

**STATE OF MINNESOTA
ENVIRONMENTAL QUALITY BOARD**

In the Matter of the Application
of G. McNeilus Wind, LLC
for a Site Permit for up to a 18.2
Megawatt Large Wind Energy
Conversion System in Dodge County,
Minnesota

**FINDINGS OF FACT,
CONCLUSIONS
AND ORDER ISSUING A
SITE PERMIT TO G.
McNEILUS WIND, LLC**

**EQB DOCKET NO.
04-83-LWECS-GMW**

The above-entitled matter came before the Minnesota Environmental Quality Board (EQB) pursuant to an application by G. McNeilus Wind, LLC (GMW) for a site permit to construct, operate, maintain and manage up to an 18.2-Megawatt (MW) nameplate capacity Large Wind Energy Conversion System (LWECS) and associated facilities in Ashland Township in Dodge County, Minnesota. The permit is to be issued in the name of G. McNeilus Wind, LLC.

All of the proposed wind turbines, foundations, transformers, feeder lines and collection lines will be located in Ashland Township in Dodge County, Minnesota. The energy from the proposed 16.5 to 18.2 MW project will be delivered to Xcel Energy's transmission system through an interconnection point at the GMLLC Substation in Dodge Center, Minnesota.

STATEMENT OF ISSUE

Should G. McNeilus Wind, LLC be granted a site permit under Minnesota Statutes section 116C.694 to construct a proposed 16.5 to 18.2 MW Large Wind Energy Conversion System in Dodge County, Minnesota?

Based upon the record and proceedings created in this proceeding, the EQB makes the following:

FINDINGS OF FACT

Background and Procedure

1. G. McNeilus Wind, LLC (GMW) filed a site permit application in April 2004 with the Minnesota Environmental Quality Board for 16.5 to 18.2 MW of nameplate wind power generating capacity. The LWECS application consists of

- one project in Ashland Township in Dodge County in southeastern Minnesota. (Exhibit 1).
2. EQB staff reviewed the application and determined that it complied with the application requirements of EQB rules. On June 10, 2004, EQB staff recommended that the EQB Chair accept the GMW application for a site permit. (Exhibit 2).
 3. On June 11, 2004, the EQB chair accepted the application and notified GMW that its application for a site permit for a 16.5 to 18.2 MW LWECS and associated facilities was accepted. (Exhibit 3)
 4. On July 29, 2004, EQB staff mailed notice of the site permit application, the EQB public information meeting and an opportunity to comment on the draft site permit to persons on the PUC service list, the EQB general notification list, local government list, G. McNeilus Project list and technical representatives. (Exhibit 4). The notice provided: a) location and date of the public information meeting; b) description of the proposed project; c) deadline for public comments on the draft site permit; d) description of the EQB site permit review process; and e) identification of the project manager and public advisor.
 5. On July 29, 2004, Mr. Garwin McNeilus distributed a copy of the G. McNeilus Wind, LLC, site permit application, notice of application acceptance and of the EQB public information meeting to 15 individuals who own or lease land on or adjacent to the proposed site. (Exhibit 6). On July 30, 2004, HDR, an engineering consulting firm acting of behalf of GMW, sent a copy of the site permit application and notice of the EQB meeting and application acceptance to Dodge County officials, Dodge Center officials, Ashland Township, the PUC and Minnesota Historical Society. (Exhibit 7).
 6. On August 2, 2004, the EQB staff made a draft site permit available on the EQB website for public review and comment and distributed the draft site permit to EQB members, Technical Representatives, Dodge County auditor, the City of Dodge Center and Ashland Township. (Exhibit 8). On August 2, 2004, EQB staff sent a memorandum to EQB members and Technical Representatives regarding application acceptance, the date, time and place of the public information meeting and project background information. (Exhibit 5).
 7. The EQB published notice of the site permit application, an EQB public information meeting, and an opportunity to comment on the draft site permit in the Dodge Center Star Record in Dodge County on August 4, 2004. (Exhibit 9).
 8. On August 2, 2004, the EQB published in the EQB Monitor, Volume 28, No. 16, notice of the site permit application, an EQB public information meeting, and an opportunity to comment on the draft site permit. (Exhibit 10).

