

In the Matter of the Application of
High Prairie Wind Farm I, LLC for
a Site Permit for a 98.9-Megawatt
Large Wind Energy Conversion
System in Mower County, Minnesota

**FINDINGS OF FACT,
AND CONCLUSIONS**

**PUC DOCKET NO.
PT6528/WS-06-91**

The above-entitled matter came before the Minnesota Public Utilities Commission (PUC), pursuant to an application by High Prairie Wind Farm I, LLC, for a site permit to construct, operate, maintain and manage a 98.9-Megawatt (MW) nameplate capacity Large Wind Energy Conversion System (LWECS) and associated facilities in the townships of Lodi, Clayton and Bennington in Mower County, Minnesota. The Site permit is to be issued to High Prairie Wind Farm I, LLC a limited liability company.

All of the proposed wind turbines, foundations, transformers, feeder lines and collection lines will be located in Mower County, Minnesota. Other associated facilities will include pad mounted step-up transformers for each wind turbine, access roads and a 34.5 kV electrical collection and feeder system. A new project substation, located in Section 23 of Clayton Township and a new 161 kV transmission line, approximately nine miles long, will be built to carry power from the High Prairie Wind Farm project to the Adams Substation. High Prairie Wind Farm I, LLC will sell and deliver power from this project to Xcel Energy at the Adams Substation.

STATEMENT OF ISSUE

Should High Prairie Wind Farm I, LLC, be granted a site permit under Minnesota Statutes section 116C.694 to construct a 98.9-megawatt Large Wind Energy Conversion System in Mower County, Minnesota?

Based upon the record and proceedings created in this proceeding, the Public Utilities Commission makes the following:

FINDINGS OF FACT

Background and Procedure

1. On February 10, 2006, Horizon Wind filed a complete site permit application on behalf of High Prairie Wind Farm I, LLC, for the High Prairie Wind Farm I, with the Public Utilities Commission for 98.9- megawatts of nameplate wind power generating capacity. (Exhibit 1)
2. Department of Commerce staff determined that the February 10, 2006, application complied with the application requirements of Minnesota Rules, part 4401.0450. In a

briefing paper to the PUC, dated March 7, 2006, DOC Energy Facility Permitting staff recommended that the PUC accept the application. (Exhibit 2)

3. On March 7, 2006, the PUC issued an order accepting the application for the High Prairie Wind Farm I and associated facilities. The March 7, 2006, PUC Order also made a preliminary determination to issue a draft site permit for review and comment. (Exhibit 3)
4. DOC EFP staff prepared a Notice of Application Acceptance, Availability of Draft Site Permit for Review and Comment and Public Information Meeting in Adams, Minnesota on March 27, 2006 to receive comments on the site permit application, draft site permit, and to review the permitting process for LWECS. (Exhibit 4)
5. On March 13, 2006, the EFP staff published in the *EQB Monitor* notice of the March 27, 2006, public information meeting in Adams, Minnesota, and the availability of the draft site permit, EQB Monitor, Volume 30, No. 6, March 13, 2006. (Exhibit 5) The published notice contained all of the information required by Minnesota Rules part 4401.0550 subp. 1. Notice also appeared on the PUC web site.
6. Published notice of the site permit application, DOC public information meeting and opportunity to comment on the draft site permit appeared in the *LeRoy Independent* on March 16, 2006; *Austin Daily Herald* on March 14, 2006; and the *Meadow Area News* on March 15, 2006. (Exhibits 6, 7, and 8) The published notice provided: a) location and date of the public information meeting; b) description of the proposed project; c) deadline for public comments on the site permit application and draft site permit (April 12, 2006); d) description of the PUC site permit review process; and e) identification of the public advisor. The notice published meets the requirements of Minnesota Rules part 4401.0550 subp. 2.
7. The High Prairie Wind Farm I, LLC permit application, draft site permit and notice of public information meeting was distributed to each landowner affected by the proposed project, township clerks within the site boundary, county and other required officials on March 15, 2006. (Exhibit 9)
8. The DOC EFP staff held a public information meeting on March 27, 2006, in Adams, Minnesota, to receive comments on the site permit application and draft site permit. Approximately 60 people attended the meeting. Representatives from Horizon Wind and FPL Energy were also present. DOC EFP staff provided an overview of the permitting process and draft site permit and responded to questions about the permitting process. Horizon Wind and FPL Energy reviewed and responded to questions about the project. Questions were asked about access roads, project timing, easement agreements and conditions, television and radio interference, location of distribution and feeder lines and the 161 kV transmission line, and project decommissioning. No significant issues or concerns were raised about the permitting process, the proposed project, or conditions in the draft site permit at the public meeting. The public comment period on the project closed on April 12, 2006.

