

MEMO

Date: August 21, 2008
To: North Dakota Public Service Commission
Copy To:
From: Kadrmass, Lee & Jackson, Inc
Re: **Addendum: Changes to Application for a Certificate of Site Compatibility (Luverne Wind Farm)**

Summary:

The Certificate of Site Compatibility for the Luverne Wind Farm was previously submitted to the PSC on May 19, 2008. Since the time of submittal, changes have been made to the type of wind turbines used and their locations. The original text from the PSC application, along with the revised text, is listed below in order as they appear in the application.

Description of Change 1: M-Power has decided to use GE 1.5 MW turbines for both the north and south fields of the Luverne Wind Farm. The GE 1.5 MW turbine is a lower MW turbine than the 2.1 MW Suzlon or 2.5 MW Clipper turbines which were originally proposed for the south field. Switching to the GE 1.5 MW turbines in the south field requires a greater amount of turbines to reach the MW nameplate. Change 1 includes changing the original number of turbines (75 to 84) and replacing it with the current 105 GE 1.5 MW turbines.

[Original Text (page 1) for Change 1]

1.0 Introduction

"M-Power, LLC is submitting this application for a Certificate of Site Compatibility (Certificate) from the North Dakota PSC (Public Service Commission) to construct the proposed Luverne Wind Farm (the Project). The Project is located in Griggs and Steele Counties in North Dakota. The facility, located within a 20,480 acre study area, is planned to be approximately 157 MW (megawatts) in size and will consist of a total of 75 to 84 wind turbines, depending on turbine type. The wind farm will consist of two separate phases. Phase I will include construction of turbines to generate 107.5 MW of power in the southern portion of the study area. Phase II will include construction of turbines to generate 49.5 MW of power in the northern portion of the study area. Please refer to Figure 1, Project Location Map, in Appendix A."

[Revised Text for Change 1]

1. Introduction

"M-Power, LLC is submitting this application for a Certificate of Site Compatibility (Certificate) from the North Dakota PSC (Public Service Commission) to construct the proposed Luverne Wind Farm (the Project). The Project is located in Griggs and Steele Counties in North Dakota. The facility, located within a 20,480 acre study area, is planned to be approximately 157 MW (megawatts) in size and will consist of a total of 105 wind turbines. The wind farm will consist of two separate phases. Phase I will include construction of turbines to generate

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107.5 MW of power in the southern portion of the study area. Phase II will include construction of turbines to generate 49.5 MW of power in the northern portion of the study area. Please refer to Figure 1, Project Location Map, in Appendix A.”

Description of Change 2: Changes to the Alternatives Section include replacing the Clipper and Suzlon turbine alternatives with only one alternative, the GE 1.5 MW Turbine.

[Original Text (page 10) for Change 2]

2.2 Alternatives

It is anticipated that full construction of the proposed Luverne Wind Farm will take place under two separate phases. Phase I will include construction of turbines to generate 107.5 MW of power in the southern portion of the study area. Phase II will include construction of turbines to generate 49.5 MW of power in the northern portion of the study area. In order to provide the flexibility to select the most appropriate technology at the time of project construction, two alternatives have been developed for Phase I. These alternatives have been developed with consideration given to optimizing wind and land resources, cost efficiency, and minimizing environmental impacts. *Please refer to Figure 4, Project Alternatives, in Appendix A.*

Alternative A will include the construction of 42 Clipper C96 2.5 MW turbines in the southern portion of the study area. Construction in the northern part of the study area will include 33 GE 1.5 MW turbines.

Alternative B will include the construction of 51 Suzlon S88 2.1 MW turbines in the southern portion of the study area. Construction in the northern part of the study area will include 33 GE 1.5 MW turbines.

Both alternatives will include the construction of wind turbines and associated step up transformers, underground electrical collection systems, underground communication lines, access roads, crane pads, and shared common facilities as outlined below.

[Revised Text for Change 2]

2.2 Alternatives

It is anticipated that full construction of the proposed Luverne Wind Farm will take place under two separate phases. Phase I will include construction of turbines to generate 107.5 MW of power in the southern portion of the study area. Phase II will include construction of turbines to generate 49.5 MW of power in the northern portion of the study area. *Please refer to Figure 4, Project Design, in Appendix A.*

Alternative A will include the construction of 72 GE 1.5 MW turbines in the southern portion of the study area. Construction in the northern part of the study area will include 33 GE 1.5 MW turbines.

The alternative will include the construction of wind turbines and associated step up transformers, underground electrical collection systems, underground

communication lines, access roads, crane pads, and shared common facilities as outlined below.

Description of Change 3: Table 5, turbine specifications, is updated to remove the Suzlon S88 and Clipper C96 turbines.

