

Staff Briefing Papers

Meeting Date: May 17, 2018 Agenda Item *8

Company: Lake Benton Power Partners, LLC and Northern States Power Company d/b/a Xcel Energy

Docket No. IP-6908/WS-13-294

In the Matter of the Large Wind Energy Conversion System Site Permit for the 107.25 Megawatt Lake Benton Wind Facility in Lincoln County, Minnesota

Issues: Should the Commission amend the site permit as requested?

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Relevant Documents

Date

EQB Findings of Fact, Conclusions of Law, and Order issuing Site Permit (1995)	October 31, 1995 (November 22, 2017 eDockets)
Micrositing Analysis Report (1997)	April 7, 1997 (April 27, 2018 eDockets)
Amended Lake Benton LWECs Site Permit (1997)	June 19, 1997 (April 27, 2018 eDockets)
Order Establishing General Wind Permit Standards (Docket No. 07-1102)	January 11, 2008
Commission Order Issuing Amended Site Permit	November 1, 2017

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The attached materials are work papers of the Commission Staff. They are intended for use by the Public Utilities Commission and are based upon information already in the record unless noted otherwise.

 Relevant Documents	Date
Site Permit Amendment Application	February 9, 2018
Department of Commerce Comments on Application Completeness and Review Process	February 20, 2018
Department of Natural Resources Comments on Site Permit Amendment Application	April 13, 2018
Lake Benton Power Partners Comments	April 23, 2018
Department of Commerce EERA Comments	April 25, 2018

I. STATEMENT OF THE ISSUES

Should the Commission amend the site permit as requested?

II. STATUTES AND RULES

Under Minn. Stat. § 216F.03, the siting of a large wind energy conversion system will be done in an orderly manner compatible with environmental preservation, sustainable development, and the efficient use of resources.

Under Minn. Stat. § 216F.04 (d), the Commission may place conditions in a permit and may deny, modify, suspend, or revoke a permit. Section 13 of the Lake Benton LWECS Site Permit provides that the “permit may be amended at any time by the Commission in accordance with Minn. R. 7854.1300, subp. 2.”¹ Minn. R. 7854.1300, subp. 2, provides that the Commission may amend a site permit for a large wind energy conversion system at any time if the Commission has good cause to do so.

III. PROJECT DESCRIPTION

The Lake Benton Wind facility is an existing 107.25 megawatt Large Wind Energy Conversion System (LWECS) that encompasses approximately 11,200 acres within portions of Drammen, Verdi, and Diamond Lake townships in Lincoln County, Minnesota. The project received its first site permit on October 31, 1995, with subsequent permit amendments on June 19, 1997, and November 1, 2017.²

¹ See also Site Permit at Section 12.4.

² The facility also received a certificate of need from the Commission on April 19, 1995 (Docket No. E0021/CN-94-795).

As constructed, the facility included 143 Zond Z-750 model wind turbines installed with 53 meter (173.9 feet) hub heights and 48 meter (157.5 feet) diameter rotors. Since the start of commercial operation in 1998, four turbines have been permanently decommissioned, leaving a total of 139 operating turbines.³

IV. PROCEDURAL BACKGROUND

On February 9, 2018, Lake Benton Power Partners, LLC (LBPP) filed a LWECS Site Permit Amendment Application (Application) for the Lake Benton Wind Facility in Lincoln County, Minnesota.

On February 20, 2018, the Department of Commerce Energy Environmental Review and Analysis (DOC-EERA) filed comments concerning the completeness of the Application and the appropriate review process. DOC-EERA concluded that the Application was properly developed using the DOC-EERA LWECS guidance document⁴ and contained the appropriate information identified under Minn. R. 7854.0500. The DOC-EERA also recommended that the Application be reviewed under the informal process developed by DOC-EERA and Commission staff and that was presented at a 2017 Commission Planning Meeting. The informal review process generally includes submission of the application, DOC-EERA review of the application for completeness, a public meeting and comment period, DOC-EERA recommendation on merits of application, and a Commission decision.

On February 16, 2018, the Commission issued a Notice of Public Information Meeting and Comment Period. The notice was sent to a list of potentially affected landowners and local government units developed by LBPP. The notice was also published in the March 21, 2018 edition of the Lake Benton Valley Journal.

