EAST POINT ENERGY CENTER

PRE-CONSTRUCTION SOUND LEVEL IMPACT ASSESSMENT

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Section 1.0

Executive Summary

1.0 EXECUTIVE SUMMARY

The proposed East Point Energy Center will be located in Schoharie County, NY. The project is expected to have a capacity of 50 MW using solar panel arrays and ancillary structures. This report is a noise impact assessment required under section 1001.19 as part of the NY State Article 10 process.

Noise Standards and Design Goals

The project will be located within the Town of Sharon which does not have a numerical sound standard.

New York state regulations do not list quantitative sound limits applicable to this project. As part of the project, noise design goals were developed based on a literature review of health-based standards, guidelines on sound and annoyance, and previous Siting Board proceedings in order to balance reasonable development and minimize potential impacts from the Facility. These design goals include a 1-hour L_{eq} sound level of 42 dBA at a non-participating residence, and 52 dBA at a participating residence during the daytime or nighttime. These design goals are consistent with condition #73(a) of the recent Certificate of Environmental Compatibility and Public Need, With Conditions issued by the Siting Board on August 20, 2019 for the Eight Point Wind project (Case 16-F-0062).

An annual nighttime level of 40 dBA ($L_{eq,\ night,\ outside}$) at a non-participating residence, and 50 dBA ($L_{eq,\ night,\ outside}$) at a participating residence are two additional design goals consistent with other renewable energy projects, such as Eight Point Wind. This covers all the nighttime periods over the course of an entire year (365 nights). Solar facilities will typically comply with this goal as the majority of the facility will not produce sound during times without sunlight.

Equipment associated with solar installations (inverters, substation) produce some infrasound but these levels are well below human thresholds of audibility. However, infrasound and low frequency energy can result in airborne vibration within homes if the levels are high enough. American National Standard ANSI S12.9-2005/Part 4 identifies that low frequency sound annoyance is minimal when the 16, 31.5 and 63 Hz octave band sound pressure levels are each less than 65 dB. Therefore, a design goal of 65 dB at these three octave bands at the exterior of a non-participating home has been established to conservatively assess the potential for low frequency annoyance.

Other design goals include a limit of 55 dBA 1-hour L_{eq} at a non-participating property line, and to prohibit a “pure tone” at non-participating residences in accordance with ANSI S12.9 Part 3/Annex B Section B.1, or impose a 5 dBA penalty to the broadband limit if a pure tone occurs.

Existing Condition Sound Monitoring

Existing condition sound levels were measured at four locations in and around the project site during the winter season, and at five locations during the summer season. Sound levels were measured for one week during each season collecting both broadband (dBA) and one-third octave band data, as well as ground-level wind speeds. All data were processed to remove invalid, intermittent, and seasonal noise in order to calculate the L_{eq} and L_{90} ambient sound levels required in the Article 10 regulations.

Future Sound Modeling

The expected future sound levels from the project were modeled at all sensitive sound receptors identified in the project area. Maximum operational sound power levels of the proposed solar inverters as well as the collector substation were entered into the acoustic model. The first round of modeling estimated the highest 1-hour L_{eq} from the project. Modeling was performed using the ISO 9613-2 propagation standard assuming every inverter and the collector substation was operating simultaneously at their maximum sound level. The second round of modeling also used the ISO 9613-2 propagation standard but included adjustments to the maximum sound power levels using one year of on-site meteorological data to calculate an estimated worst-case (L_{10}), typical (L_{50}), and annual nighttime ($L_{eq,\ night\text{-}outside}$) sound level at each receptor. Sound levels from construction activities at the most potentially impacted areas were modeled for the major phases of construction.

Conclusions

The detailed analyses presented in this report confirm that the Facility construction and operation has been designed to comply with the noise and vibration design goals. Table ES-1 summarizes each of the design goals and indicates the compliance status of the project with each one. As this table shows, the proposed project will meet all design goals. Therefore, at this stage of permitting, adverse noise and vibration impacts from the construction and operation of the proposed East Point Energy Center have been avoided or mitigated to the maximum extent practicable.

Table ES-1 Summary of Compliance with Sound Standards and Design Goals – East Point Energy Center

#	Design Goal. (Not to exceed)	Assessment Location	Noise descriptor	Period of Time	Participant Status	Meet?
1	40 dBA	At residence, Outdoor	Lnight-outside (Leq)	Annual; nighttime. (2009-WHO)	Non-participant	Yes
2	50 dBA	At residence, Outdoor	Lnight-outside (Leq)	Annual; nighttime. (2009-WHO)	Participant	Yes
3	42 dBA	At residence, Outdoor	Leq	1-hour; daytime or nighttime	Non-participant	Yes
4	52 dBA	At residence, Outdoor	Leq	1-hour; daytime or nighttime	Participant	Yes
5	55 dBA	Property line except for portions delineated as wetlands	Leq	1-hour; daytime or nighttime	Non-Participant	Yes
6	No audible prominent tones or 5 dBA penalty if they occur	At residence, Outdoor	Leq	1-hour; daytime and nighttime	Non-participant	Yes
7	65 dB at 16, 31.5, and 63 Hz full-octave bands	At residence, Outdoor	Leq	1-hour; daytime and nighttime	Non-participant	Yes

Section 2.0

Introduction

2.0 INTRODUCTION

This report is a pre-construction noise impact assessment (PNIA) of the proposed East Point Energy Center required under section 1001.19 as part of the NY State Article 10 process.

The East Point Energy Center (the "Project") is a proposed 50-megawatt (MW) commercial-scale solar power project located within the Town of Sharon, Schoharie County, New York. The Project's solar panel arrays and related facilities will be sited on privately-owned leased land within the Project Area.

Epsilon Associates ("Epsilon") conducted the PNIA in accordance with the Article 10 regulations and the Project's understanding of the required DPS scope of studies. The report includes the following elements:

- Project description
- Discussion of sound level limits, regulations, guidelines, and goals for the project
- Description of existing condition sound level measurement program
- Sound level measurement results from two seasons of monitoring
- Sound level propagation modeling procedures
- Sound level modeling results
- Construction sound level modeling procedures and results
- Other potential community noise impacts
- Detailed appendices of model inputs and results tables
- Glossary of terms

Section 3.0

Project Description

3.0 PROJECT DESCRIPTION

The proposed Project is being developed by East Point Energy Center, LLC (the “Applicant” or “East Point Energy Center”) a wholly-owned subsidiary of NextEra Energy Resources, LLC.

The proposed Project consists of the construction and operation of a commercial-scale solar power energy facility, including the installation and operation of solar panel arrays, inverters, and a collector substation, together with the associated collection lines, access roads, switchyard, and one operation and maintenance (O&M) building. These solar panels and related facilities will be sited within privately-owned leased land within an approximately 1,313-acre Project Area.

To deliver electricity to the New York State power grid, East Point Energy Center proposes to construct a collection substation, and a switchyard. The collection substation, switchyard and O&M building will all be located in the same area on the east side of the Project, north of Route 20. The switchyard will not contain any new noise sources, and thus was not included in the PNIA.

The Applicant plans to install sixteen (16) Power Electronics HEM inverters, each with a maximum output of 3,465 kWA. For this PNIA, sound levels produced by the sixteen inverters, and the collector substation were analyzed. The collector substation will contain a step-up transformer rated at up to 60 MVA.

243 discrete receptors were analyzed for the project. These include 194 year-round residences, 7 seasonal residences, 26 public areas, and 16 unknown structures. All “unknown” structures were conservatively assumed to be residences. Of the 243 receptors, 7 were participating, and 236 were non-participating. Of the 194 year-round residences, 4 were participating and 190 were non-participating. Of the 68 seasonal residences, 9 were participating and 59 were non-participating. Of the 26 public areas, 3 were participating and 23 were non-participating. Of the 16 unknown structures, 0 were participating and 16 were non-participating.

Section 4.0

Regulations, Guidelines, and Evaluation Criteria

4.0 REGULATIONS, GUIDELINES, AND EVALUATION CRITERIA

4.1 Local Regulations

Schoharie County does not have any noise regulations applicable to the operation of a solar facility. The Town of Sharon does not have any noise regulations applicable to the operation of a solar facility.

4.2 New York State

This project falls under the jurisdiction of the NY State Board on Electric Generation Siting and the Environment "Article 10" regulations. Part 1001.19 "Exhibit 19: Noise and Vibration" contains the required elements of the regulation. These regulations do not list quantitative sound limits applicable to this project, but rather all the factors that must be considered in the noise study. Standards and design goals have been established in this PNIA based on previous Article 10 projects, and the Project's understanding of the required DPS scope of studies.

4.3 Federal Guidelines

There are no federal community noise regulations applicable to solar facilities.

4.4 World Health Organization Guidelines

A useful guideline for putting sound levels in perspective is the "Guideline for Community Noise" (World Health Organization, Geneva, 1999). Table 4.1 in this document states that daytime and evening outdoor living area sound levels at a residence should not exceed an L_{eq} of 55 dBA to prevent serious annoyance and an L_{eq} of 50 dBA to prevent moderate annoyance from a steady, continuous noise. At night, sound levels at the outside facades of the living spaces should not exceed an L_{eq} of 45 dBA, so that people may sleep with bedroom windows open. The time base for these World Health Organization (WHO) sound levels is 16 hours for daytime and 8 hours for nighttime. In other words, they are not 10-minute averages but over a longer period of time. The 16-hour and 8-hour timeframes are considered short-term time periods.

In 2009 the WHO released another report entitled "Night Noise Guidelines for Europe." The 2009 WHO report recommends a Night Noise Guideline (NNG) of 40 dBA. However, the 40 dBA guideline is an "$L_{eq,\ night,\ outside}$" descriptor, which is NOT the same as a short-term measurement. $L_{eq,\ night,\ outside}$ is defined as the A-weighted long-term average sound level determined over all the night periods of a year; in which the night is eight hours (23:00 to 07:00 local time). Thus, the $L_{eq,\ night,\ outside}$ is an annual average, and is not an appropriate descriptor to use for evaluating a permit's compliance criteria. An annual design goal is not a standard and should not be a permit condition given the complexity of measuring sound over the course of 365 nights.

Since $L_{eq,\ night,\ outside}$ considers 365 nights of operation, and most components of the solar facility will not produce sound during periods without sunlight, this sound level metric will always result in a lower value than the worst-case (highest) short-term sound level. In other words, the $L_{eq,\ night,\ outside}$ guideline of 40 dBA, is not a 10-minute or 1-hour sound level but is an average annual level.

It is important to note that the 1999 and 2009 WHO guidelines were developed with a focus on transportation sound, and were not developed specifically for solar projects.

4.5 Sound Annoyance and Complaint Studies

The frequency range 20 – 20,000 Hertz (Hz) is commonly described as the range of *"audible"* noise. The frequency range of low frequency sound is generally from 20 Hz to 200 Hz, and the range below 20 Hz is often described as "*infrasound*".

4.5.1 Audible Sound

An extensive search was made of noise-related publications from professional organizations such as the Institute of Noise Control Engineering (INCE) and the Acoustical Society of America (ASA) along with their associated annual conference proceedings. Very few papers have been published on sound from solar energy facilities, and none were located that analyzed potential annoyance from solar energy facilities. This is not surprising given that sound from photo-voltaic solar systems is a very minor source of sound energy. Therefore, annoyance due to sound from solar energy is expected to be negligible.

4.5.2 Infrasound and Low Frequency

The frequency range of low frequency sound is generally from 20 Hz to 200 Hz, and the range below 20 Hz is often described as "*infrasound*". However, audibility can extend to frequencies below 20 Hz if the energy is high enough. Since there is no sharp change in hearing at 20 Hz, the division between "low-frequency sound" and "infrasound" should only be considered "practical and conventional." The threshold of hearing is standardized for frequencies down to 20 Hz.[1] Based on extensive research and data, Watanabe and Moeller have proposed normal hearing thresholds for frequencies below 20 Hz.[2] Figure 4-1 shows these sound levels as a function of frequency.

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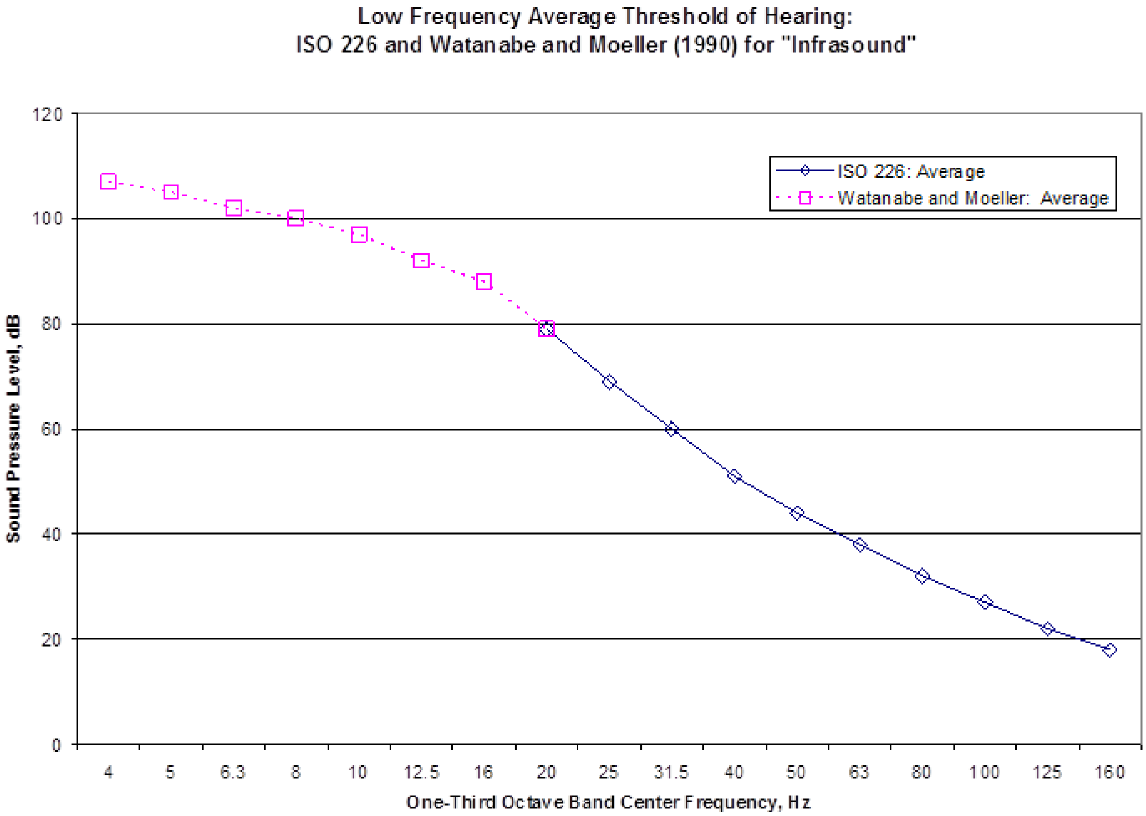
[1] Acoustics - Normal equal-loudness-level contours, International Standard ISO 226:2003, International Organization for Standardization, Geneva, Switzerland, (2003).

[2] T. Watanabe, and H. Moeller, "Low Frequency Hearing Thresholds in Pressure Field and in Free Field", J. Low Frequency Noise and Vibration, 9(3), 106-115, (1990).

Figure 4-1 Low Frequency Average Threshold of Hearing



Annex D in the American National Standard ANSI S12.9-2005/Part 4[3] identifies that low frequency sound annoyance is minimal when the 16, 31.5 and 63 Hz octave band sound pressure levels are each less than 65 dB. According to the standard, annoyance to sounds with strong low frequency content is virtually only an indoor issue. Table 4-1 summarizes these levels.

Section 6 of the American National Standard ANSI/ASA S12.2-2008[4] discusses criteria for evaluating indoor low frequency room noise. These criteria assess the potential to cause perceptible airborne induced vibration and rattles. Outdoor low frequency sounds that are high enough can cause building walls to vibrate and windows to rattle. Window rattles are not low frequency noise, but may be caused by low frequency noise. ANSI/ASA S12.2 presents limiting levels at low frequencies (16, 31.5, 63 Hz) for assessing (a) the probability of *clearly* perceptible acoustically induced vibration and rattles in lightweight wall and ceiling constructions, and (b) the probability of *moderately* perceptible acoustically induced vibration in similar constructions. See Table 4-2 below. Research has found that reduction of sound from outside to inside at these low frequencies is modest but not zero. Typical reductions with windows open are 3 dB, 6 dB, and 9 dB at 16, 31.5, and 63 Hz respectively.[5] Table 4-3 summarizes the equivalent outdoor sound levels with this level of attenuation included.

Table 4-1 Low frequency levels at which annoyance is minimal. [ANSI S12.9-2005/Part 4]

Condition	Octave-band center frequency (Hz)		
	16	31.5	63
Minimal annoyance levels	65 dB	65 dB	65 dB

Table 4-2 Measured interior sound pressure levels for perceptible vibration and rattle in lightweight wall and ceiling structures. [ANSI/ASA S12.2-2008]

Condition	Octave-band center frequency (Hz)		
	16	31.5	63
Clearly perceptible vibration and rattles likely	75 dB	75 dB	80 dB
Moderately perceptible vibration and rattles likely	65 dB	65 dB	70 dB

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3 American National Standard Quantities and Procedures for Description and Measurement of Environmental Sound – Part 4: Noise Assessment and Prediction of Long-term Community Response, American National Standards Institute ANSI S12.9-2005/Part 4, Acoustical Society of America, New York, (2005).

4 American National Standard Criteria for Evaluating Room Noise, American National Standards Institute ANSI/ASA S12.2-2008, Acoustical Society of America, New York, (2008).

5 Low frequency noise and infrasound from wind turbines, R. O'Neal et al, Noise Control Engineering J., 59(2), 2011.

Table 4-3 *Equivalent* **outdoor sound pressure levels for perceptible vibration and rattle in lightweight wall and ceiling structures.**

Condition	Octave-band center frequency (Hz)		
	16	31.5	63
Clearly perceptible vibration and rattles likely	78 dB	81 dB	89 dB
Moderately perceptible vibration and rattles likely	68 dB	71 dB	79 dB

4.6 Project Noise Design Goals

Regulatory limits for other power generation and mechanical processes never seek inaudibility but rather to limit noise from a source to a reasonably acceptable level. The project noise design goals are presented in Table 4-4 below. The seven design goals for this project are described in more detail below.

Noise design goals were developed in order to balance reasonable development and minimize annoyance to the community. These include an annual nighttime level of 40 dBA ($L_{eq,\ night,\ outside}$) at a non-participating residence (Goal #1), and also a 50 dBA ($L_{eq,\ night,\ outside}$) at a participating residence (Goal #2). This is consistent with other renewable energy projects, such as Eight Point Wind (Case 16-F-0062).

A maximum short term broadband (1-hour L_{eq}) sound level (day or night) of 42 dBA is a design goal for all non-participating residences (Goal #3), and 52 dBA is the design goal for this metric at participating residences (Goal #4). These design goals are consistent with condition #73(a) of the recent Certificate of Environmental Compatibility and Public Need, With Conditions issued by the Siting Board on August 20, 2019 for the Eight Point Wind project (Case 16-F-0062).

The WHO 1999 notes daytime and evening outdoor living area sound levels at a residence should not exceed an L_{eq} of 55 dBA to prevent serious annoyance and an L_{eq} of 50 dBA to prevent moderate annoyance from a steady, continuous noise. Since a property line is not a "living area", or even an area where people routinely spend extended time, limiting 1-hour L_{eq} sound levels to 55 dBA or less at non-participating property lines is a reasonable design goal (Goal #5). With a limit of 55 dBA at the boundary line, sound levels inside the boundary line will be less than 55 dBA.

Another design goal for non-participating residences is to prohibit an "audible prominent tone" in accordance with ANSI S12.9 Part 3/Annex B Section B.1, or impose a 5 dBA penalty to the broadband limit if a pure tone occurs (Goal #6).

Solar facilities produce very low levels of infrasound, which are well below human thresholds of audibility. However, infrasound and low frequency energy can result in airborne vibration within homes if the levels are high enough. American National Standard ANSI S12.9-2005/Part 4 identifies that low frequency sound annoyance is minimal when the 16, 31.5 and 63 Hz octave band sound pressure levels are each 65 dB or less, and therefore sound pressure levels 65 dB or less in those three octave bands is a design goal at non-participating residences (Goal #7).

Table 4-4 Summary of Design Goals – East Point Energy Center

#	Design Goal. (Not to exceed)	Assessment Location	Noise descriptor	Period of Time	Participant Status
1	40 dBA	At residence, Outdoor	Lnight-outside (Leq)	Annual; nighttime. (2009-WHO)	Non-participant
2	50 dBA	At residence, Outdoor	Lnight-outside (Leq)	Annual; nighttime. (2009-WHO)	Participant
3	42 dBA	At residence, Outdoor	Leq	1-hour; daytime or nighttime	Non-participant
4	52 dBA	At residence, Outdoor	Leq	1-hour; daytime or nighttime	Participant
5	55 dBA	Property line except for portions delineated as wetlands	Leq	1-hour; daytime or nighttime	Non-Participant
6	No audible prominent tones or 5 dBA penalty if they occur	At residence, Outdoor	Leq	1-hour; daytime and nighttime	Non-participant
7	65 dB at 16, 31.5, and 63 Hz full-octave bands	At residence, Outdoor	Leq	1-hour; daytime and nighttime	Non-participant

Section 5.0

Substation and Inverter Noise

5.0 SUBSTATION AND INVERTER NOISE

5.1 Sources of Sound from Solar Facilities

Sound produced by a solar facility is relatively low compared to other types of power generation facilities. The main components of a solar facility are the photovoltaic (PV) panel arrays, the power inverter units, the DC collection system, the AC collection system, and the substation. The operational sounds from a solar facility include the inverters which are typically located in the center of the solar panel arrays, and the transformer located at the substation. The main source of sound from the inverters and substation are their cooling fans, and the electrical components within the inverter cabinet and substation transformer. The inverters produce a low humming sound during time periods when sunlight is shining onto the panels, when the array generates electricity. The substation has switching, control equipment, and a transformer. A typical substation has two different cooling modes - natural cooling, referred to as “ONAN” and fan cooling, referred to as “ONAF”. Although a solar facility will only produce electricity during time periods with daylight, the substation is energized twenty-four hours per day. When the substation is operating at its maximum condition (ONAF), the sound emitted is a combination of both the cooling fans and the transformer “hum”.

5.2 Noise Abatement Measures

Noise from inverters or a substation can be reduced by good siting practices, or by using sound barrier walls after construction. Given the relatively low sound levels produced by solar facility equipment and the significant distances between this equipment and sensitive receptors in this project, noise abatement measures should not be necessary.

5.2.1 Construction

Noise due to construction is an unavoidable outcome of construction. The site work is expected to last approximately 7-10 months and will be performed in several phases. The four major construction phases are: site preparation and grading, trenching and road construction, equipment installation, and commissioning. Most of the construction will occur at significant distances to sensitive receptors, and therefore noise from most phases of construction is not expected to result in impacts. However, the Noise Complaint Resolution Plan provided with this Application contains the procedures to be followed in the event of a noise complaint during construction. Construction noise will be minimized through the use of best management practices (BMP) such as those listed below.

- Blasting is not anticipated at this site. However, if necessary, blasting will be limited to daytime hours and conducted in accordance with the project’s Preliminary Blasting Plan included elsewhere in the Article 10 Application.

- Pile driving and horizontal direction drilling (HDD) will be limited to daytime hours. See the preliminary geotechnical report for more detail.

- Utilizing construction equipment fitted with exhaust systems and mufflers that have the lowest associated noise whenever those features are available.

- Maintaining equipment and surface irregularities on construction sites to prevent unnecessary noise.

- Configuring, to the extent feasible, the construction in a manner that keeps loud equipment and activities as far as possible from noise-sensitive locations.

- Using back-up alarms with a minimum increment above the background noise level to satisfy the performance requirements of the current revisions of Standard Automotive Engineering (SAE) J994 and OSHA requirements.

- Develop a staging plan that establishes equipment and material staging areas away from sensitive receptors when feasible.

- Contractors shall use approved haul routes to minimize noise at residential and other sensitive noise receptor sites.

5.2.2 Operations

The Noise Complaint Resolution Plan provided with this Application contains the procedures to be followed in the event of a noise complaint during operations. The noise emitted by the solar project inverters is limited to daytime periods only.

Sound barriers can be used as needed around an inverter or a substation if the transformer is identified as a sound source requiring noise control. At a noise-sensitive receptor, interior sound levels can be reduced through the use of better doors, windows, and/or insulation.

Section 6.0

Baseline Sound Level Monitoring Program

6.0 BASELINE SOUND LEVEL MONITORING PROGRAM

To characterize the existing soundscape of the Project area, an ambient (baseline) monitoring program was conducted in accordance with the NYS Article 10 Exhibit 19 requirements and the Project's understanding of the required DPS scope of studies. This section outlines the structure of the ambient program.

6.1 Sensitive Receptors

All residences [including participating, non-participating, full-time and seasonal], outdoor public facilities and areas, State Forest Lands, places of worship, hospitals, schools, cemeteries, campsites, summer camps, Public Parks, Federal and NY State Lands, any of these within one mile of the solar project were included as sensitive receptors. Seasonal receptors included cabins and hunting camps identified by property tax codes and any other seasonal residence known to have septic systems or running water. These are shown in Figure 6-1 in accordance with the Project's understanding of the required DPS scope of studies.

6.2 Sound Level Measurement Locations

In accordance with ANSI S12.9-1992/Part 2 (R2013), the deterministic spatial sampling technique was used to select measurement locations. In other words, sound monitoring locations were selected to be representative of nearby residences in various directions from the solar project. Thus, the selected locations are representative of potentially impacted receptors. The program was intended to measure total ambient sound in the area which includes all noise sources.

Two sound level measurement programs were conducted; one during the winter season ("leaf-off"), and one in summer ("leaf-on"). The measurement locations did not remain consistent between the two programs. The anticipated project area expanded between the winter and summer measurement programs requiring an additional measurement location (Location 5) be added to the summer program. Figure 6-1 shows the measurement locations for both measurement programs. The ambient measurement locations are representative of the general vicinity of the Project. Each sound level monitoring location is described in the following subsections.

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Data Source: Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, Information Technology Division

East Point Solar Schoharie County, New York

Epsilon Associates Inc.

