

BEFORE THE MINNESOTA PUBLIC UTILITIES COMMISSION

Katie J. Sieben	Chair
Valerie Means	Commissioner
Matthew Schuerger	Commissioner
Joseph K. Sullivan	Commissioner
John A. Tuma	Commissioner

In the Matter of the Application of Freeborn Wind Energy LLC for a Large Wind Energy Conversion System Site Permit for the 84 MW Freeborn Wind Farm in Freeborn County

ISSUE DATE: August 8, 2022

DOCKET NO. IP-6946/WS-17-410

ORDER ACCEPTING POST-CONSTRUCTION NOISE MONITORING REPORT AND COMPLIANCE REVIEW

**PROCEDURAL HISTORY**

On December 19, 2018, the Commission issued an order granting Freeborn Wind Energy, LLC, a site permit (the Site Permit) to construct a collection of wind turbines and related facilities in Freeborn County (the Freeborn Wind Project or the Project). The Commission subsequently granted amendments to the site permit and transferred the Site Permit to Northern States Power Company d/b/a Xcel Energy (Xcel or the Company). Among other things, the Site Permit required Xcel to conduct a post-construction noise study.

On March 12, 2020, Xcel filed its proposed post-construction noise monitoring methodology for the Project, prepared by Hankard Environmental, Inc.

On November 18, 2021, Xcel filed its post-construction noise monitoring protocol for the project, prepared by RSG (the Protocol).

In November 2021, RSG conducted the post-construction noise monitoring study for the project (the Noise Study or the Study).

On February 1, 2022, Xcel filed its post-construction noise monitoring report (the Report) for the Project as required by Section 7.4 of the Site Permit.

On February 15, 2022, the Commission received comments from Carol Overland on behalf of Sue Madson and the Association of Freeborn County Landowners (jointly, the Landowner Comments), asserting that there were material errors and misstatements in the Report.

On May 2, 2022, EERA filed its comments on the post-construction noise monitoring study (EERA's compliance review).

On May 13, 2022, the Commission requested comments on Xcel's Report.

By May 27, 2022, the Commission received initial comments from the following:

- Allie Olson
- John and Sue Madson
- Danielle Madrigal
- Xcel

On June 3, 2022, the Commission received reply comments from:

- Xcel
- John and Sue Madson

By June 10, 2022, the Commission received supplemental comments from the following:

- EERA
- John and Sue Madson

On July 7, 2022, the matter came before the Commission.

## **FINDINGS AND CONCLUSIONS**

### **I. Background**

The Freeborn Wind Project is a wind power project located in Freeborn County, Minnesota and extending into Iowa. The Project is composed of 24 wind turbines in Minnesota and 76 wind turbines in Iowa. The area around the Project is composed primarily of agricultural land with farm residences and rural residences interspersed throughout the area.

The purpose and scope of the Noise Study was for the Freeborn Wind Project to comply with section 7.4 of the Site Permit and Minn. R. Ch. 7030 (the Pollution Control Noise Rules), which establishes noise standards for a variety of land uses.

#### **A. Noise Standards**

The Pollution Control Noise Rules are based on statistical calculations that quantify noise levels over a one-hour monitoring period and establish noise limits for various land uses based on Noise Area Classification. All noises produced by the Project must be within the noise standards described in Minn. R. 7030.0040, subp. 2 (the Noise Standards). The Noise Standards limit A-weighted decibel levels (dBA) for specific receptor environments and times of day. The primary noise receptors in the Project area are residences. The Noise Standards for these residences are  $L_{10} = 65$  dBA and  $L_{50} = 60$  dBA during the daytime<sup>1</sup>, and  $L_{10} = 55$  dBA and  $L_{50} = 50$  dBA during the nighttime.<sup>2</sup> The  $L_{10}^3$  calculation is the noise level that is exceeded for ten percent of

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<sup>1</sup> "Daytime" means those hours from 7:00 a.m. to 10:00 p.m. Minn. R. 7030.0020, subp. 3.

<sup>2</sup> "Nighttime" means those hours from 10:00 p.m. to 7:00 a.m. Minn. R. 7030.0020, subp. 10.

<sup>3</sup>  $L_{10}$  means the sound level, expressed in dBA, which is exceeded ten percent of the time for a one-hour survey. Minn. R. 7030.0020, subp. 7.

the hour, and the L<sub>50</sub><sup>4</sup> calculation is the noise level exceeded for fifty percent of the hour.<sup>5</sup>

Under the Noise Standards, during a one-hour period of monitoring, daytime noise levels cannot exceed 65 dBA for more than 10 percent of the time or 60 dBA more than 50 percent of the time; nighttime noise levels cannot exceed 55 dBA for more than 10 percent of the time or 50 dBA more than 50 percent of the time.<sup>6</sup>

## **B. Site Permit Conditions**

Section 4.3 of the Site Permit requires that all wind turbine towers comply with the Noise Standards established by the Noise Pollution Control Rules.