On April 3, 2018, a public information meeting was held at the Lake Benton Community Center in Lake Benton, Minnesota. Staff from the Public Utilities Commission and the DOC-EERA and representatives for LBPP were available at the meeting to answer questions. Approximately six members of the public attended the meeting, two provided comment. Questions and comments included the following:

³ As provided by Lake Benton Power Partners, the following four turbines were decommissioned on the following dates: Turbine No. 130 in July 2005 due to lighting strike and catastrophic fire, Turbine No. 91 in April 2008 due to faulty gearbox installation, Turbine No. 65 in April 2012 due to broken main shaft, and Turbine No. 58 in August 2012 due to lighting strike and catastrophic fire.

⁴ Department of Commerce Energy Environmental Review and Analysis, *Application Guidance for Site Permitting of Large Wind Energy Conversion Systems in Minnesota*, August 5, 2010.

- A staff member from the Lincoln County Transportation Department was interested in the weight of the trucks that would be transporting the wind turbine parts on county roads. The representative for LBPP provided weight estimates and indicated that permits from the county would be required and conditions would be followed.
- The Verdi Township Council Chair provided his support for the project noting the benefits of the additional tax revenue and the approximately 14 jobs that were created.

Following the public information meeting, a written comment period was open until April 18, 2018, for initial comments and April 25, 2018, for reply comments. Comments were received by the Department of Natural Resources (DNR), LBPP, and DOC-EERA.

V. SITE PERMIT AMENDMENT APPLICATION

As described in the Site Permit Amendment Application, LBPP has proposed to upgrade the facility's turbines. The upgrades would consist of replacing equipment within the nacelle and turbine base (gearboxes, generators, and switchgear) and replacing the rotor assembly which would include the installation of longer turbine blades. To facilitate the project upgrades, LBPP has requested the Commission grant the following amendments to the existing site permit:

- Increase the permitted rotor diameter from 48 meters to 50 meters;
- Adjust the permitted wind access buffer setbacks to current Commission guidelines; and
- Approve an exception for those upgraded turbines that would no longer meet the current Commission setbacks and site layout restrictions.

Staff summarizes the key points associated with the proposed upgrades, as identified by LBPP in its Application:

- The longer turbine blades would increase the existing rotor diameter by approximately two meters 48 meters (157.5 feet) to 50 meters (164 feet).
- The turbine locations, meteorological tower locations, and the permitted site boundary would not change.
- All turbines would remain at least 500 feet from residences.
- Turbine towers would remain the same height.
- The replacement blades will have improved lightning protection.
- The turbine upgrades would not increase individual turbine generator capacity or the permitted nameplate capacity of the facility, but would instead increase overall efficiency.

- LBPP would continue to own and operate the facility.
- Upgrades would be completed over a three year timeframe.
- Due to the increase in rotor diameter, 16 turbines would not meet the Commission’s current 5 rotor diameter (RD) by 3 RD wind access buffer setback, and 36 turbines would no longer meet the 3.6 RD by 10 RD internal turbine spacing requirements identified in the current permit.
- Based on a new noise analysis study, sound levels with the 50 m diameter rotors are expected to be consistent with the compliant levels originally demonstrated by the facility’s Post-Construction Noise Survey.
- Based on a new analysis of potential shadow flicker with 50 m diameter rotors, potentially 4 out of 76 receptors modeled may experience between 18 and 47 hours of shadow flicker per year depending on the receptor. The four receptors include three residences and the Drammen Township Hall. Two of the residences and the township hall are non-participating landowners.⁵

LBPP has requested the following modifications to the November 1, 2017 Lake Benton Site Permit:

Permit Section		Amended Language as Proposed by LBPP
2.1	Project Description	The site boundary is more specifically shown on the map that is attached hereto as Exhibit 1. The site is of sufficient size to accommodate the Permittee’s 107.25-MW LWECS and associated facilities which have the capability to convert wind power into 107.25-MW of electrical power for delivery to NSP’s-electrical system. The 107.25 MW LWECS authorized under this permit is referred to as NSP’s Phase II Project or Lake Benton I Wind Project. The project originally consisted <u>consists</u> of 143 Zond wind turbines, identified as the Z 750 model with a 48-50-meter rotor diameter.
4.1	Wind Access Buffer	Wind turbine towers shall not be placed less than five rotor diameters from the perimeter of the site. <u>Wind turbine towers shall not be placed less than 5 rotor diameters (RD) from all project boundaries on the predominant wind axis and 3 rotor diameters (RD) on the secondary wind axis, with the following exceptions:</u>

⁵ Email from Barr Engineering (LBPP’s consultant), May 9, 2018.

