

Appendix F - **NOISE ASSESSMENT**

XCEL ENERGY

SOUND STUDY

SHERCO BESS

PROJECT NO. 185459/185469

REVISION 1

DECEMBER 2, 2025

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List of Abbreviations

Abbreviation	Term/Phrase/Name
ANSI	American National Standards Institute
BESS	battery energy storage system
CadnaA	Computer Aided Noise Abatement
dB	decibel
dBA	A-weighted decibel
EOL	end of life
Hz	hertz
ISO	International Organization for Standardization
L _{eq}	equivalent-continuous sound level
L ₁₀	10-percentile exceedance sound level
L ₅₀	50-percentile exceedance sound level
L ₉₀	90-percentile exceedance sound level
MPCA	Minnesota Pollution Control Agency
MVA	megavolt-amperes
NAC	noise area classifications
NSA	noise sensitive area
Project	Xcel Energy Sherco Battery Energy Storage System
PWL	sound power level
SPL	sound pressure level

Executive Summary

Burns & McDonnell completed a sound study for the proposed Xcel Energy (Xcel) Sherco South and West Battery Energy Storage System (BESS) (Project), located in Sherburne County, Minnesota. The Project design is expected to include the Sungrow Power Titan 2.0 4H-HX BESS containers (up to 704 end of life (EOL)), medium voltage transformers (up to 176 EOL), and associated auxiliary transformers.

The objectives of the sound study were to identify the applicable noise regulations, measure baseline sound levels near adjacent noise-sensitive areas, and to develop a noise model to evaluate potential future sound level impacts from the Project.

The State of Minnesota regulates noise emissions at the state level. The Minnesota Pollution Control Agency (MPCA) has adopted the State's noise rules that are outlined in the document "A Guide to Noise Control in Minnesota." The guide provides that the Project is limited to 50 dBA at the nearest noise-sensitive areas (i.e., residences), as the Project is expected to operate during both daytime and nighttime hours.

Based on the current Project design, using vendor-supplied equipment sound levels, Project sound levels have been modeled for two potential design scenarios. The first modeling scenario is the Project operating a full load with base operational sound levels. The second modeling scenario shows the sound level impacts with the inclusion of a low-noise air-cooled heat exchanger option incorporated. Predicted sound levels are shown in this report and are compared to the Minnesota noise limits. The unmitigated scenario is expected to exceed the MPCA sound level limits, but the mitigated scenario shows that the Project can meet the limits with mitigation installed.

1.0 Acoustic Terminology

The term “sound level” is often used to describe two different sound characteristics: sound power and sound pressure. Every source that produces sound has a sound power level (PWL). The PWL is the acoustic energy emitted by a sound source and is an absolute number that is not affected by the surrounding environment. The acoustic energy produced by a source propagates through media as pressure fluctuations. These pressure fluctuations, also called sound pressure levels (SPL), are what human ears hear and microphones measure.

Sound is physically characterized by amplitude and frequency. The amplitude of sound is measured in decibels (dB) as the logarithmic ratio of a sound pressure to a reference sound pressure (20 micropascals). The reference sound pressure corresponds to the typical threshold of human hearing. To the average listener, a 3-dB change in a continuous broadband sound is generally considered “just barely perceptible”; a 5-dB change is generally considered “clearly noticeable”; and a 10-dB change is generally considered a doubling (or halving, if the sound is decreasing) of the apparent loudness.

Sound waves can occur at many different wavelengths, also known as the frequency. Frequency is measured in hertz (Hz) and is the number of wave cycles per second that occur. The typical human ear can hear frequencies ranging from approximately 20 to 20,000 Hz. Normally, the human ear is most sensitive to sounds in the middle frequencies (1,000 to 8,000 Hz) and is less sensitive to sounds in the lower and higher frequencies. As such, the A-weighting scale was developed to simulate the frequency response of the human ear to sounds at typical environmental levels. The A-weighting scale emphasizes sounds in the middle frequencies and de-emphasizes sounds in the low and high frequencies. Any sound level to which the A-weighting scale has been applied is expressed in A-weighted decibels, or dBA. For reference, the A-weighted sound pressure level and subjective loudness associated with some common sound sources are listed in Table 1-1.

Sound in the environment is constantly fluctuating, as when a car drives by, a dog barks, or a plane passes overhead. Therefore, sound metrics have been developed to quantify fluctuating environmental sound levels. These metrics include the exceedance sound level. The exceedance sound level is the sound level exceeded during “x” percent of the sampling period and is also referred to as a statistical sound level. Common exceedance sound level values are the 10-, 50-,90-percentile exceedance sound levels, denoted by L_{10} , L_{50} , and L_{90} . The equivalent continuous sound level (L_{eq}) is the arithmetic average of the varying sound over a given time period and is the most common metric used to describe sound.

