PRE-CONSTRUCTION NOISE IMPACT ASSESSMENT, YELLOW BARN SOLAR

October 2023

Yellow Barn Solar, LLC

Report Title:

Pre-Construction Noise Impact Assessment, Yellow Barn Solar

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Report Prepared for:

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1.0 INTRODUCTION

This report is a Project Noise Impact Assessment ("PNIA") of the proposed Yellow Barn Solar Project (the "Facility" or "Project") as part of its permit application under Chapter XVIII Title 19 of New York Codes, Rules, and Regulations (NYCRR), Part 900 (also known as Section 94-c).[1]

The Facility will be located in the Towns of Groton and Lansing, in Tompkins County, New York. The surrounding area is primarily farmland with some forested and rural residential areas. The Project is proposed as a 160 MW solar facility with supporting infrastructure. It will include a new Point of Interconnect substation taking the 34.5 kV solar generation up to 115 kV for transmission.

This PNIA evaluates the sound generated by the Facility and was conducted as part of the Section 94-c permitting process and in accordance with its regulations.

The PNIA includes:

1. A description of the Facility.
2. A discussion of sound level limit standards and guidelines applicable to the Facility.
3. Sound level monitoring procedures.
4. Sound monitoring results from monitoring conducted within the Facility area.
5. Sound propagation modeling procedures.
6. Sound propagation modeling results.
7. A discussion and analysis of construction noise and its mitigation.
8. Conclusions.

A primer and glossary discussing terms found in this report are in Appendix D and Appendix E.

[1] This study was prepared by Eddie Duncan of Resource Systems Group. Mr. Duncan is Board Certified through the Institute of Noise Control Engineering and a member of the Acoustical Society of America. RSG is a member of the National Council of Acoustical Consultants.

2.0 STANDARDS, GUIDELINES, AND FACILITY DESIGN GOALS

2.1 LOCAL STANDARDS

Town of Groton

The Town of Groton does not have specific noise regulations applicable this Project.

Town of Lansing

The Town of Lansing does not have specific noise regulations applicable to this Project.

2.2 STATE REGULATIONS

NYCRR Title 19 Part 900 (94c)

The Facility is evaluated by New York State under Chapter XVIII, Title 19 of NYCRR Part 900, and noise is evaluated specifically under the State of New York Office of Renewable Energy Siting, Part 900-2.8, Exhibit 7, also called “Section 94-c”.

For solar facilities, the regulation specifies a maximum exterior noise limit of 45 dBA L_{8h} at the outside of any existing non-participating residence and 55 dBA L_{8h} at the outside of any existing participating residence. Noise from collector substation equipment is limited to 40 dBA L_{1h} at existing nonparticipating residences. Audible prominent tones are given a +5 dBA penalty at residences. The tonal penalty applies only at residences, not at residential property lines. The standards are as measured outside the home or building housing the sensitive land use (residence, school, hospital, etc.) and would not apply to areas that have transient uses such as camps, driveways, trails, farm fields, and parking areas.[2]

The regulations also specify a standard of 55 dBA L_{8h} at any portion of a nonparticipating property except NYS-regulated wetlands and utility rights-of-way.

A radius of evaluation, modeling standards, input parameters, and assumptions are also given in the regulations, as well as evaluation procedures for prominent tones, ambient pre-construction baseline conditions, modeling of future noise levels, and reasonable noise abatement measures for operational and construction activities.

[2] Seasonal homes have operating septic systems or running water whereas “camps” do not.

2.3 WORLD HEALTH ORGANIZATION

The United Nation's World Health Organization (WHO) has published "Guidelines for Community Noise" (1999) which uses research on the health impacts of noise to develop guideline sound levels for communities. The foreword of the report states, "The scope of WHO's effort to derive guidelines for community noise is to consolidate actual scientific knowledge on the health impacts of community noise and to provide guidance to environmental health authorities and professionals trying to protect people from the harmful effects of noise in non-industrial environments."

The WHO long-term guideline to protect against hearing impairment is 70 dBA L_{24h} over a lifetime exposure, and higher for occupational or recreational exposure. For short-term protection against hearing impairment due to impulsive sound the guideline is 120 dB-peak for children and 140 dB-peak for adults. Section 94-c requires comparison with these thresholds for construction and blasting.

2.4 SOUND THRESHOLDS FOR YELLOW BARN SOLAR

A summary of the design goals, regulatory limits, and proposed assessment thresholds are shown in Table 1.

TABLE 1: FACILITY DESIGN GOALS AND REGULATORY LIMITS

To Address	Guideline or Regulation
Section 94-c regulations – residences exterior	Nonparticipating: 45 dBA L_{8h}
	Participating: 55 dBA L_{8h}
Section 94-c regulations – residential property lines	Nonparticipating: 55 dBA L_{8h}
Section 94-c regulation – from substation noise	40 dBA L_{1h} for nonparticipating residences
WHO 1999 hearing impairment guidelines [per Section 94-c, Exhibit 7(m)(1)]	120 dB-peak for children
	140 dB-peak for adults
	70 dBA L_{24h}
ANSI S12.9 Part 4 tonal penalty [per Section 94-c, Exhibit 7(b)(2)(ii)]	5 dB penalty for audible prominent tones at sensitive receptors

3.0 FACILITY DESCRIPTION

3.1 FACILITY AREA

The Facility will be located in the Towns of Groton and Lansing in Tompkins County, New York. The Facility extends from the Groton/Dryden town line in the south to about 540 meters (0.3 miles) south of Spring Street Extension in the north. It reaches as far west as Van Ostrand Road and as far east as 800 meters (0.5 miles) west of Smith Road.

The area is primarily agricultural and forested, with scattered residences and farmsteads throughout. The Village of Groton is located approximately 3.8 kilometers (2.4 miles) to the east-northeast of the Project area.

There are 508 sensitive receptors included in this assessment including 492 non-participating residences.

There are no solar or wind facilities within a 3,000-foot radius of the Facility.

3.2 PROJECT ELEMENTS

The Facility is proposed as a 160 MW solar facility with supporting infrastructure. It will include a new Point-of-Interconnect substation, stepping up the 34.5 kV from the solar power generation to 115 kV for transmission.

The primary operational sound sources include one high-voltage substation transformer (184 MVA) and 50 inverter skids. Each skid includes an inverter and a medium voltage transformer. Secondary operational sound sources include HVAC units at the substation control buildings, and 5,046 solar tracking motors spread throughout the solar arrays. Sound emissions of all these sources are included in the PNIA sound modeling.

Typical operations of the Facility include transformers and inverters operating during the day with periodic operation of the tracking motors. Only transformers would typically operate at night. While the inverters may operate on occasion at night for VAR support, the sound emissions for this mode are reported to be lower than during the day.[3]

Electricity from all the arrays will come together through underground collections lines into the proposed substation just east of Van Ostrand Road in the southwest corner of the Project area. An existing powerline right-of-way runs along the eastern edge of the substation parcel. The nearest residence to the proposed substation (Receptor 382) is approximately 165 meters (541 feet) to the northeast across the powerline right-of-way.

[3] Bastasch, et al., 2022," Sound emissions in solar and battery energy storage," Proceedings of NoiseCon 2022, Lexington, KY.

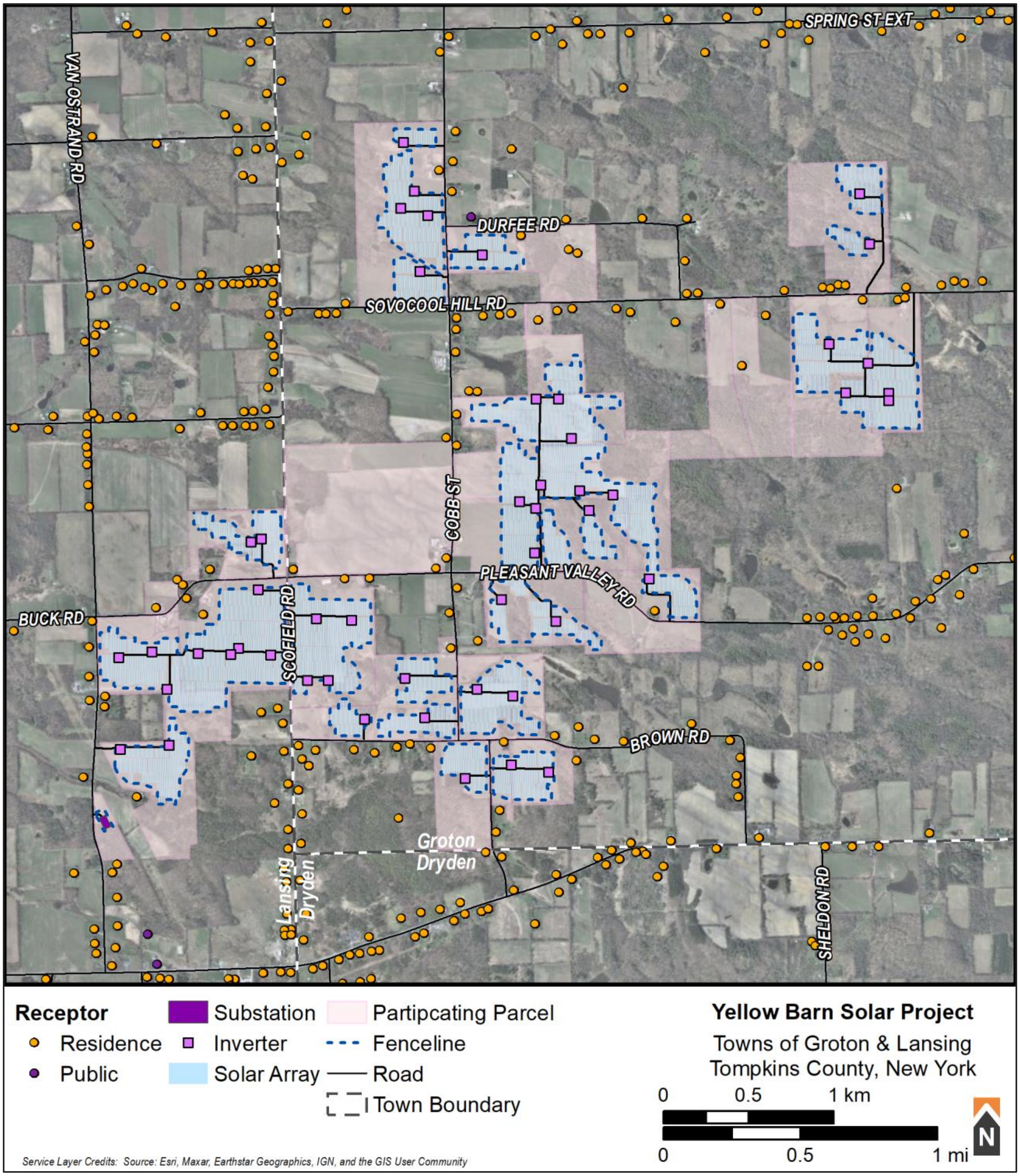

FIGURE 1: FACILITY SITE MAP

4.0 BACKGROUND SOUND LEVEL MONITORING

4.1 PROCEDURES

Background sound levels were measured at five locations around the study area for approximately six days each. The monitoring period was from November 11 to November 17, 2022. A map of the monitor locations is provided in Figure 2.

Equipment

Sound levels were measured using ANSI/IEC Class 1 sound level meters including Svantek 977C, Svantek 979, and Cirrus 171B sound level meters. Audio recordings were also made at each location to aid in source identification and soundscape characterization. Svantek 979 and 977C meters include internal recording devices while the Cirrus 171B meters were attached to an external audio recorder (Roland R-05 or R-09HR). All sound level meters logged A-weighted and 1/3 octave band equivalent sound levels once each second continuously throughout the monitoring period.

Each sound level meter microphone was mounted on a wooden stake at a height of approximately 1.2 meters (4 feet) and covered with a seven-inch weather-resistant windscreen. The windscreen reduces the influence of wind-induced self-noise on the measurements. The sound level meters were field calibrated before and after each measurement period.

Wind data was logged at each site using ONSET anemometers which recorded average wind speed and wind gust speed data once per minute and was installed at microphone height (1.2 meters). Temperature was logged at one site (Monitor E). ASOS data from Ithica was used to track precipitation.

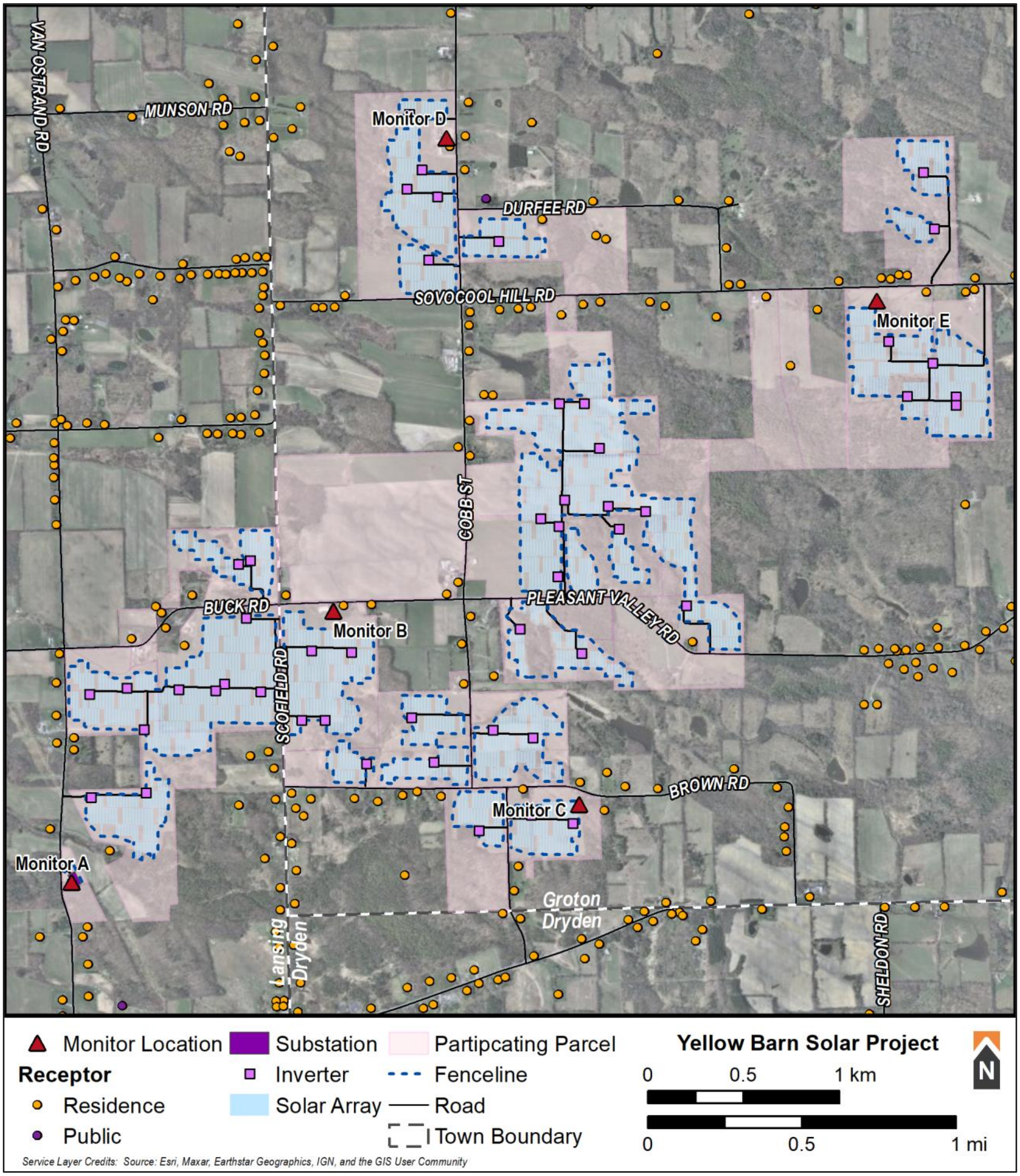

FIGURE 2: OVERVIEW OF SOUND MONITOR LOCATIONS

4.2 MONITOR LOCATIONS

Monitor A: Van Ostrand Road

Monitor A was located in the edge of the field on the same parcel as the proposed Project substation in the southwest corner of the Project Area. The monitor was situated approximately 50 meters (164 feet) east of Van Ostrand Road and approximately 865 meters north of the intersection of Peruville Road and Van Ostrand Road. The broader area is a mixture of forest and agricultural fields a few nearby residences. There is an existing power line that runs along the eastern side of the parcel. A map of the location is provided in Figure 3 and a photo is shown in Figure 4.

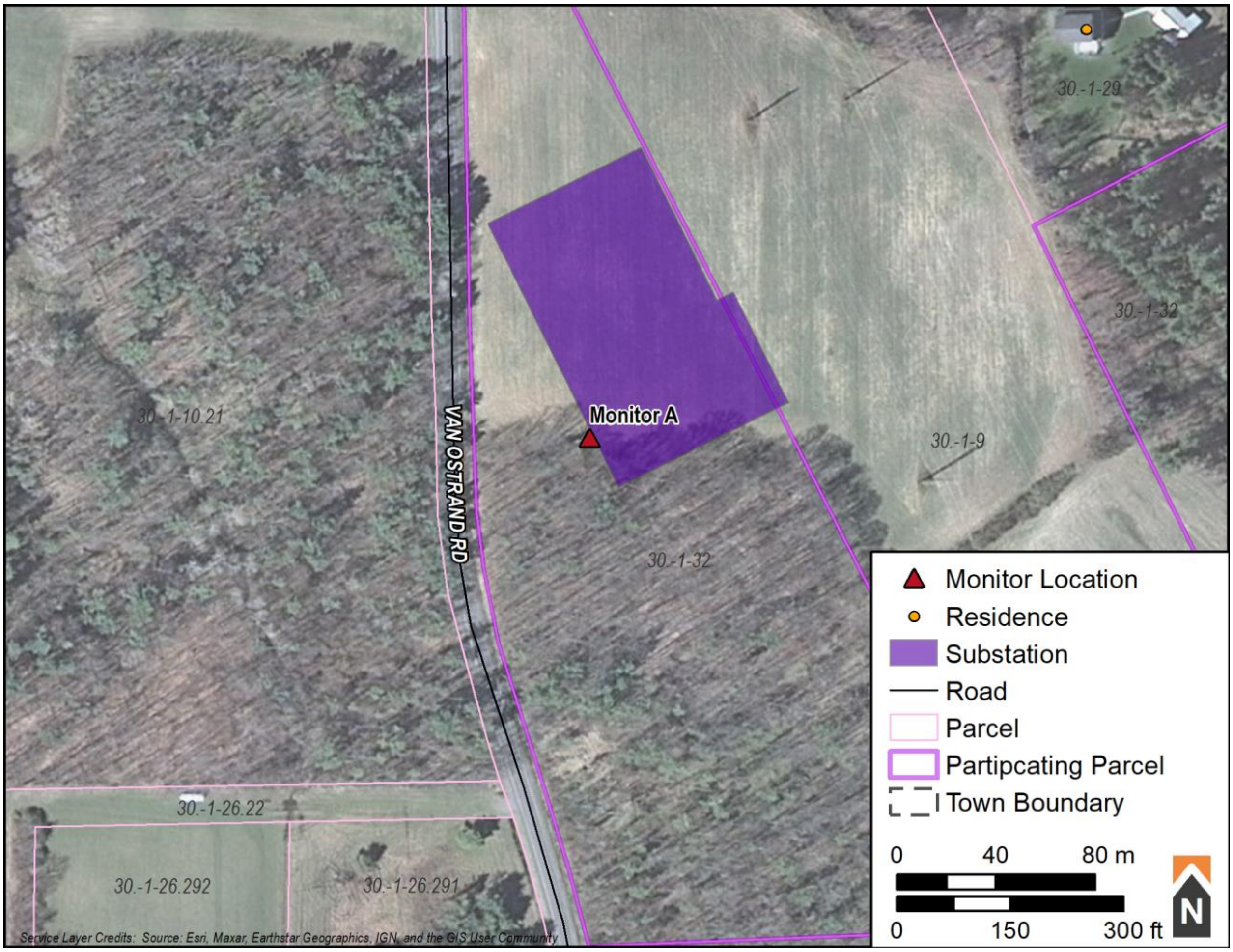

FIGURE 3: MAP OF MONITOR A LOCATION

FIGURE 4: PHOTO OF MONITOR A LOCATION

Monitor B: Pleasant Valley Road

Monitor B was located on the edge of a lawn at a residential parcel on Pleasant Valley Road in the middle of the Project area. The monitor was setback approximately 45 meters (148 feet) south of Pleasant Valley Road. A agricultural outbuilding was located approximately 25 meters (82 feet) to the west-northwest, and a residences was approximately 50 meters (164 feet) to the east-northeast. The surrounding area was largely agricultural, with residences to the east and west along Pleasant Valley Road. A map of this location is found in Figure 5 and a picture is shown in Figure 6.

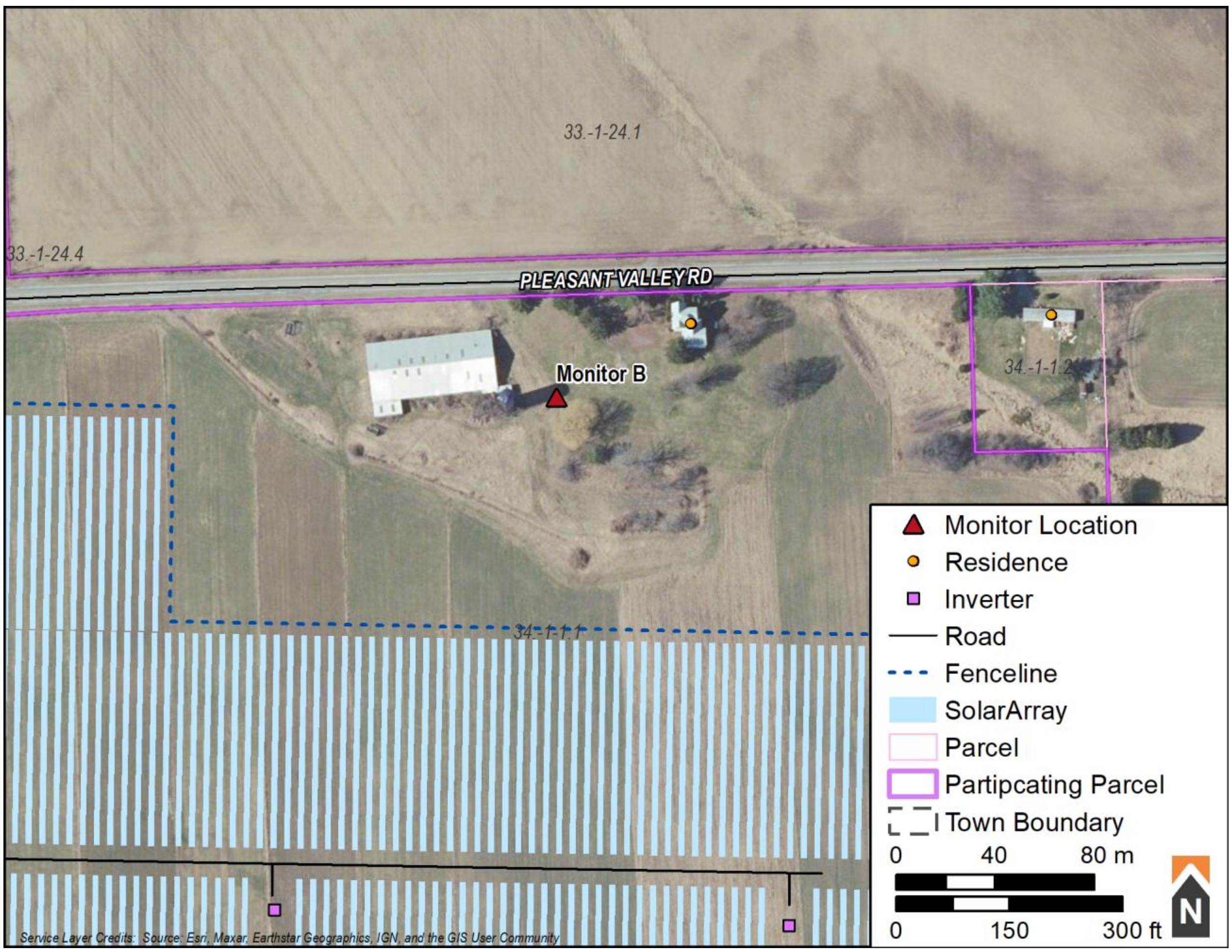

FIGURE 5: MAP OF MONITOR B LOCATION

FIGURE 6: PHOTO OF MONITOR B LOCATION

Monitor C: Brown Road

Monitor C was located 70 meters (230 feet) south of Brown Road and 390 meters (1,280 feet) east of the intersection between Brown Road and Cobb Street in the southeast corner of the Project area. The monitor was situated on the western edge of a forested area at the edge of a field. The closest residence to this monitor was approximately 100 meters (328 feet) north across Brown Road. There are other residences to the east and west along Brown Road as well. A map of this location is Figure 7 and a picture is Figure 8.

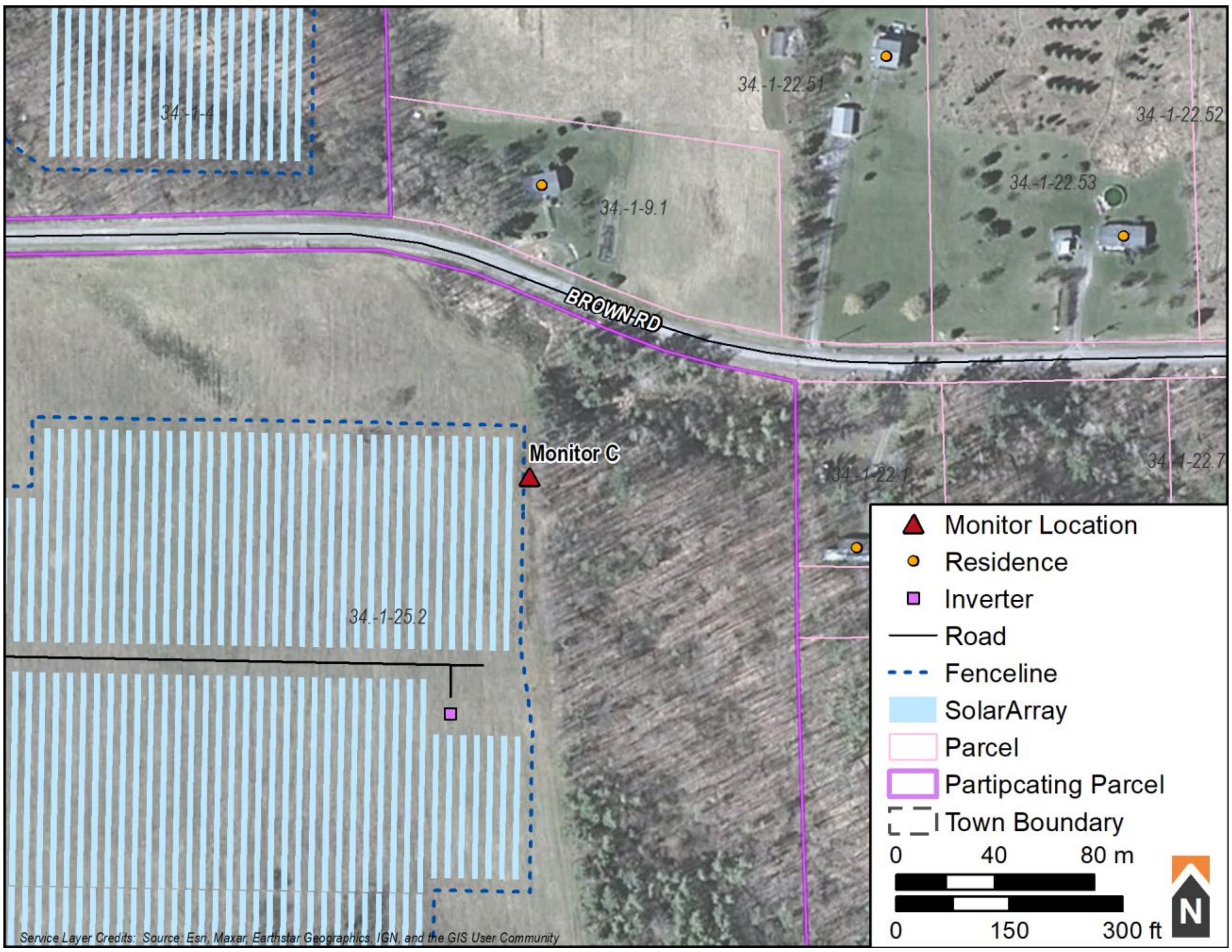

FIGURE 7: MAP OF MONITOR C LOCATION

FIGURE 8: PHOTO OF MONITOR C LOCATION

Monitor D: Cobb Street

Monitor D was in the northern part of the Project area, approximately 45 meters (148 feet) west of Cobb Street at a residential property. It was situated at the edge of a lawn approximately 37 meters (121 feet) north-northwest of the residence on the property, and 25 meters (82 feet) east-northeast of an agricultural outbuilding. The intersection of Cobb Street and Durfee Road was 375 meters (1,230 feet) to the south. The area around the monitor was primarily agricultural and residential along Cobb Street, with forested areas to the west. A map of the location is provided in Figure 9 and a picture in Figure 11.

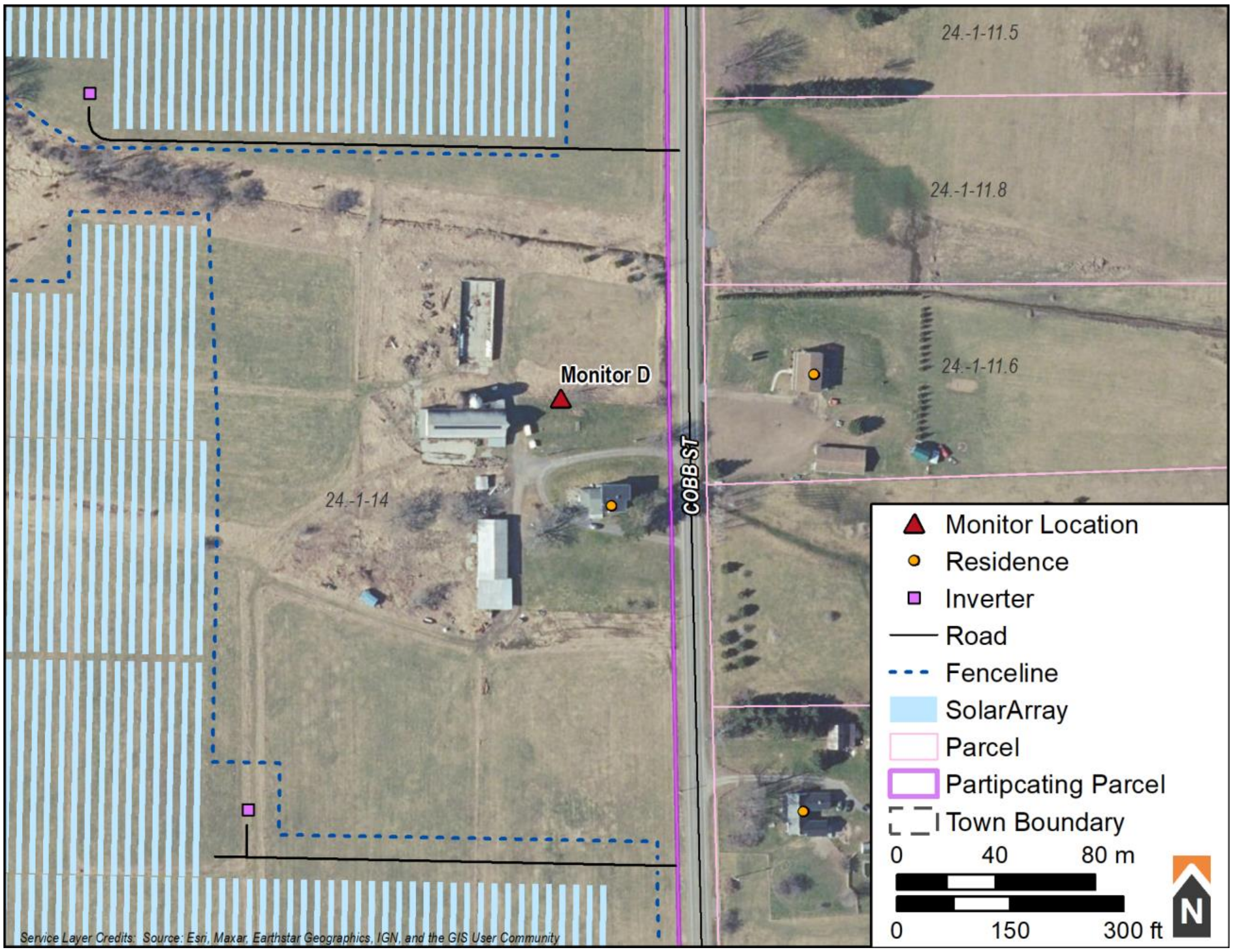

FIGURE 9: MAP OF MONITOR D LOCATION

FIGURE 10: PHOTO OF MONITOR D LOCATION

Monitor E: Sovocool Hill Road

Monitor E was in the northeast section of the Project area, approximately 70 meters (148 feet) south of Sovocool Hill Road on the edge of a field near a small, forested area. The intersection of Sovocool Hill Road and Durfee Road was 810 meters (2,657 feet) to the west. The nearest residence to the monitor was approximately 115 meters (377 feet) to the north. The area around the monitor was a mixture of agricultural and forested lands with residences to the east and west along Sovocool Hill Road. A map of the location is provided in Figure 11 and a picture in Figure 12.

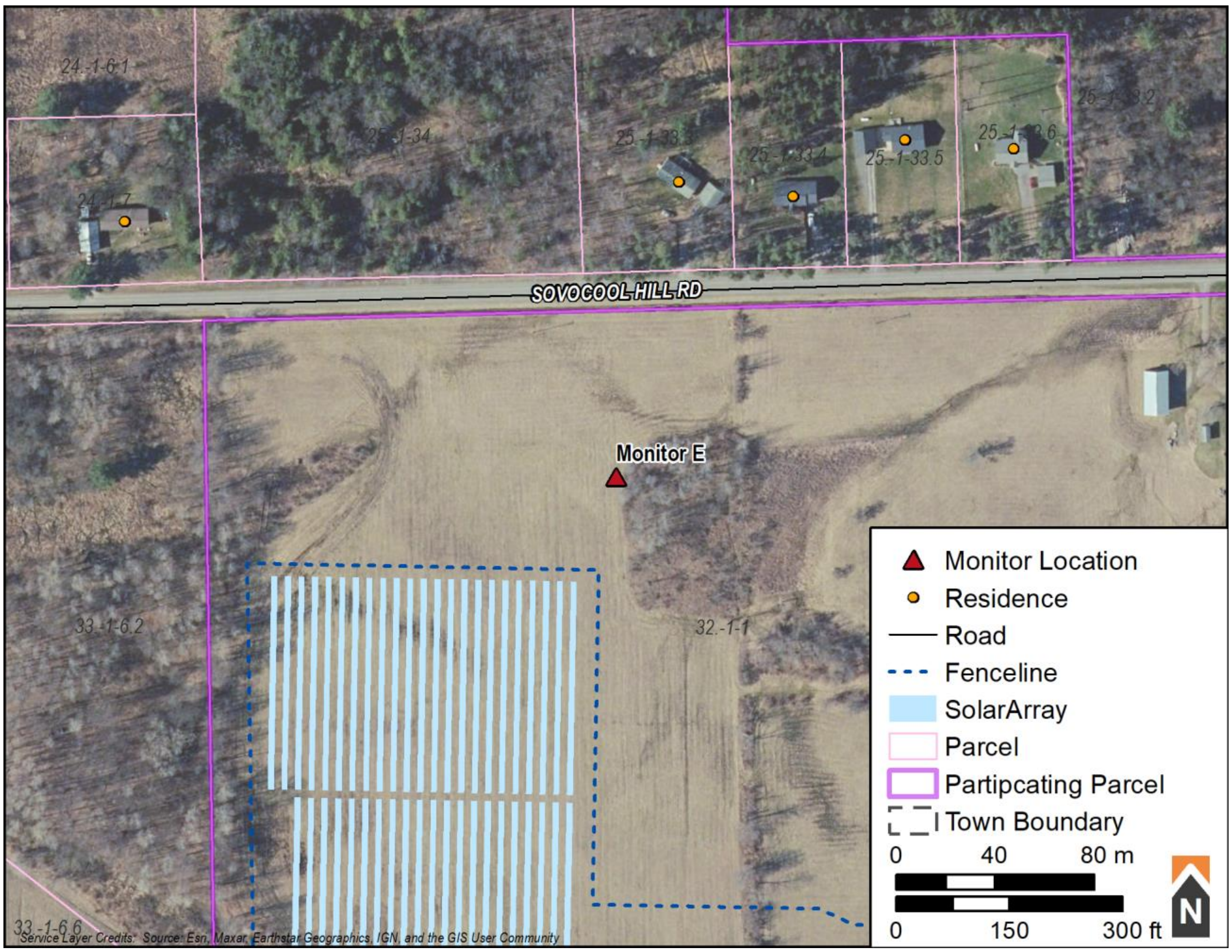

FIGURE 11: MAP OF MONITOR E LOCATION

FIGURE 12: PHOTOGRAPH OF MONITOR E LOCATION

4.3 DATA ANALYSIS

Sound level data from each monitor were averaged into 10-minute periods and summarized over the entire monitoring period. Statistical levels were calculated from the one-second L_{eq} measurements. Data were excluded from the averaging under the following conditions:

- Wind gust speeds above 5 m/s (11 mph)
- Temperatures below -18° C (0° F)
- Precipitation in the form of rain, sleet, or ice
- Thunder
- Humidity outside the specifications of the sound level meter
- Anomalous sounds that were out of character for the area being monitored

- Seasonal sound sources such as harvesting equipment, lawn mowers, and snow removal equipment, and
- Equipment interactions by RSG staff during microphone calibration and maintenance.

Seasonal and biogenic sounds including insects and birds were present. These are considered seasonal sounds. To exclude these sounds, the ANSI S12.100 "ANS" frequency-weighting network was applied to all logged data for which bird and insect sound was found. If tones above 1.25 kHz were detected, then the A-weighted sound level was recalculated by summing 1/3 octave bands from 20 Hz to 1.25 kHz.[4] This effectively removes the high-frequency portion of the sound for those periods.

4.4 MONITOR RESULTS

Over 550 hours of sound level data were collected across the five monitoring sites. The data were analyzed and are reproduced in this section.

Format of Monitor Results

For each monitoring location, results are presented as weekly graphs of sound level and maximum wind gust speed as a function of time throughout the monitoring period. Each point on the graph represents data summarized for a single 10-minute interval. Equivalent continuous sound levels (L_{eq}) are the energy-average level over 10 minutes.[5] Tenth-percentile sound levels (L_{90}) are the statistical value above which 90% of the sound levels occurred during the 10 minutes.

Wind speed data came from the collocated anemometer and are presented as the maximum gust speed occurring over the 10-minute interval.

[4] Sounds considered tonal that get the ANS weight applied are those for which a prominent discrete high frequency (>1.25 kHz) tone is found using either of the two methods:

1. If a 1/3 octave band exceeds the neighboring 1/3 octave band on either side by more than 5 dB (as in ANSI S12.9 Part 4 Annex C), or
2. If a 1/3 octave band exceeds the average of the two neighboring lower and two neighboring upper 1/3 octave bands on each side by more than 5 dB.

The latter method is used to capture complex bird harmonic sounds that would not be considered tonal under the first method.

[5] All averages of sound pressure levels presented in this report are equivalent continuous averages, as opposed to arithmetic averages. See Appendix D and Appendix E for definitions.

Monitor A Results

Results for Monitor A are provided in Figure 13. Higher sound levels during the day were caused primarily by local on Van Ostrand Road and more distant traffic (i.e. Peruville Road) causing Monitor A to register the highest sound levels of all the monitor locations. The diurnal pattern is present in both the L_{eq} and L_{90} metrics with the L_{eq} generally rising to around 50 dBA during the day and falling to around 30 to 45 dBA at night. Other contributing sources of sound were farm equipment, aircraft overflights, and occasional biogenic sounds.

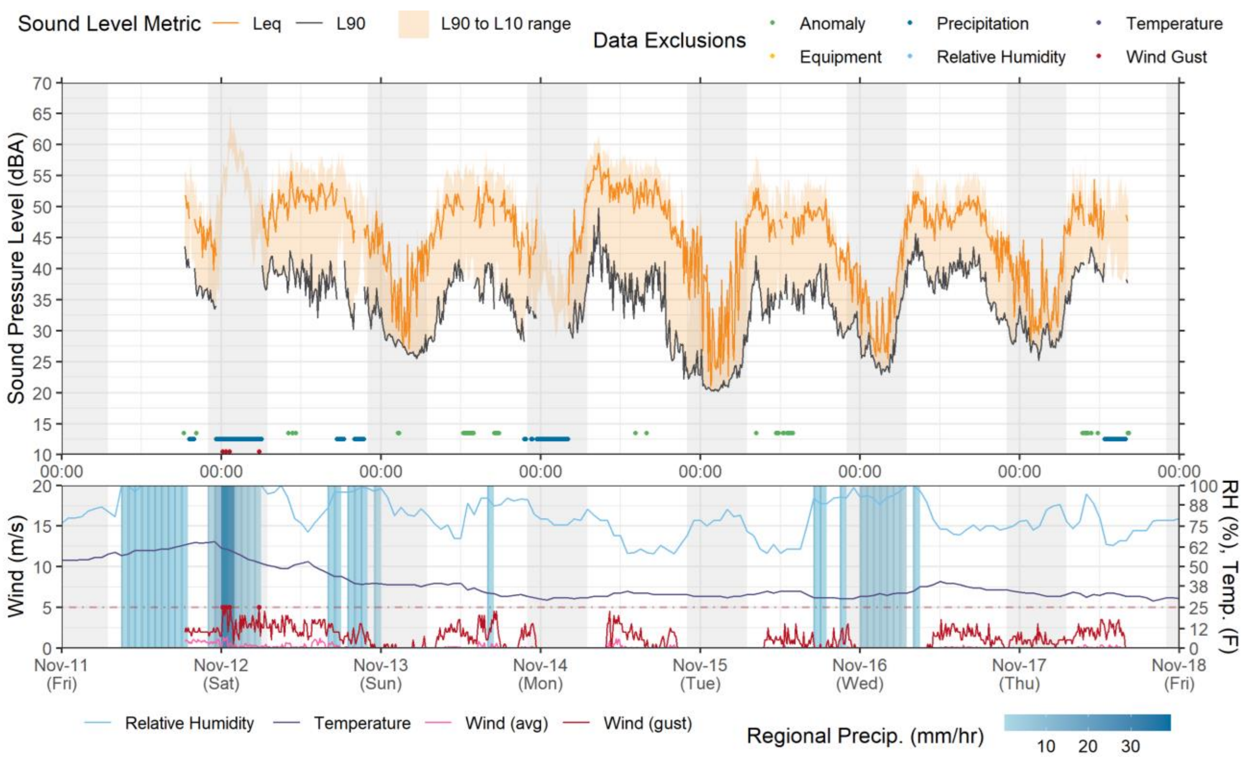

FIGURE 13: TIME-HISTORY RESULTS FOR MONITOR A, NOVEMBER 11 – 17, 2022

Monitor B Results

Results for Monitor B are provided in Figure 14. Contributing sources of sound including local traffic, aircraft overflights, distant farm equipment, and biogenic sounds. The sound levels at this location exhibit a moderate diurnal pattern for both the L_{eq} and L_{90}, due to sound from local traffic on Pleasant Valley Road and other distant anthropogenic sounds during the day. Daytime sound levels ($L_{eq,\ 10\text{-min}}$) were generally between 35 dBA and 45 dBA, with nighttime sound levels generally between 20 dBA and 40 dBA.

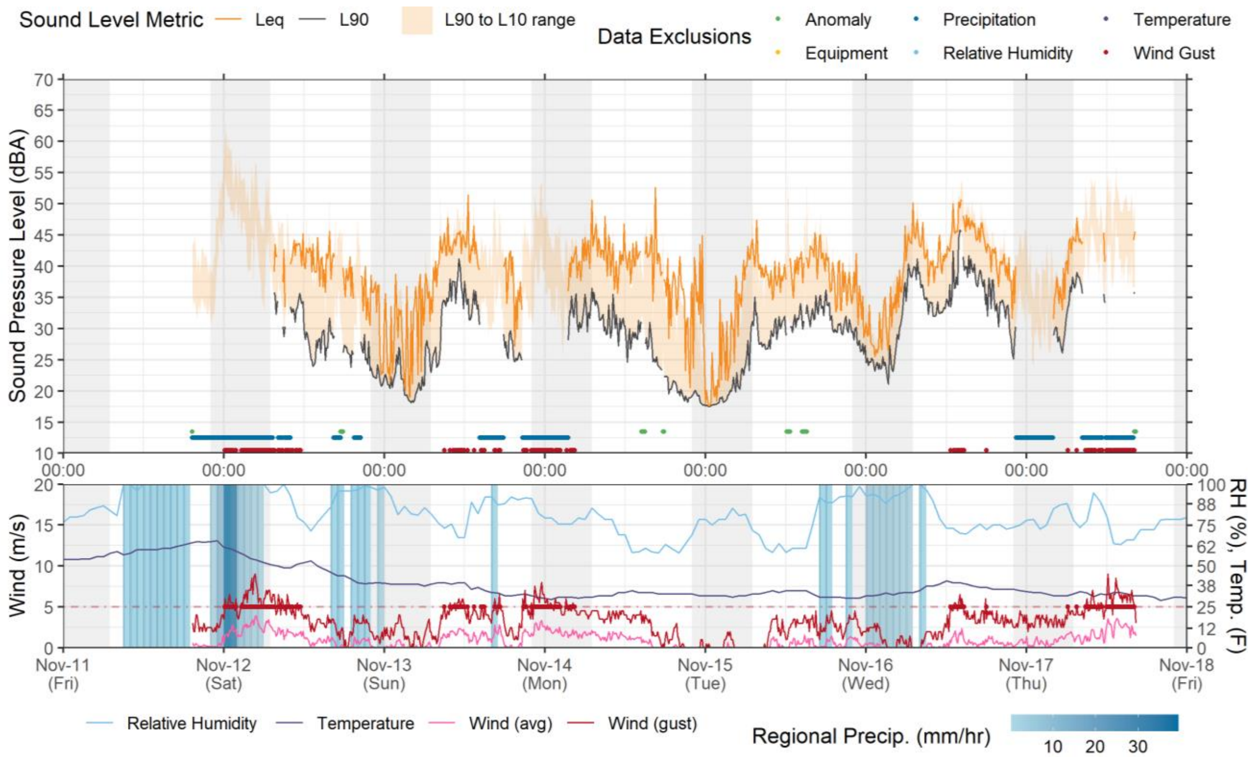

FIGURE 14: TIME-HISTORY RESULTS FOR MONITOR B, NOVEMBER 11 – 17, 2022

Monitor C Results

Results for Monitor C are provided in Figure 15. As shown in Figure 15, only about a day and a half of data was collected at Monitor C due to a failure in data logger system for the monitor; still good daytime and nighttime data were collected over that period. Based on this shorter timer period, it appears as though a diurnal pattern would have been present at this site as well with contributing sources of sound including local traffic, aircraft overflights, and some biogenic sound. Relative to the other monitor locations however, Monitor C appeared to have less sound from traffic. Daytime sound levels ($L_{eq, 10\text{-}min}$) were generally between 35 dBA and 45 dBA, with nighttime sound levels generally between 25 dBA and 35 dBA.

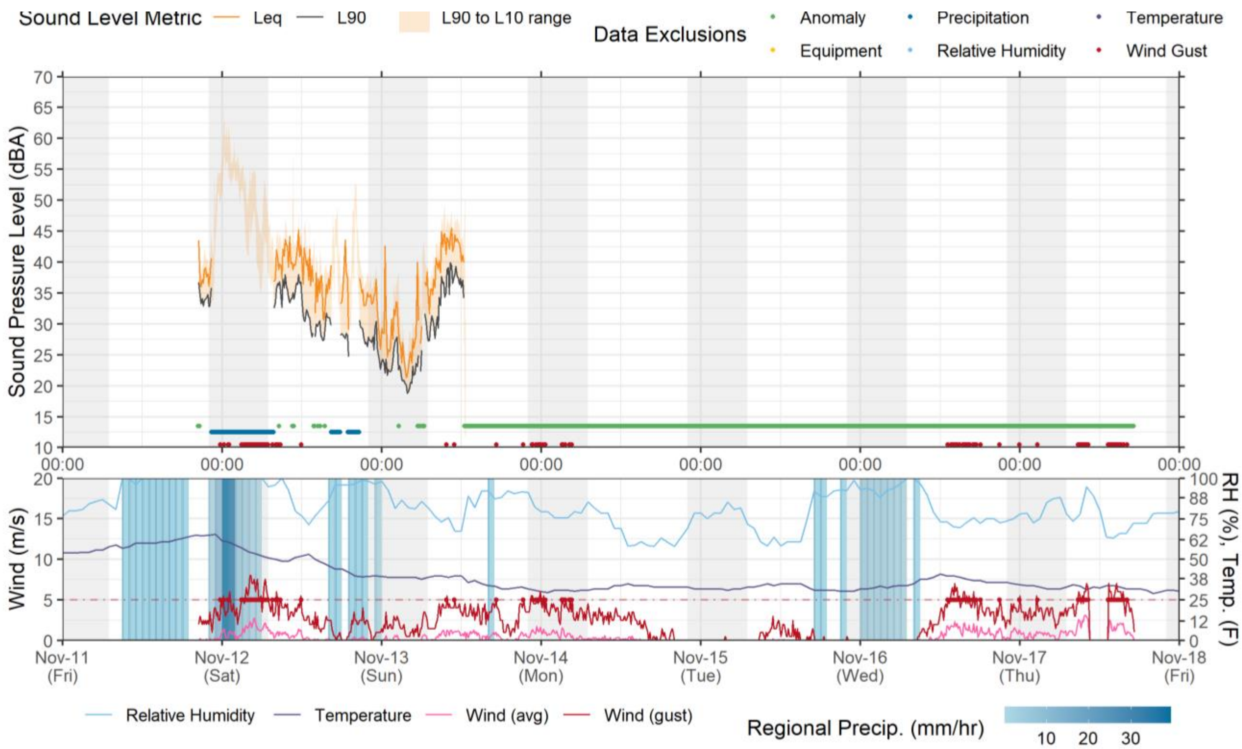

FIGURE 15: TIME-HISTORY RESULTS FOR MONITOR C, NOVEMBER 11 – 13, 2022

Monitor D Results

Results for Monitor D are provided in Figure 16. Contributing sources of sound including local traffic, aircraft overflights, and occasional biogenic sounds. Higher sound levels during the day were caused primarily by local traffic on Cobb Street, with lower anthropogenic sound at night causing a diurnal pattern. Daytime sound levels ($L_{eq,\ 10\text{-}min}$) were generally between 35 dBA and 45 dBA, with nighttime sound levels generally between 20 dBA and 40 dBA.

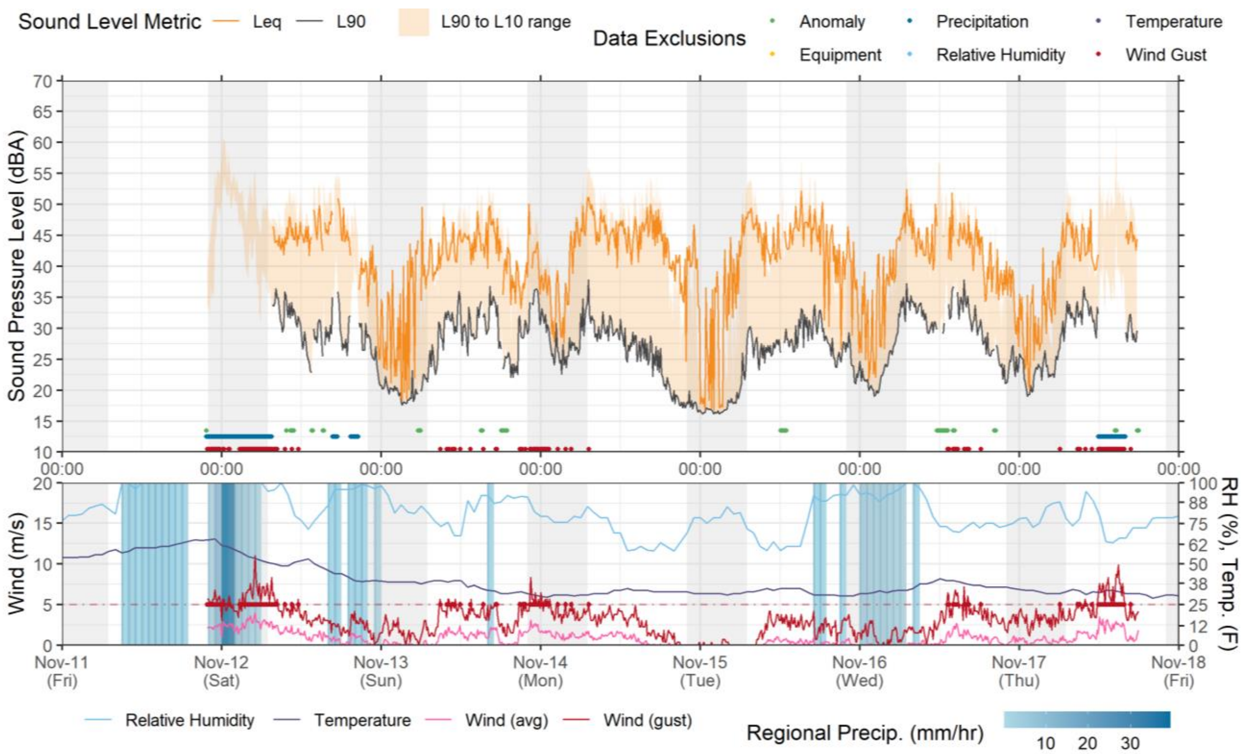

FIGURE 16: TIME-HISTORY RESULTS FOR MONITOR D, NOVEMBER 11 – 17, 2022

Monitor E Results

Results for Monitor E are provided in Figure 17. The sound levels at this location exhibit a moderate diurnal pattern, due to sound from local traffic on Sovocool Hill Road and other distant anthropogenic sounds during the day. Contributing sources of sound including local traffic, aircraft overflights, and biogenic sounds. Daytime sound levels ($L_{eq,\ 10\text{-}min}$) were generally between 35 dBA and 45 dBA, with nighttime sound levels generally between 25 dBA and 35 dBA.

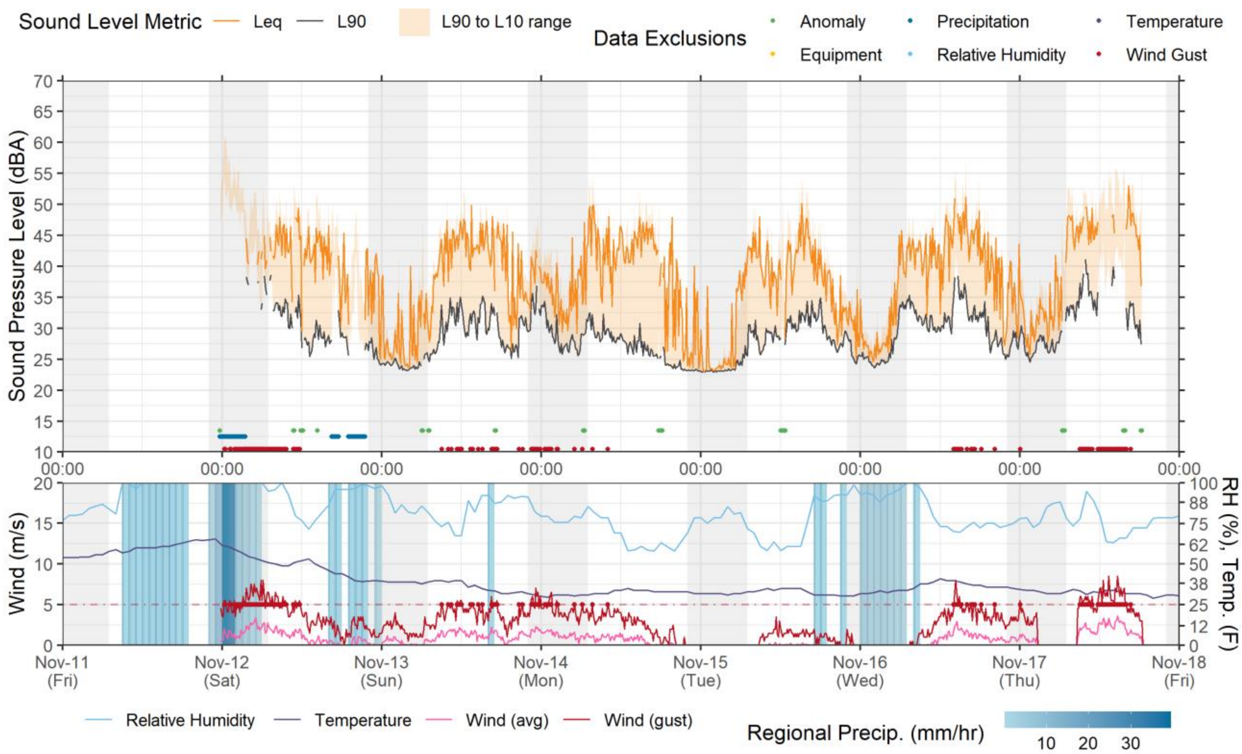

FIGURE 17: TIME-HISTORY RESULTS FOR MONITOR E, NOVEMBER 12 – 17, 2022

Sound Pressure Level Summary

The sound levels over the entire monitoring period are summarized for all four sites in Table 2. Sound levels are summarized over the entire monitoring period (overall) and by daytime and nighttime periods for the entire monitoring period.

The equivalent continuous levels (L_{eq}) at night are less than daytime levels at each site, which is typical and usually indicates a diurnal pattern, which is generally caused by anthropogenic sounds. The loudest site is Monitor A with a daytime L_{eq} of 49 dBA and a nighttime L_{eq} of 41 dBA. The monitor with the lowest overall sound level is Monitor C (based on the L_{eq}), with daytime and nighttime sound levels of 40 dBA and 32 dBA, respectively. There are large differences between the L_{eq} and L_{90} at all monitor locations, this indicates the presence of intermittent or transient sounds, such as vehicle passbys or aircraft overflights. The arithmetic average of the L_{eq} across all sites is 44 dBA during the day and 37 dBA at night.

TABLE 2: SUMMARY OF BACKGROUND SOUND LEVELS[6] BY MONITOR

Monitor	Sound Level (dBA,NS)											
	Overall				Day				Night			
	L_{eq}	L_{90}	L_{50}	L_{10}	L_{eq}	L_{90}	L_{50}	L_{10}	L_{eq}	L_{90}	L_{50}	L_{10}
A	48	28	39	52	49	34	43	54	41	24	31	41
B	41	22	33	43	42	27	35	44	37	19	27	39
C	38	24	34	42	40	30	36	43	32	22	27	35
D	43	21	32	44	44	26	34	46	39	18	26	38
E	42	25	32	42	43	27	34	45	36	24	28	37
Average	42	24	34	44	44	29	36	46	37	22	28	38

[6] High frequency biogenic sound was filtered out of the data during periods where it was present using ANS-weighting (defined in ANSI S12.100, “Methods to Define and Measure the Residual Sound in Protected Natural and Quiet Residential Areas”). ANS-weighted data is a similar to A-weighted data, except ANS-weighting removes spectral sound levels above the 1 kHz 1/1/ octave band, which is the frequency range in which the biogenic sounds occur. Results with ANS weighting are shown as “dBA, NS”.

5.0 SOUND PROPAGATION MODELING

5.1 PROCEDURES

ISO 9613-2 & Cadna/A

Modeling for this Facility was in accordance with the standard ISO 9613-2, "Acoustics – Attenuation of sound during propagation outdoors, Part 2: General Method of Calculation." The ISO standard states,

> This part of ISO 9613 specifies an engineering method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources. The method predicts the equivalent continuous A-weighted sound pressure level … under meteorological conditions favorable to propagation from sources of known sound emissions. These conditions are for downwind propagation … or, equivalently, propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs at night.

The model takes into account source sound power levels, surface reflection and absorption, atmospheric absorption, geometric divergence, meteorological conditions, walls, barriers, berms, and terrain. The acoustical modeling software used here was CadnaA, from Datakustik GmbH. CadnaA is a widely accepted acoustical propagation modeling tool, used by many noise control professionals in the United States and internationally.

ISO 9613-2 assumes downwind sound propagation between every source and every receptor, consequently, all wind directions, including the prevailing wind directions, are taken into account.

For solar facilities, the ISO 9613-2 model is more likely to overestimate sound levels. First, the barrier-effect of the solar panels in blocking sound from interior sources, especially inverters and medium-voltage transformers, is not taken into account in the modeling done for this Facility. Second, sound emissions of solar equipment tend to be highest during sunny days. Under these conditions, the sound is refracted upwards, lowering the sound levels measured near the ground. Under the modeling assumptions used in this report, the meteorological conditions are always downward refracting, such as occurs during cloudy days with moderate downwind conditions or a well-developed moderate nighttime temperature inversion. Finally, the ground factor used for modeling assumes half hard/half porous ground, as required by Section 94-c.

Source Assumptions

All equipment were modeled at the manufacturer's published maximum sound power levels or according to industry standards. If only the overall A-weighted sound levels were provided by the manufacturer, or a particular equipment model has not yet been selected, octave bands were estimated based on RSG measurements of similar equipment or published spectra. As required by Section 94-c regulations, a 5-dB penalty was applied for all sources for which manufacturer data indicated audible prominent tones or 1/3 octave band data was not available from the equipment manufacturers. As described below, this includes the inverter skids, substation transformers, HVAC, and trackers. The output of the model for residential receptors includes the 5 dB penalty and measured sound levels at these locations will thus be lower. More information on the modeled equipment is described below and in Appendix G.

Array Inverter Skids

There are 50 inverter skids scattered throughout the Facility. Each skid includes an inverter and a medium voltage transformer in a single unit. These convert the DC electricity generated by the solar panels to low-voltage AC power by the inverter, and then to medium-voltage AC power by the transformer, for transmission to the substation.

One-third octave band data was available from the inverter manufacturer (Figure 18) and indicated audible prominent tones at 4,000 and 8,000 Hz (Figure 19); therefore, under Section 94-c rules, the equipment must be considered tonal, and a 5 dB tonal penalty is added for residential receptors. Each inverter skid is modeled with a sound power level of 93 dBA plus a 5 dB tonal penalty for residential receptors, resulting in a total modeled sound power level of 98 dBA. The inverters have fans whose speed is a function of temperature and load. For the modeling in this report, the fans are assumed to operate at 100 percent during all hours.

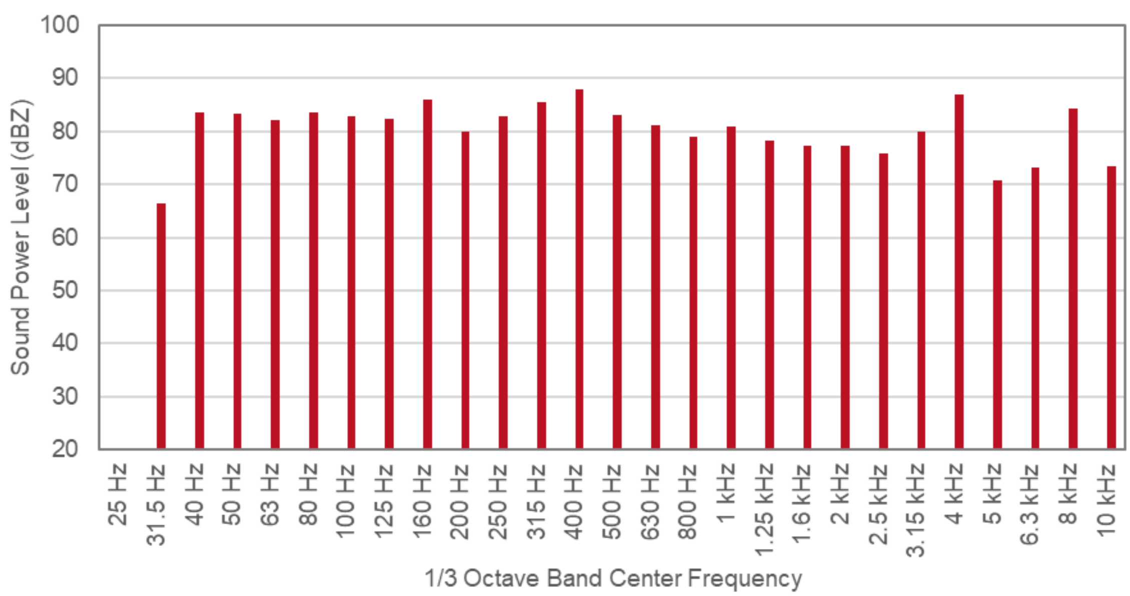

FIGURE 18: INVERTER 1/3 OCTAVE BAND SOUND POWER LEVEL

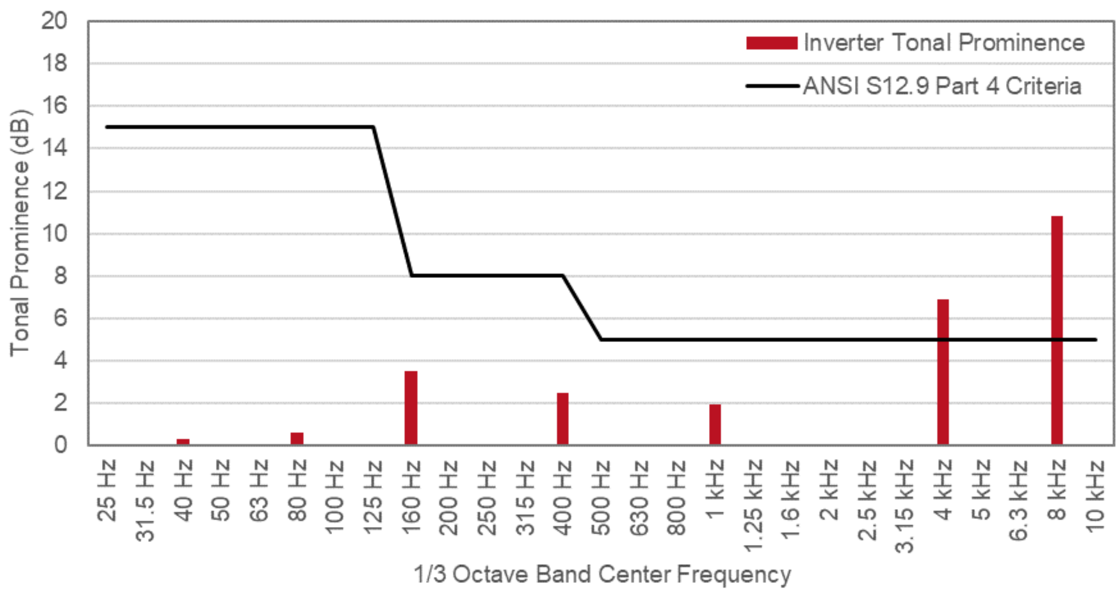

FIGURE 19: INVERTER SOUND POWER TONALITY

Substation Transformer

There will be one substation transformer, which steps up the medium voltage AC power to the high voltage of the transmission line.

The maximum sound level is determined in reference to the National Electrical Manufacturer's Association standard NEMA TR 1-2013 (R2019), Transformers, Step Voltage Regulators and Reactors. In this case, the transformer is rated 34.5/115 kV, 147/184 MVA, and 200/550 kV BIL with secondary cooling. Based on Table 1 of the standard, this transformer has a maximum sound pressure level of 84 dBA with fan cooling (ONAF) and 81 dBA without fan cooling (ONAN). Based on the dimensions of the transformer, the ONAF measurement surface area is 214 square meters and the ONAN measurement surface area is 167 square meters. This results in in a sound power level of 107 dBA with cooling fans on and 103 dBA with cooling fans off.

Manufacturer specification of the spectral distribution is not currently available. Under the 94-c regulations, the transformer must then be assumed to be tonal for residential receptors, and a 5 dB penalty is applied for residences. This is done by adding 5 dB to the modeled sound power level. With a 5 dB tonal penalty, the total modeled sound power level of the substation transformer is 112 dBA with cooling fans and 108 dBA without cooling fans.

To include an octave band spectrum for sound modeling, we calculated the average normalized spectrum from transformers RSG measured for previous projects with similar transformer specifications to the proposed Project and normalized the sound power to this spectrum. The normalization is as follows:

TABLE 3: NORMALIZATION OF OVERALL A-WEIGHTED SOUND LEVELS TO UNWEIGHTED OCTAVES (dBZ) FOR THE SUBSTATION TRANSFORMER

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
No Fans	-10	-10	8	3	0	-11	-21	-27	-31	0
With Fans	2	0	7	2	--2	-6	-12	-17	-24	0

The transformer will be energized 24 hours/day. The fans typically will operate only during daylight.

Tracking Motors

There will be 5,046 single-axis tracking motors, which tilt the solar panels to follow the sun. The sound power level of each tracking motor is 81 dBA. A 5 dB tonal penalty is added for residential receptors because 1/3 octave band data was not available from the manufacturer. This results in a total modeled sound power level of 86 dBA for each tracker. Trackers only operate for a few seconds every 10 minutes during daylight, so the model accounts for the trackers operating 4.8 minutes per hour or 8.3% of the time resulting in L_{8h} levels that are about 11 dB lower. Because we have no octave band measurement data from this or another tracking motor, we conservatively assumed in the model that all the energy from the tracking motor is in the 500 Hz octave band.

HVAC Units

There is one HVAC unit at the substation. Spectral sound level data from a similar manufacturer (Figure 20) indicates that the units are tonal (Figure 21), so a 5 dB tonal penalty is included in the sound power level for the HVAC units. With the 5 dB penalty, the total modeled sound power level for the HVAC units is 100 dBA.

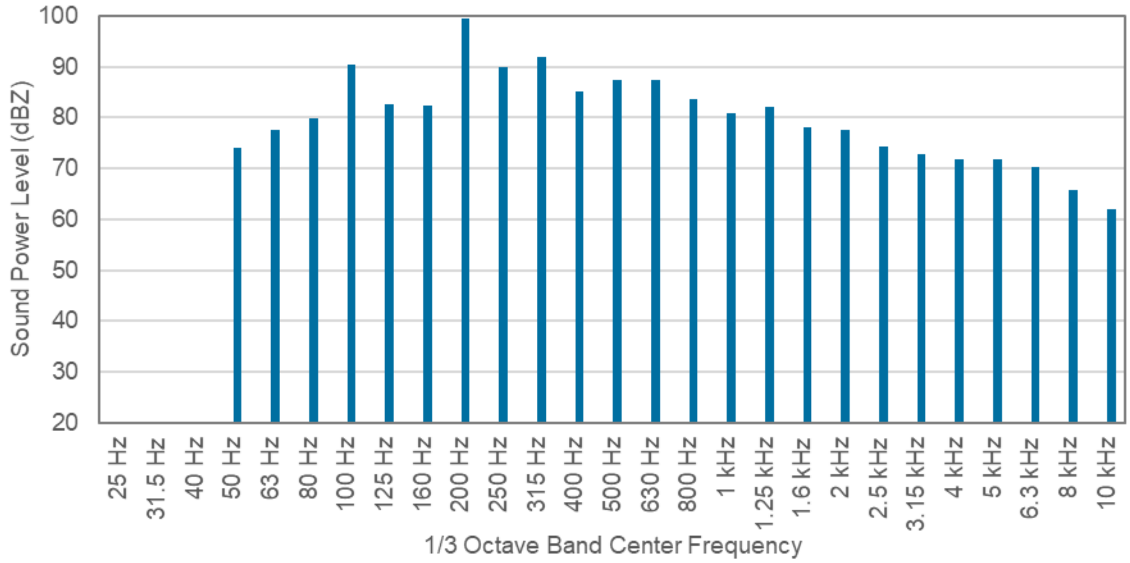

FIGURE 20: HVAC 1/3 OCTAVE BAND SOUND POWER

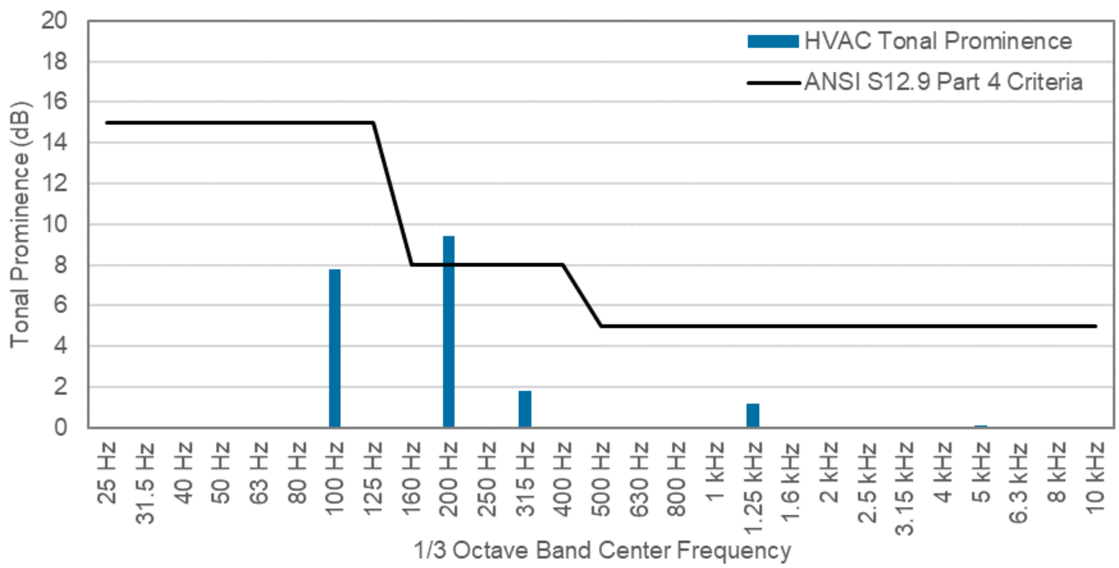

FIGURE 21: HVAC SOUND POWER TONALITY

Model Assumptions

The study area was modeled with half porous and half hard ground (G=0.5), which is a conservative assumption given that most of the ground is porous (G=1.0) and suitable for vegetation growth. A temperature of 10 degrees Celsius with 70 percent relative humidity was used. A 1.5-meter (13 feet) receptor height was used for modeling discrete receptors (like homes and worst-case property line points) and contour mapping. All receptors within 1,500-foot radius or the 30 dBA noise contour, whichever is greater, were evaluated. Model input parameters are listed in Appendix A.

Consistent with Section 94-c regulations for the modeling of solar facilities, no additional uncertainty was added to the modeling results.

Results calculated with these parameters are used to model the eight-hour equivalent average sound level (L_{8h}) during the worst-case daytime scenario. The daytime scenario assumes the Facility is generating its nameplate capacity, all equipment is producing maximum sound emissions, and transformer cooling fans are operating.

In addition, the one-hour equivalent average sound level (L_{1h}) for the substation was also modeled. The substation-only scenario assumes that all substation equipment (transformer and HVAC unit) are producing maximum sound emissions including the operation of transformer cooling fans.

5.2 TONALITY OF SOURCES

Transformers are often tonal in the 125 Hz, 250 Hz, 315 Hz, 500 Hz, and/or 630 Hz 1/3 octave bands during the ONAN condition, but not the ONAF condition due to masking from the cooling fans, though some tonal prominence may remain. Inverters are often tonal, but the tonal frequencies are less predictable.

Based on manufacturer data, the inverter and HVAC unit were calculated to have audible prominent tones. An assessment for tonal prominence of the transformers, and tracking motors was not conducted because 1/3 octave band data are not currently available from the manufacturers.

The addition of a 5 dB penalty to all equipment for residential receptors is a conservative assumption as even if the equipment generates tonal sound, the level of tonality is generally reduced at the receiver due to the attenuation of the sound over distance and masking by broadband background sound.

5.3 MODEL RESULTS OF OPERATIONAL SOUND

Mitigated L_{8h} sound propagation modeling results for all project operations are shown in Figures 22 through 26 for the worst-case daytime configuration, including the 5 dB tonal penalty. Mitigated L_{1h} sound propagation modeling results for the area adjacent to the substation are shown in Figure 27 for daytime operations with the cooling fans on. A numerical table of the results is provided in Table 4 by receptor type and the number of nonparticipating sensitive receptors at each sound level above 35 dBA is provided in Table 5. Tonal penalties are included in the figures, and results tables, except where indicated.

Modeling results include a sound barrier along the north and east sides of the transformer and along a portion of a fence line in the substation south of the transformer. Details of this mitigation are shown in Figure 36 of Section 6.0.

TABLE 4: SUMMARY OF SOUND MODELING RESULTS (IN dBA)

Receptor Type	Project Sound Level (dBA)			With 5 dB Tonal Penalty (dBA)		
	Min.	Max.	Avg.	Min.	Max.	Avg.
Non-residential, L_{8h}	15	34	26	NA[7]		
Nonparticipating Residence, L_{8h}	8	38	20	14	44	25
Participating Residence, L_{8h}	23	36	30	23	36	30
Substation at Worst-case Nonparticipating Residence, L_{1h}	35 at Receptors 374 & 377			40 at Receptors 374 & 377		
Substation at Worst-case Participating Residence, L_{1h}	18 at Receptors 376 & 827			23 at Receptors 376 & 827		
Residential Property Line[7] (worst-case), L_{8h}	51 at Property Line of Receptor 384			NA[7]		

[7] The tonal penalty is not used for non-residential sensitive receptors and property line receptors per Section 94-c.

TABLE 5: NONPARTICIPATING SENSITIVE RECEPTORS AT SOUND LEVELS ABOVE 35 dBA DURING DAYTIME

SOUND PRESSURE LEVEL	NUMBER OF NONPARTICIPATING RECEPTORS			
	ALL SOURCES OPERATING (L_{8h})		SUBSTATION ONLY (L_{1h})	
	WITH 5 dB TONAL PENALTY	WITHOUT 5 dB TONAL PENALTY	WITH 5 dB TONAL PENALTY	WITHOUT 5 dB TONAL PENALTY
35	7	3	1	2
36	7	5	1	0
37	8	1	0	0
38	8	1	1	0
39	7	0	2	0
40	4	0	2	0
41	5	0	0	0
42	1	0	0	0
43	0	0	0	0
44	1	0	0	0
45	0	0	0	0

Comparison to NYCRR Title 19 Part 900 (94-c) Regulations

Under Section 94-c, a one-hour averaging time (L_{1h}) is used for substation sound exposures and an eight-hour averaging time (L_{8h}) is used for sound exposures other than the substation. Results show sound levels with the 5 dB tonal penalty are at or below 45 dBA L_{8h} at all receptors, meeting the Section 94-c limit for participating and nonparticipating residential receptors. The highest residential exposure is 44 dBA, including the tonal penalty at Receptor 127. The highest non-residential exposure is 36 dBA, not including the tonal penalty, at Receptor 182.

The substation is at or below 40 dBA L_{1h}, with a tonal penalty, at the closest residences. All property line sound levels are below the limit of 55 dBA $L_{8h.}$ The highest residential property line sound level of 51 dBA L_{8h}, not including the tonal penalty, occurs at the property line of Receptor 384.

The results summarized above indicate compliance with all Section 94-c sound level limits. Table 19 in Appendix B has A-weighted modeling results for each receptor, and Table 20 in Appendix C reports the 1/1 octave band modeling results.

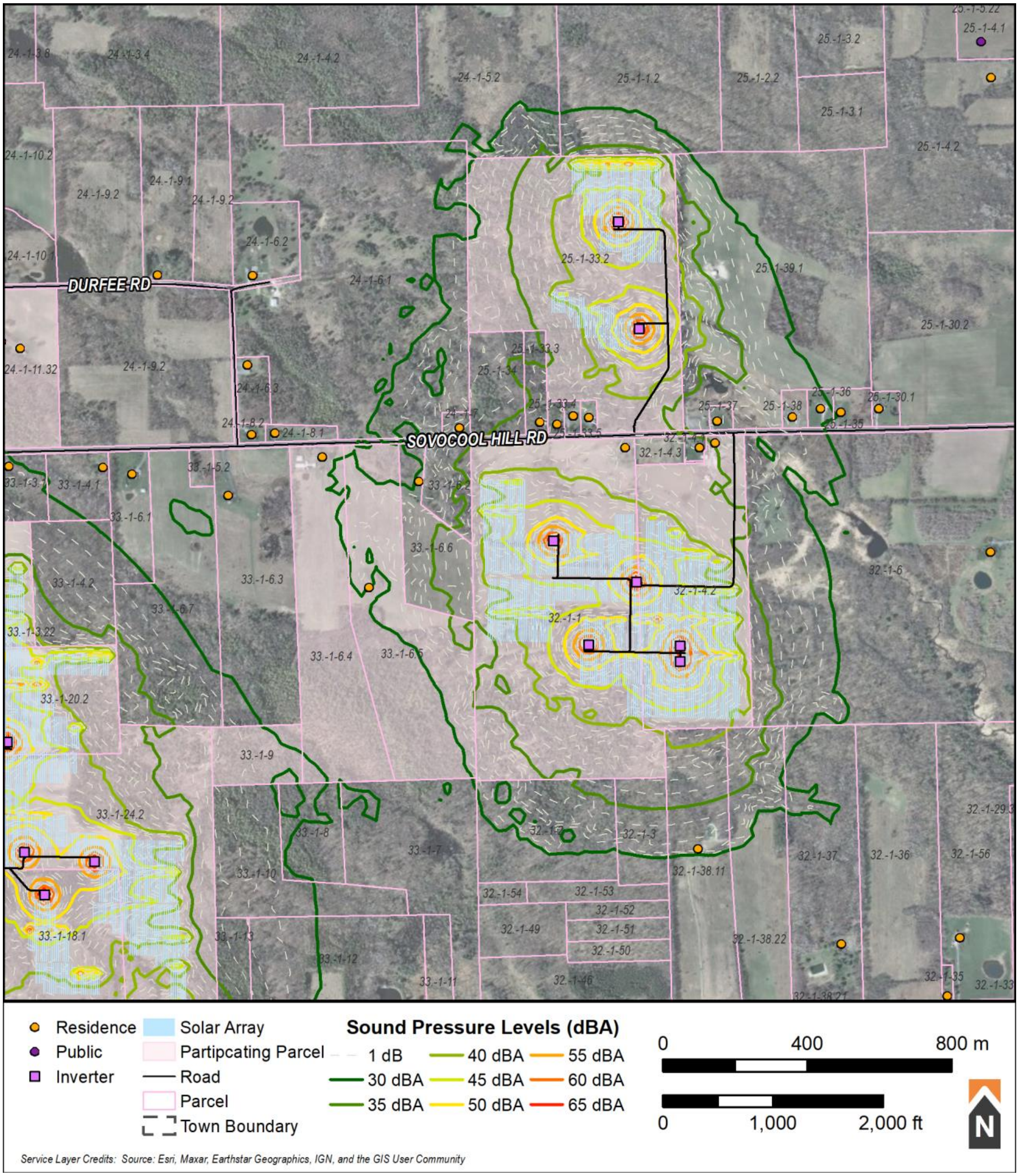

FIGURE 22: MITIGATED MAXIMUM L_{8H} MODEL RESULTS, NORTHEAST AREA

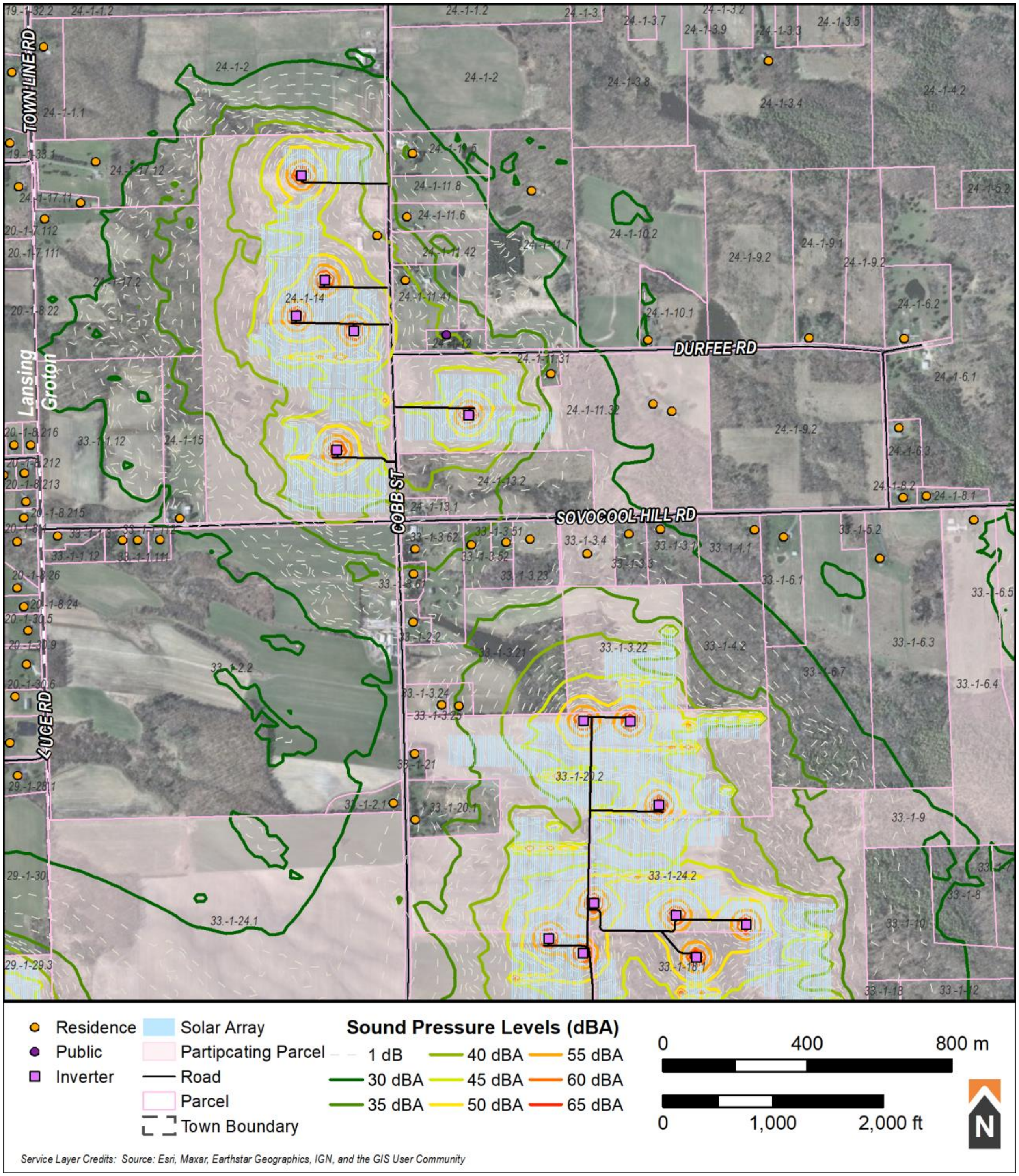

FIGURE 23: MITIGATED MAXIMUM L_{8H} MODEL RESULTS, NORTHWEST AREA

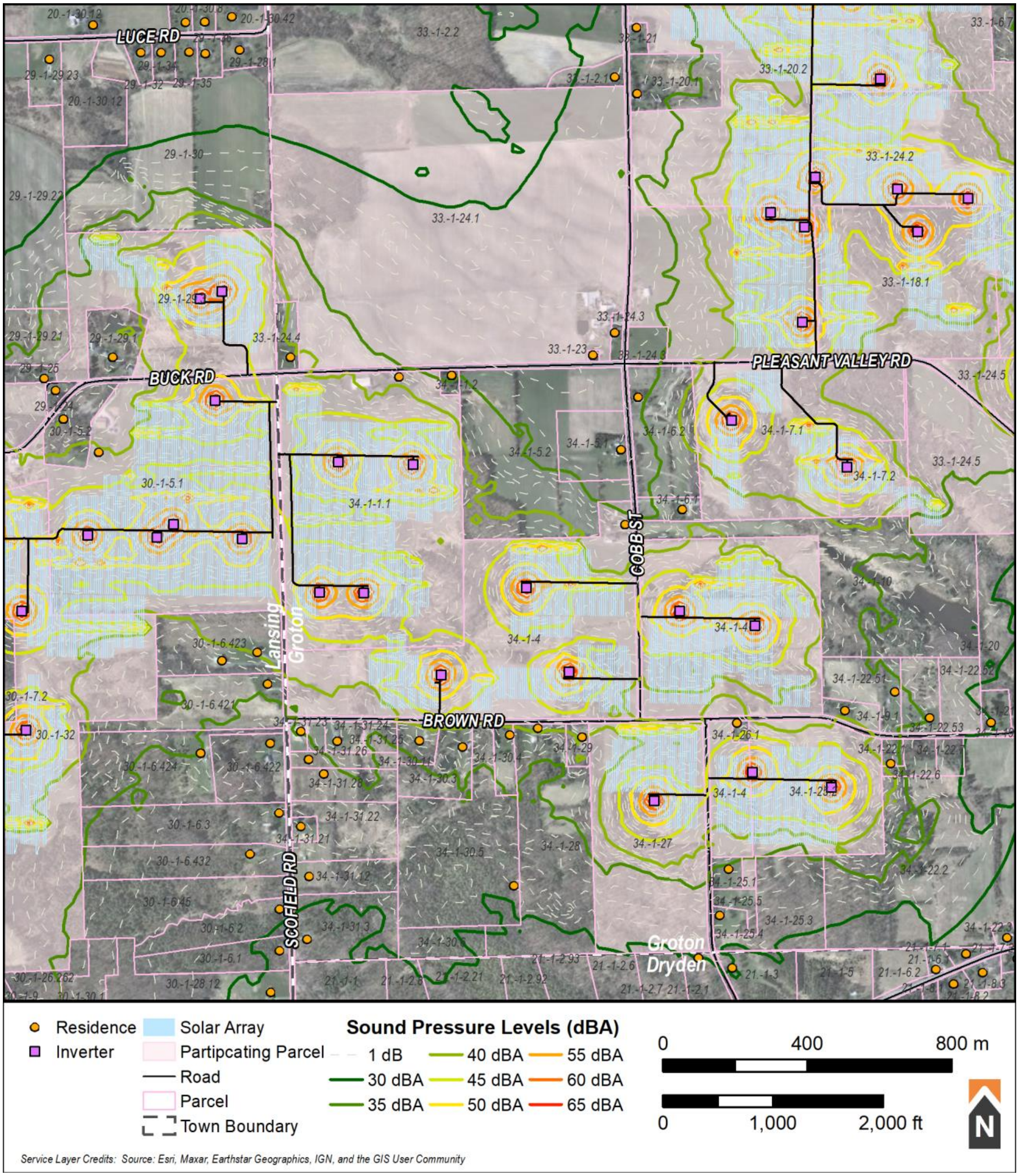

FIGURE 24: MITIGATED MAXIMUM L_{8H} MODEL RESULTS, CENTRAL AREA

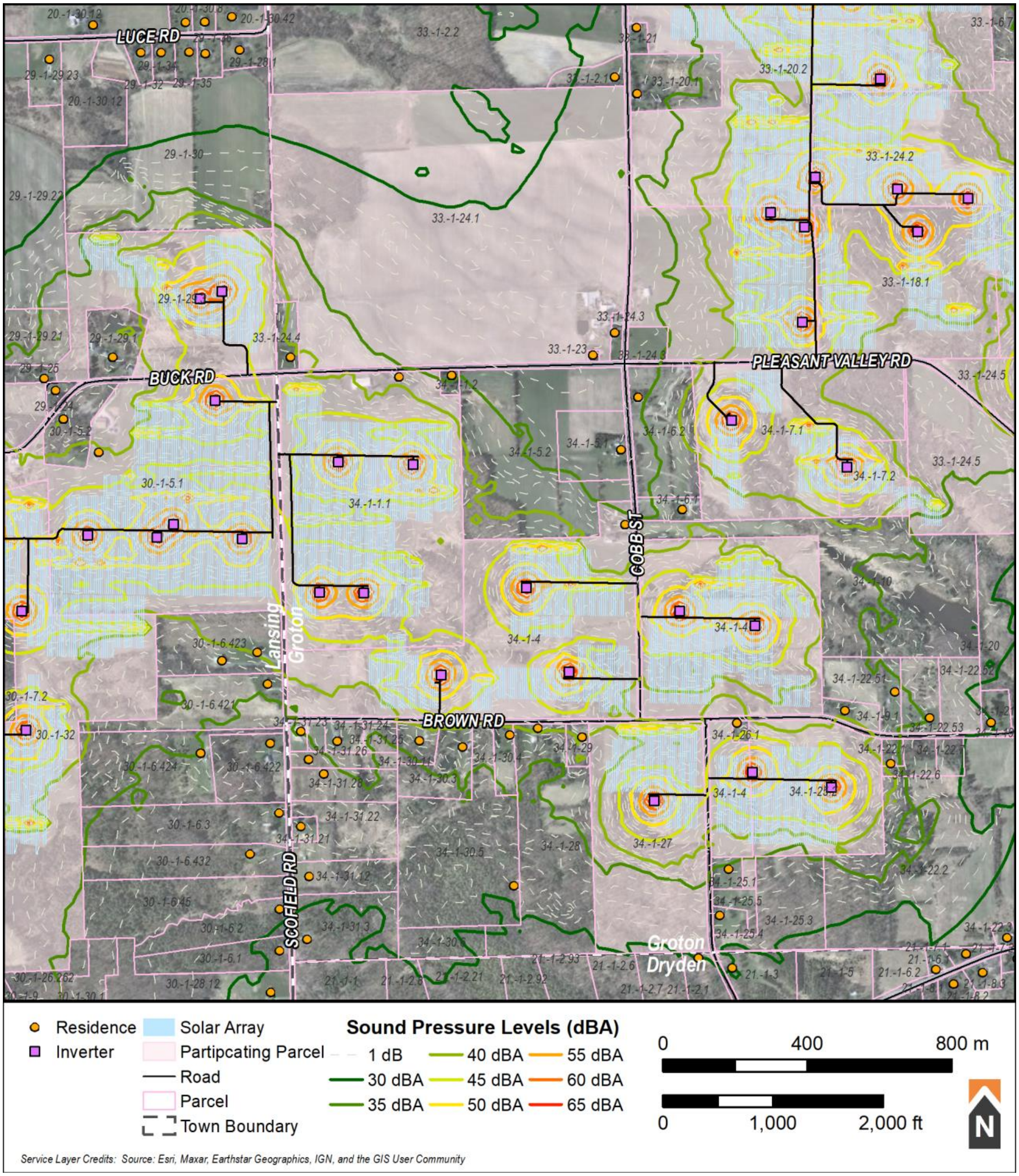

FIGURE 25: MITIGATED MAXIMUM L_{8H} MODEL RESULTS, SOUTHEAST AREA

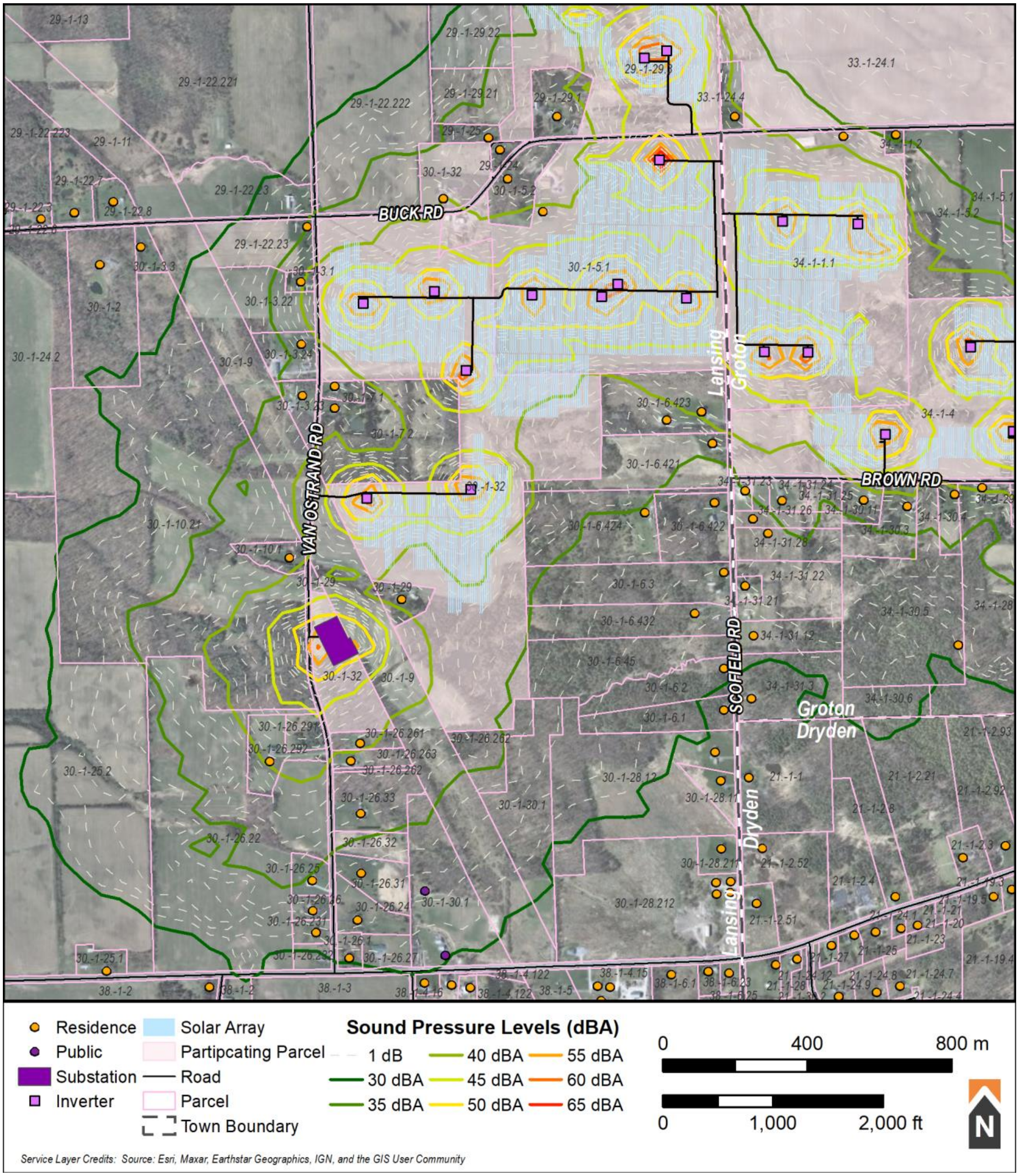

FIGURE 26: MITIGATED MAXIMUM L8H MODEL RESULTS, SOUTHWEST AREA

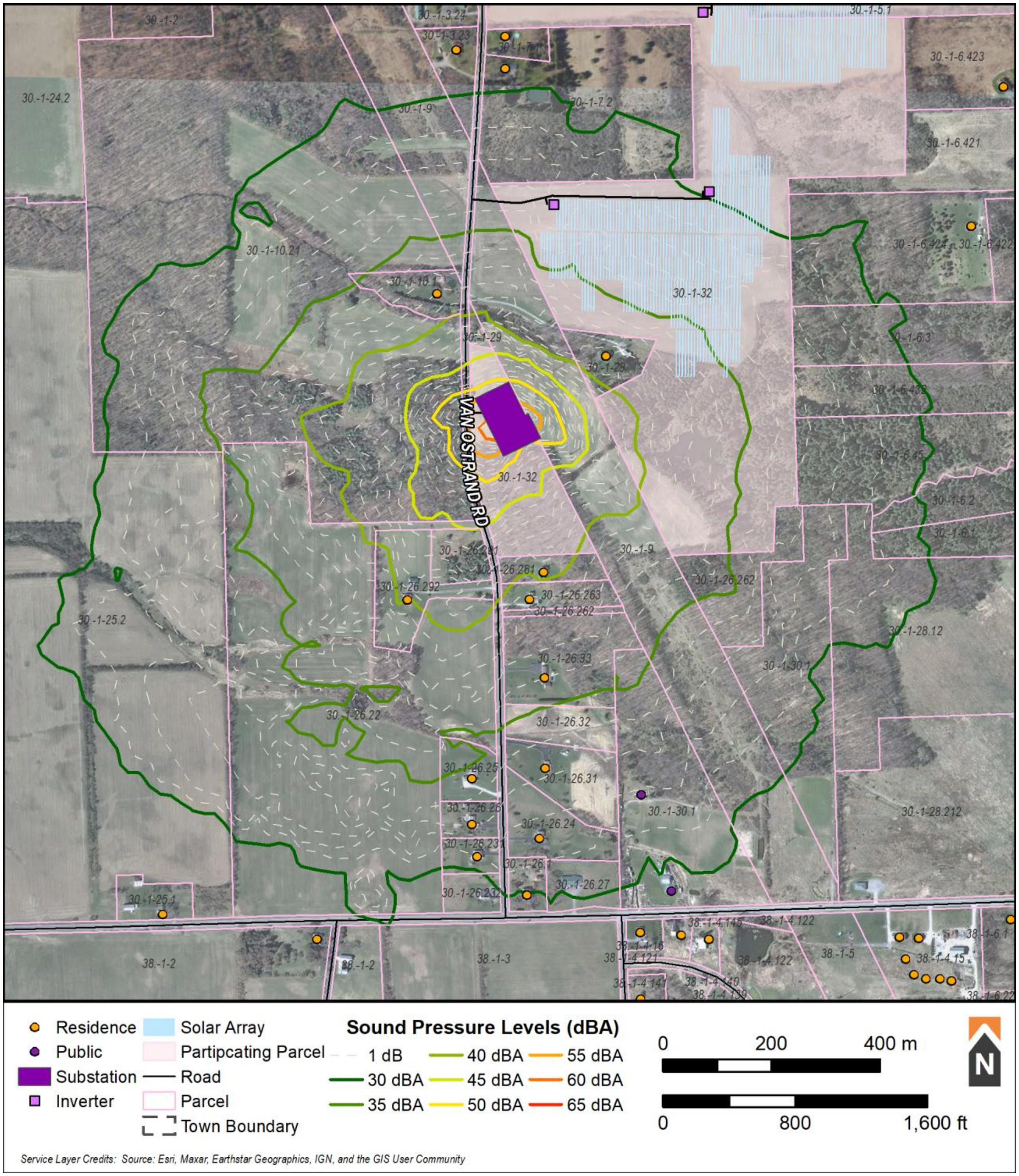

FIGURE 27: MITIGATED MAXIMUM L_{1H} MODEL RESULTS - SUBSTATION ONLY

5.4 CONSTRUCTION NOISE

Construction will require equipment delivery, access road construction, site preparation, installation of Facility components, and site restoration. Construction materials would be transported by truck to the Facility, stored at temporary staging areas, assembled, and installed. All construction activity would take place over approximately 18 to 24 months.

Construction noise modeling was performed using the same standard and software used to model operational noise, ISO 9613-2 implemented in Datakustik's CadnaA. Discrete receptor and grid heights are the same as was used in operational sound propagation modeling for the Facility, as described in Section 5.1.

With the exception of pile driving, construction equipment sound emissions were obtained from National Cooperative Highway Research Program (NCHRP) Project 25-49 (September 2018). Modeling procedures generally followed guidelines in the FHWA's Highway Construction Noise Handbook, where appropriate and where data was available. For the pile driving equipment, sound data for a representative solar array post driver was used.

For construction noise modeling, construction activities were categorized into eight groups: road construction, substation construction, trenching, inverter installation, piling, racking, boring, and laydown area activity. The Facility does not propose a batch plant. For each category, simultaneous construction of that activity throughout the site was modeled assuming the maximum sound emissions of all associated construction equipment operating simultaneously. While this scenario is unrealistic, it does provide a worst-case prediction of sound levels occurring throughout the site for any given activity. While some construction activities may occur at the same time, the location of these activities are generally considered far enough away as to have a minor cumulative impact on the maximum sound levels modeled.

The following sections describe sound modeling results for each construction activity. Large format maps showing construction sound level contours down to 30 dBA for a simultaneous cumulative scenario, with all construction activities operating simultaneously at all locations throughout the site, are provided in Appendix F.

Road Construction

Facility road construction would take place from public roads and through the areas proposed for solar arrays to inverter locations and the collection substation. The primary sources associated with this activity are excavators, dozers, graders, dump trucks, and rollers.

Table 6 shows the sound level from each source at a distance of 50 feet, and the sound level from each source at the distance of the closest receptor (380 feet). Cumulative model results of all primary road construction sources operating simultaneously along all proposed Facility roadway locations near the worst-case exposure to road construction is provided in Figure 28. The worst-case receptor for road construction is (Receptor 139) on the north side of Pleasant Valley Road, located 115 meters (380 feet) from the nearest road construction activities. The cumulative modeled sound level at this receptor is 70 dBA.

Road construction typically only takes place for a few days in any given location, so the potential impact to any given receptor is relatively short in duration.

TABLE 6: MODELED SOURCES FOR ROAD CONSTRUCTION AND MODELED SOUND LEVELS

Equipment	Sound Pressure Level at 50 Feet (dBA)	Sound Pressure Level at 98 Feet (dBA)
Excavator	76	58
Dozer	80	62
Grader	78	61
Roller	82	65
Dump Truck	82	64
Total Sound Level at Closest Receptor:		**70**

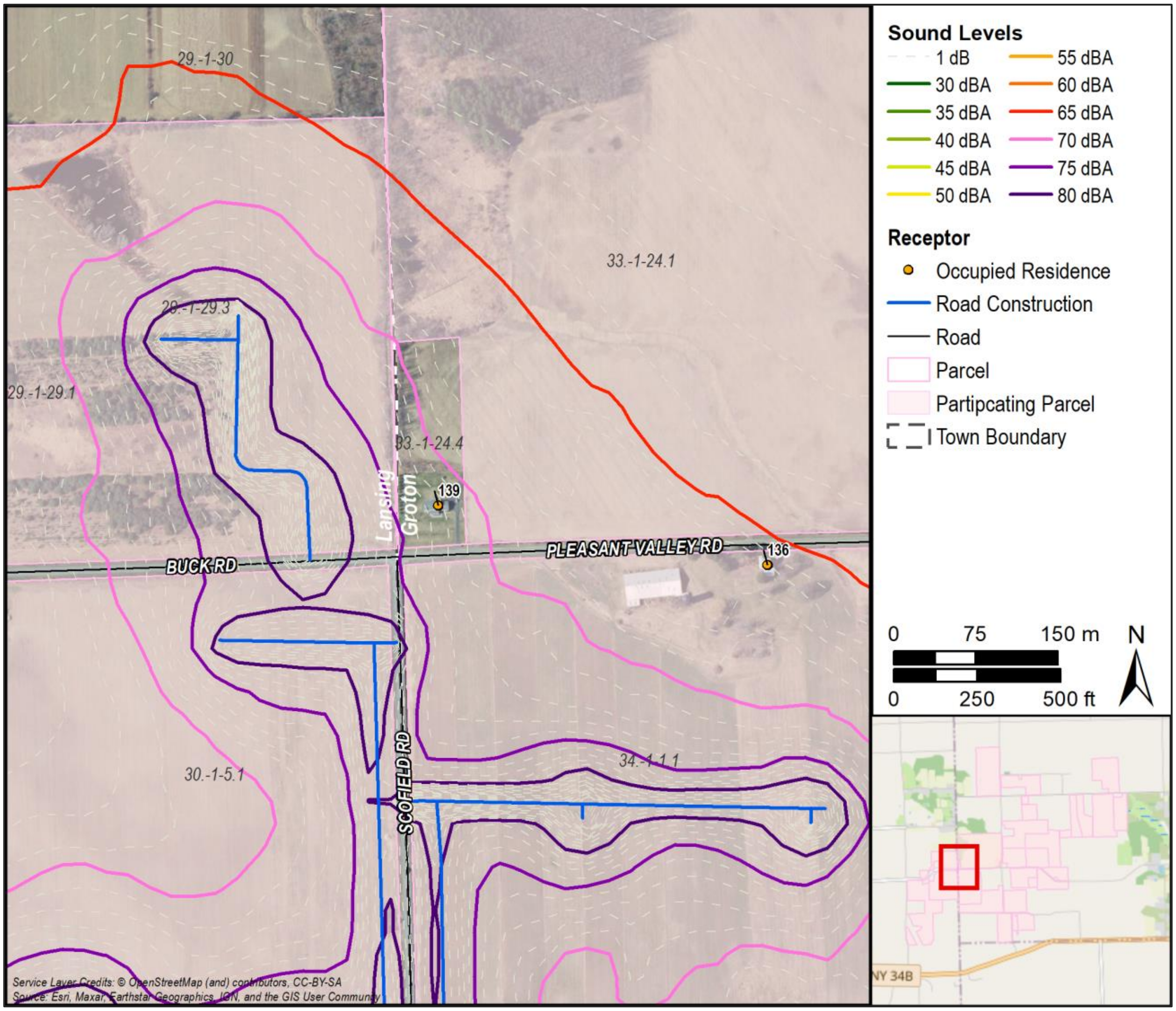

FIGURE 28: ROAD CONSTRUCTION MODEL RESULTS – WORST-CASE RECEPTOR 139

Substation Construction

Collection substation construction would take place within the collection substation area. The primary sources associated with this activity are excavators, dozers, dump trucks, rollers, concrete mixing trucks, concrete pumper trucks, flatbed trucks, man-lifts, and cranes.

Cumulative model results of all primary collection substation construction sources operating simultaneously is provided in Figure 29. The worst-case receptor for collection substation construction is a residence (Receptor 377) south of the collection substation on Van Ostrand Road. The cumulative modeled sound level at this receptor is 65 dBA, at a distance of 256 meters (840 feet) from collection substation construction. Table 7 shows the sound level from each source at a distance of 50 feet, and the sound level from each source at the closest receptor.

TABLE 7: MODELED SOURCES FOR COLLECTION SUBSTATION CONSTRUCTION AND MODELED SOUND LEVELS

Equipment	Sound Pressure Level at 50 Feet (dBA)	Sound Pressure Level at 840 Feet (dBA)
Excavator	76	51
Dozer	80	55
Roller	82	58
Dump Truck	82	57
Concrete Mixing Truck	81	57
Concrete Pumper Truck	84	59
Man-lift	72	48
Flatbed Truck	74	50
Crane (2)	77	53
Total Sound Level at Closest Receptor:		**65**

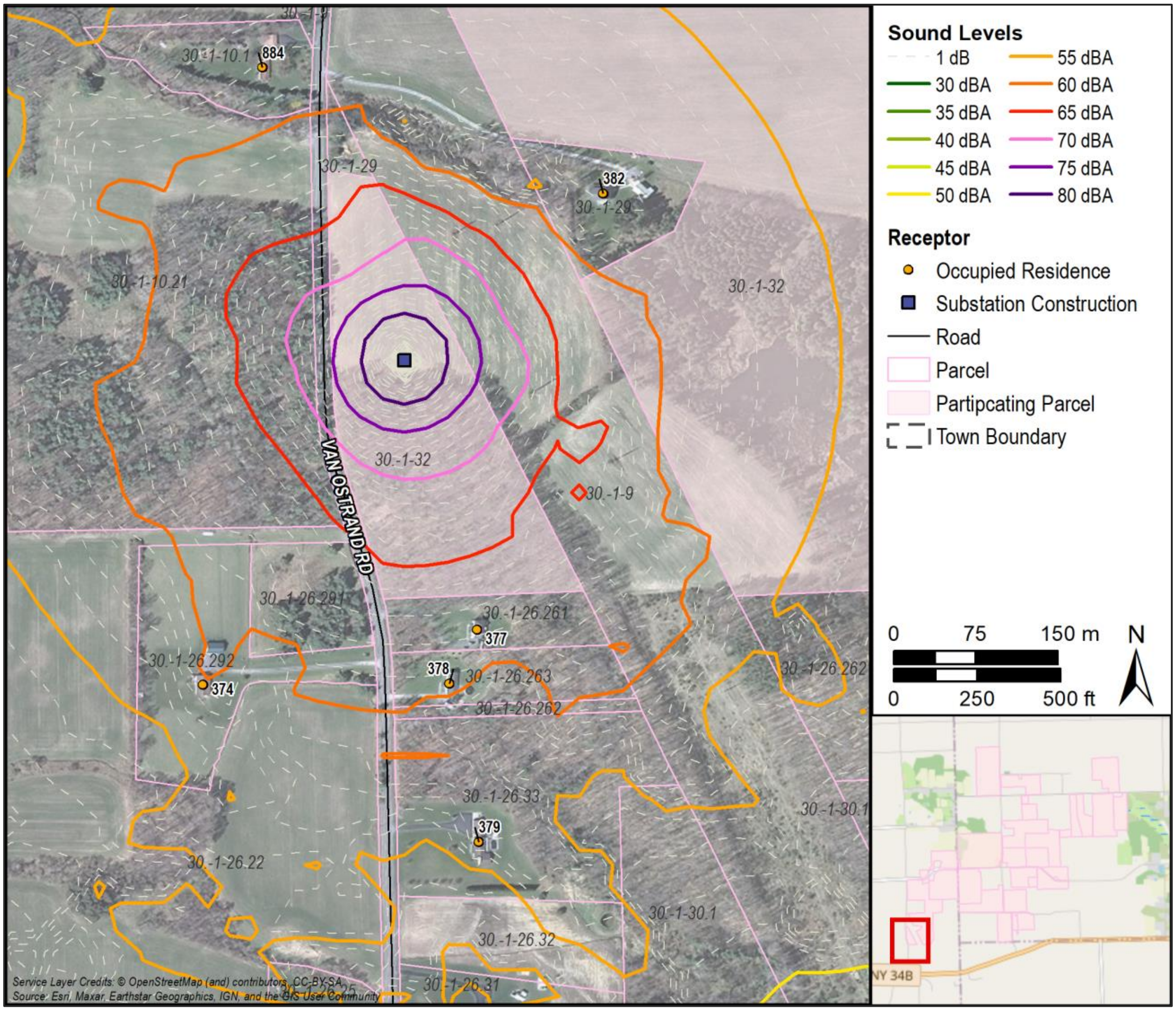

FIGURE 29: COLLECTION SUBSTATION CONSTRUCTION MODEL RESULTS, WORST-CASE RECEPTOR 377

Trenching

Trenching would take place along the underground collection line routes throughout the Facility area. The primary sources associated with this activity are excavators, dozers, rollers, compactors, flatbed trucks, forklifts, and trenchers.

Cumulative model results of all primary trenching sources operating simultaneously along all collection line routes throughout the site near the worst-case receptor exposure to trenching is provided in Figure 30. The worst-case receptor for trenching is a residence (Receptor 220) located south of Sovocool Hill Road, located as close as 24 meters (80 feet) from the nearest underground collection line route. The cumulative modeled sound level at this receptor is 87 dBA, assuming all construction equipment would operate simultaneously at all trenching locations throughout the site. Realistically, equipment would be located at varying distances from the receptors, resulting in lower sound levels. Table 8 shows the sound level from each source at a distance of 50 feet, and the sound level from each source at the closest receptor.

Trenching typically only takes place for a few days in any given location, so the potential impact to any given receptor is relatively short in duration.

TABLE 8: MODELED SOURCES FOR TRENCHING AND MODELED SOUND LEVELS

Equipment	Sound Pressure Level at 50 Feet (dBA)	Sound Pressure Level at 80 Feet (dBA)
Excavator	76	72
Dozer	80	76
Trencher	80	76
Roller	82	78
Compactor	75	71
Flatbed Truck	74	70
Forklift	89	85
Total Sound Level at Closest Receptor:		**87**

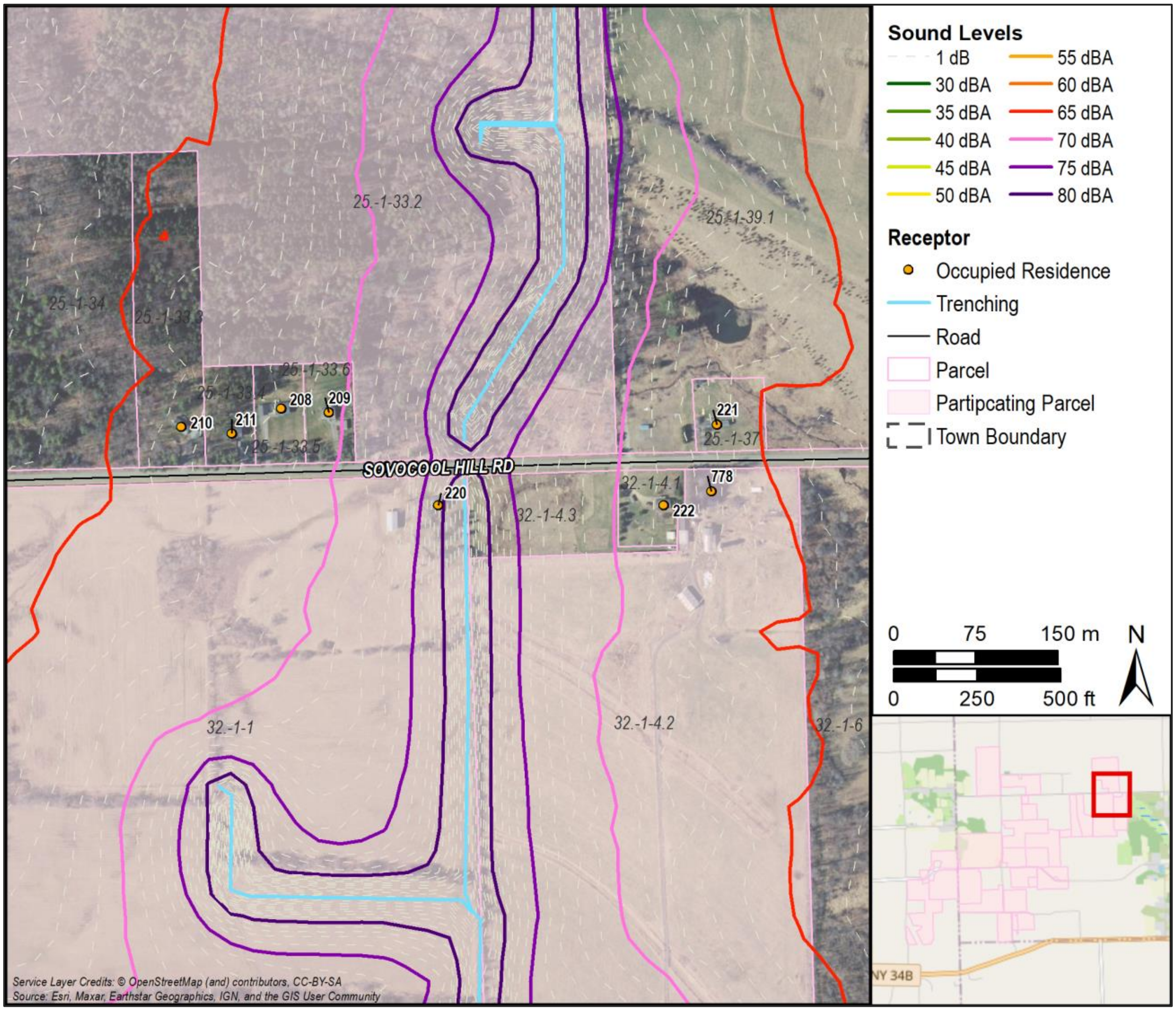

FIGURE 30: TRENCHING MODEL RESULTS, WORST-CASE RECEPTOR 220

Inverter Construction

This construction would take place around each inverter pad location throughout the solar arrays shown in Figure 1. The primary sources associated with this activity are excavators, dozers, graders, rollers, dump trucks, concrete mixing trucks, and concrete pumping trucks.

Cumulative model results of all primary inverter construction sources operating simultaneously at all inverters near the worst-case receptor exposure to inverter construction is provided in Figure 31. The worst-case receptor for inverter construction is a residence (Receptor 127) on the south side of Brown Road, about 142 meters (465 feet) from inverter construction. The cumulative modeled sound level at this receptor is 70 dBA, assuming simultaneous construction of all inverters. Table 9 shows the sound level from each source at a distance of 50 feet, and the sound level from each source at the closest receptor.

Construction at each inverter pad typically only lasts for a few days, so the potential impact to any given receptor is relatively short in duration and the simultaneous construction of all inverters is an unrealistic worst-case scenario.

TABLE 9: MODELED SOURCES FOR INVERTER CONSTRUCTION AND MODELED SOUND LEVELS

Equipment	Sound Pressure Level at 50 Feet (dBA)	Sound Pressure Level at 476 Feet (dBA)
Excavator	76	56
Dozer	80	61
Grader	78	59
Roller	82	63
Dump Truck	82	62
Concrete Mixing Truck	81	62
Concrete Pumper Truck	84	64
Total Sound Level at Closest Receptor:		**70**

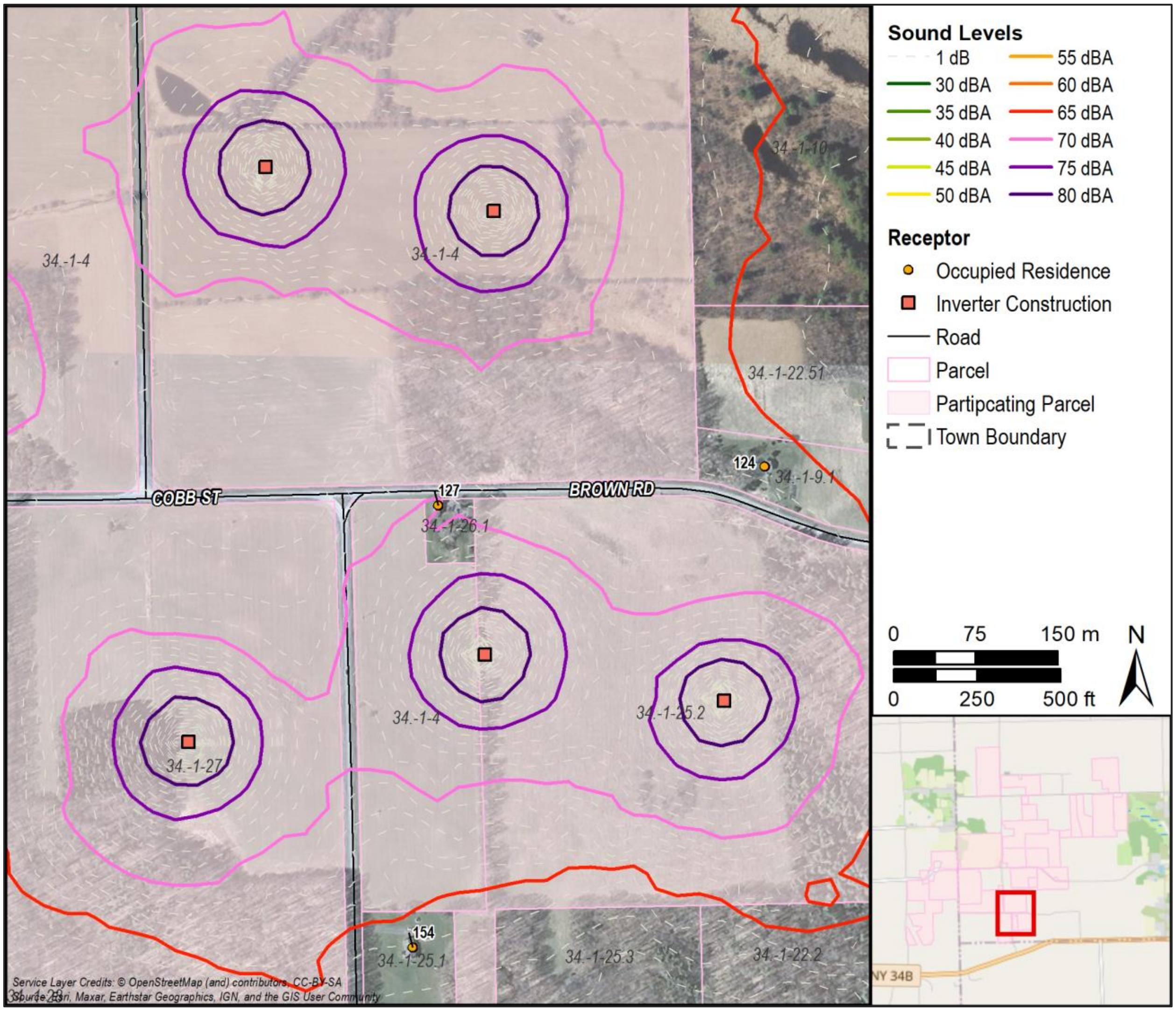

FIGURE 31: INVERTER CONSTRUCTION MODEL RESULTS, WORST-CASE RECEPTOR 127

Piling

Piling would take place throughout the solar arrays. The primary sources associated with this activity are flatbed trucks, boom trucks, and pile drivers.

For purposes of determining a worst-case simultaneous scenario for piling, the Facility area was broken into 18 construction work areas, representative of simultaneous construction being conducted by 18 construction crews. Cumulative modeling was conducted for all primary piling sources operating simultaneously at one location in each of the 18 construction areas nearest to sensitive receptors.

Results for the closest receptor to piling is provided in Figure 32. The worst-case receptor for piling is a residence (Receptor 151) south of Brown Rd, 90 meters (295 feet) from potential piling. The cumulative modeled sound level at this receptor is 69 dBA. Table 10 shows the sound level from each source at a distance of 50 feet, and the sound level from each source at the closest receptor.

Piling typically only lasts for a few days in any given location, so the potential impact to any given receptor is relatively short in duration.