9. The EQB held a public information meeting on August 12, 2004, in the Ashland Township Hall near Dodge Center, Minnesota, to receive comments on the site permit application and draft site permit. Approximately 25 people attended the meeting. Representatives from G. McNeilus Wind, LLC, were also present. Questions were raised at the meeting by several pilots who fly out of the Dodge Center Airport. Their questions are addressed in the comment section.

The Permittee

10. Garwin McNeilus of Dodge Center, Minnesota has formed a general purpose limited liability company called G. McNeilus Wind, LLC, which will own and operate the proposed project. GMW is a wind energy development company based in Dodge Center, Minnesota.
11. GMW is negotiating a power purchase agreement with Xcel Energy to supply electricity generated by the project.

Project Description

12. The proposed LWECS development will consist of up to 11 turbines. The turbines will be either the NEG Micon NM72C 1.5 Megawatt or the NM82 1.65 Megawatt wind turbine generators. The total nameplate capacity of the Project is 16.5 to 18.2 MW, depending on the selected turbine rating. The wind turbine generators will be mounted on freestanding tubular towers. The towers will be 70 to 80 meters (m) high (230 to 262 feet) at hub height. The blade length is 35 to 40 meters (114 to 131 feet) and the rotor diameter (RD) is 72 to 82 meters (236 to 269 feet). The total turbine height is 105 to 120 meters (345 to 394 feet).
13. Other components of the project include a concrete and steel foundation for each tower, pad-mounted transformers, class 5 gravel access roads, underground electric energy collection system, and communication cables. G. McNeilus Wind, LLC, is proposing to place the 34.5 kV feeder lines underground. A separate corporation, called GM Transmission, LLC, will own and operate the electric transmission necessary to deliver the electric energy to GMLLC Substation in Dodge Center.
14. Both the NM72C and the NM82 turbines are designed and suited for installation in areas with low to moderate wind conditions, such as the conditions at the proposed Project site. Both feature a variable pitch design that dynamically controls blade pitch based on load and meteorological conditions, in order to maximize production.
15. The proposed wind turbine rotor consists of three blades mounted to a rotor hub. The rotor faces into the prevailing wind and rotates clockwise at 17.3 revolutions per minute (RPM) for the 1.5 MW NM72C turbine or 14.4 RPM for the NM82 turbine. Both turbines use the NEG Micon hydraulic active-stall technology, which enables the rotor to harness maximum energy from the available wind

- while minimizing loads and providing fail-safe shut down of the turbine in all conditions. The complete rotor diameter of the NM72C is 72 meters (236 feet), with a swept area of 4,072 meters squared (1 acre). The rotor diameter of the NM82 is 82 meters (269 feet), with a swept area of 5,281 meters squared (1.3 acres).
16. The blades of the NM72C turbines are constructed of fiberglass, carbon fiber and epoxy, whereas the blades of the NM82 turbines are constructed of carbon fiber epoxy and wood. The blades of the turbines will be off-white or light grey in color. The blade bearing is a 3-piece ball bearing. Each NM72C blade measures 35 meters (115 feet) in length. Each NM82 blade measures 40 meters (131 feet) in length. The blades will be equipped with lightning protection. The entire turbine is also grounded and shielded to protect against lightning.
 17. Housed inside the fiberglass nacelle that sits on the top of the tower are the generator, brake system, yaw drive system and other miscellaneous components. The nacelle cover is a fiberglass shell enclosure with sound-insulating foam applied to the inside. The nacelle functions as a housing to protect the mechanical and electrical equipment from the outside environment.
 18. 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 with a specified time interval activates the yaw drives to align the nacelle to the wind direction.
 19. 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 kilovolt (kV) collection system via underground cables.
 20. Power will be generated at 600 volts and stepped up to 34.5 kV at a transformer mounted near the base of the tower. Multiple transformers will be looped together using 34.5 kV cable running underground along the turbine access roads to an existing 34.5 kV overhead feeder line. The power generated will be routed along the existing overhead feeder line on the west side of Highway 56 to the GMLLC Substation located in Dodge Center.
 21. The proposed turbines will be integrated into two existing meteorological towers and will also be interconnected with existing underground fiber optic communication cables. The communication cables will run back to a central host computer at an associated operations and maintenance facility where the supervisory control and data acquisition system is located.
 22. Signals from the current and potential transformers at each of the delivery points will also be fed to the central SCADA (Supervisory Control and Data