The Permittee

9. The Applicant (High Prairie Wind Farm I, LLC) will own the Project including all equipment up to the high side of the 161 kV busbar at the Project substation, as well as jointly own, with High Prairie Wind Farm II, LLC, the 161 kV transmission line interconnecting the Project to the Adams Substation.
10. High Prairie Wind Farm I, LLC and High Prairie Wind Farm II, LLC are currently subsidiaries of Horizon Wind Energy LLC (Horizon), which is a subsidiary of The Goldman Sachs Group, Inc.
11. Upon completion of development activities, High Prairie Wind Farm I, LLC will be acquired by FPL Energy Mower County, LLC, which is a wholly owned subsidiary of FPL Energy, LLC (FPLE). FPLE will be responsible for project management, procurement, construction, commissioning, operation, and long-term ownership of the Project.

Project Description

12. The proposed project will use 43 Siemens 2.3 MW wind turbines for an installed nameplate capacity of 98.9 MW. The turbine has a hub height of 80 meters (262 feet) and a rotor diameter of 93 meters (305 ft). The rotor consists of three blades mounted to a rotor hub. The hub is attached to the nacelle, which houses the gearbox, generator, brake, cooling system, and other electrical and mechanical systems. The rotor swept area is 6,800 meters² (73,195 feet²). The rotational speed of the rotor will be between six and 16 revolutions per minute. Maximum rotor tip speed is 164 miles per hour.
13. The turbine blades are approximately 149 feet long and will be light grey in color. The overall height of the tower, nacelle and blade will be approximately 413 feet when one blade is in the vertical position. The project will also include an underground-automated supervisory control and data acquisition system (SCADA) for communication purposes. Two permanent meteorological towers will be used as part of the communication system. Other components of the project include a concrete and steel foundation for each tower, pad-mounted step-up transformers, all weather class 5 roads of gravel or similar material, and an underground and overhead electric energy collection system.
14. The Siemens 2.3 MW Mk II Wind Turbine is a three blade, upwind, active yaw, and active aerodynamic control regulated wind turbine with power/torque control capabilities. The rotor utilizes blade pitch regulation and variable speed operation to achieve optimum power output at all wind speeds. The variable speed operation minimizes power and torque spike delivered from the rotor to the drive train resulting in improved long-term reliability. Each turbine is equipped with a wind direction sensor. The wind direction sensor communicates with the computer system, which evaluates the measured wind parameters, and within a specified time interval, activates the yaw drives to align the nacelle to the wind direction.

15. Each turbine is interconnected through an underground electrical collection system at 34.5 kV. The 34.5 kV feeder lines from the project collection system feed the power to the independent breaker positions at the proposed project substation. The substation steps up the voltage from the 34.5 kV collection system to the transmission system level of 161 kV. The applicant is proposing to place the 34.5 kV feeder lines on public road rights-of-way where possible. Feeder lines will be underground unless conditions require that overhead lines be used. All of the proposed feeder lines would connect to the proposed project Substation in section 23 of Clayton Township.
16. Each tower will be secured by a concrete foundation that will vary in size depending on the soil conditions. A control panel that houses communication and electronic circuitry is placed in each tower. In addition, a step-up, pad-mounted transformer is necessary for each turbine to collect the power from the turbine and transfer it to a 34.5 kV collection system via underground cables.
17. All turbines meteorological tower systems will be interconnected with fiber optic communication cables that will be installed underground. The communication cables will run back to a central host computer which will be located either at the project substation or at the operations and maintenance facility where a supervisory control and data acquisition (SCADA) system will be located. Signals from the current and potential transformers at each of the delivery points will also be fed to the central SCADA host computer. The SCADA system will be able to give status indications of the individual wind turbines and the substation and allow for remote control of the wind turbines locally or from a remote computer. This computerized supervisory control and data acquisition network will provide detailed operating and performance information for each wind turbine. The Permittee will maintain a computer program and database for tracking each wind turbine's maintenance history and energy production. The DOC EFP staff will have viewer access to the SCADA system.

