- Contractor will secure and provide any required demolition permits or certificates.
- Demolition contractor will load salvage materials in appropriate sizes and weights at each site to recycling buyer's vehicle.
- Assumed 89,760 linear feet (17 miles) of access road, 16 feet in nominal width.
- Turbine and tower dismantling production is 2 work days per turbine.
- Crane movement and setup is separate from dismantling operation.

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- Site restoration includes roadway removal and regrading of site, including deep tilling to remove compaction of soils at the road and tower site. 75% of the road will be removed, 25% will remain.
 - Salvaged roadway material is stockpiled or delivered within a 20-mile radius of each turbine site. Assumed resale value offsets freight fees.
 - Half day of decommissioning preparation per site, including oil removal, is allocated prior to crane dismantling.
 - All recycled material is processed to manageable sizes for transport from site.
 - All recycled material is provided to recycling vendor Free On Board Shipping Point.
 - Sales tax is not included; the Project is assumed not to be purchasing major quantities of new materials.

3.14 Excluded Costs

The cost estimate excludes the following costs:

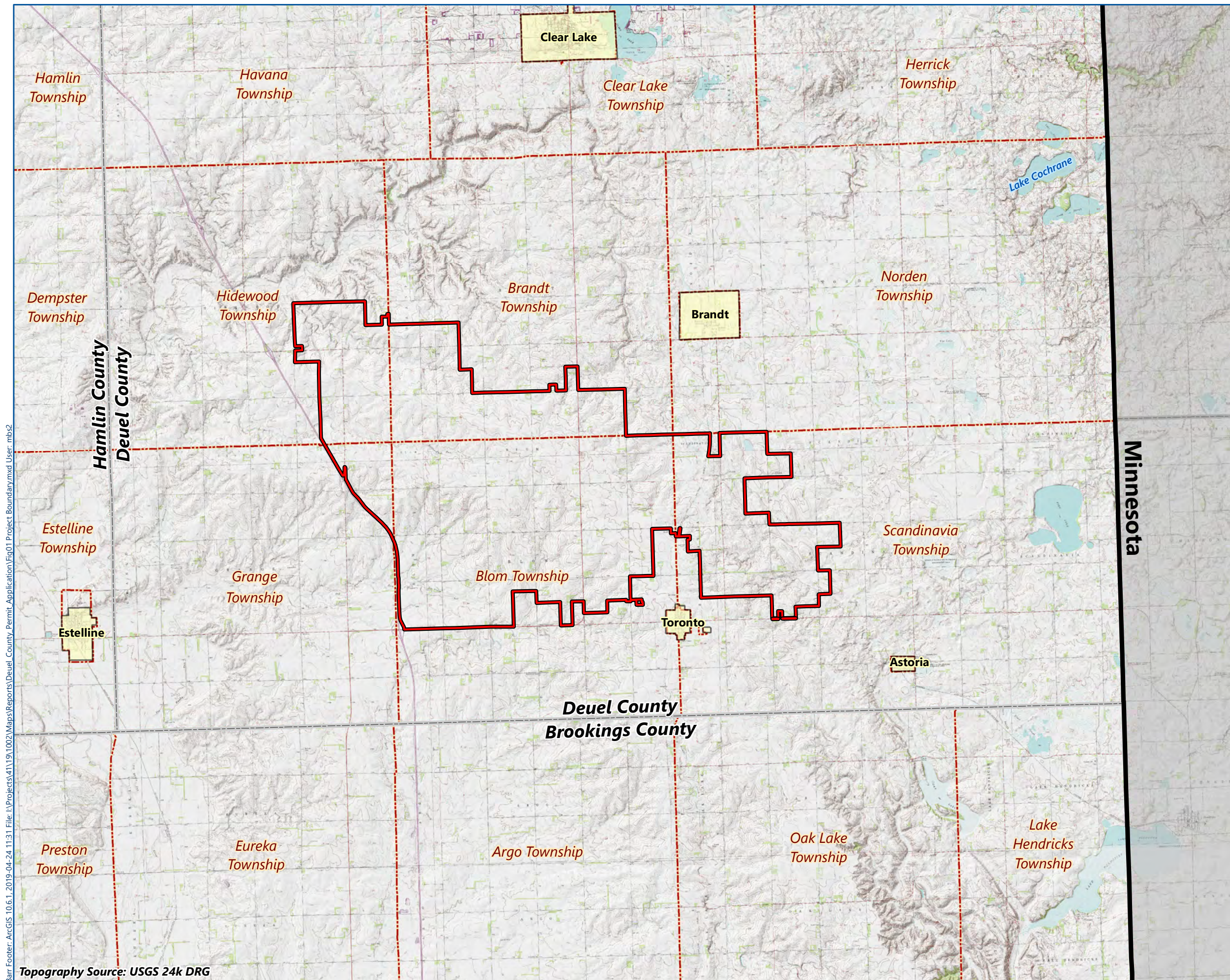
- Non-construction or soft costs for design, services during construction, land, legal, and owner administration costs.