Acquisition) host computer. The SCADA system will be able to give status indications of individual wind turbines and the substation and allow for remote control of the wind turbines locally or from a remote computer offsite. This computerized supervisory control and data acquisition system will provide detailed operating and performance information for each wind turbine. GMW will maintain a computer database for tracking each wind turbine's operations and maintenance history.

Wind Resource Considerations

23. The topography of the area is relatively flat with gently rolling hills and elevations that range between 1,280 and 1,350 feet above sea level. Land use in the area is agricultural with predominately prime farmland. As a result, there are few trees or structures in the proposed project site to inhibit the wind as it passes over the area. Winds show a Midwestern signature in that they blow from many directions rather than a single prevailing direction. The area does show a preference for winds from the south in the summer and northwest in the winter.
24. The wind characteristics of the Project Area were estimated using the wind data collected in Rochester, Minnesota, which is approximately 25 miles east of the site.
25. The Minnesota Department of Commerce published the fourteenth edition of the *Wind Resource Analysis Program (WRAP) Report* in 2002. The WRAP Report presents wind analysis data from monitoring stations across the state of Minnesota. At the project site, the mean annual wind speed at an elevation of 50 meters (164 feet) is mapped as 6.61 to 6.81 meters per second (14.8 to 15.2 mph). At an elevation of 70 m (230 feet) above ground level, mean annual wind speed is mapped as 6.81 to 7.01 meters per second (m/s) (15.2-15.7 mph). These data suggest that there are windy areas in Dodge County, which has some of the highest land in southeastern Minnesota.
26. Turbine strings will be typically oriented roughly perpendicular to the prevailing southerly winds. Turbine placement has been designed to provide a minimum of 3 rotor diameters spacing in the east-west direction and a minimum of 4 rotor diameters spacing in the north-south direction, with respect to the predominant energy production directions. Given the prevalence for southerly winds, the spacing is greatest in the north-south direction.
27. The separation required between turbines under condition III.E.5. of the site permit has varied from one site permit to another. A 3 RD by 5 RD restriction is within the parameters established in other site permits. For example, the NSP Phase III site permit in Pipestone and Lincoln Counties has a minimum spacing of 2 by 6 RD, but most of the turbines are further apart. A 3 by 6 RD separation was authorized in June 2004 for the Trimont Wind project (Permit No. 03-72-LWECS-TRIMONT) in Martin and Jackson Counties. Generally, because the

separation is of concern to the project proposer, the MEQB has accepted the separation requested by the permittee. In this case, GMW has requested a 3 by 4 RD minimum separation in its application. The purpose of the restriction is to minimize wake loss effects, but there has not been one specific restriction regarding turbine spacing that has been required in all permits.