Wind Resource Considerations

18. The High Prairie Wind Farm will be located in Mower County along the central divide at 1,350-1,420 feet above sea level. Land use in the project area is agricultural with intensive farming and some grazing activities and, as a result, there are few trees or structures in the proposed project site to inhibit the wind as it passes over the site. The wind resource in the project area is well documented by the Wind Resource Analysis Program (WRAP) Report (2002) prepared by the Minnesota Department of Commerce. The WRAP Report presents wind analysis data from monitoring stations across the state of Minnesota. In the vicinity of the project area, the mean annual wind speed at an elevation of 230 feet above ground level is mapped as 15.2 to 16.4 miles per hour.
19. For this project the wind turbines will be sited in strings along ridgelines within the site boundaries. The wind turbines are sited so as to have good exposure to winds from all directions with emphasis on exposure to the prevailing southerly and northwest winds. The turbine spacing, according to site permit application, maximizes use of the available

wind and minimizes wake and array losses within the topographical context of the site. The turbine strings are typically oriented west-northeast, which is roughly perpendicular to the prevailing southerly and northwest winds. Turbine placement has been designed to provide 3 to 3.5 rotor diameter spacing in the east-west direction and 15 rotor diameter spacing in the north-south direction, with respect to the predominant energy production directions. Given the prevalence for southerly and northwest winds, the spacing is widest in the north-south direction. Greater or lesser spacing between the turbine strings may be used in areas where the terrain dictates the spacing. This is addressed in the permit at III.E.5. Individual, isolated turbine sites are avoided to minimize interconnection and access costs. Sufficient spacing between the turbines is utilized to minimize wake losses when the winds are blowing parallel to the turbine rows.

20. The project projected average annual output will be approximately 342,650 megawatts hours per year (MWh). This calculation takes into account, among other factors, energy losses in the gathering system, mechanical availability, array losses, and system losses. Each turbine is estimated to produce 7,968 MWh a year on average. The base energy calculation presented assumes a normal or average wind year. The maximum variation in energy is within +/- 15 percent. Based on the data, one would expect the annual variation in energy at the project site to be within 10 percent of the mean during most years.
21. Most of the land within the project site is actively farmed. Corn and soybeans are the dominant row crops. Alfalfa and pasture are additional crops within the site boundary.
22. The project site as proposed includes approximately 10,000 acres in the townships of Lodi (Sections 4, 5, 7, 8), Clayton (Sections 13, 14, 23-28, 33-36), and Bennington (Sections 18-21) in Mower County. The land is predominately agricultural, with some scattered small woodlots, and wetlands. The proposed wind turbine site layout in the site permit application shows where the proposed facilities, such as towers, roads and the underground electrical lines, could be located. These locations are subject to change. It is estimated that the proposed facilities will result in the permanent disturbance of approximately 65 acres of land, primarily for roads and towers. Approximately 400 to 500 acres of land will be temporarily disturbed during construction of the wind farm for contractor staging areas, foundation construction, underground power lines, and tower and turbine assembly. Roads are expected to be about 36 to 40 feet wide.

Land Rights and Easement Agreements

23. In order to build a wind plant, a developer needs to secure site leases and easement option agreements to ensure access to the site for construction and operation of a proposed project. These lease or easement agreements also prohibit landowners from any activities that might interfere with execution of the proposed project.
24. The Applicant has obtained lease and easement option agreements and/or rights to such agreements with landowners for land within the project site boundary necessary for installation of the components of the wind farm. These rights and easements will be able to support the proposed project.

Written Comments and Letters Received by April 12, 2006

25. By the close of the comment period on April 12, 2006, 2005, the PUC had received one comment letter on the proposed High Prairie Wind Farm I, project. Another comment letter was received on May 9, 2006 from the Minnesota Historical Society.
26. The comment letter from the Minnesota Department of Natural Resources, dated April 12, 2006. (Exhibit 10) The DNR offered several comments in their letter that addressed information in the application and suggested that areas disturbed by installation of the feeder lines be seeded with native short-grass species to improve existing habitat conditions. Reseeding is most likely to occur in road rights-of-way and is addressed in the site permit (III.B.9.).
27. The comment letter from the Minnesota Historical Society, received May 10, 2006, dated May 9, 21006, recommended a survey of all areas of proposed ground disturbance be completed. The MHS also noted that “if the project area can be documented as previously disturbed or previously surveyed, we will re-evaluate the need for the survey.” (Exhibit 11) A Phase I Archaeological Survey will be conducted within the areas that will be permanently or temporarily impacted during construction or operation of the Project.