		<p><u>Turbine 1, Turbine 2, Turbine 9, Turbine 20, Turbine 21, Turbine 41, Turbine 68, Turbine 76, Turbine 134, Turbine 135, Turbine 138, Turbine 139, Turbine 140, Turbine 141, Turbine 142, and Turbine 143</u></p> <p><u>This setback applies to all parcels for which the permittee does not control land and wind rights, including all public lands.</u></p>
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VI. SUMMARY OF COMMENTS RECEIVED

Following the public information meeting, a written comment period was open until April 18, 2018, for initial comments and April 25, 2018, for reply comments. Comments were received by DNR, LBPP, and DOC-EERA. These were the only comments received.

A. Department of Natural Resources

The DNR recommended adding ultrasonic bat deterrent technology to the list of adaptive management measures included in Section 5.0 of the *Lake Benton Wind Energy Bird and Bat Conservation Strategy* (Appendix E of Application). It is not completely clear, but staff does not believe the DNR intended the permit to be amended to include such language. The DNR indicated that the technology is still “under development” and “could be a viable method to reduce bat fatalities in the future.”

B. Lake Benton Power Partners

LBPP indicated it had updated its *Lake Benton Wind Energy Bird and Bat Conservation Strategy*, to include bat deterrent technology in the list of adaptive management measures, as recommended by the DNR.

C. Department of Commerce Energy Environmental Review and Analysis

DOC-EERA concluded that the exemptions from setback requirements for certain turbines is justified and reasonable and recommended that the Commission grant the amendments requested by LBPP.

VII. STAFF DISCUSSION

Staff believes there are two issues that the Commission must consider. First, would the proposed turbine upgrades create new or additive impacts not considered during the initial permitting process and subsequent permit amendments?

Second, does the current permit need to be amended to include additional or modified conditions outlining appropriate mitigation measures that would avoid or minimize identified impacts and ensure environmental preservation, sustainable development, and the efficient use of resources?

A. Additional Impacts from Proposed Turbine Upgrades

The Application provided an analysis of the potential impacts of the proposed turbine upgrades for the relevant categories identified under Minn. R. 7854.0500, subp. 7.⁶ These are the same categories that must be included and analyzed in an initial application for an LWECS site permit. As indicated in the Application and summarized in Section V of these briefing papers, the proposed turbine upgrades do not appear to create any new or additive impacts not already considered during the initial permitting of the facility.

1. Wind Access Buffer Setback

Although no impacts have been identified with the reduced setbacks, LBPP indicated in its Application that there are currently 26 originally constructed turbines that do not meet the five rotor diameter (RD) wind access setback from the perimeter of the site specified in the original site permit.⁷ LBPP further stated that the “26 turbines were erected and operated under a PUC grant of exceptions from the 5 RD wind access setback included as a condition in the original Site Permit.” Staff notes that when original site permit was issued in 1995 and amended in 1997, LWECS site permitting authority was under the jurisdiction of the Environmental Quality Board (EQB). Accordingly, the EQB, not the Commission, would have been the government entity to grant any exception to the 5 RD wind access buffer setback. In reviewing the limited

⁶ Demographics, including people, homes, and businesses; noise; visual impacts; public services and infrastructure; cultural and archaeological impacts; recreational resources; public health and safety, including air traffic, electromagnetic fields, and security and traffic; hazardous materials; land-based economics, including agriculture, forestry, and mining; tourism and community benefits; topography; soils; geologic and groundwater resources; surface water and floodplain resources; wetlands; vegetation; wildlife; and rare and unique natural resources.

⁷ Section III.C.1 of the original 1995 Site Permit provided that “wind turbines shall not be placed less than 5 rotor diameters from the perimeter of the site.” The following 26 turbines currently do not meet the 5 RD wind access setback from the perimeter of the site: 1, 2, 5, 6, 9, 19, 20, 21, 41, 50, 51, 68, 74, 75, 76, 88, 133, 134, 135, 136, 138, 139, 140, 141, 142, and 143.

historical documents available for this facility, staff surmises that the EQB may have approved a variance to the 5 RD wind access setback for the 26 turbines during plan and profile review. Specifically, staff notes the April 1997 Micrositing Analysis Report which concluded that the total wake loss for the project as designed is extremely low compared to most projects. The wind access buffer was originally developed to address the potential for wake effects, or turbulence, between wind turbines. Therefore, if the total wake loss was nominal, the reduced setbacks would have been appropriate. That said, staff was unable to locate an EQB document that explicitly authorized a variance.