28. The Project will have a nameplate capacity of 16.5 to 18.2 MW. Under estimated average wind conditions in Dodge County and incorporating various siting and other related losses (energy losses in the gathering system, mechanical availability, array losses, icing and system losses), the Project will deliver approximately 50,589 Megawatt hours (MWh) per year using the 1.5 MW turbines and 55,801 MWh per year using the 1.65 MW turbines. An industry estimate of energy losses ranges from 8 to 10 percent of maximum output.
29. The existing project site, which already includes 41 existing Micon wind turbines, includes approximately 3,800 acres of land in sections 27, 22, 15, 16, 10 and 9 in the township of Ashland in Dodge County. The land is predominately prime agricultural land, with some scattered shelterbelts mostly around homestead areas, and very few wetlands. The proposed wind turbine site layout in the site permit application shows where the facilities, such as towers, roads and the underground electrical lines, are proposed to be located. These locations are preliminary and subject to change. It is estimated that the proposed facilities will result in the permanent disturbance of approximately 5.5 acres of land, primarily for roads and towers. Some additional acreage will be temporarily disturbed during construction of the LWECS for contractor staging areas, foundation construction, underground power lines, and tower and turbine assembly. Roads are expected to be about 4.9 meters, or 16 feet, wide Class 5 low profile roads.
30. The project as currently configured will place 11 turbines on about two and one half sections of land (1,600 acres). Considering tower footprints, and access roads, over 99% of the land will remain in its present dominant agricultural land use.
31. Permit conditions impose setbacks of five rotor diameters from non-participating properties. For the GMW Project, five rotor diameters are 1,148 to 1,345 feet, depending of which turbine model is used.

Land Rights and Easement Agreements

32. In order to build an LWECS, 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. The underlying land at the site is owned by Garwin McNeilus, LLC and leased back to the persons it was purchased from. GMW has reached agreement on lease terms with Garwin McNeilus, LLC (GM, LLC) for its turbine sites.

Written Comments and Letters Received by EQB and EQB staff Response

33. The EQB received one written comment at the EQB Public Information meeting on August 12, 2004, and two comment letters dated September 1, 2004, which was the close of the comment period for this project.
34. Jerry S. Berg, 506 5th Ave NW, Kasson, MN 55944 at the public information meeting and in a written statement recommended denying the site permit for safety reasons until a comprehensive study be conducted to identify any compromise to the safety of general aviation that may be created by the wind turbines. Mr. Berg's comments are based, in part, on an aviation fatality at the Dodge Center Airport on April 28, 2004. Mr. Berg wonders if "that plane accident was the victim of conditions induced by the proximity" of the LWECS to the southwest. Mr. Berg also commented that:
- ...in strong wind conditions there is more energy removed from the wind which induces a greater difference in the speed of the de-energized wind and the ambient wind along with more turbulence. I also believe there is a good possibility that in strong wind conditions this slower moving turbulent wind is blown further downwind before becoming stabilized. I believe with a strong southwesterly wind this slower moving turbulent wind could reach downwind as far as the Dodge Center Airport and affect aircraft operations on all runways.
- The runway 22 (southwesterly) centerline lines up with the northerly boundary of the G. McNeilus Wind LLC LWECS site. Aircraft using runway 22, which normally are smaller lightweight aircraft, do so because of prevailing southwesterly winds. This means these smaller lightweight aircraft which are the most vulnerable in unstable winds, would be flying directly into unstable wind at a time most critical to aircraft operations.
- Several of the new proposed generating towers, I believe, would increase the amount of unstable air in the flight path of aircraft departing from runway 22 even in moderate wind conditions. I further believe that all of the proposed new generating towers would increase the amount of unstable air in the flight path of aircraft during all take off and landing operations on the south and west portions of the airport in strong wind conditions.
35. The Dodge Center Municipal Airport, located in section 2 of Ashland Township, has two runways. The main runway (concrete) (16/34) is 4,500 feet long and is oriented NW to SE. The crosswind grass runway (grass) (4/22) is 2,390 feet long and oriented SW/NE. This runway is closed in the winter months.