Site Criteria

Minnesota Rules chapter 4401 applies to the siting of Large Wind Energy Conversion Systems. The rules require applicants to provide a substantial amount of information to allow the PUC to determine the potential environmental and human impacts of the proposed project and whether the project is compatible with environmental preservation, sustainable development, and the efficient use of resources. Minn. Rules parts 4401.0450 through 4401.0600. The following analysis addresses the relevant criteria that are to be applied to a LWECS project.

Human Settlement, Public Health and Safety

28. The site is in an area of low population density, with little residential, commercial or industrial development on or near the site. As a result, the impact of the proposed LWECS on human settlement, public health and safety will be minimal. The site permit condition (III. C.) specifies conditions for setbacks from residences and roads. The proposed wind turbine layout meets or exceeds those requirements. The proposed project is not expected to affect any water wells (used, unused or unsealed) or any rural water system that services the area.
29. There will be no displacement of existing residences or structures in siting the wind turbines and associated facilities.
30. The project will comply with the Federal Aviation Administration requirements with respect to lighting. See site permit condition III.E.4.

31. High Prairie Wind I, LLC will provide security during construction and operation of the project, including fencing, warning signs, and locks on equipment and facilities. High Prairie Wind I, LLC will also provide landowners and interested persons with safety information about the project and its facilities. See site permit condition III.B.15.
32. In winter months ice may accumulate on the wind turbine blades when the turbines are stopped or operating very slowly. Furthermore, the anemometer may ice up at the same time, causing the turbine to shut down during any icing event. As weather conditions change, any ice will normally drop off the blades in relatively small pieces before the turbines resume operation. This is due to flexing of the blades and the blades' smooth surface. Although turbine icing is an infrequent event, it remains important that the turbines are not sited in areas where regular human activity is expected below the turbines or in the immediate proximity during the winter months.
33. Each turbine will be clearly labeled to identify each unit and a map of the site with the labeling system will be provided to local authorities as part of the fire protection plan.

Noise

34. Wind turbines do generate noise. According to sound pressure level tests and estimations provided by High Prairie Wind I, LLC in its application for a site permit, the sound pressure level is expected to be lower than the Pollution Control Agency noise standard of 50 dBA measured at the closest residence. See Minn. Rules part 7030.0040. For this project, the site permit application indicates that at a distance of 804 feet, the noise measured at a home will meet the requirements of the Nighttime L50 standard of 50 dB(A). This model is conservative as it does not allow for all noise attenuation that may occur from the elevated source (turbine), but it also does not account for wind or cumulative effects. The typical proposed setback of 1,500 feet from occupied residences will ensure that cumulative noise levels resulting from multiple turbines and noise drift resulting from wind will not exceed regulator limits at any residence.

Visual Values

35. The placement of 43 turbines will affect the appearance of the area. The wind turbines will be mounted on tubular towers that are up to 265 feet tall. The rotor blades will have a diameter of up to 297 feet. The turbine towers and rotor blades will be prominent features on the landscape. There will be intermittent, expansive views of the turbines to passing motorists on local, county and state highways. Motorists and drivers on local township and county roads will travel within 800 feet of some turbines.
36. The visual impact of the wind turbines will be reduced by the use of a neutral paint color. The only lights will be those required by the Federal Aviation Administration. All site permits issued by the PUC require the use of tubular towers; therefore, the turbine towers will be uniform in appearance. These wind turbines will be the dominant visual features on the landscape. Blades used in the proposed project will be light grey. The wind

turbines in this project, while prominent on the landscape, will also blend in with the surrounding area. The project site will retain its rural character. The turbines and associated facilities necessary to harvest the wind for energy are consistent with existing land use and agricultural practices.