Figure 6-1

Baseline Monitoring Locations

The coordinates for the sound level measurement locations are listed in Table 6-1, which were slightly adjusted as needed from the field-measured Global Positioning System (GPS) points for refined accuracy.

The NYS DOT website was checked for Annual Average Daily Traffic (AADT) counts in the vicinity of the sound level meters (SLM). The section of Route 20 through the project had an AADT of 3,299 vehicles in 2016. Route 145 to the east of the project had an AADT of 1,601 vehicles in 2016. Route 10 to the west of the project had an AADT of 1,567 vehicles in 2016.[6] Other roads in the Project Area generally carry less traffic than these roads.

Table 6-1 GPS Coordinates – Sound Level Measurement Locations

Location	Latitude	Longitude
Location 1	42.7680°	-74.5507°
Location 2	42.7679°	-74.5620°
Location 3	42.7601°	-74.5860°
Location 4	42.7762°	-74.5456°
Location 5	42.7851°	-74.5507°

6.2.1 Location 1—Highway 20

One continuous programmable, unattended sound level meter was placed near Highway 20 in the Town of Sharon Springs. The meter was placed approximately 40 meters north of the road within a sloped field. This location is representative of existing sound levels along Highway 20. Refer to Figures 6-2 and 6-3 for a photo of the monitoring setup during the winter and summer seasons, respectively.

The meter continuously measured and stored broadband (A-weighted) and one-third octave band sound level statistics during the summer season from 3:00 p.m. Tuesday, August 7, 2018 until 9:00 a.m. on Wednesday, August 15, 2018. In total, 187 1-hour measurement periods were recorded during the summer measurement program.

The meter continuously measured and stored broadband (A-weighted) and one-third octave band sound level statistics during the winter season from 3:00 p.m. on Monday, April 16, 2018 until 2:00 p.m. on Tuesday, April 24, 2018. In total, 192 1-hour measurement periods were recorded during the winter measurement program.

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6 https://gis3.dot.ny.gov/html5viewer/?viewer=tdv Accessed in August 2019.

In addition to sound data collection, continuous ground-level wind speed data were collected at this location during both monitoring programs. The meteorological equipment setup is shown in Figures 6-4 and 6-5 for the respective seasons.

Figure 6-2 Location 1, Sound Level Meter, Winter

Figure 6-3 Location 1, Sound Level Meter, Summer

Figure 6-4 Location 1- Winter, Meteorological Tower

Figure 6-5 Location 1- Summer, Meteorological Tower (Representative Setup)

6.2.2 Location 2—Beech Road

One continuous programmable, unattended sound level meter was placed near Beech Road in the Town of Sharon Springs. The meter was placed approximately 15 meters north of the road and is representative of existing sound levels along in the central area of the Project Site and along Beech Road. Refer to Figures 6-6 and 6-7 for a photo of the monitoring setup during the winter and summer seasons, respectively.

The meter continuously measured and stored broadband (A-weighted) and one-third octave band sound level statistics during the summer season from 1:00 p.m. Tuesday, August 7, 2018 until 9:00 a.m. on Wednesday, August 15, 2018. In total, 188 1-hour measurement periods were recorded during the summer measurement program.

The meter continuously measured and stored broadband (A-weighted) and one-third octave band sound level statistics during the winter season from 4:00 p.m. on Monday, April 16, 2018 until 3:00 p.m. on Tuesday, April 24, 2018. In total, 192 1-hour measurement periods were recorded during the winter measurement program.

Figure 6-6 Location 2 - Winter, Sound Level Meter

Figure 6-7 Location 2 - Summer, Sound Level Meter

6.2.3 Location 3 – Sakon Road

One continuous programmable, unattended sound level meter was placed near Sakon Road in the Town of Sharon Springs. The meter was placed approximately 15 meters south of the road and is representative of existing sound levels along in the southern area of the Project Site and along Sakon Road. Refer to Figures 6-8 and 6-9 for a photo of the monitoring setup during the winter and summer seasons, respectively.

The meter continuously measured and stored broadband (A-weighted) and one-third octave band sound level statistics during the summer season from 1:00 p.m. Tuesday, August 7, 2018 until 8:00 a.m. on Wednesday, August 15, 2018. In total, 187 1-hour measurement periods were recorded during the summer measurement program.

The meter continuously measured and stored broadband (A-weighted) and one-third octave band sound level statistics during the winter season from 5:00 p.m. on Monday, April 16, 2018 until 4:00 p.m. on Tuesday, April 24, 2018. In total, 191 1-hour measurement periods were recorded during the winter measurement program.

Figure 6-8 Location 3, Sound Level Meter, Winter

Figure 6-9 Location 3, Sound Level Meter, Summer

6.2.4 Location 4 – Sharon Hills Road

One continuous programmable, unattended sound level meter was placed near Sharon Hills Road in the Town of Sharon Springs. The meter was placed approximately 50 meters southwest of the road and is representative of existing sound levels along in the northern area of the Project Site and along Sharon Hills Road. Refer to Figures 6-10 and 6-11 for a photo of the monitoring setup during the winter and summer seasons, respectively.

The meter continuously measured and stored broadband (A-weighted) and one-third octave band sound level statistics during the summer season from 5:00 p.m. Tuesday, August 7, 2018 until 10:00 a.m. on Wednesday, August 15, 2018. In total, 186 1-hour measurement periods were recorded during the summer measurement program.

The meter continuously measured and stored broadband (A-weighted) and one-third octave band sound level statistics during the winter season from 6:00 p.m. on Monday, April 16, 2018 until 1:00 p.m. on Tuesday, April 24. In total, 188 1-hour measurement periods were recorded during the winter measurement program.

Figure 6-10 Location 4, Sound Level Meter, Winter

Figure 6-11 Location 4, Sound Level Meter, Summer

6.2.5 Location 5 – White Road

One continuous programmable, unattended sound level meter was placed at 114 White Road in the Town of Sharon Springs. This location was added for the summer season due to the expanded project area footprint. The meter was placed on the southeast corner of the property approximately 50 meters east of the road and is representative of existing sound levels along in the northernmost area of the Project Site. Refer to Figure 6-12 for a photo of the monitoring setup during the summer season.

The meter continuously measured and stored broadband (A-weighted) and one-third octave band sound level statistics during the summer season from 4:00 p.m. Tuesday, August 7, 2018 until 10:00 a.m. on Wednesday, August 15, 2018. In total, 187 1-hour measurement periods were recorded during the summer measurement program.

Figure 6-12 Location 5, Sound Level Meter, Summer (Representative Setup)

6.3 Sound Level Measurement Instrumentation

Each of the monitoring locations utilized a Larson Davis (LD) model 831[7] sound level meter (SLM) to measure both A-weighted (dBA) and one-third octave bands from 6.3 Hz to 10,000 Hz. Each instrument was equipped with a LD PRM831 preamplifier and a PCB 377B20 or 377C20 half-inch microphone along with an environmental protection kit. The kit included a manufacturer open cell wind screen to reduce wind-induced noise over the microphone. A peer-reviewed study presenting the windscreen insertion loss data by one-third octave band for each wind screen used in the background monitoring is provided in Appendix A. Each microphone was tripod-mounted at a height of approximately five feet (1.5 meters) above ground level in accordance with ANSI S12.9-1992/Part 2 (R2013). Horizontal microphone placements near roadways were in accordance with ANSI S12.9-1992/Part 2 (R2013) for open land.

The LD831 meters meet Type 1 ANSI/ASA S1.4, ANSI S1.43-1997 (R2007), and IEC 61672 Class 1 standards for sound level meters and were calibrated and certified as accurate to standards set by the National Institute of Standards and Technology. The octave band filters for all instrumentation meet ANSI S1.11-2004 (R2009). These calibrations were conducted by an independent laboratory within 12 months of field placement and certificates of calibration are provided in Appendix B. All measurement equipment was calibrated in the field before and after the surveys with the manufacturer's acoustical calibrator which meets the standards of IEC 60942-2003 Class 1L and ANSI/ASA S1.40-2006 (R2016).

6.4 Meteorological Instrumentation

6.4.1 Ground Level Winds

Wind speed can have a strong influence on ambient sound levels. In order to understand how the existing sound levels are influenced by wind speed, a HOBO H21-002 micro-weather station (manufactured by Onset Computer Corporation) with tripod and data logger was used to record continuous wind speed data at Locations 1 during both seasons.

The HOBO wind instruments have a measurement range of 0 to 44 m/s (99 mph) or 0 to 45 m/s (100 mph) and an accuracy of +/- 0.5 m/s (1.1 mph) or +/- 1.1 m/s (2.4 mph). The starting threshold is 0.5 m/s (1.1 mph) or ≤1.0 m/s (2.2 mph).

6.4.2 Precipitation, Temperature, and Relative Humidity

Meteorological data from the New York State Mesonet system were used for both the winter and summer measurements. The New York State Mesonet consists of 125 state-of-the-art environmental monitoring stations and serves as the foundation of an Early Warning Severe

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[7] Noise floor specified in manufacturer's manual with use of PRM831 preamplifier and 377B02 microphone for A-weighted sound pressure levels is 18 dB at a 0 dB gain and 17 at a 20 dB gain. Noise floor specified for Z-weighted sound pressure levels is 23 dB at a 0 dB gain and 21 at a 20 dB gain.

Weather Detection network for the entire State of New York. The New York State Mesonet was developed by research scientists at the State University of New York (SUNY) at Albany's Atmospheric Sciences Research Center, and Department of Atmospheric and Environmental Sciences. Mesonet sites are distributed statewide with every county across New York having at least one or more sites. The Mesonet collects measurements of a number of surface and atmospheric variables, such as temperature, relative humidity, wind speed and direction, surface pressure, soil moisture, soil temperature, solar radiation, and precipitation amounts for rainfall and snow accumulation. These data are archived and available to the public.

The Cobleskill Mesonet station is located approximately 7 miles south southeast from the closest East Point measurement location. This station is the closest to the Project site and was used for both the summer and winter measurement programs.

The SUNY Mesonet data from the Cobleskill station is provided in Appendix C of this report.

6.5 Infrasound Monitoring

All monitoring locations were equipped to monitor infrasound as low as 6.3 Hz. Each meter collected continuous broadband and one-third octave-band ambient sound pressure level data. The meter logged data every 1-hour with statistical data for the following parameters: L_{eq}, L_{10}, L_{50}, L_{90}, L_{max}, and L_{min}. A one-second time history data collection using the "fast" response setting was also implemented.

Section 7.0

Baseline Sound Level Monitoring Results

7.0 BASELINE SOUND LEVEL MONITORING RESULTS

This chapter discusses the results from the detailed ambient (baseline) monitoring program outlined in the previous chapter. Specifically, the logic for data validity, and sound level result descriptions for the monitoring locations are explained.

7.1 Data Formatting Overview

Sound level data were collected at 1-hour intervals[8] at four strategically selected locations around the proposed solar energy Project during a winter season and at five strategically selected locations during a summer season. Monitoring periods that experienced elevated ground-level wind speeds or precipitation were excluded from the data analysis per Method #1 in ANSI S12.18-1994. According to this standard, “No sound level measurement shall be made when the average wind velocity exceeds 5 m/s when measured at a height of 2±0.2 m above the ground”. In addition, “Measurement during precipitation […] is highly discouraged”. Precipitation events identified at the SUNY MesoNet station in Cobleskill, NY defined periods for which sound level data were excluded from the analysis for the summer and winter measurement programs.

The sound level equipment used in ambient monitoring have specifications regarding operative ranges under certain air conditions, e.g., temperature and relative humidity.[9,10] Data from the Cobleskill MesoNet station was additionally referenced for the range exceedances during all measurement timeframes. Sound levels during these exceedances were excluded from further processing.

As per the Project’s understanding of the required DPS scope of studies, intermittent noise was filtered by using the L_{90}. Seasonal noise was removed from the ambient sound level measurements regardless of season. A high-frequency natural sound (HFNS) filter was therefore applied to the measured one-third octave-band data from which a broadband sound level was calculated for both the summer and winter monitoring seasons. This technique removes all sound energy above the 1,250 Hertz frequency band. The methodology for the filtration process is as

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8 It should be noted that all sound level instrumentation data, ground level meteorological instrumentation data and on-site meteorological tower data records were all time-correlated for appropriate alignment of monitoring periods.

9 Periods measured outside the temperature range of 14°F to 122°F were considered invalid due to the Larson Davis Model 831 SLM specifications.

10 Periods measured outside the relative humidity range of 1 to 99% were considered invalid based on microphone specifications. The accuracy of sound levels measured with a Larson Davis Model 831 SLM outside the relative humidity range of 25% to 90% is unknown; however, the data are not considered invalid and are included in the data summaries. The same is relevant for sound levels measured with a Norsonic Nor140 SLM outside the range of 5% to 90% relative humidity.

specified in ANSI/ASA S12.100-2014 and the sound pressure levels presented in this report using this methodology are indicated as ANS-weighted levels (presented in dBA). The calculated broadband ANS-weighted (dBA) average L_{eq} and L_{90} ambient sound levels are presented for the winter and summer seasons for each location in the following subsections.

As per the Exhibit 19 regulations 1001.19(f)(1) daytime is defined as the period from 7 a.m. to 10 p.m. Respectively, nighttime is defined as the period from 10 p.m. to 7 a.m. (1001.19(f)(2)).

7.2 Location 1 – Highway 20

Sound levels at Location 1 were influenced by vehicular traffic on Highway 20, vegetation rustle, wind, birds, and occasional aircraft. Sound level-versus-time graphs are provided in this section. This includes L_{eq} and L_{90} sound pressure levels and ground-level wind speeds measured at Location 1. Data that were excluded from further analysis and calculations due to ground-level winds exceeding 5 m/s as recorded by the HOBO wind instrumentation at Location 1 or due to precipitation and instrumentation operative exceedances as recorded at the Cobleskill MesoNet station is identified in the figures.

7.2.1 Winter Monitoring

The ranges of measured A-weighted sound levels during the winter season are summarized below and presented graphically in Figure 7-1. A total of 10 1-hour periods were excluded from the winter season. The resulting dataset includes a total of 182 1-hour periods of valid data.

- The valid steady-state level (L_{90}) measurements ranged from 23 to 49 dBA;
- The valid equivalent level (L_{eq}) measurements ranged from 45 to 61 dBA.

The ranges of calculated ANS-weighted sound levels during the winter season are summarized below.

- The valid, calculated steady-state (L_{90}) ANS-weighted broadband sound levels ranged from 21 to 48 dBA;
- The valid, calculated equivalent (L_{eq}) ANS-weighed broadband sound levels ranged from 44 to 60 dBA.

7.2.2 Summer Monitoring

The ranges of measured A-weighted sound levels during the summer season are summarized below and presented graphically in Figure 7-2. A total of 13 1-hour periods were excluded from the summer season. The resulting dataset includes a total of 164 1-hour periods of valid data.

- The valid steady-state level (L_{90}) measurements ranged from 42 to 57 dBA;
- The valid equivalent level (L_{eq}) measurements ranged from 54 to 65 dBA.

The ranges of calculated ANS-weighted sound levels during the summer season are summarized below.

- The valid, calculated steady-state (L_{90}) ANS-weighted broadband sound levels ranged from 17 to 48 dBA;
- The valid, calculated equivalent (L_{eq}) ANS-weighed broadband sound levels ranged from 44 to 63 dBA.

7.2.3 Spectral Sound Level Data

In addition to broadband sound levels, spectral sound level data were measured during each 1-hour period at Location 1 for both the winter and summer measurement periods. Using only valid measurement periods, octave-band and one-third octave-band data are summarized in Figures 7-3 and 7-4, respectively, as logarithmic averages of the equivalent (L_{eq}) sound levels; separated by daytime and nighttime. Octave-band levels are displayed from 31.5 Hz to 16,000 Hz in Figure 7-3 for both L_{eq} and L_{90}. The one-third octave-band data in Figure 7-4 span the audible frequencies from 20 Hz to 10,000 Hz and were analyzed for prominent discrete tones[11]. Pure tones were present and were most prominent at the 8,000 Hz frequency for the summer daytime measurement period and at 5,000 Hz and 6,300 Hz frequency for the summer nighttime period. This is likely due to bird and insect activity.

7.3 Location 2 – Beech Road

Sound levels at the Location 2 monitor were influenced by wind, cars along Beech Road, traffic noise, birds, insects, vegetation rustle, farming equipment, and occasional aircraft. Sound level-versus-time graphs are provided in this section. This includes L_{eq} and L_{90} sound pressure levels and ground-level wind speeds measured at Location 1. Data that were excluded from further analysis and calculations due to ground-level winds exceeding 5 m/s as recorded by the HOBO wind instrumentation at Location 1 or due to precipitation and instrumentation operative exceedances as recorded at the Cobleskill MesoNet station is identified in the figures.

7.3.1 Winter Monitoring

The ranges of measured A-weighted sound levels during the winter season are summarized below and presented graphically in Figure 7-5. A total of 10 1-hour periods were excluded from the winter season. The resulting dataset includes a total of 182 1-hour periods of valid data.

- The valid steady-state level (L_{90}) measurements ranged from 17 to 46 dBA;
- The valid equivalent level (L_{eq}) measurements ranged from 28 to 58 dBA.

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[11] Prominent discrete tones as defined by the ANSI S12.9 Part 3 standard. The lowest frequency in the Annex B.1 tone test is 25 Hz. 20 Hz data are presented for informational purposes.

The ranges of calculated ANS-weighted sound levels during the winter season are summarized below.

- The valid, calculated steady-state (L_{90}) ANS-weighted broadband sound levels ranged from 12 to 43 dBA;
- The valid, calculated equivalent (L_{eq}) ANS-weighed broadband sound levels ranged from 27 to 50 dBA.

7.3.2 Summer Monitoring

The ranges of measured A-weighted sound levels during the summer season are summarized below and presented graphically in Figure 7-6. A total of 24 1-hour periods were excluded from the summer season. The resulting dataset includes a total of 164 1-hour periods of valid data.

- The valid steady-state level (L_{90}) measurements ranged from 27 to 52 dBA;
- The valid equivalent level (L_{eq}) measurements ranged from 36 to 54 dBA.

The ranges of calculated ANS-weighted sound levels during the summer season are summarized below.

- The valid, calculated steady-state (L_{90}) ANS-weighted broadband sound levels ranged from 15 to 43 dBA;
- The valid, calculated equivalent (L_{eq}) ANS-weighed broadband sound levels ranged from 25 to 46 dBA.

7.3.3 Spectral Sound Level Data

In addition to broadband sound levels, spectral sound level data were measured during each 1-hour period at Location 2. Using only valid measurement periods, octave-band and one-third octave-band data are summarized in Figures 7-7 and 7-8, respectively, as logarithmic averages of the equivalent (L_{eq}) sound levels; separated by daytime and nighttime. Octave-band levels are displayed from 31.5 Hz to 16,000 Hz in Figure 7-7 for both L_{eq} and L_{90}. The one-third octave-band data in Figure 7-8 span the audible frequencies from 20 Hz to 10,000 Hz and were analyzed for prominent discrete tones[12]. Pure tones were present and were most prominent at the 3,150 Hz frequency for the summer nighttime measurement period. This is likely due to bird and insect activity.

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[12] Prominent discrete tones as defined by the ANSI S12.9 Part 3 standard. The lowest frequency in the Annex B.1 tone test is 25 Hz. 20 Hz data are presented for informational purposes.

7.4 Location 3 – Sakon Road

Sound levels at Location 3 were influenced by occasional traffic on Sakon Rd, wind, vegetation rustle, birds, insects, frogs, distant traffic, and occasional aircraft. Sound level-versus-time graphs are provided in this section. This includes L_{eq} and L_{90} sound pressure levels and ground-level wind speeds measured at Location 1. Data that were excluded from further analysis and calculations due to ground-level winds exceeding 5 m/s as recorded by the HOBO wind instrumentation at Location 1 or due to precipitation and instrumentation operative exceedances as recorded at the Cobleskill MesoNet station is identified in the figures.

7.4.1 Winter Monitoring

The ranges of measured A-weighted sound levels during the winter season are summarized below and presented graphically in Figure 7-9. A total of 10 1-hour periods were excluded from the winter season. The resulting dataset includes a total of 182 1-hour periods of valid data.

- The valid steady-state level (L_{90}) measurements ranged from 19 to 49 dBA;
- The valid equivalent level (L_{eq}) measurements ranged from 21 to 54 dBA.

The ranges of calculated ANS-weighted sound levels during the winter season are summarized below.

- The valid, calculated steady-state (L_{90}) ANS-weighted broadband sound levels ranged from 13 to 47 dBA;
- The valid, calculated equivalent (L_{eq}) ANS-weighed broadband sound levels ranged from 16 to 52 dBA.

7.4.2 Summer Monitoring

The ranges of measured A-weighted sound levels during the summer season are summarized below and presented graphically in Figure 7-10. A total of 25 1-hour periods were excluded from the summer season. The resulting dataset includes a total of 163 1-hour periods of valid data.

- The valid steady-state level (L_{90}) measurements ranged from 39 to 64 dBA;
- The valid equivalent level (L_{eq}) measurements ranged from 43 to 65 dBA.

The ranges of calculated ANS-weighted sound levels during the summer season are summarized below.

- The valid, calculated steady-state (L_{90}) ANS-weighted broadband sound levels ranged from 11 to 38 dBA;
- The valid, calculated equivalent (L_{eq}) ANS-weighed broadband sound levels ranged from 15 to 54 dBA.

7.4.3 Spectral Sound Level Data

In addition to broadband sound levels, spectral sound level data were measured during each 1-hour period at Location 3. Using only valid measurement periods, octave-band and one-third octave-band data are summarized in Figures 7-11 and 7-12, respectively, as logarithmic averages of the equivalent (L_{eq}) sound levels; separated by daytime and nighttime. Octave-band levels are displayed from 31.5 Hz to 16,000 Hz in Figure 7-11 for both L_{eq} and L_{90}. The one-third octave-band data in Figure 7-12 span the audible frequencies from 20 Hz to 10,000 Hz and were analyzed for prominent discrete tones[13]. Pure tones were present and were most prominent at the 5,000 Hz frequency for the summer daytime measurement period and at the 2,000 Hz, 5,000 Hz, and 12,500 Hz frequencies for the summer nighttime measurement period. These are likely due to bird and insect activity.

7.5 Location 4 – Sharon Hills Road

Sound levels at the Location 4 monitor were influenced by occasional traffic on Sharon Hills Rd, vegetation rustle, wind, insects, birds, barking dogs, distant traffic, distant construction/drilling, and occasional aircraft. Sound level-versus-time graphs are provided in this section. This includes L_{eq} and L_{90} sound pressure levels and ground-level wind speeds measured at Location 1. Data that were excluded from further analysis and calculations due to ground-level winds exceeding 5 m/s as recorded by the HOBO wind instrumentation at Location 1 or due to precipitation and instrumentation operative exceedances as recorded at the Cobleskill MesoNet station is identified in the figures.

7.5.1 Winter Monitoring

The ranges of measured A-weighted sound levels during the winter season are summarized below and presented graphically in Figure 7-13. A total of 10 1-hour periods were excluded from the winter season. The resulting dataset includes a total of 178 1-hour periods of valid data.

- The valid steady-state level (L_{90}) measurements ranged from 24 to 41 dBA;
- The valid equivalent level (L_{eq}) measurements ranged from 27 to 57 dBA.

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13 Prominent discrete tones as defined by the ANSI S12.9 Part 3 standard. The lowest frequency in the Annex B.1 tone test is 25 Hz. 20 Hz data are presented for informational purposes.

The ranges of calculated ANS-weighted sound levels during the winter season are summarized below.

- The valid, calculated steady-state (L_{90}) ANS-weighted broadband sound levels ranged from 21 to 40 dBA;
- The valid, calculated equivalent (L_{eq}) ANS-weighed broadband sound levels ranged from 25 to 54 dBA.

7.5.2 Summer Monitoring

The ranges of measured A-weighted sound levels during the summer season are summarized below and presented graphically in Figure 7-14. A total of 22 1-hour periods were excluded from the summer season. The resulting dataset includes a total of 164 1-hour periods of valid data.

- The valid steady-state level (L_{90}) measurements ranged from 25 to 46 dBA;
- The valid equivalent level (L_{eq}) measurements ranged from 31 to 52 dBA.

The ranges of calculated ANS-weighted sound levels during the summer season are summarized below.

- The valid, calculated steady-state (L_{90}) ANS-weighted broadband sound levels ranged from 12 to 40 dBA;
- The valid, calculated equivalent (L_{eq}) ANS-weighed broadband sound levels ranged from 17 to 49 dBA.

7.5.3 Spectral Sound Level Data

In addition to broadband sound levels, spectral sound level data were measured during each 1-hour period at Location 4. Using only valid measurement periods, octave-band and one-third octave-band data are summarized in Figures 7-15 and 7-16, respectively, as logarithmic averages of the equivalent (L_{eq}) sound levels; separated by daytime and nighttime. Octave-band levels are displayed from 31.5 Hz to 16,000 Hz in Figure 7-15 for both L_{eq} and L_{90}. The one-third octave-band data in Figure 7-16 span the audible frequencies from 20 Hz to 10,000 Hz and were analyzed for prominent discrete tones[14]. Pure tones were present and were most prominent at the 5,000 Hz and 10,000 Hz frequency for the summer nighttime measurement period. This is likely due to bird and insect activity.

[14] Prominent discrete tones as defined by the ANSI S12.9 Part 3 standard. The lowest frequency in the Annex B.1 tone test is 25 Hz. 20 Hz data are presented for informational purposes.

7.6 Location 5 – White Road

Sound levels at the Location 5 monitor were influenced by activities from a nearby farm, a neighboring workshop, insects, frogs, wind, distant traffic, and occasional aircraft overhead. Sound level-versus-time graphs are provided in this section. This includes L_{eq} and L_{90} sound pressure levels and ground-level wind speeds measured at Location 1. Data that were excluded from further analysis and calculations due to ground-level winds exceeding 5 m/s as recorded by the HOBO wind instrumentation at Location 1 or due to precipitation and instrumentation operative exceedances as recorded at the Cobleskill MesoNet station is identified in the figures.

7.6.1 Winter Monitoring

Location 5 was added to the measurement program after completion of the winter monitoring program in order to address an expanded project area which occurred after the winter measurements. Therefore, no winter monitoring data for this location were collected.

7.6.2 Summer Monitoring

The ranges of measured A-weighted sound levels during the summer season are summarized below and presented graphically in Figure 7-17. A total of 22 1-hour periods were excluded from the summer season. The resulting dataset includes a total of 165 1-hour periods of valid data.