36. The end of Runway 16 is more than 8,000 feet from the closest existing turbine, which is located in the Southwest 1/4 of the NW 1/4 of Section 10 in Ashland Township. The end of runway 22 is also approximately 8,000 feet from the nearest existing turbine. The existing turbines, closest to the runways, were approved by the FAA and comply with flight airspace height restrictions. All of the existing turbines are in compliance with required FAA lighting requirements.
37. At the August 12, 2004, EQB public information meeting Mr. McNeilus stated that he would withdraw three of the proposed turbines that would be closest to the end of runway 22 and relocate them further away from the airport. In a letter to the EQB dated August 16, 2004, Mr. McNeilus indicated that three proposed turbine sites would be moved "because of height restrictions associated with new, larger turbines, due to this location's proximity to the Dodge Center Airport." (Exhibit 12).
38. In a letter to the EQB dated August 23, 2004, Mr. McNeilus again indicated that three of the future turbine sites in the EQB site permit application will be moved. Two of the turbine sites are located in the SE 1/4 of Section 9 and one site is in the NE 1/4 of Section 16 in Ashland Township. Mr. McNeilus is now proposing to relocate the three proposed turbine sites to the south approximately two miles to Section 27. Two of these turbines would be placed in the SW 1/4 of Section 27 and the third would be in the center of the E 1/2 of Section 27. Section 27 is included as a part of the site in the GMW site permit application. (Exhibit 13).
39. With regard to Mr. Berg's concerns about the effects of turbine induced wakes and turbulence, EQB staff consulted with two professional wind meteorologists and the Office of Aeronautics in the Minnesota Department of Transportation, and conducted a review of the scientific literature concerning turbine wakes and turbulence. The professional meteorologists consulted indicated that turbine wakes and turbulence are pretty well dissipated between five and ten rotor diameters and any remaining turbulence would be insignificant. Staff at the Office of Aeronautics does not consider the location of the existing and now proposed turbines to be an aviation hazard. The nearest proposed turbines are approximately 12,000 feet or more away from the runways at the Dodge Center Municipal Airport. In this case 10 RD is about 2,360 to 2,690 feet.
40. EQB staff review of more than twenty recent scientific papers on turbine induced wakes and turbulence provided no information to indicate that turbine induced wakes and turbulence are significant beyond ten rotor diameters. Nearly all of the scientific papers applied to wakes and turbulence with wind farms. If wakes and turbulence were a significant problem at the distances Mr. Berg is concerned about, turbines within wind farms would be spaced at a much greater distance from one another.
41. On September 1, 2004, the Minnesota Department of Natural Resources (DNR) submitted comments on the Project to the EQB (Exhibit 14). DNR states that:

“The site permit requires a preconstruction inventory of biologically sensitive resources. Should the inventory identify state-listed bird species nesting in the project vicinity, we will request setbacks from the nesting sites.” DNR has requested a setback of 180 meters from the nesting sites in other LWECS projects. This is acceptable to GMW. The DNR letter also noted that “DNR staff recommends site permit approval.”

42. In a letter dated September 1, 2004, the Minnesota Historical Society commented that if involvement by a federal agency or if a Section 106 review (a Federal review process designed to ensure that historic preservation properties are considered during Federal project planning and execution) is required, the discussion on page 38 (site permit application) does not adequately address the issue of potential effects on National Register properties. The eligibility of the Ashland Township Hall has not been established, and, if eligible, the impacts on the Hall and potential avoidance/mitigation measures will need to be considered. The MHS also stated: “The discussion does accurately reflect our assessment that an archaeological survey for this area is not needed.”(Exhibit 15).
43. The Ashland Township Hall has been replaced with a new one. The old Ashland Township Hall has been sold to a private party and relocated. Therefore, this property may no longer be eligible for inclusion on the National Register of Historic Places. The Site Permit at III. D. 2. requires notification of the MHS if a federal permit is required for a determination on the Area of Potential Effects.

Site Criteria

44. 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 EQB 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 and 4401.0600. The following analysis addresses the relevant criteria that are to be applied to a LWECS project.

Human Settlement, Public Health and Safety

45. The site is in an area of low population density, with little residential or commercial 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, at part III. C., has conditions for setbacks from residences and roads. The proposed wind turbine layout meets or exceeds those requirements.
46. The proposed project is not expected to affect any water wells or any rural water system that services the area.