37. From one perspective, the proposed project might be perceived as a visual intrusion on the natural aesthetic value on the landscape, characterized by 43 tubular steel structures approximately 265 -feet high, standing on formerly undisturbed ridgelines, with 148.5-foot blades, for an overall height of 415 feet when one blade is in the vertical position. Wind plants have their own aesthetic quality, distinguishing them from other non-agricultural uses. The existing wind farm south of Adams and the numerous wind farms on the Buffalo Ridge have altered the landscape from agricultural to wind plant/agricultural. This project will increase the visual impact to the area. The cumulative effect of the proposed project will increase both the industrial appearances of the wind plants in the area and the areas from which they will be seen. Because wind generation development is likely to continue in Mower County, this visual impact will continue to increase the size of the wind plant/farm footprint as the turbines harvest the wind resources of Mower County for energy. To date the presence of numerous wind turbines on Buffalo Ridge has been well accepted by the people who live and work in the area.
38. Several other measures will also be taken to minimize visual intrusion such as: low profile access roads, project access roads will avoid cuts and fill, the areas affected by construction will be restored after construction is completed, turbines will not be illuminated unless required by FAA regulations, and the turbine rotor size will require increased turbine spacing to minimize wake loss, therefore the turbines will be spaced further from one another than in several projects on Buffalo Ridge. The visual scale of the High Prairie Wind Farm will be similar to those on the Buffalo Ridge.

Recreational Resources

39. Recreational opportunities in Mower County include: hunting, fishing, and snowmobiling, campgrounds and trails. Hunting is permitted in designated Minnesota Department of Natural Resources Wildlife Management Areas (WMA's), unless otherwise posted.
40. The Shooting Star Prairie State Natural Area (SNA) is located approximately 3 miles southeast of the Project Area on the south side of Highway 56. SNAs protect rare and endangered species habitat, unique plant communities and geologic features that possess exceptional scientific or educational values. SNAs are open for observation, education and research. Lake Louise is a 1,170 acre State Park also located southeast of the Project Area. This park is valued for its open landscape and lush hardwood forest.
41. Recreational activities will no be significantly impacted by the Project. Visual impacts would be the most evident impact to people who use the WMAs and SNAs for recreation. The town of Taopi is located within one mile of the Project Area and the turbines will be

visible to the residents. The turbines will be noticeable to persons using the WMA's. Turbines will not be located in WMA's or in any local parks. Turbine operations are not expected to affect the natural areas in any material way and no adverse impact on wildlife management areas or practices is expected.

Infrastructure

42. The proposed wind farm is expected to have a minimal effect on the existing infrastructure. The proposed project will use underground cables for the collector lines on private property within the wind farm. The feeder lines associated with the project are currently planned to be underground. Any above ground feeder lines, if used, would be wood-pole, 34.5 kV typical of wind project feeder lines in the Buffalo Ridge area. The feeder lines will deliver the energy from the wind farm to the project substation. Placement of collector and feeder lines is addressed in the site permit at III.E.7. and 8.
43. The project will require the use of public roads to deliver construction supplies and materials to the work site. Site permit condition III.B.8. addresses this topic. Construction of the project requires the addition of several miles of access roads that will be located on private property. The access roads will be routed along the wind turbine strings, fence lines, and field edges to minimize disturbance to agricultural activities. The typical access road will be 36 to 40 feet in width and covered in Class 5 gravel (or similar material). The access roads will be low profile roads to allow for the movement of agricultural equipment. The site permit at III.B. 8 (b) addresses this topic. During operation and maintenance of the wind plant, operation and maintenance crews, while inspecting and servicing the wind turbines, will use the access roads. Periodic grading or other methods are necessary to maintain road integrity. The Permittee may do this work or contract it out.
44. If access roads must be installed across streams or drainage ways that are considered public waters, the Permittee in consultation with the Minnesota Department of Natural Resources will design, shape and locate the road so as not to alter the original water flow or drainage patterns. Any work required below the ordinary high water line, such as road crossings or culvert installation, will require a permit from the Minnesota Department of Natural Resources.
45. The proposed wind farm will not affect water supplies, railroads, telecommunication facilities, and radio reception. The presence or operation of the wind plant could potentially impact the quality of television reception in the area. Previous work on television reception issues indicates that in some cases new antennas or relocation of existing antennas can restore television signal strength reception. High Prairie Wind I, LLC will address the concerns of residents in the area of the project site before and after the project construction to document and mitigate any television reception impacts that might occur. This is addressed in the site permit at III.D.3.
46. Construction, operation, and maintenance of the proposed wind plant will comply with all of the required federal and state permit requirements.