Table 1-1: Typical Sound Pressure Levels Associated with Common Sound Sources

Sound Pressure Level (dBA)	Subjective Evaluation	Environment
140	Deafening	Jet aircraft at 75 feet
130	Threshold of pain	Jet aircraft during takeoff at a distance of 300 feet
120	Threshold of feeling	Elevated train
110	Very loud	Jet flyover at 1,000 feet
100		Motorcycle at 25 feet
90	Moderately loud	Propeller plane flyover at 1,000 feet
80		Diesel truck (40 mph) at 50 feet
70	Loud	B-757 cabin during flight
60	Moderate	Air-conditioner condenser at 15 feet
50	Quiet	Private Office
40		Farm field with light breeze, birdcalls
30	Very quiet	Quiet residential neighborhood
20		Rustling leaves
10	Just audible	--
0	Threshold of hearing	--

Sources:

- (1) Adapted from *Architectural Acoustics*, M. David Egan, 1988
(2) *Architectural Graphic Standards*, Ramsey and Sleeper, 1994

2.0 Applicable Regulations & Criteria

State and local noise regulations were reviewed to determine the applicable Project limits. The Project is in Sherburne County, Minnesota, in the City of Becker. The MPCA has adopted the States noise rules that are outlined in the document “A Guide to Noise Control in Minnesota”¹. The MPCA’s limits are based on statistical calculations over a one-hour period. As presented in the Guide:

The statutory limits for a residential location are $L_{10} = 65$ dBA and $L_{50} = 60$ dBA during the daytime (7:00 a.m. – 10:00 p.m.) and $L_{10} = 55$ dBA and $L_{50} = 50$ dBA during the nighttime (10:00 p.m. – 7:00 a.m.) (Minn. R. 7030.0040). This means that during the 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.

The sound level limits for all noise area classifications (NAC) are presented in Table 2-1 below. Based on the MPCA’s rules, the Project is limited to 50 dBA L_{50} at the nearest residential properties (NAC 1), 65 dBA L_{50} at the nearest commercial properties (NAC 2), and 75 dBA L_{50} at the nearest manufacturing or agricultural properties (NAC 3), as the Project could operate at any hour of the day or night.

Table 2-1: MPCA Sound Level Limits

Noise Area Classification	Classification Summary	Daytime (dBA)		Nighttime (dBA)	
		L_{10}	L_{50}	L_{10}	L_{50}
1	Noise Sensitive Areas	65	60	55	50
2	Commercial	70	65	70	65
3	Manufacturing/Agriculture	80	75	80	75

¹ <https://www.pca.state.mn.us/sites/default/files/p-gen6-01.pdf>

3.0 Ambient Sound Level Measurements

3.1 Measurement Standards and Equipment

Burns & McDonnell personnel measured the sound level to establish the existing ambient sound level in an area close to the noise-sensitive areas. The sound level measurement was made using a sound level meter that met the American National Standards Institute (ANSI) S1.4 requirements for a Type 1 Precision Sound Level Meter. A one-half inch random-incidence microphone was used on the meter. A microphone windscreen was used for the measurement. The sound level meter was calibrated before and after the measurement using a sound level calibrator. Calibration level changes did not exceed ± 0.5 dB during the measurement. The meters and calibrator were checked within a year prior of the measurements to verify compliance with the U.S. National Institute of Standards and Technology specifications.

3.2 Existing Sound Level

The ambient sound level measurement was collected at measurement point (MP) one as identified in Figure A-1 of Appendix A. The MP was selected to be near the closest residential properties. The microphone was located at a height of 5 feet (1.5 meters) above the ground, mounted on a tripod. The MP was free from excess reflections due to walls, columns, etc., and from significant shadowing effects. The sound levels varied at the MP due to the extraneous sounds that occurred during the measurement.

The long-term monitor measured sound levels continuously over a period from approximately 11:00 AM on June 24, 2025, to 11:00 AM on June 25, 2025, to capture representative daytime and nighttime ambient sound levels in the area. Weather data was captured from a nearby meteorological station.² Temperatures ranged from 59-78°F, relative humidity ranged from 40-95%, and wind speeds ranged from 0-16 miles per hour (mph). Wind speeds are taken at standard met station height of 33 feet, average wind speeds at microphone height would be lower than measured and are generally acceptable for noise measurements. There was brief precipitation on the morning of June 25th reaching 0.2 inches at approximately 9:30 AM. The average L₅₀ and L₁₀ sound levels measured at the MP are provided below in Table 3-1.

Table 3-1: Measured Sound Level

Measurement Point	L ₅₀ Ambient Daytime (dBA)	L ₅₀ Ambient Nighttime (dBA)	L ₁₀ Ambient Daytime (dBA)	L ₁₀ Ambient Nighttime (dBA)
MP1	43	44	50	47

² [Personal Weather Station Dashboard | Weather Underground](#)

3.3 Noise-Sensitive Areas

The closest noise sensitive areas (NSA) to the Project site were identified and are summarized below in Table 3-2. The summary shows each of the identified NSA locations, description, proximity to the Project, and the applicable MPCA sound level limit. As the project will operate continuously, the MP was used to conservatively determine existing ambient noise levels based on observations that intermittent sources could have affected the noise measurements for short periods of time during monitoring.

