

Appendix E

Route Comparison Analysis

Appendix E			
Comparison of Minn. Admin. Rule 7850.4100 Routing Factors Considered for the Big Bend Wind Project			
Factor	Route Options		
	Proposed Route	Crandall Alternate Route	Peaking Plant Alternate Route
Factor A - Effects on Human Settlement			
Displacement (Section 5.2.3)	No displacement of residences or businesses would occur as a result of the Project. On the Crandall Alternate Route, there is an abandoned building that would need to be removed within the right-of-way; Big Bend is coordinating with this landowner.		
Noise (Section 5.2.4)	Construction of the Project would result in minimal, temporary, and localized increases in noise; increases in noise would resolve with the completion of construction. Operation of the Project would not exceed noise limits set by the MPCA.		
Aesthetics (Section 5.2.5)	All of the route options would result in minimal to moderate aesthetic impacts from alteration of the current landscape due to the visibility of the transmission line poles and switching station.		
Cultural Values (Section 5.2.7)	None of the route options would impact cultural values within the Project Study Area.		
Recreation (Section 5.2.8)	The route options presented for the Project avoid designated federal, state, or local recreation areas. Temporary increases in dust and noise during construction could disrupt public use of nearby recreation areas, but these effects would be minimal and temporary and would resolve with the completion of construction. Operation of the Project would not impact public use and enjoyment of recreation areas.		
Snowmobile Trails Crossed by the Application Alignment	2 crossings and co-located for 0.3 mile	2 crossings and co-located for 0.3 mile	2 crossings and co-located for 0.3 mile
Land Use (Section 5.2.9)	Within Right-of-way and Total Percentage of Route ¹		
Cultivated Crop Land	247.8 acres 82.4% of route	193.8 acres 77.3% of route	190.4 acres 73.8% of route
Hay/Pasture Land	1.4 acres 0.5% of route	0 acres 0% of route	0.9 acre 0.3% of route
Emergent Herbaceous Wetlands	1.8 acres 0.6% of route	1.1 acres 0.4% of route	0 acre 0% of route
Herbaceous Land	1.9 acres 0.6% of route	0 acre 0% of route	0 acre 0% of route
Deciduous/Mixed Forest	0 acre 0% of route	1.1 acres 0.4% of route	1.1 acres 0.4% of route
Developed Areas	47.5 acres 15.9% of route	54.5 acres 21.8% of route	65.3 acres 25.4% of route

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Public Services (Section 5.2.10)	The Project would not impact the availability of public services in Cottonwood, Watonwan, and Martin Counties.		
Factor B - Effects on Public Health and Safety			
Public Health and Safety (Section 5.2.1)	Construction of any of the route options has the potential to cause a minimal, temporary increase in demand for public health and safety services in Cottonwood, Watonwan, and Martin Counties. No increase in demand for public health and safety services is anticipated during operation of the Project. Big Bend will comply with all applicable safety requirements during construction and operation of the Project to minimize the need for public health and safety services.		
Factor C - Effects on Land-Based Economies			
Agriculture (Section 5.3.1)	Construction of any of the route options would cause minimal, temporary impacts to agricultural land from soil compaction and rutting, accelerated soil erosion, crop damage, temporary disruption to normal farming activities, and introduction of noxious weeds to the soil surface. In addition, some areas of prime farmland or farmland of statewide importance would be taken out of production during construction of any of the route options. Permanent impacts to agricultural land would occur from placement of transmission line structures in agricultural fields and construction and operation of the Step-up Substation (for the proposed Route and the Crandall Alternate Route) or the Substation for the Peaking Plant Alternate Route. However, Big Bend will minimize permanent impacts to agricultural land by siting structures along field edges, as closely as feasible (approximately 15 feet) from the edge of road rights-of-way or parcel lines. None of the route options cross parcels enrolled in the CREP or RIM programs. Overall, impacts to agricultural production as a result of the Project are anticipated to be minimal, regardless of the route option chosen by the Commission.		
Number of poles in cultivated crop land (based on preliminary pole spacing) ²	163	138	147
CREP Easements Within Right-of-Way	No CREP Easements	No CREP Easements	No CREP Easements
Forestry (Section 5.3.2)	No forestry operations are located within the route options; therefore, the Project would not impact forestry operations.		
Tourism (Section 5.3.3)	The Project is not anticipated to affect available tourism and recreational opportunities in the Project Study Area regardless of which route option is chosen by the Commission.		