Community Benefits

47. The project will provide local tax revenues from a production tax on the wind energy produced by the turbines. No significant adverse impact on public services is expected. Wear and tear on roads will occur as a result of the transport of heavy equipment and other materials. The site permit at III.B.8. addresses road damages. Landowners with turbine(s) on their property will also receive payments from the Permittee for energy generated by the turbine(s).
48. To the extent that local workers and local contractors are capable, qualified, and available, High Prairie Wind Farm I, LLC will seek to hire them to construct the proposed project. The hiring of local people will expand employment opportunities in this area of the state and keep money in the local economy. Once constructed, the project will be staffed with several full time site technicians and a wind plant supervisor.

Effects on Land-Based Economies

49. The wind turbines and access roads will be located so that the most productive farmland will be left as intact as possible. However, the project will displace approximately 65 acres of agricultural land. The site permit at III.B. 2., 3., 4., 5., 6., 7., 8(c), 9., and 10. addresses mitigation measures for agricultural lands. The proposed project does not affect any sand or gravel operations.

Archaeological and Historical Resources

50. A review of the Minnesota State Historic Preservation Office (SHPO) computer database indicates no known archaeological sites are documented in the project Cultural Study Area. The Project Area does not seem to have the same high prehistoric archaeological potential as the nearby Grand Meadow Quarry Archaeological District. However, there is enough potential to necessitate a Phase I Field Survey of the Cultural Study Area. A Phase I Field Survey will serve to identify any additional area of historic interest. The Project, would avoid, when practicable, or cause minimal impacts to archaeological and historic sites.
51. A Phase I Archaeology survey is recommended for all the proposed turbine locations, access roads, and junction boxes to document any previously unrecorded archaeological sites within the project site. The site permit at III. D.2. requires High Prairie Wind Farm I, LLC to consult with the Minnesota Historical Society. A Phase I archaeology survey consists of the following tasks: consultation, documentation, and identification.
52. If any archaeological sites are found during the Phase I survey, their integrity and significance should be addressed in terms of the site's potential eligibility for placement on the National Register of Historic Places (NRHP). If such sites are found to be eligible for the NRHP, appropriate mitigative measures will need to be developed in consultation with the Minnesota State Historic Preservation Officer (SHPO), the State Archaeologist,

and consulting American Indian communities. The site permit also requires the Permittee to stop work and notify the Minnesota Historical Society and PUC if any unrecorded cultural resources are found during construction.

Air and Water Emissions

53. No harmful air or water emissions are expected from the construction and operation of the LWECS.

Animals and Wildlife

54. Neither construction nor operation of the project is expected to significantly impact wildlife. Based on studies of existing wind power projects in the United States and Europe, the only impact of concern to wildlife would primarily be to avian and bat populations. The final report on avian monitoring studies at Buffalo Ridge, Minnesota “Final Report-Avian Monitoring Studies at the Buffalo Ridge, Minnesota Resource Area: Results of a 4-Year Study” (September 2000) identified the following impacts:
- a) Following construction of the wind turbines, there is a reduction in the use of the area within 100 meters of the turbines by seven of 22 species of grassland breeding birds. It was hypothesized that lower avian use may be associated with avoidance of turbine noise, maintenance activities, and less available habitat. The researchers stated "on a large scale basis, reduced use by birds associated with wind power development appears to be relatively minor and would not likely have any population consequences on a regional level."(p. 44)
 - b) Avian mortality appears to be low on Buffalo Ridge, compared to other wind facilities in the United States, and is primarily related to nocturnal migrants. Resident bird mortality is very low and involves common species. The researchers stated that "based on the estimated number of birds that migrate through Buffalo Ridge each year, the number of wind plant related avian fatalities at Buffalo Ridge is likely inconsequential from a population standpoint." (p. iv)
55. Bat mortality was also studied at Buffalo Ridge, instigated by bat collision victims found during the avian monitoring studies. The bat study was conducted in 2001 and 2002. (“Bat Interactions with Wind Turbines at the Buffalo Ridge, Minnesota Wind Resource Area,” November 2003). The overall conclusion is that bat activity at turbines and the numbers of bat fatalities do not share a statistical relationship. Bat collisions were found to be very rare, given the amount of bat activity documented at the turbines. Most fatalities involved migrating bats, a wind-plant related mortality “is possibly not sufficient to cause significant, large-scale population declines.” (p. 61)
56. Mitigation measures are also prescribed in the site permit and include but are not limited to: a) a pre-construction inventory of existing biological resources, native prairie, state listed and threatened species and wetlands in the project area; b) turbines and associated facilities will not be constructed in wildlife management areas, recreation and state and

scientific natural areas; c) landowner approval will be negotiated prior to any removal of trees during construction; d) sound water and soil conservation practices will be implemented during construction and operation of the project to protect topsoil and adjacent resources and to minimize soil erosion. This also applies to any work in proximity to watercourses.