In November 2017, the Commission made certain amendments to the site permit.⁸ In addition to extending the site permit expiration date as requested by LBPP, the Commission incorporated several conditions that have become standard in LWECS site permits since the Lake Benton site permit was originally issued. The Commission, however, was not asked to consider and did not address or modify the original wind access buffer language (Section 4.1) to reflect the General Wind Permit Standards due to potential conflicts with the existing project design.⁹

LBPP is now requesting that the Commission update the wind access buffer setback to the five RD by three RD General Wind Permit Standard. LBPP determined using updated prevailing wind data and the proposed rotor diameter increase from 48 m to 50 m that only 16 of the original 26 turbines would not conform to the five RD by three RD wind access buffer setback.¹⁰ Because these 16 turbines would continue to not meet wind access buffer setback, LBPP has also requested that the Commission approve an exception for the 16 turbines.

2. Internal Turbine Spacing

Similar to the reduced wind access buffer setbacks, LBPP also requested an exception to allow up to 26 percent of the turbines to be less than the current site permit turbine spacing requirement of 3.6 RD between turbines towers (crosswind) and 10 RD between strings of turbine towers (downwind). The current site permit language reads:

The turbine towers shall be spaced no closer than 3.6 rotor diameters (RD) within a string and 10 RDs between strings. If required during final micro-siting of the turbine

⁸ *Order Issuing Amended Site Permit*, November 1, 2017.

⁹ The General Wind Permit Standards, enacted after the issuance of the original Site Permit, specify that turbine placement cannot be less than five RD from all boundaries of wind and land rights on the predominant wind axis and three RD on the secondary wind axis, without the approval of the permitting authority. *See also* Commission Order Establishing General Wind Permit Standards, January 11, 2008, Docket No. E, G-999/M-07-1102.

¹⁰ Turbines: 1, 2, 9, 20, 21, 41, 68, 76, 134, 135, 138, 139, 140, 141, 142, and 143.

towers to account for topographic conditions, up to 10 percent of the towers (14 towers) may be sited closer . . .

The current deviation from the turbine spacing requirement is 33 turbines or 24 percent of the total number of turbines. LBPP indicated that the larger rotor diameter would increase the number of turbines not meeting the setback by three to 36 turbines or 26 percent of the total number of turbines. LBPP pointed out that the increased rotor diameter is the only factor causing an increase in the number of turbines not meeting the internal setback, as no turbines are being relocated.

Again, similar to the reasoning behind the reduced wind access buffer setbacks, staff believes the EQB may have also granted a variance to the turbine spacing requirement during plan and profile or micrositing review. As with the wind access buffer setback, internal turbine spacing was also developed to address wake loss effects and to ensure LWECs are designed and sited in a manner that ensures efficient use of the wind resources, long term energy production, and reliability. Therefore, if the total project wake loss was nominal the reduced setback would have likely been appropriate.

B. Site Permit Language

LBPP requested an exemption for 36 turbines that would not meet the current internal turbine spacing requirements after the proposed upgrades, but did not provide any proposed amendments to the permit conditions as it did with its other requests. Therefore, staff recommends the following modifications to permit Section 4.10 (Turbine Spacing):

Permit Section		Amended Language as Proposed by Commission Staff
4.10	Turbine Spacing	The turbine towers shall be constructed within the site boundary as shown in the official site maps. The turbine towers shall be spaced no closer than 3.6 rotor diameters (RD) within a string and 10 RDs between strings. If required during final micro siting of the turbine towers to account for topographic conditions, up to 10 <u>Up to 10 26</u> percent of the towers (14 <u>36</u> towers) may be sited closer than the above spacing but the Permittee shall minimize the need to site the turbine towers closer.

Staff also provides further clarification to LBPP’s suggested permit language modifications to Section 2.1 and Section 4.1. For easier review, staff accepted LBPP’s proposed language

modifications and inserted the new language. The table below represents the final recommended permit language:

Permit Section		Clarifications to LBPP’s Amended Language as Proposed by Commission Staff
2.1	Project Description	The site boundary is more specifically shown on the map that is attached hereto as Exhibit 1. The site is of sufficient size to accommodate the Permittee’s 107.25-MW LWECS and associated facilities which have the capability to convert wind power into 107.25-MW of electrical power for delivery to NSP’s-electrical system. The 107.25 MW LWECS authorized under this permit is referred to as NSP’s Phase II Project or Lake Benton I Wind Project. The project consists of 443 <u>139</u> Zond wind turbines, identified as the Z 750 model with a 48- 50-meter rotor diameter.
4.1	Wind Access Buffer	<p><u>Wind turbine towers shall not be placed less than five rotor diameters on the prevailing wind directions and three rotor diameters on the non-prevailing wind directions from the perimeter of the property where the Permittee does not hold the land and wind rights including public lands, without the approval of the Commission, with the following exceptions: Wind turbine towers shall not be placed less than 5 rotor diameters (RD) from all project boundaries on the predominant wind axis and 3 rotor diameters (RD) on the secondary wind axis, with the following exceptions:</u></p> <p>Turbine 1, Turbine 2, Turbine 9, Turbine 20, Turbine 21, Turbine 41, Turbine 68, Turbine 76, Turbine 134, Turbine 135, Turbine 138, Turbine 139, Turbine 140, Turbine 141, Turbine 142, and Turbine 143.</p> <p><u>This section does not apply to public roads and trails.</u></p> <p>This setback applies to all parcels for which the permittee does not control land and wind rights, including all public lands.</p>