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Mining (Section 5.3.4)	The Project is not anticipated to affect mining resources regardless of which route option is chosen by the Commission.		
Factor D - Effects on Archaeological and Historic Resources			
Previously Recorded Archaeological Resources (Section 5.4)			
Total Number Within Route/ Eligible for NRHP ³	0/0	0/0	0/0
Total Number Within 1 mile of Route/ Eligible for NRHP ³	1/1	1/1	1/1
Previously Recorded Historic Architectural Resources (Section 6.4)			
Total Number Within Route/ Eligible for NRHP ³	1/1	1/1	2/1
Total Number Within 1 mile of Route/ Eligible for NRHP ³	16/0	22/0	30/0
Factor E - Effects on the Natural Environment			
Air Quality (Section 5.5.1)	Minimal, temporary impacts to air quality would occur during construction of the Project from vehicle emissions and fugitive dust along right-of-way and local gravel roads. Impacts to air quality would resolve after construction is complete. Operation of the Project could result in increases to ozone production rate; however, any emissions of ozone from the transmission line would be minimal and are expected to be well below federal and state standards.		
Geology and Groundwater (Section 5.5.2)	No impacts to geology or groundwater resources would occur from construction or operation of the Project.		
Number of Wells Within the Right- of-Way	0	0	0
Soils (Section 5.5.3)			
Prime Farmland (All Categories) ¹	291.2 acres 96.9% of route	244.4 acres 97.6% of route	253.5 acres 98.4% of route

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Farmland of Statewide Importance ¹	7.5 acres 2.5% of route	3.7 acres 1.5% of route	1.7 acres 0.7% of route
Surface Water Resources (Section 5.5.4)			
Lakes, Rivers, Streams, and Ditches (Section 5.5.4.1)	The right-of-way of this route option would cross streams and rivers 6 times, including 4 PWI stream crossings	The right-of-way of this route option would cross streams and rivers 10 times, including 9 PWI stream crossings	The right-of-way of this route option would cross streams and rivers 6 times, including 5 PWI stream crossings
Impaired Waters Crossed by the Route (Section 5.5.4.2)	5	9	5
Total FEMA-designated 100-year Floodplains (Section 5.5.4.3) ⁴	41.2 acres 13.7% of route	48.2 acres 19.3% of route	40.7 acres 15.8% of route
Number of Poles in FEMA-designated 100-year Floodplains (based on preliminary engineering design)	20	25	20
Wetlands (Section 5.5.5)			
Total Wetlands Within the Right-of-Way	3.4 acres 1.2% of route	3.7 acres 1.5% of route	1.4 acres <0.1% of route
Non-Forested Wetlands Within the Right-of-Way	3.4 acres 1.2% of route	3.5 acres 1.4% of route	1.2 acres <0.1% of route
Forested Wetlands Within the Right-of-Way	0 acres 0% of route	0.2 acres 0.1% of route	0.2 acres <0.1% of route
Number of Poles in Wetlands (based on preliminary engineering design)	2	2	1

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Flora (Section 5.5.6)	Vegetation clearing any of the route options would be minimal because Big Bend sited the routes to predominantly cross cultivated cropland. Approximately 1.1 acres of deciduous/mixed forest land is within the right-of-way of the Crandall and Peaking Plant route options and no forested land is within the right-of-way of the Proposed Route.		
Fauna (Section 5.5.7)	The potential impacts on wildlife and wildlife habitat during construction and maintenance of the Project will be minimal regardless of the route option chosen by the Commission. Potential impacts on wildlife during construction would be primarily related to temporary disturbance and displacement. Potential impacts to wildlife and wildlife habitat during operation of the Project would be minimal and primarily related to avian collisions. Big Bend will coordinate with USFWS and MNDNR as needed to identify avian movement pathways and migration flyways that may be crossed by the route options and to discuss areas along the transmission line that may need to be marked with avian flight diverters to minimize impacts to birds. In addition, the Project will be constructed and operated according to Avian Power Line Interaction Committee (APLIC) recommended standards to reduce the potential for avian collisions and electrocutions (APLIC, 2006; APLIC, 2012).		
Factor F - Effects on Rare and Unique Natural Resources			
Rare and Unique Natural Resources (Section 5.6)			
Federal and State-listed Species Potentially Present Within One Mile of the Route (Section 5.6.1)	Northern long-eared bat Prairie bush clover Abbreviated Underwing Great Plains Toad Phlox Moth Poweshiek Skipperling Sullivant's Milkweed	Northern long-eared bat Prairie bush clover Abbreviated Underwing Great Plains Toad Phlox Moth Poweshiek Skipperling Sullivant's Milkweed	Northern long-eared bat Prairie bush clover Abbreviated Underwing Great Plains Toad Phlox Moth Poweshiek Skipperling Sullivant's Milkweed
Designated Natural Resource Sites Within Right-of-Way (Section 5.6.2)	1 SOBS (ranked as moderate)	Does not cross SOBS	Does not cross SOBS
Factor G – Application of Design Options that Maximize Energy Efficiencies, Mitigate Adverse Environmental Effects, and Could Accommodate Expansion of Transmission or Generating Capacity			
General	Construction of the facilities along any of the route options will maximize energy efficiencies and mitigate adverse environmental effects.		
Factor H - Use or Paralleling of Existing Rights-of-Way, Survey Lines, Natural Division Lines, and Agricultural Field Boundaries			

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Survey Lines, Natural Division Lines, Agricultural Field Boundaries	Approximately 3.3 miles of this route option will follow existing property lines (18.6%).	Approximately 1.9 miles of this route option will follow existing property lines (13%).	Approximately 3.0 miles of this route option will follow existing property lines (19.7%).
Factor I – Use of Existing Large Electric Power Generating Plant Sites			
Not applicable			
Factor J - Use of Existing Transportation, Pipeline, and Electrical Transmission Systems or Rights-of-Way			
Existing road Rights-of-way	12.2 miles 68.9%	11.4 miles 78.1%	11.4 miles 75.0%
Existing Electrical Transmission Systems or Rights-of-Way	0 miles 0%	0 miles 0%	0 miles 0%
Existing Pipeline Systems or Rights-of-Way	None of the route options were sited to follow existing pipeline systems or rights-of-way and none of the route options cross existing pipeline systems rights-of-way.		
Factor K - Electrical System Reliability			
Electrical System Reliability	All route options support the reliability of the regional electrical system.		
Factor L - Cost of Constructing, Operating, and Maintaining the Facility Which Are Dependent on Design and Route			
Estimated Construction Costs – Single-Circuit Monopole (2020\$) (Section 2.7)	\$12-14 million	\$9.6-12 million	\$9.6-12 million
Operation and Maintenance Costs– Single-Circuit Monopole (2020\$)	Approximately \$1,500/mile	Approximately \$1,500/mile	Approximately \$1,500/mile
Factor M - Adverse Human and Natural Environmental Effects Which Cannot Be Avoided and Factor N – Irreversible and Irretrievable Commitments of Resources			
General	Construction of any of the three route options would require a commitment of people and resources and would impact the existing environment in the Project Study Area. While impacts to most resources would be minimal and temporary, other resources would be irreversibly committed to the Project and would be irretrievable. A summary of the unavoidable impacts from construction and operation of the route options is presented below. For each route option, the resources committed would be similar due to the same general area being crossed by each route; however, for some resources the Crandall and Peaking Plant Alternate Routes would have less of an impact overall due to their shorter lengths.		

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Route Specific	Length: 17.7 miles Acres in right-of-way: 300.4 Approximately 165 structures total	Length: 14.6 miles Acres in right-of-way: 250.4 Approximately 138 structures total	Length: 15.2 miles Acres in right-of-way: 257.6 Approximately 148 structures total
Construction – All Routes	Unavoidable impacts related to the Project that would last only as long as the construction period include: <ul style="list-style-type: none"> • noise emitted from vehicles and equipment during construction that will be audible to neighboring landowners; • increased traffic on roads crossed by the route options; • minimal air quality impacts due to fugitive dust; • potential for soil erosion and compaction; and disturbance to and displacement of some species of wildlife. 		
Operation – All Routes	Unavoidable impacts related to the Project that would last as long as the life of the Project would include: <ul style="list-style-type: none"> • changes to existing aesthetics of landscape (from agrarian to visible transmission line structures), which will be visible from local roadways and parcels; and • permanent impacts to agricultural land from placement of transmission line structures and the Step-up Substation or Substation. 		
¹	Acreage provided is for the routes options only; the Step-up Substation and/or Substation impacts are not included.		
²	Pole spacing is representative and assumes the Project minimum of 600 feet where the right-of-way is 100 feet wide and 800 feet where the right-of-way is 150 feet wide; final pole spacing may vary from this estimate and would likely result in fewer poles overall as changes to final design are incorporated. Pole spacing will range from approximately 600-800 feet in the 100-foot right-of-way and 800-1,100 feet in the 150-foot right-of-way.		
³	The number of NRHP-eligible resources shown is a subset of the total number of archaeological sites or historic architectural resources.		
⁴	None of the route options would cross 500-year floodplains.		
Notes: Commission: Minnesota Public Utilities Commission CREP: Conservation Reserve Enhancement Program MPCA: Minnesota Pollution Control Agency NRHP: National Register of Historic Places PWI: Public Waters Inventory RIM: Reinvest in Minnesota SOBS: Site of Biodiversity Significance			