Vegetation

57. No Public Waters, Public Water wetlands or forested land are expected to be affected by the project. No groves of trees or shelterbelts will need to be removed to construct and operate the system. Native prairie will also be avoided. If native prairie cannot be avoided, the site permit, at III. C.6. provides for preparation of a prairie protection and management plan.

Soils

58. Construction of the wind turbines and access roads increases the potential for erosion during construction and converts prime farmland to industrial use. The site permit at III. B. 9. requires a soil erosion and sediment control plan. The project will also require a storm water run-off permit from the Minnesota Pollution Control Agency.

Surface Water and Wetlands

59. No towers, access roads or utility lines will be located in Public Water wetlands. See site permit at III.C.5.

Future Development and Expansion

60. It is expected that there will be a second 100 MW phase to the High Prairie Wind Farm Project. A second site permit application will be submitted for the second phase once it has reached certain commercial development milestones. Current information suggests the windy areas of Mower County are large enough to accommodate more wind facilities. In the future, turbines used in this area will likely consist of several types and sizes supplied by different vendors and installed at different times.
61. While large-scale projects have occurred elsewhere (California and Iowa), little systematic study of the cumulative impact has occurred. Research on the total impact of many different projects in one area has not occurred. DOC EFP staff continues to monitor for impacts and issues related to wind energy development.
62. The PUC anticipates more site permit applications under Minnesota Statutes section 116C.694 (a). The PUC is responsible for siting of LWECS "in an orderly manner compatible with environmental preservation, sustainable development, and the efficient use of resources." Minnesota Statutes section 116C.693.

63. Minnesota Statutes section 116C.57, subd. 4 requires consideration of design options that might minimize adverse environmental impacts. By using larger turbines, fewer turbines are required, reducing siting needs for turbines and related facilities. Turbines must also be designed to minimize noise and aesthetic impacts. Buffers between strings of turbines are designed to protect the turbines' production potential. The site permit also provides for buffers between adjacent wind generation projects to protect production potential. See site permit at III.C.1.
64. The location and spacing of the turbines are critical to the issues of orderly development and the efficient use of wind resources. Turbines are likely to be located in the best winds, and the spacing dictates, among other factors, how much land area the project occupies. There is strong public support for orderly development of wind energy in Minnesota.
65. One efficiency issue is the loss of wind in the wake of turbines. When wind is converted to rotational energy by the blades of a wind turbine, energy is extracted from the wind. Consequently, the wind flow behind the turbine is not as fast and is more turbulent than the free-flowing wind. This condition persists for some distance behind the turbine as normal wind flow is gradually restored. If a turbine is spaced too close downwind of another, it produces less energy and is less cost-effective. This is the wake loss effect. If the spacing is too far, wind resources are wasted and the projects' footprint on the land is unnecessarily large.
66. For this project, turbine spacing maximizes use of the available wind resources and minimizes wake and array losses within the topographical context of the site. Site topography and wind resources resulted in a layout involving long strips of turbines running parallel to each other and perpendicular to the prevailing wind. The objective was to capture the most net energy possible from the best available wind resource. Allowing for setback from roads and residences and avoiding sensitive areas, High Prairie Wind I, LLC arrived at an average turbine spacing of about 3 to 3.5 rotor diameter spacing in the east-west direction and 15 rotor diameter spacing in the north-south direction, with respect to the predominant energy production directions. Given the prevalence for southerly and northerly winds, the spacing between turbines is greatest in the north-south direction for this project. The wake investigation shows that the estimated array losses for the proposed High Prairie Wind Project will be around 4.13 percent.
67. Other factors that lead to discounts or losses were assumed to be identical for all arrays and include turbine availability loss (2.10 %); icing loss (.5%), power curve degradation loss (1.00%), electrical efficiency loss (2.50%), on-line wind curtailments (1.00%). Total losses are calculated at 11.23 percent.