47. There will be no displacement of existing residences or structures in siting the wind turbines and related facilities.
48. The project will comply with the Federal Aviation Administration requirements with respect to lighting. See site permit condition III.E.5.
49. GMW will provide security during construction and operation of the project, including fencing, warning signs, and locks on equipment and facilities. GMW will also provide landowners and interested persons with safety information about the project and its facilities. See site permit condition III.B.15.
50. 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 surfaces. Although turbine icing is an infrequent event (three to five days per year at the site), 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.
51. 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

52. Wind turbines do generate noise. According to sound pressure level tests and estimations provided by GMW in its application for a site permit, the sound pressure level is expected to be lower than the MPCA nighttime noise standard of 50 dBA at 623 feet for the 1.5 MW and 738 feet for the 1.65 MW Micon turbines. For this project, no turbine will be sited closer than 738 feet from an occupied residence. See site permit at III. E. 3.

Visual Values

53. The placement of up to 11 more turbines will not dramatically affect the appearance of the area. The existing and proposed turbine towers and rotor blades will be prominent features on the landscape. There will be expansive views of the turbines to passing motorists on local township, county roads and State Highway 56.
54. 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 EQB require the use of tubular towers; therefore, the turbine towers will be uniform in appearance. The turbine

towers will be similar to those used on the existing 41 wind turbines within the site boundaries. The wind turbines in this project, while prominent on the landscape, also blend in with the surrounding area. The project site will retain its rural character.

55. From one perspective, the proposed project might be perceived as a visual intrusion on the natural aesthetic value on the landscape. Wind projects have their own aesthetic quality, distinguishing them from other non-agricultural uses. In the last several years, new wind plants have altered the landscape in the Buffalo Ridge area from agricultural to wind plant/agricultural. This project will add a similar visual impact to the local area. To date, the presence of the wind turbines in Dodge Center has been well accepted by the people who live and work there.
56. Several other measures will be taken to minimize visual intrusion such as: access roads will be low profile and will avoid cuts and fill; the areas affected by construction will be restored after construction is completed; and though turbines are larger than earlier than most of the other wind project on the site, turbine rotor size will require increased turbine spacing to minimize wake loss, therefore the turbines will be spaced further from one another than in some projects on the site. The visual scale will be similar.

Recreational Resources

57. Recreational opportunities in Dodge County are primarily sports-related; however opportunities for family activities are available at several city parks. The community of Dodge Center is home to a sportsman's club for archery, trap shooting, and rifle ranges, the Dodge Center Country Club golf course, tennis courts, and ball fields. Hunting is permitted in designated state Minnesota Department of Natural Resources Wildlife Management Areas (WMA's), unless otherwise posted.
58. The Bud Jensen WMA is located approximately one mile from the external boundary of the project site; there are none within the project boundary. WMA's are managed to provide wildlife habitat, improve wildlife production and provide public hunting and trapping opportunities. These DNR lands were acquired and developed primarily with hunting license fees. WMA's are closed to all-terrain vehicles and horses because of detrimental effects on wildlife habitat.
59. The turbines may be visually noticeable to persons using the Bud Jensen WMA. Turbines will not be located in WMA's or 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

60. 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 are typically overhead lines and located in public road rights-of-way, but may also be underground if it is necessary to do so. The feeder lines will deliver the energy from the wind farm to the GMLLC Substation just south of Dodge Center. Placement of collector and feeder lines is addressed in the site permit at III.E. 8.
61. 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 thousand feet of new 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 16 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 access roads. Periodic grading or other methods will maintain the roads necessary to maintain road integrity. GNW may do this work or contract it out.
62. If access roads must be installed across streams or drainage ways, GMW, 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.
63. The proposed wind project is not expected to affect water supplies, railroads, and radio reception or telecommunication facilities. The presence or operation of the project could potentially impact the quality of television reception in the area. Previous work on this subject indicates that in some cases new antennas or relocation of antennas has solved the problem. GMW will address the concerns of residents in the area of the project site after the project construction to document and mitigate any impacts that might occur. This is addressed in the site permit at III. D. 3.
64. Construction, operation, and maintenance of the proposed wind plant will comply with all required federal and state permit requirements.