Under Section 7.4 of the Site Permit, Xcel must conduct a post-construction noise monitoring study and file the results with the Commission within 18 months of commencing commercial operation of the Project.

Section 6.2 of the Site Permit requires the Company to work with the Department of Commerce to develop a plan to minimize and mitigate turbine-only noise impacts where turbine-only noise levels produce more than L<sub>50</sub>=47 dBA.

## **II. The Post-Construction Noise Monitoring Report**

The Report provides an overview of the methodology and results of the Noise Study conducted by RSG in November 2021 at the Freeborn Wind Project. The stated purpose of the Noise Study was to assess the Project's sound levels with the noise limits defined in the Pollution Control Noise Rules and in the Site Permit.

### **A. The Noise Study**

Xcel Energy contracted with RSG to conduct the required noise monitoring, analyze the data, and report the results. RSG conducted continuous noise level monitoring at four locations for approximately 13 days. The North, Central, West, and South Monitors were identified in the Protocol and represent the highest modeled turbine-only sound levels in their respective regions.

According to the Report, RSG's assessment also included:

- Analysis of the post-construction data to determine the total sound levels, background sound levels, and turbine-only sound levels from the Project.
- Comparison of the results with the Noise Standards.
- Comparison of the monitoring results with modeled sound levels calculated prior to construction.

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<sup>4</sup> L<sub>50</sub> means the sound level, expressed in dBA, which is exceeded fifty percent of the time for a one-hour survey. Minn. R. 7030.0020, subp. 8.

<sup>5</sup> Minn. R. 7030.0020, subp. 7 and 8.

<sup>6</sup> Minn. R. 7030.0040, subp. 2.

## **B. Methodology**

### **1. Shutdowns**

According to the Report, RSG utilized an operational shutdown-based method to measure the background sound levels at each monitor location. The wind turbines were shut down during nighttime hours periodically throughout the monitoring period to assess background sound levels and to allow for a direct calculation of sound levels attributable to the Project. RSG explained that wind turbine shutdowns are the most effective method to determine the contribution of wind turbines to total sound by quantifying the background sound immediately before or after a period of turbine operation at the same location.

### **2. Binning**

Wind speed “binning” is an alternative method for determining wind turbine-only sound levels. The Protocol requires a binning analysis at monitors that register sound levels that exceed Noise Standards and are attributable to the Project. The Binning method assesses how sound levels change with variations in wind speed and how often changes in wind speed occur throughout the full monitoring period.

Under the binning method, to determine the average sound level at each wind speed when the facility output is at its highest, data with high wind turbine emissions and similar environmental conditions are “binned” (aggregated) by ground level wind speed. This method is considered a reliable and effective approach for measuring turbine-only sound levels.

The Study excluded data from periods in which any of the following conditions occurred:

- Ground level wind gust speeds exceeding 5 m/s (meter per second), or when winds create notable contaminating noise.
- Precipitation in the form of rain, sleet, or hail.
- The presence of short-term contaminating sound caused by human or other activity including field calibration and maintenance.

According to the Report, excluded data for a given location were verified using one or more of the following methods:

- High ground-level wind periods were removed according to the measurements of ground-level wind gust speed collected by an anemometer present at each monitoring location.
- Precipitation events were identified by regional meteorological data and pinpointed with spectrograms representatives of the sound level data and/or continuous audio recordings at each monitor.
- Anomalous sounds such as site setup, microphone calibration, and extraneous anthropogenic sources in some shutdown periods were identified by 1/3 octave band spectrograms and audio files.

### C. Results

The highest L<sub>50</sub> attributed to the wind turbines are shown in Table 1, below.

Table 1. Summary of Highest Valid Monitored L<sub>50</sub> at Each Location<sup>7</sup>

Monitor	Total Sound	Background	Turbine-only
North	50 dBA	31 dBA	50 dBA
Central	48 dBA	26 dBA	48 dBA
West	51 dBA	38 dBA	50 dBA
South	47 dBA	35 dBA	47 dBA

The Report identified two one-hour events in which sound levels appeared to exceed the Noise Standards. At the Central Monitor, total noise during the turbine operation period associated with the Study's 9th wind turbine shut down was 51 dBA. RSG calculated a background L<sub>50</sub> of 47 dBA, resulting in a calculated turbine-only sound level of 49 dBA. RSG indicated that the total sound level of 51 dBA was due to strong and gusty winds aloft, averaging 14 m/s. RSG reviewed the audio recordings associated with the shut down and explained that gusty winds dominated the recordings during the turbine-on and background periods. RSG concluded that the sound levels recorded around the shutdown were not substantially influenced by or attributed to the wind turbines.