- The valid steady-state level (L_{90}) measurements ranged from 34 to 60 dBA;
- The valid equivalent level (L_{eq}) measurements ranged from 40 to 62 dBA.

The ranges of calculated ANS-weighted sound levels during the summer season are summarized below.

- The valid, calculated steady-state (L_{90}) ANS-weighted broadband sound levels ranged from 12 to 37 dBA;
- The valid, calculated equivalent (L_{eq}) ANS-weighed broadband sound levels ranged from 16 to 54 dBA.

7.6.3 Spectral Sound Level Data

In addition to broadband sound levels, spectral sound level data were measured during each 1-hour period at Location 5. Using only valid measurement periods, octave-band and one-third octave-band data are summarized in Figures 7-18 and 7-19, respectively, as logarithmic averages of the equivalent (L_{eq}) summer sound levels; separated by daytime and nighttime. Octave-band levels are displayed from 31.5 Hz to 16,000 Hz in Figure 7-18 for both L_{eq} and L_{90}. The one-third octave-band data in Figure 7-19 span the audible frequencies from 20 Hz to 10,000 Hz and were analyzed for prominent discrete tones[15]. Pure tones were present and were most prominent at the 5,000 Hz and 10,000 Hz frequency for the summer nighttime measurement period. This is likely due to bird and insect activity or from activities at the nearby farm.

[15] Prominent discrete tones as defined by the ANSI S12.9 Part 3 standard. The lowest frequency in the Annex B.1 tone test is 25 Hz. 20 Hz data are presented for informational purposes.

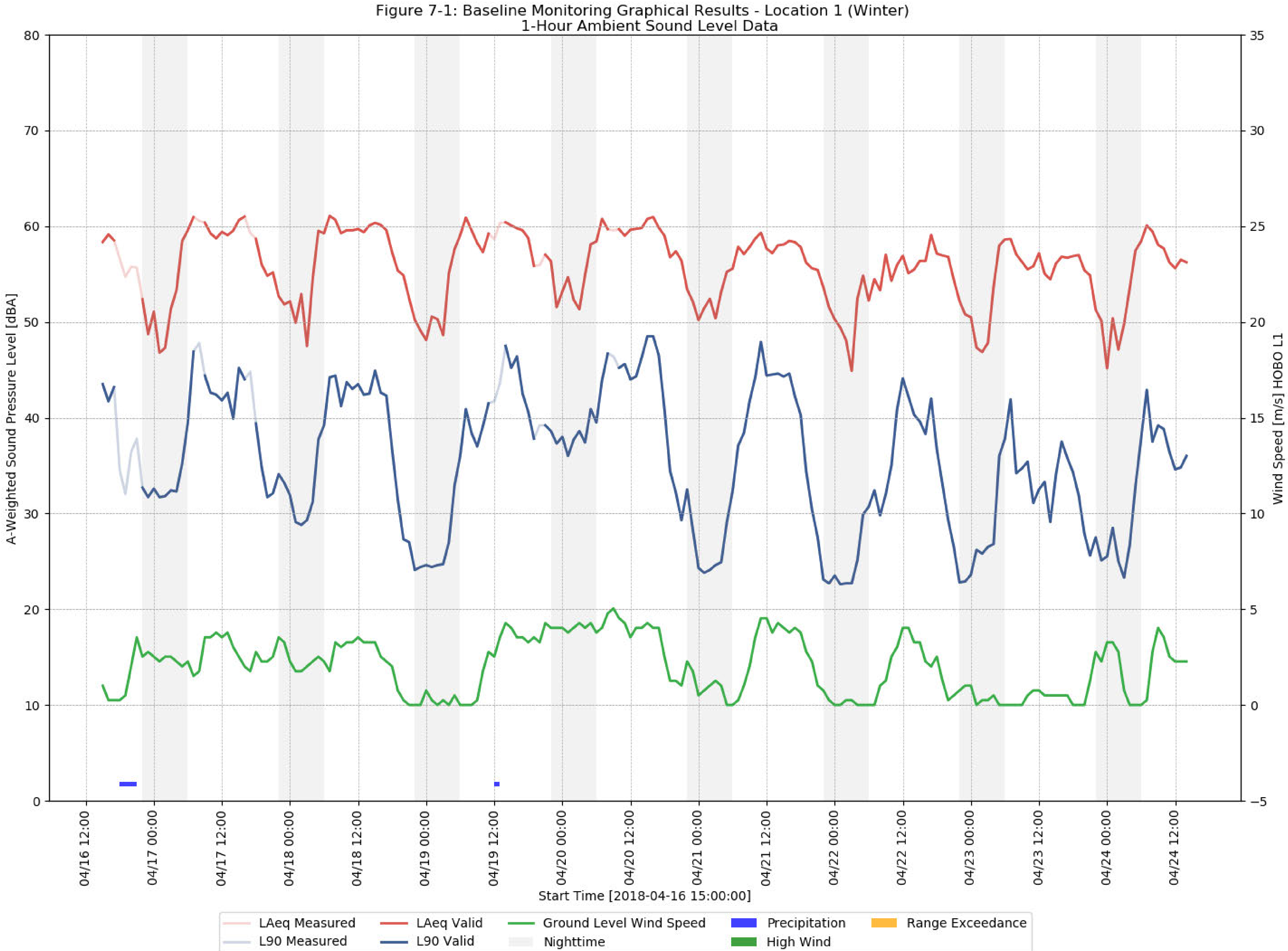


Figure 7-1: Baseline Monitoring Graphical Results - Location 1 (Winter)
1-Hour Ambient Sound Level Data
A-Weighted Sound Pressure Level [dBA]
Wind Speed [m/s] HOBO L1
Start Time [2018-04-16 15:00:00]
04/16 12:00
04/17 00:00
04/17 12:00
04/18 00:00
04/18 12:00
04/19 00:00
04/19 12:00
04/20 00:00
04/20 12:00
04/21 00:00
04/21 12:00
04/22 00:00
04/22 12:00
04/23 00:00
04/23 12:00
04/24 00:00
04/24 12:00
LAeq Measured
L90 Measured
LAeq Valid
L90 Valid
Ground Level Wind Speed
Nighttime
Precipitation
High Wind
Range Exceedance

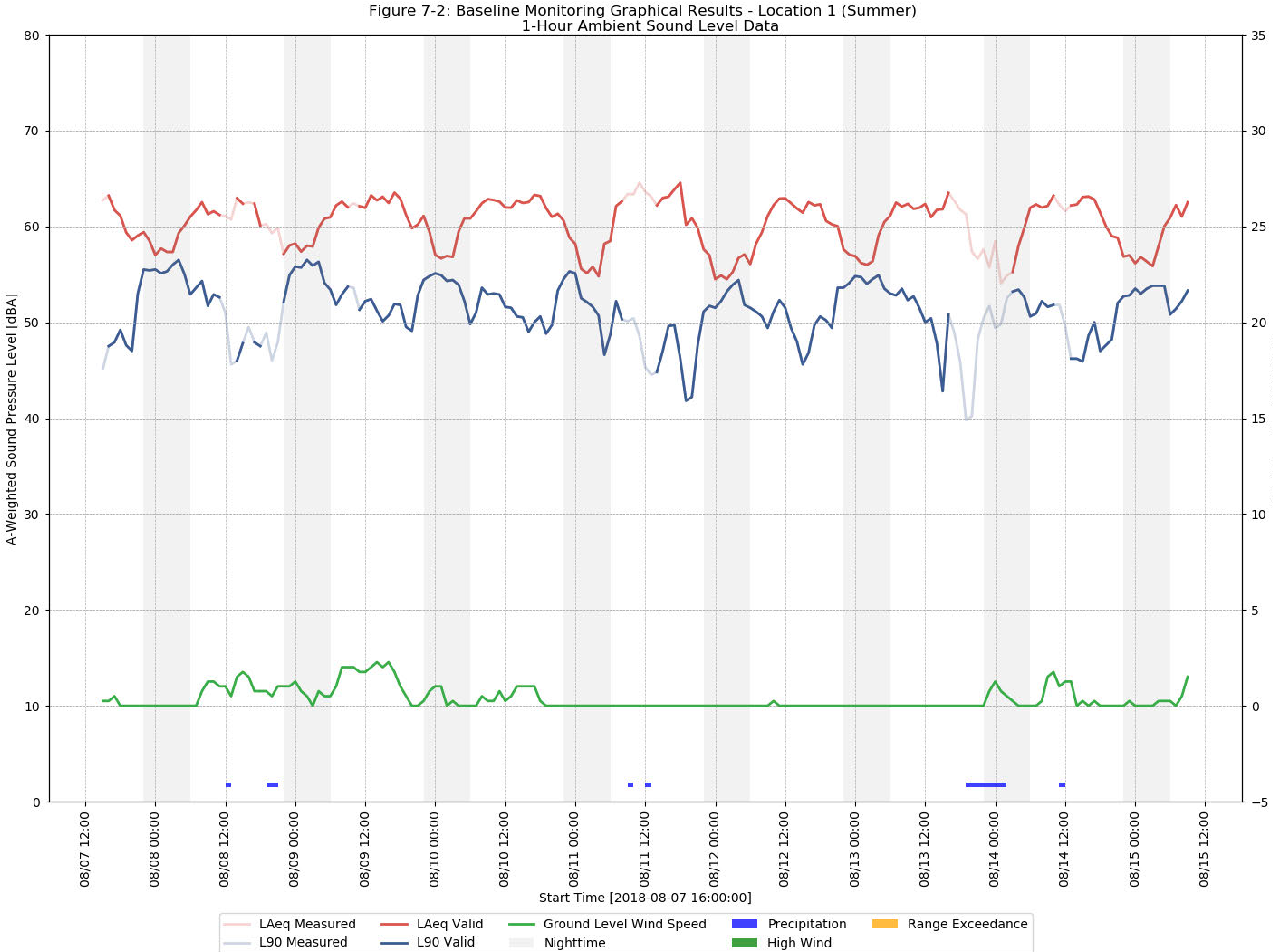


Figure 7-2: Baseline Monitoring Graphical Results - Location 1 (Summer)
1-Hour Ambient Sound Level Data
A-Weighted Sound Pressure Level [dBA]
Wind Speed [m/s] HOBO L1
Start Time [2018-08-07 16:00:00]
08/07 12:00
08/08 00:00
08/08 12:00
08/09 00:00
08/09 12:00
08/10 00:00
08/10 12:00
08/11 00:00
08/11 12:00
08/12 00:00
08/12 12:00
08/13 00:00
08/13 12:00
08/14 00:00
08/14 12:00
08/15 00:00
08/15 12:00
LAeq Measured
L90 Measured
LAeq Valid
L90 Valid
Ground Level Wind Speed
Nighttime
Precipitation
High Wind
Range Exceedance

Figure 7-3: Baseline Monitoring Graphical Results - Location 1 - Octave Band Sound Pressure Levels
1-Hour Ambient Sound Level Data

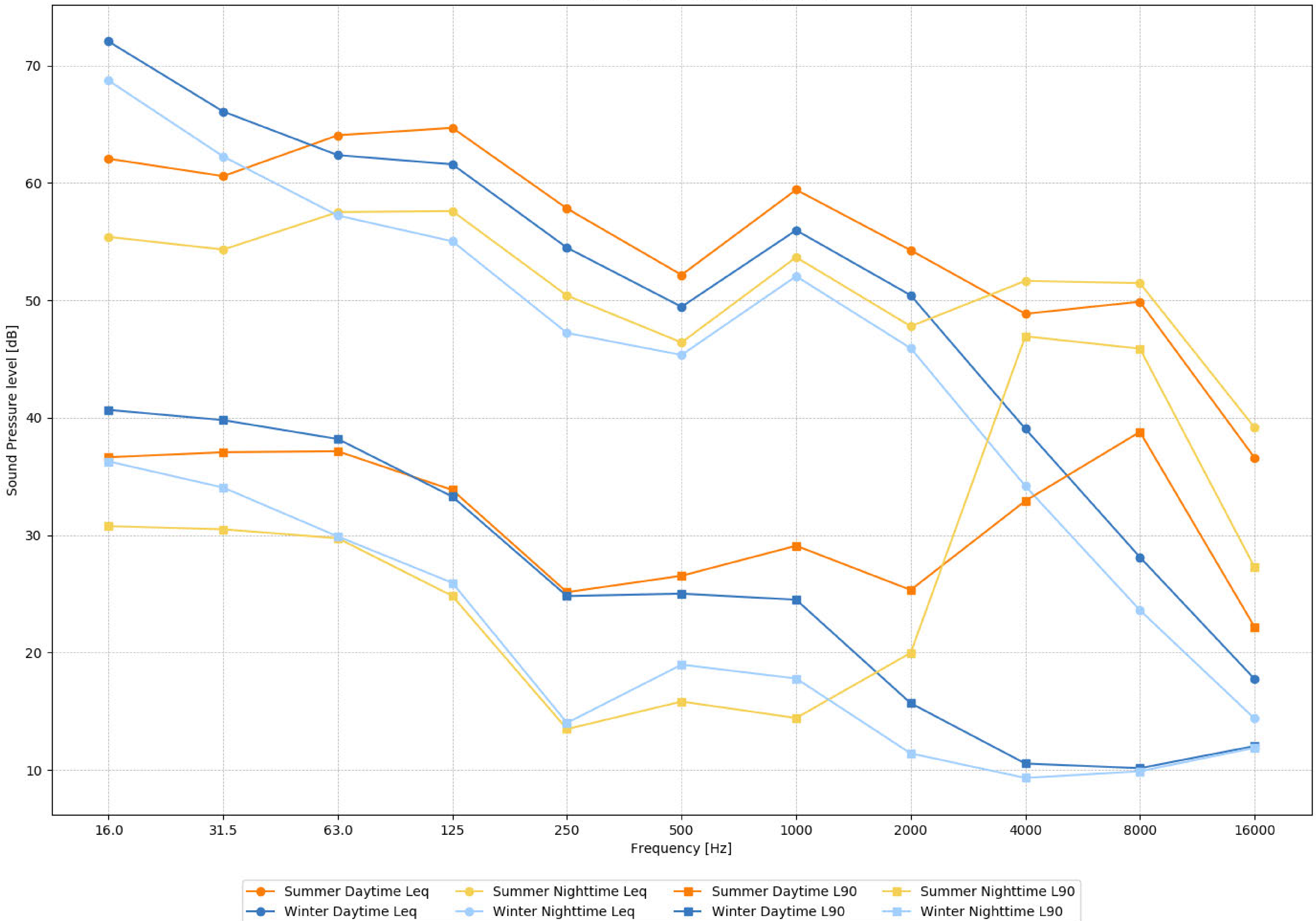
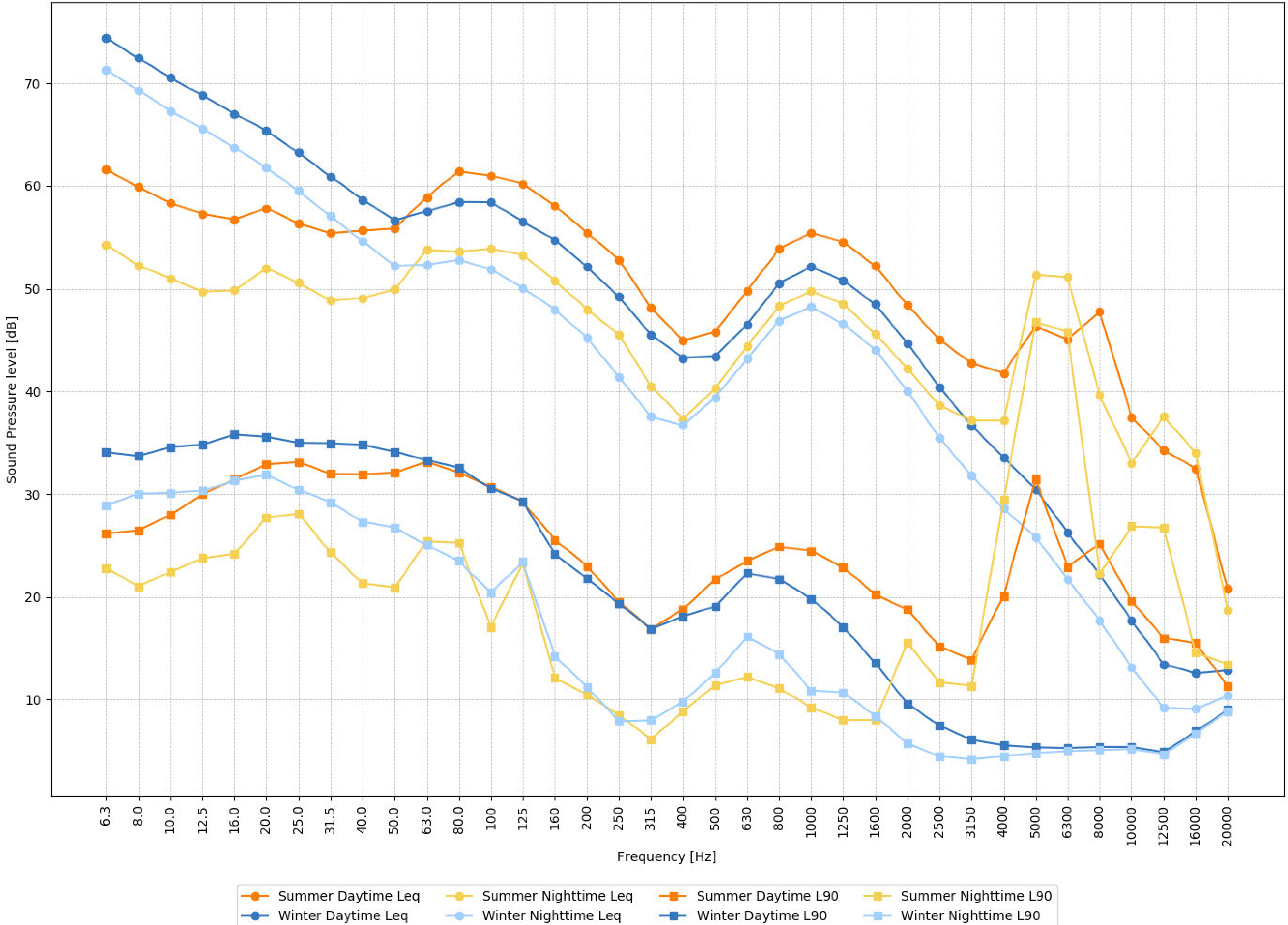


Figure 7-4: Baseline Monitoring Graphical Results - Location 1 - Third Octave Band Sound Pressure Levels
1-Hour Ambient Sound Level Data



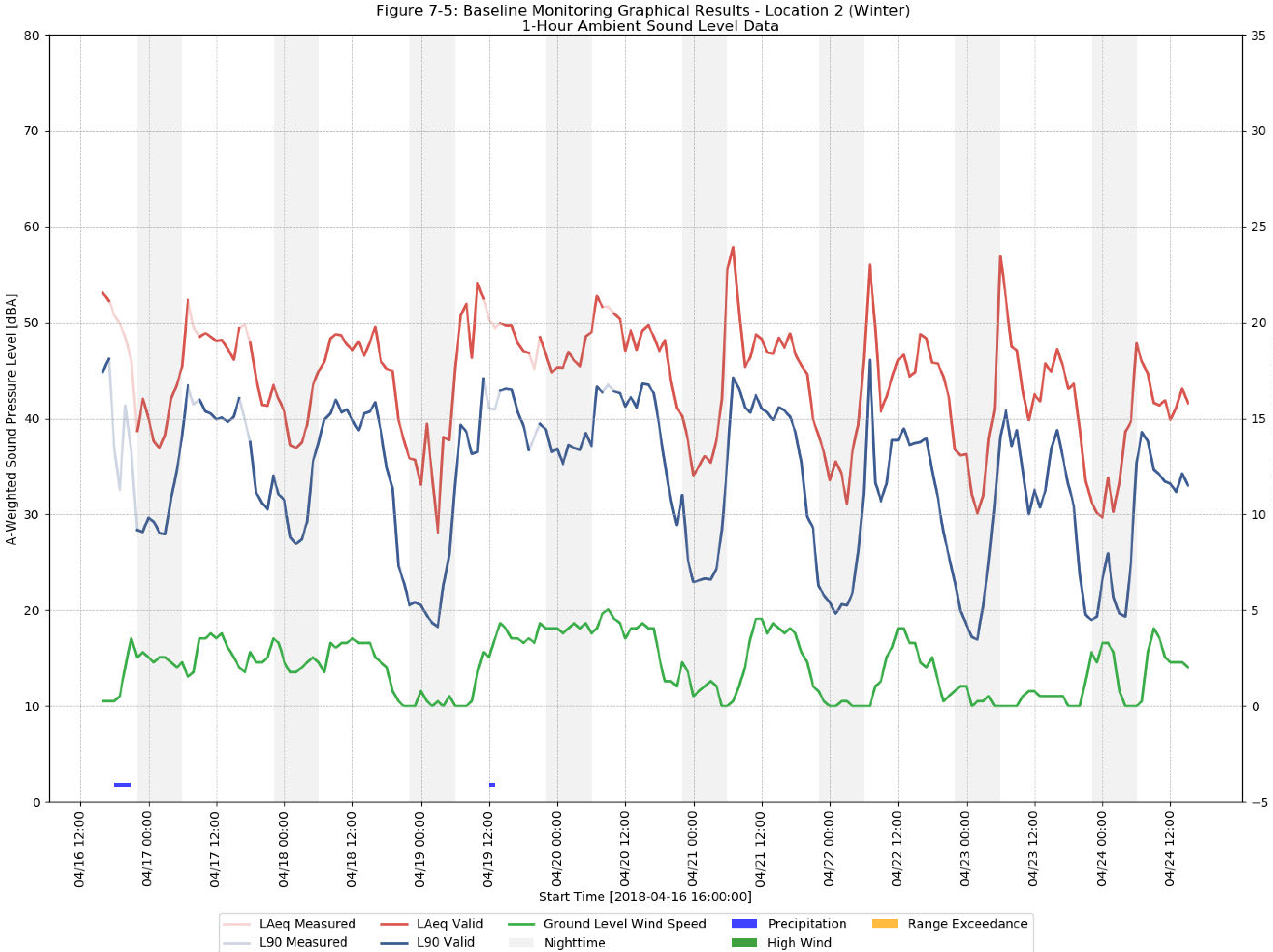


Figure 7-5: Baseline Monitoring Graphical Results - Location 2 (Winter)
1-Hour Ambient Sound Level Data
A-Weighted Sound Pressure Level [dBA]
Wind Speed [m/s] HOBO L1
Start Time [2018-04-16 16:00:00]
04/16 12:00
04/17 00:00
04/17 12:00
04/18 00:00
04/18 12:00
04/19 00:00
04/19 12:00
04/20 00:00
04/20 12:00
04/21 00:00
04/21 12:00
04/22 00:00
04/22 12:00
04/23 00:00
04/23 12:00
04/24 00:00
04/24 12:00
LAeq Measured
L90 Measured
LAeq Valid
L90 Valid
Ground Level Wind Speed
Nighttime
Precipitation
High Wind
Range Exceedance

Figure 7-6: Baseline Monitoring Graphical Results - Location 2 (Summer)
1-Hour Ambient Sound Level Data

Figure 7-7: Baseline Monitoring Graphical Results - Location 2 - Octave Band Sound Pressure Levels
1-Hour Ambient Sound Level Data

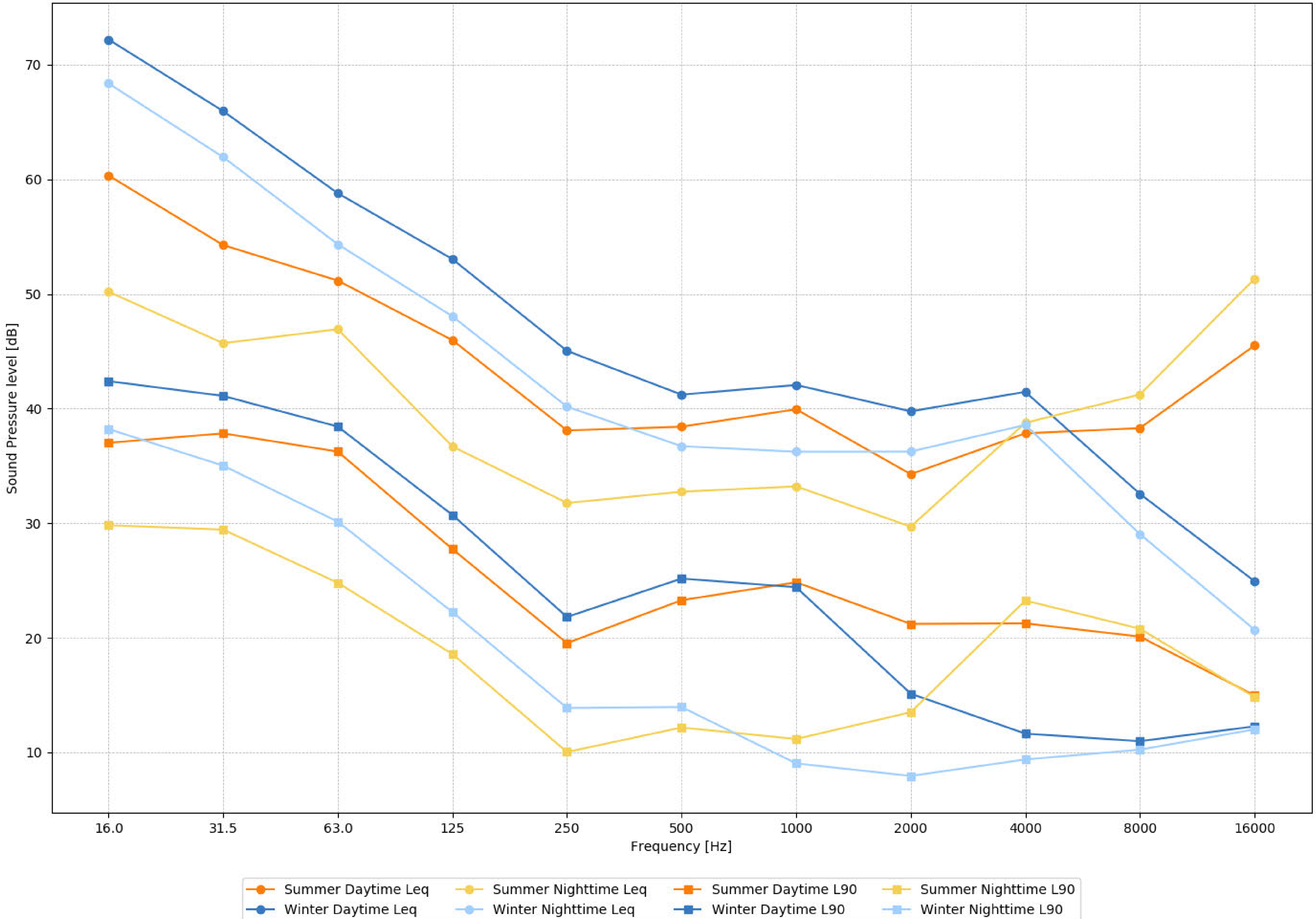
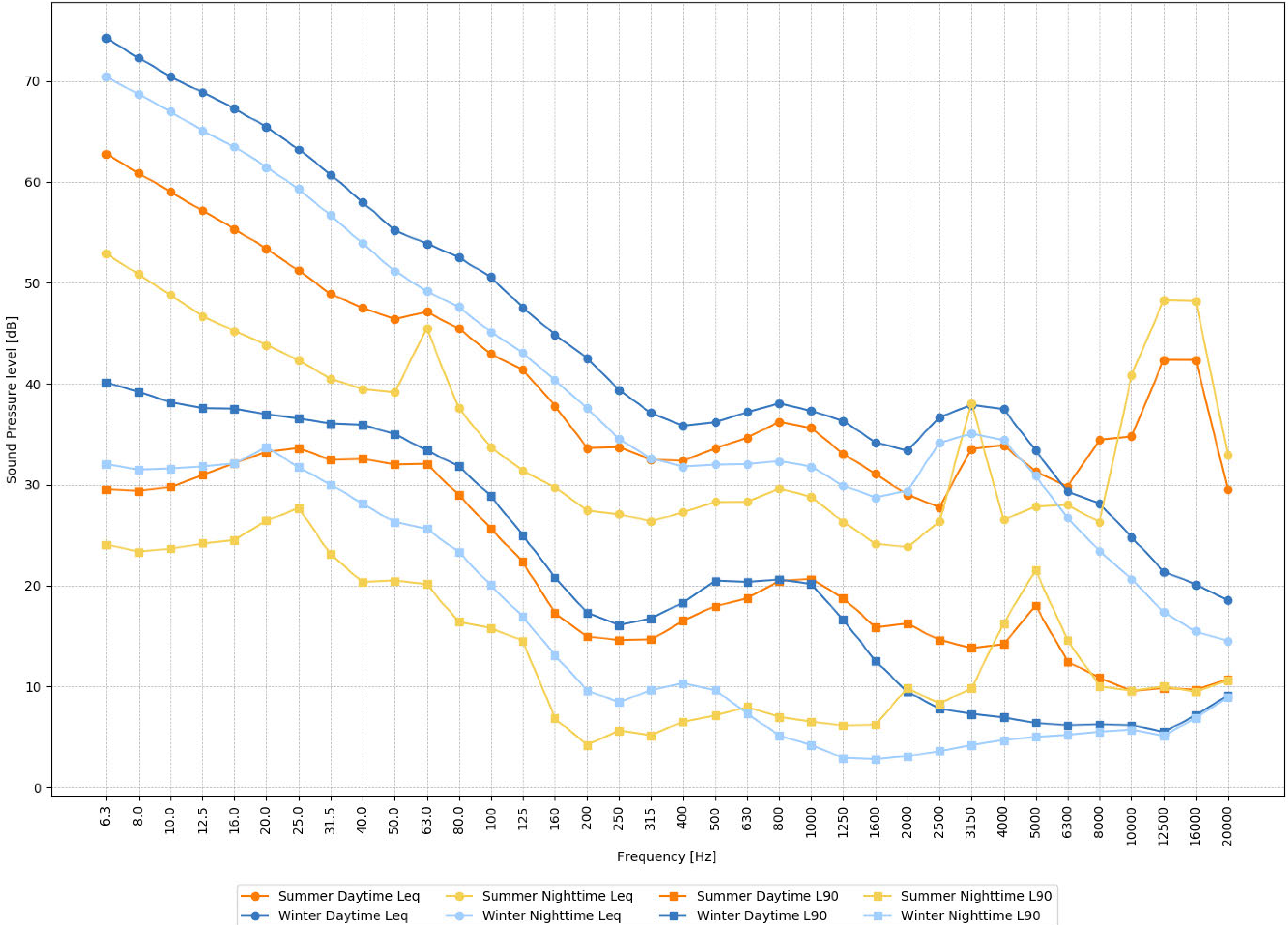


Figure 7-8: Baseline Monitoring Graphical Results - Location 2 - Third Octave Band Sound Pressure Levels
1-Hour Ambient Sound Level Data



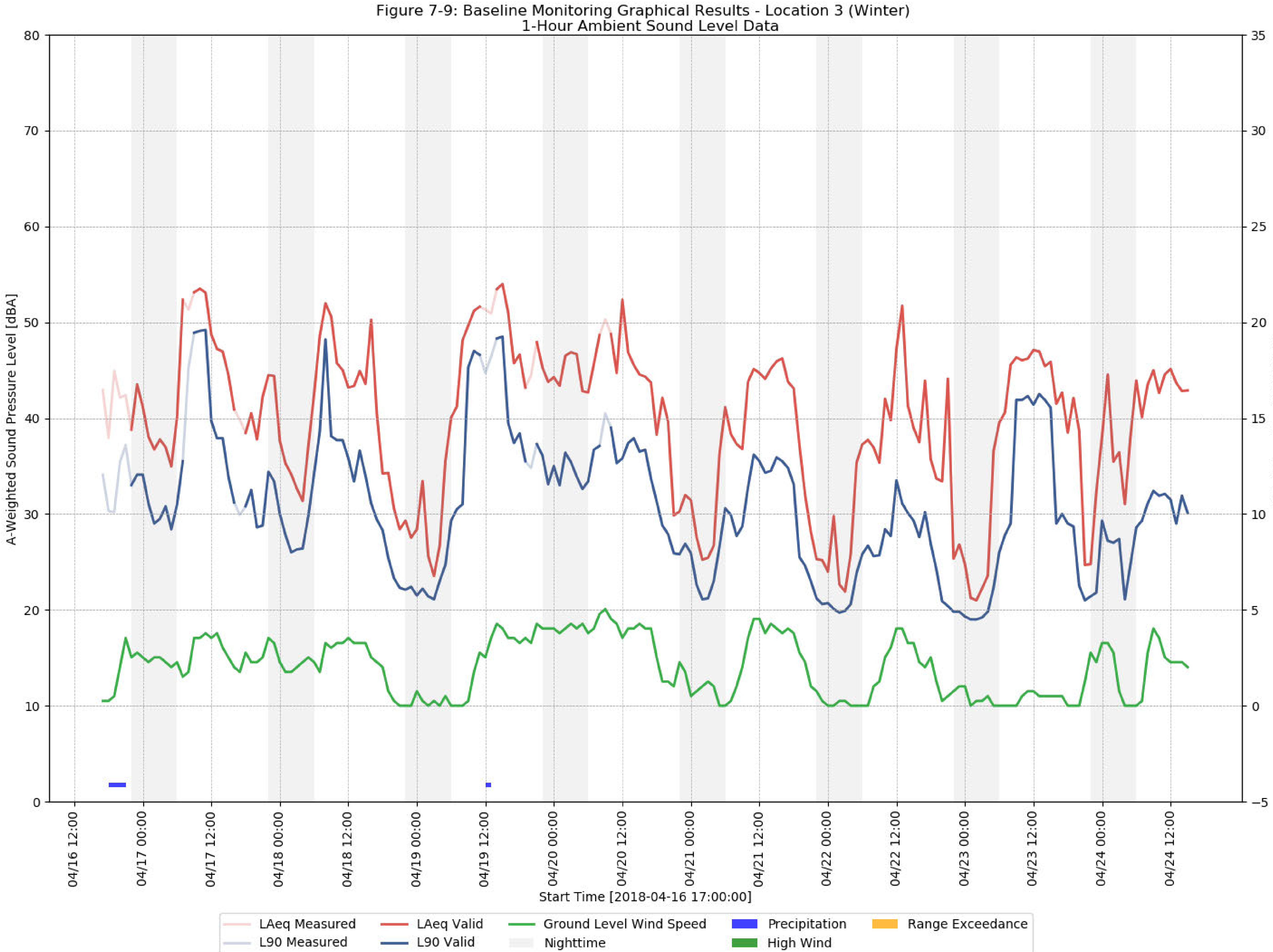


Figure 7-9: Baseline Monitoring Graphical Results - Location 3 (Winter)
1-Hour Ambient Sound Level Data
A-Weighted Sound Pressure Level [dBA]
Wind Speed [m/s] HOBO L1
0
10
20
30
40
50
60
70
80
−5
0
5
10
15
20
25
30
35
04/16 12:00
04/17 00:00
04/17 12:00
04/18 00:00
04/18 12:00
04/19 00:00
04/19 12:00
04/20 00:00
04/20 12:00
04/21 00:00
04/21 12:00
04/22 00:00
04/22 12:00
04/23 00:00
04/23 12:00
04/24 00:00
04/24 12:00
Start Time [2018-04-16 17:00:00]
LAeq Measured
L90 Measured
LAeq Valid
L90 Valid
Ground Level Wind Speed
Nighttime
Precipitation
High Wind
Range Exceedance

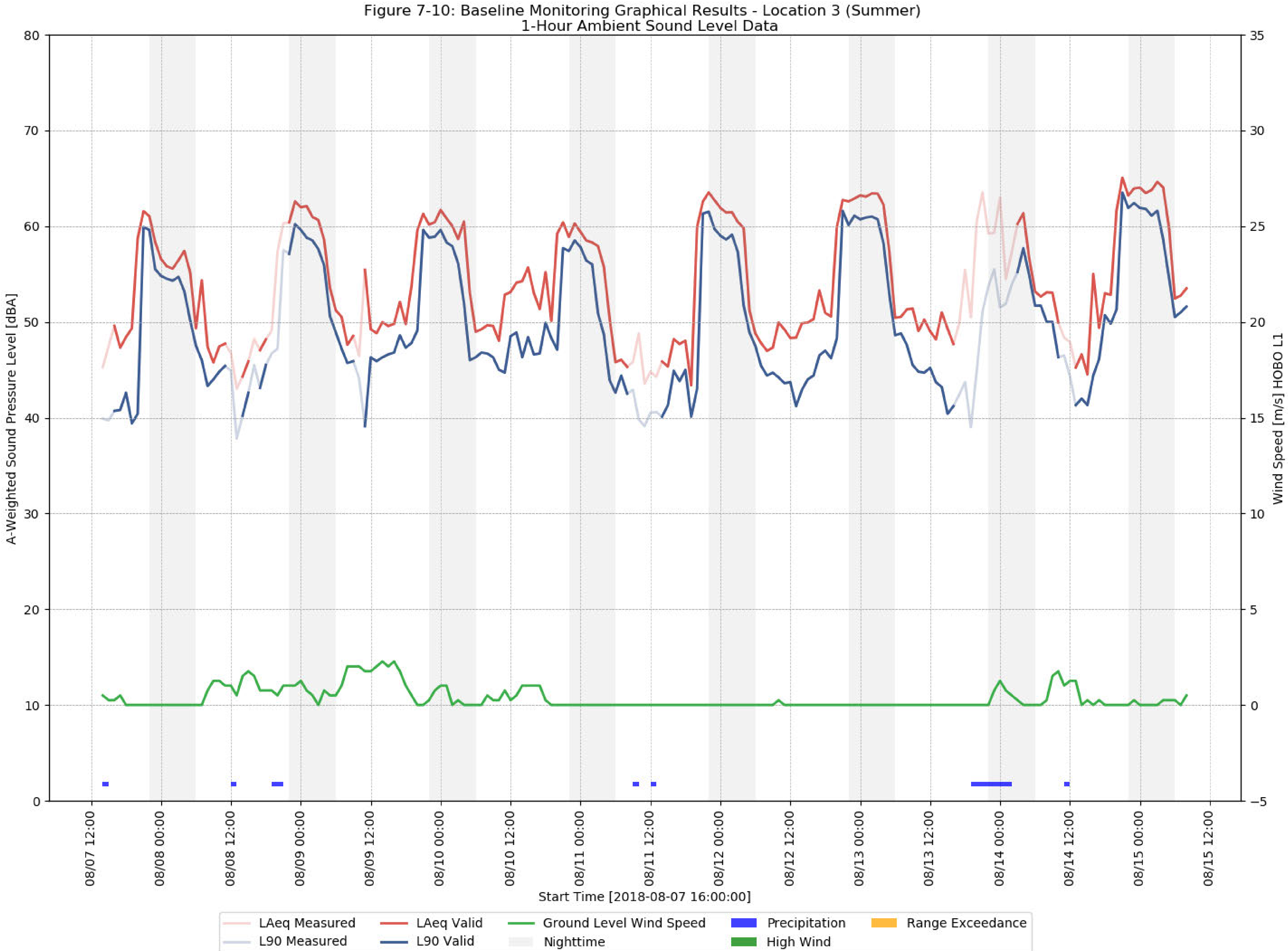


Figure 7-10: Baseline Monitoring Graphical Results - Location 3 (Summer)
1-Hour Ambient Sound Level Data
A-Weighted Sound Pressure Level [dBA]
Wind Speed [m/s] HOBO L1
80
70
60
50
40
30
20
10
0
35
30
25
20
15
10
5
0
−5
08/07 12:00
08/08 00:00
08/08 12:00
08/09 00:00
08/09 12:00
08/10 00:00
08/10 12:00
08/11 00:00
08/11 12:00
08/12 00:00
08/12 12:00
08/13 00:00
08/13 12:00
08/14 00:00
08/14 12:00
08/15 00:00
08/15 12:00
Start Time [2018-08-07 16:00:00]
LAeq Measured
L90 Measured
LAeq Valid
L90 Valid
Ground Level Wind Speed
Nighttime
Precipitation
High Wind
Range Exceedance

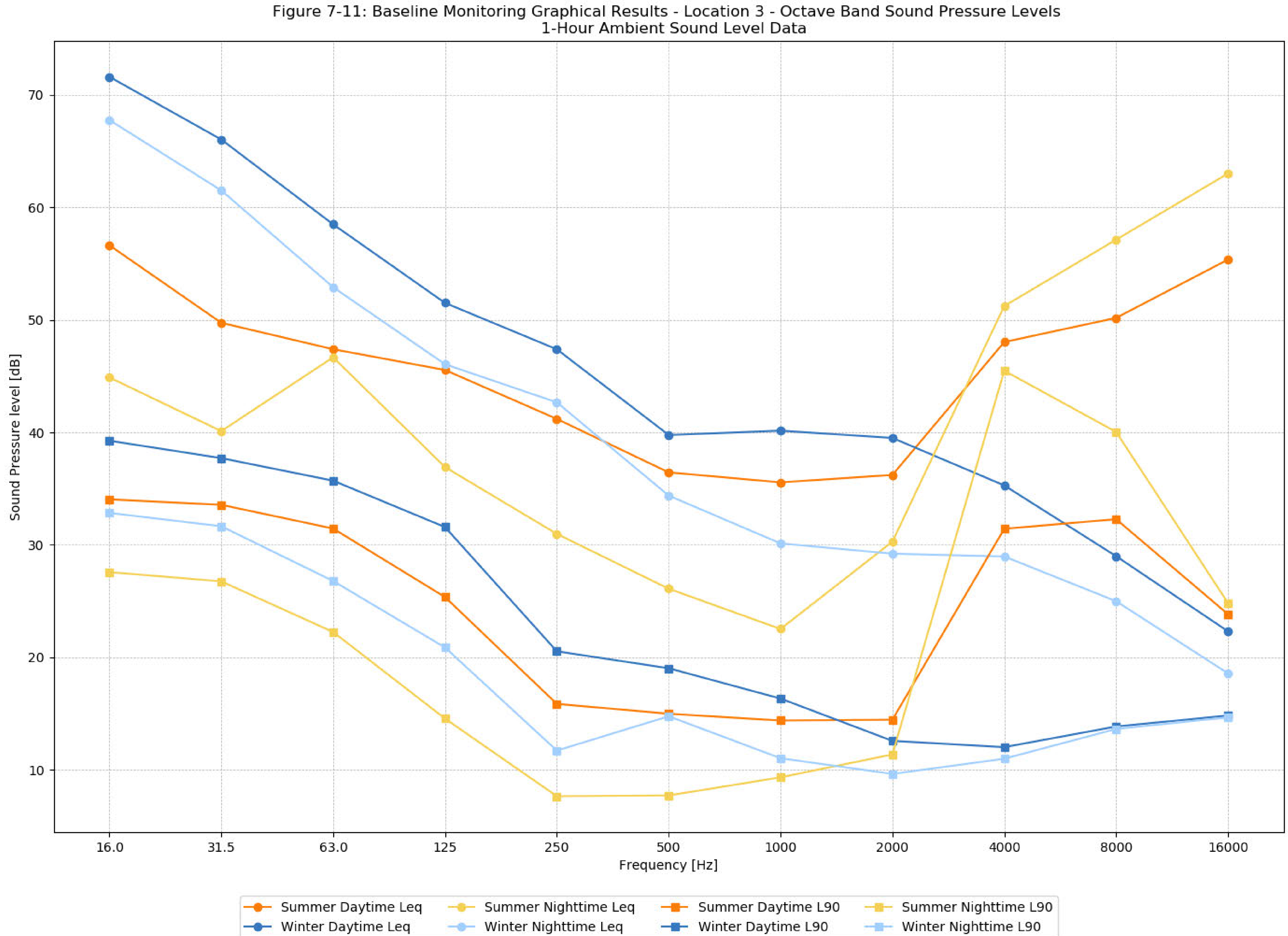


Figure 7-11: Baseline Monitoring Graphical Results - Location 3 - Octave Band Sound Pressure Levels
1-Hour Ambient Sound Level Data
Sound Pressure level [dB]
70
60
50
40
30
20
10
16.0
31.5
63.0
125
250
500
1000
2000
4000
8000
16000
Frequency [Hz]
Summer Daytime Leq
Winter Daytime Leq
Summer Nighttime Leq
Winter Nighttime Leq
Summer Daytime L90
Winter Daytime L90
Summer Nighttime L90
Winter Nighttime L90

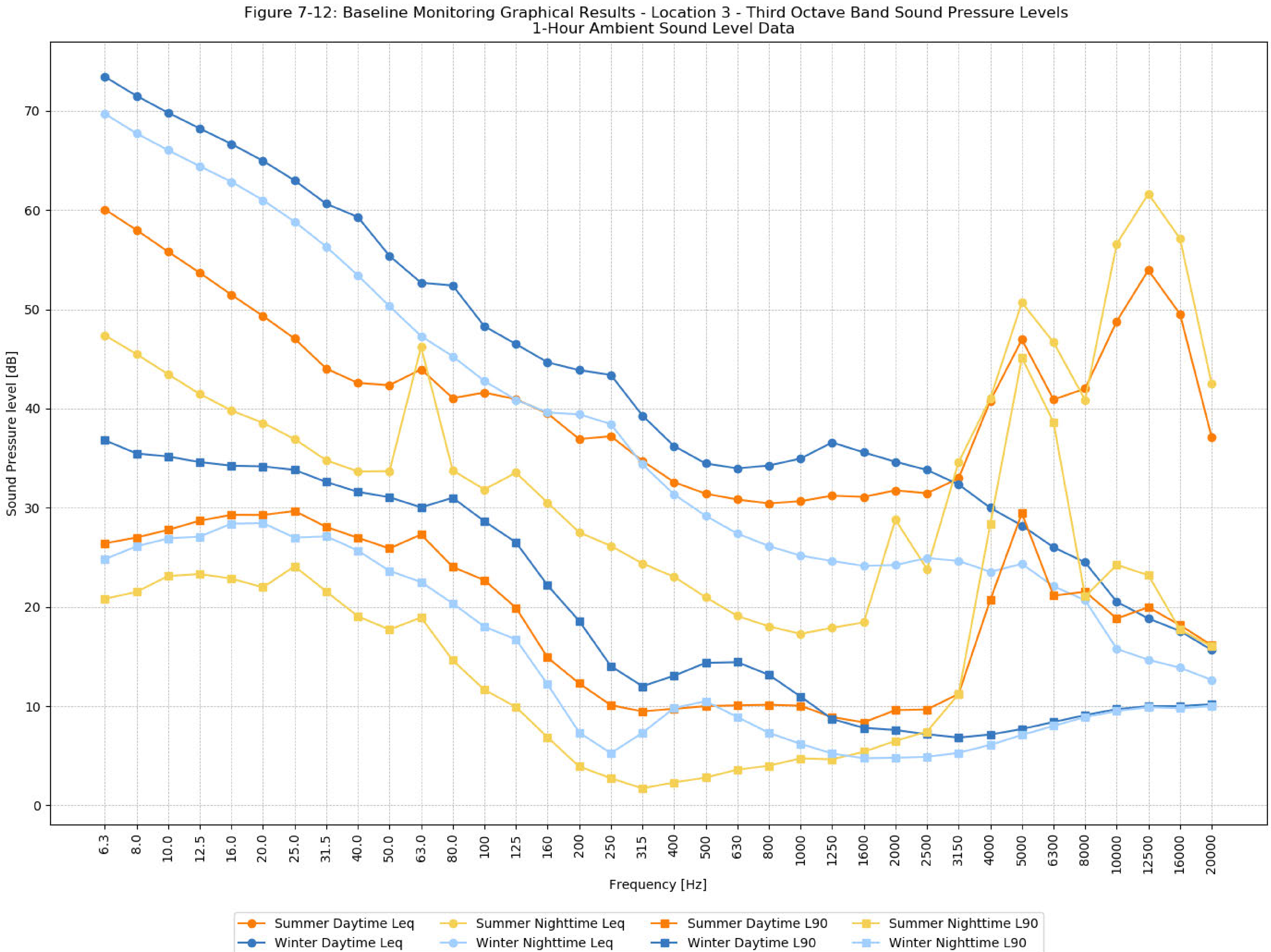
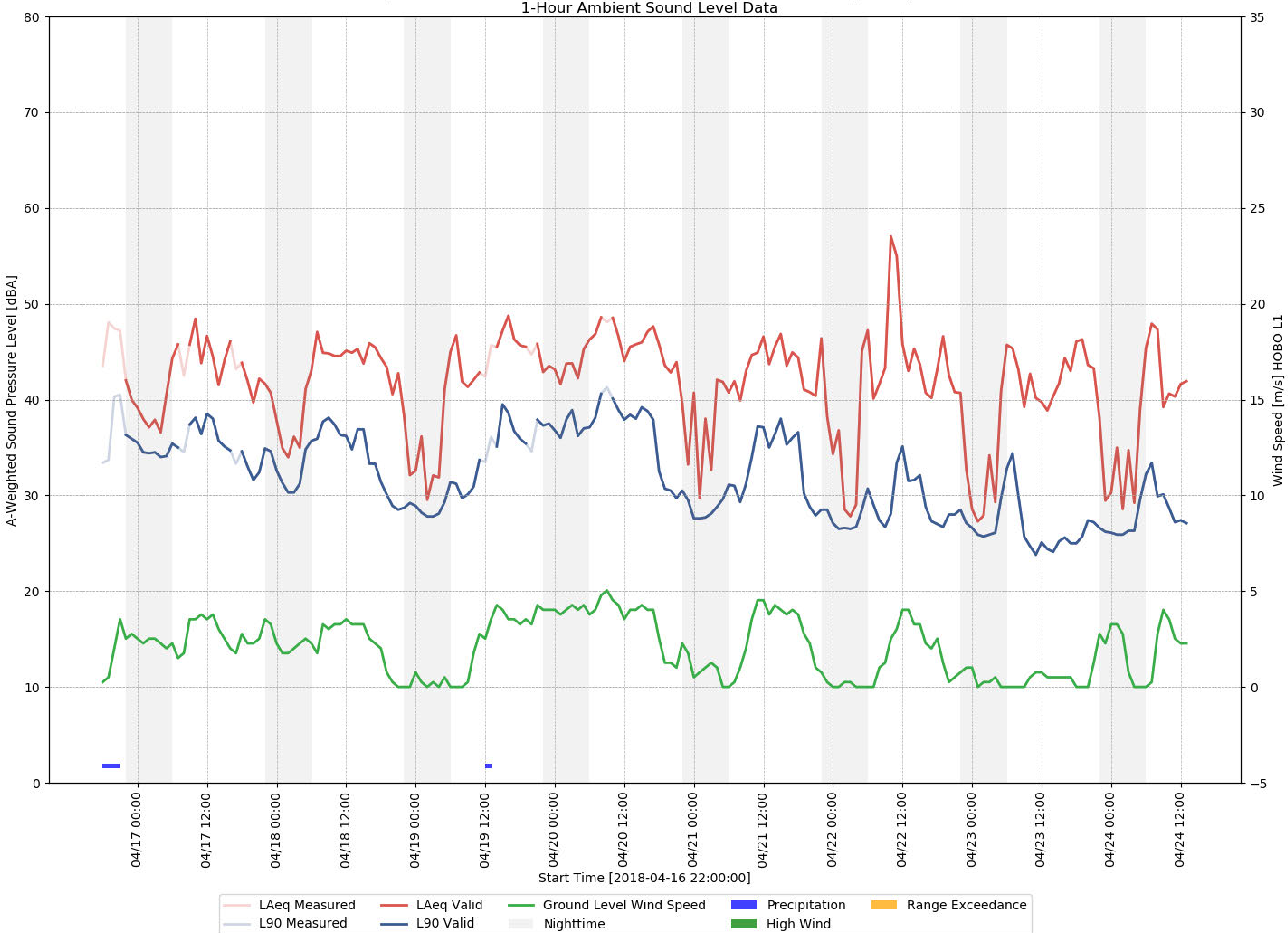


Figure 7-12: Baseline Monitoring Graphical Results - Location 3 - Third Octave Band Sound Pressure Levels
1-Hour Ambient Sound Level Data
Sound Pressure level [dB]
0
10
20
30
40
50
60
70
6.3
8.0
10.0
12.5
16.0
20.0
25.0
31.5
40.0
50.0
63.0
80.0
100
125
160
200
250
315
400
500
630
800
1000
1250
1600
2000
2500
3150
4000
5000
6300
8000
10000
12500
16000
20000
Frequency [Hz]
Summer Daytime Leq
Summer Nighttime Leq
Summer Daytime L90
Summer Nighttime L90
Winter Daytime Leq
Winter Nighttime Leq
Winter Daytime L90
Winter Nighttime L90