TABLE 10: MODELED SOURCES FOR PILING AND MODELED SOUND LEVELS

Equipment	Sound Pressure Level at 50 Feet (dBA)	Sound Pressure Level at 328 Feet (dBA)
Flatbed Truck	74	59
Boom Truck	74	59
Pile Driver	84	69
Total Sound Level at Closest Receptor:		**69**

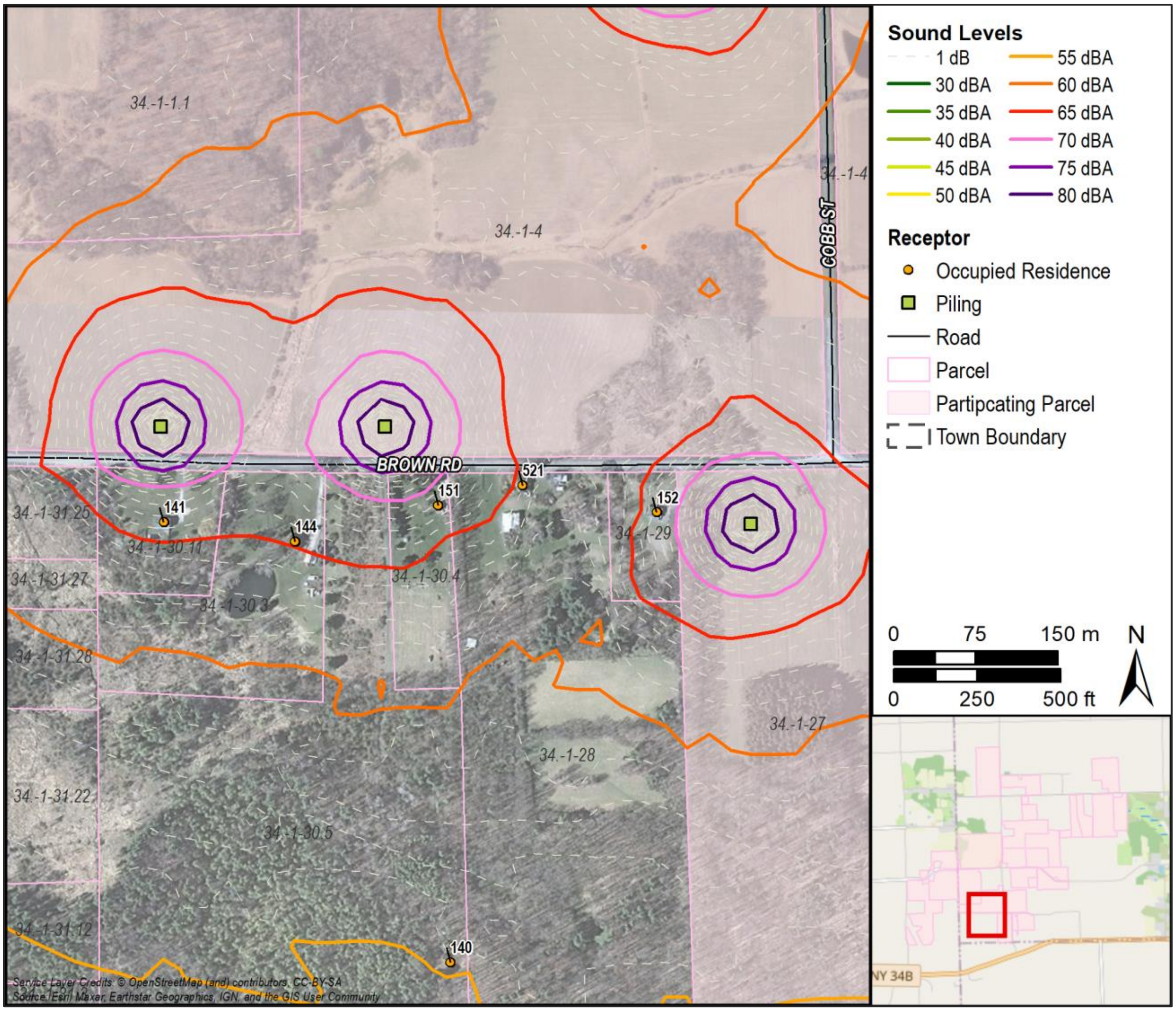

FIGURE 32: PILING MODEL RESULTS – WORST-CASE RECEPTOR 151

Racking

Racking would take place throughout the solar arrays. The primary sources associated with this activity are flatbed trucks and forklifts.

For purposes of determining a worst-case simultaneous scenario for racking, the Facility area was broken into 18 construction work areas, representative of simultaneous construction being conducted by each of 18 construction crews. There are two of each source in each construction area for racking assuming that two teams may be working in the same area at once. Cumulative modeling was conducted for all primary racking sources operating simultaneously at one location in each of the 18 construction areas nearest to sensitive receptors.

Results for the closest receptor to racking is provided in Figure 33. The worst-case receptor for racking is Receptor 151 south of Brown Road, 90 meters (295 feet) from potential racking. The cumulative modeled sound level at this receptor is 77 dBA. Table 11 shows the sound level from each source at a distance of 50 feet, and the sound level from each source at the closest receptor, along the sound level from all construction sources for one site, at the worst-case receptor.

Like piling, racking typically only lasts for a few days in any given location, so the potential impact to any given receptor is relatively short in duration.

TABLE 11: MODELED SOURCES FOR RACKING AND MODELED SOUND LEVELS

Equipment	Sound Pressure Level at 50 Feet (dBA)	Sound Pressure Level at 295 Feet (dBA)
Flatbed Truck (2)	77	62
Forklift (2)	92	77
Total Sound Level at Closest Receptor:		**77**

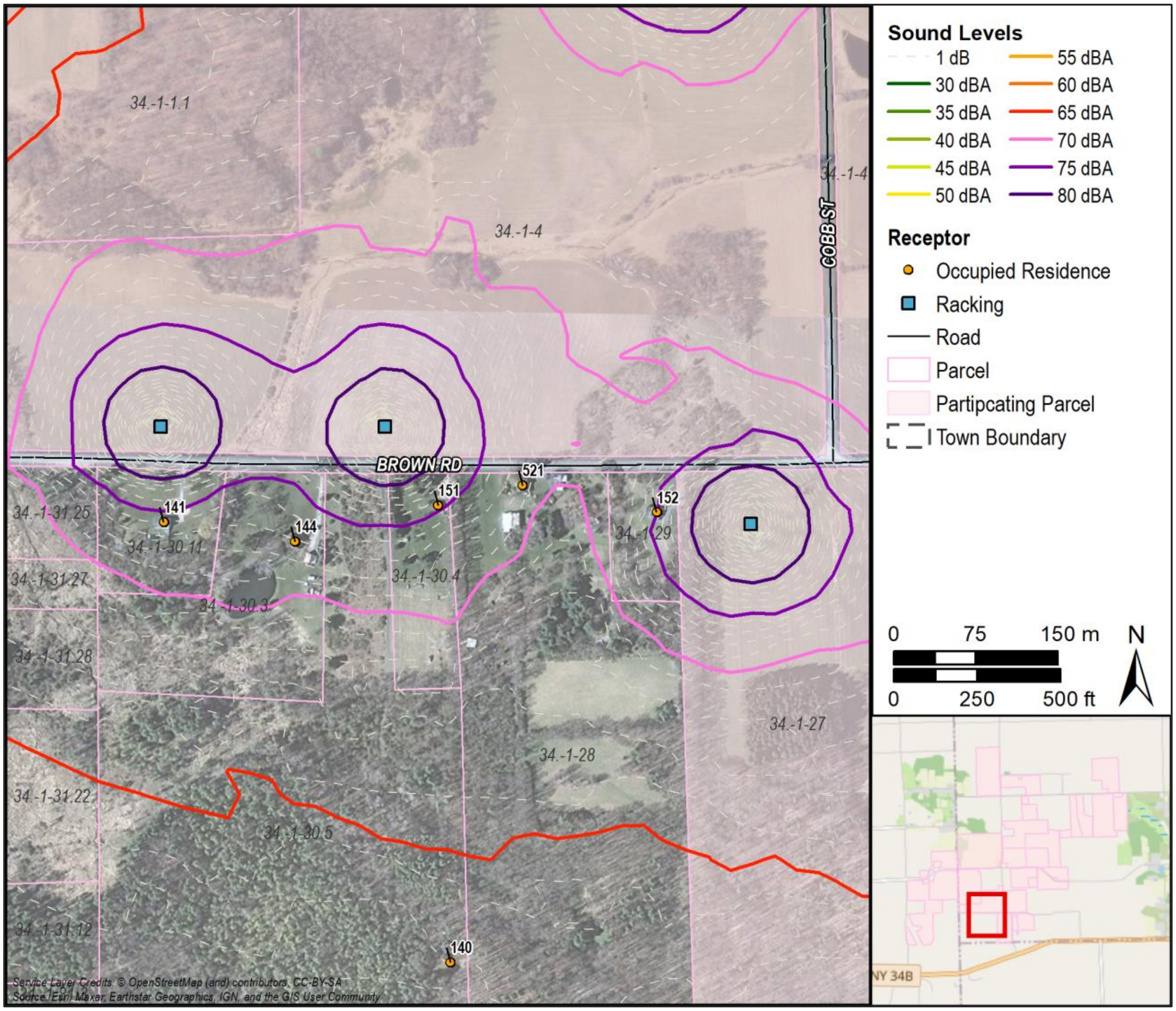

FIGURE 33: RACKING MODEL RESULTS – WORST-CASE RECEPTOR 151

Laydown Area

There are 19 laydown areas proposed for the Project. The primary construction noise sources associated with the laydown area are forklifts, skid steers, flatbed trucks, and a diesel generator.

Cumulative model results of the noise sources operating simultaneously near the closest receptor to the laydown area is provided in Figure 34. The worst-case receptor for laydown area construction is Receptor 139 north of Pleasant Valley Road, about 100 meters (329 feet) to the center of that laydown area. The cumulative modeled sound level at this receptor is 76 dBA. Table 12 shows the sound level from each source at a distance of 50 feet, and the sound level from each source at the closest receptor.

Construction noise associated with the laydown areas will be medium-term in duration, as the sites will be used throughout the construction period.

The large format maps in Appendix F shows the sound from construction at all laydown areas occurring simultaneously.

TABLE 12: MODELED SOURCES FOR LAYDOWN AREA AND MODELED SOUND LEVELS

Equipment	Sound Pressure Level at 50 Feet (dBA)	Sound Pressure Level at 329 Feet (dBA)
Forklift (2)	92	76
Skid Steer (2)	82	66
Flatbed Truck	74	61
Diesel Generator	74	91
Total Sound Level at Closest Receptor:		**76**

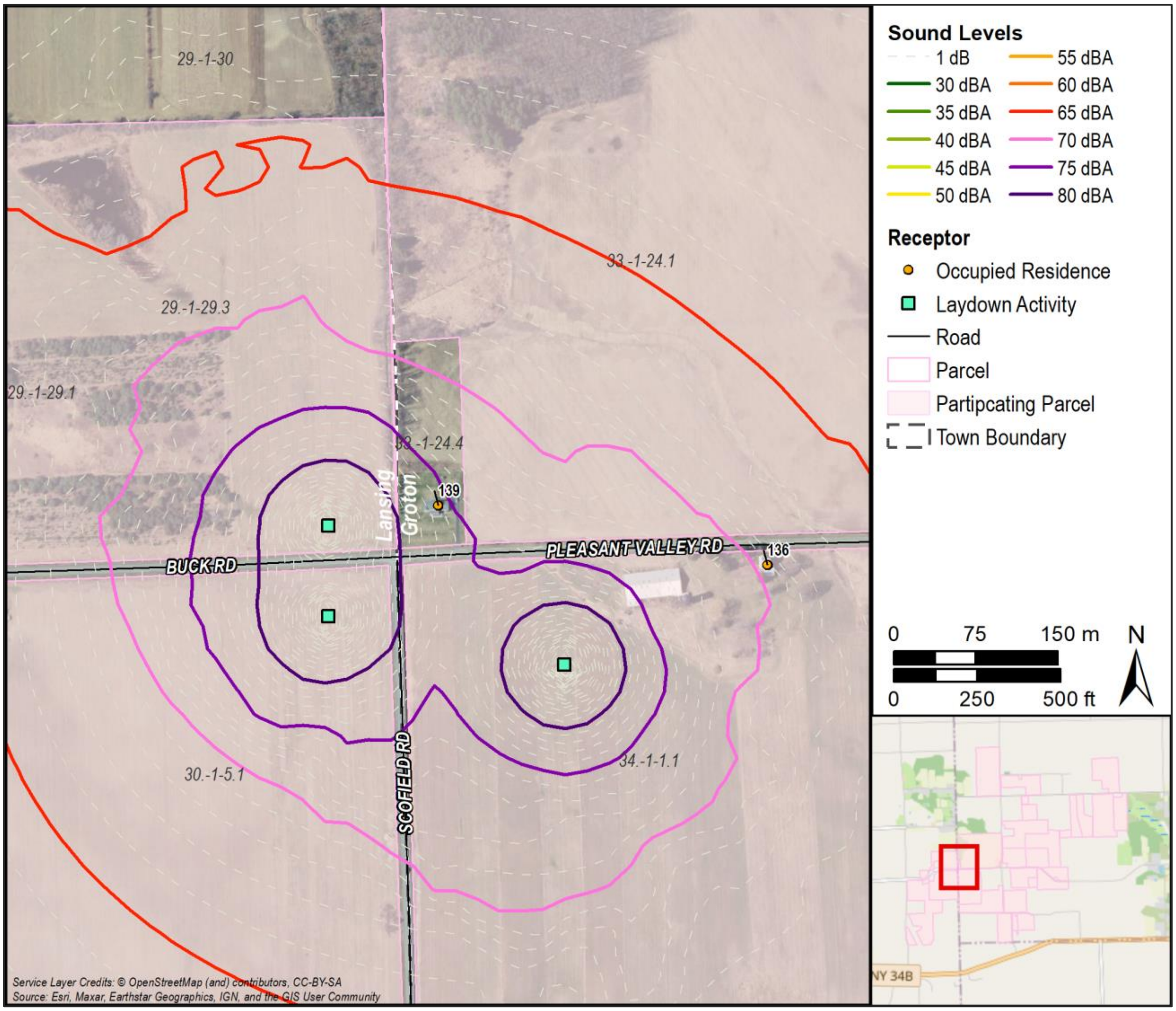

FIGURE 34: LAYDOWN AREA MODEL RESULTS – WORST-CASE RECEPTOR 139

Boring

Boring would take place where horizontal drilling is required to go under roads and streams. The primary sources associated with this activity are horizontal bore drills and excavators.

Cumulative model results of all primary boring sources operating simultaneously at each boring location near the closest receptor to racking is provided in Figure 35. The worst-case receptor for boring is Receptor 220, south of Sovocool Hill Road, about 31 meters (102 feet) from a potential boring location. The cumulative modeled sound level at this receptor from a single boring location is 81 dBA. Sound levels during construction for all boring locations would be about 81. Table 11 shows the sound level from each source at a distance of 50 feet, and the sound level from each source at the closest receptor.

Like piling and racking, boring typically only lasts for a few days in any given location, so the potential impact to any given receptor is relatively short in duration.

TABLE 13: MODELED SOURCES FOR BORING AND MODELED SOUND LEVELS

Equipment	Sound Pressure Level at 50 Feet (dBA)	Sound Pressure Level at 102 Feet (dBA)
Horizontal Bore Drill	87	81
Excavator	76	70
Total Sound Level at Closest Receptor:		**81**

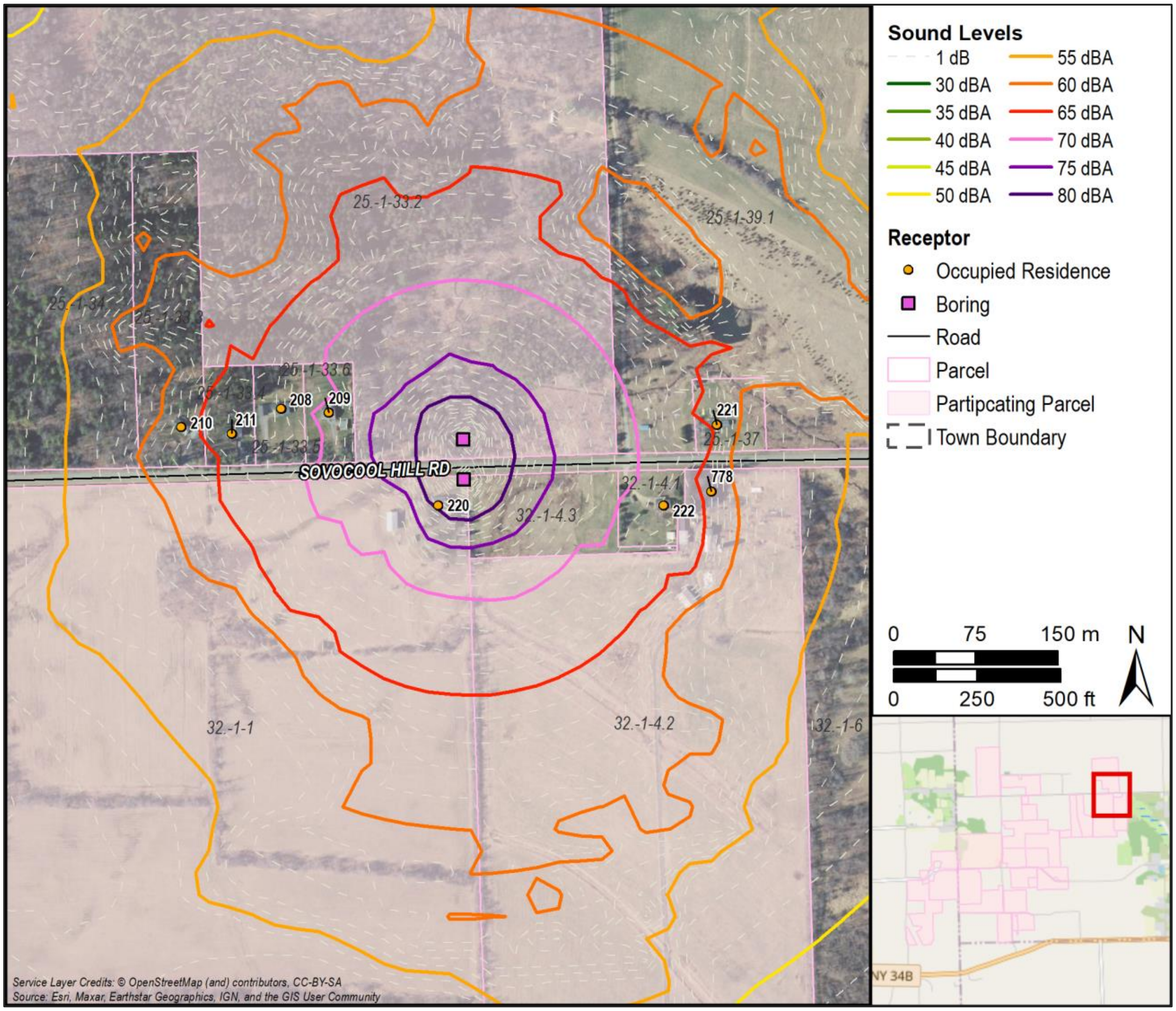

FIGURE 35: BORING MODEL RESULTS – WORST-CASE RECEPTOR ID 220

Cumulative Construction Impacts

The previous sections assume that the construction phases are done throughout the project at the same time. In this section, we reanalyze cumulative construction impacts assuming that construction is going on at every location at the same time at their maximum one-second sound levels. That is,

- **Road construction** is modeled to occur along the full length of each proposed access road concurrently across the Project. The sound power of all equipment associated with road construction is distributed along each of the 80 roadway sections as line sources.
- Construction of the **substation** facility is assumed to occur concurrently for all stages of its construction at once the same as in the previous section.
- **Trenching** is modeled to take place along the full length of all underground collection line routes throughout the Facility Site concurrently. The total sound power of all equipment associated with trenching is distributed along each of 83 trench sections as line sources.
- **Array inverter and transformer** construction is assumed to take place at all 50 proposed pads throughout the solar arrays concurrently for all stages of inverter construction at once. The sound power in the model is represented by a point source at each inverter and has the sound power of the sum of all sources operating at their maximum sound power simultaneously.
- **Piling** (as described above) is assumed to take place throughout the solar arrays concurrently. Given the potential for multiple pile drivers is possible within larger arrays of construction, but unlikely in smaller arrays, 18 locations were selected based on array size and number of laydown area to model the concurrent pile driving. Piling driving sound was modeled at all of the identified locations as point sources. The sound power associated with each point source is the sum of all sources at their maximum sound power.
- While **racking** would take place throughout the solar arrays once piling driving and other site preparations are completed, it is unlikely that material amounts of racking would be underway concurrently with all of the other construction activities within this list. 18 locations were selected based on array size and number of laydown areas which reflect construction areas large enough for concurrent scheduling of pile driving and racking. Racking sound was modeled at those locations concurrently with the rest of the construction sound on this list. Each racking area is modeled as a point source with a sound power equal to the sum of the sources in Table 11.
- **Boring** is modeled to take place at all bore pits located throughout the Project area concurrently. While each bore is directional (the bore at one end), we assumed that each

end would contain the maximum sound power of all equipment associated with boring (Table 13), resulting in 66 modeled point sources.

- **Laydown yards** are modeled the same as the previous section. That is, all laydown equipment (Table 12) would take place at the 19 laydown yards across the Facility Site concurrently and at their maximum sound power.

The highest 10 receptor sound pressure levels under this scenario are shown in Table 14. The results for each receptor are shown in Table 19of Appendix B. Sound contour isolines are shown in Appendix F in 22X34 inch format.

TABLE 14: HIGHEST 10 CONSTRUCTION SOUND LEVELS UNDER CUMULATIVE SCENARIO (L_{Smax})

Receptor	Participating/Non-Participating	Cumulative Sound Level (dBA)
220	Participating	83
139	Non-participating	83
152	Non-participating	80
170	Non-participating	79
127	Non-participating	79
151	Non-participating	78
130	Non-participating	78
136	Participating	78
141	Non-participating	78
135	Non-participating	77

While this analysis captures a hypothetical maximum potential noise impact of the cumulative impact of all phases of concurrent construction, it inherently overpredicts the potential for noise generation. Specifically, this analysis assumes that all phases of concurrent construction would occur simultaneously at all possible locations across the Facility Site with each piece of equipment at their maximum sound levels at the same time.

While this may have a use for permitting, it is not possible for all sites across a Facility of this size to be under construction at a single time. First, the modeled scenario involves the simultaneous maximum sound output of hundreds of pieces of heavy construction equipment at the same time, which would not be how the construction would be phased. Typically, a project will have a small number of construction teams constructing portions of the project in sequence, with only a handful of locations under construction at a single time. More detail on construction phasing can be found in Exhibit 7.

Thus, this modeling scenario overestimates the total potential for noise generation. Therefore, while the cumulative analysis helps to quantify the maximum potential impact of cumulative construction activities at each sensitive receptor, the actual level of noise generation during construction will be lower across the whole site. Each sensitive receptor will also likely experience less of a noise impact, consistent with a staged construction schedule with less concurrent activities and wider spread between work areas.

Construction Best Management Practices

The following best management construction practices are recommended to limit construction hours and reduce construction noise levels at noise sensitive locations.

- Construction will take place during normal hours (7:00 am to 8:00 pm Monday through Saturday and 8:00 am through 8:00 pm Sunday and holidays)
- 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 the construction in a manner that keeps loud equipment and activities as far as possible from noise-sensitive locations to the extent feasible;
- Using back-up alarms with a minimum increment above the background sound level to satisfy the performance requirements of the current revisions of Standard Automotive Engineering and Occupational Safety and Health Administration (OSHA) requirements;
- Locating equipment and material staging areas away from sensitive receptors when feasible; and
- Requiring contractors to use approved haul routes to minimize noise at residential and other sensitive noise receptor sites.

A Complaint Resolution Plan will be made available to the public and municipalities prior to construction and will include a process for addressing complaints received during construction and operation of the Project, including complaints regarding noise.

6.0 MITIGATION OF OPERATIONAL SOURCES

Mitigation has been incorporated into the model that is needed to meet the Section 94-c noise standards. The mitigation in the model includes:

- Specification of the substation transformer to meet the NEMA TR 1 standard sound level minus 8 dB. The NEMA sound pressure level of the transformer for this Facility is 84 dBA (ONAF) and 81 dBA (ONAN), so the transformer should be specified to meet sound pressure levels that are 8 dB less, 76 dBA (ONAF) and 73 dBA (ONAN)[8], and
- Two noise barriers in the substation: one located to the north and east of the transformer, and another located on a fenceline to the south that runs east to west through the substation separating the Project substation from a NYSEG switchyard. These barriers are shown in Figure 36.

No mitigation is needed for the other operational sound sources in order to meet the 94c sound level limits.

All tables in the report showing modeled sound levels represent the mitigated results.

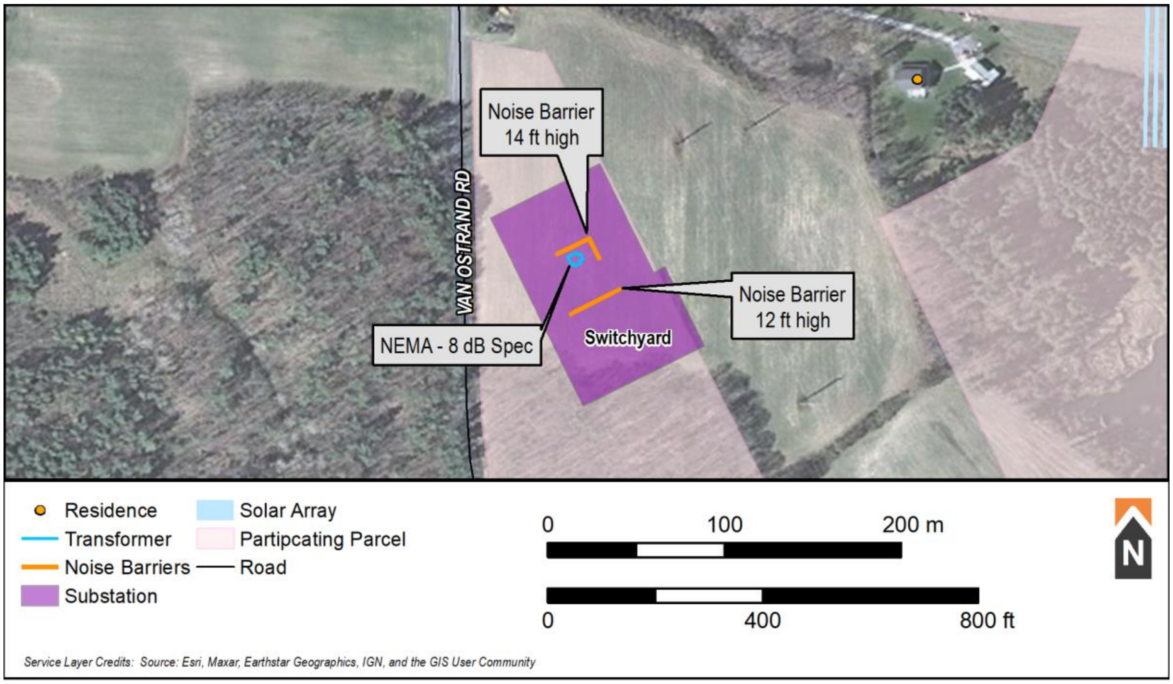

FIGURE 36: MAP OF SUBSTATION MITIGATION

[8] These are sound pressure levels that are measured per IEEE Standard C57.12.90 at distances between 0.3 and 2.0 meters from the transformer.

7.0 SUMMARY AND CONCLUSIONS

The Yellow Barn Solar Project is a proposed 160 megawatt (MW) photovoltaic solar power facility with supporting infrastructure in the Towns of Groton and Lansing, New York. RSG has prepared this Pre-Construction Noise Impact Assessment for the Facility.

The Facility is evaluated by the State of New York Office of Renewable Energy Siting established under Section 94-c of the Executive Law. Section 94-c is implemented through regulations Chapter XVIII, Title 19 of NYCRR Part 900, and noise is evaluated specifically under Part 900-2.8, Exhibit 7. There are no local or federal noise standards that are applicable to the Facility.

Table 15 shows the Section 94-c noise limits that are applicable to the Facility and the highest modeled sound level at any relevant receptor. As shown in the table, there are no receptors analyzed in this PNIA that exceed any applicable quantitative noise limit.

TABLE 15: SOUND LEVEL LIMITS APPLICABLE TO THE FACILITY AND NUMBER OF RECEPTORS EXCEEDING THE LIMITS

Sound Level Limit or Threshold	Maximum Sound Level (dBA)	Number of Receptors Exceeding Standard
45 dBA L_{8h} at nonparticipating residences	44 dBA[9]	0 (0%)
55 dBA L_{8h} at participating residence	41 dBA[9]	0 (0%)
55 dBA L_{8h} at nonparticipating property lines	51 dBA	0 (0%)
40 dBA L_{1h} at nonparticipating residences from substation noise, including tonal penalty	40 dBA[9]	0 (0%)

A summary of some key points in this assessment and conclusions of the assessment are as follows:

- Background sound level measurements were performed at five locations around the Study area for approximately six days in November 2022. Monitor locations were chosen to represent different areas and soundscapes throughout the Study Area. Descriptions of each monitor location are found in Section 4.2 and results are found in Section 4.4.
- The average background equivalent sound level across the study area was 44 dBA during the day and 37 dBA at night. The background sound levels and the types of sources that were present during the monitoring period are indicative of a rural area.
- Sound propagation modeling was performed using ISO 9613-2 sound propagation modeling algorithms to calculate projected Facility-related sound levels at 508 sensitive

[9] Maximum sound level at residences includes a 5 dB tonal penalty. Without the tonal penalty, the projected sound level is 5 dB less, which is the highest that would actually be measured in the field.

sound receptors including 492 nonparticipating residences, 12 participating residences, and 4 public buildings.

- The operational sound sources that were included in the sound propagation model included:
    - 50 inverter skids each of which include an inverter and a medium-voltage transformer,
    - A high-voltage transformer at the substation,
    - An HVAC unit at the substation, and
    - 5,046 single-axis tracking motors positioned throughout the array.
- The inverter has tonal prominence in the mid to high frequency range. Accordingly, a 5 dB penalty was applied to the inverters for evaluating the projected sound levels against the Section 94-c sound level limits applied at residences. This is a conservative assumption as tonality is generally reduced at the receiver due to the attenuation of the sound over distance and masking by broadband background sound.
- Spectral sound level data from a similar manufacturer indicates that the HVAC units are tonal, and therefore a tonal penalty was applied to the units.
- 1/3 octave band sound emission data was not available from the equipment manufacturers for the Facility transformers or trackers. In accordance with 94-c, these sources were assumed to be tonal with a 5 dB penalty applied to them in the model for evaluating the projected sound levels against the sound level limits applied at residences. Again, this is a conservative assumption as tonality is generally reduced at the receiver due to background sound masking and sound attenuation over distance.
- Projected sound levels (L_{8h}) from the Facility are reported in Section 5.3 and Appendix B for the worst-case daytime (with sunlight) scenario.
- The highest projected sound level at a non-participating residence (Receptor 127), including 5 dB tonal penalties, is 44 dBA L_{8h}. This level meets the Section 94-c noise limits.
- The highest projected sound level at a residential property line, not including a tonal penalty, is 51 dBA L_{8h} which occurs at the property line of Receptor 384. This level meets the Section 94-c noise limits.
- The highest projected sound level from the substation is 40 dBA L_{1h}, including a 5 dB tonal penalty, at Receptors 374 and 377 during the daytime ONAF conditions. This sound level assumes a NEMA minus 8 dB transformer and barriers in the substation as detailed in Section 6.0.

- Construction noise was modeled using ISO 9613-2 for a number of construction activities in the areas where they would be conducted closest to receptors. The projected sound level at the most impacted receptors that would occur from each activity is provided below. These sound levels are from construction equipment associated with a specific activity operating simultaneously and will not be consistently experienced by nearby receptors. Impacts will also be of relatively short duration.
  - 70 dBA for road construction,
  - 65 dBA for substation construction,
  - 87 dBA for trenching,
  - 70 dBA for inverter construction,
  - 69 dBA for piling,
  - 77 dBA for racking,
  - 76 dBA for laydown area activity, and
  - 81 dBA for a single bore.
- Construction was also modeled assuming all construction activities occurred at once, under this scenario, the highest modeled sound level is 83 dBA L_{Smax} at Receptor 220.
- The Facility has incorporated noise-mitigating elements into the design. In addition to siting inverter skids away from residences, the substation transformer is specified to meet the NEMA TR 1 standard sound level minus 8 dB, and two noise barriers are proposed for the substation as detailed in Section 6.0.

Based upon the results from the analysis completed in this report and the information presented in this report, we conclude that the modeled Facility sound levels meet the noise limits set in Section 94-c, and the noise reporting requirements of Section 94-c have been met.

APPENDIX A. MODEL INPUT DATA

TABLE 16: MODEL PARAMETER SETTINGS

MODEL PARAMETER	SETTING
Atmospheric Absorption	Based on 10°C and 70% RH
Foliage	None
Ground Absorption	ISO 9613-2 spectral and G=0.5
Receiver Height	1.5 meters for sound level isolines and discrete receptors
Search Radius	8,000 meters from each source

TABLE 17: OPERATIONAL SOURCE INPUT DATA

SOURCE ID	SOUND POWER LEVEL (dBA)		SOURCE HEIGHT (m)	COORDINATES (UTM NAD83 Z18N)		ABSOLUTE HEIGHT (m)
	INCLUDING TONAL PENALTY	EXCLUDING PENALTY		X (m)	Y (m)	
ONAF Transformer	104	99	4.8	379489	4711632	351
Inverter&MVT01	98	93	2.3	381313	4715294	399
Inverter&MVT02	98	93	2.3	381235	4715194	396
Inverter&MVT03	98	93	2.3	381394	4715153	399
Inverter&MVT04	98	93	2.3	381249	4715583	396
Inverter&MVT05	98	93	2.3	381713	4714920	407
Inverter&MVT06	98	93	2.3	381347	4714822	399
Inverter&MVT07	98	93	2.3	382031	4714073	411
Inverter&MVT08	98	93	2.3	382160	4714072	414
Inverter&MVT09	98	93	2.3	382238	4713840	419
Inverter&MVT10	98	93	2.3	382059	4713568	417
Inverter&MVT11	98	93	2.3	381934	4713470	414
Inverter&MVT12	98	93	2.3	382028	4713430	416
Inverter&MVT13	98	93	2.3	382342	4713417	419
Inverter&MVT14	98	93	2.3	382286	4713535	418
Inverter&MVT15	98	93	2.3	382481	4713509	420
Inverter&MVT16	98	93	2.3	382022	4713167	416
Inverter&MVT17	98	93	2.3	382147	4712765	416
Inverter&MVT18	98	93	2.3	382695	4713016	426
Inverter&MVT19	98	93	2.3	381826	4712894	412
Inverter&MVT20	98	93	2.3	381683	4712366	403
Inverter&MVT21	98	93	2.3	381892	4712325	410
Inverter&MVT22	98	93	2.3	381376	4712198	396

SOURCE ID	SOUND POWER LEVEL (dBA)		SOURCE HEIGHT (m)	COORDINATES (UTM NAD83 Z18N)		ABSOLUTE HEIGHT (m)
	INCLUDING TONAL PENALTY	EXCLUDING PENALTY		X (m)	Y (m)	
Inverter&MVT23	98	93	2.3	381257	4712431	393
Inverter&MVT24	98	93	2.3	381884	4711920	404
Inverter&MVT25	98	93	2.3	382103	4711878	412
Inverter&MVT26	98	93	2.3	381612	4711840	395
Inverter&MVT27	98	93	2.3	381022	4712189	387
Inverter&MVT28	98	93	2.3	380807	4712417	386
Inverter&MVT29	98	93	2.3	380685	4712418	385
Inverter&MVT30	98	93	2.3	380470	4712566	380
Inverter&MVT31	98	93	2.3	380945	4712773	391
Inverter&MVT32	98	93	2.3	380737	4712779	387
Inverter&MVT33	98	93	2.3	380280	4712606	376
Inverter&MVT34	98	93	2.3	380235	4712571	374
Inverter&MVT35	98	93	2.3	380396	4712950	380
Inverter&MVT36	98	93	2.3	380353	4713231	381
Inverter&MVT37	98	93	2.3	380415	4713251	382
Inverter&MVT38	98	93	2.3	380043	4712576	369
Inverter&MVT39	98	93	2.3	379772	4712586	360
Inverter&MVT40	98	93	2.3	379575	4712552	357
Inverter&MVT41	98	93	2.3	379860	4712367	362
Inverter&MVT42	98	93	2.3	379872	4712037	361
Inverter&MVT43	98	93	2.3	379585	4712013	353
Inverter&MVT44	98	93	2.3	383932	4715280	411
Inverter&MVT45	98	93	2.3	383989	4714984	403
Inverter&MVT46	98	93	2.3	383752	4714396	421
Inverter&MVT47	98	93	2.3	383981	4714284	425
Inverter&MVT48	98	93	2.3	383850	4714110	430
Inverter&MVT49	98	93	2.3	384103	4714107	430
Inverter&MVT50	98	93	2.3	384103	4714064	429
HVAC	100	95	0.8	379473	4711617	347
Trackers[10]	86	81	1.0	Throughout Array		

[10] Trackers modeled as operating 4.8 minutes per hour or 8.3% of the time resulting in levels that are about 11 dB lower.

TABLE 18: SOURCE SOUND POWER LEVEL SPECTRA

SOUND SOURCE	1/1 OCTAVE BAND SOUND POWER LEVEL (dBZ)									TOTAL SOUND POWER LEVEL (dBA)	REFERENCE
	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz		
Transformer ONAF	102	99	106	102	97	93	88	82	75	99	NEMA specs minus 8 dB & RSG measurements
Inverter	49	63	74	80	86	0	83	89	84	93	Test report & Manufacturer data
MVT	72	71	76	76	78	84	63	50	42	78	NEMA spec & RSG measurements
Tracker[10]					84					81	Manufacturer data
HVAC Unit		83	92	101	92	87	82	77	72	94	Manufacturer data + Similar unit spectrum