Table 3-2: Measured Sound Level

Receptor Location	Receptor Description	Distance from Project to Receptor (feet) ¹	Coordinates (m) (UTM Zone 15)		MPCA Sound Level Limit ² (L ₅₀ dBA)	Ambient Sound Level ³ (L ₅₀ dBA)
			Easting	Northing		
RB1	River Boundary	1,590	428,796	5,025,039	-	44
RB2	River Boundary	670	429,207	5,024,494	-	44
RES1	Residence	2,050	428,598	5,024,932	50	44
RES2	Residence	1,890	428,632	5,024,810	50	44
RES3	Residence	1,240	429,259	5,024,214	50	44
RES4	Residence	3,660	428,117	5,024,554	50	44
RES5	Residence	2,750	428,576	5,024,230	50	44
RES6	Residence	3,480	429,259	5,023,478	50	44
AGR1	Agriculture	2,870	429,029	5,023,779	65	44
COMM1	Business	1,570	429,926	5,024,093	75	44

- 1) Approximate closest distance from receptor to property line
- 2) L₅₀ limits for nighttime noise as listed in Table 2-1
- 3) L₅₀ nighttime ambient measurement as listed in Table 3-1

4.0 Modeled Sound Levels

Operational sound levels for the proposed Project were performed using the Computer Aided Noise Abatement (CadnaA) modeling software. Equipment sound levels used for modeling were based on a combination of provided data for the BESS containers, medium voltage transformers, and estimated data for the auxiliary transformers. This model was used for determining expected sound levels due to the Project at the neighboring residential receptors.

4.1 Sound Modeling Methodology and Input Parameters

Predictive noise modeling was performed using the industry-accepted sound modeling software CadnaA, version 2025. The software is a scaled, three-dimensional program, which considers air absorption, terrain, ground absorption, and reflections and shielding for each piece of noise-emitting equipment. It predicts sound pressure levels at discrete locations and over a gridded area based on input source sound levels. The model calculates sound propagation based on International Organization for Standardization (ISO) 9613-2:2024, General Method of Calculation. ISO 9613-2 assesses the sound level propagation based on the octave band center-frequency range from 31.5 to 8,000 Hz.

The ISO standard considers sound propagation and directivity. The sound-modeling software calculates omnidirectional, downwind sound propagation, in tandem with user-specified directivities and propagation properties. Empirical studies accepted within the industry have demonstrated that modeling may over-predict sound levels in certain directions, and as a result, modeling results generally are considered a conservative measure of the Project's actual sound level.

The modeled atmospheric conditions were assumed to be calm, and the temperature and relative humidity were left at the program's default values. Reflections and shielding were considered for sound waves encountering physical structures. Sound levels around the site can be influenced by the sound reflections from physical structures onsite. The area surrounding the Project has mild elevation changes, which scatter and absorb the sound waves. Thus, terrain was included to account for surface effects such as ground absorption. Average ground absorption for the site location and adjacent river was set to a value of 0.0 to account for the Project foundation and reflective water. Average ground absorption for the surrounding land area was set to a value of 0.5 to account for the combination of generally soft vegetative ground and industrial areas surrounding the Project site. Foliage was not included in the model and instead was captured by the 0.5 average ground absorption, as to not overestimate attenuation during the fall/winter months when the trees aren't as dense with foliage. The modeling assumptions are outlined in Table 4-1. This model excludes noise sources not associated with the Project (e.g., existing industry, traffic noise and local fauna). Only Project sound levels have been evaluated.

Table 4-1: Sound Modeling Parameters

Model Input	Parameter Value
Site Location, River Ground Absorption	0.0
Surrounding Land Ground Absorption	0.5
Number of Reflections	1
Receptor Height	5 feet above grade
Terrain	USGS topographic land data
Temperature	50 °F
Humidity	70%

4.2 Project Acoustical Design

The Project general arrangement is included as Figure A-2 of Appendix A. The Project's EOL configuration is expected to include:

- 704 – Power Titan 2.0 4H-HX (unmitigated) BESS containers
- 704 – Power Titan 2.0 4H-LN (mitigated) BESS containers
- 176 – medium voltage transformers
- 12 – auxiliary transformers

Sound levels for the Power Titan BESS containers and medium voltage transformers are based on supplier-provided sound level data for the equipment packages. The auxiliary transformer sound levels have been estimated based on in-house sound level calculations from the unit's rated system voltage. EOL Sound levels for the Project were modeled based on two modeling scenarios. Modeled equipment sound levels are included in Appendix C.

1. Base – Power Titan 2.0 BESS containers (4H-HX), medium voltage transformers, and auxiliary transformers were modeled with data based on 100% capacity at 35 °C.
2. Mitigation – All Power Titan 2.0 BESS containers were modeled with vendor-provided mitigated container data (4H-LN) based on 100% capacity at 35 °C. The transformers were modeled at the same sound levels as the base with full load capacity.