Maintenance

68. Maintenance of the turbines will be on a scheduled, rotating basis with units normally off for maintenance each day, if necessary. Maintenance on the interconnection points will

be scheduled for low wind periods and coordinated with Xcel Energy. The High Prairie Wind Farm I, LLC will be staffed with site technicians and a wind plant supervisor. The Permittee will construct a facility to house the operation and maintenance efforts for the Project. The approximate 5000 square foot facility will provide office space for the crews, a shop/storage area for spare parts and vehicles, and will house all of the central monitoring equipment for the wind turbines. The building may be built on the Project site, or if the location is convenient, an existing facility may be purchased and modified to function as the operations and maintenance facility.

Site Restoration

69. Decommissioning and site restoration activities will include (1) removal of all turbines and towers; (2) removal of all pad mounted transformers; (3) removal of all above-ground distribution facilities; (4) removal of foundations to a depth of three feet below grade; and (5) removal of surface road material and restoration of the roads and turbine sites to previous conditions to the extent feasible.

Decommissioning Economics

70. The estimated decommissioning cost for the High Prairie Wind Farm I, LLC is approximately \$1.7 million in 2006 dollars in the Project's financials. The Permit requires the Permittee to submit a Decommissioning Plan to the PUC that describes how the Permittee will ensure that the resources are available to pay for decommissioning the project at the appropriate time.
71. To assure that the Project will meet its obligation to dismantle the wind Project, the Permittee will either establish a decommissioning fund in the amount of \$25,000 per wind turbine generator to be held in escrow for the benefit of landowners, provide the landowners a corporate guaranty of the Project's decommissioning obligations from a company with an investment grade credit rating, or provide similar security acceptable to the landowners. The Permittee will establish the decommissioning security during the seventh year of the Project. See Exhibit 1, page 76.

Site Permit Conditions

72. Nearly all of the conditions contained in this site permit were established as part of the site permit proceedings of other wind turbine projects permitted by the Environmental Quality Board and the Public Utilities Commission. No significant comments were received concerning the requirements in the draft site permit distributed for comment on March 7, 2006. Minor changes that provide for clarifications of the draft site permit conditions have been made.
73. The site permit contains conditions that apply to site preparation, construction, cleanup, restoration, operation, maintenance, abandonment, decommissioning and all other aspects of the project.

Based on the foregoing findings, the Minnesota Public Utilities Commission makes the following:

CONCLUSIONS OF LAW

1. Any of the foregoing findings, which more properly should be designated as conclusions, are hereby adopted as such.
2. The Minnesota Public Utilities Commission has jurisdiction under Minnesota Statutes section 116C.694 over the site permit applied for by High Prairie Wind Farm I, LLC.
3. The High Prairie Wind Farm I, LLC application for a site permit was properly filed and noticed as required by Minnesota Statutes section 116C.94 and Minnesota Rules parts 4401.0460 subp 2 and 4401.0550 subp 2.
4. The Minnesota Public Utilities Commission has afforded all interested persons an opportunity to participate in the development of the site permit and has complied with all applicable procedural requirements of Minnesota Statutes section 116C.694 and Minnesota Rules Chapter 4401.
5. No objections were filed with the Minnesota Public Utilities Commission by any governmental unit, affected landowner or any other interested person during the 30-day comment period and no public hearing was requested or is required.
6. The Minnesota Public Utilities Commission is the agency directed to carry out the legislative mandate to site LWECS in an orderly manner compatible with environmental preservation, sustainable development and the efficient use of resources. The proposed 98.9-megawatt High Prairie Wind Farm LWECS project will not create significant human or environmental impacts and is compatible with environmental preservation, sustainable development, and the efficient use of resources.
8. The Minnesota Public Utilities Commission has the authority under Minnesota Statutes section 116C.694 to establish conditions in site permits relating to site layout and construction and operation and maintenance of an LWECS. The conditions contained in the site permit issued to High Prairie Wind Farm I, LLC are appropriate and necessary and within the Minnesota Public Utilities Commission's authority.

Based on the foregoing Findings of Fact and Conclusions of Law, the Minnesota Public Utilities Commission issues the following: