SOUND LEVEL ASSESSMENT REPORT

Hillman Energy Center
Tewksbury, Massachusetts

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TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF FIGURES

LIST OF TABLES

1.0 EXECUTIVE SUMMARY

The Hillman Energy Center Project (the Project) is a proposed 125 megawatt (MW) battery energy storage facility consisting of battery energy storage systems and an electric substation on approximately 4 acres of land located at 73-75 Hillman Street in the Town of Tewksbury, Massachusetts. The proposed Project is being developed by East Point Energy, LLC (East Point). East Point has retained Epsilon Associates, Inc. (Epsilon) to conduct a pre-construction sound level assessment for the Project.

This sound level assessment includes an ambient sound level measurement program to document the existing conditions in the vicinity of the Project and computer modeling to predict sound levels from the proposed Project. Results from the measurement program and the modeling were used to evaluate compliance with the Massachusetts Department of Environmental Protection (MassDEP) Noise Policy which limits the increase over ambient to 10 dBA or less and prohibits creation of new 'pure tone' conditions. Modeling results were also compared to the Town of Tewksbury sound limits.

Existing condition sound levels were continuously measured for eight days at three locations around the site. Supplemental short-term measurements were also performed at three additional locations near the site during both a daytime and nighttime period. The eight-day average sound level using the lowest hourly L_{90} sound levels measured during each daytime and nighttime period of the program was used to establish representative daytime and nighttime background (ambient) sound levels at each location.

Noise controls necessary to meet the requirements of the MassDEP Noise Policy were implemented and are discussed in this analysis. Mitigation was applied in the acoustic model including utilizing low noise equipment, equipment silencers and sound barriers.

At residential locations, predicted sound level increases range from 3 to 10 dBA above the nighttime ambient. In addition, the Project is not predicted to create any new pure tones. Therefore, with the noise mitigation measures described in this report, or equivalent design changes, the proposed Project will meet the requirements set forth in the MassDEP Noise Policy at all residential locations. The predicted sound level increases are based on low ambient sound levels derived from the quietest nighttime hours. During the majority of time, background sound levels are expected to be higher than those assumed in this evaluation and the resulting sound level impacts will be less.

At all locations, predicted Project-Only sound levels will be at or below the respective Town of Tewksbury sound level limits. At Area Use II locations, predicted Project-Only sound levels are at or below 65 dBA and at Area Use I locations, predicted Project-Only sound levels are below 50 dBA. Therefore, the proposed Project will meet the Town of Tewksbury Bylaws with respect to sound.

2.0 INTRODUCTION

The Project Site is located at 73-75 Hillman Street in Tewksbury, Massachusetts. The Project Site is approximately 4 acres in size. As shown on the Town of Tewksbury's Assessor's map, the Project Site is composed of two parcels (Parcels 35-6 and 35-7, 73 Hillman Street and 75 Hillman Street, respectively). Figure 2-1 shows the locations of the Project Site over aerial imagery.

The proposed Project consists of a 125 megawatt (MW) standalone battery energy storage system (BESS), a new 115kV / 34.5kV electric substation (the Project Substation), and other associated site features.

The BESS will consist of 169 Sungrow PowerTitan 2.0 units and 43 medium voltage transformers located north of Hillman Street. The PowerTitan units will be equipped with sound mitigation kits and arranged throughout the site in a back-to-back orientation. The units will be spaced in compliance with the manufacturer's installation requirements. The PowerTitan units are coupled and placed immediately adjacent to a medium voltage transformer. Each PowerTitan and the medium voltage transformers will be supported by concrete slabs and surrounded by crushed stone.

This report presents the findings of an ambient measurement program and a sound level modeling analysis for the Project. The Project components were modeled in CadnaA using sound data calculated by Epsilon or from the manufacturer (Sungrow). The proposed substation was also included in the model. The results of this analysis are found within this report.

Hillman Energy Center Tewksbury, Massachusetts

Epsilon Associates Inc.

Figure 2-1
Aerial Locus

3.0 SOUND TERMINOLOGY

There are several ways in which sound levels are measured and quantified. All of them use the logarithmic decibel (dB) scale. The following information defines the sound level terminology used in this analysis.

The decibel scale is logarithmic to accommodate the wide range of sound intensities found in the environment. A property of the decibel scale is that the sound pressure levels of two or more separate sounds are not directly additive. For example, if a sound of 50 dB is added to another sound of 50 dB, the total is only a 3-decibel increase (53 dB), which is equal to doubling in sound energy, but not equal to a doubling in decibel quantity (100 dB). Thus, every 3-dB change in sound level represents a doubling or halving of sound energy. The human ear does not perceive changes in the sound pressure level as equal changes in loudness. Scientific research demonstrates that the following general relationships hold between sound level and human perception for two sound levels with the same or very similar frequency characteristics[1]:

- 3 dBA increase or decrease results in a change in sound that is just perceptible to the average person,
- 5 dBA increase or decrease is described as a clearly noticeable change in sound level, and
- 10 dBA increase or decrease is described as twice or half as loud.

Another mathematical property of decibels is that if one source of sound is at least 10 dB louder than another source, then the total sound level is simply the sound level of the higher-level source. For example, a sound source at 60 dB plus another sound source at 47 dB is equal to 60 dB.

A sound level meter (SLM) that is used to measure sound is a standardized instrument.[2] It contains "weighting networks" (e.g., A-, C-, Z-weightings) to adjust the frequency response of the instrument. Frequencies, reported in Hertz (Hz), are detailed characterizations of sounds, often addressed in musical terms as "pitch" or "tone". The most commonly used weighting network is the A-weighting because it most closely approximates how the human ear responds to sound at various frequencies. The A-weighting network is the accepted scale used for community sound level measurements; therefore, sounds are frequently reported as detected with a sound level meter using this weighting. A-weighted sound levels emphasize middle frequency sounds (i.e., middle pitched – around 1,000 Hz), and de-emphasize low and high frequency sounds. These sound levels are reported in decibels designated as "dBA". The C-weighting network has a nearly flat response for frequencies between 63 Hz and 4,000 Hz and is noted as dBC. Z-weighted sound levels are measured sound levels without any weighting curve and are otherwise referred to as

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1 Bies, David, and Colin Hansen. 2009. *Engineering Noise Control: Theory and Practice*, 4th Edition. New York: Taylor and Francis.

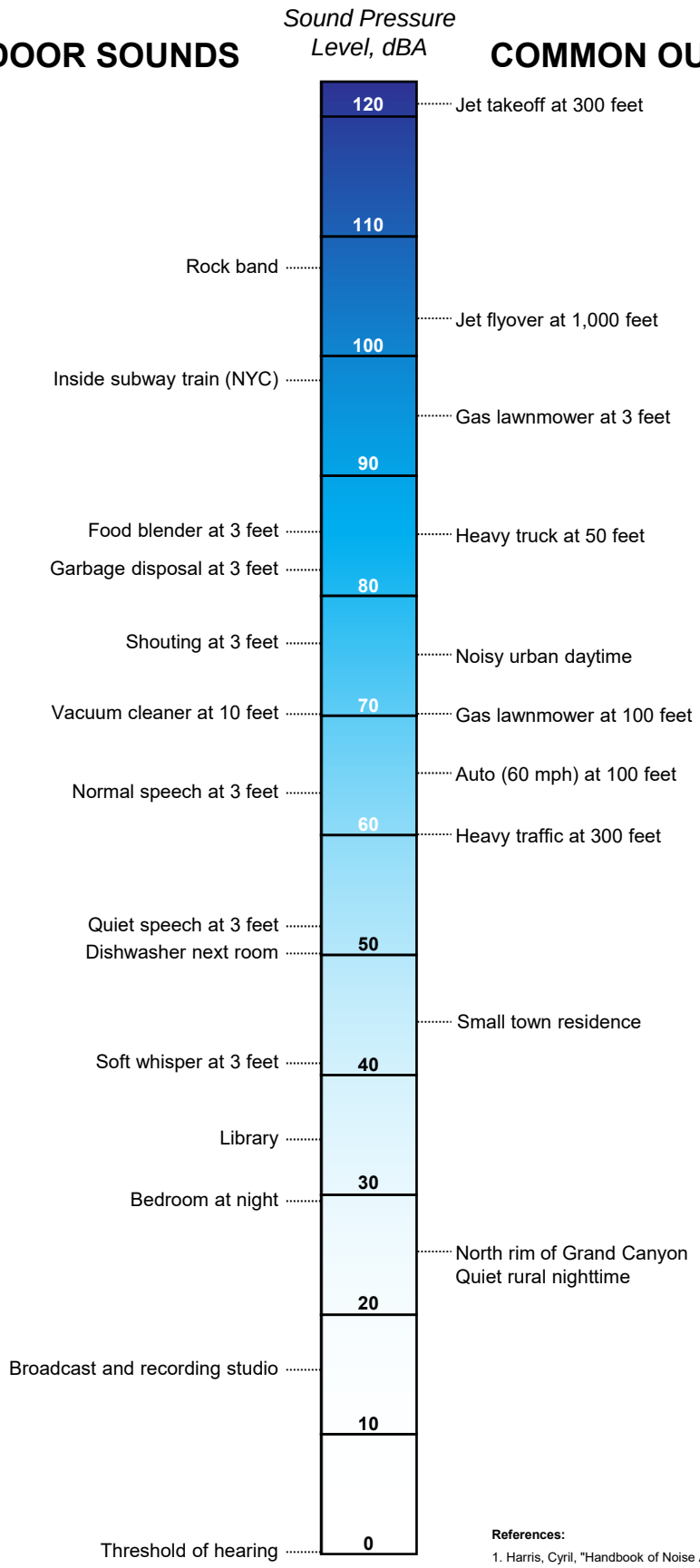
2 *American National Standard Specification for Sound Level Meters,* ANSI S1.4-2014 (R2019), published by the Standards Secretariat of the Acoustical Society of America, Melville, NY.

"unweighted". Sound pressure levels for some common indoor and outdoor environments are shown in Figure 3-1.

Because the sounds in our environment vary with time they cannot simply be described with a single number. Two methods are used for describing variable sounds. These are exceedance levels and the equivalent level, both of which are derived from some number of moment-to-moment A-weighted sound level measurements. Exceedance levels are values from the cumulative amplitude distribution of all of the sound levels observed during a measurement period. Exceedance levels are designated L_n, where n can have a value between 0 and 100 in terms of percentage. Several sound level metrics that are reported in community sound monitoring are described below.

- L_{90} is the sound level exceeded 90 percent of the time during the measurement period. The L_{90} is close to the lowest sound level observed. It is essentially the same as the residual sound level, which is the sound level observed when there are no obvious nearby intermittent sound sources. The L_{90} level is used to establish the "ambient" or "background" sound level as part of the MassDEP Noise Policy.

- L_{eq}, the equivalent level, is the level of a hypothetical steady sound that would have the same energy (*i.e.,* the same time-averaged mean square sound pressure) as the actual fluctuating sound observed. The equivalent level is designated L_{eq} and is typically A-weighted. The equivalent level represents the time average of the fluctuating sound pressure, but because sound is represented on a logarithmic scale and the averaging is done with linear mean square sound pressure values, the L_{eq} is mostly determined by loud sounds if there are fluctuating sound levels.



References:

1. Harris, Cyril, "Handbook of Noise Acoustical Measurements and Noise Control", p 1-10., 1998
2. "Controlling Noise", USAF, AFMC, AFDTC, Elgin AFB, Fact Sheet, August 1996
3. California Dept. of Trans., "Technical Noise Supplement", Oct, 1998

Figure 3-1

Common Indoor and Outdoor Sound Levels

4.0 NOISE REGULATIONS

4.1 Federal Regulations

There are no federal community noise regulations applicable to this Project.

4.2 Massachusetts State Regulations

The Massachusetts Department of Environmental Protection (MassDEP) regulates noise under its Air Pollution Control regulations. In these regulations, an "air contaminant" is defined to include sound, and a condition of "air pollution" includes the presence of an air contaminant in such concentration and duration as to "cause a nuisance" or "unreasonably interfere with the comfortable enjoyment of life and property." (310 CMR 7.00)

MassDEP's regulations at 310 CMR 7.10 prohibit "unnecessary emissions" of noise. MassDEP Division of Air Quality Control ("DAQC") Policy Statement 90-001 (February 1, 1990) (the "MassDEP Noise Policy") interprets a violation of this noise regulation to have occurred if the source causes either:

1) An increase in the broadband sound pressure level of more than 10 dBA above the ambient, or

2) A "pure tone" condition.

"Ambient" is defined as the background A-weighted sound level that is exceeded 90% of the time, measured during equipment operating hours (L_{90}). A "pure tone" condition occurs when any octave band sound pressure level exceeds both of the two adjacent octave band sound pressure levels by 3 dB or more.

These noise limits are MassDEP policy and are applicable both at the property line and at the nearest residences. As a policy and not regulation, the MassDEP has waived these limits in certain cases at property line locations where the adjacent land uses are not considered noise sensitive, such as an adjacent industrial parcel. According to the MassDEP, "Noise levels that exceed the criteria at the source's property line by themselves do not necessarily result in a violation or a condition of air pollution under MassDEP regulations (see 310 CMR 7.10 U). The agency also considers the effect of noise on the nearest occupied residence and/or building housing sensitive receptors". In addition, "…a new noise source that would be located in an area in which housing or buildings containing other sensitive receptors could be developed in the future may be required to mitigate its noise impact in these areas." The Noise Policy interpretation is attached to this report as Appendix A.

4.3 Tewksbury Local Regulations

The Town of Tewksbury Bylaws Chapter 8.12.050 defines property line noise limits for continuous sources based on the receiving property classification in Table I. Maximum Allowable Exterior Sound Level, which is reproduced below, as Table 4-1. Additionally, Chapter 8.12.050 disallows pure tone conditions. Area I land uses are residential properties and the grounds of any school, day care, hospital, house of worship, library or cemetery. Area II land uses are all other properties.

Table 4-1 Tewksbury Maximum Allowable Exterior Sound Level

Land Use Area	Daytime Level 7:00 AM to 10:00 PM	Nighttime Level 10:00 PM to 7:00 AM
I	60 dBA	50 dBA
II	70 dBA	65 dBA

5.0 EXISTING SOUND LEVELS

The Project is to be located at 73-75 Hillman Street in Tewksbury, Massachusetts. The Project Site is in an existing industrial park. The property is bordered by industrial and commercial uses to the east and south, with an assisted living community further to the east and a few residences further to the south. The northern and western sides of the Project are bordered by uninhabited wetlands and utilities.

5.1 Baseline Sound Environment

An existing sound level survey was conducted during the daytime and nighttime hours to characterize the existing "baseline" acoustical environment in the vicinity of the site. Three long-term continuous sound level monitoring stations were deployed for 8-days to:

1. Establish representative A-weighted broadband ambient sound pressure levels, for evaluating requirements of the MassDEP policy limit of a 10 dBA increase due to the proposed Project; and

2. Establish representative octave-band ambient sound pressure levels to identify any existing "pure tones," as defined by MassDEP, and evaluate whether the addition of modeled sound levels from the proposed Project to these background sound levels may introduce or exacerbate existing "pure tones" in the community.

Only measurement periods during, or affected by, precipitation were excluded from the analysis. This approach is consistent with ANSI Standard S12.18-1994 (R2009).

5.2 Sound Level Measurement Locations

The selection of the sound level measurement locations was based upon a review of the Project site plan and the land use in the vicinity of the Project. Three (3) long-term (LT) sound level measurement locations were selected to obtain a sampling of the baseline sound environment. These measurement locations were selected to be representative of the north and sound end of the Project parcel and the neighboring assisted living community to the east of the Project. In addition, three (3) short-term (ST) sound level measurements were performed at additional locations near the site. Coordinates of the monitoring locations are presented in Table 5-1. These measurement locations are depicted in Figure 5-1 and described below.

- **Location LT1** is located approximately 90 feet east of Washington Street and 150 feet west of the assisted living community. This location is representative of the closest residences in the assisted living community to the east of the Project.
- **Location LT2** is located near the southern property line of the Project parcel, on the road verge between the Project and Hillman Street. This location is representative of the industrial and commercial business to the south of the Project and the residences further to the south along Court Street.

- **Location LT3** is located near the northern property line of the Project parcel, 130 feet south of the railway which is located north of the project Parcel as well as north of the assisted living community. This location is representative of the northern part of the assisted living community to the far east of the Project.
- **Location ST1** is located to the east of the Project at the intersection of Hillman Street and Washington Street. This location is representative of the eastern portion of the industrial park and the assisted living community east of the Project.
- **Location ST2** is located to the south of the project, on the edge of Rockland Street along the electrical transmission lines. This location is representative of the residences to the south of the Project and along Court Street.
- **Location ST3** is located to the far southwest of the Project near the intersection of Main Street and Old Boston Road. This is representative of the residences to the far south of the Project along Old Boston Road, Washington Street and Main Street.

Table 5-1 GPS Coordinates (WGS 84) – Sound Level Measurement Locations

Location	Coordinates	
	Latitude (N°)	Longitude (W°)
LT1	42.618454	-71.241007
LT2	42.619754	-71.243179
LT3	42.621154	-71.242805
ST1	42.619570	-71.241389
ST2	42.618597	-71.243482
ST3	42.618376	-71.249701

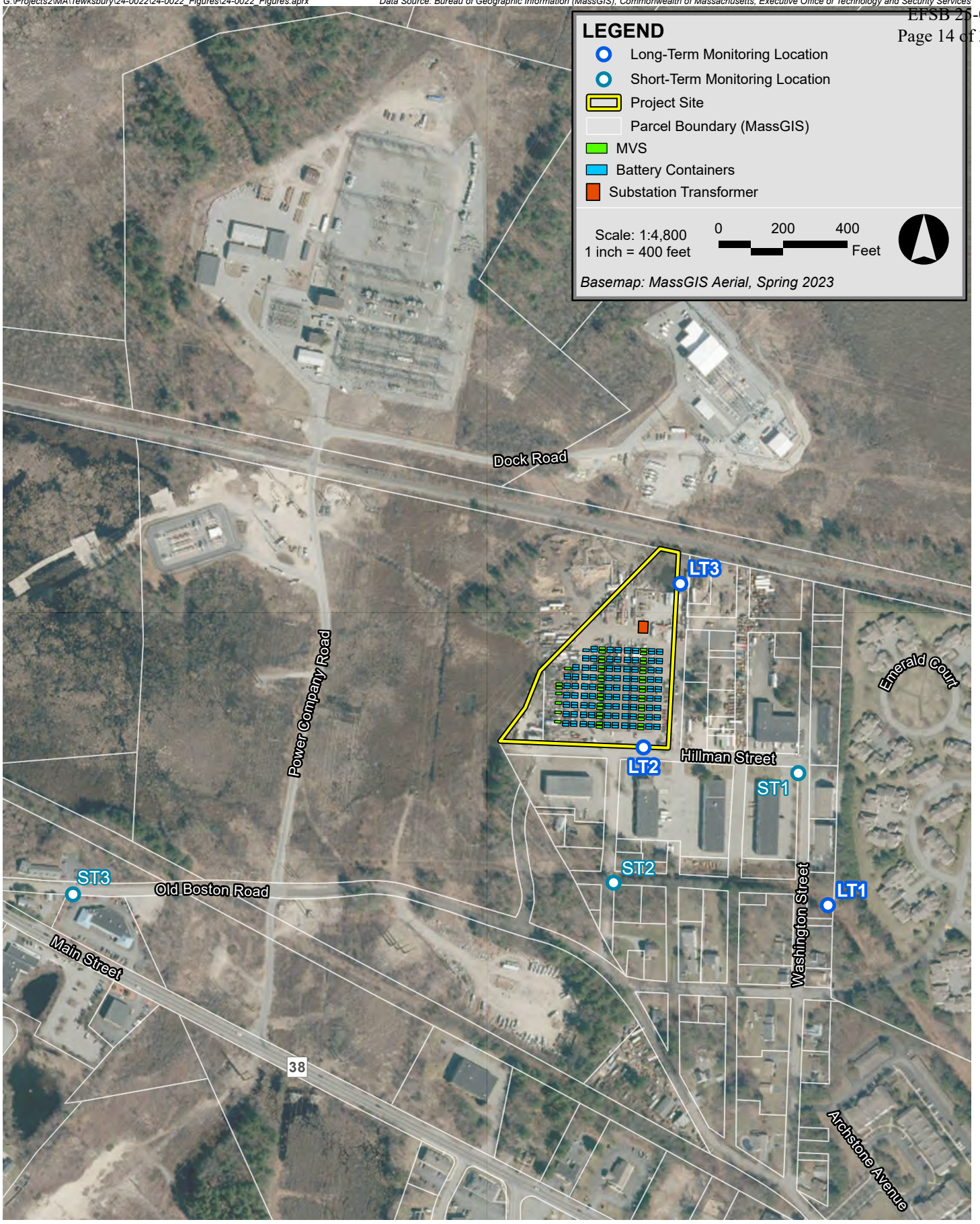


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Figure 5-1
Sound Monitoring Locations

5.3 Measurement Methodology

A comprehensive sound level measurement program was developed to quantify the existing ambient sound levels around the proposed Project. The program consisted of three long-term monitoring stations as well as three short-term monitoring stations. The long-term monitoring stations collected continuous sound level data for approximately eight days from Wednesday, February 26, 2025 to Thursday, March 6, 2025. The long-term monitors were generally unattended, with personal observations made by a field technician during deployment, a nighttime site visit, and demobilization. Short-term sound level measurements were made on Wednesday, February 26, 2025 during the daytime (2:11 p.m. to 3:32 p.m.) and on Thursday, February 27, 2025 during nighttime hours (12:13 a.m. to 1:27 a.m.). All short-term measurements were 20 minutes in duration.

5.4 Measurement Equipment

Three Larson Davis (LD) 831 sound level meters, equipped with a LD PRM831 preamplifier and a PCB 377B02 or a PCB 377C20 half-inch microphone, along with an environmental protection kit were used to collect background sound pressure level data at the long-term measurement locations. The environmental protection kit included a manufacturer-provided wind screen to reduce wind-induced noise over the microphone. One LD 831 sound level meter, equipped with a PCB PRM831 preamplifier and a PCB 377C20 half-inch microphone, and a manufacturer-provided wind screen, was used to collect background sound pressure level data at the short-term measurement locations. Wind speed, wind direction, temperature, and precipitation measurements were made at LT1 using one, 2-meter above ground level (AGL), ATMOS 41 weather station and Z6 data logger (manufactured by Meter Group, Inc.).

All instrumentation meets the “Type 1 - Precision” requirements set forth in ANSI S1.4 for acoustical measuring devices. The measurement equipment was calibrated in the field before and after the survey with a Larson Davis CAL200 acoustical calibrator which meets the standards of IEC 942 Class 1L and ANSI S1.40. Statistical descriptors (e.g., Leq, L90, etc.) were measured for each sampling period (20-minutes for short-term and 1-hour for long-term) with octave band sound levels corresponding to the same datasets.

5.5 Baseline Ambient Sound Levels

Current sound sources in the area surrounding the proposed project site include: industrial activity, chainsaws and other construction equipment, forklifts and dump trucks, idling trucks, backup alarms, vehicle traffic along local roads and distant major roads and highways, HVAC hum, substation noise, insects, birds, coyotes, wind through vegetation, and occasional aircraft.

5.5.1 Short-term Sound Levels

Summaries of the existing condition sound levels are shown in Tables 5-2 and 5-3 with measured daytime and nighttime sound levels from the short-term measurements, respectively. Daytime L_{90} sound levels at the short-term locations ranged from 47 to 54 dBA and nighttime L_{90} sound levels ranged from 40 to 43 dBA.

Table 5-2 Daytime Short-Term Ambient Measurement Summary

Location	Start Date & Time	L_{eq}	L_{90}	L_{90} Sound Pressure Level by Octave-Band Center Frequency (Hz)									
				31.5	63	125	250	500	1000	2000	4000	8000	16000
		dBA	dBA	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB
ST1	02/26/2025 2:11 PM	55	47	55	52	48	44	45	42	33	27	23	17
ST2	02/26/2025 2:38 PM	63	49	54	50	49	47	47	45	36	26	16	14
ST3	02/26/2025 3:12 PM	67	54	59	58	52	53	50	50	45	34	23	14

Table 5-3 Nighttime Short-Term Ambient Measurement Summary

Location	Start Date & Time	L_{eq}	L_{90}	L_{90} Sound Pressure Level by Octave-Band Center Frequency (Hz)									
				31.5	63	125	250	500	1000	2000	4000	8000	16000
		dBA	dBA	dB	dB	dB	dB	dB	dB	dB	dB	dB	dB
ST1	02/27/2025 12:13 AM	44	43	50	54[1]	44	38	42	39	31	21	11	17
ST2	02/27/2025 12:40 AM	52	40	44	40	42	39	40	33	21	12	11	14
ST3	02/27/2025 1:07 AM	47	41	51	49	44	42	40	34	23	15	12	14

1. An existing “pure-tone” condition was observed in the 63 Hz Octave Band at night at ST1.

5.5.2 Long-term Sound Levels

A-weighted broadband (dBA) and un-weighted octave-band (dB) background sound levels from the long-term locations are presented in Tables 5-4 and 5-5 for daytime (7AM – 9:59PM) and nighttime (10PM – 6:59AM) hours, respectively. Broadband L_{90} values represent the average of the daily minimum L_{90} sound pressure levels observed during the relevant daytime or nighttime operating periods throughout the measurement program. The octave-band values correspond to a representative time period where the broadband value equals the average of the daily/nightly minimum L_{90} sound levels. There were a total of 24 hours with recorded precipitation during the 8-day program. These hours were excluded from further processing in accordance with ANSI S12.18.

One-hour A-weighted broadband sound pressure level data plots from the continuous ambient monitoring stations at locations LT1 through LT3 are presented in Appendix B for the entire measurement period. The average daily minimum L_{90} (1-hour) sound levels ranged, by location, from 38 to 40 dBA during the day and from 34 to 37 dBA at night.

Table 5-4 Daytime[1] Background Sound Level Measurement Summary

Monitoring Location ID	L_{90}[2]	L_{90}[3] Sound Pressure Level (dB) by Octave-Band (Hz)								
		31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz	8k Hz
	dBA	dB	dB	dB	dB	dB	dB	dB	dB	dB
LT1	38	51	45	40	39	36	29	22	20	19
LT2	40	52	53	46	41	35	32	27	19	15
LT3	40	49	44	40	39	37	35	25	16	14

1. 'Daytime' defined to be between the operational hours of 7AM and 9:59PM.
2. Broadband L_{90} represents the average of the minimum L_{90} sound pressure levels observed each day of the measurement program during daytime hours.
3. Octave-band values correspond to a representative time period where the broadband value equals the average of the daily minimum L_{90} sound levels.

Table 5-5 Nighttime[1] Background Sound Level Measurement Summary

Monitoring Location ID	L_{90}[2]	L_{90}[3] Sound Pressure Level (dB) by Octave-Band (Hz)								
		31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz	8k Hz
	dBA	dB	dB	dB	dB	dB	dB	dB	dB	dB
LT1	34	44	41	32	34	33	28	18	10	11
LT2	37	46	46	44	38	34	27	19	11	11
LT3	37	45	42	40	39	36	24	10	10	11

1. 'Nighttime' defined to be between the operational hours of 10PM and 7AM.
2. Broadband L_{90} represents the average of the minimum L_{90} sound pressure level observed each day of the measurement program during nighttime hours.
3. Octave-band values correspond to a representative time period where the broadband value equals the average of the nightly minimum L_{90} sound levels.

5.5.3 Establishment of Ambient Sound Levels for Evaluations

The Project will be evaluated in this report against the MassDEP Noise Policy that is described in Section 4.2. As a result, ambient (background) sound levels must be established for each measurement location to then be applied to modeling receptors, i.e., evaluation points. The Project may operate at any time of the day or night, therefore the quietest representative nighttime sound levels from the long-term measurements presented in Table 5-5 above have been conservatively used in the evaluation. Each modeling receptor was evaluated based on the closest long-term measurement location. Assigned representative ambient sound levels and monitoring locations for each modeling receptor are provided in Section 6.

6.0 MODELED SOUND LEVELS

6.1 Modeled Sound Sources

The primary sources of sound associated with the Facility will consist of:

- Sungrow PowerTitan 2.0 Battery Containers
- Medium Voltage Substations (MVS)
- Substation power transformers

The Project expects to place 169 Sungrow PowerTitan 2.0 Containers and 43 MVS on the site. The substation associated with the Project will include one 150 MVA 115 kV transformer. Table 6-1 summarizes the sound-producing equipment list for the Project.

Table 6-1 Summary of Sound Producing Equipment

Component	Manufacturer/model	Quantity
Sungrow PowerTitan 2.0	Sungrow	169
MVS	Sungrow	43
Power transformer (150 MVA)	TBD	1

6.2 Modeling Methodology

Noise impacts from mechanical equipment associated with the Facility were predicted using CadnaA noise calculation software (DataKustik Corporation, Version 2025). This software, which uses the ISO 9613-2 international standard for sound propagation (Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation [2024]), offers a refined set of computations accounting for local topography, ground attenuation, drop-off with distance, barrier shielding, diffraction around building edges, reflection off building facades, and atmospheric absorption of sound from multiple noise sources.

Inputs and significant parameters included in the model are described below:

- **Facility Layout:** The location of all proposed equipment was provided by East Point in a Site Plan drawing dated March 6, 2025.

- **Sensitive Receptors:** Sound levels were evaluated at seventeen (17) sensitive locations, including the nearest residential property lines and additional surrounding residences. Additionally, the directly abutting property lines were evaluated. The locations are shown in Figure 6-1. All receptors were modeled at a height of 1.5 meters above ground level to mimic the ears of a typical standing observer.

- **Terrain Elevation:** Elevation contours for the modeling domain derived from datasets supplied East Point Energy for the Project Site and by MassGIS for the surrounding area were directly imported into CadnaA, which allowed for consideration of terrain shielding and differences in elevation between sources and receivers, where appropriate.

- **Buildings:** Nearby buildings derived from datasets supplied by MassGIS with heights calculated from DSM elevations were imported into CadnaA, which allowed for consideration of shielding between sources and receivers, where appropriate. Within the area, 5 nearby industrial buildings were modeled, which represents the closest buildings to the Project.

- **Source Sound Power Levels:** A tabular summary of the modeled equipment proposed for the Facility and sound power levels for each unit, as provided by the manufacturer or calculated from NEMA ratings, are presented below in Table 6-2. Octave band data for the Sungrow PowerTitan 2.0 battery storage container and MVS units were provided to Epsilon. Octave band data for the power transformer were not provided; thus, were calculated based on the Edison Electric Institute Environmental Noise Guide.

- **Meteorological Conditions:** A temperature of 10ºC (50ºF) and a relative humidity of 70% were assumed in the model to minimize atmospheric attenuation in the 500 Hz and 1 kHz octave-bands where the human ear is most sensitive.

- **Ground Attenuation:** Spectral ground absorption was calculated using a G-factor of 0 to represent reflective surfaces (i.e., gravel, pavement) for the BESS site and a G-factor of 0.5 for the surrounding area to represent mixed ground.

Several modeling assumptions inherent in the ISO 9613-2 calculation methodology, or selected as conditional inputs by Epsilon, were implemented in the CadnaA model to ensure conservative results (i.e., higher sound levels), and are described below:

- All modeled sources were assumed to be operating simultaneously and the corresponding to the greatest expected operational sound level impacts.

- Per ISO 9613-2, the model assumed favorable conditions for sound propagation, corresponding to a moderate, well-developed ground-based temperature inversion, as might occur on a calm, clear night or equivalently downwind propagation.

- Meteorological conditions assumed in the model (T=10°C/RH=70%) were selected to minimize atmospheric attenuation in the 500 Hz and 1 kHz octave bands where the human ear is most sensitive.

- No additional attenuation due to air turbulence, foliage, or wind shadow effects was considered in the model.

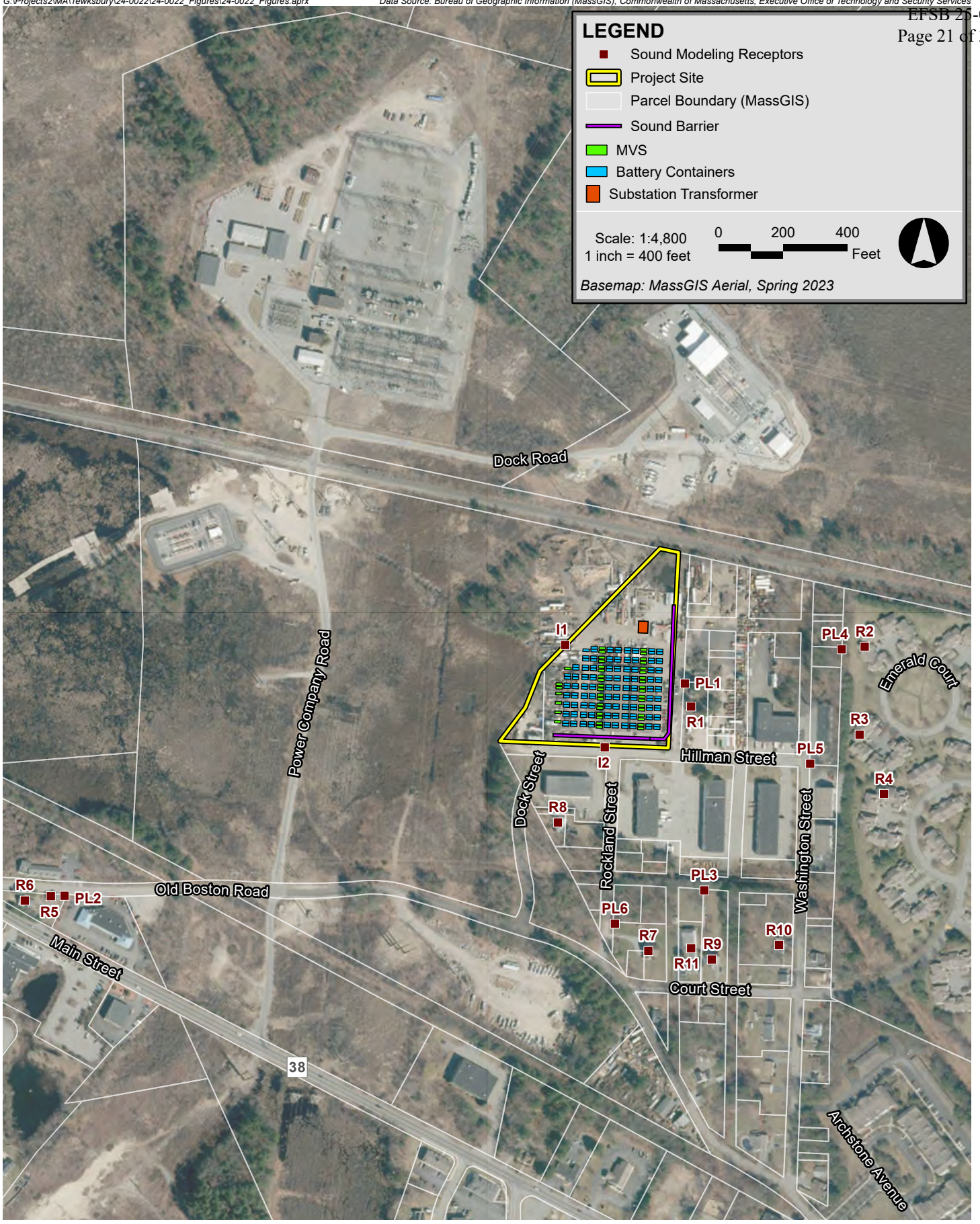

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Figure 6-1
Sound Level Modeling Locations

Table 6-2 Reference Sound Power Level by Source (Proposed Equipment)

Proposed Source	Broadband Sound Power Level per Unit	Sound Level per Unit (dB) by Octave Band (Hz)								
		31.5	63	125	250	500	1k	2k	4k	8k
	dBA	dB	dB	dB	dB	dB	dB	dB	dB	dB
Sungrow PowerTitan 2.0 w/ Noise Reduction	CONFIDENTIAL[1]	CONFIDENTIAL								
Sungrow MVS	CONFIDENTIAL[2]	CONFIDENTIAL								
150 MVA 115 kV Power Transformer	95[3]	92	98	100	95	95	89	84	79	72

1. Sound power level per Sungrow PowerTitan 2.0 Battery Container, with fan speeds at 100%, ambient temperature of 35°C and manufacturer specified noise mitigation kit.
2. Sound power level per MVS unit.
3. Broadband and octave band data for power transformer calculated from Electric Power Plant Environmental Noise Guide, Edison Electric Institute, 2nd edition, 1984. Assumes National Electrical Manufacturers Association (NEMA) rating of 71 dBA.

6.3 Sound Modeling Results

Table 6-3 presents an evaluation of broadband sound levels at all modeling receptors. Ambient L_{90} sound levels shown in the table were assigned to each modeling location. Modeled Project-only broadband L_{eq} sound levels are provided in the table. The ambient sound levels are logarithmically added to the modeled sound levels to determine a worst-case total broadband sound level for each modeling location. The total sound levels have been compared to the representative ambient L_{90} sound levels for evaluation. With the noise control features described in Section 7, modeled future sound levels from the project are predicted to increase the background (ambient) L_{90} sound levels by no more than 10 dBA at all residential receptor locations. Figure 6-2 presents the Project-only sound level contours for the facility operating at full capacity.

The highest 10 dBA increase occurs at two residential property lines to the south and east of the Project and one residence east of the Project. Closer residential areas to the south are shielded by industrial buildings. At all other residential locations, increases are predicted to be 9 dBA or less.

The predicted sound level increases are based on low ambient sound levels derived from quiet nighttime hours. During the majority of the time, background sound levels are expected to be higher than those assumed in this evaluation and the resulting sound level impacts will be less.

Octave-band sound pressure level modeling indicates that the proposed Project would not be anticipated to create any "pure-tone" conditions, as defined by MassDEP, when combined with existing ambient sound levels at any modeled receptor locations. A nighttime pure tone evaluation is presented in Table 6-4.

Modeled Project only sound levels have also been compared to the most restrictive Town of Tewksbury nighttime sound level limits in Table 6-5 for all receptors. As seen in Figure 6-2, the 50 dBA sound contour does not encroach on residential property and the 65 dBA contour is completely contained within the Project Boundary. Project only sound levels are at or below the respective nighttime noise limit based on use Area for all modeled receptor locations. With the noise control features described in Section 7, all Project-Only sound levels are less than the Town of Tewksbury sound level limits and therefore, the Project will comply with the Town of Tewksbury Bylaws with respect to sound.

Table 6-3 Nighttime[1] MassDEP Compliance Evaluation – Mitigated Case

Receptor ID	Land Use	Representative Long Term Sound Level Measurement Location	Measured Background Noise Level	Modeled Facility-Only Noise Level (Proposed)	Combined Facility + Background Noise Level	Increase Above Background[2]	Meets MassDEP Limit?
			dBA	dBA	dBA	dBA	
R1	Residence	2	37	47	47	10	Yes
R2	Residence	1	34	41	42	8	Yes
R3	Residence	1	34	39	40	6	Yes
R4	Residence	1	34	41	42	8	Yes
R5	Residence	2	37	42	43	6	Yes
R6	Residence	2	37	42	43	6	Yes
R7	Residence	2	37	45	46	9	Yes
R8	Residence	2	37	40	42	5	Yes
R9	Residence	2	37	44	45	8	Yes
R10	Residence	1	34	41	42	7	Yes
R11	Residence	2	37	44	45	8	Yes
PL1	Property Line	2	37	46	47	10	Yes
PL2	Property Line	2	37	42	43	7	Yes
PL3	Property Line	2	37	45	46	9	Yes
PL4	Property Line	1	34	41	42	8	Yes
PL5	Property Line	1	34	43	44	9	Yes
PL6	Property Line	2	37	47	47	10	Yes
I1	Industrial	3	37	65	65	28	N/A
I2	Industrial	2	37	51	51	14	N/A

1. 'Nighttime' defined as the operational hours between 10 PM and 7 AM
2. 'Increase Above Background' calculated from levels with greater precision than shown in this table, and then rounded to the nearest whole decibel.

Table 6-4 Nighttime "Pure Tone" Evaluation of the MassDEP Noise Policy

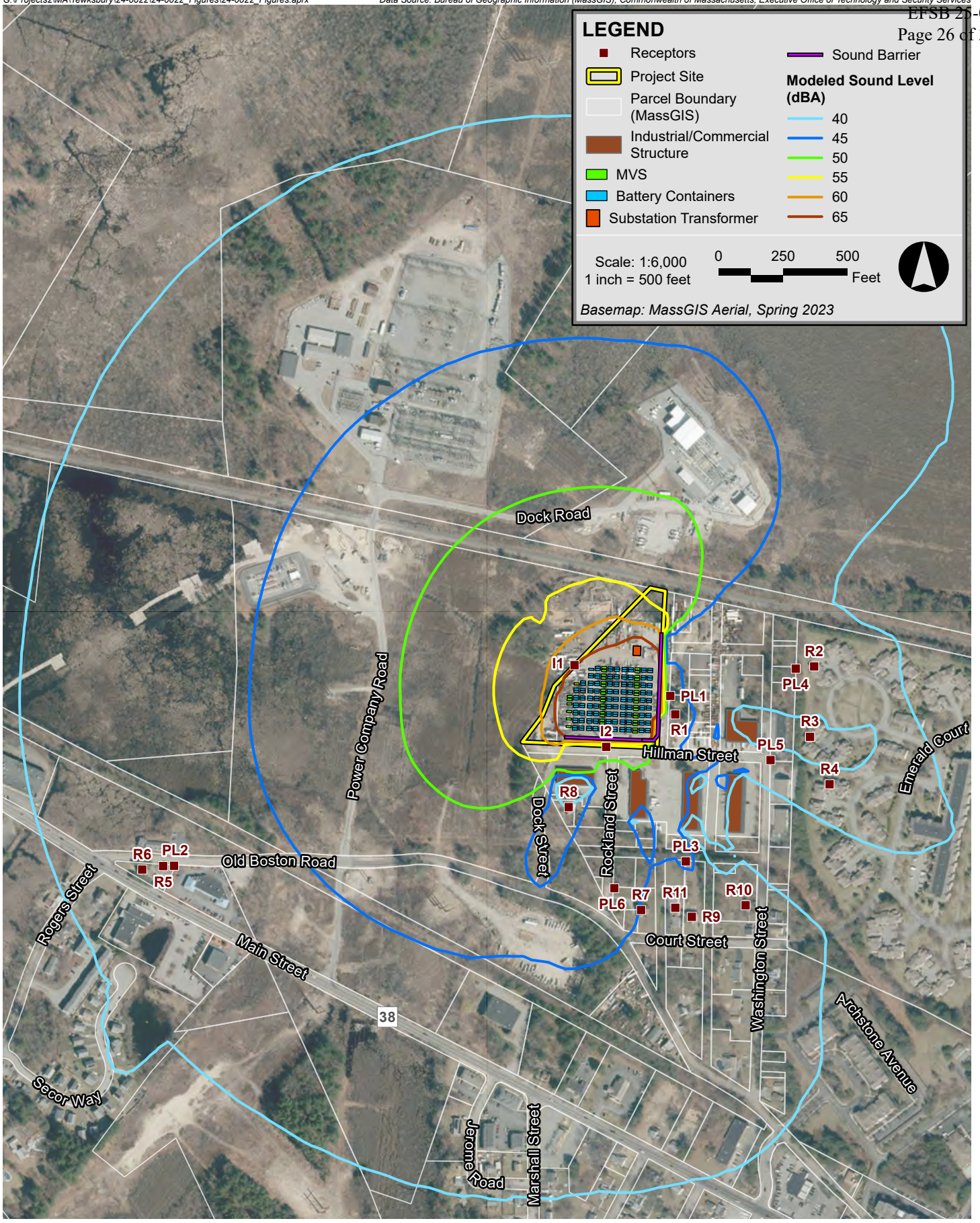
Receptor ID	Land Use	Sound Level (dB) per Octave-Band Center Frequency (Hz)[1]								
		31.5	63	125	250	500	1k	2k	4k	8k
R1	Residence	62	57	53	48	43	43	35	27	19
R2	Residence	56	52	47	43	39	38	29	16	11
R3	Residence	55	51	45	41	37	35	27	15	11
R4	Residence	55	51	46	43	39	38	29	17	11
R5	Residence	54	51	47	42	40	40	31	15	11
R6	Residence	54	51	46	42	40	39	30	14	11
R7	Residence	56	53	49	46	42	42	35	23	11
R8	Residence	58	54	49	44	39	36	27	16	11
R9	Residence	56	53	49	45	41	41	33	20	11
R10	Residence	55	51	46	43	39	38	28	15	11
R11	Residence	56	53	49	45	41	41	33	21	11
PL1	Residence	63	58	53	49	43	41	35	28	21
PL2	Residence	54	51	47	42	40	40	31	15	11
PL3	Residence	57	54	50	46	42	43	35	23	11
PL4	Residence	56	52	47	43	39	38	28	16	11
PL5	Residence	56	52	47	44	39	41	32	20	11
PL6	Residence	57	54	50	47	43	44	37	26	11
I1	Industrial	69	66	65	64	61	61	56	49	42
I2	Industrial	66	61	57	53	48	46	37	30	22

1. Calculated from levels with greater precision than shown in this table, and then rounded to the nearest whole decibel.

Table 6-5 Nighttime[1] Tewksbury Compliance Evaluation – Mitigated Case

Receptor ID	Land Use Area	Modeled Facility-Only Noise Level (Proposed) dBA	Tewksbury Use Area Noise Limit dBA	Meets Tewksbury Limit?
R1	I	47	50	Yes
R2	I	41	50	Yes
R3	I	39	50	Yes
R4	I	41	50	Yes
R5	I	42	50	Yes
R6	I	42	50	Yes
R7	I	45	50	Yes
R8	I	40	50	Yes
R9	I	44	50	Yes
R10	I	41	50	Yes
R11	I	44	50	Yes
PL1	I	46	50	Yes
PL2	I	42	50	Yes
PL3	I	45	50	Yes
PL4	I	41	50	Yes
PL5	I	43	50	Yes
PL6	I	47	50	Yes
I1	II	65	65	Yes
I2	II	51	65	Yes

1. 'Nighttime' defined as the operational hours between 10 PM and 7 AM



Hillman Energy Center LLC **Tewksbury, Massachusetts**

Epsilon Associates Inc.

Figure 6-2
Sound Level Modeling Results

7.0 MITIGATION MEASURES

7.1 Silenced Equipment

The manufacturers for the proposed battery containers offer silencing equipment to mitigate the sound produced by the units. The Project will utilize the manufacturer specified silencing equipment on all Sungrow Power Titan units to reduce the sound produced by the battery containers.

7.2 Sound Attenuation Barriers

In addition to silencing the battery container units, the Project will also utilize sound attenuation barriers along the east and south of the site. Under current design, a 26-foot-tall barrier along the east of the Project as well as a 17-foot-tall barrier along the southern side of each parcel of the Project will be constructed. The barriers will be constructed of materials with adequate thickness and density to provide appropriate sound level reductions as well as have an absorptive inner face corresponding to an absorption coefficient of at least 0.60. The proposed barrier locations, shown in Figures 6-1 and 6-2, are situated as close as possible to the equipment while maintaining adequate ventilation and accessibility. Egress areas in the barriers will be designed to achieve adequate transmission loss approximately equivalent to the barrier itself. The contractor selected would be responsible for the design, detailing, and adequacy of the framework, supports, and attachment methods required for the proper construction of the sound attenuation barriers.

7.3 Low Noise Substation Transformer

The Project will utilize a low noise power transformer at the substation. The proposed substation will feature one 150 MVA transformer. As described in Section 6.2, Epsilon estimated the octave band sound power levels of the transformer using methods outlined in the Electric Power Plant Environmental Noise guide (EEI Noise Guide) assuming the transformer will have a National Electrical Manufacturers Association (NEMA) noise rating of 71 dBA.

8.0 CONCLUSIONS

A comprehensive sound level assessment has been conducted for the proposed Project. Substantial noise mitigation measures have been incorporated into the design of the proposed Project to minimize noise impacts in the community. These mitigation measures include low noise equipment, equipment silencers, and sound attenuation barriers. Results of a complete sound level assessment demonstrate that the sound levels from the facility will comply with the requirements set forth in the MassDEP Noise Policy at all residential locations as well as the Town of Tewksbury Bylaws.

Appendix A

MassDEP Noise Pollution Policy Interpretation

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs
Department of Environmental Protection
One Winter Street Boston, MA 02108 • 617-292-5500

Noise Pollution Policy Interpretation

Noise is a public health concern that falls within the scope of Massachusetts Department of Environmental Protection (MassDEP) authority as a form of regulated air pollution. See the related law, regulations, and policy: M.G.L. Chapter 111, Sections 142A-M, 310 CMR 7.00: Air Pollution Control, and MassDEP Noise Policy

Definitions (310 CMR 7.00)

- *Noise* is defined as "sound of sufficient intensity and/or duration as to cause a condition of air pollution."
- *Air pollution* means "the presence in the ambient air space of one or more air contaminants or combinations thereof in such concentrations and of such duration as to: (a) cause a nuisance; (b) be injurious, or be on the basis of current information, potentially injurious to human health or animal life, to vegetation, or to property; or (c) unreasonably interfere with the comfortable enjoyment of life and property or the conduct of business."