Table 4-2: Project Sound Model Inputs

Equipment	Quantity ^a		Sound Power Level ^b (dBA)
	Base	Mitigation	
Power Titan 2.0 4H-HX BESS Containers	704	0	102
Power Titan 2.0 4H-LN BESS Containers	0	704	78
Medium Voltage Transformers	176	176	89
Auxiliary transformers	12	12	75

a) EOL quantities only

b) Total sound power level of each individual source

4.3 Model Results – Base Design

Project sound levels were modeled for end-of-life normal operation, assuming a 35 degrees Celsius ambient temperature with maximum BESS cooling power of 100%. The acoustic model results are for the BESS Project operations and do not include any contributions from existing ambient sound sources. The predicted A-weighted sound level contours for the base modeling scenario is shown in Figures A-3 of Appendix A. The Project sound levels predicted at the nearest residential receptors for the base modeling scenario is provided in Table 4-3. The most significant noise contributors from the Project are the Power Titan BESS containers.

Table 4-3: Model Predicted Sound Levels – Base Design

Receptor Location	Receptor Description	MPCA Sound Level Limit ¹ (dBA)	Ambient Sound Level ² (dBA)	Modeled Sound Level (dBA)	
				Project Only	Project + Ambient
RB1	River Boundary	-	44	56	56
RB2	River Boundary	-	44	59	59
RES1	Residence	50	44	54	54
RES2	Residence	50	44	55	55
RES3	Residence	50	44	60	60
RES4	Residence	50	44	49	50
RES5	Residence	50	44	52	53
RES6	Residence	50	44	50	51
AGR1	Agriculture	65	44	52	53
COMM1	Business	75	44	54	54

1) L₅₀ limits for nighttime noise as listed in Table 2-1

2) L₅₀ nighttime ambient measurement as listed in Table 3-1

4.4 Model Results – Mitigated Design

Project sound levels were modeled for end-of-life normal operation, assuming a 35 degrees Celsius ambient temperature with maximum BESS cooling power of 100% with the inclusion of the Power Titan air-cooled heat exchanger system. This system utilizes air as the medium to cool or condense high-temperature fluids inside pipes. This system allows the BESS containers to operate at a much lower sound level with an approximately 24-dBA reduction from the base cooling system design. The predicted A-weighted sound level contours for the mitigated modeling scenario is shown in Figures A-4 of Appendix A. The Project sound levels predicted at the nearest residential receptors for the mitigated modeling scenario is provided in Table 4-4. The most significant noise contributors from the Project are the Power Titan BESS containers.

Table 4-4: Model Predicted Sound Levels – Mitigated Design

Receptor Location	Receptor Description	MPCA Sound Level Limit ¹ (dBA)	Ambient Sound Level ² (dBA)	Modeled Sound Level (dBA)	
				Project Only	Project + Ambient
RB1	River Boundary	-	44	39	45
RB2	River Boundary	-	44	42	46
RES1	Residence	50	44	37	45
RES2	Residence	50	44	38	45
RES3	Residence	50	44	43	47
RES4	Residence	50	44	33	44
RES5	Residence	50	44	36	45
RES6	Residence	50	44	33	44
AGR1	Agriculture	65	44	36	45
COMM1	Business	75	44	35	45

1) L₅₀ limits for nighttime noise as listed in Table 2-1

2) L₅₀ nighttime ambient measurement as listed in Table 3-1

4.5 Model Results – Mitigated Design at 0 degrees Fahrenheit

The Project would emit its loudest sound levels when the ambient temperatures are high during full load cooling situations. This is why Section 4.3 and 4.4 noted the container sound levels were tested at 35 degrees Celsius ambient temperature with maximum BESS cooling power of 100%. When ambient temperatures are lower, the cooling system would not need to operate at as high of a load and the containers would emit significantly less noise due to reduced fan speeds.

Sound generally travels slightly farther in cold weather, but the reason for this is not purely due to the sound waves moving more efficiently through cold air. The speed of sound decreases as the temperature gets colder, but the atmospheric conditions associated with cool weather can refract (bend) sound waves downward, keeping the sound concentrated near the ground. This is why you can typically hear noise from a distant highway more clearly on a cold morning. The modeling software accounts for temperature inversions like this during all weather conditions in our standard modeling protocol, which is a conservative assumption (higher modeled sound levels).

To show the impacts of Project noise at cold temperatures, the model was run with all of the standard conservative modeling parameters, but the temperature in the model was decreased from 50 °F to 0 °F. All containers were modeled at full cooling power (maximum sound level). It is highly unlikely the containers would need full cooling power during these ambient temperatures. Project sound levels predicted at the most impacted residential receptor, RES3, would actually decrease from 43 dBA to 41 dBA with the reduced ambient temperature in the model.