[Original Text (page 17) for Change 3]

Table 5 Turbine Specifications			
Specifications	Turbine Type		
	GE 1.5	Suzlon S88	Clipper C96
Power Output	1.5 MW	2.1 MW	2.5 MW
Hub Height	262 feet	262 feet	262 feet
Rotor Diameter	253 feet	289 feet	315 feet
Cut-In Wind Speed	7.8 mph	8.9 mph	8.9 mph
Cut-Out Wind Speed	55.9 mph	55.9 mph	55.9 mph
Rated Wind Speed	26.8 mph	31.3 mph	
Rotor RPM¹ Range	10.1 to 20.4		9.6 to 15.5
Cold Temp Limit	To -25° Celsius		To -30° Celsius
Generator (all 60Hz)	3 phase DFIG	Asynchronous Slip Ring	Synchronous Permanent Magnet (4x)

[Revised Text for Change 3]

Table 5 Turbine Specifications	
Specifications	Turbine Type
	GE 1.5
Power Output	1.5 MW
Hub Height	262 feet
Rotor Diameter	253 feet
Cut-In Wind Speed	7.8 mph
Cut-Out Wind Speed	55.9 mph
Rated Wind Speed	26.8 mph
Rotor RPM² Range	10.1 to 20.4
Cold Temp Limit	To -25° Celsius
Generator (all 60Hz)	3 phase DFIG

Description of Change 4: The Collector Line section has changed due to the revised orientation of the wind turbines. *Please refer to a new Figure 4, Project Design.*

Description of Change 5: The Project Layout and Associated Facilities section is updated to correlate with the new turbine orientation. *Please refer to a new Figure 4, Project Design.*

Description of Change 6: Section 6.2.1 Turbine Types has been revised to no longer discuss the Suzlone S88 and Clipper C96 turbine types. In addition, the table name has been changed from *Comparison of Turbine Types* to *Turbine Design*.

[Original Text (page 21) for Change 6]

6.2.1 Turbine Types

“Three turbine types have been selected as proxy turbines for the proposed project: GE, Suzlon S88, and Clipper C96. *Please refer to Table 6, Comparison of Turbine Types.*”

Table 6 Comparison of Turbine Types			
	Proxy Turbines		
	GE	Suzlon S88	Clipper C96
Rated Capacity	1.5 MW	2.1 MW	2.5 MW
Begin Operation Wind Speed	6.7 mph	8.9 mph	8.9 mph
Capacity Reached Wind Speed	26.4 mph	31.1 mph	31.5 mph
Maximum Operation Wind Speed	45 mph	45 mph	45 mph
Withstandable Wind Speed	Over 100 mph	Over 95 mph	Over 95 mph

All of the turbine types would be controlled and monitored by SCADA communication technology, allowing for the simultaneous control of many wind turbines.”

[Revised Text for Change 6]

6.2.1 Turbine Design

“The turbine type selected for the project is the GE turbine. *Please refer to Table 6, Turbine Design.*”

Table 6 Turbine Design	
	GE Turbine
Rated Capacity	1.5 MW
Begin Operation Wind Speed	6.7 mph
Capacity Reached Wind Speed	26.4 mph
Maximum Operation Wind Speed	45 mph
Withstandable Wind Speed	Over 100 mph

The turbines would be controlled and monitored by SCADA communication technology, allowing for the simultaneous control of many wind turbines. “

Description of Change 7: Section 6.2.2 Rotor has been updated to remove the portions of the Rotor Comparison table that include Suzlone S88 and Clipper C96 turbine types. In addition, the title of the table was changed to *Rotor Design*.

[Original Text (page 21) for Change 7]

6.2.2 Rotor

“A rotor consists of three blades mounted to a central rotor hub. The hub attaches to the nacelle, which houses the gearbox, generator, brake, cooling system and other electrical and mechanical systems. **Please refer to Table 7, Rotor Comparison.**”

Table 7 Rotor Comparison			
	Proxy Turbines		
	GE	Suzlon S88	Clipper C96
Rated Capacity	1.5 MW	2.1 MW	2.5 MW
Rotor Diameter	231 to 269 ft	288 ft	304 ft
Swept Area	41,991 to 56,802 ft ²	65,417 ft ²	73,065 ft ²
Rotor Speed	10.1 to 20.4 rpm	15 rpm	15.5 rpm

[Revised Text for Change 7]

6.2.2 Rotor

A rotor consists of three blades mounted to a central rotor hub. The hub attaches to the nacelle, which houses the gearbox, generator, brake, cooling system and other electrical and mechanical systems. **Please refer to Table 7, Rotor Design.**

Table 7 Rotor Design	
	GE
Rated Capacity	1.5 MW
Rotor Diameter	231 to 269 ft
Swept Area	41,991 to 56,802 ft ²
Rotor Speed	10.1 to 20.4 rpm

Description of Change 8: *Chapter 7, Environmental Analysis* section, describes the environmental impacts of the proposed project. Change 8 includes removing all mention of Alternative B. The environmental impacts associated with construction of the wind farm have not changed due to the change to all GE 1.5 MW turbines.