When Does MassDEP Evaluate Noise Impacts?

MassDEP evaluates how noise may affect people when 1) the agency reviews applications for approval under its air pollution regulations (310 CMR 7.02) for construction of facilities that will generate more than threshold amounts of pollutants such as nitrogen dioxide, sulfur dioxide, carbon monoxide, volatile organic compounds, particulate matter, and substances that are toxic in air; and 2) the agency responds to complaints from the public about noise generated by an existing source:

- When reviewing applications for pre-construction approval of new sources of air pollution, MassDEP examines the potential increase in sound levels over ambient conditions and the impacts of noise at both the source's property line and at the nearest residence or other sensitive receptor (e.g., schools, hospitals) located in the area surrounding the facility and occupied at the time of the permit review. Please note: *MassDEP requires that an air approval be obtained when a proposed facility is expected to emit more than threshold amounts of specific pollutants. If noise is the only air pollutant expected to be emitted by a facility, a pre-construction air approval is not required.*
- When MassDEP responds to a complaint about an existing source of noise, it focuses on protecting affected people at their residences and in other buildings that are occupied by sensitive receptors from nuisances and the public health effects of the noise. *Please note: An existing source of sound may or may not have needed a MassDEP air approval before it was built.*

Where Are MassDEP's Noise Criteria Applied?

The MassDEP noise pollution policy describes criteria that MassDEP uses to evaluate noise impacts at both the property line and the nearest occupied residence or other sensitive receptor. When noise is found to be a nuisance or a threat to health, MassDEP requires the source to mitigate its noise.

Noise levels that exceed the criteria at the source's property line by themselves do not necessarily result in a violation or a condition of air pollution under MassDEP regulations (see 310 CMR 7.10 U). The agency also considers the effect of noise on the nearest occupied residence and/or building housing sensitive receptors:

- In responding to complaints, MassDEP measures noise levels at the complainant's location and at other nearby locations that may be affected (e.g., residences and/or buildings with other sensitive receptors). If the noise level at a sensitive receptor's location is more than 10 dB(A) above ambient, MassDEP requires the noise source to mitigate its impact.

- A new noise source will be required to mitigate its sound emissions if they are projected to cause the broadband sound level at a residence or building housing sensitive receptors to exceed ambient background by more than 10 dB(A).

- A new noise source that would be located in an area that is not likely to be developed for residential use in the future (e.g., due to abutting wetlands or similarly undevelopable areas), or in a commercial or industrial area with no sensitive receptors may not be required to mitigate its noise impact on those areas, even if projected to cause noise levels at the facility's property line to exceed ambient background by more than 10 dB(A). However, a new noise source that would be located in an area in which housing or buildings containing other sensitive receptors could be developed in the future may be required to mitigate its noise impact in these areas.

This policy has been designed to protect affected residents and other sensitive occupants of nearby property, but not necessarily uninhabited areas in and around the source's property. Sources of noise may need to implement mitigation if residences or buildings occupied by sensitive receptors are developed where they may be affected by the source's noise.

Appendix B

Long-Term Sound Level Measurement Data

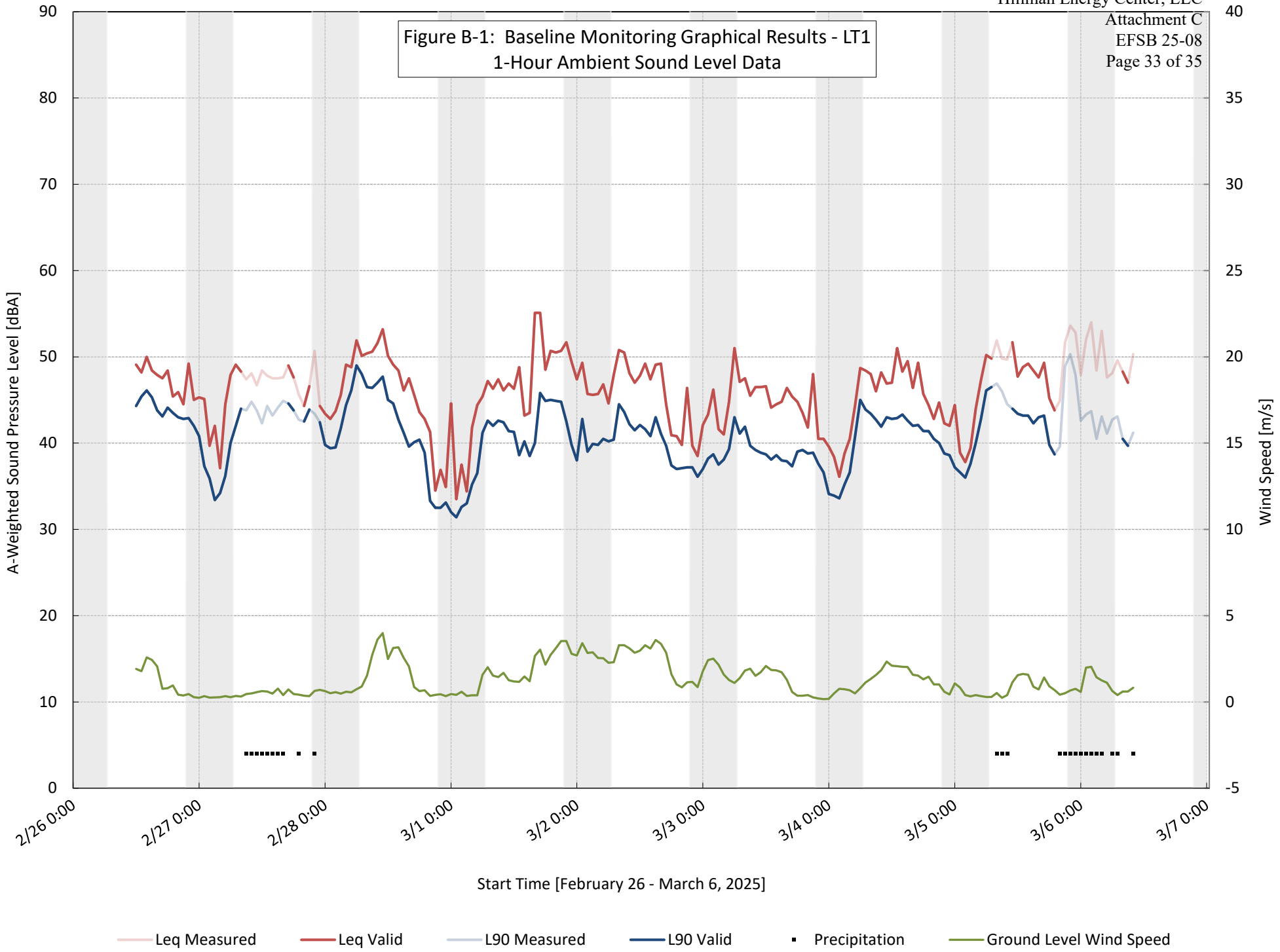


Figure B-1: Baseline Monitoring Graphical Results - LT1
1-Hour Ambient Sound Level Data
A-Weighted Sound Pressure Level [dBA]
Wind Speed [m/s]
90
80
70
60
50
40
30
20
10
0
40
35
30
25
20
15
10
5
0
-5
2/26 0:00
2/27 0:00
2/28 0:00
3/1 0:00
3/2 0:00
3/3 0:00
3/4 0:00
3/5 0:00
3/6 0:00
3/7 0:00
Start Time [February 26 - March 6, 2025]
Leq Measured
Leq Valid
L90 Measured
L90 Valid
Precipitation
Ground Level Wind Speed