Lastly, when a request to amend a LWECS site permit has come before the Commission it has historically taken that opportunity to review the whole permit and incorporate conditions that have become standard in current LWECS site permits. In this case, the Commission updated the

provisions of the site permit in November 2017, when it considered the LBPP's request to extend the permit expiration date.¹¹ The Commission was made aware at that time that this second amendment request to upgrade the turbines would be forthcoming. Consequently, the Commission considered this possibility when standardizing the site permit language in its November 1 2017 Order. Because the facility has already been constructed and has been operational for approximately 19 years and because it was granted certain spacing exceptions by the EQB around the time the facility was constructed, a number of the conditions did not apply as they related to construction activities. However, in anticipation of the facility upgrades, the following provisions were amended at that time and do apply:

Noise Studies – The current permit (November 2017 Permit) indicates that the required noise studies have been filed.

Avian and Bat Protection – The November 2017 Permit requires an updated Avian and Bat protection Plan (ABPP) to be filed within 6 months of the order amending the permit. LBPP included the required updated ABPP in its current Application as Appendix E. The report reflects the proposed upgrades to the turbines and steps to identify and mitigate impacts to avian and bat species during continued operation of the retrofitted facility. The report also acknowledges the various reporting requirements required by the current permit.

Decommissioning Plan – The November 2017 Permit requires an updated decommissioning plan and updates to the plan every five years thereafter.

Emergency Response Plan – The November 2017 Permit requires an updated emergency response plan.

As a result of the permit amendments authorized by the Commission in November 2017, staff believes that the current site permit contains conditions that will continue to provide sufficient protection during the proposed turbine upgrades and future operation of the facility. In addition, considering the absence of any identified new or additive impacts from the proposed turbine upgrades, and the fact the facility has been successfully operating in its current configuration with reduced wind access buffer and internal spacing setbacks for its 19-year operating history with little to no complaints leads staff to believe the recommended upgrades and site permit amendments and variances are appropriate in this case. Staff agrees with the Department of Commerce and recommends granting the site permit amendments requested by LBPP in its Application as further modified by staff in these briefing papers.

¹¹ Commission *Order Issuing Amended Site Permit*, November 1, 2017.

Staff believes the only additional condition that the Commission may want to consider is the requirement of a post-turbine upgrade noise study. However, staff points out that LBPP provided a noise analysis in its Application which indicated no significant change in sound levels is expected with the turbine upgrades. Also, as stated earlier, the facility has been in operation for 19 years with little to no complaints. Therefore, staff does not believe a post-construction noise study is warranted.

VIII. COMMISSION DECISION OPTIONS

1. Grant the amendments to the November 1, 2017 Lake Benton LWECS Site Permit (Permit Sections 2.1 and 4.1) as requested by LBPP in its Application.
2. Grant the amendments to the November 1, 2017 Lake Benton LWECS Site Permit as requested by LBPP in its Application and as further modified by Commission staff in Section VII.B of these briefing papers (Permit Sections 2.1, 4.1, and 4.10).
3. Do not grant the amendments to the November 1, 2017 Lake Benton LWECS Site Permit as requested by LBPP in its Application.
4. Require a post-turbine upgrade noise study to be filed upon completion of facility upgrades.**
5. Authorize Commission staff to make further refinements to the permit conditions as necessary to ensure consistency with the record, the language of recently issued permits, and the Commission's decision on this matter.
6. Take some other action deemed appropriate.

Staff Recommendation: 2 and 5

** If the Commission requires a post-turbine upgrade noise study, staff recommends the Commission delegate authority to the Executive Secretary to implement the monitoring using an independent 3rd party to be recommended by the Permittee, approved by the Executive Secretary, and reporting directly to and filing the results directly with EERA and Commission staff. This is the same manner in which the Commission has required of noise monitoring in recent dockets.