Community Benefits

65. The project will provide local tax revenues of approximately \$60,000 to \$67,000 per year. 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.

66. To the extent that local workers and local contractors are capable, qualified, and available, GMW 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 serviced by the existing operations and maintenance workers.

Effects on Land-Based Economies

67. 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 5.5 acres of prime farmland within the project site boundaries which is owned by GMW. 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

68. All known archaeological and historical sites will be avoided in designing and constructing the project. In letters dated May 12, 2003, and September 1, 2004, from the State Historic Preservation Office (SHPO) to HDR, it was stated: "We do not believe that an archaeological survey of the project area is necessary."
69. The site permit at III. D.2. will not require the usual Phase I archaeological reconnaissance survey. A Phase I archaeology survey consists of the following tasks: consultation, documentation, and identification.
70. If any archaeological sites are found during the Phase I survey, their integrity and significance will need to be addressed in terms of the site's potential eligibility for listing 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, the State Archaeologist, and consulting American Indian communities. The site permit requires the Permittee to stop work and notify the Minnesota Historical Society and EQB if any unrecorded cultural resources are found during construction.

Air and Water Emissions

71. No harmful air or water emissions are expected from the construction and operation of the LWECs.

Animals and Wildlife

72. Development of the wind farm, including the construction and operation of the project, is expected to produce a minimal impact on wildlife. Based on studies of existing wind power projects in the United States and Europe, the impact to wildlife would be primarily to avian and bat populations. "Final Report-Avian Monitoring Studies at the Buffalo Ridge, Minnesota Wind Resource Area: Results Of A 4-Year Study" (September 2000) identified the following impacts:
- a) Following construction of the wind turbines, there was a reduction in the use of the area within 100 meters of the turbines by seven of 22 species of grassland breeding birds. The authors 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)
 - c) 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, and wind-plant-related mortality "is possibly not sufficient to cause significant, large-scale population declines." (p. 6-1)
73. The impact of wind power development on resident wildlife, typical of those found in agriculture-related habitats, is expected to be minimal. The only measurable impacts may be a small reduction in the available habitat that some of the resident wildlife use for forage or cover.
74. 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, 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) trees and shrubs that are important to the wildlife present in the area will not be disturbed; d) sound water and soil conservation

practices during construction and operation of the project to protect topsoil and adjacent resources and to minimize soil erosion will be taken. This also applies to any work in proximity to watercourses.

Vegetation

75. No forested land will be affected by the LWECS. No groves of trees or shelterbelts will need to be removed to construct and operate the system. Most of the area has already been reformed through drainage and cultivation. Any remaining 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

76. 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 NPDES permit application to discharge storm water from construction and will be acquired by GMW from the Minnesota Pollution Control Agency. Best management Practices will be used during construction and operation of the project to protect topsoil and adjacent resources and to minimize soil erosion.

Surface Water and Wetlands

77. No public waters or wetlands are expected to be affected by the LWECS. No towers, access roads or utility lines will be located in surface water or wetlands. See site permit at III.C.5.

Future Development and Expansion

78. The EQB anticipates more site permit applications in southeastern Minnesota under Minnesota Statutes section 116C.694 (a). The EQB 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.
79. Minnesota Statutes section 116C.57, subd. 4 requires consideration of design options that might minimize adverse environmental impacts. By using large turbines, fewer turbines are required per megawatt, 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.

