Appendix E

Noise Assessment

NOISE IMPACT ASSESSMENT

Snowshoe BESS Project

Olmsted County, Minnesota

AUGUST 9, 2024

PREPARED FOR:
Snowshoe BESS, LLC

spearmint energy

PREPARED BY:
Westwood

Westwood

Noise Impact Assessment

Snowshoe BESS Project

Olmsted County, Minnesota

Prepared For:
Snowshoe BESS, LLC
2916 N. Miami Avenue
Suite 830
Miami, FL 33127

Prepared By:
Westwood Professional Services, Inc.
12701 Whitewater Drive
Suite 300
Minnetonka, MN 55343

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Executive Summary

Westwood Professional Services, Inc. (Westwood) was contracted to conduct an operational noise impact analysis for the Snowshoe BESS Project located in Olmsted County, Minnesota. The Project will include a battery energy storage system (BESS), Project substation, O&M facility, and associated equipment/infrastructure.

As required under the Power Plant Siting Act (Minnesota Statutes Chapter 216E) and Minnesota Public Utilities Commission (MPUC), an operational noise impact assessment was conducted in support of the Site Permit Application (SPA). A noise propagation model was run for the proposed Project layout, and resultant levels at receptors within 3200' of the Project boundary were compared to the relevant noise level limits set forth within Minnesota Rules Chapter 7030.

Noise propagation for each BESS container was modeled using spectral noise data for a typical BESS unit in the absence of equipment model selection and manufacturer provided noise data. The model assumes BESS equipment to be integrated units containing both power conversion systems (inverters) and batteries.

If a final equipment selection includes separate batteries and power conversion systems, or the final equipment selection for each BESS unit is rated at a sound power level greater than 90 dBA, additional noise analysis will be necessary and mitigation measures will likely be required to comply with Minnesota Rules Chapter 7030.

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1.0 Site Description

The proposed Project is located in Olmsted County, Minnesota (**Figure 1**). The Project area consists of a battery energy storage system (BESS), substation, an O&M building and associated equipment. The primary land uses in the Project area are agricultural and rural residential. Additional noise sources in the Project vicinity include US-14, Dakota, Minnesota & Eastern (DME) Railroad, local road traffic, the existing substation, and agricultural activity.