5.0 Conclusion

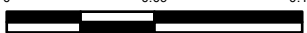
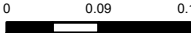

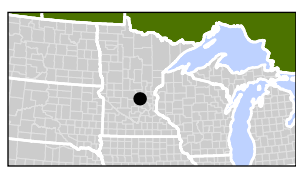

Burns & McDonnell completed a sound study for the Project located in Sherburne County, Minnesota, in the City of Becker. The study included a review of the applicable noise regulations for the Project and acoustic modeling to estimate Project sound levels at neighboring noise-sensitive areas.

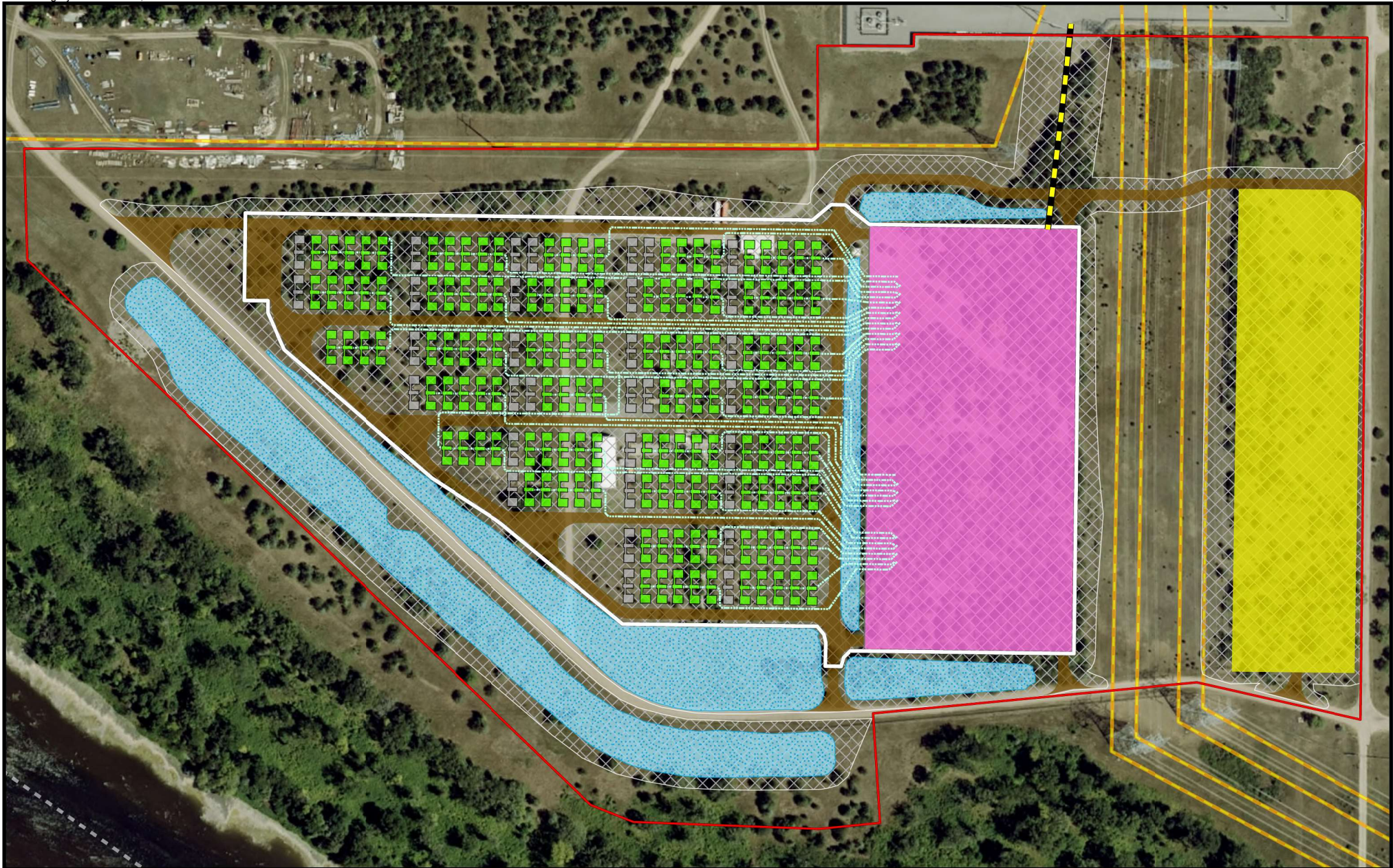
The Project is required to meet the applicable sound level limits set by the MPCA as outlined in their guidance document. Based on the current Project design, using vendor-supplied equipment sound levels, Project sound levels have been modeled for two potential design scenarios. The first modeling scenario is the Project operating a full load with base operational sound levels. The second modeling scenario shows the sound level impacts with the inclusion of a low-noise air-cooled heat exchanger option incorporated on the BESS containers. Predicted sound levels are shown in this report and are compared to the Minnesota noise limits. The unmitigated scenario is expected to exceed the MPCA sound level limits, but the mitigated scenario shows that the Project can meet the limits with mitigation installed.