80. 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.
81. 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.
82. 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 did not lead to a layout involving long strips of turbines running parallel to each other and perpendicular to the prevailing wind. Instead, the site uses shorter strings and individual turbine sites. 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 grasslands and other sensitive areas, GMW arrived at a minimum turbine spacing of about 3 to 4 rotor diameters (RD) crosswind spacing in the east-west direction and 4 to 5 RD downwind spacing in the north-south direction. Given the prevalence for southerly winds, the spacing between turbines is greatest in the north-south direction. GMW reports that based upon its own wake loss evaluation, the estimated array losses will be less than five percent.
83. Other factors that lead to losses within a wind farm include turbine availability (2 %); transformer and line loss (1 %); control algorithm, yaw error, turbulence (1.5%); and icing (2%).

Operation and Maintenance

84. Operation and maintenance will be done at an existing on-site maintenance facility. The maintenance facility is located along State Highway 56 in Section 22, adjacent to existing wind turbines. The maintenance facility will be equipped with all necessary tools, instruments and spare parts to accomplish service, repairs and project/site operational control. Spare parts in relation to the electrical infrastructure will also be maintained based on similar historic project demands. The project staff will be complemented with the necessary service vehicles, such as light trucks, boom trucks, cranes etc., to ensure timely response. Maintenance of the turbines will be on a scheduled, rotating basis.

Decommissioning and Restoration

85. GMW as the Permittee is responsible for all costs to decommission the Project and associated facilities. Decommissioning 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 four 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. The Permit requires GMW to submit a Decommissioning Plan to the EQB that describes how GMW will ensure that the resources are available to pay for decommissioning the project at the appropriate time. Dodge County requires the decommissioning plan to include \$3,000 per turbine to be held in escrow by the County. The money would only be withdrawn upon successful implementation of a decommissioning plan. If GMW fails to meet the goals and objectives of the decommissioning plan, the County reserves the right to use all or a portion of the money in escrow to finish the plan. Additionally, any disturbed surface shall be graded, reseeded, and restored as best as possible to its original state.

Site Permit Conditions

86. 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 EQB. The site permit contains conditions that apply to site preparation, construction, cleanup, restoration, operation, maintenance, abandonment, decommissioning and all other aspects of the project. No significant comments were received concerning the requirements in the draft site permit distributed for comment on August 2, 2004.

Based on the foregoing findings, the Minnesota Environmental Quality Board 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 Environmental Quality Board has jurisdiction under Minnesota Statutes section 116C.694 over the site permit applied for by G. McNeilus Wind, LLC.
3. The G. McNeilus Wind, LLC application for a site permit was properly filed and noticed as required by Minnesota Statutes section 116C.94 and Minnesota Rules parts 4410.0460 subp 2 and 4401.0550 subp 2.
4. The Minnesota Environmental Quality Board has afforded all interested persons an opportunity to participate in the development of the site permit and has

5. No objections were filed with the Minnesota Environmental Quality Board 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 Environmental Quality Board 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 G. McNeilus Wind, LLC, 18.2 MW LWECS project will not create significant human or environmental impacts and is compatible with environmental preservation, sustainable development, and the efficient use of resources.
7. The Minnesota Environmental Quality Board 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 G. McNeilus Wind, LLC, are appropriate and necessary and within the Minnesota Environmental Quality Board's authority.

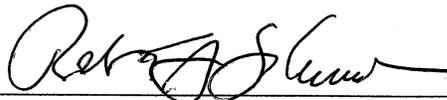
Based on the foregoing Findings of Fact and Conclusions of Law, the Minnesota Environmental Quality Board issues the following:

ORDER

The Environmental Quality Board hereby issues a site permit to G. McNeilus Wind, LLC, in the form attached hereto. The site permit authorizes G. McNeilus Wind, LLC, to construct and operate up to an 18.2- Megawatt large wind energy conversion system in Ashland Township in Dodge County in accordance with the conditions contained in the site permit for EQB Docket No. 04-83-LWECS-GMW.

Approved and adopted this 16th day of September, 2004.

STATE OF MINNESOTA
ENVIRONMENTAL QUALITY BOARD



Robert A. Schroeder, Chair