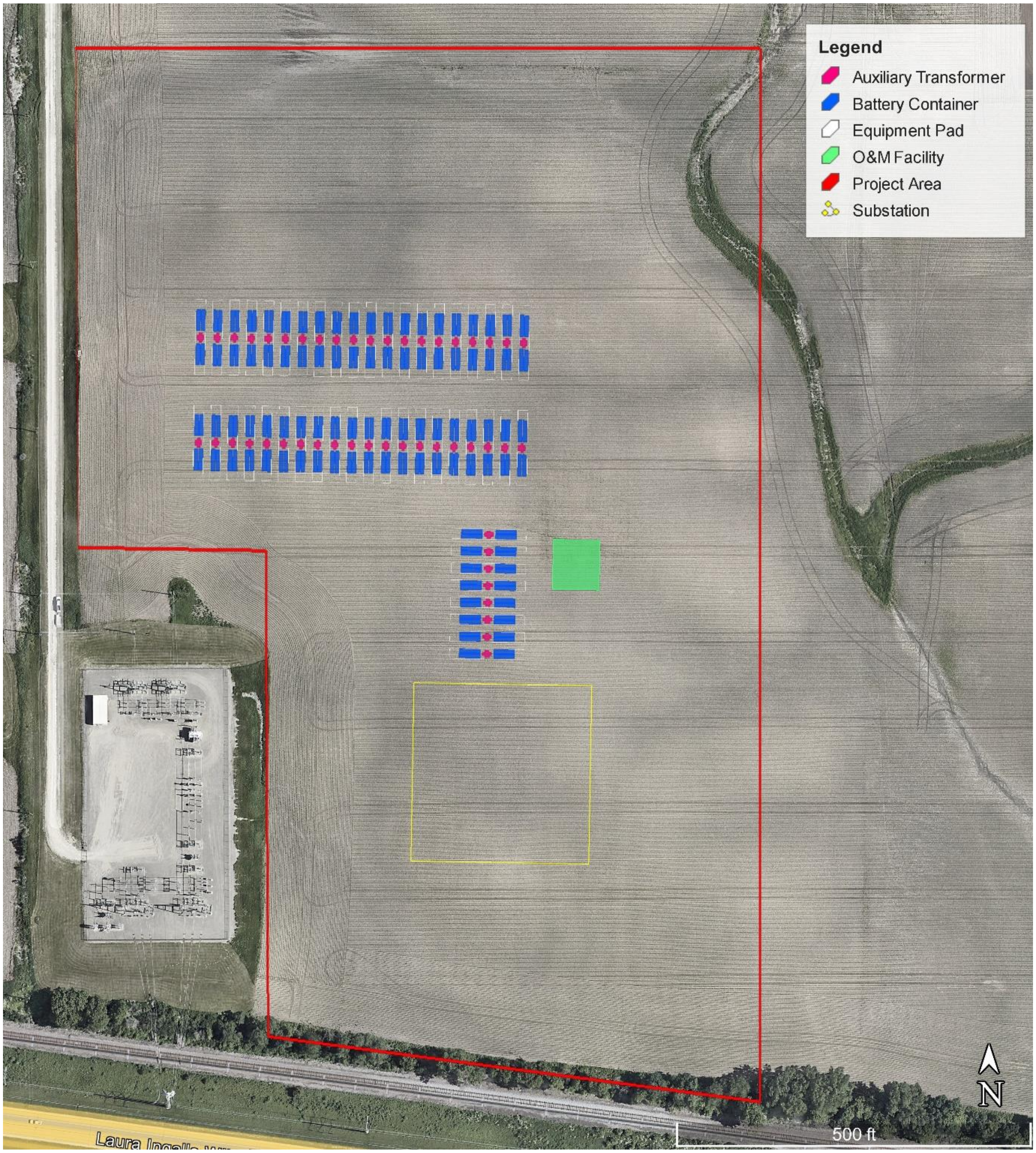


FIGURE 1: PROJECT OVERVIEW

2.0 Regulatory Setting & Noise Level Requirements

Minnesota Rules Chapter 7030 sets forth noise limits according to land use and time of day. Noise sensitive areas in the Project Area consist of residential. Households are classified as Noise Area Classification 1 (NAC 1) per MN Rules 7030.0050, Subp. 2. NAC 1 has the lowest noise limits of the three classifications, these limits are listed in **Table 1**. Daytime is defined as 7 am – 10 pm and nighttime is defined as 10 pm – 7 am. MN Rules 7030 refers to total noise – ambient plus Project generated noise.

Table 1 MN Rules 7030 NAC 1 Noise Limits

Metric	Daytime Limit	Nighttime Limit
L_{50}	60 dB(A)	50 dB(A)
L_{10}	65 dB(A)	55 dB(A)

These limits are expressed in the L_{50} and L_{10} metrics, which represent the level that is exceeded 50% and 10% of the measurement period, respectively.

Noise modeling is most accurate predicting L_{eq} levels, which is the overall logarithmic average of a measurement period. L_{10} levels are on average 3 dBA above L_{eq}, while L_{50} values are lower than L_{eq}. Thus, modeled L_{eq} can be compared to the L_{50} limits to ensure full compliance and conservatism.

The relationship between the L_{50}, L_{10}, and L_{eq} metrics is shown in **Figure 2** below.