4.0 Referenced Documents

This estimate is based upon the following documents:

- GIS data 3-27-2019 (Avangrid)
- GE 2.0MW Platform – Weights and Dimensions
- AMM August 2018 Pricing Index

Figures



-  Project Boundary
-  Municipality
-  Civil Township Boundary
-  County Boundary
-  State Boundary

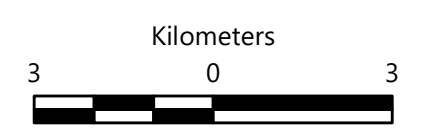
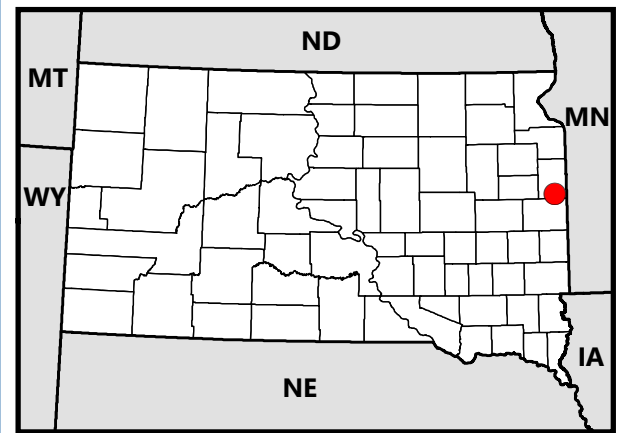


Figure 1

PROJECT BOUNDARY
 Tatanka Ridge Wind Project
 Tatanka Ridge Wind, LLC
 Deuel County, South Dakota

Bar: Footer: ArcGIS 10.6.1, 2019-04-24 11:31 File: I:\Projects\4119\1002\Maps\Reports\Deuel County_Permit_Application\Fig01 Project Boundary.mxd User: mbs2

Topography Source: USGS 24k DRG

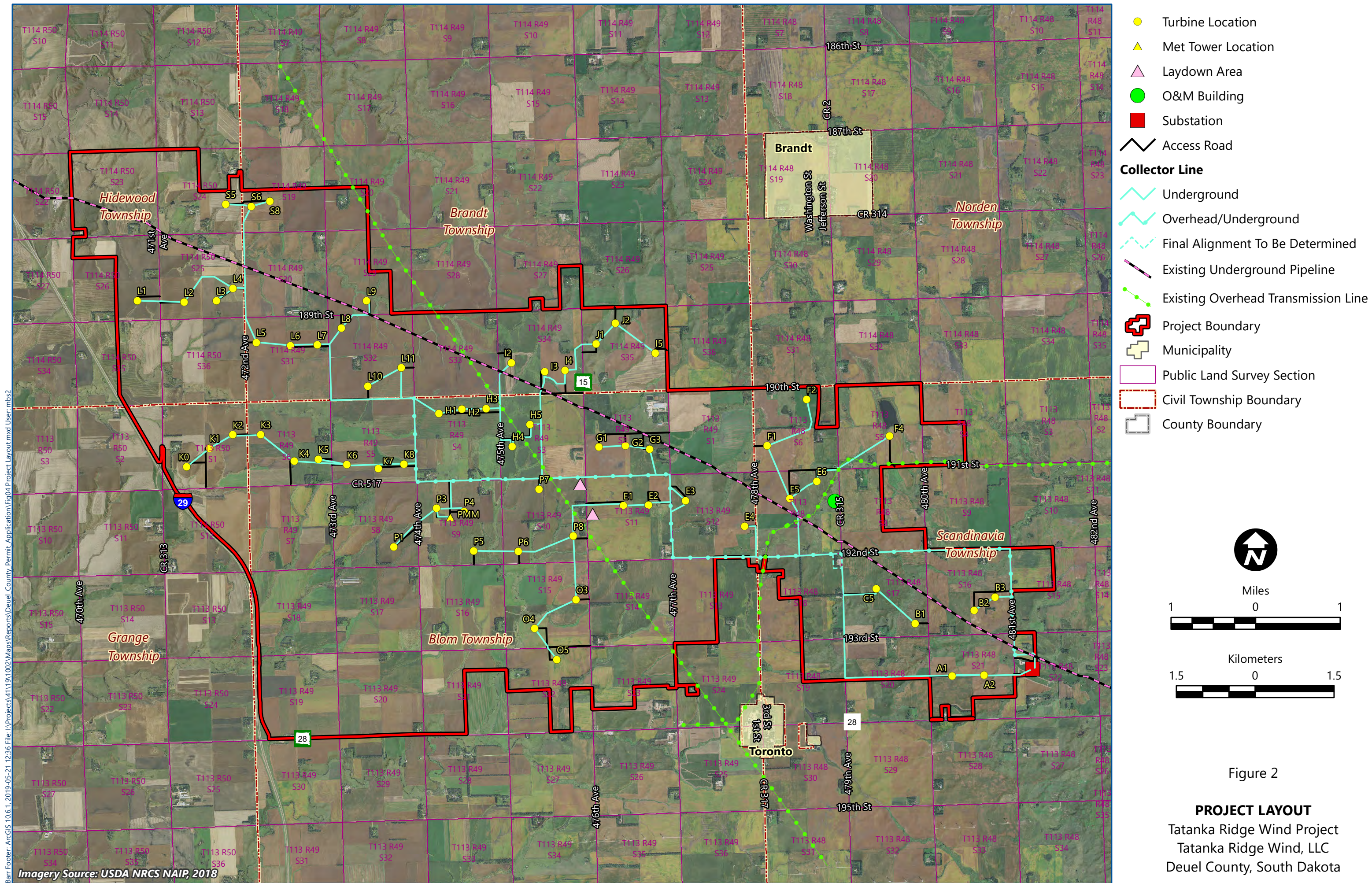


Figure 2

PROJECT LAYOUT
 Tatanka Ridge Wind Project
 Tatanka Ridge Wind, LLC
 Deuel County, South Dakota