Table 11, Summary of Project Alternatives and Impacts, has changed to remove any reference to alternative B.

Description of Change 9: Figure 4, Project Alternatives, has been updated to include the new turbine design and configuration. In addition, the title of the figure is changed from Project Alternatives to Project Design.

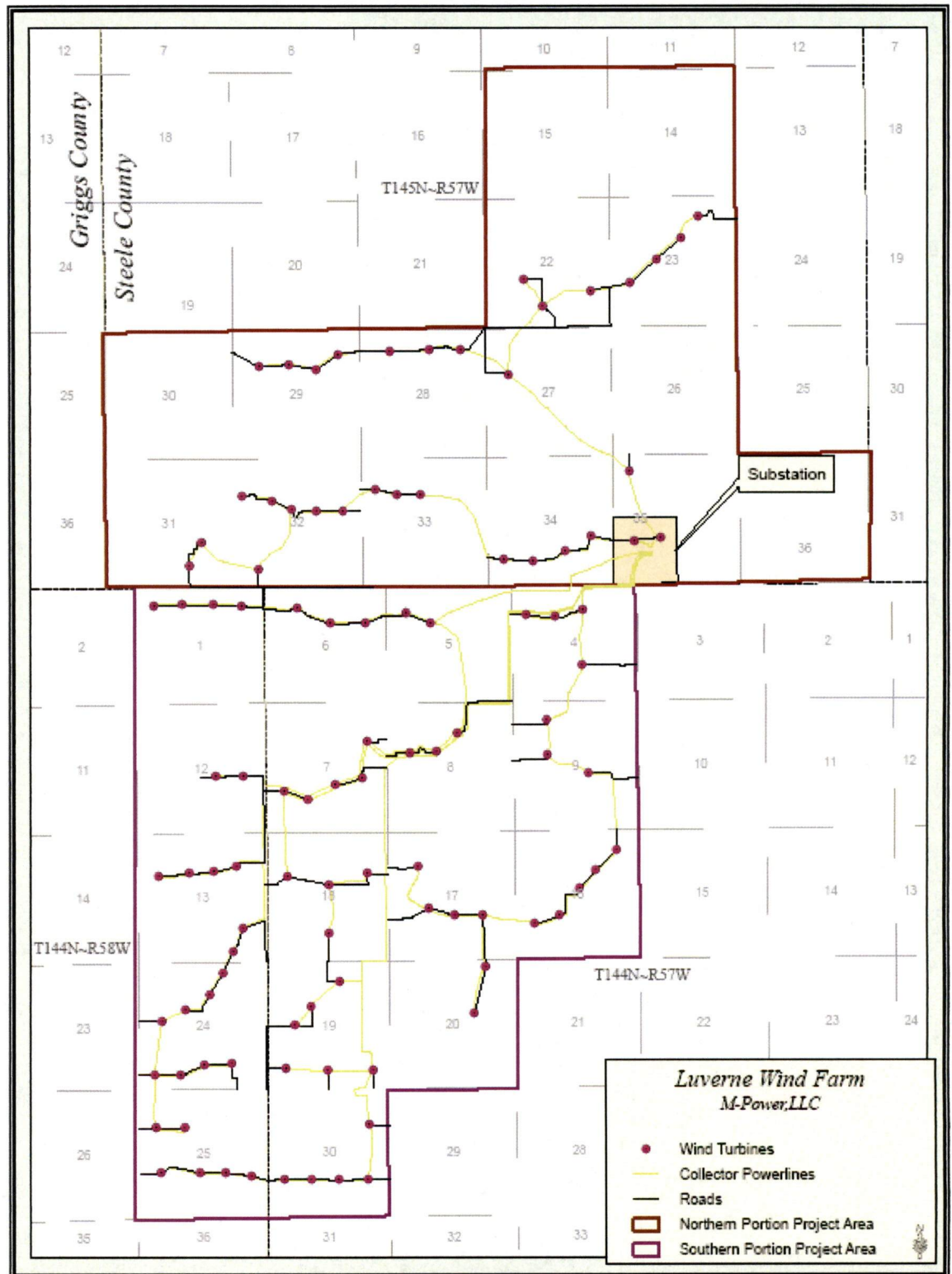


Figure 4 Project Design