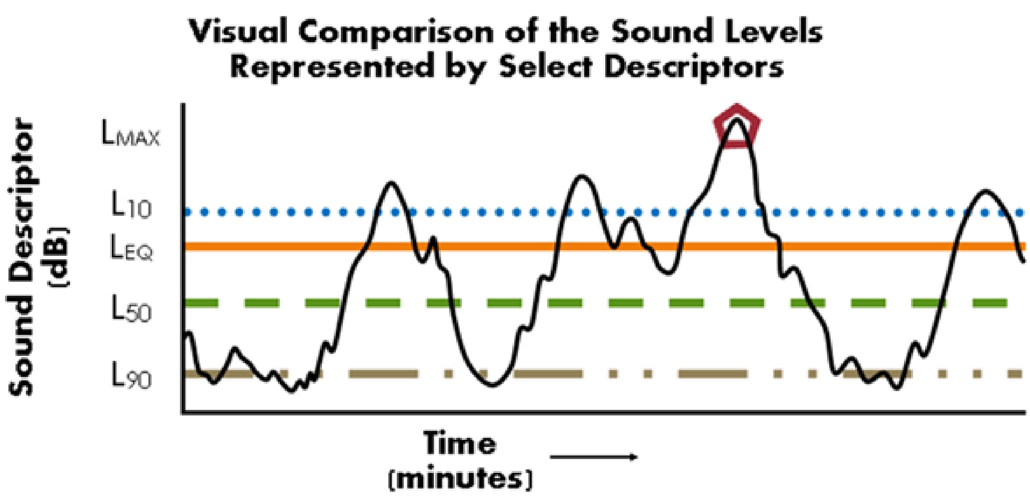


FIGURE 2: SOUND LEVEL METRICS COMPARISON

3.0 Modeling Methodology & Parameters

Noise sensitive receptors/areas (NSAs) were identified within 3200' of the Project boundary. Note that receptor location have not been field verified and are based upon aerial imagery only. Receptor location coordinates are listed in **Table 2** below.

Table 2 NSA Locations

ID	UTM Zone 15N Coordinates (m)		
	Easting	Northing	Elevation ASML
NSR-01	532289.8	4875913.7	353.7
NSR-02	532804.1	4875946.6	357.5
NSR-03	533289.6	4875945.7	357.0
NSR-04	533819.1	4875926.0	355.4
NSR-05	533716.0	4876009.7	354.3
NSR-06	533695.8	4876033.5	352.9
NSR-07	534069.4	4875937.1	352.8
NSR-08	534024.9	4874412.9	345.5
NSR-09	533738.7	4874498.4	353.5
NSR-10	533625.8	4874486.9	356.5
NSR-11	533523.2	4874481.6	362.1
NSR-12	533573.6	4874331.5	352.5
NSR-13	533520.2	4874331.4	353.5
NSR-14	533286.0	4874432.5	367.0
NSR-15	533193.5	4874425.2	367.5
NSR-16	533050.4	4874685.2	360.8
NSR-17	532947.7	4874329.0	370.6
NSR-18	532899.3	4874317.6	370.2
NSR-19	532353.7	4874384.9	380.5

Additionally, receptors were categorized by distance from the Project boundary, shown in **Table 3** below.

Table 3 NSA Distance Distribution

Distance from Project Boundary	# of NSAs
<50'	0
50' - 100'	0
100' - 200'	0
200' - 400'	0
400' - 800'	0
800' - 1600'	5
1600' - 3200'	14

A noise propagation model was developed and run for the Project. CADNA-A (a noise modeling software in compliance with ISO 9613-2) was used to calculate cumulative Project noise at all noise sensitive receptors/areas (NSAs) within 3200' of the Project boundary. The following modeling parameters were assumed:

- Ground absorption factor of G=0
- Receptor height of 1.5 m above ground level
- No other model adjustments
- Assumed meteorological conditions of 10°C and 70% humidity

The proposed BESS containers, substation transformer, HVAC equipment (associated with the O&M building), and auxiliary transformers were modeled as point sources, with noise source data taken from manufacturer cut sheets and NEMA (National Electrical Manufacturers Association) standards. The model assumed all equipment to be operating at the loudest noise emission levels, which, in combination with the other parameters, ensures a "worst case" scenario.

Noise propagation for each BESS container was modeled using spectral noise data for a typical BESS unit in the absence of equipment model selection and manufacturer provided noise data. The model assumes BESS equipment to be integrated units containing both power conversion systems (inverters) and batteries. If a final equipment selection includes separate batteries and power conversion systems, additional noise analysis will be necessary.

Project equipment and layout configuration details are shown below in **Table 4**. Unweighted octave-band sound power levels for Project equipment is listed in **Table 5** along with overall A-weighted sound power levels.