APPENDIX A – FIGURES



Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, Sherburne County MN, Microsoft, Vantor

<p>LEGEND</p> <ul style="list-style-type: none"> Property Area Measurement Point (MP) 	<p>REFERENCE</p> <div style="text-align: center;"> <p>0 0.09 0.17</p>  <p>MILES</p> </div> <div style="text-align: center;"> <p>0 0.09 0.17</p>  <p>KILOMETERS</p> </div> <div style="text-align: right;"> <p>N</p>  </div>		<p style="text-align: center;">Figure A-1 Ambient Measurement Location</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">LOCATION: Sherburne County, MN</td> </tr> <tr> <td style="padding: 2px;">PROJECT: Xcel Energy - Sherco BESS</td> </tr> <tr> <td style="padding: 2px;">PROJ. NO.: 185459/185469</td> </tr> <tr> <td style="padding: 2px;">CREATED: 10/24/2025</td> </tr> </table> <div style="text-align: right; padding-top: 10px;">  <p>BURNS & MCDONNELL www.burnsmcd.com</p> </div>	LOCATION: Sherburne County, MN	PROJECT: Xcel Energy - Sherco BESS	PROJ. NO.: 185459/185469	CREATED: 10/24/2025
LOCATION: Sherburne County, MN							
PROJECT: Xcel Energy - Sherco BESS							
PROJ. NO.: 185459/185469							
CREATED: 10/24/2025							



- | | | |
|------------------------------------|---------------------------|---------------------------------------|
| Project Site | Proposed Gen-tie | Proposed Access Road |
| Proposed BESS Container | Proposed Fence Line | Proposed Preliminary Development Area |
| Proposed Future Augmentation Block | Proposed Substation | Existing Transmission Lines |
| Proposed Collection Lines | Proposed Laydown Yard | |
| | Proposed Stormwater Basin | |

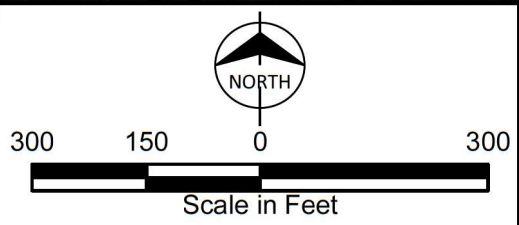


Figure A-2
 Project Layout



Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, Sherburne County MN GIS, Vantor

LEGEND		REFERENCE	
Base Structures	35 dBA	50 dBA	65 dBA
Project Area	40 dBA	55 dBA	70 dBA
Receptors	45 dBA	60 dBA	