At the West Monitor, total noise during the turbine operation period associated with the Study's 37th wind turbine shutdown was 51 dBA. The background L<sub>50</sub> during the shutdown was 38 dBA, resulting in a turbine-only sound level of 50 dBA. RSG explained that the exceedance at the West Monitor occurred during high wind shear, with ground gusts at 0 m/s and hub height wind speed at 10 m/s. According to RSG, the absence of ground-wind gusts at and over 10 m/s occur approximately 4 percent over the full monitoring period and for 6 percent of nighttime period.

Because the West monitor had a one-hour period with a total L<sub>50</sub> attributable to the Project over 50 dBA, RSG conducted a binning analysis using hub height wind speed as the basis for the binning to determine total and turbine-only sound levels by wind speed. The binning analysis found that:

- The highest turbine-only sound level using this method was 46 dBA at the 8 m/s wind speed bin.
- There were no periods attributable to the Project that exceeded the sound limits using the binning method.
- Above 10 m/s, wind-induced background noise exceeded the turbine-only sound levels.

According to the Report, the Study identified a variance of 2 to 5 dBA between the pre-construction noise modeling and post-construction noise monitoring at the Freeborn Wind Project. RSG explained that this discrepancy was primarily due to the modeling parameters that were used in the pre-construction study.

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<sup>7</sup> Report, at v.

### **III. EERA Compliance Review**

EERA worked with its independent consultant, Aercoustics, to conduct additional review and analysis of the Report. EERA also evaluated the variance of 2 to 5 dBA between the pre-construction noise modeling and post-construction noise monitoring at the Project as identified in the Report.

Aercoustics assessed compliance with Noise Standard by binning data of the noise monitoring locations by ground level wind speeds rather than the hub height wind speeds included in RSG's analysis. EERA explained that the Aercoustics ground level wind speed binning method reduces the potential for inclusion of atypical project related noise caused by unique or rare meteorological events.

### **IV. Positions of the Parties**

#### **A. Landowners**

The Landowner Comments alleged that the Report contains material errors and misstatements and requested that the Commission suspend the Site Permit, require additional noise monitoring at all turbine locations, and continue nighttime curtailment of specific wind turbines.

#### **B. EERA**

EERA reviewed the Report and the additional detailed analysis conducted by Aercoustics and agrees with the Company that the Project complies with the Noise Standards and the Site Permit. EERA also noted that the variation between the pre-construction modelling of noise levels and post-construction monitoring is within an acceptable range to validate the modeling predictions.

#### **C. Xcel**

Xcel stated that the Noise Study was conducted in accordance with Section 7.4 of the Site Permit and Protocol and recommended that the Commission accept the Report and EERA's compliance review. Xcel further stated that because the Project complies with the Noise Standards and the Site Permit, there is no factual basis for requiring further monitoring, curtailment, or any other action.

### **V. Commission Action**

The Commission appreciates the comments and participation of the landowners, as well as the EERA's thorough review of the Noise Study.

The Commission has reviewed the entire record and the arguments of all parties. The record does not expose material errors in in the Company's Report or EERA's compliance review.

The Project's compliance with the Noise Standards and the Site Permit are well supported in the record. The Commission is persuaded that the methodologies applied in the Noise Study and compliance review reliably assessed the Project's noise levels to determine compliance with the Noise Standards. The record does not demonstrate that RSG's approach to collecting data and assessing the results was improper, or that the results should be invalidated. The Noise Study and

the compliance review support the Company's assertion that the Project has not violated the Site Permit or the Pollution Control Noise Rules.

The Commission agrees with EERA's analysis and conclusion that the Project complies with the Noise Standards and relevant Site Permit conditions. Therefore, the Commission accepts Xcel's Noise Study and Report and EERA's compliance review.

The Commission's decision does not preclude future complaints regarding potential violations of the Noise Standards. The Commission appreciates Xcel's commitment to working with landowners and the EERA to mitigate noise issues as they arise.

### ORDER

1. The Commission accepts Xcel's post-construction noise study and EERA's compliance review. No additional noise monitoring is necessary at this time.
2. This order shall become effective immediately.

BY ORDER OF THE COMMISSION



Will Seuffert  
Executive Secretary



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## **CERTIFICATE OF SERVICE**

I, Chrishna Beard, hereby certify that I have this day, served a true and correct copy of the following document to all persons at the addresses indicated below or on the attached list by electronic filing, electronic mail, courier, interoffice mail or by depositing the same enveloped with postage paid in the United States mail at St. Paul, Minnesota.

**Minnesota Public Utilities Commission  
ORDER ACCEPTING POST-CONSTRUCTION NOISE MONITORING  
REPORT AND COMPLIANCE REVIEW**

Docket Number **IP-6946/WS-17-410**

Dated this 8th day of August, 2022

/s/ Chrishna Beard



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