APPENDIX B. RECEPTOR INFORMATION & MODEL RESULTS

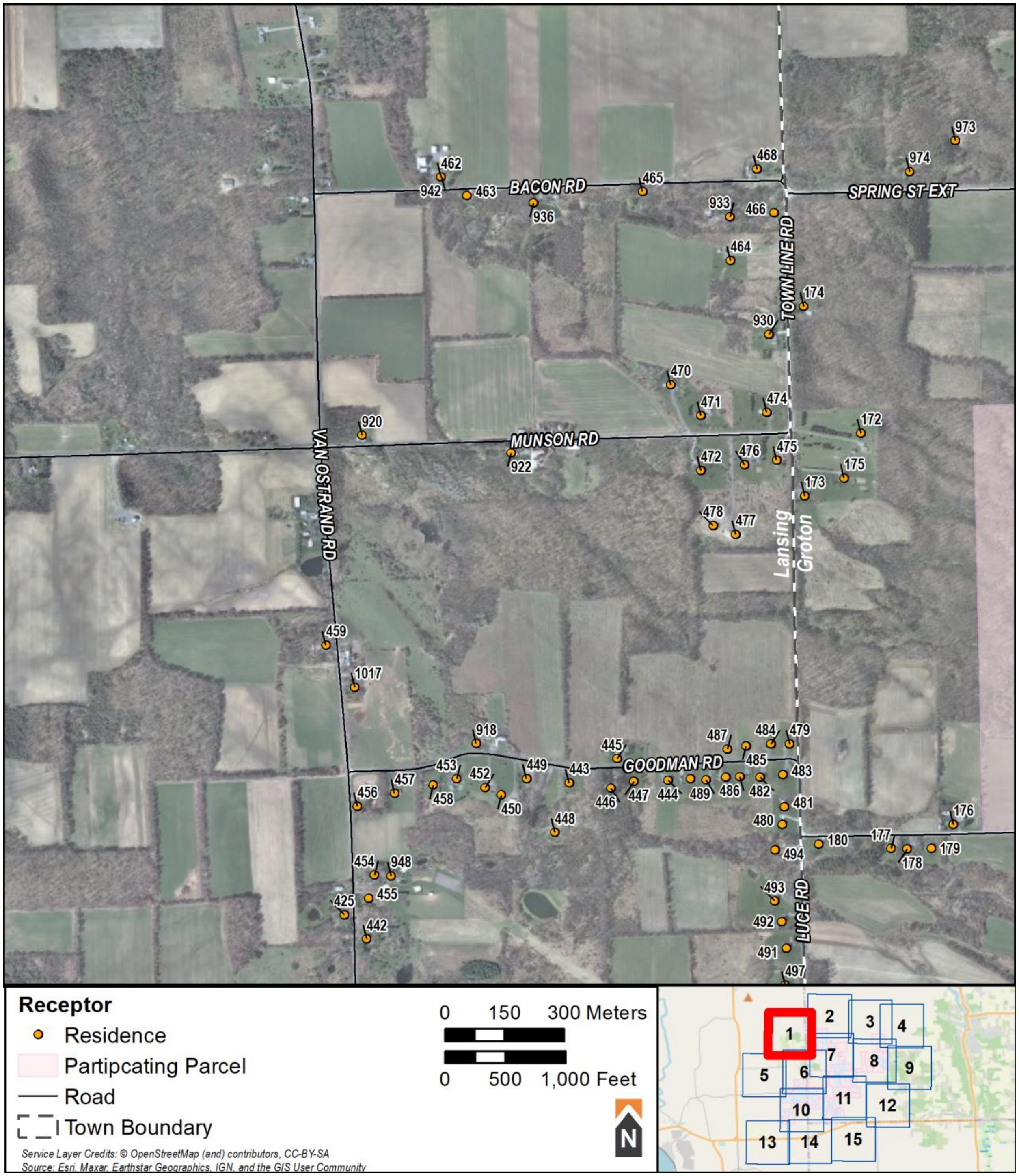

FIGURE 37: MAP OF MODELED RECEPTORS – AREA 1

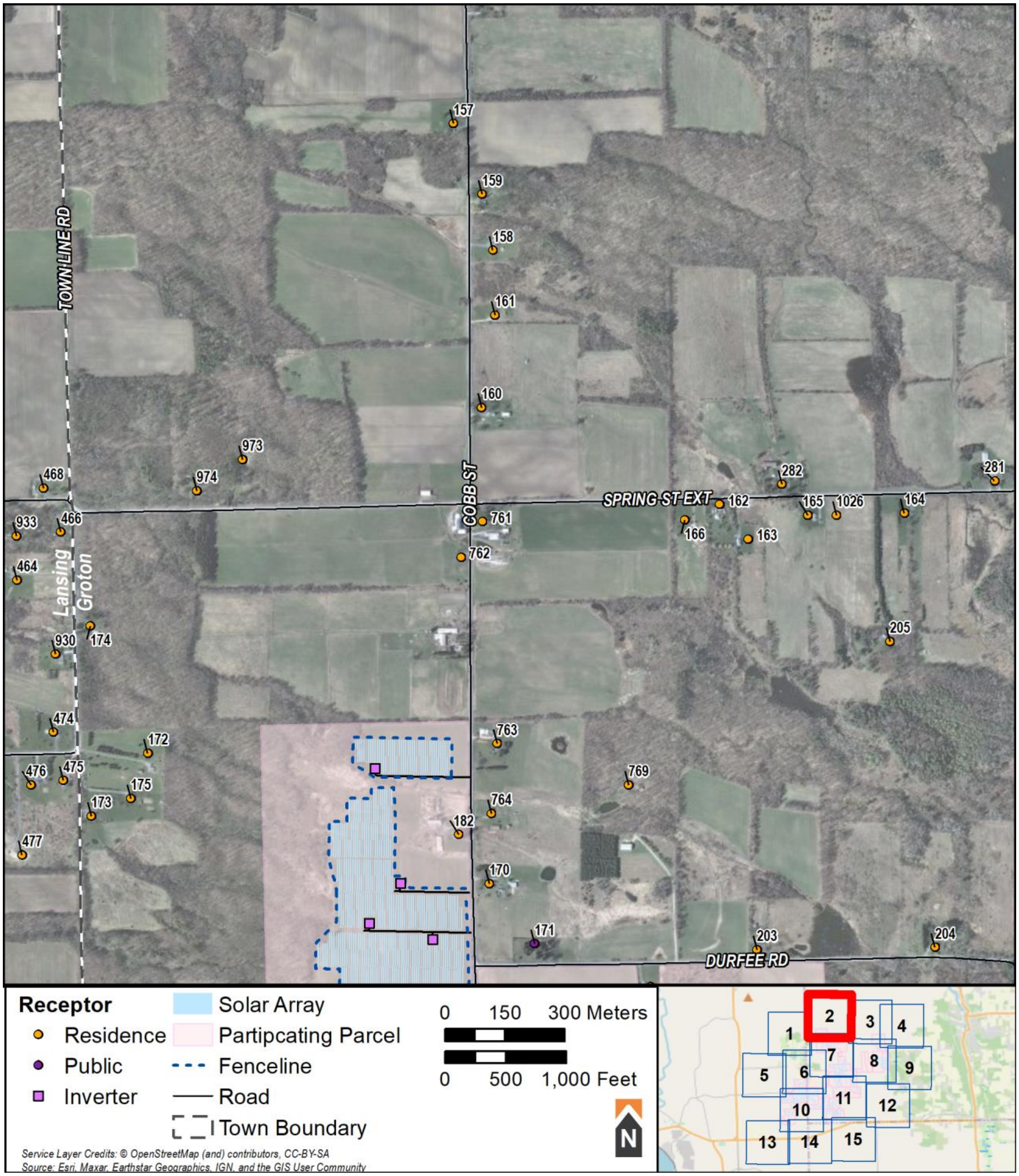

FIGURE 38: MAP OF MODELED RECEPTORS – AREA 2

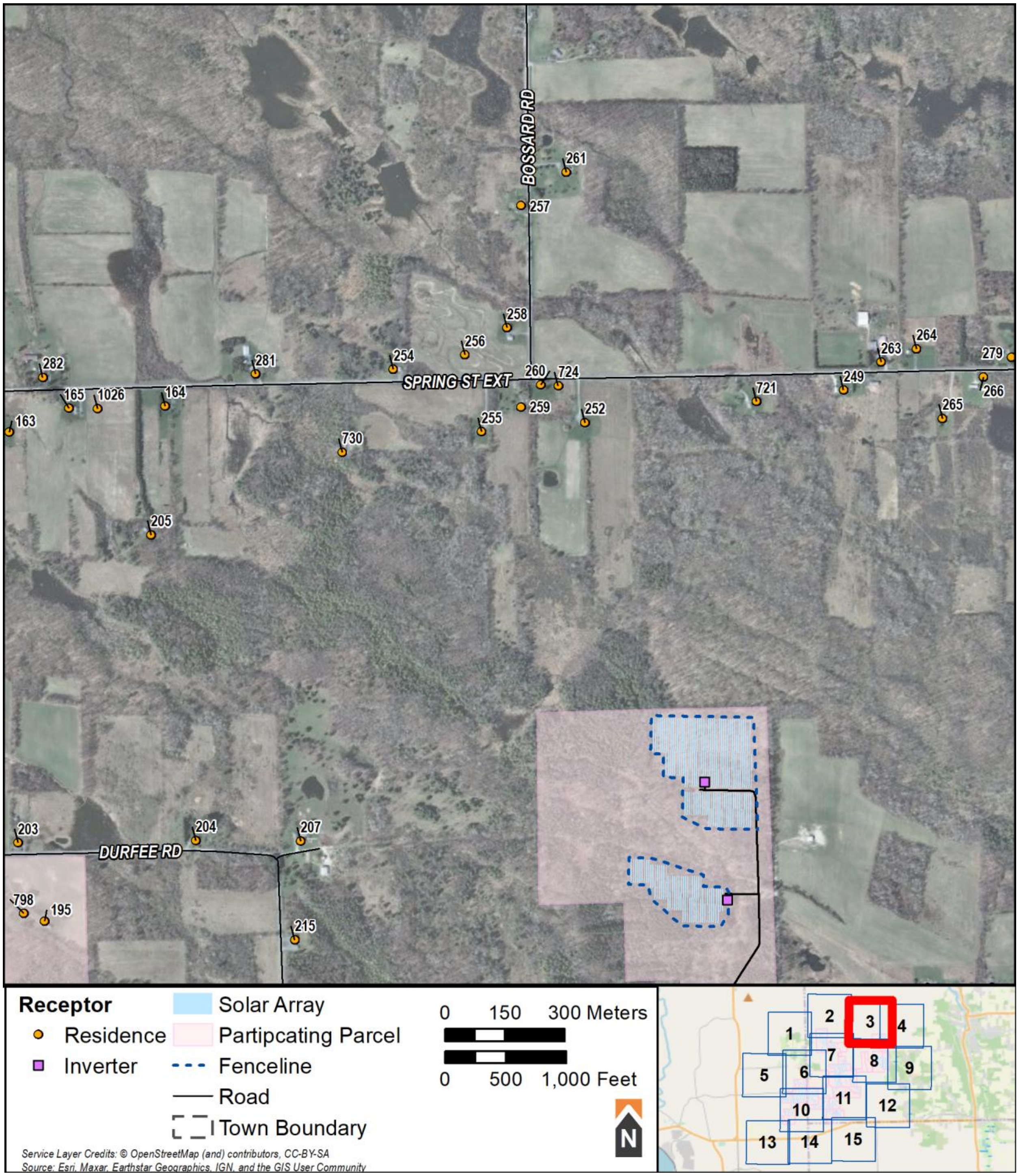

FIGURE 39: MAP OF MODELED RECEPTORS – AREA 3

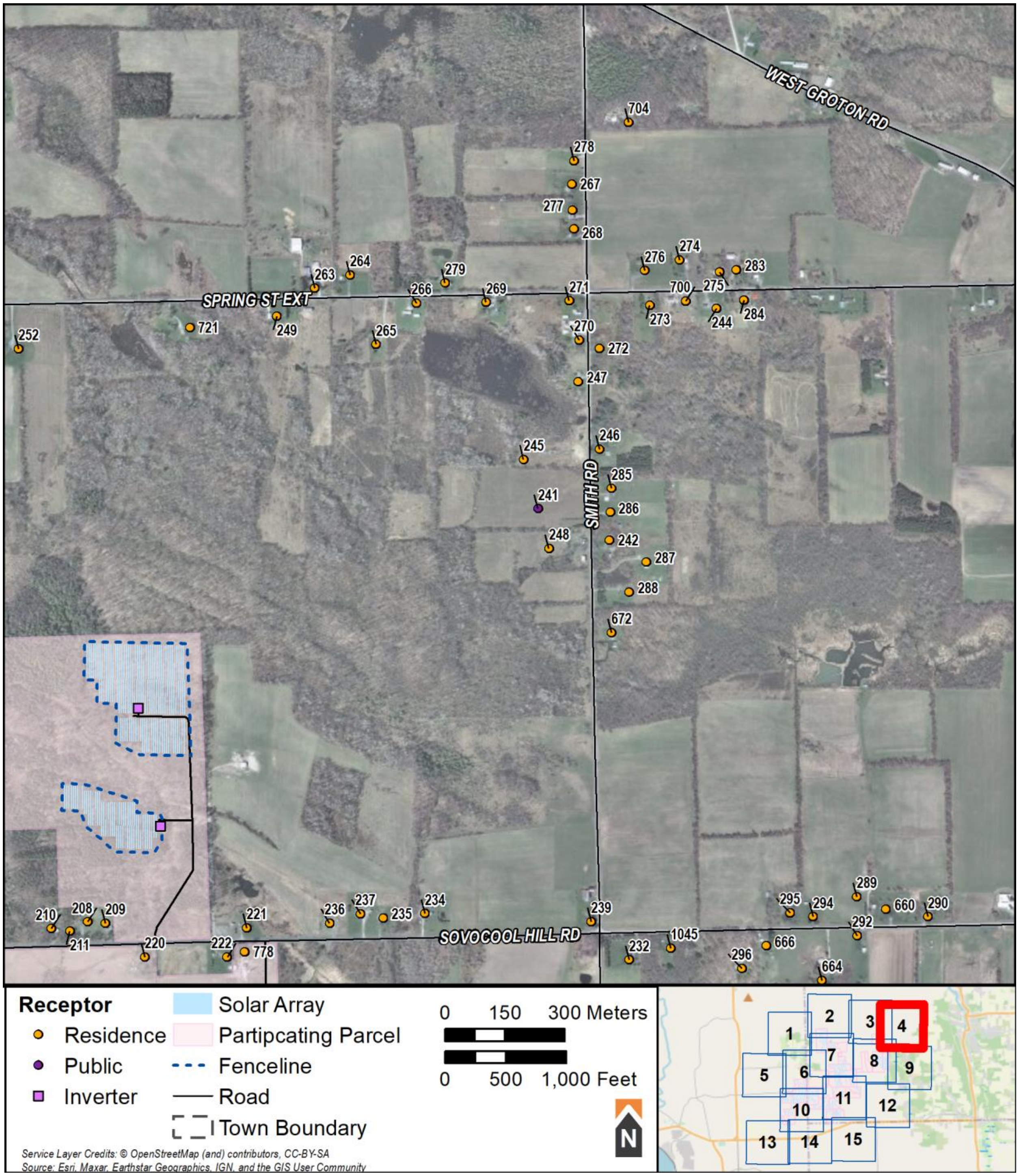

FIGURE 40: MAP OF MODELED RECEPTORS – AREA 4

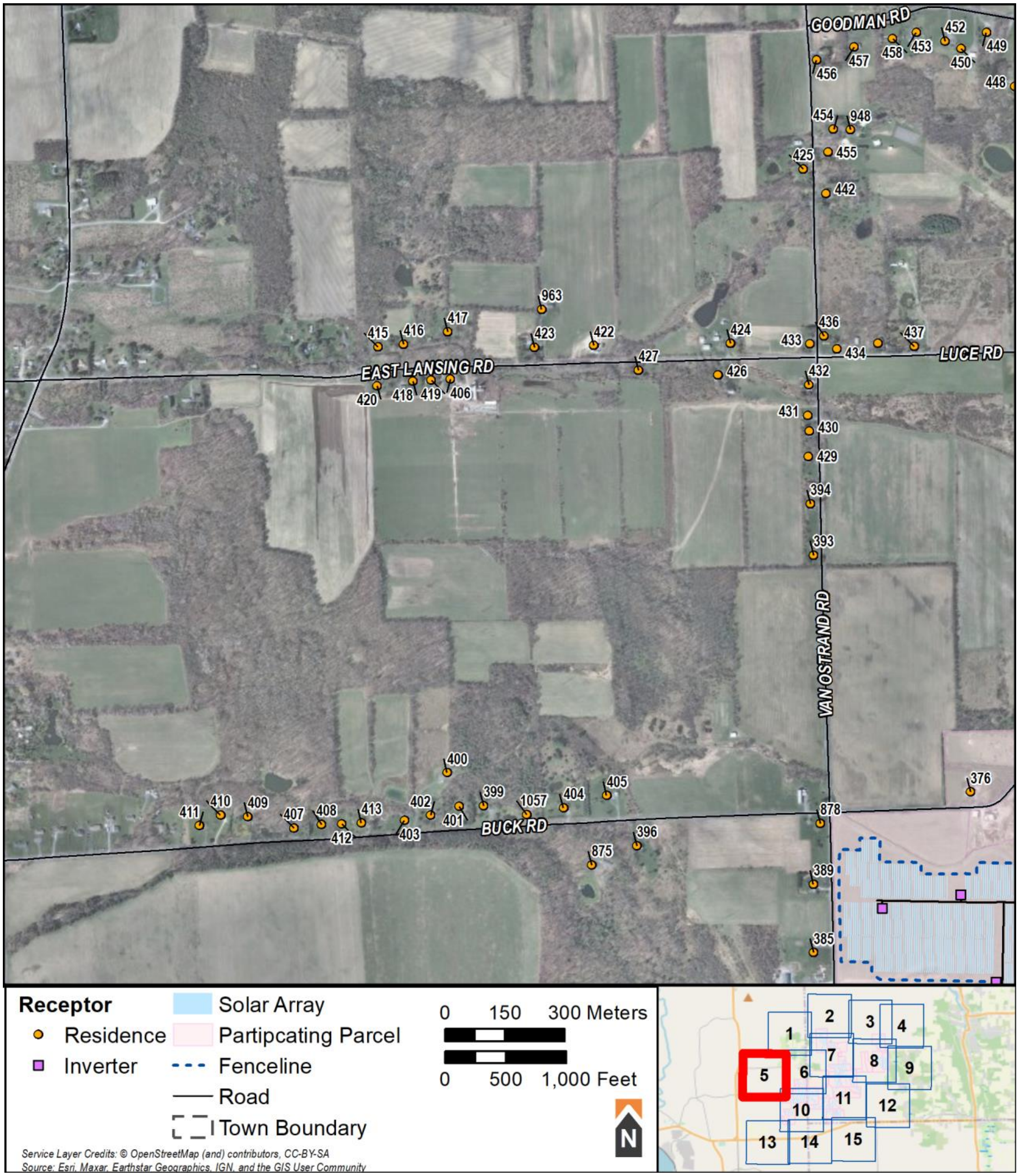

FIGURE 41: MAP OF MODELED RECEPTORS – AREA 5

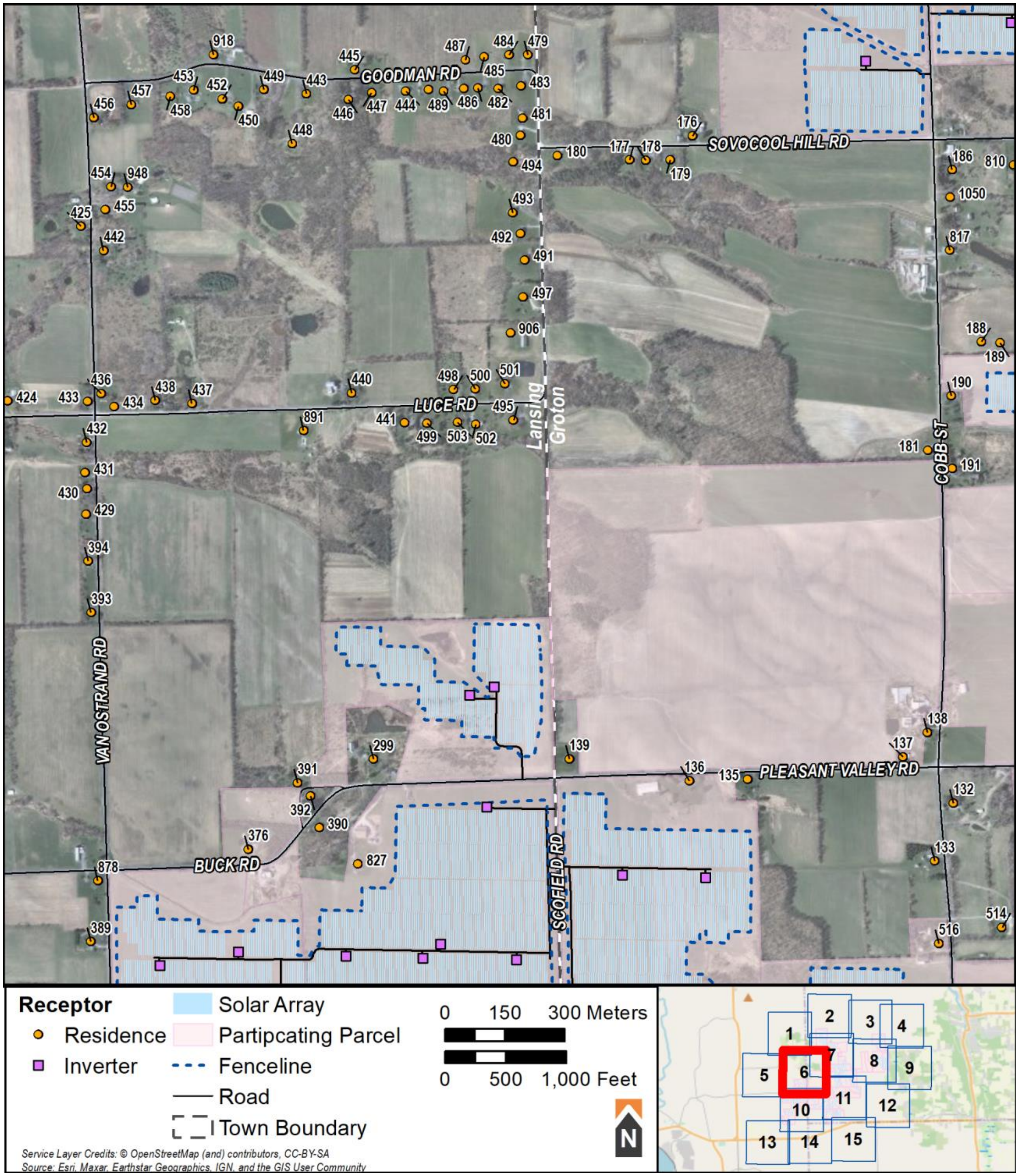

FIGURE 42: MAP OF MODELED RECEPTORS – AREA 6

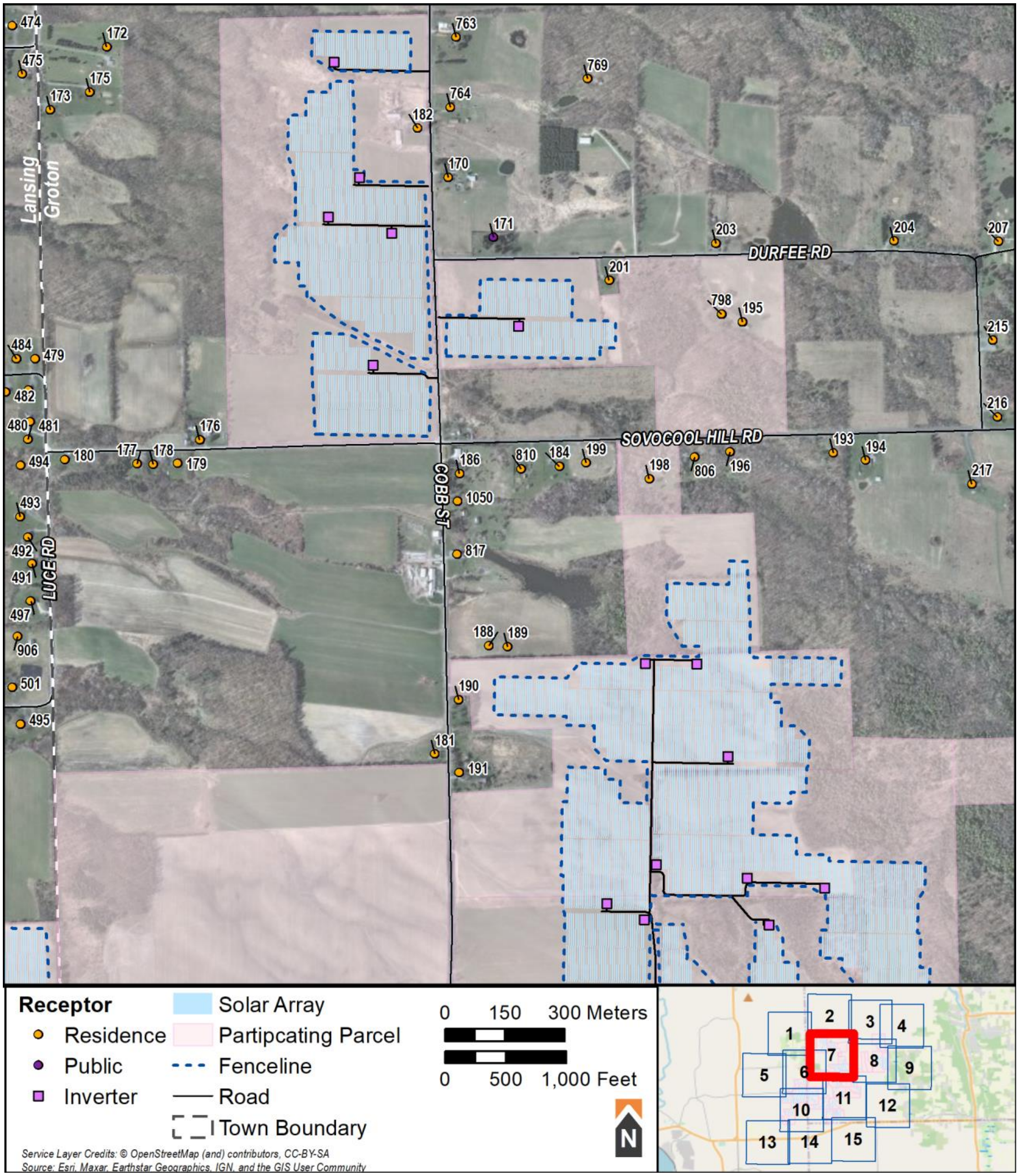

FIGURE 43: MAP OF MODELED RECEPTORS – AREA 7

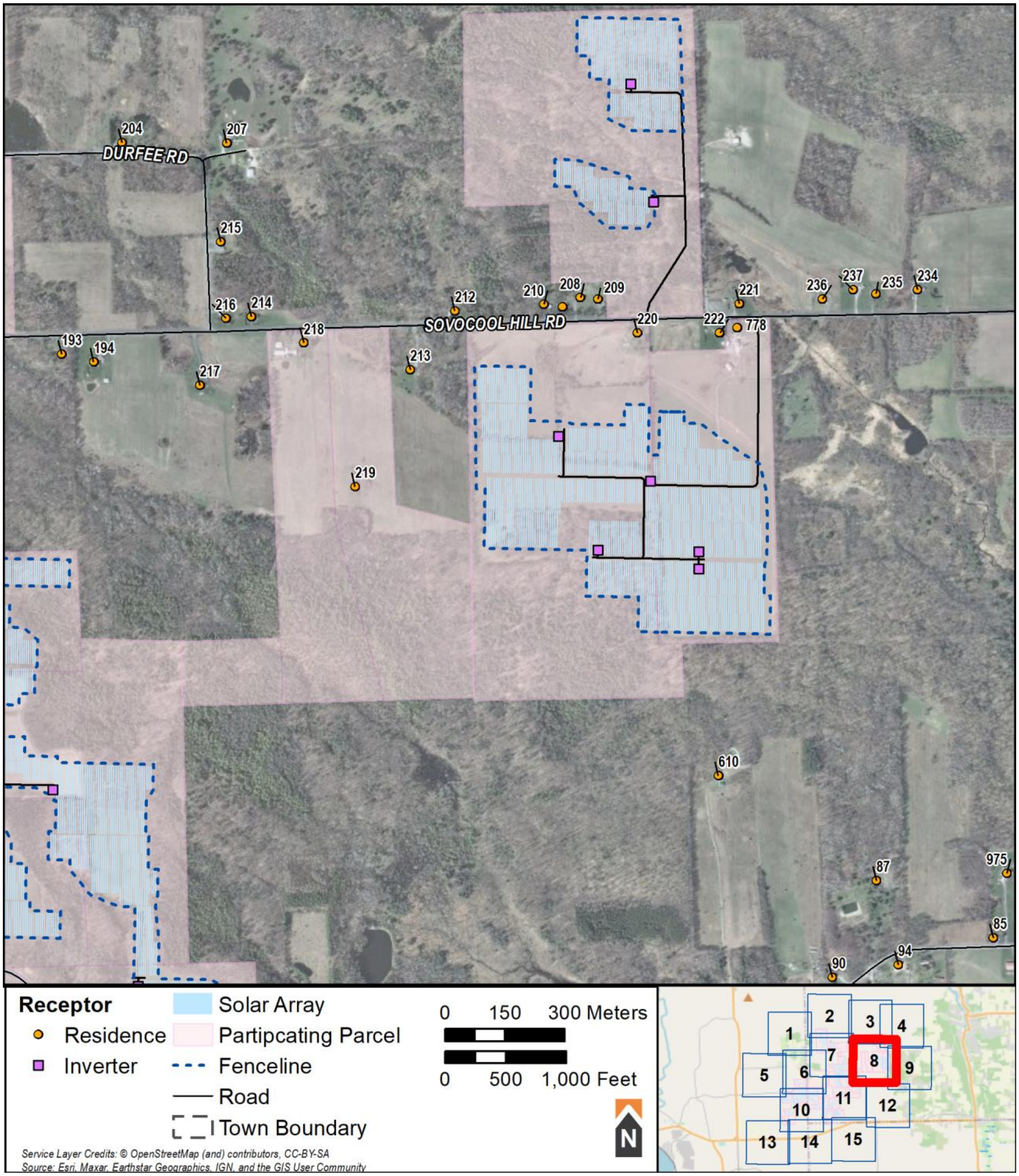

FIGURE 44: MAP OF MODELED RECEPTORS – AREA 8

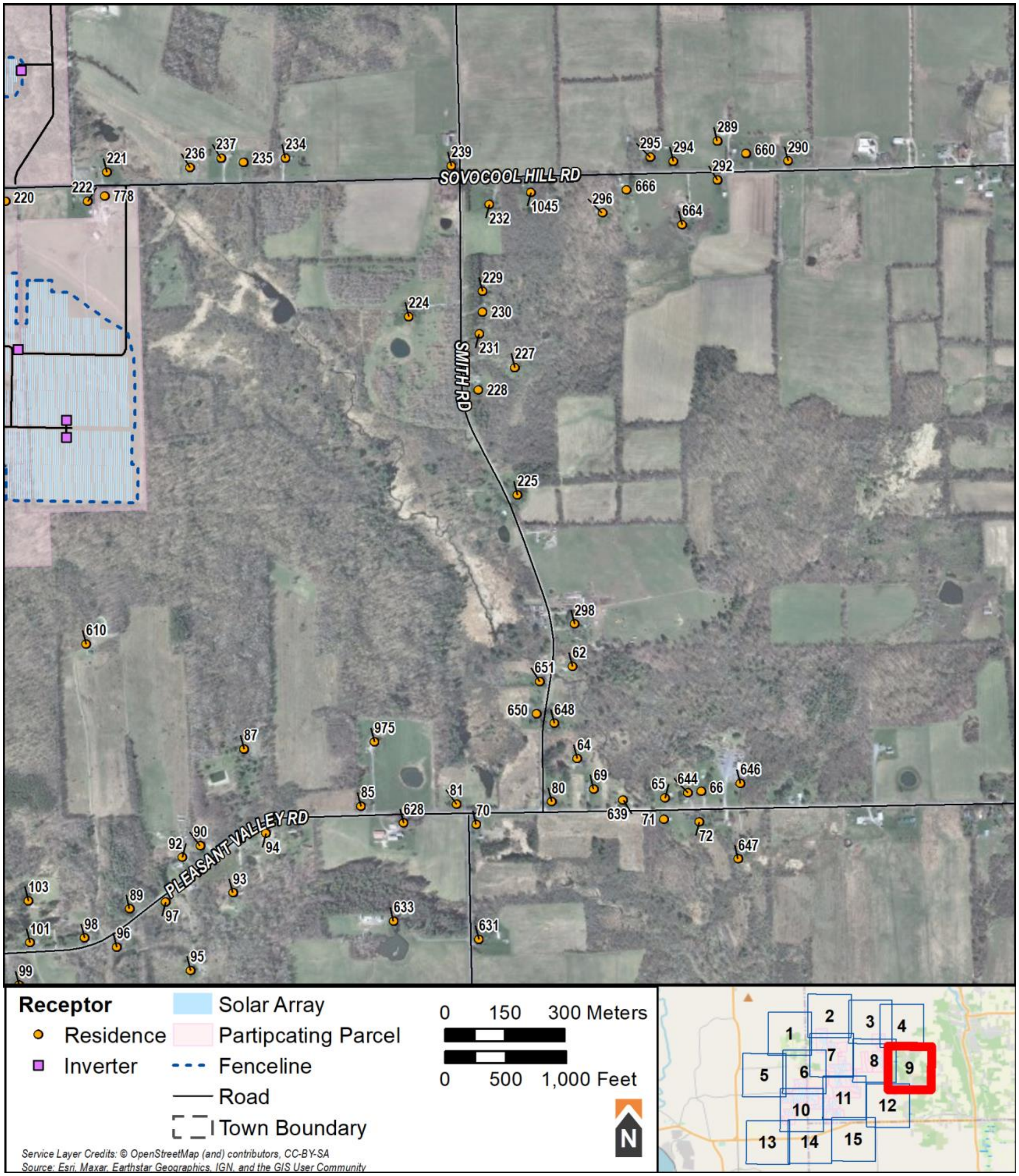

FIGURE 45: MAP OF MODELED RECEPTORS – AREA 9

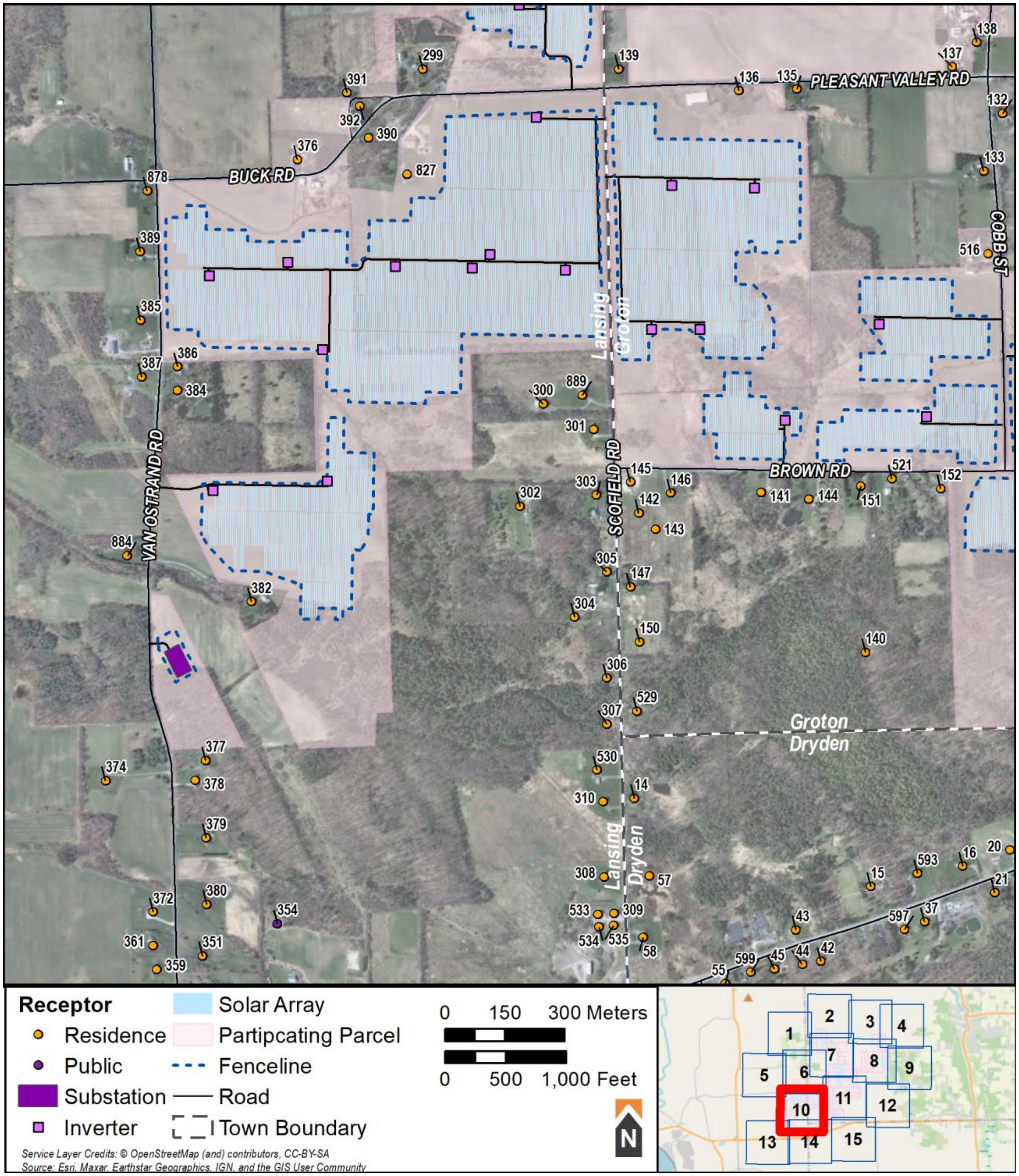

FIGURE 46: MAP OF MODELED RECEPTORS – AREA 10

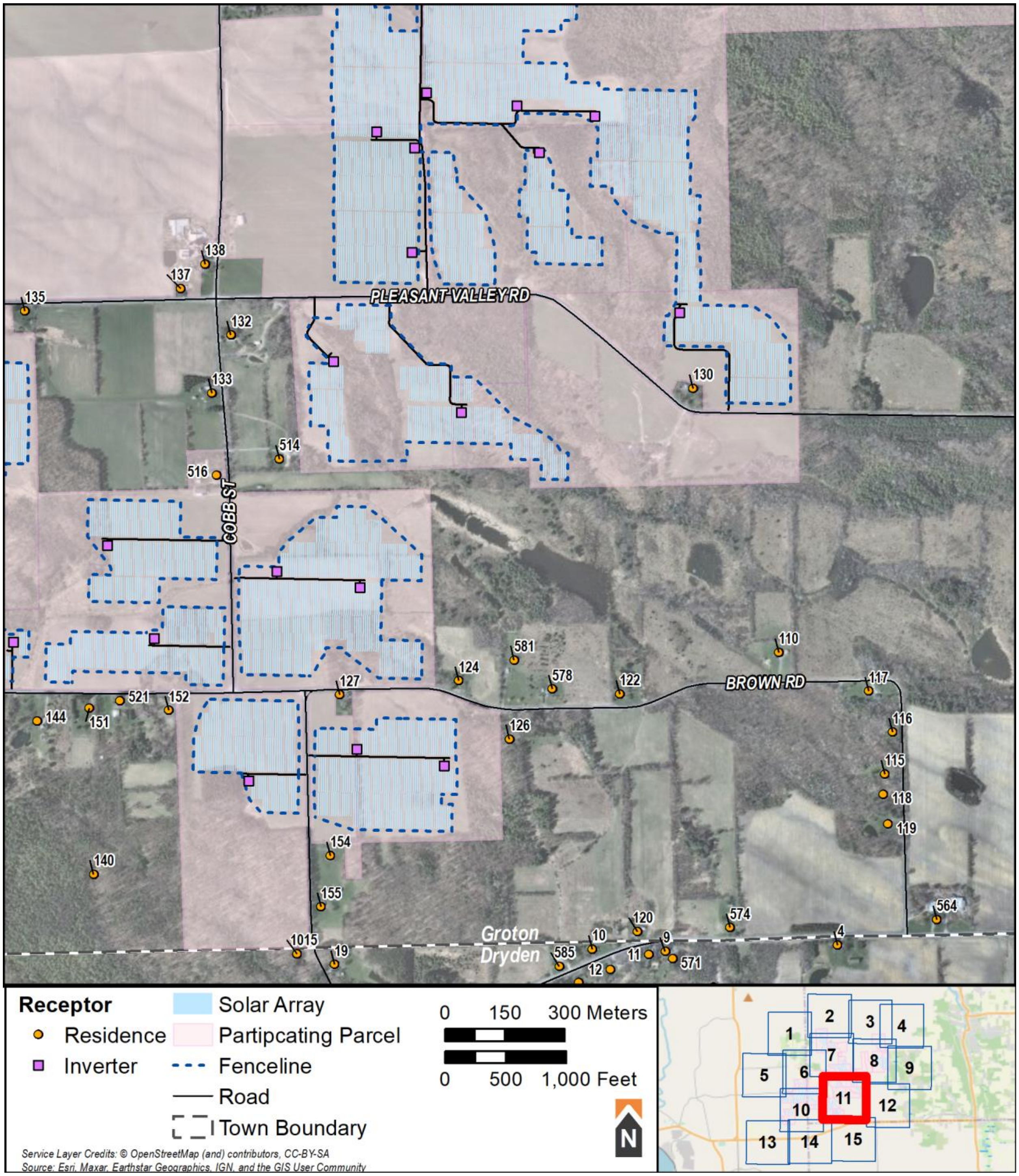

FIGURE 47: MAP OF MODELED RECEPTORS – AREA 11

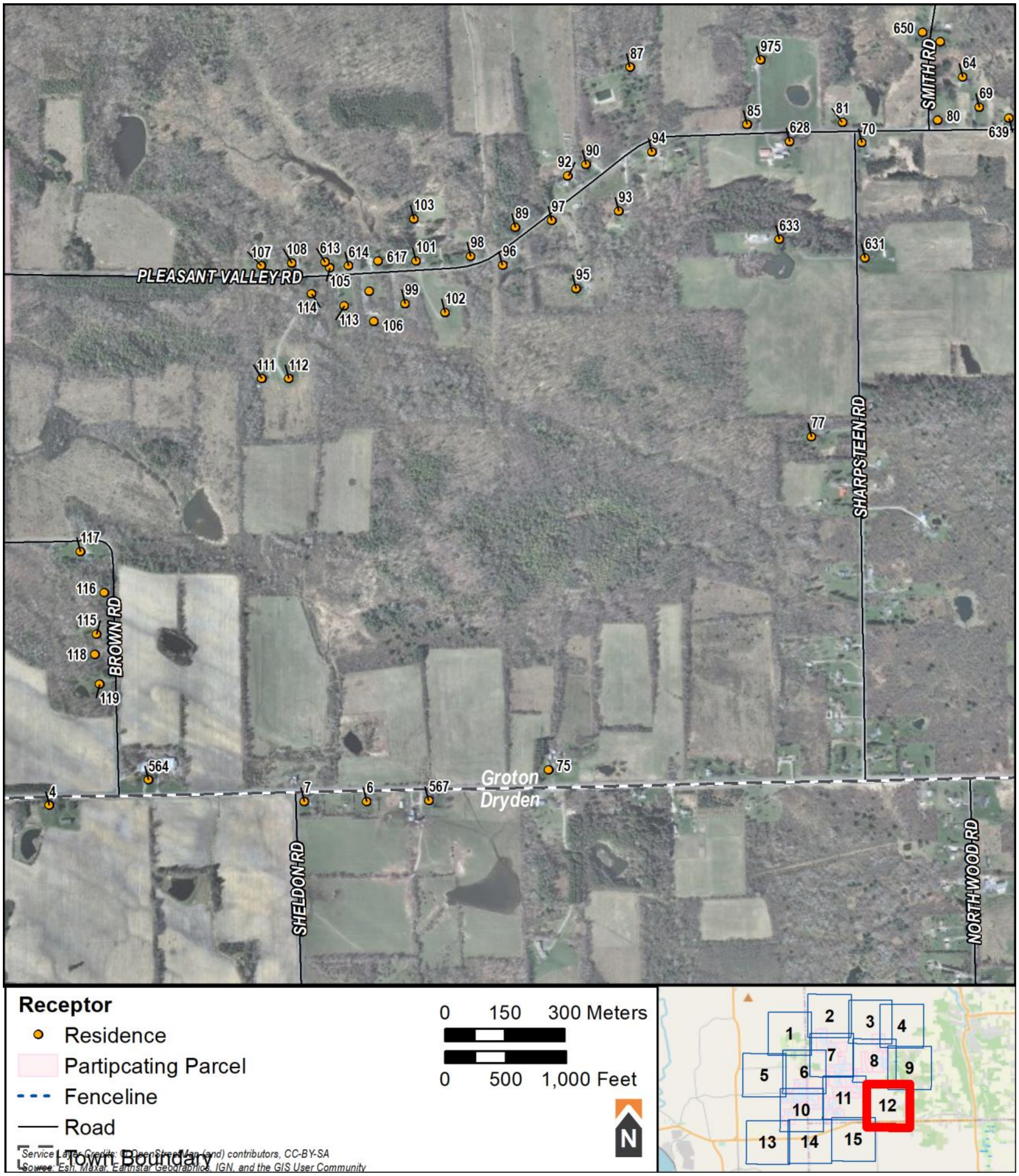

FIGURE 48: MAP OF MODELED RECEPTORS – AREA 12

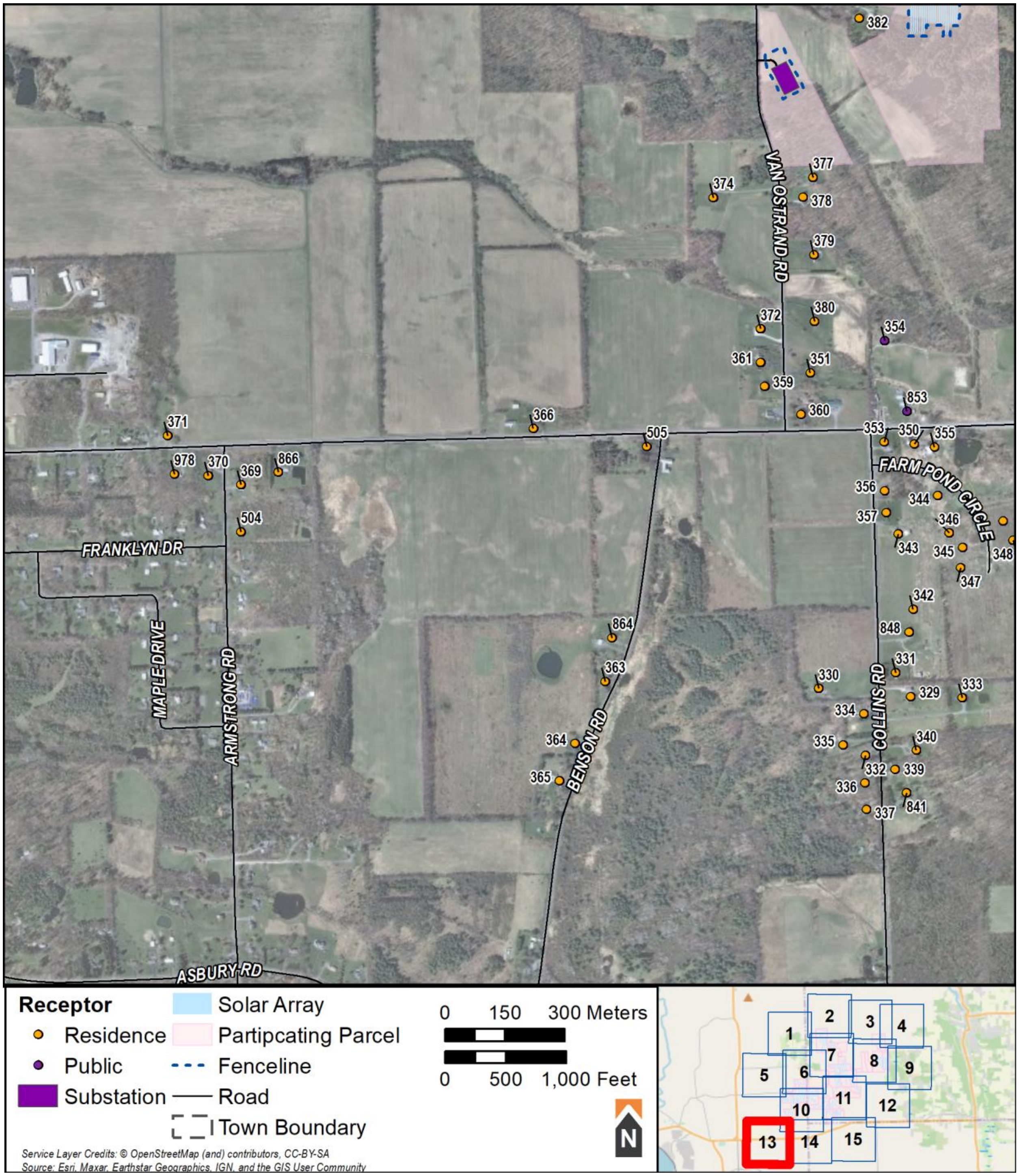

FIGURE 49: MAP OF MODELED RECEPTORS – AREA 13

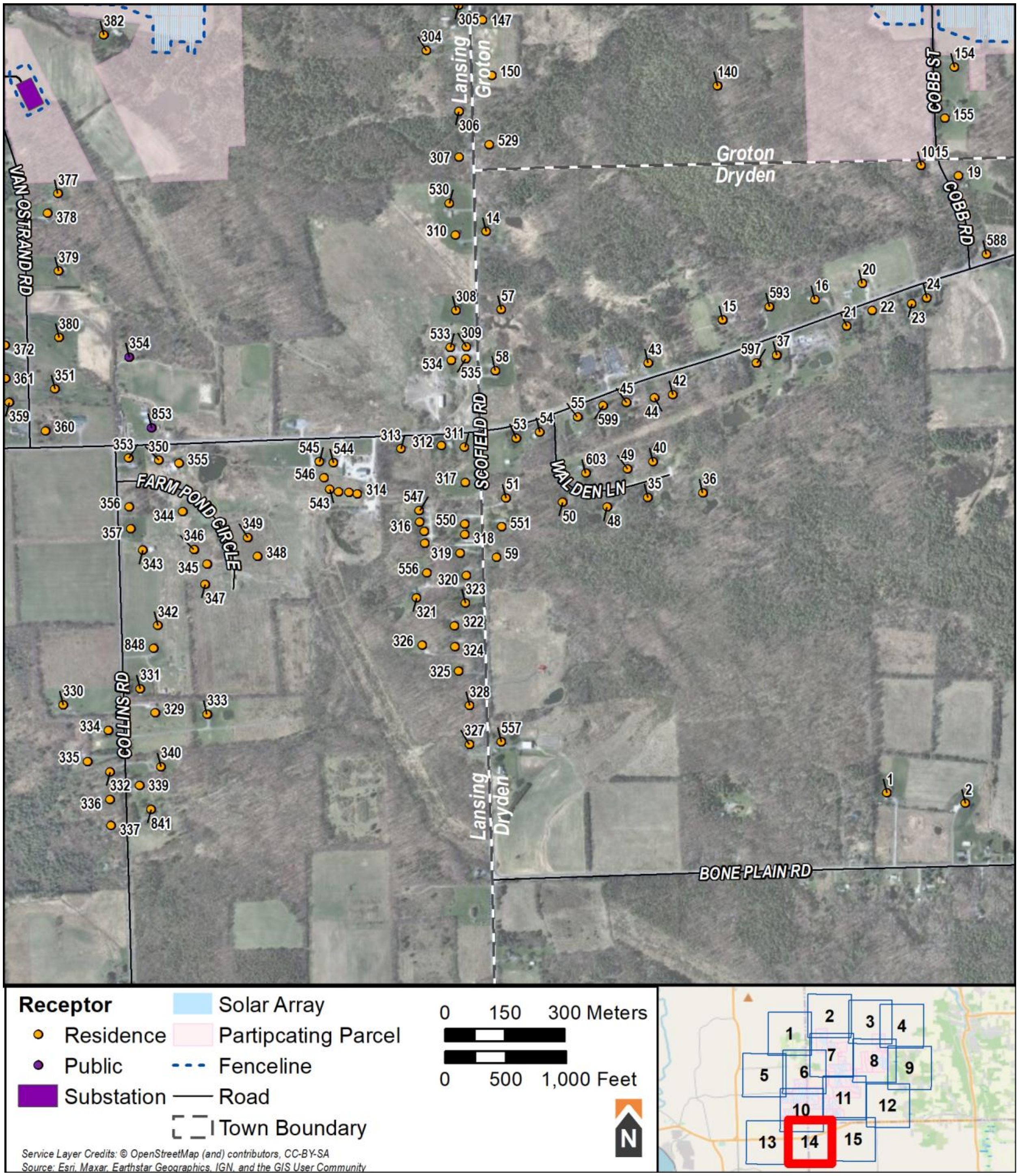

FIGURE 50: MAP OF MODELED RECEPTORS – AREA 14

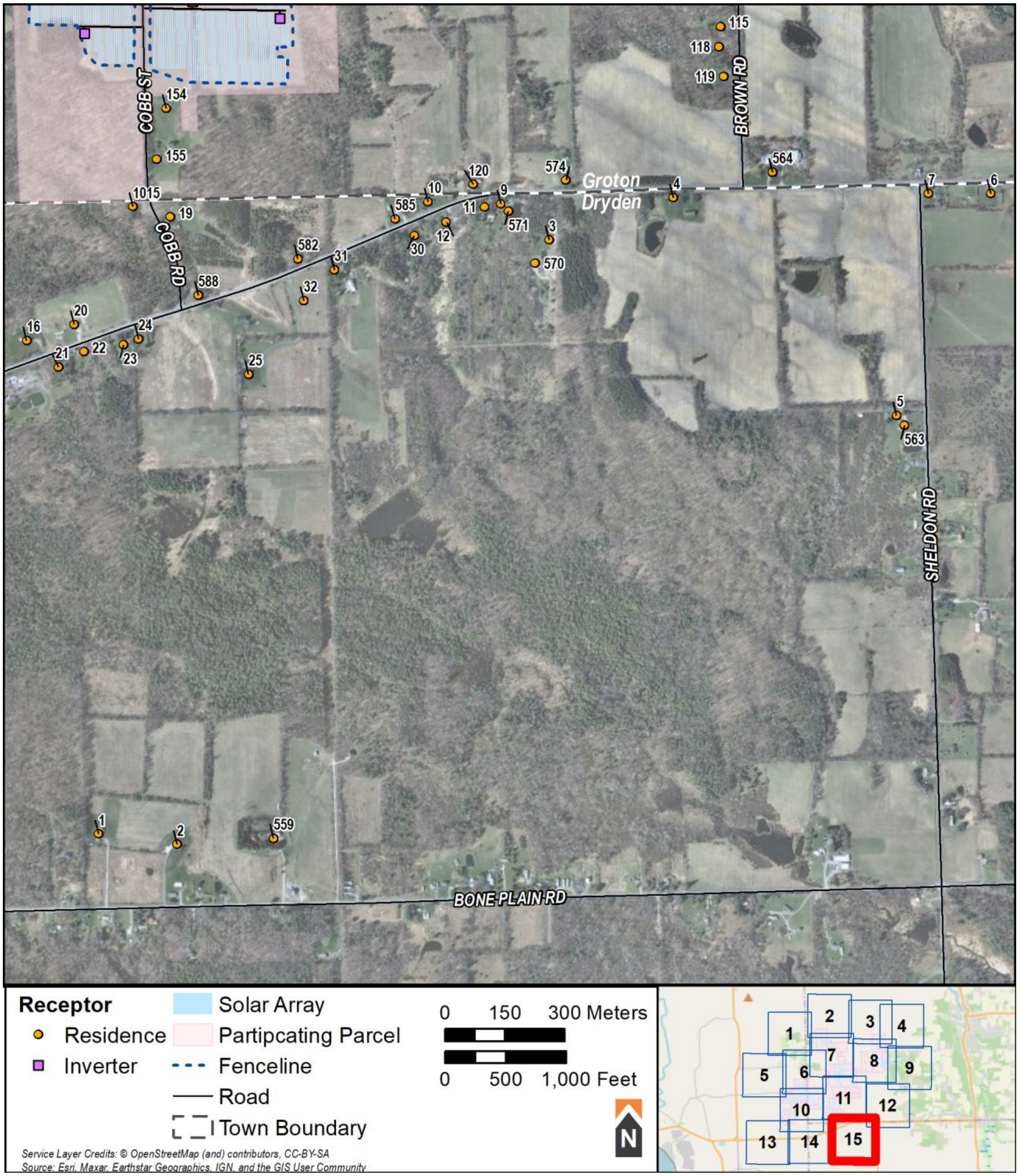

FIGURE 51: MAP OF MODELED RECEPTORS – AREA 15

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TABLE 19: RECEIVER LOCATIONS, TAX ID, MITIGATED MODELING RESULTS, & CUMULATIVE CONSTRUCTION MAXIMUM SOUND LEVELS

ID	Type	Participation Status	Tax ID	Sound Pressure Level (dBA) - Maximum L_{8h}	Sound Pressure Level (dBA), Substation Only, Maximum L_{1h}		Cumulative Maximum Construction Sound Pressure Levels (dBA)	Coordinates (UTM NAD83 Z18N)		Absolute Height (m)
					With Tonal Penalty	Without Tonal Penalty		X (m)	Y (m)	
					Participating					
136	Residence	Part.	34.-1-1.1	38	19	14	78	380905	4713016	393
182	Residence	Part.	24.-1-14	41	9	4	77	381460	4715417	401
195	Residence	Part.	24.-1-11.32	29	9	4	71	382275	4714931	414
198	Residence	Part.	33.-1-3.4	34	9	4	77	382041	4714537	409
217	Residence	Part.	33.-1-6.3	28	9	4	66	382851	4714524	427
219	Residence	Part.	33.-1-6.5	30	9	4	69	383240	4714269	431
220	Residence	Part.	32.-1-1	37	0	0	83	383950	4714655	406
376	Residence	Part.	30.-1-32	40	23	18	74	379797	4712843	367
516	Residence	Part.	34.-1-4	37	18	13	77	381532	4712607	402
778	Residence	Part.	32.-1-4.2	35	2	0	74	384200	4714668	404
798	Residence	Part.	24.-1-11.32	28	9	4	71	382223	4714950	412
827	Residence	Part.	30.-1-5.1	40	23	18	75	380073	4712806	372
			Minimum	28	0	0	66			
			Maximum	41	23	18	83			
			Average	35	11	7	74			
					Nonparticipating					
1	Residence	Non-Part.	21.-1-35.51	21	17	12	58	381648	4709831	394
2	Residence	Non-Part.	21.-1-35.4	20	15	10	58	381845	4709804	393
3	Residence	Non-Part.	21.-1-12.3	25	14	9	63	382779	4711322	406
4	Residence	Non-Part.	21.-1-11	24	14	9	62	383091	4711428	420
5	Residence	Non-Part.	21.-1-10.32	18	10	5	57	383652	4710882	408
6	Residence	Non-Part.	22.-1-2.3	19	10	5	58	383889	4711438	429
7	Residence	Non-Part.	22.-1-1	20	11	6	58	383732	4711438	427

ID	Type	Participation Status	Tax ID	Sound Pressure Level (dBA) - Maximum L_{8h}	Sound Pressure Level (dBA), Substation Only, Maximum L_{1h}		Cumulative Maximum Construction Sound Pressure Levels (dBA)	Coordinates (UTM NAD83 Z18N)		Absolute Height (m)
					With Tonal Penalty	Without Tonal Penalty		X (m)	Y (m)	
9	Residence	Non-Part.	21.-1-12.2	27	14	9	64	382658	4711412	403
10	Residence	Non-Part.	21.-1-7.1	28	15	10	65	382475	4711418	399
11	Residence	Non-Part.	21.-1-12.1	27	14	9	64	382618	4711404	401
12	Residence	Non-Part.	21.-1-8.3	26	14	9	64	382521	4711366	397
14	Residence	Non-Part.	21.-1-1	30	26	21	66	380643	4711240	370
15	Residence	Non-Part.	21.-1-2.3	27	21	16	65	381236	4711018	380
16	Residence	Non-Part.	21.-1-2.91	26	19	14	65	381467	4711069	381
19	Residence	Non-Part.	21.-1-3	30	19	14	69	381828	4711379	395
20	Residence	Non-Part.	21.-1-2.6	27	19	14	65	381586	4711110	385
21	Residence	Non-Part.	21.-1-19.1	26	19	14	65	381548	4711003	383
22	Residence	Non-Part.	21.-1-17	26	19	14	65	381611	4711042	385
23	Residence	Non-Part.	21.-1-18.2	27	19	14	65	381710	4711059	392
24	Residence	Non-Part.	21.-1-15	26	19	14	65	381748	4711073	392
25	Residence	Non-Part.	21.-1-14.3	25	16	11	64	382025	4710985	389
30	Residence	Non-Part.	21.-1-8.2	27	14	9	65	382441	4711334	396
31	Residence	Non-Part.	21.-1-13	26	15	10	65	382240	4711247	397
32	Residence	Non-Part.	21.-1-14.4	26	17	12	65	382163	4711170	399
35	Residence	Non-Part.	21.-1-24.4	24	20	15	62	381048	4710572	372
36	Residence	Non-Part.	21.-1-24.5	24	20	15	62	381186	4710584	373
37	Residence	Non-Part.	21.-1-19.3	26	20	15	64	381372	4710930	381
40	Residence	Non-Part.	21.-1-24.7	25	20	15	62	381061	4710662	373
42	Residence	Non-Part.	21.-1-22	26	21	16	63	381111	4710831	374
43	Residence	Non-Part.	21.-1-2.8	26	21	16	64	381049	4710910	373
44	Residence	Non-Part.	21.-1-24.1	26	21	16	63	381065	4710823	374
45	Residence	Non-Part.	21.-1-25	26	21	16	63	380994	4710811	373
48	Residence	Non-Part.	21.-1-24.13	24	21	16	61	380946	4710549	370
49	Residence	Non-Part.	21.-1-24.8	25	21	16	62	380997	4710644	371
50	Residence	Non-Part.	21.-1-24.12	25	21	16	62	380834	4710561	369

ID	Type	Participation Status	Tax ID	Sound Pressure Level (dBA) - Maximum L_{8h}	Sound Pressure Level (dBA), Substation Only, Maximum L_{1h}		Cumulative Maximum Construction Sound Pressure Levels (dBA)	Coordinates (UTM NAD83 Z18N)		Absolute Height (m)
					With Tonal Penalty	Without Tonal Penalty		X (m)	Y (m)	
51	Residence	Non-Part.	21.-1-30.2	24	21	16	61	380692	4710571	365
53	Residence	Non-Part.	21.-1-29	25	22	17	62	380718	4710722	368
54	Residence	Non-Part.	21.-1-28	26	22	17	63	380777	4710737	369
55	Residence	Non-Part.	21.-1-27	26	21	16	63	380871	4710774	370
57	Residence	Non-Part.	21.-1-2.52	27	24	19	64	380680	4711044	368
58	Residence	Non-Part.	21.-1-2.51	27	24	19	64	380665	4710891	370
59	Residence	Non-Part.	21.-1-31	25	22	17	61	380668	4710422	366
62	Residence	Non-Part.	32.-1-29.2	19	1	0	57	385374	4713488	390
64	Residence	Non-Part.	32.-1-29.42	18	2	0	57	385385	4713256	391
65	Residence	Non-Part.	32.-1-25.1	17	2	0	55	385605	4713158	389
66	Residence	Non-Part.	32.-1-25.122	17	3	0	55	385697	4713175	392
69	Residence	Non-Part.	32.-1-29.41	18	2	0	56	385427	4713181	390
70	Residence	Non-Part.	35.-1-9	18	0	0	57	385132	4713092	397
71	Residence	Non-Part.	35.-1-11.22	17	2	0	55	385604	4713104	387
72	Residence	Non-Part.	35.-1-11.42	17	3	0	55	385692	4713098	391
75	Residence	Non-Part.	35.-1-26	18	9	4	56	384344	4711518	439
77	Residence	Non-Part.	35.-1-24.7	17	4	0	56	385005	4712354	417
80	Residence	Non-Part.	32.-1-29.44	18	2	0	56	385322	4713148	393
81	Residence	Non-Part.	32.-1-33	18	0	0	56	385083	4713143	399
85	Residence	Non-Part.	32.-1-35	21	7	2	59	384843	4713137	418
87	Residence	Non-Part.	32.-1-37	23	7	2	61	384549	4713281	429
89	Residence	Non-Part.	32.-1-40	22	7	2	60	384262	4712880	415
90	Residence	Non-Part.	32.-1-39	22	7	2	60	384439	4713038	418
92	Residence	Non-Part.	32.-1-38.22	22	7	2	60	384394	4713009	417
93	Residence	Non-Part.	35.-1-5	21	7	2	59	384521	4712920	415
94	Residence	Non-Part.	35.-1-6	20	5	0	58	384604	4713069	414
95	Residence	Non-Part.	35.-1-4.1	21	7	2	59	384414	4712725	420
96	Residence	Non-Part.	35.-1-3	22	7	2	60	384229	4712784	416

ID	Type	Participation Status	Tax ID	Sound Pressure Level (dBA) - Maximum L_{8h}	Sound Pressure Level (dBA), Substation Only, Maximum L_{1h}		Cumulative Maximum Construction Sound Pressure Levels (dBA)	Coordinates (UTM NAD83 Z18N)		Absolute Height (m)
					With Tonal Penalty	Without Tonal Penalty		X (m)	Y (m)	
97	Residence	Non-Part.	35.-1-4.2	21	7	2	60	384353	4712897	413
98	Residence	Non-Part.	32.-1-41	22	7	2	60	384149	4712807	415
99	Residence	Non-Part.	35.-1-1.22	22	9	4	61	383984	4712688	423
100	Residence	Non-Part.	35.-1-29	23	7	2	61	383894	4712718	419
101	Residence	Non-Part.	32.-1-42.1	22	7	2	61	384012	4712795	416
102	Residence	Non-Part.	35.-1-1.23	22	6	1	60	384086	4712666	422
103	Residence	Non-Part.	32.-1-42.2	23	8	3	61	384007	4712900	419
105	Residence	Non-Part.	32.-1-45	23	9	4	62	383796	4712778	419
106	Residence	Non-Part.	35.-1-30	22	9	4	61	383907	4712643	425
107	Residence	Non-Part.	32.-1-48	24	9	4	63	383623	4712782	422
108	Residence	Non-Part.	32.-1-47	24	7	2	62	383700	4712790	419
110	Residence	Non-Part.	34.-1-20	28	13	8	65	382944	4712163	421
111	Residence	Non-Part.	35.-1-1.322	24	9	4	62	383625	4712499	428
112	Residence	Non-Part.	35.-1-1.34	23	9	4	62	383692	4712499	428
113	Residence	Non-Part.	35.-1-1.33	23	9	4	61	383832	4712682	422
114	Residence	Non-Part.	35.-1-1.31	23	9	4	62	383750	4712713	422
115	Residence	Non-Part.	34.-1-17.1	25	12	7	63	383209	4711858	426
116	Residence	Non-Part.	34.-1-17.3	25	12	7	63	383230	4711962	428
117	Residence	Non-Part.	34.-1-17.2	26	12	7	64	383169	4712066	427
118	Residence	Non-Part.	34.-1-17.4	25	12	7	63	383206	4711807	424
119	Residence	Non-Part.	34.-1-17.5	25	12	7	62	383217	4711732	424
120	Residence	Non-Part.	34.-1-22.3	27	14	9	65	382589	4711462	402
122	Residence	Non-Part.	34.-1-21	32	14	9	68	382545	4712058	417
124	Residence	Non-Part.	34.-1-9.1	38	17	12	76	382140	4712092	412
126	Residence	Non-Part.	34.-1-22.1	38	15	10	72	382267	4711945	413
127	Residence	Non-Part.	34.-1-26.1	44	18	13	79	381841	4712056	405
130	Residence	Non-Part.	33.-1-15	35	13	8	78	382728	4712825	426
132	Residence	Non-Part.	34.-1-6.2	35	16	11	74	381568	4712959	406

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					With Tonal Penalty	Without Tonal Penalty		X (m)	Y (m)	
133	Residence	Non-Part.	34.-1-5.1	34	15	10	74	381520	4712814	401
135	Residence	Non-Part.	34.-1-1.2	35	16	11	77	381051	4713020	392
137	Residence	Non-Part.	33.-1-23	33	16	11	73	381442	4713076	402
138	Residence	Non-Part.	33.-1-24.1	33	15	10	73	381503	4713137	405
139	Residence	Non-Part.	33.-1-24.4	41	18	13	83	380604	4713070	384
140	Residence	Non-Part.	34.-1-30.5	31	21	16	70	381223	4711606	382
141	Residence	Non-Part.	34.-1-30.11	38	22	17	78	380961	4712008	383
142	Residence	Non-Part.	34.-1-31.27	33	25	20	71	380654	4711956	380
143	Residence	Non-Part.	34.-1-31.28	33	24	19	71	380696	4711915	380
144	Residence	Non-Part.	34.-1-30.3	39	21	16	77	381081	4711991	384
145	Residence	Non-Part.	34.-1-31.23	36	25	20	73	380633	4712033	382
146	Residence	Non-Part.	34.-1-31.24	37	25	20	74	380734	4712006	381
147	Residence	Non-Part.	34.-1-31.21	32	26	21	70	380633	4711771	378
150	Residence	Non-Part.	34.-1-31.12	30	26	21	68	380656	4711632	373
151	Residence	Non-Part.	34.-1-30.4	39	21	16	78	381212	4712023	388
152	Residence	Non-Part.	34.-1-29	41	20	15	80	381412	4712017	397
154	Residence	Non-Part.	34.-1-25.1	34	19	14	77	381818	4711653	398
155	Residence	Non-Part.	34.-1-25.4	32	18	13	72	381794	4711524	394
157	Residence	Non-Part.	23.-1-18	16	2	0	56	381447	4717202	391
158	Residence	Non-Part.	23.-1-17.1	18	4	0	57	381545	4716883	395
159	Residence	Non-Part.	23.-1-17.2	18	5	0	57	381518	4717024	397
160	Residence	Non-Part.	23.-1-16.2	23	6	1	60	381517	4716489	399
161	Residence	Non-Part.	23.-1-16.32	19	4	0	58	381551	4716720	395
162	Residence	Non-Part.	24.-1-3.6	22	4	0	61	382114	4716245	410
163	Residence	Non-Part.	24.-1-3.7	22	4	0	61	382187	4716158	408
164	Residence	Non-Part.	24.-1-3.3	21	3	0	60	382578	4716224	407
165	Residence	Non-Part.	24.-1-3.9	21	5	0	60	382336	4716218	413
166	Residence	Non-Part.	24.-1-3.1	24	7	2	62	382027	4716206	410

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					With Tonal Penalty	Without Tonal Penalty		X (m)	Y (m)	
170	Residence	Non-Part.	24.-1-11.41	42	10	5	79	381537	4715293	402
171	Public	Non-Part.	24.-1-12	40	9	4	77	381650	4715143	402
172	Residence	Non-Part.	24.-1-17.12	28	8	3	65	380679	4715621	387
173	Residence	Non-Part.	24.-1-17.2	26	7	2	64	380537	4715463	383
174	Residence	Non-Part.	24.-1-1.1	25	7	2	62	380535	4715940	383
175	Residence	Non-Part.	24.-1-17.11	27	9	4	65	380637	4715507	386
176	Residence	Non-Part.	24.-1-15	33	12	7	69	380912	4714635	393
177	Residence	Non-Part.	33.-1-1.13	28	11	6	66	380754	4714574	390
178	Residence	Non-Part.	33.-1-1.111	28	11	6	67	380796	4714573	391
179	Residence	Non-Part.	33.-1-1.112	28	11	6	67	380857	4714575	392
180	Residence	Non-Part.	33.-1-1.3	28	11	6	65	380573	4714585	389
181	Residence	Non-Part.	33.-1-2.1	31	12	7	71	381503	4713846	403
184	Residence	Non-Part.	33.-1-3.51	34	9	4	73	381816	4714568	408
186	Residence	Non-Part.	33.-1-3.62	36	11	6	75	381565	4714549	404
188	Residence	Non-Part.	33.-1-3.24	34	12	7	73	381638	4714118	412
189	Residence	Non-Part.	33.-1-3.25	36	12	7	73	381685	4714115	413
190	Residence	Non-Part.	33.-1-21	31	12	7	75	381563	4713982	404
191	Residence	Non-Part.	33.-1-20.1	32	13	8	72	381564	4713799	405
193	Residence	Non-Part.	33.-1-4.1	28	9	4	68	382504	4714602	415
194	Residence	Non-Part.	33.-1-6.1	28	9	4	68	382584	4714583	420
196	Residence	Non-Part.	33.-1-3.1	31	9	4	71	382244	4714604	411
199	Residence	Non-Part.	33.-1-3.23	33	9	4	75	381882	4714577	408
201	Residence	Non-Part.	24.-1-11.31	34	8	3	76	381940	4715034	411
203	Residence	Non-Part.	24.-1-10.1	30	8	3	69	382208	4715128	418
204	Residence	Non-Part.	24.-1-9.1	25	6	1	64	382655	4715133	418
205	Residence	Non-Part.	24.-1-3.4	23	5	0	61	382542	4715901	415
207	Residence	Non-Part.	24.-1-6.2	25	5	0	64	382918	4715132	420
208	Residence	Non-Part.	25.-1-33.5	37	3	0	75	383806	4714744	408

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					With Tonal Penalty	Without Tonal Penalty		X (m)	Y (m)	
209	Residence	Non-Part.	25.-1-33.6	38	3	0	75	383850	4714740	406
210	Residence	Non-Part.	25.-1-33.3	37	4	0	73	383715	4714727	412
211	Residence	Non-Part.	25.-1-33.4	38	4	0	74	383761	4714721	410
212	Residence	Non-Part.	24.-1-7	34	4	0	72	383491	4714711	416
213	Residence	Non-Part.	33.-1-6.6	30	3	0	70	383379	4714563	418
214	Residence	Non-Part.	24.-1-8.1	27	6	1	65	382980	4714696	423
215	Residence	Non-Part.	24.-1-6.3	27	7	2	65	382903	4714884	424
216	Residence	Non-Part.	24.-1-8.2	27	6	1	65	382916	4714692	423
218	Residence	Non-Part.	33.-1-6.4	29	7	2	66	383112	4714631	424
221	Residence	Non-Part.	25.-1-37	33	2	0	74	384205	4714729	401
222	Residence	Non-Part.	32.-1-4.1	37	3	0	74	384156	4714656	404
224	Residence	Non-Part.	32.-1-6	27	4	0	63	384963	4714367	406
225	Residence	Non-Part.	32.-1-32.2	22	2	0	59	385236	4713918	396
227	Residence	Non-Part.	32.-1-11.6	24	3	0	60	385229	4714239	403
228	Residence	Non-Part.	32.-1-11.5	24	3	0	60	385138	4714182	400
229	Residence	Non-Part.	32.-1-11.2	25	4	0	61	385148	4714430	411
230	Residence	Non-Part.	32.-1-11.4	25	4	0	61	385149	4714378	408
231	Residence	Non-Part.	32.-1-11.3	25	4	0	61	385140	4714323	405
232	Residence	Non-Part.	32.-1-55	25	5	0	61	385165	4714648	420
234	Residence	Non-Part.	25.-1-30.1	29	2	0	66	384653	4714764	405
235	Residence	Non-Part.	25.-1-35	30	2	0	67	384548	4714754	405
236	Residence	Non-Part.	25.-1-38	31	2	0	70	384413	4714741	404
237	Residence	Non-Part.	25.-1-36	30	3	0	68	384491	4714764	405
239	Residence	Non-Part.	25.-1-30.2	25	4	0	62	385070	4714745	420
241	Public	Non-Part.	25.-1-4.1	21	3	0	59	384937	4715781	430
242	Residence	Non-Part.	25.-1-12.1	21	3	0	58	385116	4715702	435
244	Residence	Non-Part.	25.-1-11.2	17	2	0	55	385385	4716284	439
245	Residence	Non-Part.	25.-1-5.22	18	3	0	57	384900	4715905	429

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					With Tonal Penalty	Without Tonal Penalty		X (m)	Y (m)	
246	Residence	Non-Part.	25.-1-5.21	18	3	0	56	385092	4715930	428
247	Residence	Non-Part.	25.-1-5.1	17	1	0	56	385038	4716100	427
248	Residence	Non-Part.	25.-1-4.2	21	3	0	59	384964	4715681	428
249	Residence	Non-Part.	25.-1-2.1	20	4	0	58	384281	4716264	422
252	Residence	Non-Part.	24.-1-5.2	22	4	0	59	383632	4716182	419
254	Residence	Non-Part.	23.-1-13.1	20	4	0	58	383151	4716316	407
255	Residence	Non-Part.	24.-1-4.2	22	4	0	60	383373	4716160	410
256	Residence	Non-Part.	22.-1-23.22	20	4	0	58	383331	4716353	411
257	Residence	Non-Part.	22.-1-23.3	17	4	0	56	383472	4716728	413
258	Residence	Non-Part.	22.-1-23.21	19	4	0	58	383436	4716420	413
259	Residence	Non-Part.	24.-1-5.3	21	4	0	59	383471	4716222	415
260	Residence	Non-Part.	24.-1-5.1	21	4	0	59	383521	4716278	418
261	Residence	Non-Part.	22.-1-23.1	17	4	0	56	383585	4716811	416
263	Residence	Non-Part.	22.-1-20	20	4	0	58	384376	4716334	428
264	Residence	Non-Part.	22.-1-19.2	20	3	0	57	384465	4716367	428
265	Residence	Non-Part.	25.-1-3.4	20	4	0	58	384530	4716193	427
266	Residence	Non-Part.	25.-1-3.5	19	3	0	57	384632	4716297	428
267	Residence	Non-Part.	22.-1-19.14	15	2	0	54	385022	4716595	433
268	Residence	Non-Part.	22.-1-19.13	17	3	0	55	385027	4716483	435
269	Residence	Non-Part.	25.-1-6.2	19	3	0	56	384806	4716299	430
270	Residence	Non-Part.	25.-1-9	17	1	0	56	385040	4716205	429
271	Residence	Non-Part.	25.-1-8	17	3	0	55	385015	4716303	431
272	Residence	Non-Part.	25.-1-10.3	17	1	0	55	385091	4716184	428
273	Residence	Non-Part.	25.-1-10.12	17	2	0	55	385217	4716292	432
274	Residence	Non-Part.	22.-1-16.1	17	2	0	55	385292	4716405	440
275	Residence	Non-Part.	22.-1-18.1	17	2	0	54	385392	4716376	445
276	Residence	Non-Part.	22.-1-16.4	17	2	0	55	385205	4716378	437
277	Residence	Non-Part.	22.-1-19.15	17	3	0	55	385023	4716531	435

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					With Tonal Penalty	Without Tonal Penalty		X (m)	Y (m)	
278	Residence	Non-Part.	22.-1-19.11	14	0	0	53	385027	4716654	428
279	Residence	Non-Part.	22.-1-19.3	19	3	0	57	384703	4716347	433
281	Residence	Non-Part.	23.-1-13.2	21	3	0	59	382805	4716304	407
282	Residence	Non-Part.	23.-1-14.1	21	5	0	60	382271	4716296	412
283	Residence	Non-Part.	22.-1-18.2	17	2	0	54	385434	4716380	447
284	Residence	Non-Part.	25.-1-11.12	17	2	0	54	385454	4716305	443
285	Residence	Non-Part.	25.-1-12.5	18	3	0	57	385122	4715832	431
286	Residence	Non-Part.	25.-1-12.2	18	3	0	57	385118	4715772	432
287	Residence	Non-Part.	25.-1-12.3	21	3	0	58	385209	4715647	438
288	Residence	Non-Part.	25.-1-12.4	21	3	0	59	385166	4715571	434
289	Residence	Non-Part.	25.-1-27	20	5	0	57	385737	4714807	438
290	Residence	Non-Part.	25.-1-25	16	4	0	55	385915	4714757	434
292	Residence	Non-Part.	32.-1-14.1	20	5	0	57	385738	4714709	433
294	Residence	Non-Part.	25.-1-28	21	5	0	58	385627	4714757	432
295	Residence	Non-Part.	25.-1-29.2	21	5	0	58	385570	4714767	431
296	Residence	Non-Part.	32.-1-9.1	22	5	0	59	385449	4714627	423
298	Residence	Non-Part.	32.-1-28	20	2	0	58	385380	4713595	394
299	Residence	Non-Part.	29.-1-29.1	39	21	16	73	380112	4713070	374
300	Residence	Non-Part.	30.-1-6.423	37	25	20	74	380415	4712230	377
301	Residence	Non-Part.	30.-1-6.421	36	27	22	73	380542	4712165	381
302	Residence	Non-Part.	30.-1-6.424	35	28	23	71	380355	4711973	373
303	Residence	Non-Part.	30.-1-6.422	34	26	21	71	380548	4712001	378
304	Residence	Non-Part.	30.-1-6.432	31	27	22	68	380492	4711694	370
305	Residence	Non-Part.	30.-1-6.3	32	27	22	70	380573	4711808	377
306	Residence	Non-Part.	30.-1-6.2	30	27	22	67	380574	4711541	369
307	Residence	Non-Part.	30.-1-6.1	30	26	21	67	380574	4711426	368
308	Residence	Non-Part.	30.-1-28.211	28	25	20	64	380567	4711043	368

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					With Tonal Penalty	Without Tonal Penalty		X (m)	Y (m)	
309	Residence	Non-Part.	30.-1-28.212	28	25	20	64	380592	4710951	368
310	Residence	Non-Part.	30.-1-28.11	29	26	21	65	380565	4711231	368
311	Residence	Non-Part.	38.-1-6.23	25	23	18	62	380588	4710699	366
312	Residence	Non-Part.	38.-1-6.21	26	24	19	62	380530	4710702	366
313	Residence	Non-Part.	38.-1-6.1	26	25	20	62	380428	4710695	362
314	Residence	Non-Part.	38.-1-4.15	26	25	20	61	380319	4710582	360
316	Residence	Non-Part.	38.-1-6.22	26	24	19	61	380475	4710511	363
317	Residence	Non-Part.	38.-1-6.25	25	22	17	61	380590	4710610	364
318	Residence	Non-Part.	38.-1-6.9	26	23	18	61	380589	4710480	366
319	Residence	Non-Part.	38.-1-6.8	25	23	18	60	380577	4710433	364
320	Residence	Non-Part.	38.-1-6.7	24	23	18	60	380593	4710377	364
321	Residence	Non-Part.	38.-1-6.26	24	23	18	60	380468	4710321	362
322	Residence	Non-Part.	38.-1-6.4	23	21	16	60	380562	4710250	363
323	Residence	Non-Part.	38.-1-6.6	23	21	16	60	380590	4710307	363
324	Residence	Non-Part.	38.-1-6.3	24	22	17	60	380563	4710198	363
325	Residence	Non-Part.	38.-1-6.5	24	21	16	59	380574	4710136	363
326	Residence	Non-Part.	38.-1-6.24	24	22	17	59	380482	4710202	361
327	Residence	Non-Part.	38.-1-7.11	23	21	16	58	380600	4709953	362
328	Residence	Non-Part.	38.-1-7.3	23	21	16	59	380600	4710050	362
329	Residence	Non-Part.	38.-1-7.152	24	23	18	58	379811	4710032	346
330	Residence	Non-Part.	38.-1-7.21	24	23	18	58	379580	4710052	343
331	Residence	Non-Part.	38.-1-4.21	24	23	18	58	379774	4710092	346
332	Residence	Non-Part.	38.-1-7.1	23	22	17	57	379698	4709884	344
333	Residence	Non-Part.	38.-1-7.153	24	22	17	58	379941	4710028	350
334	Residence	Non-Part.	38.-1-7.4	24	23	18	57	379694	4709988	344
335	Residence	Non-Part.	38.-1-7.13	23	22	17	57	379642	4709910	342
336	Residence	Non-Part.	38.-1-7.5	22	21	16	57	379697	4709814	342
337	Residence	Non-Part.	38.-1-7.6	22	21	16	56	379700	4709748	343

ID	Type	Participation Status	Tax ID	Sound Pressure Level (dBA) - Maximum L_{8h}	Sound Pressure Level (dBA), Substation Only, Maximum L_{1h}		Cumulative Maximum Construction Sound Pressure Levels (dBA)	Coordinates (UTM NAD83 Z18N)		Absolute Height (m)
					With Tonal Penalty	Without Tonal Penalty		X (m)	Y (m)	
339	Residence	Non-Part.	38.-1-7.10	23	22	17	57	379772	4709849	344
340	Residence	Non-Part.	38.-1-7.92	23	22	17	57	379825	4709896	345
342	Residence	Non-Part.	38.-1-4.144	25	24	19	59	379817	4710251	351
343	Residence	Non-Part.	38.-1-4.142	27	26	21	60	379780	4710440	354
344	Residence	Non-Part.	38.-1-4.139	28	27	22	61	379880	4710537	354
345	Residence	Non-Part.	38.-1-4.137	27	26	21	60	379941	4710406	354
346	Residence	Non-Part.	38.-1-4.138	27	26	21	60	379908	4710442	353
347	Residence	Non-Part.	38.-1-4.136	26	25	20	60	379937	4710354	354
348	Residence	Non-Part.	38.-1-4.124	27	26	21	60	380068	4710424	355
349	Residence	Non-Part.	38.-1-4.123	28	27	22	61	380043	4710472	355
350	Residence	Non-Part.	38.-1-4.121	29	29	24	62	379820	4710666	353
351	Residence	Non-Part.	30.-1-26.24	32	32	27	64	379559	4710844	351
353	Residence	Non-Part.	38.-1-4.16	30	29	24	62	379745	4710671	353
354	Public	Non-Part.	30.-1-30.1	32	32	27	64	379746	4710925	351
355	Residence	Non-Part.	38.-1-4.145	29	28	23	62	379871	4710658	353
356	Residence	Non-Part.	38.-1-4.141	28	27	22	61	379746	4710548	353
357	Residence	Non-Part.	38.-1-4.11	28	27	22	60	379750	4710493	353
359	Residence	Non-Part.	30.-1-26.231	31	31	26	62	379444	4710810	349
360	Residence	Non-Part.	30.-1-26.1	31	30	25	62	379536	4710740	352
361	Residence	Non-Part.	30.-1-26.26	34	33	28	64	379435	4710871	350
363	Residence	Non-Part.	38.-1-10.1	24	23	18	57	379045	4710069	335
364	Residence	Non-Part.	38.-1-8.1	23	22	17	56	378968	4709914	332
365	Residence	Non-Part.	38.-1-9.5	22	21	16	55	378929	4709820	329
366	Residence	Non-Part.	30.-1-25.1	27	27	22	59	378864	4710704	331
369	Residence	Non-Part.	38.-1-1.3	23	22	17	56	378129	4710563	309
370	Residence	Non-Part.	37.1-3-9	22	21	16	56	378047	4710586	307
371	Residence	Non-Part.	30.-1-23	22	21	16	55	377945	4710686	304
372	Residence	Non-Part.	30.-1-26.25	35	35	30	64	379434	4710955	346

ID	Type	Participation Status	Tax ID	Sound Pressure Level (dBA) - Maximum L_{8h}	Sound Pressure Level (dBA), Substation Only, Maximum L_{1h}		Cumulative Maximum Construction Sound Pressure Levels (dBA)	Coordinates (UTM NAD83 Z18N)		Absolute Height (m)
					With Tonal Penalty	Without Tonal Penalty		X (m)	Y (m)	
374	Residence	Non-Part.	30.-1-26.292	40	40	35	68	379315	4711284	342
377	Residence	Non-Part.	30.-1-26.261	41	40	35	69	379567	4711335	347
378	Residence	Non-Part.	30.-1-26.263	39	39	34	68	379541	4711285	346
379	Residence	Non-Part.	30.-1-26.33	36	36	31	66	379568	4711141	348
380	Residence	Non-Part.	30.-1-26.31	34	33	28	64	379570	4710974	348
382	Residence	Non-Part.	30.-1-29	40	39	34	77	379682	4711733	353
384	Residence	Non-Part.	30.-1-7.2	38	29	24	74	379495	4712263	350
385	Residence	Non-Part.	30.-1-3.24	37	27	22	73	379403	4712440	351
386	Residence	Non-Part.	30.-1-7.1	38	29	24	73	379496	4712323	351
387	Residence	Non-Part.	30.-1-3.23	36	29	24	72	379406	4712298	347
389	Residence	Non-Part.	30.-1-3.1	39	26	21	77	379402	4712612	354
390	Residence	Non-Part.	30.-1-5.2	40	22	17	74	379975	4712898	371
391	Residence	Non-Part.	29.-1-25	37	22	17	72	379922	4713011	373
392	Residence	Non-Part.	29.-1-24	38	22	17	72	379953	4712977	372
393	Residence	Non-Part.	29.-1-21.1	27	20	15	64	379403	4713438	359
394	Residence	Non-Part.	29.-1-21.2	26	19	14	64	379395	4713567	359
396	Residence	Non-Part.	30.-1-3.3	29	24	19	65	378959	4712708	341
399	Residence	Non-Part.	29.-1-22.3	25	22	17	62	378575	4712808	330
400	Residence	Non-Part.	29.-1-22.223	24	21	16	61	378482	4712892	329
401	Residence	Non-Part.	29.-1-22.1	24	19	14	61	378512	4712807	329
402	Residence	Non-Part.	29.-1-22.4	23	19	14	61	378441	4712785	326
403	Residence	Non-Part.	29.-1-22.51	23	18	13	60	378375	4712772	324
404	Residence	Non-Part.	29.-1-22.7	27	22	17	64	378774	4712803	337
405	Residence	Non-Part.	29.-1-22.8	28	23	18	64	378883	4712834	341
406	Residence	Non-Part.	29.-1-13	21	17	12	58	378491	4713880	335
407	Residence	Non-Part.	29.-1-3.4	21	17	12	59	378098	4712752	315

ID	Type	Participation Status	Tax ID	Sound Pressure Level (dBA) - Maximum L_{8h}	Sound Pressure Level (dBA), Substation Only, Maximum L_{1h}		Cumulative Maximum Construction Sound Pressure Levels (dBA)	Coordinates (UTM NAD83 Z18N)		Absolute Height (m)
					With Tonal Penalty	Without Tonal Penalty		X (m)	Y (m)	
408	Residence	Non-Part.	29.-1-3.1	21	17	12	59	378167	4712762	317
409	Residence	Non-Part.	29.-1-3.3	20	17	12	58	377981	4712782	310
410	Residence	Non-Part.	29.-1-37.4	20	17	12	58	377913	4712786	308
411	Residence	Non-Part.	29.-1-37.5	20	16	11	57	377860	4712758	305
412	Residence	Non-Part.	29.-1-4.1	22	18	13	59	378217	4712763	319
413	Residence	Non-Part.	29.-1-4.2	22	19	14	60	378267	4712765	321
415	Residence	Non-Part.	20.-1-22.1	19	15	10	57	378310	4713960	328
416	Residence	Non-Part.	20.-1-22.2	19	14	9	58	378373	4713967	330
417	Residence	Non-Part.	20.-1-22.3	20	16	11	58	378484	4713999	334
418	Residence	Non-Part.	29.-1-9	21	17	12	58	378396	4713874	331
419	Residence	Non-Part.	29.-1-10	21	17	12	58	378443	4713877	333
420	Residence	Non-Part.	29.-1-7	20	15	10	58	378306	4713863	329
422	Residence	Non-Part.	20.-1-24.223	22	17	12	60	378851	4713964	342
423	Residence	Non-Part.	20.-1-23.2	21	16	11	59	378702	4713959	338
424	Residence	Non-Part.	20.-1-24.222	22	14	9	61	379194	4713969	352
425	Residence	Non-Part.	20.-1-14	22	14	9	60	379377	4714407	362
426	Residence	Non-Part.	29.-1-15	23	15	10	61	379162	4713890	350
427	Residence	Non-Part.	29.-1-14	22	14	9	60	378963	4713902	343
429	Residence	Non-Part.	29.-1-19	25	15	10	63	379390	4713685	358
430	Residence	Non-Part.	29.-1-18	24	15	10	63	379392	4713749	358
431	Residence	Non-Part.	29.-1-17	24	15	10	63	379388	4713789	357
432	Residence	Non-Part.	29.-1-16	24	15	10	62	379391	4713865	356
433	Residence	Non-Part.	20.-1-25.1	23	15	10	62	379394	4713968	358
434	Residence	Non-Part.	20.-1-26	24	15	10	62	379461	4713955	361
436	Residence	Non-Part.	20.-1-25.2	23	14	9	62	379428	4713988	360
437	Residence	Non-Part.	20.-1-30.11	25	15	10	63	379656	4713962	369
438	Residence	Non-Part.	20.-1-27	24	15	10	63	379564	4713970	368

ID	Type	Participation Status	Tax ID	Sound Pressure Level (dBA) - Maximum L_{8h}	Sound Pressure Level (dBA), Substation Only, Maximum L_{1h}		Cumulative Maximum Construction Sound Pressure Levels (dBA)	Coordinates (UTM NAD83 Z18N)		Absolute Height (m)
					With Tonal Penalty	Without Tonal Penalty		X (m)	Y (m)	
440	Residence	Non-Part.	20.-1-30.12	27	15	10	65	380057	4713989	380
441	Residence	Non-Part.	29.-1-32	27	14	9	65	380190	4713914	381
442	Residence	Non-Part.	20.-1-12	22	12	7	61	379434	4714346	361
443	Residence	Non-Part.	20.-1-10.1	23	12	7	61	379944	4714740	378
444	Residence	Non-Part.	20.-1-8.25	24	12	7	63	380193	4714746	383
445	Residence	Non-Part.	20.-1-9	23	12	7	62	380064	4714800	381
446	Residence	Non-Part.	20.-1-10.2	23	12	7	62	380049	4714726	381
447	Residence	Non-Part.	20.-1-8.23	23	12	7	62	380107	4714744	381
448	Residence	Non-Part.	20.-1-8.32	23	13	8	62	379907	4714615	376
449	Residence	Non-Part.	20.-1-8.31	22	12	7	61	379836	4714750	375
450	Residence	Non-Part.	20.-1-8.54	22	12	7	61	379772	4714709	375
452	Residence	Non-Part.	20.-1-8.52	22	12	7	61	379733	4714728	374
453	Residence	Non-Part.	20.-1-8.53	21	12	7	60	379660	4714750	370
454	Residence	Non-Part.	20.-1-11.22	21	13	8	60	379453	4714507	365
455	Residence	Non-Part.	20.-1-11.1	21	12	7	60	379439	4714449	362
456	Residence	Non-Part.	20.-1-13	21	14	9	60	379410	4714681	366
457	Residence	Non-Part.	20.-1-11.24	21	12	7	60	379504	4714713	368
458	Residence	Non-Part.	20.-1-8.51	21	12	7	60	379601	4714734	368
459	Residence	Non-Part.	20.-1-15.2	20	13	8	58	379331	4715087	367
462	Residence	Non-Part.	19.-1-16.1	17	6	1	56	379621	4716266	358
463	Residence	Non-Part.	19.-1-15.2	17	6	1	56	379686	4716219	359
464	Residence	Non-Part.	19.-1-32.2	21	7	2	60	380350	4716055	376
465	Residence	Non-Part.	19.-1-14.2	19	7	2	58	380128	4716229	369
466	Residence	Non-Part.	19.-1-13.1	21	7	2	60	380461	4716176	380
468	Residence	Non-Part.	19.-1-12	20	7	2	59	380417	4716286	380
470	Residence	Non-Part.	19.-1-33.21	22	7	2	60	380200	4715743	374
471	Residence	Non-Part.	19.-1-33.22	22	7	2	61	380275	4715665	375
472	Residence	Non-Part.	20.-1-7.113	23	7	2	62	380276	4715526	378

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					With Tonal Penalty	Without Tonal Penalty		X (m)	Y (m)	
474	Residence	Non-Part.	19.-1-33.1	24	7	2	62	380441	4715674	381
475	Residence	Non-Part.	20.-1-7.112	24	7	2	63	380466	4715552	381
476	Residence	Non-Part.	20.-1-7.111	24	7	2	62	380386	4715541	379
477	Residence	Non-Part.	20.-1-7.115	26	7	2	63	380363	4715365	382
478	Residence	Non-Part.	20.-1-7.114	27	7	2	63	380307	4715388	381
479	Residence	Non-Part.	20.-1-8.216	29	12	7	65	380499	4714838	389
480	Residence	Non-Part.	20.-1-8.215	26	12	7	64	380481	4714635	388
481	Residence	Non-Part.	20.-1-8.214	26	12	7	65	380487	4714680	389
482	Residence	Non-Part.	20.-1-8.212	27	12	7	64	380425	4714754	389
483	Residence	Non-Part.	20.-1-8.213	26	12	7	65	380482	4714760	389
484	Residence	Non-Part.	20.-1-8.217	27	12	7	64	380452	4714838	389
485	Residence	Non-Part.	20.-1-8.218	25	12	7	64	380390	4714833	388
486	Residence	Non-Part.	20.-1-8.211	25	12	7	64	380373	4714755	387
487	Residence	Non-Part.	20.-1-8.219	25	12	7	63	380342	4714825	387
488	Residence	Non-Part.	20.-1-8.27	24	12	7	63	380250	4714751	385
489	Residence	Non-Part.	20.-1-8.29	25	12	7	63	380288	4714747	385
490	Residence	Non-Part.	20.-1-8.210	25	12	7	63	380338	4714754	386
491	Residence	Non-Part.	20.-1-30.5	28	11	6	66	380491	4714323	390
492	Residence	Non-Part.	20.-1-8.24	27	11	6	65	380480	4714390	389
493	Residence	Non-Part.	20.-1-8.26	26	11	6	65	380461	4714442	388
494	Residence	Non-Part.	20.-1-8.4	25	11	6	64	380462	4714570	387
495	Residence	Non-Part.	29.-1-28.1	28	14	9	66	380463	4713921	385
497	Residence	Non-Part.	20.-1-30.6	27	14	9	65	380488	4714230	391
498	Residence	Non-Part.	20.-1-30.7	27	14	9	66	380313	4713997	385
499	Residence	Non-Part.	29.-1-34	27	14	9	66	380246	4713914	382
500	Residence	Non-Part.	20.-1-30.8	27	14	9	66	380368	4713999	386
501	Residence	Non-Part.	20.-1-30.42	27	14	9	66	380441	4714013	386
502	Residence	Non-Part.	29.-1-36	28	14	9	66	380369	4713910	384

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					With Tonal Penalty	Without Tonal Penalty		X (m)	Y (m)	
503	Residence	Non-Part.	29.-1-35	27	14	9	66	380323	4713915	383
504	Residence	Non-Part.	38.-1-1.61	22	21	16	55	378130	4710445	311
505	Residence	Non-Part.	38.-1-2	28	28	23	60	379148	4710659	339
514	Residence	Non-Part.	34.-1-6.1	39	19	14	76	381690	4712648	411
521	Residence	Non-Part.	34.-1-28	41	20	15	77	381289	4712042	392
529	Residence	Non-Part.	34.-1-31.3	30	26	21	67	380650	4711458	369
530	Residence	Non-Part.	30.-1-28.12	30	27	22	66	380549	4711311	369
533	Residence	Non-Part.	30.-1-28.212	28	25	20	64	380552	4710949	368
534	Residence	Non-Part.	30.-1-28.212	27	25	20	64	380554	4710917	368
535	Residence	Non-Part.	30.-1-28.212	28	25	20	64	380591	4710921	369
541	Residence	Non-Part.	38.-1-4.15	26	25	20	61	380298	4710586	360
542	Residence	Non-Part.	38.-1-4.15	27	25	20	61	380272	4710586	359
543	Residence	Non-Part.	38.-1-4.15	27	25	20	61	380249	4710593	359
544	Residence	Non-Part.	38.-1-4.15	27	26	21	62	380258	4710660	360
545	Residence	Non-Part.	38.-1-4.15	27	26	21	62	380223	4710663	359
546	Residence	Non-Part.	38.-1-4.15	27	26	21	61	380235	4710622	358
547	Residence	Non-Part.	38.-1-6.22	26	24	19	61	380474	4710540	363
548	Residence	Non-Part.	38.-1-6.22	25	23	18	61	380487	4710458	363
549	Residence	Non-Part.	38.-1-6.22	25	24	19	61	380486	4710487	363
550	Residence	Non-Part.	38.-1-6.9	26	23	18	61	380588	4710506	366
551	Residence	Non-Part.	21.-1-30.1	25	22	17	61	380681	4710499	365
556	Residence	Non-Part.	38.-1-6.27	24	22	17	60	380494	4710383	363
557	Residence	Non-Part.	21.-1-33.1	23	20	15	59	380680	4709960	364
559	Residence	Non-Part.	21.-1-35.2	19	15	10	57	382087	4709820	393
563	Residence	Non-Part.	21.-1-10.32	18	10	5	57	383672	4710856	408
564	Residence	Non-Part.	34.-1-16	21	12	7	60	383340	4711492	424
567	Residence	Non-Part.	22.-1-2.2	18	10	5	57	384044	4711441	432

ID	Type	Participation Status	Tax ID	Sound Pressure Level (dBA) - Maximum L_{8h}	Sound Pressure Level (dBA), Substation Only, Maximum L_{1h}		Cumulative Maximum Construction Sound Pressure Levels (dBA)	Coordinates (UTM NAD83 Z18N)		Absolute Height (m)
					With Tonal Penalty	Without Tonal Penalty		X (m)	Y (m)	
570	Residence	Non-Part.	21.-1-12.3	25	14	9	63	382744	4711263	404
571	Residence	Non-Part.	21.-1-12.2	26	14	9	64	382677	4711394	403
574	Residence	Non-Part.	34.-1-19	25	14	9	63	382821	4711472	409
578	Residence	Non-Part.	34.-1-22.53	35	15	10	70	382375	4712071	414
581	Residence	Non-Part.	34.-1-22.51	37	17	12	72	382279	4712144	416
582	Residence	Non-Part.	21.-1-5	27	17	12	66	382148	4711275	400
585	Residence	Non-Part.	21.-1-6.1	28	14	9	65	382392	4711375	398
588	Residence	Non-Part.	21.-1-4.2	27	18	13	66	381898	4711183	391
593	Residence	Non-Part.	21.-1-2.92	27	21	16	65	381354	4711051	381
597	Residence	Non-Part.	21.-1-19.5	25	21	16	64	381321	4710910	380
599	Residence	Non-Part.	21.-1-26	26	22	17	63	380936	4710803	371
603	Residence	Non-Part.	21.-1-24.9	25	21	16	62	380892	4710634	371
610	Residence	Non-Part.	32.-1-38.11	33	9	4	67	384152	4713544	442
613	Residence	Non-Part.	32.-1-45	23	8	3	62	383783	4712792	419
614	Residence	Non-Part.	32.-1-45	23	8	3	62	383843	4712782	418
617	Residence	Non-Part.	32.-1-43	23	7	2	61	383917	4712795	417
628	Residence	Non-Part.	35.-1-8.1	20	6	1	58	384950	4713095	414
631	Residence	Non-Part.	35.-1-10.1	18	4	0	56	385139	4712803	404
633	Residence	Non-Part.	35.-1-8.2	19	6	1	57	384924	4712849	408
639	Residence	Non-Part.	32.-1-25.123	17	2	0	56	385501	4713153	388
644	Residence	Non-Part.	32.-1-25.2	18	3	0	55	385664	4713172	392
646	Residence	Non-Part.	32.-1-25.124	17	3	0	55	385795	4713195	394
647	Residence	Non-Part.	35.-1-11.31	17	3	0	54	385789	4713005	392
648	Residence	Non-Part.	32.-1-27.2	19	2	0	57	385328	4713345	391
650	Residence	Non-Part.	32.-1-30	19	1	0	57	385284	4713369	392
651	Residence	Non-Part.	32.-1-31	19	1	0	57	385292	4713450	391
660	Residence	Non-Part.	25.-1-26	18	5	0	56	385810	4714776	437

ID	Type	Participation Status	Tax ID	Sound Pressure Level (dBA) - Maximum L_{8h}	Sound Pressure Level (dBA), Substation Only, Maximum L_{1h}		Cumulative Maximum Construction Sound Pressure Levels (dBA)	Coordinates (UTM NAD83 Z18N)		Absolute Height (m)
					With Tonal Penalty	Without Tonal Penalty		X (m)	Y (m)	
664	Residence	Non-Part.	32.-1-13	21	4	0	58	385649	4714597	426
666	Residence	Non-Part.	32.-1-10	22	6	1	58	385510	4714684	426
672	Residence	Non-Part.	25.-1-30.3	22	3	0	59	385122	4715470	428
700	Residence	Non-Part.	25.-1-11.3	17	2	0	55	385308	4716302	438
704	Residence	Non-Part.	22.-1-10.3	14	0	0	52	385164	4716751	424
721	Residence	Non-Part.	25.-1-1.1	20	4	0	58	384062	4716235	417
724	Residence	Non-Part.	24.-1-5.1	21	4	0	59	383565	4716275	419
730	Residence	Non-Part.	24.-1-4.1	21	4	0	59	383023	4716108	406
761	Residence	Non-Part.	24.-1-1.2	24	7	2	63	381519	4716202	398
762	Residence	Non-Part.	24.-1-1.2	27	7	2	64	381465	4716113	398
763	Residence	Non-Part.	24.-1-11.5	34	8	3	70	381557	4715645	401
764	Residence	Non-Part.	24.-1-11.6	34	9	4	73	381541	4715470	400
769	Residence	Non-Part.	24.-1-11.7	30	8	3	67	381886	4715541	406
806	Residence	Non-Part.	33.-1-3.3	32	9	4	75	382155	4714591	410
810	Residence	Non-Part.	33.-1-3.52	36	10	5	73	381720	4714561	408
817	Residence	Non-Part.	33.-1-2.2	34	11	6	72	381558	4714347	407
841	Residence	Non-Part.	38.-1-7.8	22	21	16	57	379801	4709789	344
848	Residence	Non-Part.	38.-1-4.13	25	24	19	59	379807	4710193	350
853	Public	Non-Part.	30.-1-30.1	30	30	25	62	379802	4710747	352
864	Residence	Non-Part.	38.-1-10.21	24	24	19	57	379062	4710179	335
866	Residence	Non-Part.	38.-1-1.1	23	22	17	56	378224	4710595	311
870	Residence	Non-Part.	30.-1-24.2	20	18	13	55	377413	4712144	292
875	Residence	Non-Part.	30.-1-2	28	24	19	65	378845	4712660	336
878	Residence	Non-Part.	29.-1-22.23	35	24	19	71	379420	4712764	355
884	Residence	Non-Part.	30.-1-10.1	39	38	33	74	379370	4711849	345
889	Residence	Non-Part.	30.-1-6.423	41	25	20	76	380512	4712252	383
891	Residence	Non-Part.	29.-1-29.23	26	15	10	65	379936	4713895	374
906	Residence	Non-Part.	20.-1-30.41	27	14	9	65	380455	4714140	387

ID	Type	Participation Status	Tax ID	Sound Pressure Level (dBA) - Maximum L_{8h}	Sound Pressure Level (dBA), Substation Only, Maximum L_{1h}		Cumulative Maximum Construction Sound Pressure Levels (dBA)	Coordinates (UTM NAD83 Z18N)		Absolute Height (m)
					With Tonal Penalty	Without Tonal Penalty		X (m)	Y (m)	
918	Residence	Non-Part.	20.-1-8.21	21	12	7	60	379709	4714839	373
920	Residence	Non-Part.	19.-1-30	18	8	3	57	379422	4715615	364
922	Residence	Non-Part.	20.-1-7.2	20	9	4	59	379798	4715571	372
930	Residence	Non-Part.	19.-1-32.1	23	7	2	61	380447	4715869	381
933	Residence	Non-Part.	19.-1-13.2	21	7	2	59	380349	4716166	376
936	Residence	Non-Part.	19.-1-14.2	18	7	2	57	379854	4716201	363
942	Residence	Non-Part.	19.-1-16.1	17	6	1	56	379621	4716266	358
948	Residence	Non-Part.	20.-1-11.22	22	13	8	60	379495	4714505	366
963	Residence	Non-Part.	20.-1-24.224	21	16	11	59	378720	4714054	340
973	Residence	Non-Part.	23.-1-23.1	25	7	2	61	380917	4716358	389
974	Residence	Non-Part.	23.-1-23.2	26	7	2	61	380802	4716279	386
975	Residence	Non-Part.	32.-1-56	21	2	0	59	384876	4713299	418
978	Residence	Non-Part.	NA	22	21	16	55	377963	4710590	306
1015	Residence	Non-Part.	NA	30	19	14	70	381734	4711406	394
1017	Residence	Non-Part.	20.-1-15.1	20	10	5	59	379403	4714981	367
1026	Residence	Non-Part.	NA	21	5	0	60	382408	4716218	412
1045	Residence	Non-Part.	32.-1-8.1	24	5	0	60	385270	4714678	422
1050	Residence	Non-Part.	33.-1-3.61	34	11	6	73	381560	4714480	404
1057	Residence	Non-Part.	NA	26	22	17	63	378683	4712786	332
			Minimum	14	0	0	52			
			Maximum	44	40	35	83			
			Average	25	14	9	63			

APPENDIX C. 1/1 OCTAVE BAND MODEL RESULTS

TABLE 20: MITIGATED 1/1 OCTAVE BAND MODEL RESULTS (5 dB TONAL PENALTY NOT INCLUDED, ALL SOURCES)

ID	TYPE	1/1 OCTAVE BAND SOUND PRESSURE LEVELS (dBZ) MAXIMUM L_{1h}								
		31.5 Hz	63 HZ	125 Hz	250 Hz	500 HZ	1 kHz	2 kHZ	4 KHZ	8 KHZ
		Participating								
136	Residence	22	20	26	26	31	0	25	24	0
182	Residence	18	16	23	26	32	0	28	28	5
195	Residence	16	15	18	19	24	0	13	1	0
198	Residence	18	17	20	21	27	0	19	14	0
217	Residence	15	13	18	18	23	0	10	0	0
219	Residence	16	14	19	20	25	0	14	5	0
220	Residence	20	19	21	23	29	0	24	22	0
376	Residence	27	25	29	27	32	0	27	25	0
516	Residence	21	19	25	26	30	0	23	21	0
778	Residence	18	17	19	21	27	0	22	17	0
798	Residence	15	13	18	19	23	0	11	3	0
827	Residence	25	23	29	28	32	0	27	26	0
	Minimum	15	13	18	18	23	0	10	0	0
	Maximum	27	25	29	28	32	0	28	28	5
	Average	20	18	22	22	28	0	20	16	0
		Nonparticipating								
1	Residence	19	16	22	18	15	0	0	0	0
2	Residence	17	15	20	17	14	0	0	0	0
3	Residence	17	15	20	18	20	0	8	0	0
4	Residence	17	15	20	17	19	0	5	0	0
5	Residence	14	11	17	14	13	0	0	0	0
6	Residence	14	11	17	14	14	0	0	0	0
7	Residence	14	11	17	14	15	0	0	0	0
9	Residence	17	15	20	19	21	0	11	0	0
10	Residence	17	14	20	19	22	0	12	3	0
11	Residence	17	15	20	19	21	0	12	1	0
12	Residence	17	14	20	19	20	0	8	0	0
14	Residence	26	23	29	26	23	0	10	0	0

ID	TYPE	1/1 OCTAVE BAND SOUND PRESSURE LEVELS (dBZ) MAXIMUM L_{1h}								
		31.5 Hz	63 HZ	125 Hz	250 Hz	500 HZ	1 kHz	2 kHZ	4 KHZ	8 KHZ
15	Residence	22	19	25	23	21	0	6	0	0
16	Residence	20	18	24	22	21	0	7	0	0
19	Residence	20	18	24	22	24	0	15	8	0
20	Residence	21	18	24	22	21	0	7	0	0
21	Residence	20	18	24	21	20	0	5	0	0
22	Residence	21	18	24	21	21	0	6	0	0
23	Residence	20	18	23	21	21	0	7	0	0
24	Residence	20	17	23	21	21	0	7	0	0
25	Residence	18	15	21	19	19	0	5	0	0
30	Residence	17	14	20	19	21	0	11	1	0
31	Residence	18	15	21	19	21	0	8	0	0
32	Residence	19	16	22	20	21	0	8	0	0
35	Residence	21	18	24	22	18	0	0	0	0
36	Residence	20	18	24	21	18	0	0	0	0
37	Residence	21	19	25	22	21	0	5	0	0
40	Residence	21	18	24	22	19	0	2	0	0
42	Residence	21	18	25	22	20	0	3	0	0
43	Residence	22	19	25	23	21	0	5	0	0
44	Residence	22	19	25	22	20	0	5	0	0
45	Residence	22	19	25	23	20	0	3	0	0
48	Residence	21	18	24	22	18	0	0	0	0
49	Residence	21	18	24	22	19	0	1	0	0
50	Residence	22	19	25	22	19	0	1	0	0
51	Residence	22	19	25	22	18	0	0	0	0
53	Residence	22	20	26	23	20	0	1	0	0
54	Residence	22	20	26	23	20	0	3	0	0
55	Residence	22	19	25	23	20	0	4	0	0
57	Residence	24	21	27	25	21	0	5	0	0
58	Residence	24	22	28	25	21	0	4	0	0
59	Residence	23	20	26	23	19	0	0	0	0
62	Residence	9	6	11	11	14	0	0	0	0
64	Residence	10	7	11	11	14	0	0	0	0
65	Residence	10	7	11	10	13	0	0	0	0
66	Residence	10	8	11	10	13	0	0	0	0
69	Residence	10	6	11	11	13	0	0	0	0
70	Residence	9	6	11	11	14	0	0	0	0
71	Residence	10	6	11	10	12	0	0	0	0
72	Residence	11	8	12	10	13	0	0	0	0

ID	TYPE	1/1 OCTAVE BAND SOUND PRESSURE LEVELS (dBZ) MAXIMUM L_{1h}								
		31.5 Hz	63 HZ	125 Hz	250 Hz	500 HZ	1 kHz	2 kHZ	4 KHZ	8 KHZ
75	Residence	13	10	16	13	13	0	0	0	0
77	Residence	11	7	12	11	13	0	0	0	0
80	Residence	10	7	11	11	14	0	0	0	0
81	Residence	9	6	10	11	14	0	0	0	0
85	Residence	12	10	15	14	16	0	0	0	0
87	Residence	13	10	16	15	18	0	4	0	0
89	Residence	13	10	15	15	17	0	0	0	0
90	Residence	13	10	15	15	17	0	1	0	0
92	Residence	13	10	15	15	17	0	0	0	0
93	Residence	12	10	15	14	16	0	0	0	0
94	Residence	12	9	13	13	16	0	0	0	0
95	Residence	12	10	14	14	16	0	0	0	0
96	Residence	13	10	15	14	17	0	0	0	0
97	Residence	13	10	15	14	17	0	0	0	0
98	Residence	13	10	15	15	17	0	0	0	0
99	Residence	14	11	16	15	18	0	0	0	0
100	Residence	13	10	15	15	18	0	0	0	0
101	Residence	13	10	15	15	18	0	0	0	0
102	Residence	13	10	14	14	17	0	0	0	0
103	Residence	13	11	16	16	18	0	1	0	0
105	Residence	14	11	16	16	19	0	1	0	0
106	Residence	14	11	16	15	18	0	0	0	0
107	Residence	14	11	17	16	20	0	3	0	0
108	Residence	13	10	15	16	19	0	2	0	0
110	Residence	17	15	19	19	22	0	11	0	0
111	Residence	14	12	17	16	19	0	2	0	0
112	Residence	14	12	17	16	19	0	1	0	0
113	Residence	14	11	16	16	18	0	0	0	0
114	Residence	14	11	17	16	19	0	1	0	0
115	Residence	16	14	19	17	20	0	6	0	0
116	Residence	17	14	19	17	20	0	6	0	0
117	Residence	17	15	19	18	21	0	8	0	0
118	Residence	16	14	19	17	19	0	6	0	0
119	Residence	16	14	19	17	19	0	5	0	0
120	Residence	17	14	20	19	21	0	11	1	0
122	Residence	19	17	21	21	25	0	17	11	0
124	Residence	20	18	25	25	31	0	25	25	1
126	Residence	19	17	23	25	29	0	26	27	7

ID	TYPE	1/1 OCTAVE BAND SOUND PRESSURE LEVELS (dBZ) MAXIMUM L_{1h}								
		31.5 Hz	63 HZ	125 Hz	250 Hz	500 HZ	1 kHz	2 kHZ	4 KHZ	8 KHZ
127	Residence	24	23	27	28	34	0	31	32	15
130	Residence	18	16	22	23	28	0	20	21	0
132	Residence	20	18	24	24	29	0	20	17	0
133	Residence	20	18	23	24	28	0	19	14	0
135	Residence	20	18	24	24	29	0	20	18	0
137	Residence	20	18	23	23	27	0	18	10	0
138	Residence	20	18	23	23	28	0	18	11	0
139	Residence	24	22	27	27	33	0	28	27	0
140	Residence	22	19	25	24	26	0	15	8	0
141	Residence	23	20	26	27	30	0	26	26	5
142	Residence	26	23	29	27	27	0	18	12	0
143	Residence	24	22	27	26	27	0	18	13	0
144	Residence	24	22	27	26	31	0	27	27	4
145	Residence	26	23	29	28	29	0	21	16	0
146	Residence	26	24	29	27	30	0	24	21	0
147	Residence	26	23	29	27	26	0	16	6	0
150	Residence	26	23	29	27	25	0	12	0	0
151	Residence	24	22	27	26	31	0	26	25	0
152	Residence	24	22	27	27	33	0	28	28	6
154	Residence	21	19	24	24	28	0	20	19	0
155	Residence	20	17	23	23	26	0	17	14	0
157	Residence	11	7	12	10	12	0	0	0	0
158	Residence	11	8	13	11	14	0	0	0	0
159	Residence	12	9	14	11	14	0	0	0	0
160	Residence	14	12	15	14	18	0	5	0	0
161	Residence	12	9	13	12	15	0	0	0	0
162	Residence	12	9	14	13	17	0	1	0	0
163	Residence	12	9	14	14	17	0	1	0	0
164	Residence	12	9	13	13	16	0	0	0	0
165	Residence	13	10	15	13	17	0	0	0	0
166	Residence	15	12	16	15	19	0	6	0	0
170	Residence	23	22	26	26	32	0	29	30	7
171	Public	22	21	24	25	31	0	27	26	1
172	Residence	16	14	18	18	22	0	14	4	0
173	Residence	14	12	17	17	20	0	8	0	0
174	Residence	14	11	16	15	20	0	8	0	0
175	Residence	15	12	18	17	21	0	11	3	0
176	Residence	20	18	21	20	26	0	19	12	0

ID	TYPE	1/1 OCTAVE BAND SOUND PRESSURE LEVELS (dBZ) MAXIMUM L_{1h}								
		31.5 Hz	63 HZ	125 Hz	250 Hz	500 HZ	1 kHz	2 kHZ	4 KHZ	8 KHZ
177	Residence	17	14	19	18	22	0	10	0	0
178	Residence	17	14	19	19	23	0	11	0	0
179	Residence	17	14	19	19	23	0	12	4	0
180	Residence	18	15	19	18	22	0	11	0	0
181	Residence	18	15	21	21	26	0	14	5	0
184	Residence	17	16	20	22	27	0	20	15	0
186	Residence	20	19	22	22	29	0	23	19	0
188	Residence	20	18	22	22	28	0	19	12	0
189	Residence	20	19	22	23	29	0	22	17	0
190	Residence	18	15	21	21	26	0	15	7	0
191	Residence	18	16	21	22	26	0	16	8	0
193	Residence	15	13	19	19	23	0	11	0	0
194	Residence	15	13	19	19	23	0	10	0	0
196	Residence	16	13	19	20	25	0	15	6	0
199	Residence	18	16	20	21	27	0	18	13	0
201	Residence	17	16	20	22	27	0	19	18	0
203	Residence	15	13	19	19	25	0	13	3	0
204	Residence	14	11	16	16	20	0	5	0	0
205	Residence	13	11	15	14	18	0	1	0	0
207	Residence	13	11	16	16	20	0	4	0	0
208	Residence	19	18	21	22	29	0	24	21	0
209	Residence	21	20	22	23	30	0	26	24	0
210	Residence	20	20	22	22	29	0	24	21	0
211	Residence	21	20	22	22	29	0	25	22	0
212	Residence	18	16	19	20	27	0	20	15	0
213	Residence	14	12	17	19	25	0	15	11	0
214	Residence	15	12	17	18	22	0	9	0	0
215	Residence	14	12	17	17	22	0	8	0	0
216	Residence	14	12	17	17	22	0	7	0	0
218	Residence	15	13	17	18	24	0	13	0	0
221	Residence	15	14	18	21	26	0	19	14	0
222	Residence	20	19	21	22	29	0	24	20	0
224	Residence	14	13	15	15	21	0	11	0	0
225	Residence	11	9	12	13	17	0	4	0	0
227	Residence	13	11	13	13	18	0	6	0	0
228	Residence	13	11	13	14	19	0	7	0	0
229	Residence	14	12	14	14	19	0	8	0	0
230	Residence	14	12	14	14	19	0	8	0	0

ID	TYPE	1/1 OCTAVE BAND SOUND PRESSURE LEVELS (dBZ) MAXIMUM L_{1h}								
		31.5 Hz	63 HZ	125 Hz	250 Hz	500 HZ	1 kHz	2 kHZ	4 KHZ	8 KHZ
231	Residence	13	11	14	14	19	0	8	0	0
232	Residence	14	13	15	14	19	0	7	0	0
234	Residence	15	14	16	17	22	0	13	0	0
235	Residence	16	14	16	18	23	0	15	3	0
236	Residence	16	14	17	19	24	0	18	10	0
237	Residence	16	15	17	18	24	0	16	5	0
239	Residence	14	12	15	14	19	0	8	0	0
241	Public	11	9	13	12	16	0	0	0	0
242	Residence	12	9	13	12	16	0	0	0	0
244	Residence	11	9	12	9	12	0	0	0	0
245	Residence	11	8	13	11	14	0	0	0	0
246	Residence	11	8	13	10	13	0	0	0	0
247	Residence	10	7	11	10	13	0	0	0	0
248	Residence	12	10	13	12	16	0	1	0	0
249	Residence	11	9	13	12	15	0	0	0	0
252	Residence	12	10	14	13	17	0	1	0	0
254	Residence	12	9	14	12	15	0	0	0	0
255	Residence	13	10	14	13	17	0	3	0	0
256	Residence	12	10	14	12	16	0	0	0	0
257	Residence	11	8	13	11	13	0	0	0	0
258	Residence	11	9	14	12	14	0	0	0	0
259	Residence	13	10	14	13	17	0	1	0	0
260	Residence	13	10	14	13	16	0	0	0	0
261	Residence	11	8	13	10	12	0	0	0	0
263	Residence	12	10	13	11	15	0	0	0	0
264	Residence	12	10	13	11	15	0	0	0	0
265	Residence	12	10	13	12	15	0	0	0	0
266	Residence	11	9	13	11	14	0	0	0	0
267	Residence	10	7	12	9	11	0	0	0	0
268	Residence	11	9	12	9	13	0	0	0	0
269	Residence	12	9	13	10	14	0	0	0	0
270	Residence	10	7	11	10	12	0	0	0	0
271	Residence	11	8	12	10	12	0	0	0	0
272	Residence	10	7	11	9	12	0	0	0	0
273	Residence	11	8	12	9	12	0	0	0	0
274	Residence	11	9	12	9	12	0	0	0	0
275	Residence	11	9	12	9	12	0	0	0	0
276	Residence	11	9	12	9	12	0	0	0	0

ID	TYPE	1/1 OCTAVE BAND SOUND PRESSURE LEVELS (dBZ) MAXIMUM L_{1h}								
		31.5 Hz	63 HZ	125 Hz	250 Hz	500 HZ	1 kHz	2 kHZ	4 KHZ	8 KHZ
277	Residence	11	9	12	9	12	0	0	0	0
278	Residence	8	5	9	8	10	0	0	0	0
279	Residence	12	10	13	11	14	0	0	0	0
281	Residence	12	10	14	12	16	0	0	0	0
282	Residence	12	10	15	13	16	0	0	0	0
283	Residence	11	9	12	9	12	0	0	0	0
284	Residence	11	9	12	9	12	0	0	0	0
285	Residence	11	8	13	11	14	0	0	0	0
286	Residence	11	8	13	11	14	0	0	0	0
287	Residence	13	11	13	11	16	0	0	0	0
288	Residence	12	10	13	12	16	0	0	0	0
289	Residence	13	11	14	11	15	0	0	0	0
290	Residence	11	8	13	10	12	0	0	0	0
292	Residence	13	11	13	11	15	0	0	0	0
294	Residence	13	11	14	12	16	0	0	0	0
295	Residence	13	11	14	12	16	0	1	0	0
296	Residence	12	9	14	13	17	0	1	0	0
298	Residence	11	8	11	12	15	0	0	0	0
299	Residence	25	23	28	26	31	0	27	25	0
300	Residence	27	24	30	28	30	0	23	20	0
301	Residence	27	24	30	29	30	0	21	18	0
302	Residence	29	26	32	29	29	0	19	11	0
303	Residence	26	24	30	28	28	0	17	10	0
304	Residence	27	24	30	28	25	0	12	0	0
305	Residence	26	24	30	28	26	0	16	6	0
306	Residence	26	24	30	27	24	0	10	0	0
307	Residence	26	23	29	27	24	0	9	0	0
308	Residence	25	22	28	25	22	0	7	0	0
309	Residence	25	22	28	26	22	0	6	0	0
310	Residence	26	23	29	27	23	0	7	0	0
311	Residence	23	20	26	23	19	0	0	0	0
312	Residence	24	21	27	24	20	0	0	0	0
313	Residence	25	22	28	25	20	0	1	0	0
314	Residence	25	22	28	25	20	0	0	0	0
316	Residence	24	21	27	24	19	0	0	0	0
317	Residence	23	20	26	23	19	0	0	0	0
318	Residence	23	21	27	24	19	0	0	0	0
319	Residence	23	20	26	24	18	0	0	0	0

ID	TYPE	1/1 OCTAVE BAND SOUND PRESSURE LEVELS (dBZ) MAXIMUM L_{1h}								
		31.5 Hz	63 HZ	125 Hz	250 Hz	500 HZ	1 kHz	2 kHZ	4 KHZ	8 KHZ
320	Residence	23	20	26	23	18	0	0	0	0
321	Residence	23	20	26	23	18	0	0	0	0
322	Residence	22	19	25	22	17	0	0	0	0
323	Residence	22	19	25	22	17	0	0	0	0
324	Residence	22	20	26	23	18	0	0	0	0
325	Residence	22	19	25	22	18	0	0	0	0
326	Residence	23	20	26	23	17	0	0	0	0
327	Residence	21	19	25	21	16	0	0	0	0
328	Residence	22	19	25	22	17	0	0	0	0
329	Residence	22	20	26	23	17	0	0	0	0
330	Residence	23	20	26	24	17	0	0	0	0
331	Residence	23	20	26	24	17	0	0	0	0
332	Residence	22	19	25	22	16	0	0	0	0
333	Residence	22	20	26	23	17	0	0	0	0
334	Residence	22	20	26	23	17	0	0	0	0
335	Residence	22	19	25	23	16	0	0	0	0
336	Residence	22	19	25	22	16	0	0	0	0
337	Residence	21	19	25	22	16	0	0	0	0
339	Residence	22	19	25	22	16	0	0	0	0
340	Residence	22	19	25	22	16	0	0	0	0
342	Residence	24	21	27	25	18	0	0	0	0
343	Residence	26	23	29	26	20	0	2	0	0
344	Residence	26	23	30	27	21	0	3	0	0
345	Residence	25	22	29	26	20	0	0	0	0
346	Residence	25	23	29	26	20	0	0	0	0
347	Residence	25	22	28	25	20	0	0	0	0
348	Residence	25	23	29	26	20	0	2	0	0
349	Residence	26	24	29	26	21	0	3	0	0
350	Residence	27	25	31	28	22	0	7	0	0
351	Residence	33	30	34	31	25	0	12	0	0
353	Residence	31	28	32	29	23	0	8	0	0
354	Public	33	30	34	31	25	0	12	0	0
355	Residence	27	25	31	28	22	0	6	0	0
356	Residence	26	24	30	27	21	0	3	0	0
357	Residence	26	23	30	27	21	0	2	0	0
359	Residence	33	30	34	30	24	0	9	0	0
360	Residence	32	29	33	30	24	0	7	0	0
361	Residence	35	33	36	32	26	0	14	0	0

ID	TYPE	1/1 OCTAVE BAND SOUND PRESSURE LEVELS (dBZ) MAXIMUM L_{1h}								
		31.5 Hz	63 HZ	125 Hz	250 Hz	500 HZ	1 kHz	2 kHZ	4 KHZ	8 KHZ
363	Residence	23	20	26	23	17	0	0	0	0
364	Residence	22	19	25	22	16	0	0	0	0
365	Residence	21	18	24	21	15	0	0	0	0
366	Residence	26	23	30	27	20	0	2	0	0
369	Residence	22	19	25	22	16	0	0	0	0
370	Residence	22	19	25	22	16	0	0	0	0
371	Residence	22	19	25	22	15	0	0	0	0
372	Residence	38	35	37	33	27	0	16	0	0
374	Residence	41	38	42	37	31	0	23	9	0
377	Residence	41	38	42	39	33	0	23	11	0
378	Residence	40	37	41	38	31	0	22	9	0
379	Residence	37	34	38	35	28	0	18	1	0
380	Residence	35	32	36	32	26	0	14	0	0
382	Residence	41	38	43	38	32	0	20	17	0
384	Residence	33	30	34	30	30	0	25	24	0
385	Residence	31	28	32	28	29	0	23	25	2
386	Residence	32	29	33	30	30	0	24	24	0
387	Residence	33	29	33	29	29	0	23	20	0
389	Residence	30	27	31	28	31	0	26	27	6
390	Residence	27	25	29	26	32	0	27	23	0
391	Residence	25	23	28	25	30	0	24	18	0
392	Residence	26	23	28	26	30	0	25	19	0
393	Residence	22	19	25	21	21	0	8	0	0
394	Residence	22	19	25	21	21	0	5	0	0
396	Residence	26	23	29	24	23	0	10	0	0
399	Residence	24	21	27	22	19	0	3	0	0
400	Residence	23	20	26	21	18	0	1	0	0
401	Residence	22	19	24	20	18	0	1	0	0
402	Residence	22	19	24	19	18	0	0	0	0
403	Residence	22	18	24	19	17	0	0	0	0
404	Residence	24	22	27	23	21	0	6	0	0
405	Residence	25	22	28	23	22	0	8	0	0
406	Residence	20	17	23	18	15	0	0	0	0
407	Residence	21	17	23	18	16	0	0	0	0
408	Residence	21	18	23	18	16	0	0	0	0
409	Residence	20	17	22	17	15	0	0	0	0
410	Residence	20	17	22	17	15	0	0	0	0
411	Residence	20	16	22	17	14	0	0	0	0

ID	TYPE	1/1 OCTAVE BAND SOUND PRESSURE LEVELS (dBZ) MAXIMUM L_{1h}								
		31.5 Hz	63 HZ	125 Hz	250 Hz	500 HZ	1 kHz	2 kHZ	4 KHZ	8 KHZ
412	Residence	21	18	24	19	16	0	0	0	0
413	Residence	21	18	24	19	17	0	0	0	0
415	Residence	18	15	21	16	14	0	0	0	0
416	Residence	18	15	20	16	14	0	0	0	0
417	Residence	19	16	22	17	15	0	0	0	0
418	Residence	20	17	23	18	15	0	0	0	0
419	Residence	20	17	23	18	15	0	0	0	0
420	Residence	18	15	21	16	14	0	0	0	0
422	Residence	20	17	23	18	17	0	0	0	0
423	Residence	20	17	22	18	16	0	0	0	0
424	Residence	18	15	20	16	18	0	0	0	0
425	Residence	18	15	21	17	17	0	0	0	0
426	Residence	19	16	22	18	18	0	0	0	0
427	Residence	18	15	20	16	17	0	0	0	0
429	Residence	19	16	22	18	20	0	4	0	0
430	Residence	19	16	22	18	19	0	3	0	0
431	Residence	19	16	21	18	19	0	3	0	0
432	Residence	19	16	21	18	19	0	2	0	0
433	Residence	19	15	21	17	18	0	1	0	0
434	Residence	19	16	21	18	19	0	2	0	0
436	Residence	19	15	21	17	19	0	1	0	0
437	Residence	19	16	21	18	20	0	3	0	0
438	Residence	19	16	21	18	19	0	2	0	0
440	Residence	19	16	21	19	22	0	9	0	0
441	Residence	19	16	21	19	22	0	9	0	0
442	Residence	17	14	19	16	17	0	0	0	0
443	Residence	17	14	19	16	18	0	0	0	0
444	Residence	17	14	19	17	19	0	2	0	0
445	Residence	17	14	19	16	18	0	1	0	0
446	Residence	17	14	19	16	18	0	0	0	0
447	Residence	17	14	19	16	19	0	1	0	0
448	Residence	17	14	19	16	18	0	0	0	0
449	Residence	17	14	19	16	17	0	0	0	0
450	Residence	17	14	19	16	17	0	0	0	0
452	Residence	17	14	19	16	17	0	0	0	0
453	Residence	17	14	19	16	17	0	0	0	0
454	Residence	17	14	20	16	17	0	0	0	0
455	Residence	17	14	19	16	17	0	0	0	0