Table 4 Project Equipment & Layout Configuration

Noise Source	# of Units	Equipment Model/Reference	Source Height AGL
Substation Transformer	1	NEMA TR-1	4.0 m
Auxiliary Transformer	48	NEMA TR-1	2.0 m
O&M HVAC	2	Trane Voyager 3 (30 ton)	3.0 m
BESS Container	192	90 dBA Sound Power Level Integrated BESS Unit	2.8 m

Table 5 Project Equipment Spectral & Overall Data (CADNA-A Inputs)

Noise Source	Unweighted Octave Band (Hz) Sound Power Levels (dB L_w)								Broadband Sound Power Level (Single Unit)
	63	125	250	500	1000	2000	4000	8000	
Substation Transformer	100.6	102.6	97.6	97.6	91.6	86.6	81.6	74.6	98 dBA
Auxiliary Transformer	71.6	73.6	68.6	68.6	62.6	57.6	52.6	45.6	69 dBA
O&M HVAC	88.7	89.6	83.6	83.4	84.3	82.0	77.0	73.0	89 dBA
BESS Container	82.8	94.3	91.3	88.0	84.1	80.0	75.7	69.9	90 dBA

An ambient noise level of 45 dBA was assumed based on the day-night average sound level ranges listed in ANSI/ASA S12.9-2013 Part 3 Annex C. The high end of the range for rural residential/quiet suburban ambient noise was used, as a higher assumed ambient level is more conservative in the context of MN Rules 7030.

4.0 Noise Level Estimates & Impact Assessment

A predictive model was run using the inputs above to predict Project generated noise and total noise for all noise sensitive receptors within 3200' of the Project boundary. As BESS facilities potentially operate at all hours, the nighttime total noise level limits were used. Predicted nighttime noise levels for the Project given the stated equipment assumptions are shown in **Table 6** below. As shown, compliance is expected. Note that compliance is contingent upon selection of an integrated BESS unit rated at a maximum sound power level of 90 dBA. A total noise level contour figure can be found in **Appendix A**.

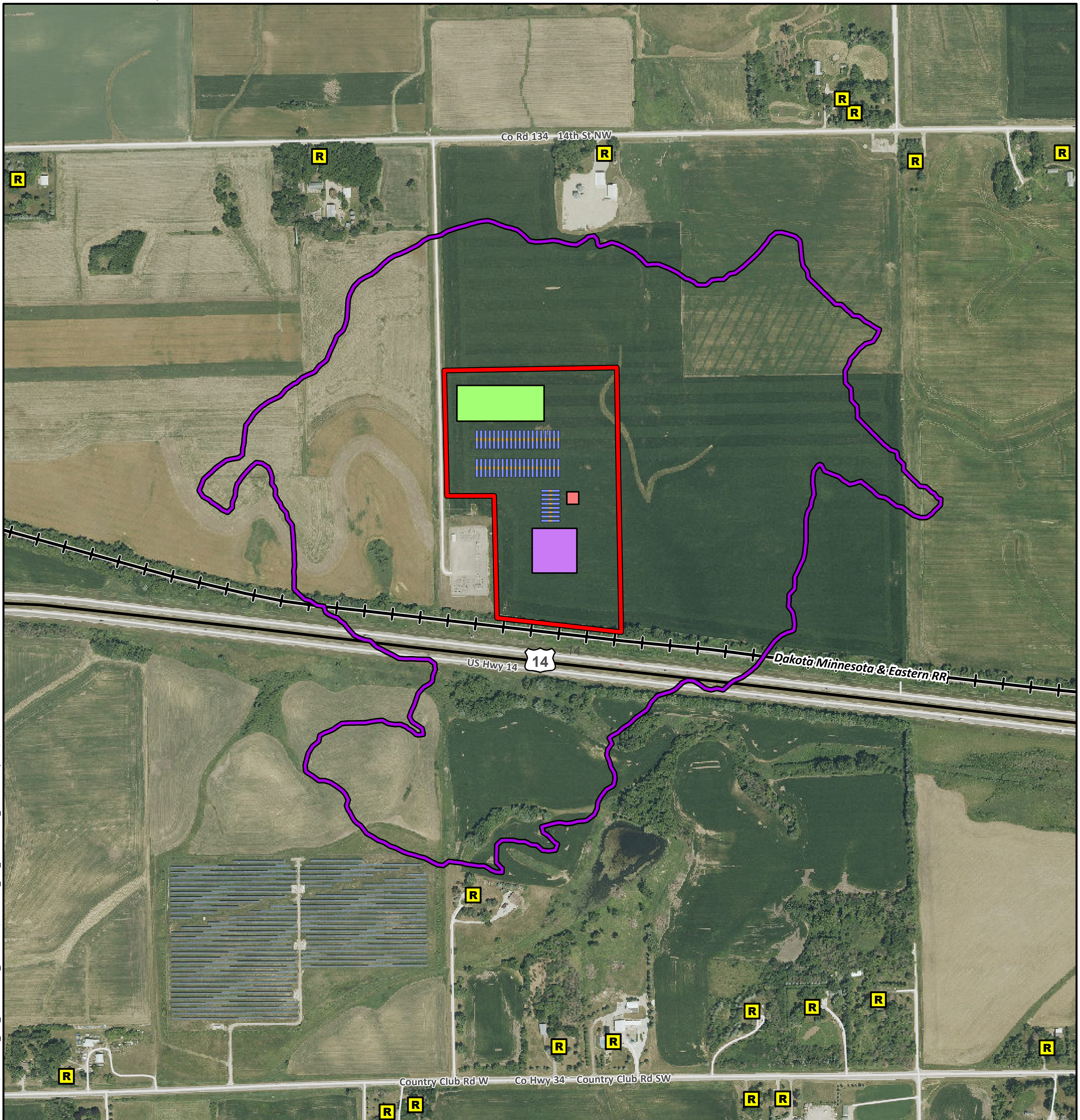
Table 6 Nighttime Modeling Results

Receptor ID	Project Noise (L_{eq} dBA)	Total Noise assuming 45 dBA ambient (L_{eq} dBA)
NSA-01	39.8	46.1
NSA-02	44.7	47.8
NSA-03	45.8	48.4
NSA-04	41.8	46.7
NSA-05	42.0	46.8
NSA-06	42.0	46.7
NSA-07	39.5	46.1
NSA-08	40.1	46.2
NSA-09	43.1	47.1
NSA-10	43.9	47.5
NSA-11	44.5	47.7
NSA-12	38.1	45.8
NSA-13	38.3	45.8
NSA-14	44.8	47.9
NSA-15	44.7	47.8
NSA-16	47.7	49.5
NSA-17	43.6	47.4
NSA-18	43.4	47.3
NSA-19	41.7	46.7

5.0 Mitigation Measures

If the final equipment selection for each BESS unit is rated at a sound power level greater than 90 dBA, mitigation measures will be required to ensure compliance. Mitigation measures may include equipment silencers, noise barriers, equipment operational capacity limitations, or a combination of these methods. Note that the extent of necessary mitigation measures is dependent on equipment selection and may be significant. Additional noise analysis may be required for mitigation design.

Appendix A
Total Noise Level Contours



Map Document: N:\0046088.00_GIS_ArcPro\R0046088_040_NoiseExhibit_20240710\R0046088_040_NoiseExhibit_20240710.aprx 8/9/2024 10:53 AM MMQuade

Data Source(s): Westwood (2024); NAIP (2023); U.S. Census Bureau (2021 & 2023).

N

0 750 Feet

Snowshoe Energy Storage Project

Kalmar Township, Olmsted County, Minnesota

50 dBA Total Noise Level Contour (Assumed 45 dBA Ambient + Project Generated Noise)

Noise Impact Assessment - Appendix A

Legend

- Project Area
- Major Road
- Road
- Railroad
- R Receptor

Noise Contours [dB(A)]

- 50

Proposed Site Features

- Proposed Project Substation
- Proposed O&M Facility
- Proposed Auxiliary Transformer
- Proposed BESS Unit
- Proposed Laydown Yard

Westwood

Toll Free (888) 937-5150 westwoodps.com