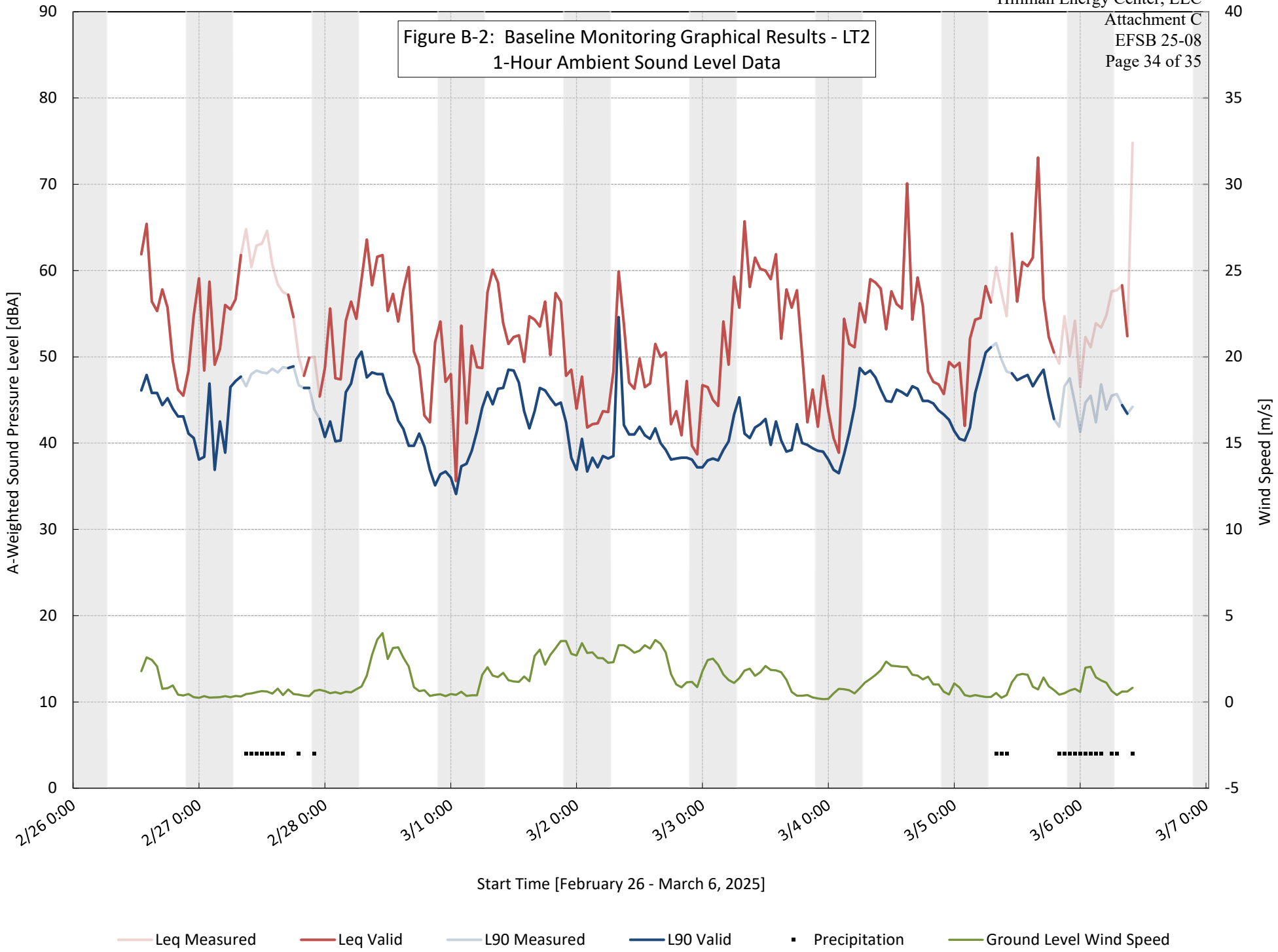


Figure B-2: Baseline Monitoring Graphical Results - LT2
1-Hour Ambient Sound Level Data
A-Weighted Sound Pressure Level [dBA]
Wind Speed [m/s]
90
80
70
60
50
40
30
20
10
0
40
35
30
25
20
15
10
5
0
-5
2/26 0:00
2/27 0:00
2/28 0:00
3/1 0:00
3/2 0:00
3/3 0:00
3/4 0:00
3/5 0:00
3/6 0:00
3/7 0:00
Start Time [February 26 - March 6, 2025]
Leq Measured
Leq Valid
L90 Measured
L90 Valid
Precipitation
Ground Level Wind Speed

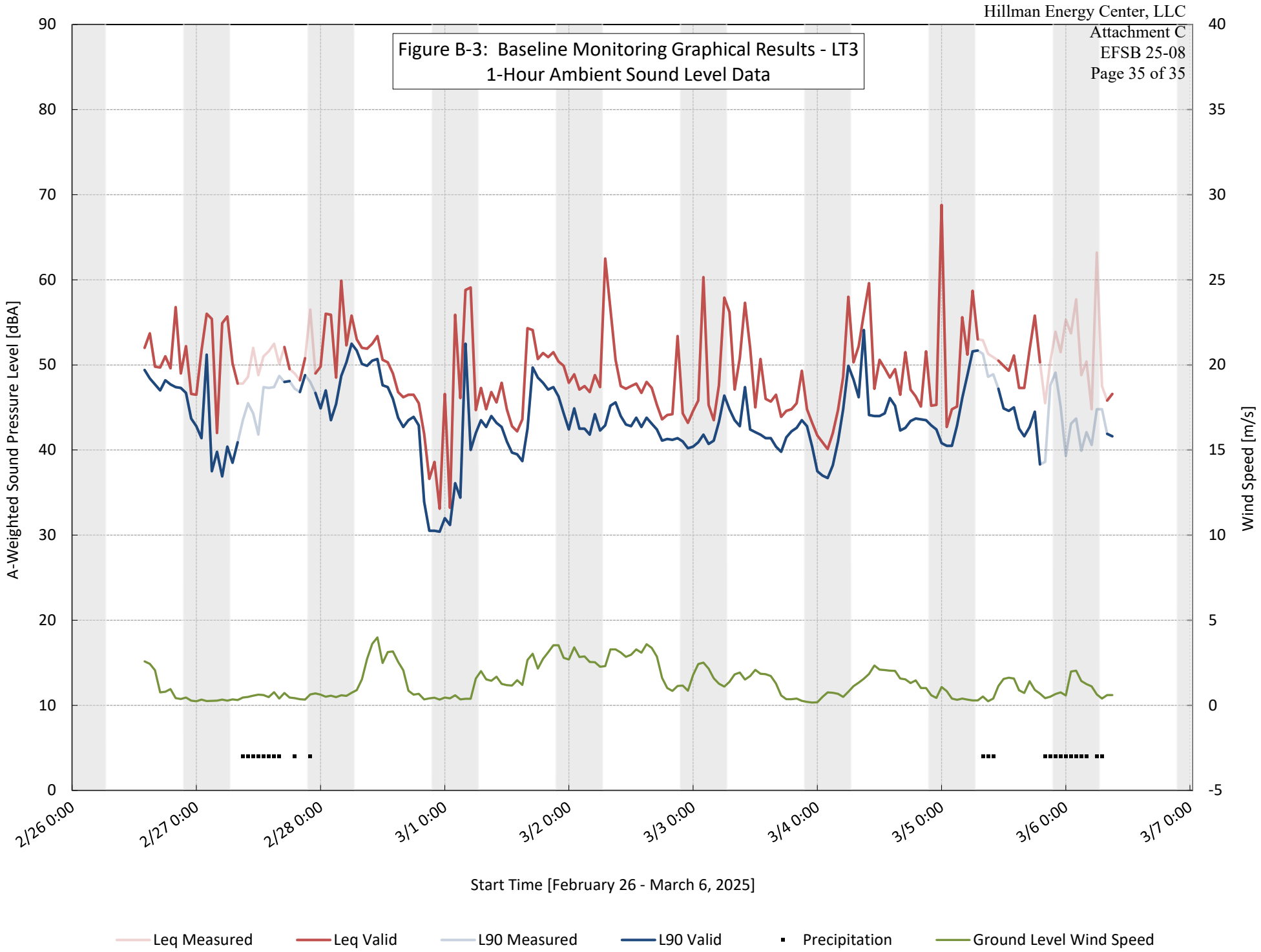


Figure B-3: Baseline Monitoring Graphical Results - LT3
1-Hour Ambient Sound Level Data
A-Weighted Sound Pressure Level [dBA]
Wind Speed [m/s]
90
80
70
60
50
40
30
20
10
0
40
35
30
25
20
15
10
5
0
-5
2/26 0:00
2/27 0:00
2/28 0:00
3/1 0:00
3/2 0:00
3/3 0:00
3/4 0:00
3/5 0:00
3/6 0:00
3/7 0:00
Start Time [February 26 - March 6, 2025]
Leq Measured
Leq Valid
L90 Measured
L90 Valid
Precipitation
Ground Level Wind Speed