0 0.1 0.2

MILES

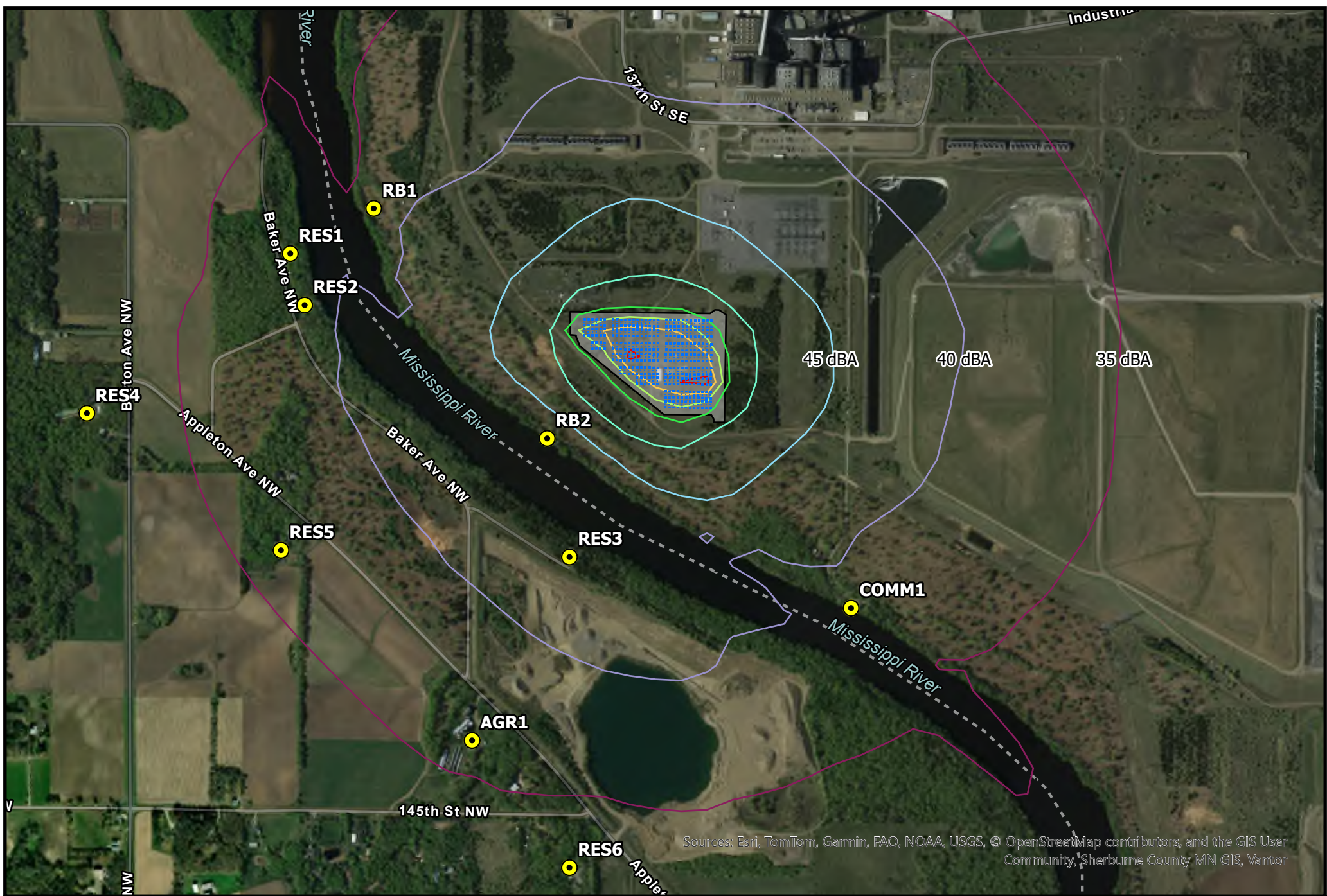
0 0.1 0.2

KILOMETERS

N

**Figure A-3 - Base (Unmitigated) BESS
Projected Sound Level Contours EOL (dBA)**

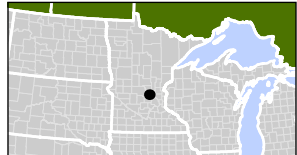
LOCATION: Sherburne County, MN	
PROJECT: Xcel Energy - Sherco BESS	
PROJ. NO.: 185459	
CREATED: 10/24/2025	



Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, Sherburne County MN GIS, Vantor

LEGEND			
	Mitigated BESS		35 dBA
	Project Area		40 dBA
	Receptors		45 dBA
			50 dBA
			55 dBA
			60 dBA
			65 dBA
			70 dBA

REFERENCE	
	0 0.1 0.2 MILES
	0 0.1 0.2 KILOMETERS



**Figure A-4 - Mitigated BESS
Projected Sound Level Contours EOL (dBA)**

LOCATION: Sherburne County, MN	 www.burnsmcd.com
PROJECT: Xcel Energy - Sherco BESS	
PROJ. NO.: 185459	
CREATED: 10/24/2025	