Figure 7-13: Baseline Monitoring Graphical Results - Location 4 (Winter)
1-Hour Ambient Sound Level Data



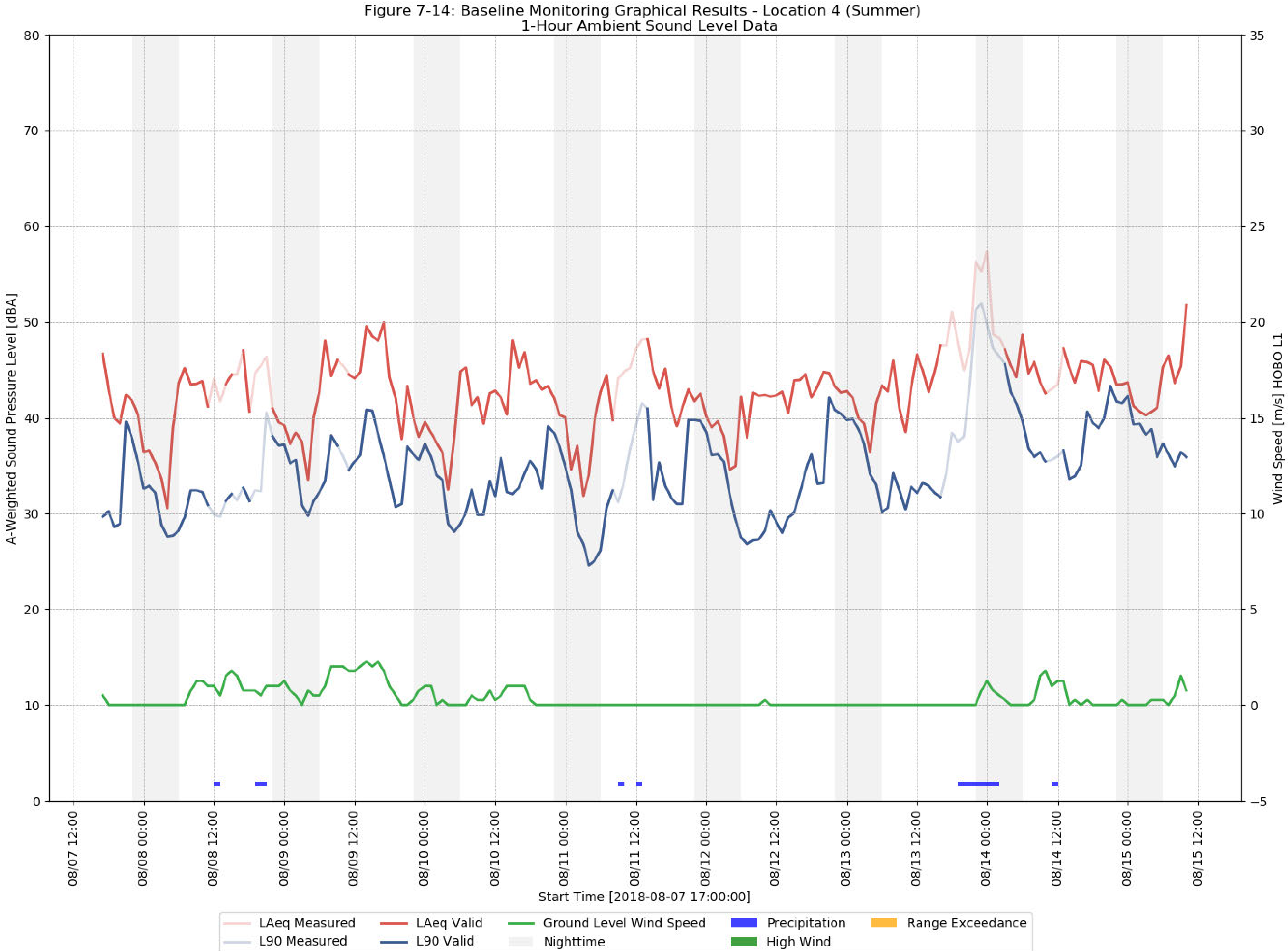


Figure 7-14: Baseline Monitoring Graphical Results - Location 4 (Summer)
1-Hour Ambient Sound Level Data
A-Weighted Sound Pressure Level [dBA]
Wind Speed [m/s] HOBO L1
Start Time [2018-08-07 17:00:00]
08/07 12:00
08/08 00:00
08/08 12:00
08/09 00:00
08/09 12:00
08/10 00:00
08/10 12:00
08/11 00:00
08/11 12:00
08/12 00:00
08/12 12:00
08/13 00:00
08/13 12:00
08/14 00:00
08/14 12:00
08/15 00:00
08/15 12:00
LAeq Measured
L90 Measured
LAeq Valid
L90 Valid
Ground Level Wind Speed
Nighttime
Precipitation
High Wind
Range Exceedance

Figure 7-15: Baseline Monitoring Graphical Results - Location 4 - Octave Band Sound Pressure Levels
1-Hour Ambient Sound Level Data

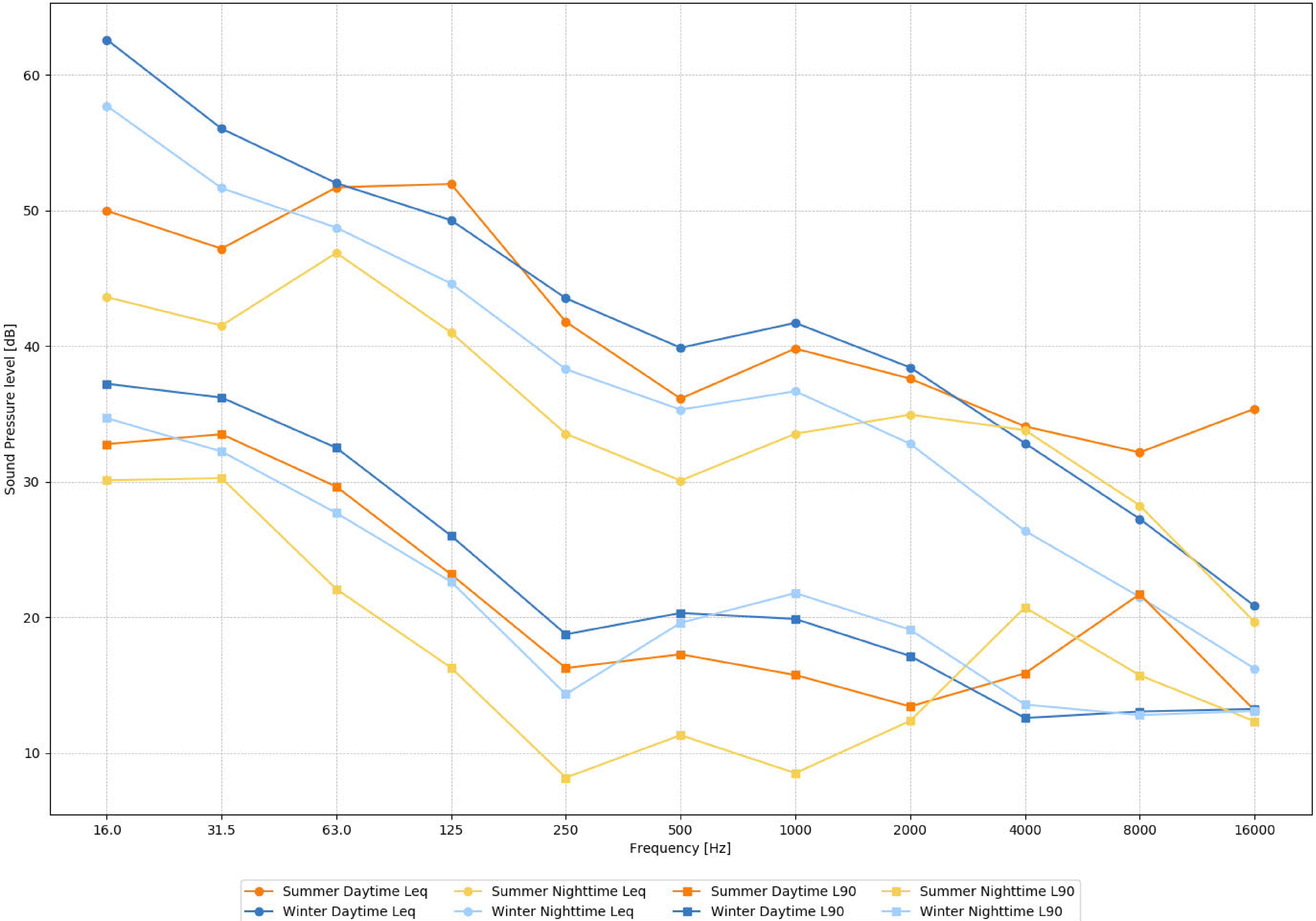


Figure 7-16: Baseline Monitoring Graphical Results - Location 4 - Third Octave Band Sound Pressure Levels
1-Hour Ambient Sound Level Data

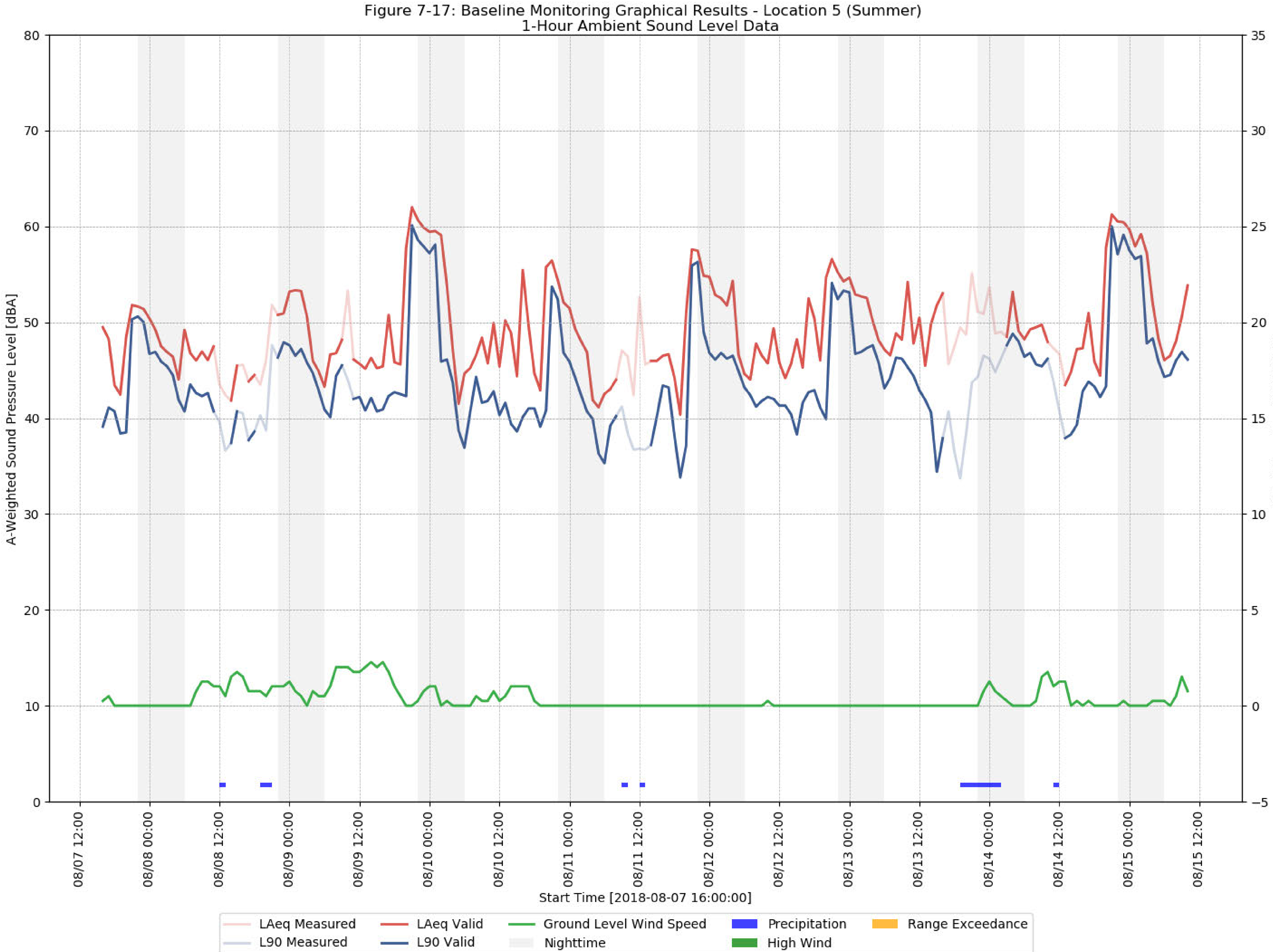


Figure 7-17: Baseline Monitoring Graphical Results - Location 5 (Summer)
1-Hour Ambient Sound Level Data
A-Weighted Sound Pressure Level [dBA]
Wind Speed [m/s] HOBO L1
0
10
20
30
40
50
60
70
80
−5
0
5
10
15
20
25
30
35
08/07 12:00
08/08 00:00
08/08 12:00
08/09 00:00
08/09 12:00
08/10 00:00
08/10 12:00
08/11 00:00
08/11 12:00
08/12 00:00
08/12 12:00
08/13 00:00
08/13 12:00
08/14 00:00
08/14 12:00
08/15 00:00
08/15 12:00
Start Time [2018-08-07 16:00:00]
LAeq Measured
LAeq Valid
Ground Level Wind Speed
Precipitation
Range Exceedance
L90 Measured
L90 Valid
Nighttime
High Wind

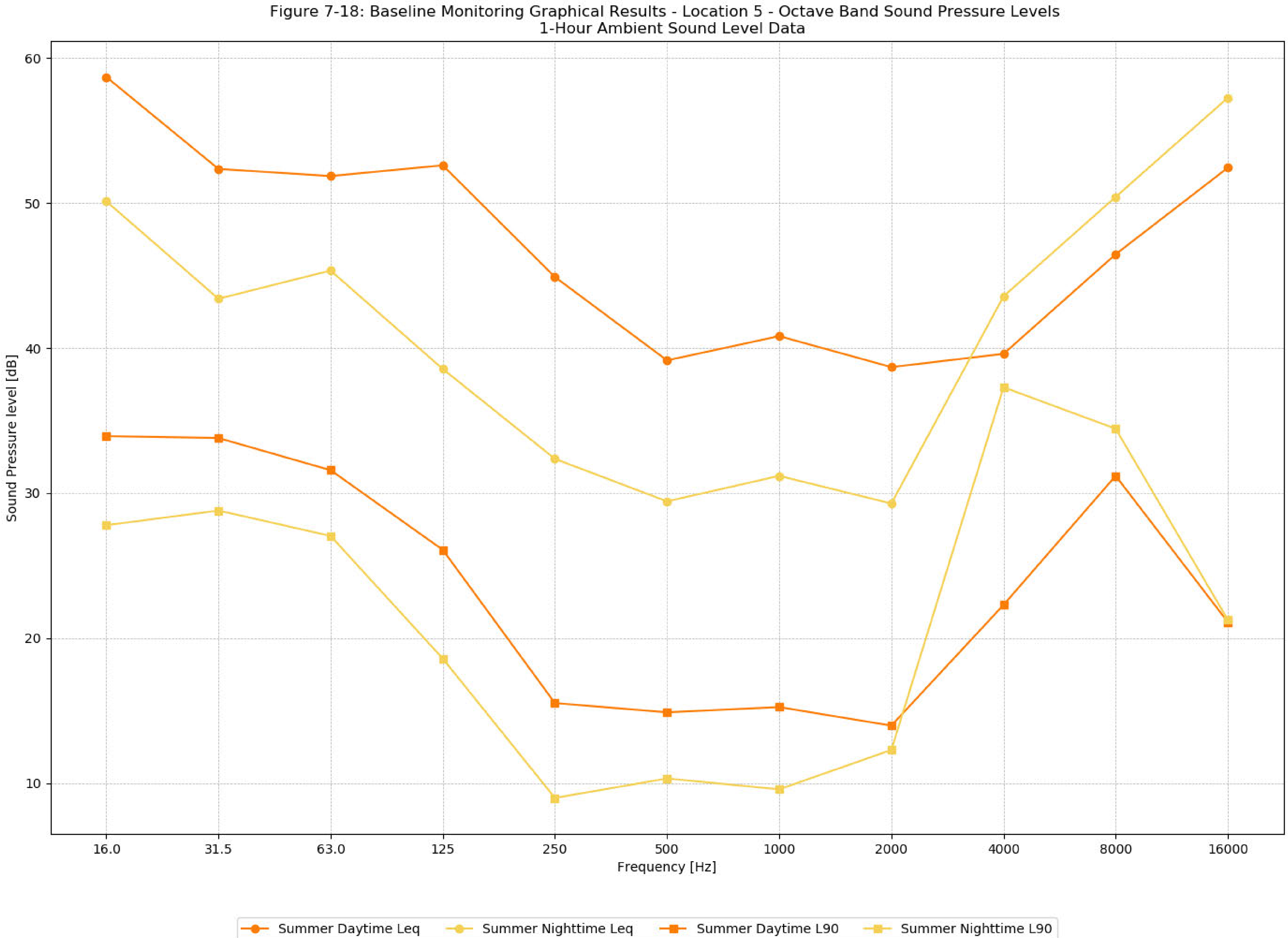


Figure 7-18: Baseline Monitoring Graphical Results - Location 5 - Octave Band Sound Pressure Levels
1-Hour Ambient Sound Level Data
Sound Pressure level [dB]
60
50
40
30
20
10
16.0
31.5
63.0
125
250
500
1000
2000
4000
8000
16000
Frequency [Hz]
Summer Daytime Leq
Summer Nighttime Leq
Summer Daytime L90
Summer Nighttime L90

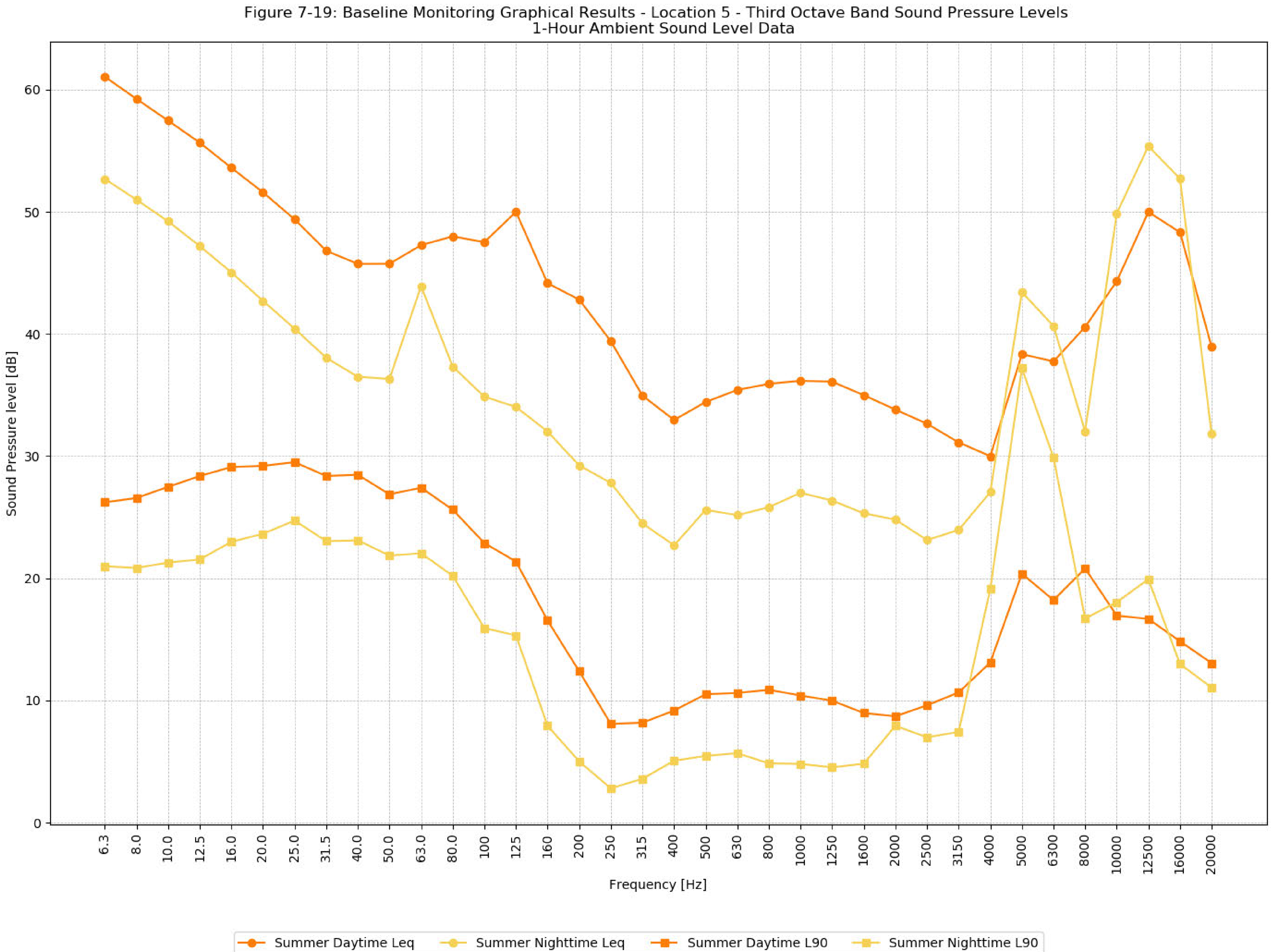


Figure 7-19: Baseline Monitoring Graphical Results - Location 5 - Third Octave Band Sound Pressure Levels
1-Hour Ambient Sound Level Data
Sound Pressure level [dB]
0
10
20
30
40
50
60
6.3
8.0
10.0
12.5
16.0
20.0
25.0
31.5
40.0
50.0
63.0
80.0
100
125
160
200
250
315
400
500
630
800
1000
1250
1600
2000
2500
3150
4000
5000
6300
8000
10000
12500
16000
20000
Frequency [Hz]
Summer Daytime Leq
Summer Nighttime Leq
Summer Daytime L90
Summer Nighttime L90

Section 8.0

Seasonal Sound Level Monitoring Summary

8.0 SEASONAL SOUND LEVEL MONITORING SUMMARY

A two-season baseline monitoring program was performed for the proposed East Point Energy Center in 2018 to characterize the existing sound level environment around the Project region. The sound levels measured during the winter and summer monitoring periods are summarized in the following subsections as tabular data by location. Respective ANS-weighted broadband sound levels calculated for the desired summary of interest are tandemly provided with the measured broadband levels within each table. Only valid[16] 1-hour measurement periods are included in the summary tables. Daytime is defined as the period from 7 AM to 10 PM. Nighttime is defined as the period from 10 PM to 7 AM.

8.1 Daytime Ambient – Lower Tenth Percentile

Measured daytime ambient L_{90} sound levels are shown below in Table 8-1, as per 1001.19(f)(1). Values are separated by monitoring season as well as for both seasons combined. These values represent the L_{90} of the measured L_{90} values.

Table 8-1 Daytime Ambient L_{90} (dBA) Sound Pressure Level Summary

Location	Overall (dBA)		Winter (dBA)		Summer (dBA)	
	Measured	ANS	Measured	ANS	Measured	ANS
Location 1	33	31	31	30	46	32
Location 2	32	30	31	30	34	30
Location 3	28	21	26	24	41	20
Location 4	27	22	26	24	30	20
Location 5	-	-	-	-	38	20

8.2 Nighttime Ambient – Lower Tenth Percentile

Measured nighttime ambient L_{90} sound levels are presented below in Table 8-2, as per 1001.19(f)(2) (summer) and (f)(3) (winter). Values are separated by monitoring season as well as for both seasons combined. These values represent the L_{90} of the measured L_{90} values.

16 Refer to Chapter 7 for details concerning valid periods.

Table 8-2 Nighttime Ambient L_{90} (dBA) Sound Pressure Level Summary

Location	Overall (dBA)		Winter (dBA)		Summer (dBA)	
	Measured	ANS	Measured	ANS	Measured	ANS
Location 1	24	21	23	22	52	19
Location 2	21	16	19	17	31	16
Location 3	21	14	20	16	49	12
Location 4	27	15	26	24	28	13
Location 5	-	-	-	-	41	14

8.3 Daytime Ambient - Average

Measured daytime average ambient levels are presented in Table 8-3, as per 1001.19(f)(7). The daytime ambient average noise level was calculated by logarithmically averaging sound pressure levels (Leq) (after exclusions) from the background sound level measurements over the daytime period at each monitoring location. These calculations include both summer and winter data combined.

Table 8-3 Daytime Ambient L_{eq} (dBA) Sound Pressure Level Summary

Location	Overall (dBA)		Winter (dBA)		Summer (dBA)	
	Measured	ANS	Measured	ANS	Measured	ANS
Location 1	60	59	58	57	62	60
Location 2	47	44	48	45	46	42
Location 3	52	43	46	44	54	39
Location 4	45	43	46	44	45	42
Location 5	-	-	-	-	51	44

8.4 Nighttime Ambient - Average

Measured nighttime average ambient levels are presented in Table 8-4. The nighttime ambient average noise level was calculated by logarithmically averaging sound pressure levels (Leq) (after exclusions) from the background sound level measurements over the nighttime period at each monitoring location. These calculations include both summer and winter data combined.

Table 8-4 Nighttime Ambient L_{eq} (dBA) Sound Pressure Level Summary

Location	Overall (dBA)		Winter (dBA)		Summer (dBA)	
	Measured	ANS	Measured	ANS	Measured	ANS
Location 1	56	54	54	53	58	55
Location 2	46	38	44	40	48	35
Location 3	57	36	39	38	61	29
Location 4	40	38	40	39	40	35
Location 5	-	-	-	-	54	34

8.5 Temporal Accuracy

The temporal accuracy section of the ANSI S12.9-1992/Part 2 document requires that the data collection must be long enough to achieve the desired confidence interval. The goal of the sound measurement program is to achieve a 95% confidence interval which would allow for a statement of 95% confidence that the true long-term average sound level falls within the given interval. The size of this confidence interval places the data set into one of three categories referred to as Class A, Class B, and Class C, listed here from most precise to least precise.

To determine the temporal accuracy, the mean square average sound level must be obtained using equation 2 of section 9.5 of the ANSI S12.9-1992/Part 2 document. In this equation, the sample standard deviation and average are used to determine the mean square average. These pieces of information are then combined with the information presented in Table 1 of section 9.5 of the standard to determine the upper and lower bounds of the 95% confidence interval. The equations for the upper and lower bound of the confidence interval are equations 3 and 4 of section 9.5 of the standard respectively. If there are data sets where the number of samples was outside the range covered by the information in Table 1, the source data presented in the Crow et al. document cited in the standard is used to calculate the necessary ‘k1’ and ‘k2’ values. A two-tailed ‘t’ interval function is used to generate the necessary ‘t’ value.

To use the equations in the Temporal Accuracy section, the raw data set must be shown to be approximately normal. This can be obtained by following the directions laid out in Appendix D of the standard. The method used in the standard is the Kolmogorov-Smirnov test for normality of data. In general, the Kolmogorov-Smirnov test takes the actual repetition of a measurement and compares it to the expected repetition based on the average and standard deviation of the sample. The difference between the actual and expected recurrence is then compared to a critical value that is based on the number of samples and desired confidence level. If any measured value has a difference between expected and actual recurrence that exceeds the critical value, the data shall not be approximated as normal.

Tables 8-5 through 8-10 present the 95% CI of the valid measured L_{90} sound level data at each site for Summer Daytime, Summer Nighttime, Winter Daytime, Winter Nighttime, Yearly Daytime, and Yearly Nighttime periods, respectively. The “Yearly Daytime” and “Yearly Nighttime” are composed of the summer and winter data combined for each time period (day or night). Each sample represents one full daytime (7 a.m. – 10 p.m.) or nighttime (10 p.m. – 7 a.m.) period in which more than 50% of the 1-hour records were valid. The same information is presented in Tables 8-11 to 8-16 for the measured L_{eq} sound levels at each site. All sound levels in Tables 8-5 to 8-16 are ANS-filtered.

Table 8-5 Temporal Accuracy Summary – Summer Daytime L90

Location	# of Samples	95% CI Mean (dBA)	Lower CI (dBA)	Upper CI (dBA)	Measurement Class	Normality
Location 1	7	34.39	3.45	4.8	Class C	Normal
Location 2	7	31.89	2.12	2.51	Class B	Normal
Location 3	7	21.54	2.7	3.44	Class C	Normal
Location 4	7	23.36	3.34	4.59	Class C	Normal
Location 5	7	22.74	2.84	3.68	Class C	Normal

Table 8-6 Temporal Accuracy Summary – Summer Nighttime L90

Location	# of Samples	95% CI Mean (dBA)	Lower CI (dBA)	Upper CI (dBA)	Measurement Class	Normality
Location 1	7	22.21	2.52	3.13	Class C	Normal
Location 2	7	19.49	2.45	3.02	Class C	Normal
Location 3	7	17.55	3.55	5	Class C	Normal
Location 4	7	19.8	4.44	6.89	Worse than Class C	Normal
Location 5	7	17.42	2.85	3.69	Class C	Normal

Table 8-7 Temporal Accuracy Summary – Winter Daytime L90

Location	# of Samples	95% CI Mean (dBA)	Lower CI (dBA)	Upper CI (dBA)	Measurement Class	Normality
Location 1	8	32.5	2.57	3.23	Class C	Normal
Location 2	8	31.32	2.62	3.33	Class C	Normal
Location 3	8	26.37	3.07	4.11	Class C	Normal
Location 4	7	27.68	2.58	3.22	Class C	Normal
Location 5	-	-	-	-	-	-

Table 8-8 Temporal Accuracy Summary – Winter Nighttime L90

Location	# of Samples	95% CI Mean (dBA)	Lower CI (dBA)	Upper CI (dBA)	Measurement Class	Normality
Location 1	8	28.87	4.67	7.41	Worse than Class C	Normal
Location 2	8	27.5	7.22	13.64	Worse than Class C	Normal
Location 3	8	25.16	5.83	10.13	Worse than Class C	Normal
Location 4	8	29.03	3.79	5.51	Worse than Class C	Normal
Location 5	-	-	-	-	-	-

Table 8-9 Temporal Accuracy Summary – Yearly Daytime L90

Location	# of Samples	95% CI Mean (dBA)	Lower CI (dBA)	Upper CI (dBA)	Measurement Class	Normality
Location 1	15	33.44	1.97	2.36	Class B	Normal
Location 2	15	31.62	1.59	1.81	Class A	Normal
Location 3	15	24.66	2.33	2.92	Class B	Normal
Location 4	14	26.2	2.48	3.15	Class C	Normal
Location 5	-	-	-	-	-	-

Table 8-10 Temporal Accuracy Summary – Yearly Nighttime L90

Location	# of Samples	95% CI Mean (dBA)	Lower CI (dBA)	Upper CI (dBA)	Measurement Class	Normality
Location 1	15	26.35	2.93	3.91	Class C	Normal
Location 2	15	23.99	3.75	5.36	Worse than Class C	Normal
Location 3	15	22.3	3.69	5.26	Worse than Class C	Normal
Location 4	15	27.3	4.37	6.51	Worse than Class C	Normal
Location 5	-	-	-	-	-	-

Table 8-11 Temporal Accuracy Summary - Summer Daytime Leq

Location	# of Samples	95% CI Mean (dBA)	Lower CI (dBA)	Upper CI (dBA)	Measurement Class	Normality
Location 1	7	60.48	0.27	0.27	Class A	Normal
Location 2	7	41.73	1.17	1.24	Class A	Normal
Location 3	7	39.12	3.76	5.43	Worse than Class C	Normal
Location 4	7	42.33	1.27	1.37	Class A	Normal
Location 5	7	43.8	2.67	3.38	Class C	Normal

Table 8-12 Temporal Accuracy Summary - Summer Nighttime Leq

Location	# of Samples	95% CI Mean (dBA)	Lower CI (dBA)	Upper CI (dBA)	Measurement Class	Normality
Location 1	7	54.58	1.23	1.32	Class A	Normal
Location 2	7	35.34	1.65	1.85	Class A	Normal
Location 3	7	28.96	3.07	4.08	Class C	Normal
Location 4	7	35.46	0.92	0.95	Class A	Normal
Location 5	7	33.53	1.68	1.88	Class A	Normal

Table 8-13 Temporal Accuracy Summary - Winter Daytime Leq

Location	# of Samples	95% CI Mean (dBA)	Lower CI (dBA)	Upper CI (dBA)	Measurement Class	Normality
Location 1	8	57.13	0.86	0.89	Class A	Normal
Location 2	8	45.12	1.76	2.01	Class B	Normal
Location 3	8	44.45	2.06	2.44	Class B	Normal
Location 4	7	43.92	1.3	1.4	Class A	Normal
Location 5	-	-	-	-	-	-

Table 8-14 Temporal Accuracy Summary - Winter Nighttime Leq

Location	# of Samples	95% CI Mean (dBA)	Lower CI (dBA)	Upper CI (dBA)	Measurement Class	Normality
Location 1	8	52.87	0.86	0.89	Class A	Normal
Location 2	8	39.68	2.73	3.5	Class C	Normal
Location 3	8	38.37	6.3	11.3	Worse than Class C	Normal
Location 4	8	38.96	1.81	2.07	Class B	Normal
Location 5	-	-	-	-	-	-

Table 8-15 Temporal Accuracy Summary - Yearly Daytime Leq

Location	# of Samples	95% CI Mean (dBA)	Lower CI (dBA)	Upper CI (dBA)	Measurement Class	Normality
Location 1	15	59.04	1.07	1.15	Class A	Normal
Location 2	15	43.81	1.33	1.47	Class A	Normal
Location 3	15	43.13	2.78	3.65	Class C	Normal
Location 4	14	43.2	0.93	0.99	Class A	Normal
Location 5	-	-	-	-	-	-

Table 8-16 Temporal Accuracy Summary - Yearly Nighttime Leq

Location	# of Samples	95% CI Mean (dBA)	Lower CI (dBA)	Upper CI (dBA)	Measurement Class	Normality
Location 1	15	53.74	0.8	0.84	Class A	Normal
Location 2	15	38.02	1.84	2.18	Class B	Normal
Location 3	15	34.93	3.95	5.73	Worse than Class C	Normal
Location 4	15	37.6	1.31	1.45	Class A	Normal
Location 5	-	-	-	-	-	-

8.6 Infrasound and Low Frequency

Infrasound and low frequency sound pressure levels were measured at all locations in both the summer and winter seasons. The frequency range of these data is from 6.3 Hz to 200 Hz. The sound levels were summarized by averaging[17] sound level data from all valid[18] winter daytime hours, winter nighttime hours, summer daytime hours, and summer nighttime hours within each one-third octave band. Winter and summer infrasound data collected at Location 2 are presented in Figure 8-1. This location was chosen for its centralized location within the project area.

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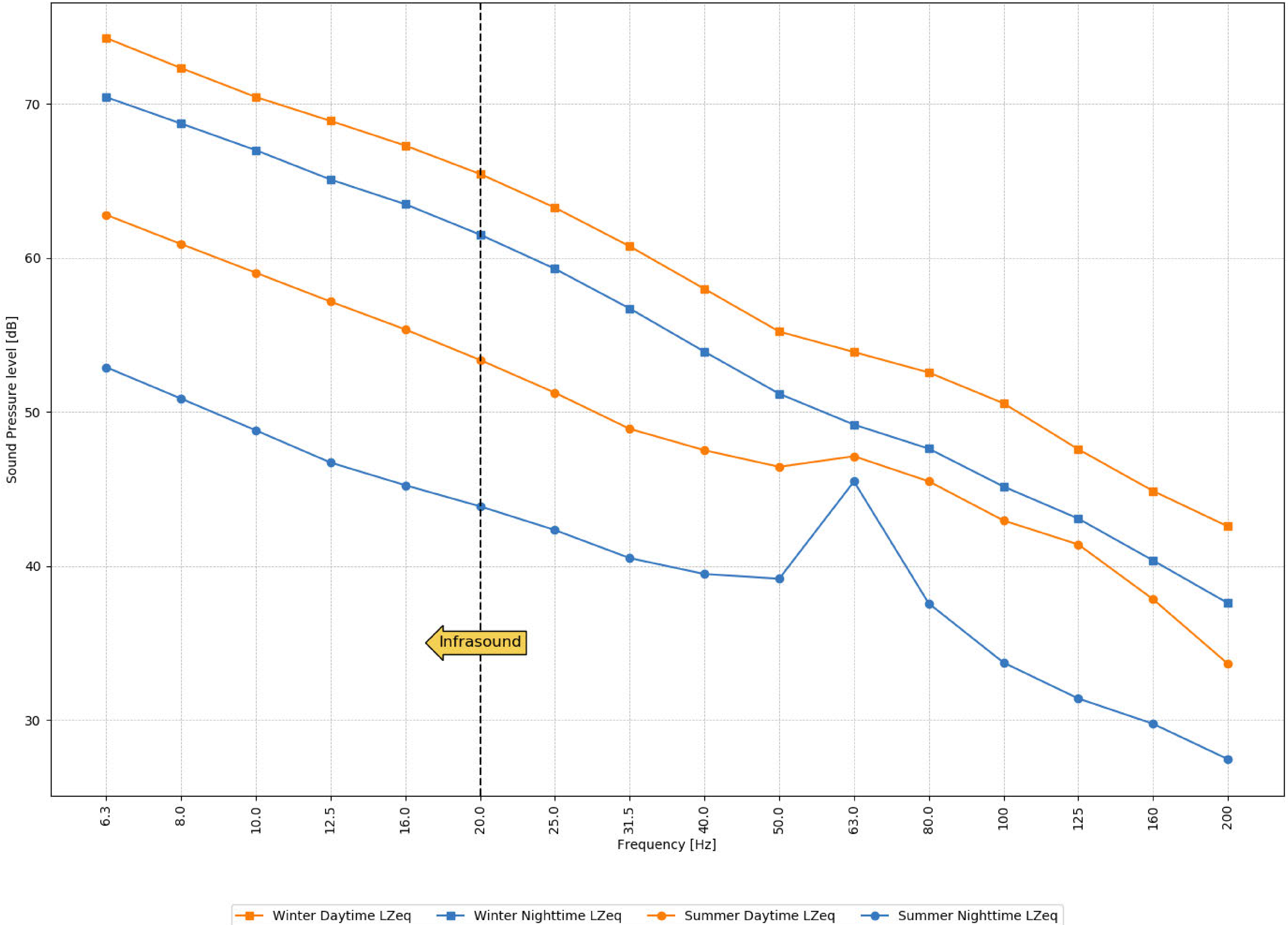
[17] Logarithmic (energy) average of equivalent (Leq) sound pressure levels.

[18] Refer to Chapter 7 for details concerning valid periods.

Figure 8-1 Baseline Monitoring Graphical Summary – Location 2
One-Third Octave-Band Low Frequency and Infrasound Sound Pressure Levels



Section 9.0

Future Sound Levels

9.0 FUTURE SOUND LEVELS

9.1 Sound Propagation

The noise impacts associated with the proposed Project were predicted using the Cadna/A noise calculation software developed by DataKustik GmbH. This software implements the ISO 9613-2 international standard for sound propagation (Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation). The benefits of this software are a more refined set of computations due to the inclusion of topography, ground attenuation, multiple reflections, drop-off with distance, and atmospheric absorption. The Cadna/A software allows for octave band calculation of sound from multiple sources as well as computation of diffraction.

9.2 Equipment and Operating Conditions

9.2.1 Inverters

The sound level analysis includes 16 inverters. There is one inverter manufacturer (Power Electronics) being considered in this PNIA. The inverter manufacturer, power ratings, and inverter dimensions examined for this assessment are presented below in Table 9-1. All 16 of the proposed inverters will be HEM Inverters with identical specifications.

Table 9-1 Power Inverter Analyzed for Sound Level Assessment

Manufacturer	Inverter Model	Maximum Electrical Output [kVA]	Dimensions [WxDxH] [m]
Power Electronics	HEM-FS3350M	3,465	6.6 x 2.2 x 2.2

Broadband and one-third octave band sound pressure level measurements for the HEM Inverter operating under typical (daylight) conditions were provided by the Applicant[19]. Engineering methods were utilized to calculate the inverter's one-third octave band sound power level from these sound pressure level measurements. The octave band sound power levels are presented in Table 9-2.

Table 9-2 Inverter Octave Band Sound Power Levels

Inverter Type	Broadband Sound Power Level [dBA]	Sound Power Levels per Octave-Band Center Frequency [Hz]									
		16	31.5	63	125	250	500	1k	2k	4k	8k
		dB	dB	dB	dB	dB	dB	dB	dB	dB	dB
HEM	97	92	90	104	95	94	93	91	90	85	83

19 Noise Emissions Testing of Power Electronics HEM Inverter. On-Site Acoustic Testing, LLC June 2019.

9.2.2 Collector Substation

In addition to the inverters, there will be a collector substation located within the Project area. One step-up transformer rated at 60 MVA and a NEMA sound rating of 75 dB is proposed for the substation. Epsilon estimated the broadband sound power level and octave band sound level emissions using the techniques in the Electric Power Plant Environmental Noise Guide (Edison Electric Institute), Table 4.5 Sound Power Levels of Transformers. Table 9-3 summarizes the sound power level data used in the modeling.

Table 9-3 Collector Substation Transformer Sound Power Levels

Maximum Rating [MVA]	Broadband Sound Power Level [dBA]	Sound Power Levels per Octave-Band Center Frequency [Hz]								
		31.5 dB	63 dB	125 dB	250 dB	500 dB	1k dB	2k dB	4k dB	8k dB
60	94	90	96	98	93	93	87	82	77	70

9.3 Modeling Inputs and Scenarios

9.3.1 Common Modeling Inputs

Inputs and significant parameters employed in the model common to all modeling scenarios for this Project are described below:

- *Project Layout:* An inverter layout was provided by the Applicant to the Project team (Layout 20190905). The 16 proposed inverters were input into the model. The substation location was also provided by the Applicant to the Project team with the layout. For the modeling analysis, it was assumed that the collector substation transformer would be located at the center of the substation pad. The proposed inverters and substation for the Project are shown in Figure 9-1. All point sources in the model, including their coordinates, are presented in Table D-1 in Appendix D.

- *Receptor Locations:* A modeling receptor dataset was provided by the Applicant to the Project team on June 20, 2019. The 243 receptors from this dataset were input into the Cadna/A model. These receptors include the sensitive receptors identified in Section 6.1 above. The 243 receptors are a combination of both participating and non-participating sound sensitive locations within at least 1 mile from the Project boundary. These receptors were modeled as discrete points at a height of 1.5 meters AGL to mimic the ears of a typical standing person. These locations are shown in Figure 9-1. The modeling receptors, including their coordinates, participation status, and receptor type are listed in tabular form in Table D-2 in Appendix D.

- *Terrain Elevation:* Elevation contours for the modeling domain were directly imported into Cadna/A which allowed for consideration of terrain shielding where appropriate. The terrain height contour elevations for the modeling domain were generated from elevation information derived from the National Elevation Dataset (NED) developed by the U.S. Geological Survey.

- The meteorological correction term (Cmet) was set to zero.

- No credit was taken for potential shielding of sound by the solar panels surrounding each inverter.

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

9.3.2 Short-Term Modeling Scenarios - ISO 9613-2

Short-term sound level modeling was conducted using the Cadna/A noise calculation software which incorporates the ISO 9613-2 international standard for sound propagation. For this modeling scenario, the octave band data for the HEM Inverter was input into Cadna/A to calculate the inverter generated sound pressure levels during conditions when worst-case sound power levels are expected. Modeling assumptions inherent in the ISO 9613-2 calculation methodology, or selected as conditional inputs by Epsilon, were implemented in the Cadna/A software for this modeling scenario to ensure conservative results (i.e., higher sound levels), and are described below:

- *Ground Attenuation:* Spectral ground absorption was calculated using a G-factor of 0.5 which corresponds to “mixed ground” consisting of both hard and porous ground cover. This is consistent with the modeling guidelines of NARUC 2011. One small body of water with moderate width (approximately 500 feet) was identified within the Project area. Therefore, a G-factor of 0.5 was assumed for the entire model area except for the single body of water, which was set to G=0.

- As 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.

- All modeled sources were assumed to be operating at their maximum capacities, corresponding to the greatest sound level impacts.

- Meteorological conditions assumed in the model (temperature=10℃ & relative humidity=70%) were selected to minimize atmospheric attenuation in the 500 Hz and 1000 Hz octave bands where the human ear is most sensitive.

Sound pressure levels due to operation of all 16 inverters and the collector substation transformer were modeled at 243 receptors within and surrounding the Project area. The sound levels calculated are 1-hour L_{eq} sound levels.

In addition to modeling at discrete points, sound levels were also modeled throughout a large grid of receptor points, each spaced 10 meters apart to allow for the generation of sound level isolines. Tabular results and sound level isolines were calculated and generated for the entire Project area.

9.3.3 Long-Term Modeling Scenarios – ISO 9613-2 Annual Sound Level Metrics

Over the course of a year, sound levels associated with the normal operation of the inverters will at times be less than the modeled worst-case / short-term sound levels due to the presence of cloud cover. In order to quantify this reduction, differences in the operational vs non-operational inverter sound power levels due to the presence of clouds or lack of sunshine were addressed in the sound level modeling meteorological adjustments to the calculations. The inverters were assumed to be non-operational and therefore producing no sound during any period without sunlight either after sunset and before sunrise or when clouds were present. During periods with sunshine and no clouds, the inverters will be operational and are assumed to be operating at the levels provided in Table 9-2.

Site-specific daily sunrise and sunset data corrected for daylight saving time were used to calculate the maximum sunshine for a year. This represents the total amount of time between sunrise and sunset for each day within a year. Table 9-4 presents these results. Monthly site-specific sunshine probabilities, measured in Albany, NY, displayed in Table 9-5, were applied to the maximum monthly sunshine values to calculate the expected monthly sunshine. The inverter was assumed to operate during any period with potential sunshine. The expected inverter operation was thus assumed to be any period of potential sunshine in which no clouds would be present.

From this data, the inverters would operate at most 50.9% of the year, and 6.4% of the nighttime hours (10 PM to 7 AM) within a year. This is due to sunrise potentially occurring before 7 AM in the summer. Based on the data, an equivalent sound level for all nighttime hours in one year ($L_{eq, night, outside}$) was calculated.

The sound level exceeded for 10% of the time over the course of one year (L_{10}) was also calculated, as well as the sound exceeded for 50% of the time over the course of one year (L_{50}). NYCRR §1001.19(f) requires that the future noise levels (L_{10} and L_{50}) be evaluated for "normal operating conditions"; therefore, periods where the facility could not be operating, due to no potential sunshine were excluded from the calculations. The expected annual operational time was found to be 51.3% of the potential minutes of operation in a year as seen in Table 9-6. Because the percent of expected yearly operation was found to be greater than 50% of the potential yearly operation, both the annualized L_{10} and the L_{50} sound power levels will be equal the short-term L_{eq} sound power level of the inverters shown in Table 9-2. The $L_{eq, night, outside}$, L_{10}, and L_{50} sound power levels derived from these calculations are summarized in Table 9-7.

Table 9-4 Summary of Maximum Annual On-Site Sunshine (2019)

Annual Time Period	Maximum Minutes in Period [min]	Maximum Sunshine in Period [min]	Maximum Percent of Period in Operation
Total	525,600	267,516	50.9%
Nighttime	197,100	12,661	6.4%
Daytime	328,500	254,855	77.6%

Table 9-5 Summary of Monthly Sunshine Probability

Month	Possible Sunshine
January	46%
February	52%
March	51%
April	55%
May	53%
June	55%
July	62%
August	58%
September	54%
October	46%
November	33%
December	36%

Table 9-6 Summary of Maximum and Expected Operational Minutes (2019)

Annual Time Period	Maximum Operational Time [min]	Expected Operational Time [min]	Percent of Maximum Operational Time Expected to Occur
Total	267,516	137,129	51.3%
Nighttime	12,661	7,054	55.7%
Daytime	254,855	130,075	51.0%

Table 9-7 Summary of L_{10}, L_{50}, and L_{EQ}, Night, Outside Annual Sound Power Levels – Inverters [dBA]

HEM Inverter	Lw [dBA]
L_{10}	97
L_{50}	97
$L_{eq, night, outside}$	85

9.3.4 Cumulative Modeling Scenarios – ISO 9613-2

Cumulative short-term sound level modeling was conducted using the Cadna/A noise calculation software. For this modeling scenario, cumulative impacts for existing projects and projects that are under construction, permitted or have a stipulation submitted, were taken into consideration. In total, there was one nearby project, which was taken into consideration while determining cumulative impacts of the proposed Project. The nearby project is Birdseye Solar.

The Birdseye Solar project is an existing project, centrally located within the Project. Through multiple sources of publicly available information, various levels of information were ascertained with respect to layout, project size, and inverter location regarding the nearby project. No information on the inverter manufacturer or specifications was available for Birdseye Solar; therefore, the inverter was conservatively considered equivalent to the HEM inverter used for the East Point project.

All modeling inputs and assumptions made earlier in sections 9.3.1 and 9.3.2, were carried out with respect to this cumulative analysis. These inputs and assumptions were implemented in the Cadna/A software for this modeling scenario to ensure conservative results (i.e., higher sound levels).

Sound pressure levels due to the operation of all 16 inverters and the collector substation transformer for the Project, along with the one inverter at the Birdseye Solar site were modeled at 243 receptors within and surrounding the Project area. The sound levels calculated are 1-hour L_{eq} sound levels. In addition to modeling at discrete points, sound levels were also modeled throughout a large grid of receptor points, each spaced 10 meters apart to allow for the generation of sound level isolines. Tabular results and sound level isolines (Figure 9-4) were calculated and generated for the entire Project area.

9.4 Modeling Results

Since the ISO 9613-2 standard does not include the 16 Hz frequency, results at the 16 Hz octave band for each receptor were extrapolated from the 31.5 Hz results. The extrapolation is the difference between the inverter's sound power data at 16 Hz and the sound power data at 31.5

Hz used for modeling as presented in Table 9-3. For example, the HEM Inverter has a sound power level of 91.8 dB at 16 Hz and 90.2 dB at 31.5 Hz. Thus the 31.5 Hz modeled results for the inverter were scaled up by 1.6 dB to calculate the expected sound levels at 16 Hz.

9.4.1 Short-Term – ISO 9613-2

Table E-1 in Appendix E shows the predicted "Project-Only" short-term broadband [dBA] and octave band [dB] sound levels under conditions specified in Section 9.3.2 sorted by modeling receptor ID for the designed project layout. Table E-1.1 presents the same data sorted by sound level from high to low. The tables present modeled 1-hour L_{eq} sound levels at the 243 receptors included in the analysis. The broadband sound levels range from 11 to 43 dBA. In addition to these discrete modeling points, sound level contours generated from the modeling grid are presented in an overview figure, Figure 9-2, accompanied by a series of inset maps that provide a higher level of detail at all modeled receptors.

Table 9-8 presents the number of sensitive noise receptors that have been modeled to experience a worst-case sound level of 35 dBA or greater. Modeled sound levels have been rounded to the nearest integer and presented in 1 dBA increments by receptor participation status. All non-participating receptors are at 42 dBA or less (Receptor ID 2002). One participating receptor is predicted to be at 43 dBA (Receptor ID 2005). All other participating receptors are below 41 dBA.

Table 9-8 Participating and Non-Participating Receptors Modeled at 35 dBA or Greater

Modeled Leq Sound Level [dBA][1]	# of Receptors							
	Year-Round Residence		Seasonal Residence		Unknown		Public	
	Participating	Non-Participating	Participating	Non-Participating	Participating	Non-Participating	Participating	Non-Participating
45	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	1	0
42	0	1	0	0	0	0	0	0
41	0	0	0	0	0	0	1	0
40	1	1	0	0	0	0	0	0
39	0	2	0	0	0	1	0	1
38	0	3	0	0	0	0	0	0
37	0	0	0	0	0	0	0	0
36	0	4	0	1	0	0	0	0
35	0	3	0	0	0	0	0	0

9.4.2 Long-Term – ISO 9613-2 L_{10}, L_{50}, and Nighttime L_{EQ} Annual Sound Level Results

A full year of 2019 site-specific daily sunrise and sunset data were coupled with monthly site-specific sunshine potentials to determine the equivalent L_{10}, L_{50} and nighttime L_{EQ} sound power levels for the HEM Inverter as described in Section 9.3.3. The long-term sound levels have been analyzed based on the following methodology. The analysis includes only periods when the inverters are capable of operating based on the daily sunrise and sunset times. This is conservative in that there will be periods when no sunshine is present (before sunrise or after sunset) and the sound level associated with the inverters will be zero as they will not be operating. These periods have the potential to reduce the sound levels for the various metrics presented in this analysis. The project substation will be energized 24 hours per day, and therefore has been conservatively assumed to be always operating at maximum load for all modeling scenarios.

Using the sound power levels for the HEM Inverter from Table 9-7, the annual Project L_{10} and L_{50} sound level at each noise sensitive location has been calculated, along with the annual L_{EQ} nighttime noise level ($L_{eq,\ night,\ outside}$) at each of the modeled noise sensitive locations. $L_{eq,\ night,\ outside}$ is the equivalent continuous sound level determined over all nighttime periods during the year with the 1001.19 regulations defining nighttime as the period from 10 p.m. to 7 a.m. (1001.19(f)(2)). The definition, as presented in the 2009 WHO document, refers to ISO 1996-2: 1987 and identifies night as an eight-hour period. The more recent ISO 1996-1:2016 (Acoustics – description, measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedures) defines $L_{eq,\ night,\ outside}$ and provides various time frames for a nighttime period. In order to remain consistent with the 2009 WHO document, a night for $L_{eq,\ night,\ outside}$ will be defined as a 9-hour period.

$L_{eq,\ night,\ outside}$ Project sound levels range from 1 to 33 dBA. The highest $L_{eq,\ night,\ outside}$ level at a non-participating receptor is 33 dBA (Receptor ID 1235). In addition to these discrete modeling points, sound level contours generated from the modeling grid are presented in an overview figure, Figure 9-3, accompanied by a series of inset maps that provide a higher level of detail at all modeled receptors. Table 9-9 summarizes the number of receptors equal to or greater than 40 dBA for the $L_{eq,\ night,\ outside}$ sound level.

The annual L_{10} and L_{50} impacts are the same as the short-term 1-hour L_{eq} impacts. Annual Project L_{10} sound levels range from 11 to 43 dBA. The highest L_{10} level at a non-participating receptor is 42 dBA (Receptor ID 2002). Annual Project L_{50} sound levels range from 11 to 43. The highest L_{50} level at a non-participating receptor is 42 dBA (Receptor ID 2002).

The annual L_{10}, L_{50}, and nighttime L_{EQ} ($L_{eq,\ night,\ outside}$) values for all receptors are presented in Table F-1 in Appendix F.

Table 9-9 **Number of Receptors Modeled at 40 dBA or Greater for L_{EQ}-night-outside**

Modeled Leq Sound Level [dBA][1]	# of Receptors	
	Participating	Non-Participating
45	0	0
44	0	0
43	0	0
42	0	0
41	0	0
40	0	0

Notes: 1. Rounded to the nearest whole decibel.

9.4.3 Cumulative – ISO 9613-2

Table G-1 in Appendix G shows the predicted "Cumulative" short-term broadband [dBA] sound levels under conditions specified in Section 9.3.4 sorted by modeling receptor ID for the designed project layout. In addition, Table G-1 displays the predicted "Project Only" short-term broadband [dBA] sound levels from Table E-1 in Appendix E. As a result, the predicted "Surrounding Projects Only" contribution to the short-term broadband [dBA] sound levels is the difference between the two. Table G-1.1 presents the same data sorted by "Cumulative" short-term broadband sound levels from high to low. The tables present modeled 1-hour L_{eq} sound levels at the 243 receptors included in the analysis. The "Cumulative" broadband sound levels range from 11 to 43 dBA. In addition to these discrete modeling points, sound level contours generated from the modeling grid are presented in an overview figure, Figure 9-4, accompanied by a series of inset maps that provide a higher level of detail at all modeled receptors.

Table 9-10 presents the number of sensitive noise receptors that have been modeled to experience a "Cumulative" worst-case L_{eq} 1-hour sound level of 40 dBA or greater. Modeled sound levels have been rounded to the nearest integer and presented in 1 dBA increments by receptor participation status.

Table 9-10 **Participating and Non-Participating Receptors Modeled at 40 dBA or Greater – Cumulative Analysis**

Modeled Leq Sound Level [dBA][1]	# of Receptors	
	Participating	Non-Participating
45	0	0
44	0	0
43	1	0
42	0	1
41	1	0
40	1	1

Notes: 1. Rounded to the nearest whole decibel.

9.5 Total Sound Levels - Modeled Combined with Ambient

9.5.1 Assignment of Ambient Sound Levels to Modeling Locations

Measured ambient data were assigned to each modeling receptor based on proximity between measurement points and the similarity of the soundscape between the evaluated position and the location where the ambient noise levels were measured. Assumptions regarding the similarities of soundscapes were based on personal observations at each of the sound level measurement locations and on a review of the aerial imagery for the area. The modeling receptors were not visited during the measurement program to confirm/deny assumptions made regarding the soundscapes. Table H-1 in Appendix H presents the sound level modeling locations with their assigned ambient measurement location.

9.5.2 Future Total Sound Levels

The worst-case future noise level during the daytime period at all receptors has been determined by logarithmically adding the daytime ambient sound level (L_{90}), calculated from background sound level monitoring in the summer and winter, to the modeled upper tenth percentile sound level (L_{10}) of the Project as per 1001.19(f)(4). The L_{10} statistical noise descriptor corresponds to estimates for one year of operation using the sound power levels for the HEM Inverter, as presented in Table 9-7. These worst-case future noise levels during the daytime period are presented in Table H-2 in Appendix H. Worst case future daytime noise levels range from 22 to 43 dBA.

The worst case future noise level during the summer nighttime period at all receptors has been determined by logarithmically adding the summer nighttime ambient sound level (L_{90}), calculated from background sound level monitoring, to the modeled upper tenth percentile sound level (L_{10}) of the Project as per 1001.19(f)(5). The L_{10} statistical noise descriptor corresponds to estimates for summer nighttime period for one year of operation. These worst-case future noise levels during the summer nighttime period are presented in Table H-2 in Appendix H. Worst case future total summer nighttime noise levels range from 15 to 43.

The worst case future total noise level during the winter nighttime period at all receptors has been determined by logarithmically adding the winter nighttime ambient sound level (L_{90}), calculated from background sound level monitoring, to the modeled upper tenth percentile sound level (L_{10}) of the Project as per 1001.19(f)(6). The L_{10} statistical noise descriptor corresponds to estimates for winter nighttime period for one year of operation. These worst case future noise levels during the winter nighttime period are presented in Table H-2 in Appendix H. Worst case future winter nighttime noise levels range from 17 to 43 dBA.

The typical Project daytime noise level at all receptors which has been determined by logarithmically adding the daytime equivalent average sound level (L_{eq}) calculated from background sound level monitoring, to the modeled median Project sound pressure level (L_{50}) as per 1001.19(f)(9). The L_{50} statistical noise descriptor corresponds to estimates for one year of operation. These typical Project daytime noise levels are presented in Table H-2 in Appendix H. Typical Project daytime noise levels range from 43 to 59 dBA.

9.6 Infrasound and Low Frequency Sound

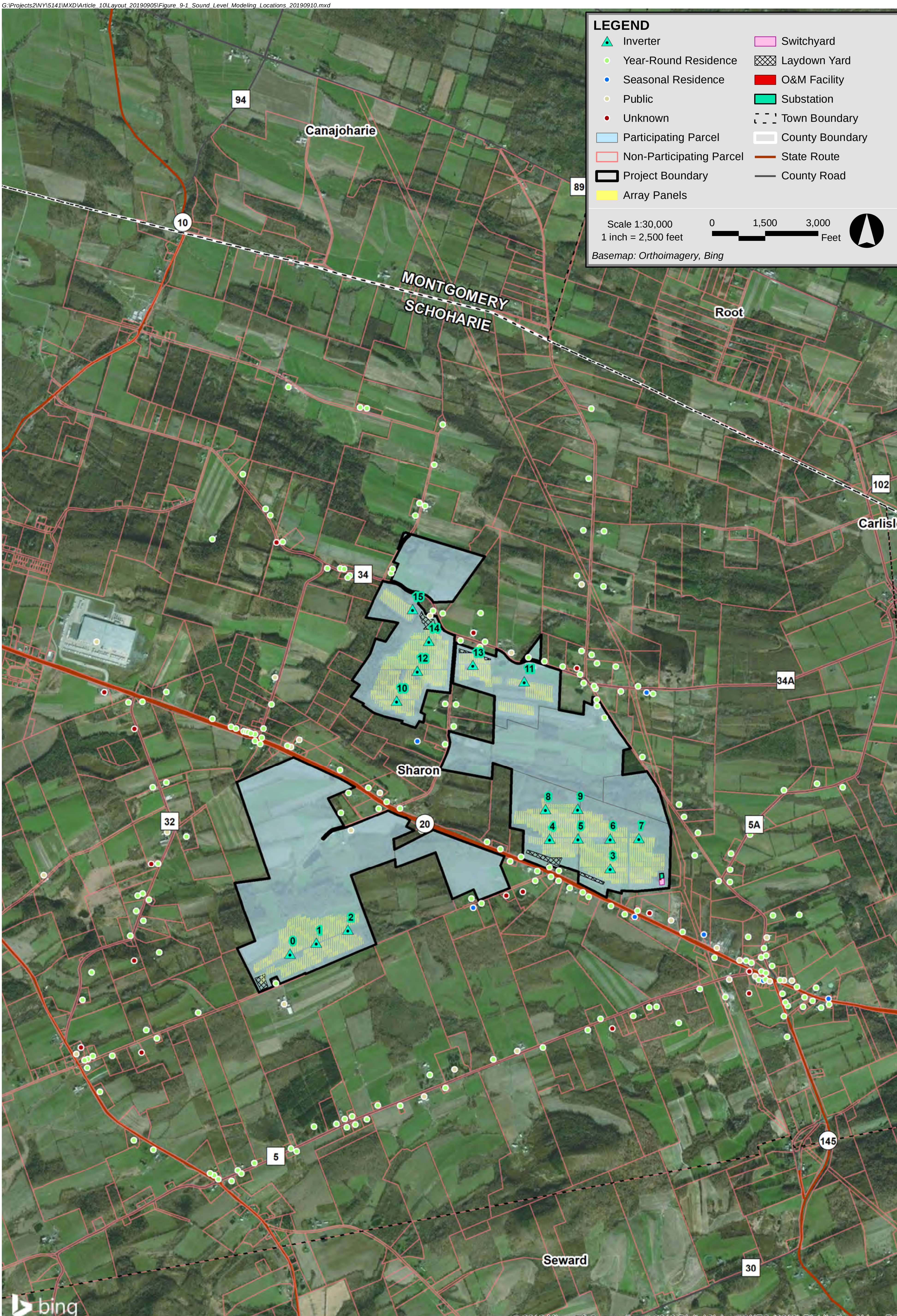
One-third octave band sound pressure level measurements from 12.5 Hz to 20,000 Hz for the HEM Inverter were provided by the Applicant via a sound test report as described in Section 9.2. No sound pressure level data for the proposed inverter was available from the manufacturer. Engineering methods were used to calculate the one-third octave band sound power level utilizing these measurements. The infrasound and low frequency sound power levels for the HEM Inverter are shown in Table 9-11.

Low frequency sound levels down to 31.5 Hz were calculated for each receptor by Cadna/A and are presented in Appendix E. Since the ISO 9613-2 standard does not include the 16 Hz frequency, results at the 16 Hz octave band for each receptor were extrapolated from the 31.5 Hz results. The extrapolation is the difference between the inverter's sound power data at 16 Hz and the sound power data at 31.5 Hz used for modeling as presented in Table 9-3. The results are presented in Appendix E. Solar projects do not produce significant levels of infrasound, and therefore no infrasound below 16 Hz was analyzed in the Application.

Receptors were analyzed for infrasound at 16 Hz according to low frequency and infrasound criteria presented in ANSI 12.2-2008 and ANSI S12.9-2005/Part 4 seen in Table 11-1. All receptors were at or below 55 dB at each of the three frequencies (16, 31.5, 63 Hz).

Table 9-11 HEM Inverter Sound Power Levels—Infrasound & LFN

One-Third Octave Band	HEM Inverter Sound Power Level [dB]
12.5	88
16	87
20	85
25	84
31.5	85
40	87
50	91
63	103
80	96
100	91
125	89
160	91
200	90



East Point Solar Schoharie County, New York

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Figure 9-1

Sound Level Modeling Locations

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Inverter	Array Panels	**Predicted Sound Level (dBA)**
Year-Round Residence	Laydown Yard	5 dBA Contour Interval
Seasonal Residence	Switchyard	1 dBA Contour Interval
Public	O&M Facility	
Unknown	Substation	
Participating Parcel	Town Boundary	
Non-Participating Parcel	County Boundary	
Project Boundary		

Scale 1:8,400
1 inch = 700 feet

0 350 700 Feet

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	1	2	
3	4	5	6
7	8	9	10

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Figure 9-2, Map 1 of 10

Short Term Sound Level Modeling Results

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East Point Solar **Schoharie County, New York**

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Figure 9-2, Map 2 of 10

Short Term Sound Level Modeling Results

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Inverter	Array Panels	**Predicted Sound Level (dBA)**	
Year-Round Residence	Laydown Yard	5 dBA Contour Interval	
Seasonal Residence	Switchyard	1 dBA Contour Interval	
Public	O&M Facility		
Unknown	Substation		
Participating Parcel	Town Boundary		
Non-Participating Parcel	County Boundary		
Project Boundary			

Scale 1:8,400
1 inch = 700 feet

0 350 700 Feet

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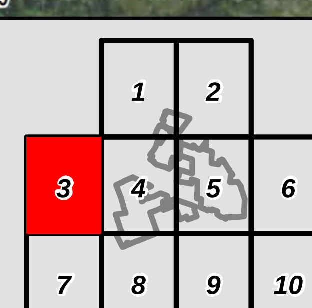

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Figure 9-2, Map 3 of 10
Short Term Sound Level Modeling Results

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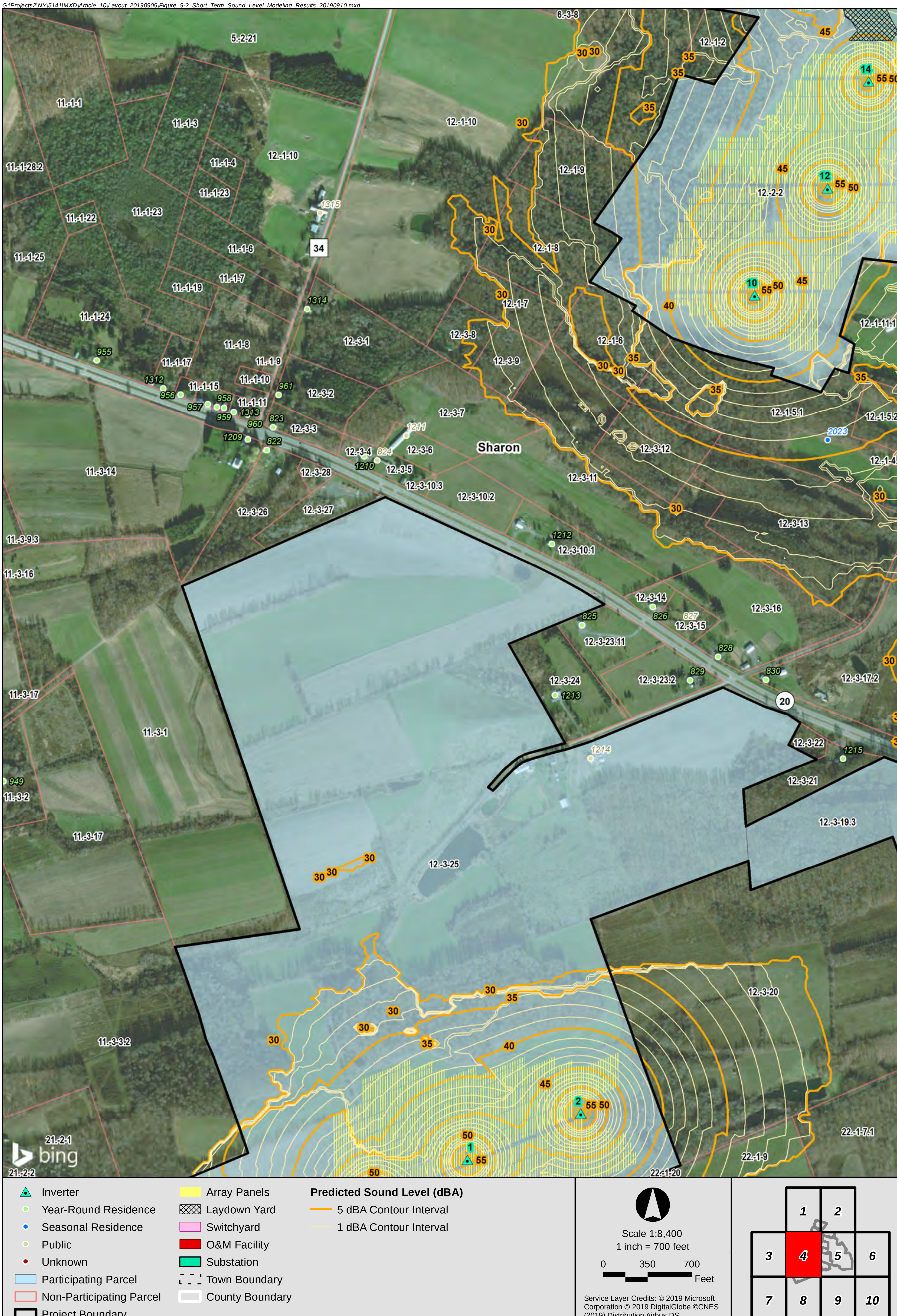

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Figure 9-2, Map 4 of 10

Short Term Sound Level Modeling Results

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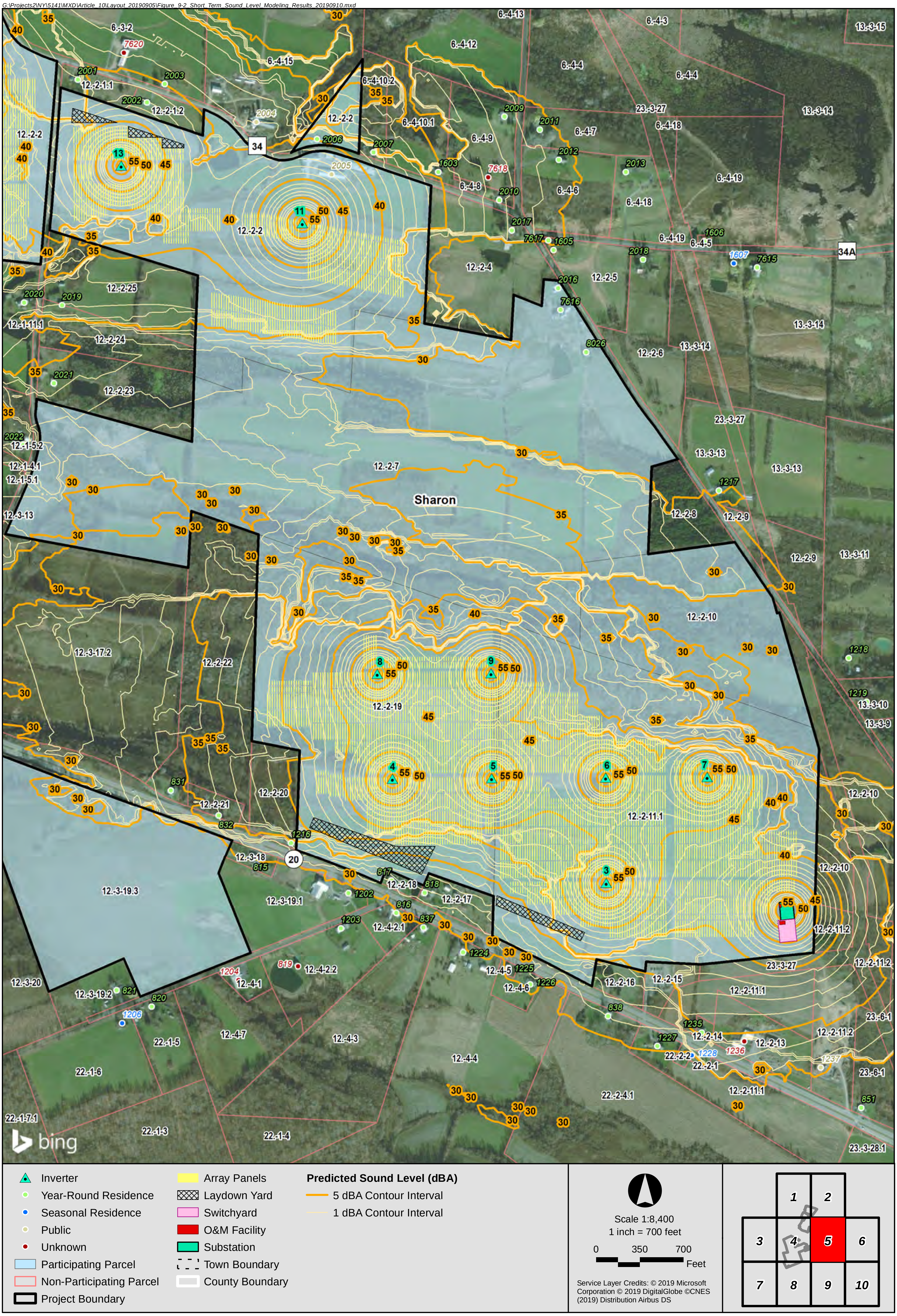

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Figure 9-2, Map 5 of 10

Short Term Sound Level Modeling Results

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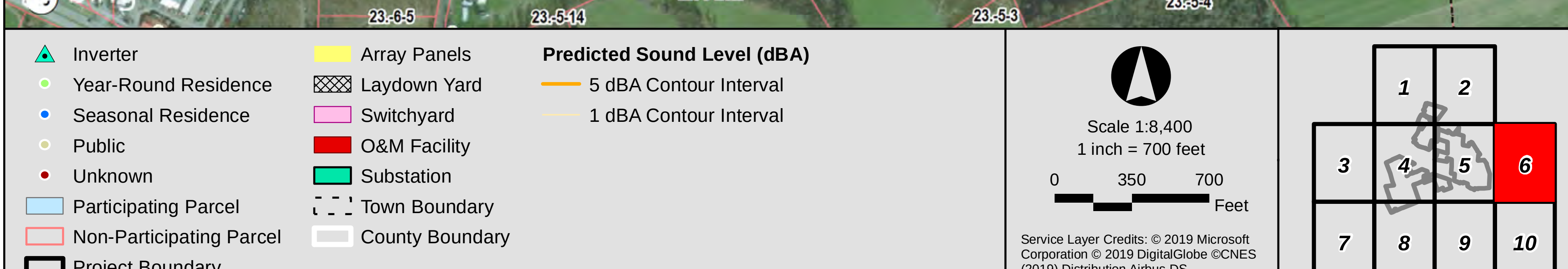

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Figure 9-2, Map 6 of 10

Short Term Sound Level Modeling Results

G:\Projects2\NY\5141\MXD\Article_10\Layout_20190905\Figure_9-2_Short_Term_Sound_Level_Modeling_Results_20190910.mxd

Inverter
Year-Round Residence
Seasonal Residence
Public
Unknown
Participating Parcel
Non-Participating Parcel
Project Boundary

Array Panels
Laydown Yard
Switchyard
O&M Facility
Substation
Town Boundary
County Boundary

Predicted Sound Level (dBA)
5 dBA Contour Interval
1 dBA Contour Interval

Scale 1:8,400
1 inch = 700 feet
0 350 700
Feet

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	1	2	
3	4	5	6
7	8	9	10

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Figure 9-2, Map 7 of 10
Short Term Sound Level Modeling Results

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Figure 9-2, Map 8 of 10

Short Term Sound Level Modeling Results

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- Inverter
- Year-Round Residence
- Seasonal Residence
- Public
- Unknown
- Participating Parcel
- Non-Participating Parcel
- Project Boundary
- Array Panels
- Laydown Yard
- Switchyard
- O&M Facility
- Substation
- Town Boundary
- County Boundary

Predicted Sound Level (dBA)

- 5 dBA Contour Interval
- 1 dBA Contour Interval

Scale 1:8,400
1 inch = 700 feet

0 350 700
Feet

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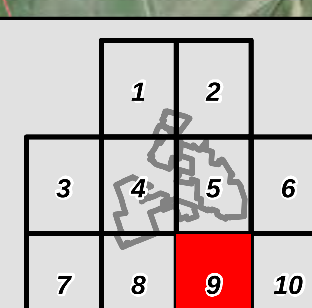

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Figure 9-2, Map 9 of 10

Short Term Sound Level Modeling Results

Inverter
Year-Round Residence
Seasonal Residence
Public
Unknown
Participating Parcel
Non-Participating Parcel
Project Boundary
Array Panels
Laydown Yard
Switchyard
O&M Facility
Substation
Town Boundary
County Boundary

Predicted Sound Level (dBA)
5 dBA Contour Interval
1 dBA Contour Interval

Scale 1:8,400
1 inch = 700 feet
0 350 700
Feet

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1 2 3 4 5 6 7 8 9 10

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Figure 9-2, Map 10 of 10
Short Term Sound Level Modeling Results

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East Point Solar **Schoharie County, New York**

Figure 9-3, Map 1 of 10

Annual Nighttime L_{EQ} Sound Level Modeling Results

G:\Projects2\NY\5141\MXD\Article_10\Layout_20190905\Figure_9-3_Annual_Nighttime_LEQ_Sound_Level_Modeling_Results_20190913.mxd

Inverter
Year-Round Residence
Seasonal Residence
Public
Unknown
Participating Parcel
Non-Participating Parcel
Project Boundary
Array Panels
Laydown Yard
Switchyard
O&M Facility
Substation
Town Boundary
County Boundary

Predicted Sound Level (dBA)
5 dBA Contour Interval
1 dBA Contour Interval

Scale 1:8,400
1 inch = 700 feet
0 350 700 Feet

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1 2 3 4 5 6 7 8 9 10

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Figure 9-3, Map 2 of 10

Annual Nighttime L_{EQ} Sound Level Modeling Results

G:\Projects2\NY\5141\MXD\Article_10\Layout_20190905\Figure_9-3_Annual_Nighttime_LEQ_Sound_Level_Modeling_Results_20190913.mxd

Inverter
Year-Round Residence
Seasonal Residence
Public
Unknown
Participating Parcel
Non-Participating Parcel
Project Boundary
Array Panels
Laydown Yard
Switchyard
O&M Facility
Substation
Town Boundary
County Boundary

Predicted Sound Level (dBA)
5 dBA Contour Interval
1 dBA Contour Interval

Scale 1:8,400
1 inch = 700 feet
0 350 700
Feet

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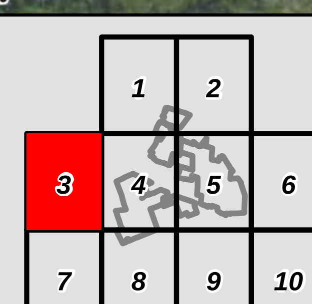

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Figure 9-3, Map 3 of 10
Annual Nighttime L_{EQ} Sound Level Modeling Results

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East Point Solar **Schoharie County, New York**

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Figure 9-3, Map 4 of 10

Annual Nighttime L_{EQ} Sound Level Modeling Results

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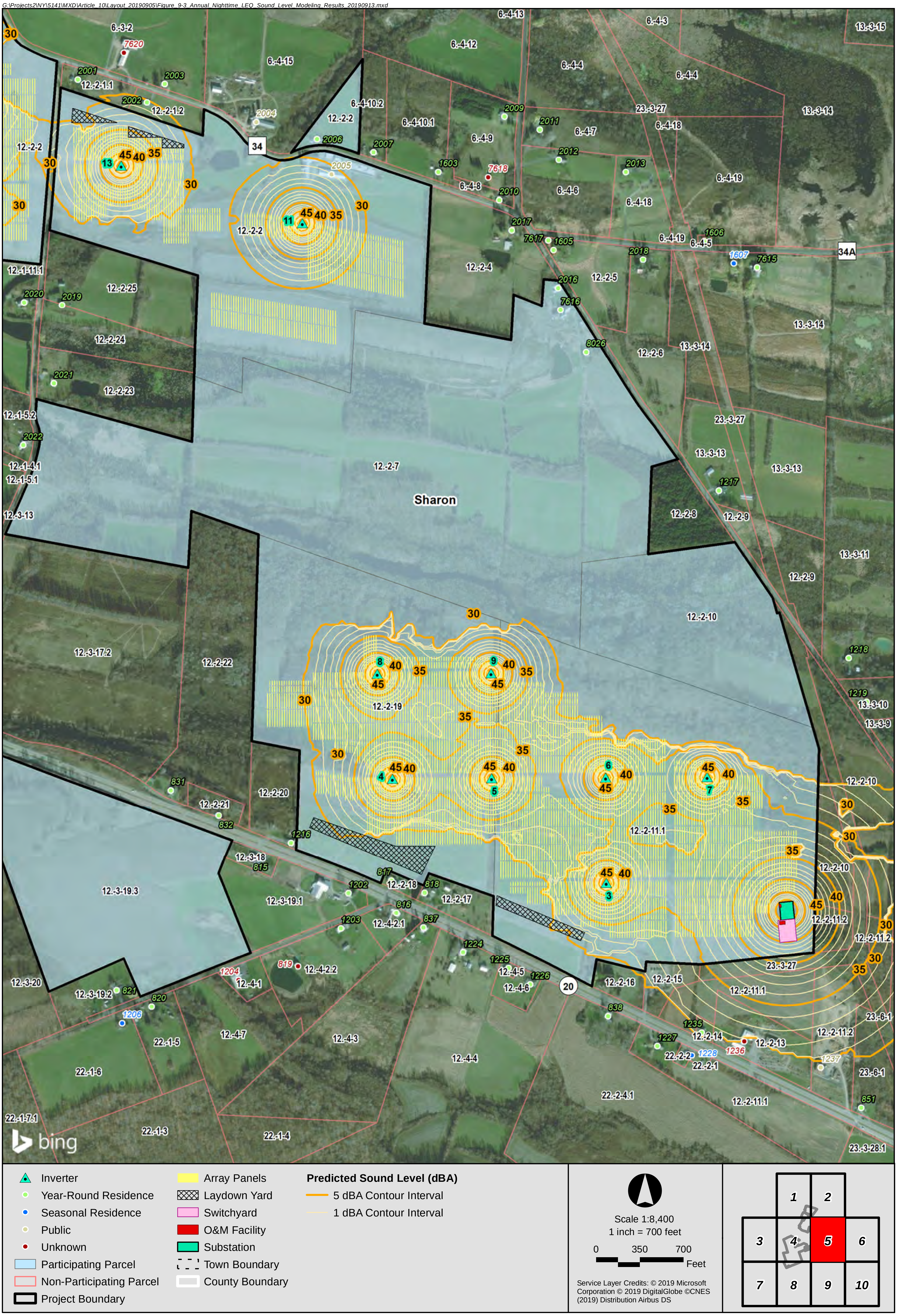

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Figure 9-3, Map 5 of 10

Annual Nighttime L_{EQ} Sound Level Modeling Results

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East Point Solar   Schoharie County, New York

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Figure 9-3, Map 6 of 10

Annual Nighttime L_{EQ} Sound Level Modeling Results

- Inverter
- Year-Round Residence
- Seasonal Residence
- Public
- Unknown
- Participating Parcel
- Non-Participating Parcel
- Project Boundary
- Array Panels
- Laydown Yard
- Switchyard
- O&M Facility
- Substation
- Town Boundary
- County Boundary

Predicted Sound Level (dBA)

- 5 dBA Contour Interval
- 1 dBA Contour Interval

Scale 1:8,400
1 inch = 700 feet

0 350 700 Feet

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1 2 3 4 5 6 7 8 9 10

East Point Solar **Schoharie County, New York**

Epsilon ASSOCIATES INC.

Figure 9-3, Map 7 of 10

Annual Nighttime L_{EQ} Sound Level Modeling Results

- Inverter
- Year-Round Residence
- Seasonal Residence
- Public
- Unknown
- Participating Parcel
- Non-Participating Parcel
- Project Boundary
- Array Panels
- Laydown Yard
- Switchyard
- O&M Facility
- Substation
- Town Boundary
- County Boundary

Predicted Sound Level (dBA)
- 5 dBA Contour Interval
- 1 dBA Contour Interval

Scale 1:8,400
1 inch = 700 feet
0 350 700 Feet

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1 2 3 4 5 6 7 8 9 10

East Point Solar **Schoharie County, New York**

Epsilon ASSOCIATES INC.

Figure 9-3, Map 8 of 10

Annual Nighttime L_{EQ} Sound Level Modeling Results

Inverter
Year-Round Residence
Seasonal Residence
Public
Unknown
Participating Parcel
Non-Participating Parcel
Project Boundary

Array Panels
Laydown Yard
Switchyard
O&M Facility
Substation
Town Boundary
County Boundary

Predicted Sound Level (dBA)
5 dBA Contour Interval
1 dBA Contour Interval

Scale 1:8,400
1 inch = 700 feet
0 350 700
Feet

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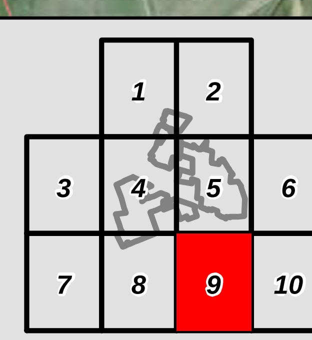

East Point Solar Schoharie County, New York

Epsilon Associates Inc.

Figure 9-3, Map 9 of 10
Annual Nighttime L_{EQ} Sound Level Modeling Results

East Point Solar **Schoharie County, New York**

Epsilon Associates Inc.

Figure 9-3, Map 10 of 10

Annual Nighttime L_{EQ} Sound Level Modeling Results

East Point Solar Schoharie County, New York

Epsilon ASSOCIATES INC.

Figure 9-4, Map 1 of 10

Cumulative Sound Level Modeling Results

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Inverter
Inverter - Birdseye Solar
Year-Round Residence
Seasonal Residence
Public
Unknown
Participating Parcel
Non-Participating Parcel
Project Boundary
Array Panels
Laydown Yard
Switchyard
O&M Facility
Substation
Town Boundary
County Boundary

Predicted Sound Level (dBA)
5 dBA Contour Interval
1 dBA Contour Interval

Scale 1:8,400
1 inch = 700 feet
0 350 700
Feet

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1 2 3 4 5 6 7 8 9 10

East Point Solar **Schoharie County, New York**

Figure 9-4, Map 2 of 10
Cumulative Sound Level Modeling Results

G:\Projects2\NY\5141\MXD\Article_10\Layout_20190905\Figure_9-4_Cumulative_Sound_Level_Modeling_Results_20190913.mxd

Inverter
Inverter - Birdseye Solar
Year-Round Residence
Seasonal Residence
Public
Unknown
Participating Parcel
Non-Participating Parcel
Project Boundary
Array Panels
Laydown Yard
Switchyard
O&M Facility
Substation
Town Boundary
County Boundary

Predicted Sound Level (dBA)
5 dBA Contour Interval
1 dBA Contour Interval

Scale 1:8,400
1 inch = 700 feet
0 350 700 Feet

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1 2 3 4 5 6 7 8 9 10

East Point Solar **Schoharie County, New York**

Epsilon Associates Inc.

Figure 9-4, Map 3 of 10
Cumulative Sound Level Modeling Results

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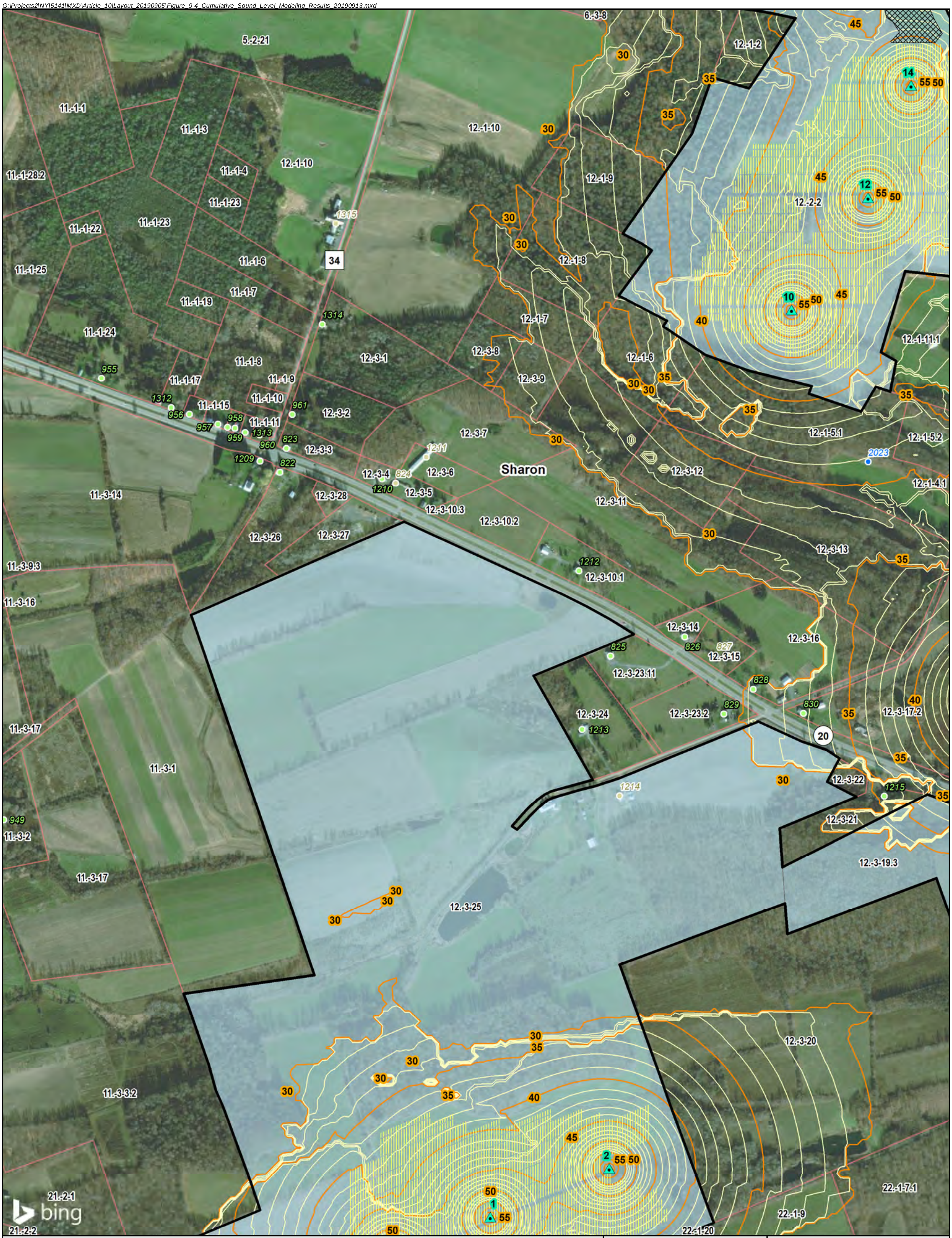

Inverter
Inverter - Birdseye Solar
Year-Round Residence
Seasonal Residence
Public
Unknown
Participating Parcel
Non-Participating Parcel

Project Boundary
Array Panels
Laydown Yard
Switchyard
O&M Facility
Substation
Town Boundary
County Boundary

Predicted Sound Level (dBA)
5 dBA Contour Interval
1 dBA Contour Interval

Scale 1:8,400
1 inch = 700 feet
0 350 700 Feet

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1 2 3 4 5 6 7 8 9 10

East Point Solar **Schoharie County, New York**

Epsilon ASSOCIATES INC.

Figure 9-4, Map 4 of 10
Cumulative Sound Level Modeling Results

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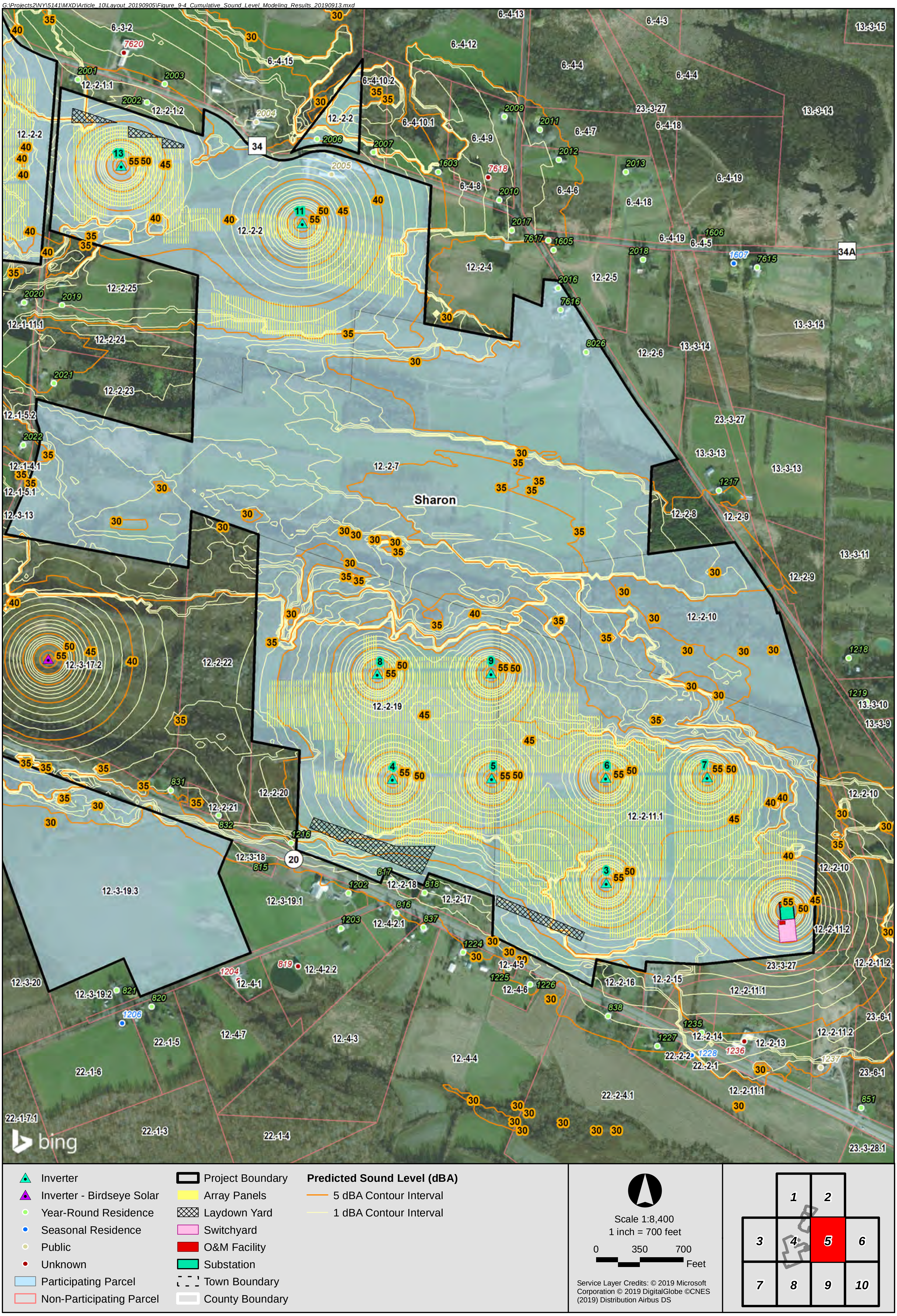

East Point Solar **Schoharie County, New York**

Figure 9-4, Map 5 of 10

Cumulative Sound Level Modeling Results

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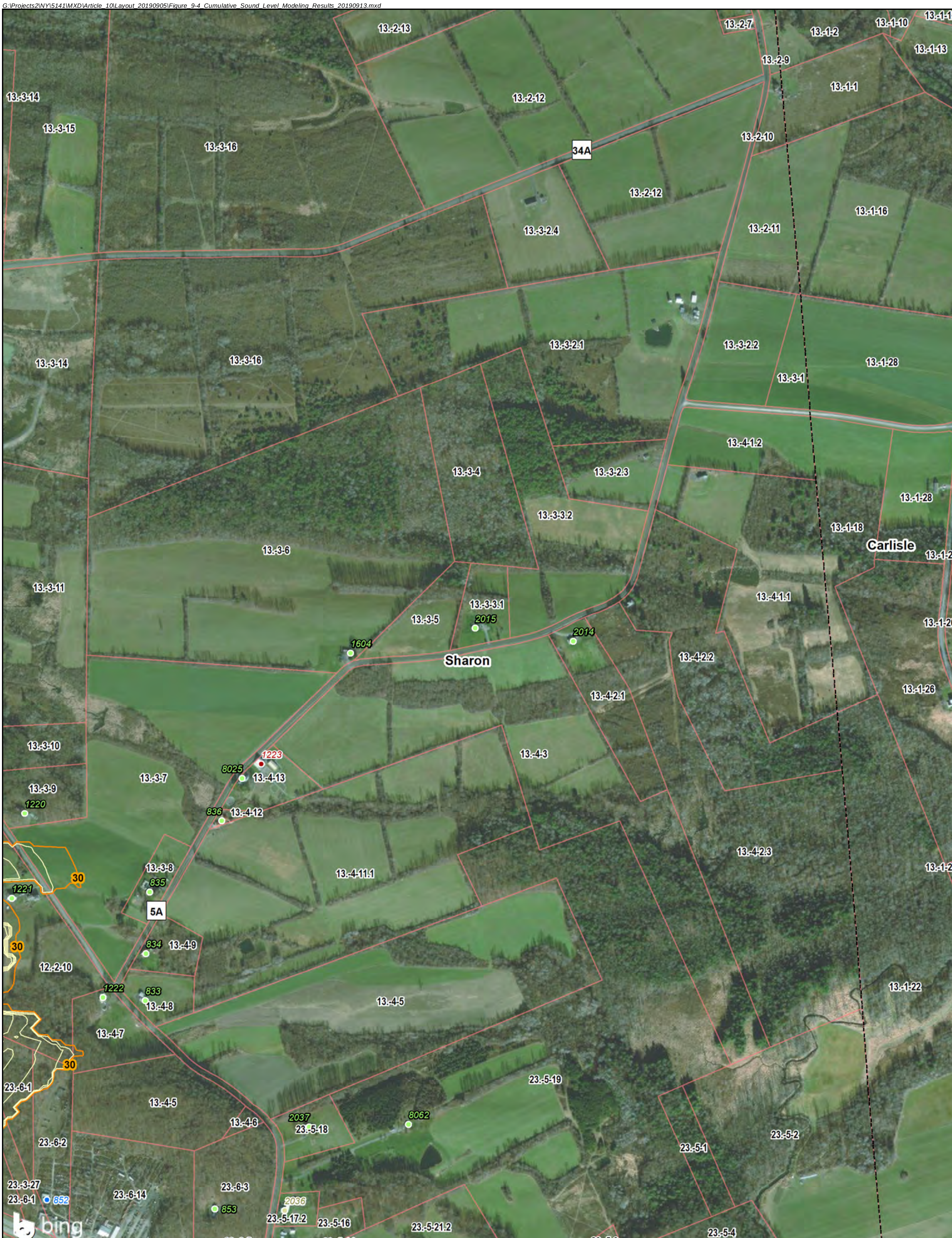

Inverter
Inverter - Birdseye Solar
Year-Round Residence
Seasonal Residence
Public
Unknown
Participating Parcel
Non-Participating Parcel

Project Boundary
Array Panels
Laydown Yard
Switchyard
O&M Facility
Substation
Town Boundary
County Boundary

Predicted Sound Level (dBA)
5 dBA Contour Interval
1 dBA Contour Interval

Scale 1:8,400
1 inch = 700 feet
0 350 700
Feet

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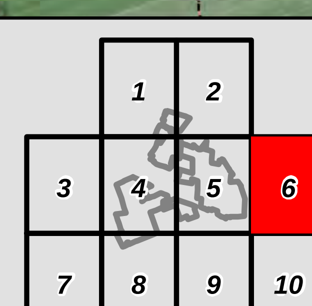

East Point Solar **Schoharie County, New York**

Epsilon Associates Inc.

Figure 9-4, Map 6 of 10
Cumulative Sound Level Modeling Results

Inverter
Inverter - Birdseye Solar
Year-Round Residence
Seasonal Residence
Public
Unknown
Participating Parcel
Non-Participating Parcel

Project Boundary
Array Panels
Laydown Yard
Switchyard
O&M Facility
Substation
Town Boundary
County Boundary

Predicted Sound Level (dBA)
5 dBA Contour Interval
1 dBA Contour Interval

Scale 1:8,400
1 inch = 700 feet
0 350 700
Feet

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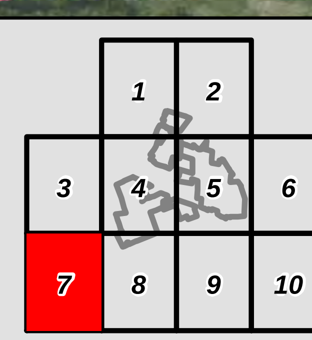

East Point Solar **Schoharie County, New York**

Epsilon ASSOCIATES INC.

Figure 9-4, Map 7 of 10
Cumulative Sound Level Modeling Results

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Inverter	Project Boundary	**Predicted Sound Level (dBA)**
Inverter - Birdseye Solar	Array Panels	5 dBA Contour Interval
Year-Round Residence	Laydown Yard	1 dBA Contour Interval
Seasonal Residence	Switchyard	
Public	O&M Facility	
Unknown	Substation	
Participating Parcel	Town Boundary	
Non-Participating Parcel	County Boundary	

Scale 1:8,400
1 inch = 700 feet

0 350 700
Feet

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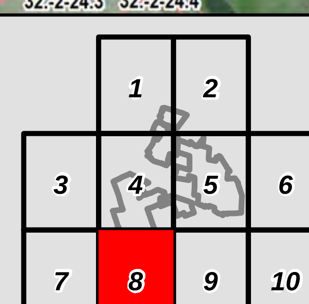

East Point Solar **Schoharie County, New York**

Epsilon

Figure 9-4, Map 8 of 10

Cumulative Sound Level Modeling Results

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Inverter
Inverter - Birdseye Solar
Year-Round Residence
Seasonal Residence
Public
Unknown
Participating Parcel
Non-Participating Parcel

Project Boundary
Array Panels
Laydown Yard
Switchyard
O&M Facility
Substation
Town Boundary
County Boundary

Predicted Sound Level (dBA)
5 dBA Contour Interval
1 dBA Contour Interval

Scale 1:8,400
1 inch = 700 feet
0 350 700
Feet

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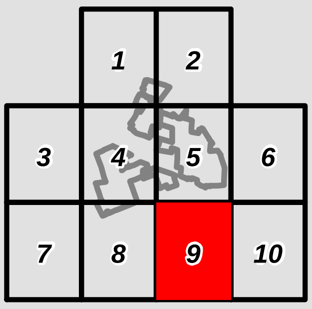

East Point Solar **Schoharie County, New York**

Epsilon

Figure 9-4, Map 9 of 10
Cumulative Sound Level Modeling Results

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Inverter
Inverter - Birdseye Solar
Year-Round Residence
Seasonal Residence
Public
Unknown
Participating Parcel
Non-Participating Parcel
Project Boundary
Array Panels
Laydown Yard
Switchyard
O&M Facility
Substation
Town Boundary
County Boundary

Predicted Sound Level (dBA)
5 dBA Contour Interval
1 dBA Contour Interval

Scale 1:8,400
1 inch = 700 feet
0 350 700 Feet

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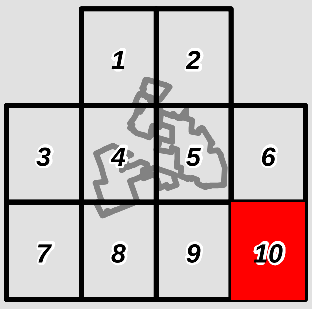

East Point Solar **Schoharie County, New York**

Epsilon ASSOCIATES INC.

Figure 9-4, Map 10 of 10
Cumulative Sound Level Modeling Results