APPENDIX B – AMBIENT MEASUREMENTS

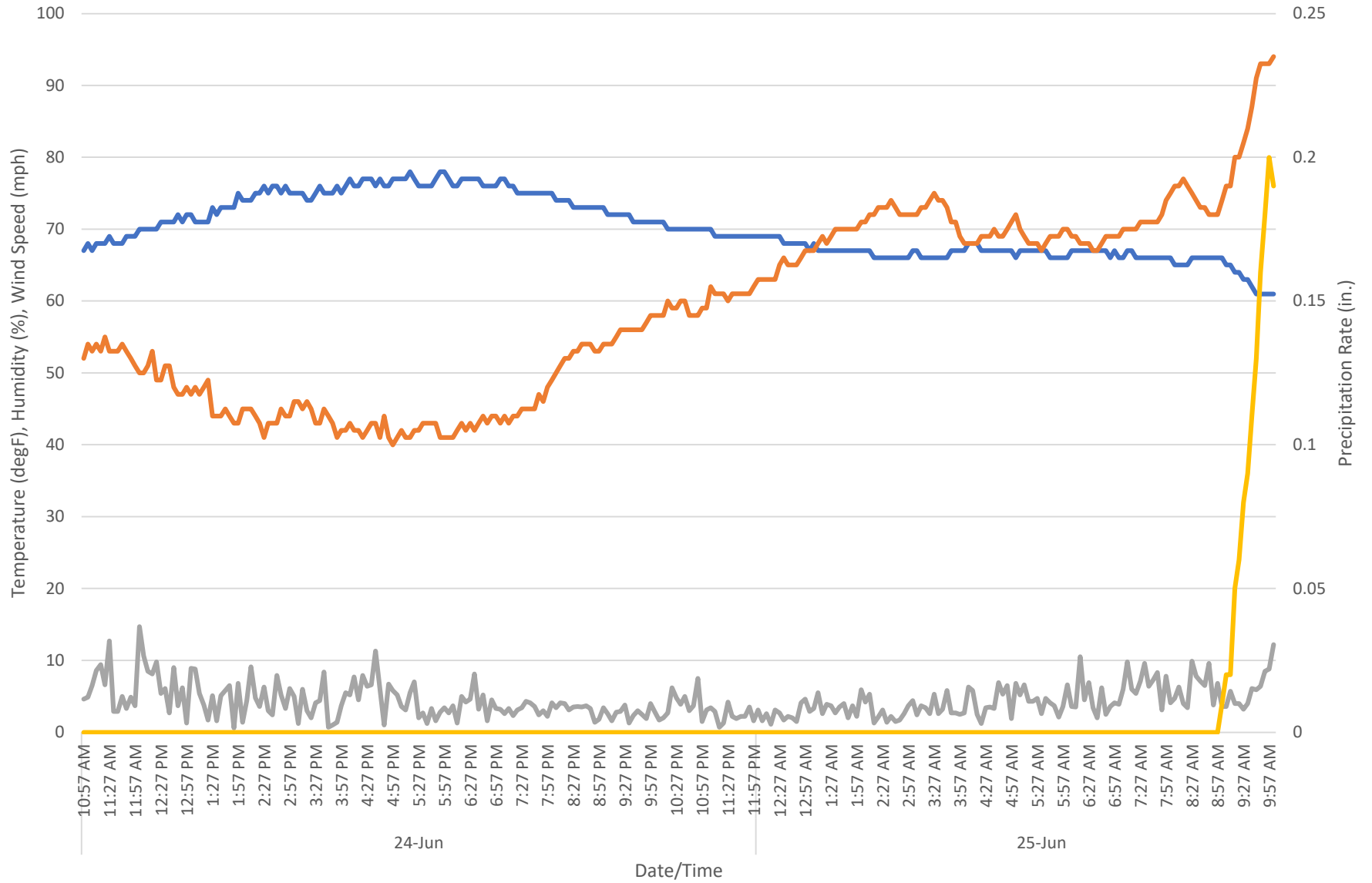
Table 1 - Hourly Average Sound Levels

Time	MP1 [dBA]			
	Leq	L10	L50	L90
6/24/25 11:00 AM	58	62	42	38
6/24/25 12:00 PM	51	52	40	38
6/24/25 1:00 PM	45	47	41	38
6/24/25 2:00 PM	56	57	43	40
6/24/25 3:00 PM	58	58	44	41
6/24/25 4:00 PM	47	48	43	40
6/24/25 5:00 PM	46	46	43	42
6/24/25 6:00 PM	49	52	42	39
6/24/25 7:00 PM	44	45	42	39
6/24/25 8:00 PM	46	49	43	40
6/24/25 9:00 PM	47	50	47	44
6/24/25 10:00 PM	51	53	49	47
6/24/25 11:00 PM	48	49	48	47
6/25/25 12:00 AM	48	49	46	44
6/25/25 1:00 AM	48	47	45	44
6/25/25 2:00 AM	48	47	44	42
6/25/25 3:00 AM	41	43	41	40
6/25/25 4:00 AM	42	42	41	40
6/25/25 5:00 AM	44	46	43	40
6/25/25 6:00 AM	47	49	41	39
6/25/25 7:00 AM	51	43	40	39
6/25/25 8:00 AM	44	44	41	39
6/25/25 9:00 AM	55	44	40	39
6/25/25 10:00 AM	56	57	48	40
6/25/25 11:00 AM	45	53	51	48
Average Daytime:	53	50	43	40
Average Nighttime:	47	47	44	43

**Note: The average daytime and nighttime Leq sound levels shown are the logarithmic average of all fair weather daytime or nighttime 1-hour sound levels measured. L10/L50/L90 averages are arithmetic.*

Daytime: 7am to 9pm
 Nighttime: 10pm to 6am

Meteorological Data



— Temperature (degF) — Humidity (%) — Wind Speed (mph) — Precipitation (in.)

APPENDIX C – MODELED SOUND LEVELS

Appendix C- BESS Modeled Sound Power Levels

Xcel Energy

Sherco BESS Project (EOL)

Name	Number of Sources	Sound Power Level (dB) ¹ Octave Band Frequency (Hz)									Overall (dBA)	Notes ²
		31.5	63.0	125	250	500	1000	2000	4000	8000		
BESS Equipment												
Power Titan 4H-HX BESS Container	704	91	86	85	97	101	96	93	86	78	102	Vendor Study
Power Titan 2.0 ST5015UX-4H-LN BESS Container	704	83	81	81	77	75	74	71	66	59	78	Vendor Study
MV Transformer	176		90	91	93	87	82	79	73	65	89	Vendor Study
Auxillary Transformer	12	72	78	80	75	75	69	64	59	52	75	Calculated from Power Rating ³

Notes:

1. All sound levels are based on expected base design equipment (i.e., no additional mitigation beyond base design)
2. NEMA ratings used for estimated frequency spectral data
3. Referenced from B&H Noise Control