ID	TYPE	1/1 OCTAVE BAND SOUND PRESSURE LEVELS (dBZ) MAXIMUM L_{1h}								
		31.5 Hz	63 HZ	125 Hz	250 Hz	500 HZ	1 kHz	2 kHZ	4 KHZ	8 KHZ
456	Residence	18	15	21	16	16	0	0	0	0
457	Residence	17	14	19	15	16	0	0	0	0
458	Residence	16	13	19	15	16	0	0	0	0
459	Residence	17	14	20	15	15	0	0	0	0
462	Residence	13	9	14	11	12	0	0	0	0
463	Residence	13	10	15	11	13	0	0	0	0
464	Residence	13	10	15	14	16	0	1	0	0
465	Residence	13	10	15	12	14	0	0	0	0
466	Residence	13	10	16	14	16	0	1	0	0
468	Residence	13	10	15	13	16	0	0	0	0
470	Residence	14	11	16	14	17	0	1	0	0
471	Residence	14	11	16	14	18	0	3	0	0
472	Residence	14	11	16	15	18	0	3	0	0
474	Residence	14	11	16	15	19	0	6	0	0
475	Residence	14	11	16	16	19	0	7	0	0
476	Residence	14	11	16	15	19	0	5	0	0
477	Residence	15	12	16	16	20	0	10	0	0
478	Residence	16	14	17	16	21	0	10	0	0
479	Residence	18	16	19	18	22	0	12	0	0
480	Residence	17	15	20	18	21	0	6	0	0
481	Residence	17	14	20	18	21	0	7	0	0
482	Residence	17	15	19	18	21	0	9	0	0
483	Residence	17	14	19	18	21	0	7	0	0
484	Residence	16	14	19	18	21	0	10	0	0
485	Residence	17	14	19	17	20	0	7	0	0
486	Residence	17	14	19	17	20	0	5	0	0
487	Residence	16	14	19	17	20	0	5	0	0
488	Residence	17	14	19	17	20	0	3	0	0
489	Residence	17	14	19	17	20	0	4	0	0
490	Residence	17	14	19	17	20	0	4	0	0
491	Residence	18	16	19	18	23	0	10	0	0
492	Residence	17	14	19	18	22	0	7	0	0
493	Residence	17	14	19	17	21	0	6	0	0
494	Residence	16	13	19	17	21	0	5	0	0
495	Residence	19	16	21	20	23	0	9	0	0
497	Residence	18	15	21	19	22	0	8	0	0
498	Residence	18	16	21	19	22	0	8	0	0
499	Residence	19	16	21	19	22	0	9	0	0

ID	TYPE	1/1 OCTAVE BAND SOUND PRESSURE LEVELS (dBZ) MAXIMUM L_{1h}								
		31.5 Hz	63 HZ	125 Hz	250 Hz	500 HZ	1 kHz	2 kHZ	4 KHZ	8 KHZ
500	Residence	19	16	21	19	22	0	8	0	0
501	Residence	19	16	21	19	22	0	8	0	0
502	Residence	19	16	21	19	22	0	9	0	0
503	Residence	19	16	21	19	22	0	9	0	0
504	Residence	21	19	25	22	15	0	0	0	0
505	Residence	27	24	30	28	21	0	4	0	0
514	Residence	24	22	26	26	31	0	26	23	0
521	Residence	24	22	27	27	32	0	28	29	9
529	Residence	26	23	29	27	24	0	9	0	0
530	Residence	26	24	30	27	24	0	9	0	0
533	Residence	25	23	29	26	22	0	6	0	0
534	Residence	25	22	28	26	21	0	4	0	0
535	Residence	25	22	28	25	22	0	6	0	0
541	Residence	25	22	28	25	20	0	0	0	0
542	Residence	25	22	28	26	20	0	0	0	0
543	Residence	25	22	29	26	20	0	0	0	0
544	Residence	25	23	29	26	21	0	2	0	0
545	Residence	26	23	29	26	21	0	2	0	0
546	Residence	25	23	29	26	20	0	1	0	0
547	Residence	24	21	27	24	19	0	0	0	0
548	Residence	24	21	27	24	19	0	0	0	0
549	Residence	24	21	27	24	19	0	0	0	0
550	Residence	24	21	27	24	20	0	1	0	0
551	Residence	22	20	26	23	19	0	0	0	0
556	Residence	23	20	26	23	18	0	0	0	0
557	Residence	21	19	24	21	17	0	0	0	0
559	Residence	18	15	20	17	14	0	0	0	0
563	Residence	14	11	16	14	13	0	0	0	0
564	Residence	15	13	18	16	17	0	0	0	0
567	Residence	14	11	16	14	14	0	0	0	0
570	Residence	16	14	19	18	20	0	6	0	0
571	Residence	17	14	20	18	21	0	9	0	0
574	Residence	16	14	20	18	20	0	7	0	0
578	Residence	20	18	22	22	27	0	21	19	0
581	Residence	22	21	24	24	29	0	24	21	0
582	Residence	19	17	22	20	22	0	10	0	0
585	Residence	17	15	21	19	22	0	12	4	0
588	Residence	20	17	23	21	21	0	9	0	0

ID	TYPE	1/1 OCTAVE BAND SOUND PRESSURE LEVELS (dBZ) MAXIMUM L_{1h}								
		31.5 Hz	63 HZ	125 Hz	250 Hz	500 HZ	1 kHz	2 kHZ	4 KHZ	8 KHZ
593	Residence	22	19	25	22	21	0	7	0	0
597	Residence	22	19	25	22	20	0	4	0	0
599	Residence	22	19	25	23	20	0	5	0	0
603	Residence	22	19	25	22	19	0	1	0	0
610	Residence	18	17	19	19	25	0	19	12	0
613	Residence	14	11	16	16	19	0	2	0	0
614	Residence	14	11	16	16	19	0	1	0	0
617	Residence	13	10	15	15	18	0	1	0	0
628	Residence	12	9	14	13	15	0	0	0	0
631	Residence	11	7	12	11	14	0	0	0	0
633	Residence	12	9	14	12	15	0	0	0	0
639	Residence	10	6	11	11	13	0	0	0	0
644	Residence	11	8	11	10	13	0	0	0	0
646	Residence	11	8	11	10	12	0	0	0	0
647	Residence	11	8	12	10	12	0	0	0	0
648	Residence	10	7	11	11	14	0	0	0	0
650	Residence	9	6	11	12	15	0	0	0	0
651	Residence	10	7	11	12	15	0	0	0	0
660	Residence	11	8	13	11	13	0	0	0	0
664	Residence	13	11	13	12	16	0	0	0	0
666	Residence	13	11	14	12	16	0	2	0	0
672	Residence	12	10	13	12	16	0	1	0	0
700	Residence	11	9	12	9	13	0	0	0	0
704	Residence	9	5	9	7	9	0	0	0	0
721	Residence	11	8	13	12	15	0	0	0	0
724	Residence	13	10	14	13	16	0	0	0	0
730	Residence	12	9	14	13	16	0	0	0	0
761	Residence	14	11	16	15	19	0	8	0	0
762	Residence	15	13	17	16	21	0	11	1	0
763	Residence	16	15	20	21	27	0	21	18	0
764	Residence	16	15	21	23	28	0	20	18	0
769	Residence	16	14	18	19	24	0	15	6	0
806	Residence	17	16	20	20	26	0	17	10	0
810	Residence	20	18	22	22	28	0	22	18	0
817	Residence	20	18	21	21	27	0	19	12	0
841	Residence	21	19	25	22	16	0	0	0	0
848	Residence	23	21	27	24	18	0	0	0	0
853	Public	32	28	32	29	23	0	8	0	0

ID	TYPE	1/1 OCTAVE BAND SOUND PRESSURE LEVELS (dBZ) MAXIMUM L_{1h}								
		31.5 Hz	63 HZ	125 Hz	250 Hz	500 HZ	1 kHz	2 kHZ	4 KHZ	8 KHZ
864	Residence	24	21	27	24	17	0	0	0	0
866	Residence	22	19	26	23	16	0	0	0	0
870	Residence	21	18	24	18	13	0	0	0	0
875	Residence	26	23	28	24	22	0	9	0	0
878	Residence	26	23	29	26	28	0	21	21	0
884	Residence	42	38	43	37	32	0	20	16	0
889	Residence	27	25	30	28	33	0	28	26	0
891	Residence	19	16	21	19	21	0	7	0	0
906	Residence	18	16	21	19	22	0	7	0	0
918	Residence	17	14	19	15	17	0	0	0	0
920	Residence	14	11	16	12	13	0	0	0	0
922	Residence	15	12	17	13	15	0	0	0	0
930	Residence	14	11	16	15	18	0	4	0	0
933	Residence	13	10	15	13	16	0	0	0	0
936	Residence	13	10	15	12	13	0	0	0	0
942	Residence	13	9	14	11	12	0	0	0	0
948	Residence	17	14	20	16	17	0	0	0	0
963	Residence	19	16	22	17	16	0	0	0	0
973	Residence	15	13	16	14	19	0	10	0	0
974	Residence	15	13	16	15	19	0	10	0	0
975	Residence	11	8	12	13	16	0	1	0	0
978	Residence	21	19	25	22	15	0	0	0	0
1015	Residence	21	18	24	22	24	0	14	9	0
1017	Residence	15	12	17	14	15	0	0	0	0
1026	Residence	13	11	15	13	17	0	0	0	0
1045	Residence	14	12	15	13	18	0	6	0	0
1050	Residence	17	15	21	22	28	0	20	14	0
1057	Residence	24	21	27	22	20	0	4	0	0
	Minimum	39	26	16	9	3	0	0	0	1
	Maximum	39	26	16	9	3	0	0	0	1
	Average	19	16	21	18	20	0	6	3	0

APPENDIX D. ACOUSTICS PRIMER

Expressing Sound in Decibel Levels

The varying air pressure that constitutes sound can be characterized in many different ways. The human ear is the basis for the metrics that are used in acoustics. Normal human hearing is sensitive to sound fluctuations over an enormous range of pressures, from about 20 micropascals (the "threshold of audibility") to about 20 pascals (the "threshold of pain").[11] This factor of one million in sound pressure difference is challenging to convey in engineering units. Instead, sound pressure is converted to sound "levels" in units of "decibels" (dB, named after Alexander Graham Bell). Once a measured sound is converted to dB, it is denoted as a level with the letter "L".

The conversion from sound pressure in pascals to sound level in dB is a four-step process. First, the sound wave's measured amplitude is squared and the mean is taken. Second, a ratio is taken between the mean square sound pressure and the square of the threshold of audibility (20 micropascals). Third, using the logarithm function, the ratio is converted to factors of 10. The final result is multiplied by 10 to give the decibel level. By this decibel scale, sound levels range from 0 dB at the threshold of audibility to 120 dB at the threshold of pain.

Typical sound sources, and their sound pressure levels, are listed on the scale in Figure 52.

Human Response to Sound Levels: Apparent Loudness

For every 20 dB increase in sound level, the sound pressure increases by a *factor* of 10; the sound *level* range from 0 dB to 120 dB covers 6 factors of 10, or one million, in sound *pressure*. However, for an increase of 10 dB in sound *level* as measured by a meter, humans perceive an approximate doubling of apparent loudness: to the human ear, a sound level of 70 dB sounds about "twice as loud" as a sound level of 60 dB. Smaller changes in sound level, less than 3 dB up or down, are generally not perceptible.

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[11] The pascal is a measure of pressure in the metric system. In Imperial units, they are themselves very small: one pascal is only 145 millionths of a pound per square inch (psi). The sound pressure at the threshold of audibility is only 3 one-billionths of one psi: at the threshold of pain, it is about 3 one-thousandths of one psi.

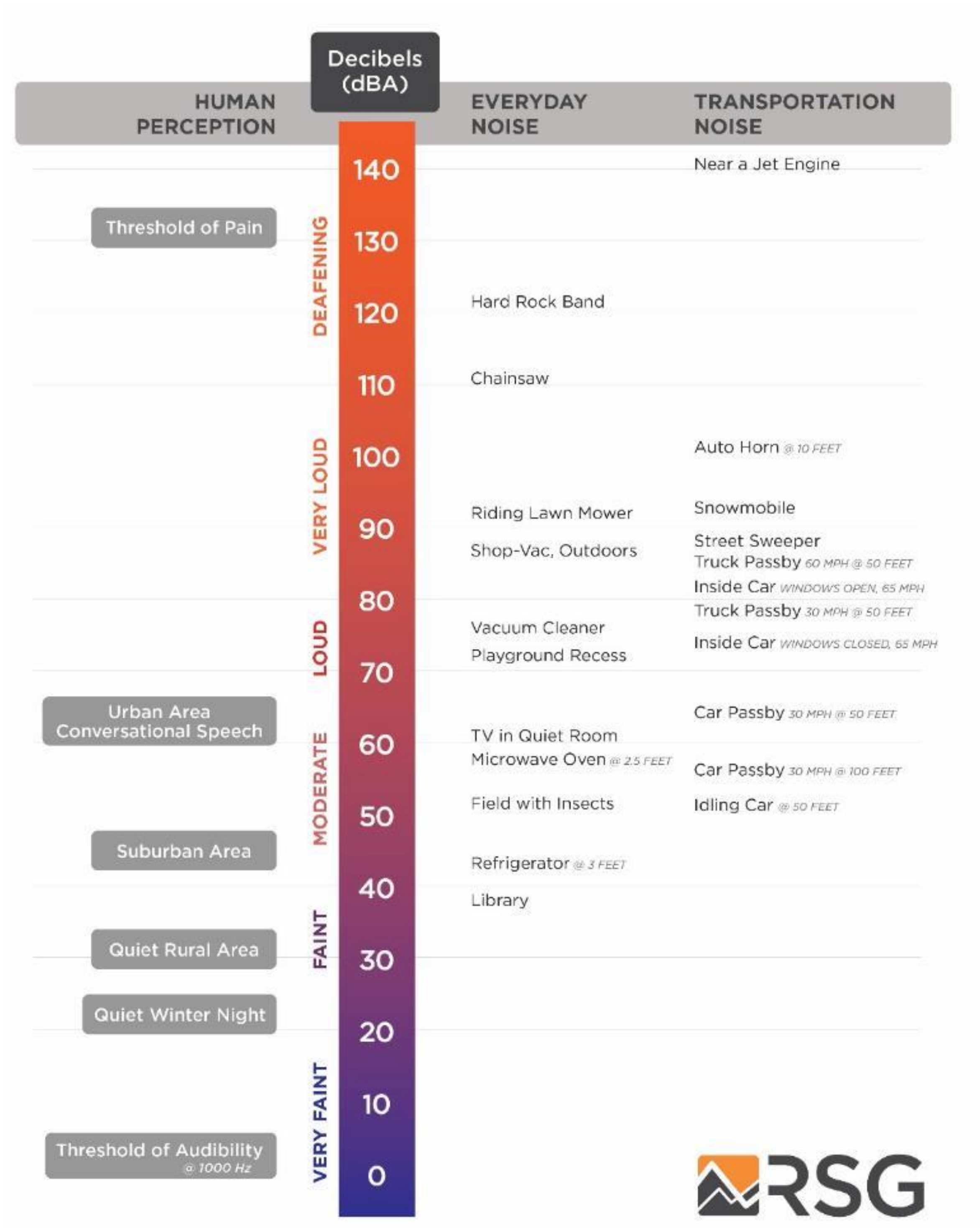


FIGURE 52: A SCALE OF SOUND PRESSURE LEVELS FOR TYPICAL SOUND SOURCES

Frequency Spectrum of Sound

The “frequency” of a sound is the rate at which it fluctuates in time, expressed in Hertz (Hz), or cycles per second. Very few sounds occur at only one frequency: most sound contains energy at many different frequencies, and it can be broken down into different frequency divisions, or bands. These bands are similar to musical pitches, from low tones to high tones. The most common division is the standard octave band. An octave is the range of frequencies whose upper frequency limit is twice its lower frequency limit, exactly like an octave in music. An octave band is identified by its center frequency: each successive band’s center frequency is twice as high (one octave) as the previous band. For example, the 500 Hz octave band includes all sound whose frequencies range between 354 Hz (Hertz, or cycles per second) and 707 Hz. The next band is centered at 1,000 Hz with a range between 707 Hz and 1,414 Hz. The range of human hearing is divided into 10 standard octave bands: 31.5 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1,000 Hz, 2,000 Hz, 4,000 Hz, 8,000 Hz, and 16,000 Hz. For analyses that require finer frequency detail, each octave-band can be subdivided. A commonly used subdivision creates three smaller bands within each octave band, or so-called 1/3-octave bands.

Human Response to Frequency: Weighting of Sound Levels

The human ear is not equally sensitive to sounds of all frequencies. Sounds at some frequencies seem louder than others, despite having the same decibel level as measured by a sound level meter. In particular, human hearing is much more sensitive to medium pitches (from about 500 Hz to about 4,000 Hz) than to very low or very high pitches. For example, a tone measuring 80 dB at 500 Hz (a medium pitch) sounds quite a bit louder than a tone measuring 80 dB at 60 Hz (a very low pitch). The frequency response of normal human hearing ranges from 20 Hz to 20,000 Hz. Below 20 Hz, sound pressure fluctuations are not “heard”, but sometimes can be “felt”. This is known as “infrasound”. Likewise, above 20,000 Hz, sound can no longer be heard by humans; this is known as “ultrasound”. As humans age, they tend to lose the ability to hear higher frequencies first; many adults do not hear very well above about 16,000 Hz. Most natural and man-made sound occurs in the range from about 40 Hz to about 4,000 Hz. Some insects and birdsongs reach to about 8,000 Hz.

To adjust measured sound pressure levels so that they mimic human hearing response, sound level meters apply filters, known as “frequency weightings”, to the signals. There are several defined weighting scales, including “A”, “B”, “C”, “D”, “G”, and “Z”. The most common weighting scale used in environmental noise analysis and regulation is A-weighting. This weighting represents the sensitivity of the human ear to sounds of low to moderate level. It attenuates sounds with frequencies below 1000 Hz and above 4000 Hz; it amplifies very slightly sounds between 1000 Hz and 4000 Hz, where the human ear is particularly sensitive. The C-weighting scale is sometimes used to describe louder sounds. The B- and D- scales are seldom used. All of these frequency weighting scales are normalized to the average human hearing response at

1000 Hz: at this frequency, the filters neither attenuate nor amplify. G-weighting is a standardized weighting used to evaluate infrasound.

When a reported sound level has been filtered using a frequency weighting, the letter is appended to "dB". For example, sound with A-weighting is usually denoted "dBA". When no filtering is applied, the level is denoted "dB" or "dBZ". The letter is also appended as a subscript to the level indicator "L", for example "L_A" for A-weighted levels.

Time Response of Sound Level Meters

Because sound levels can vary greatly from one moment to the next, the time over which sound is measured can influence the value of the levels reported. Often, sound is measured in real time, as it fluctuates. In this case, acousticians apply a so-called "time response" to the sound level meter, and this time response is often part of regulations for measuring sound. If the sound level is varying slowly, over a few seconds, "Slow" time response is applied, with a time constant of one second. If the sound level is varying quickly (for example, if brief events are mixed into the overall sound), "Fast" time response can be applied, with a time constant of one-eighth of a second.[12] The time response setting for a sound level measurement is indicated with the subscript "S" for Slow and "F" for Fast: L_S or L_F. A sound level meter set to Fast time response will indicate higher sound levels than one set to Slow time response when brief events are mixed into the overall sound, because it can respond more quickly.

In some cases, the maximum sound level that can be generated by a source is of concern. Likewise, the minimum sound level occurring during a monitoring period may be required. To measure these, the sound level meter can be set to capture and hold the highest and lowest levels measured during a given monitoring period. This is represented by the subscript "max", denoted as "L_{max}". One can define a "max" level with Fast response L_{Fmax} (1/8-second time constant), Slow time response L_{Smax} (1-second time constant), or Continuous Equivalent level over a specified time period $L_{eq,max}$.

Accounting for Changes in Sound Over Time

A sound level meter's time response settings are useful for continuous monitoring. However, they are less useful in summarizing sound levels over longer periods. To do so, acousticians apply simple statistics to the measured sound levels, resulting in a set of defined types of sound level related to averages over time. An example is shown in Figure 53. The sound level at each instant of time is the grey trace going from left to right. Over the total time it was measured (1 hour in the figure), the sound energy spends certain fractions of time near various levels, ranging from the minimum (about 27 dB in the figure) to the maximum (about 65 dB in the

[12] There is a third time response defined by standards, the "Impulse" response. This response was defined to enable use of older, analog meters when measuring very brief sounds; it is no longer in common use.

figure). The simplest descriptor is the average sound level, known as the Equivalent Continuous Sound Level. Statistical levels are used to determine for what percentage of time the sound is louder than any given level. These levels are described in the following sections.

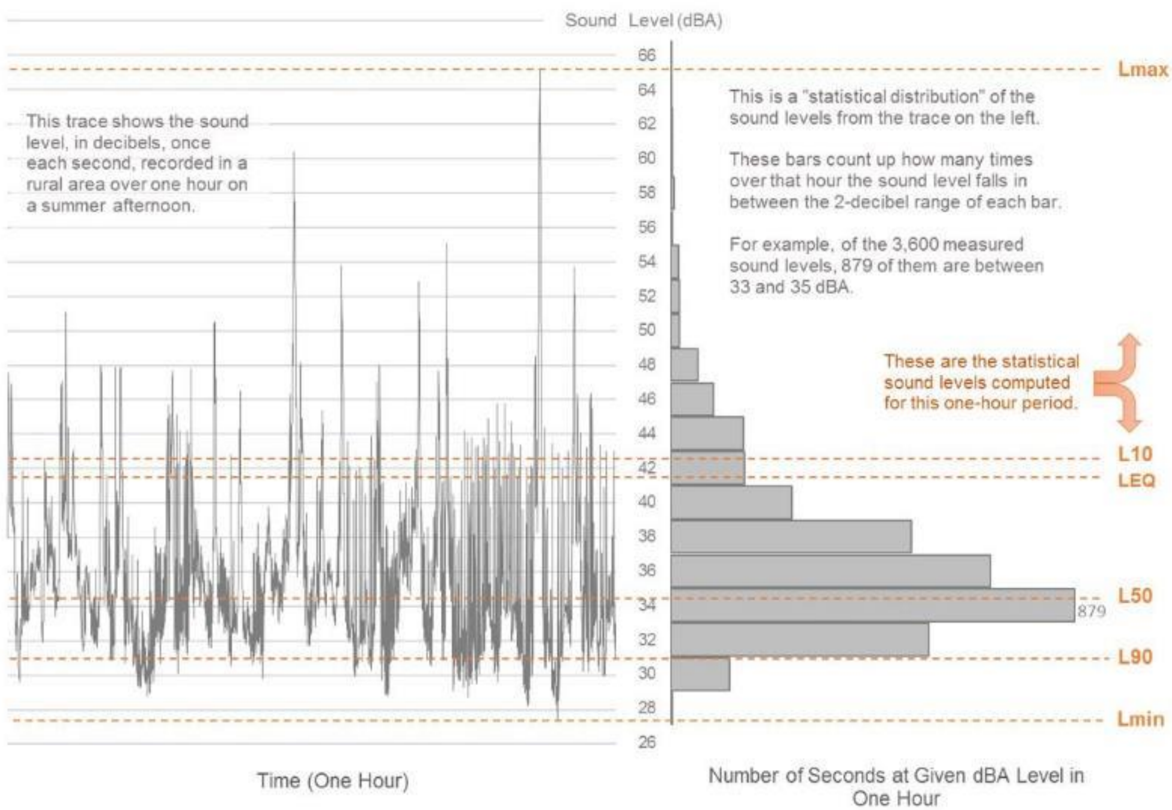


FIGURE 53: EXAMPLE OF DESCRIPTIVE TERMS OF SOUND MEASUREMENT OVER TIME

Equivalent Continuous Sound Level - L_{eq}

One straightforward, common way of describing sound levels is in terms of the Continuous Equivalent Sound Level, or L_{eq}. The L_{eq} is the average sound pressure level over a defined period of time, such as one hour or one day. L_{eq} is the most commonly used descriptor in noise standards and regulations. L_{eq} is representative of the overall sound to which a person is exposed. Because of the logarithmic calculation of decibels, L_{eq} tends to favor higher sound levels: loud and infrequent sources have a larger impact on the resulting average sound level than quieter but more frequent sounds. For example, in Figure 53, even though the sound levels spends most of the time near about 34 dBA, the L_{eq} is 41 dBA, having been “inflated” by the maximum level of 65 dBA and other occasional spikes over the course of the hour.

Percentile Sound Levels – L_n

Percentile sound levels describe the statistical distribution of sound levels over time. “L_N” is the level above which the sound spends “N” percent of the time. For example, L_{90} (sometimes called the “residual base level”) is the sound level exceeded 90% of the time: the sound is louder than L_{90} most of the time. L_{10} is the sound level that is exceeded only 10% of the time. L_{50} (the “median level”) is exceeded 50% of the time: half of the time the sound is louder than , and half the time it is quieter than . Note that (median) and L_{eq} (mean) are not always the same, for reasons described in the previous section.

The L_{90} is the sound that persists for longer periods, and below which the overall sound level seldom falls. It tends to filter out other short-term environmental sounds that aren’t part of the source being investigated. L_{10} represents the higher, but less frequent, sound levels. These could include such events as barking dogs, vehicles driving by and aircraft flying overhead, gusts of wind, and work operations. L_{90} represents the background sound that is present when these event sounds are excluded.

Note that if one sound source is very constant and dominates the soundscape in an area, all of the descriptive sound levels mentioned here tend toward the same value. It is when the sound is varying widely from one moment to the next that the statistical descriptors are useful.

APPENDIX E. GLOSSARY

Definitions of acoustical term or general scientific terms are included here if not explained within the body of the report.

A-Weighting The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise Ambient noise – The ANSI S1.1 definition is the "all-encompassing sound at a given place, usually a composite of sounds from many sources near and far."

Ambient The "all-encompassing sound at a given place, usually a composite of sounds from many sources near and far." (ANSI S1.1)

ANSI American National Standards Institute

Audible For the purposes of this report, able to be heard by ontologically normal healthy young adults (18 to 25 years), according to ISO 389-7 (see Figure 54).

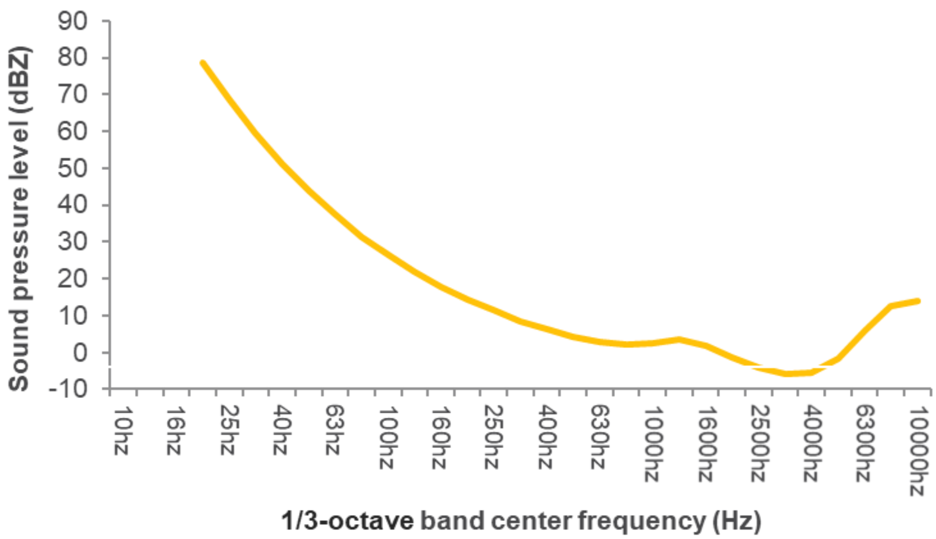


FIGURE 54: ISO 387-7 AUDIBILITY CURVE IN A FREE FIELD

Background Sound Level – the sound level in absence of the source of interest.

Biogenic Produced of brought about by living organisms

Broadband Sound – Sound with a broad spectral distribution, with no tones, such as white noise, static, and airflow.

dBA A-Weighted decibels (see A-Weighting, Decibel)

Decibel, dB A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20 micro Pascals.

Frequency	In acoustics, the number of times in a second one cycle of a waveform passes a fixed space. The perceived pitch of a sound is proportional to its frequency. The relationship between wavelength and frequency is dependent on the speed of sound. $$f = \frac{c}{\lambda}$$ where λ is wavelength, c is the speed of sound, and f is frequency. The typical hearing range for young healthy individuals is roughly between frequencies of 20 Hz (1 Hertz is one cycle per second) and 20,000 Hz (also designated as 20 kHz, where 1 kHz is one thousand cycles per second).
G	The proportion of ground that is considered porous, as defined under ISO 9613-2. For example, G = 1 represents all porous ground, G = 0 represents all hard ground, and G = 0.5 represents half-porous and half-hard ground.
Geophonic	Naturally occurring sound produced by a habitat, excluding sounds made by living organisms.
Infrasound	Sound that is of such low frequency that it is not readily audible by humans at nominal levels – generally considered to be below 20 Hz.
ISO	The International Organization for Standards
ISO 9613	The International Standards Organization Standard ISO 9613, “Acoustics – Attenuation of sound during propagation outdoors”. The standard is used to predict how sound propagates outdoors. It is currently the standard used by most noise control engineers in the U.S. to predict sound levels in communities. Part 1 of the standard estimates atmospheric attenuation, and Part 2 uses the results from Part 1 with sound emissions from the source and propagation path factors to estimate sound levels at some distance from the source.
L_{1h}	The average A-weighted sound pressure level, in decibels, during a period of 1-hour. This averaging time is used for substation sound sources.
L_{8h}	The average A-weighted sound pressure level, in decibels, during a period of 8-hours. This averaging time is used for all non-substation sound sources.
L_F	Fast-response sound level, where the exponential response time is set to 125 ms. A sound level meter set to Fast-response is relatively faster to respond to rapidly changing sound levels. It can be expressed as an instantaneous level, in a percentile, or in a statistic such as a one-second L_{Fmax}, for example. (See “sound level meter response”)
$L_{Fmax\ (1\text{-}sec)}$	The A-weighted, fast-response maximum sound level, as measured over a one-second period, in decibels.
L_{eq}	Equivalent average sound level. The average of the mean square sound *pressure* over an entire monitoring period and expressed as a decibel: $$Leq_T = 10 * log_{10}\left(\frac{1}{T}\int_{\theta}^{T} p_A^2(t)dt \Big/ p_{ref}^2\right)$$ where p_A^2 is the squared instantaneous weighted sound pressure signal, as a function of elapsed time t, p_{ref} is the reference pressure of 20 µPa, and T

	is the stated time interval. The reference pressure of 20 µPa is used for all measurements in this document. The monitoring period, T, can be for any defined length of time. It could be one second ($L_{eq\ 1\text{-}sec}$), one hour (L_{1h}), eight hours (L_{8h}), or 24 hours (L_{24h}). Because L_{eq} is a logarithmic function of the average pressure, loud and infrequent sounds have a greater effect on the resulting L_{eq} than quieter and more frequent sounds.
L_n	See "nth percentile"
L_p	See "Sound Pressure Level"
L_S	Slow response sound level, where the exponential response time is set to 1.0 second. This is a relatively slower response time to Fast and results in a longer rise and fall time in the displayed sound level. The five-second instantaneous A-weighted L_S is the metric currently used by MassDEP for compliance monitoring. L_S is often used in local sound regulations as it tends to filter short-term contamination by responding more slowly to rapidly changing sound levels, and is easier to read on a sound level meter display. (See "sound level meter response")
Lw	See "Sound Power Level"

Low Frequency Sound – Sound with frequency content between 20 Hz and 200 Hz.

Measured	An observed quantity. In this report, we differentiate between measured values, for example, those that are logged by a sound level meter, and modeled values, such as those that are predicted by a sound propagation model.
m/s	Velocity in meters per second.
mph	Velocity in miles per hour.
ms	Milliseconds; one thousandth of a second.
MVA	The apparent electrical power rating. The product of the voltage and current (in amperes).
MVT	Medium voltage transformer
nth Percentile	In statistics, the value which represents the highest nth percent of a series of values. For example, in 100 measurements sorted from high to low, the 10th percentile would be the 90th measurement down from the top. That is, 10 percent of the observations fall below that value. In acoustics, the nth percentile level is the level exceeded n percent of the time, which is the opposite of the statistical definition. Thus, the acoustic L_{90} represents the statistical 10th percentile level. In this document, if we use "*n*th percentile" it will refer to the statistical definition, and if we use "L*n*", it refers to the acoustical definition. L_{50} is the median sound level.
NYCRR	New York Codes, Rules, and Regulations
Octave bands	An octave is a band of frequencies whose lower frequency limit is one half of its upper frequency limit. An octave-band is identified by its center frequency. As an example, the 500 Hz octave band is the range which includes frequencies between 360 Hz and 720 Hz. An octave higher would be twice this. That is, it would be centered at 1,000 Hz with a range between 720 and 1,440 Hz. The range of human hearing is divided into 10 standardized octave-bands: 31.5 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1

kHz, 2 kHz, 4 kHz, 8 kHz, and 16 kHz. For analyses that require even further frequency detail, each octave-band divided into equal parts, such as 1/3-octave-bands.

ONAF Oil Natural Air Forced, Under ONAF conditions, the air of a transformer is circulated using fans.

ONAN Oil Natural Air Natural, Under ONAN conditions, the oil and air of a transformer are circulated without the use of fans, resulting in quieter operation of the transformer.

PNIA Project Noise Impact Assessment

Section 94c Chapter XVIII Title 19 Part 900 of New York Codes, Rules, and Regulations

Site The entire area of a Facility and its surroundings.

Sound [Pressure] Level – the sound pressure level as measured in decibels:

$$\text{Lp (in dB)} = 10log_{10}\left(\frac{p}{p_{ref}}\right)^2$$

where p is the sound pressure in Pascals and p_{ref} is the reference sound pressure of 20 µPa. All sound pressure levels shown in this document use this p_{ref}.

Sound level meter response – The rate at which a sound level meter display can change related to a change in actual sound level. Sound levels vary over time. In fact, the variation is so fast, that one would not be reliably able to read the level on a sound level meter. For that reason, the displayed sound level is damped in time, to make it readable.

There are three standard time responses available on most sound level meters: Slow, Fast, and Impulse (see "Ls", "Lf", and" Li", respectively). Fast response has a time constant of 125 ms. This response is similar to the response of the human ear. The Slow response has a time constant of 1 second. This is often used in environmental noise measurement because its slow rise and fall time eliminates very short spikes in noise that are not related to the measurement. The Impulse response has a very fast rise time of 35 ms and a slow decay time of 1.5 seconds. It is rarely used in environmental noise measurements, but can be used with other metrics to evaluate the impulsivity of a sound event.

Fast, slow, and impulse sound levels cannot be averaged over time, since they are not representative of the actual sound level over time. They are simply applied to the actual sound level to slow the meter reading. A true energy average can be calculated using the L_{eq} metric, which is independent of the sound level meter response setting (see "L_{eq}").

Sound Power Level – The level of sound power (sound generation) of a source, independent of environmental factors, measured in decibels:

$$\text{Lw (in dB)} = 10log_{10}\left(\frac{w}{w_{ref}}\right)^2$$

where w is the sound power measured in Watts and w_{ref} is the reference sound power of 10^{-12} Watts. A simple way of thinking about the difference between sound pressure and sound power is by the analogy of a light bulb: the sound pressure is similar to the lumens of light measured in a certain place under specific conditions, while the sound power would be equivalent to the wattage rating of the bulb, which does not change.

Sound Propagation The spreading of sound from the sound source through the environment.

Spectrum The components of a sound broken down into individual frequencies or frequency bands.

Tonal Sound - Sound where narrow frequency band(s) are pronounced, such as in alarms, sirens, squeals, and horns.

Unattended Monitoring – Sound monitoring where a sound level meter and associated equipment is left unattended for some length of time.

VAR Control Reactive power management through power distribution systems.

WHO The United Nation's World Health Organization

APPENDIX F. LARGE SCALE CONSTRUCTION NOISE MAPS

Maps scaled 1:12:000 and sized 22” X 34” are provided separately.

APPENDIX G. ADDITIONAL EQUIPMENT SPECIFICATIONS AND TEST DATA

MEDIUM VOLTAGE POWER STATION
4000-S2-US / 4200-S2-US / 4400-S2-US / 4600-S2-US

Robust
• Complete station is UL listed for higher safety and lower risk
• Station and all individual components type-tested for maximum reliability
• Optimally suited to extreme ambient conditions

Simple Integration
• Plug and play concept
• Completely pre-assembled for easy set-up and commissioning

Cost-Effective
• Fully integrated transformer and switchgear simplifies logistics
• Minimun O&M requirements create lowest cost of ownership

Flexible
• One product for all markets and applications
• Ideally suited for PV applications, PV plus storage (DC coupled) and storage applications (AC coupled)

MEDIUM VOLTAGE POWER STATION
4000-S2-US / 4200-S2-US / 4400-S2-US / 4600-S2-US

Turnkey solution for PV, storage, and PV plus storage power plants

With the power of the SMA's robust central inverters, the Sunny Central UP or Sunny Central Storage UP, and with perfectly integrated medium-voltage components, the Medium Voltage Power Station (MVPS) offers even more power density in a turn-key solution available worldwide. The solution is the ideal choice for next-generation PV power plants operating at 1500 V DC. Delivered pre-configured on a 20-foot container-integrated skid, the solution is easy to transport and quick to commission. The UL1741-listed MVPS combines rigorous plant safety with maximum energy yield and minimized deployment and operating risk. The MVPS is DC-coupling ready for large-scale storage integration.

MEDIUM VOLTAGE POWER STATION 4000-S2-US / 4200-S2-US

Technical Data	MVPS 4000-S2-US	MVPS 4200-S2-US
Input (DC)		
Available inverters	1 x SC 4000 UP-US or 1 x SCS 3450 UP-US or 1 x SCS 3450 UP-XT-US	1 x SC 4200 UP-US or 1 x SCS 3600 UP-US or 1 x SCS 3600 UP-XT-US
Max. input voltage	1500 V	1500 V
Number of DC inputs	dependent on the selected inverter	
Integrated zone monitoring	○	
Available DC fuse sizes (per input)	200 A, 250 A, 315 A, 350 A, 400 A, 450 A, 500 A	
Output (AC) on the medium-voltage side		
Rated power with SC-UP-US (at -25°C to +35°C / 40°C optional 50°C)[1]	4000 kVA / 3600 kVA	4200 kVA / 3780 kVA
Rated power with SCS-UP-US (at -25°C to +25°C / 40°C optional 50°C)[1]	3450 kVA / 2930 kVA	3620 kVA / 3075 kVA
Charging power with SCS-UP-XT-US (at -25°C to + 25°C / 40°C optional 50°C)[1]	3590 kVA/3000 kVA	3770 kVA / 3150 kVA
Discharging power with SCS-UP-XT-US (at -25°C to + 25°C / 40°C optional 50°C)[1]	4000 kVA / 3400 kVA	4200 kVA / 3570 kVA
Typical nominal AC voltages	12 kV to 34.5 kV	12 kV to 34.5 kV
AC power frequency	50 Hz / 60 Hz	50 Hz / 60 Hz
Transformer vector group Dy11 / YNd11 / YNy0	● / ○ / ○	● / ○ / ○
Transformer cooling methods	KNAN[2]	KNAN[2]
Transformer efficiency: Standard / Eco Design 1 / Eco Design 2	● / ○ / ○	● / ○ / ○
Max. total harmonic distortion	< 3%	
Reactive power feed-in (up to 60% of nominal power)	○	
Power factor at rated power / displacement power factor adjustable	1 / 0.8 overexcited to 0.8 underexcited	
Inverter efficiency		
Max. efficiency[3] / European efficiency[3] / CEC weighted efficiency[4]	98.7% / 98.6% / 98.5%	98.7% / 98.6% / 98.5%
Protective devices		
Input-side disconnection point	DC load-break switch	
Output-side disconnection point	Medium-voltage vacuum circuit breaker	
DC overvoltage protection	Surge arrester type I	
Galvanic isolation	●	
Internal arc classification medium-voltage control room (according to IEC 62271-202)	IAC A 20 kA 1 s	
General Data		
Dimensions equal to 20-foot HC shipping container (W / H / D)	6058 mm / 2896 mm / 2438 mm	
Weight	< 18 t	
Self-consumption (max. / partial load / average)[1]	< 8.1 kW / < 1.8 kW / < 2.0 kW	
Self-consumption (stand-by)[1]	< 370 W	
Degree of protection according to IEC 60529	Control rooms IP23D, inverter electronics IP54	
Environment: standard / harsh	● / ○	
Degree of protection according to IEC 60721-3-4 (4C1, 4S2 / 4C2, 4S4)	● / ○	
Maximum permissible value for relative humidity	95% (for 2 months/year)	
Max. operating altitude above mean sea level 1000 m / 2000 m	● / ○	
Fresh air consumption of inverter	6500 m^3/h	
Features		
DC terminal	Terminal lug	
AC connection	Outer-cone angle plug	
Tap changer for MV-transformer: without / with	● / ○	
Shield winding for MV-Transformer: without / with	● / ○	
Station enclosure color	RAL 7004	
Transformer for external loads: without / 10 / 20 / 30 / 40 / 50 / 60 kVA	● / ○ / ○ / ○ / ○ / ○ / ○	
Medium-voltage switchgear: without / 3 feeders 2 cable feeders with load-break switch, 1 transformer feeder with circuit breaker, internal arc classification IAC A FL 20 kA 1 s according to IEC 62271-200	● / ○	
Short circuit rating medium voltage switchgear (25 kA 1 s)	○	
Integrated oil containment: without / with	● / ○	
Industry standards (for other standards see the inverter datasheet)	IEC 60076, IEC 62271-200, IEC 62271-202, EN50588-1 IEEE 1547-2018[5], IEEE C37.100.1, IEEE C57.12, C37.20.9, UL 1741 listed, CSC Certificate, UL 347	
● Standard features ○ Optional features – Not available		
Type designation	MVPS-4000-S2-US	MVPS-4200-S2-US

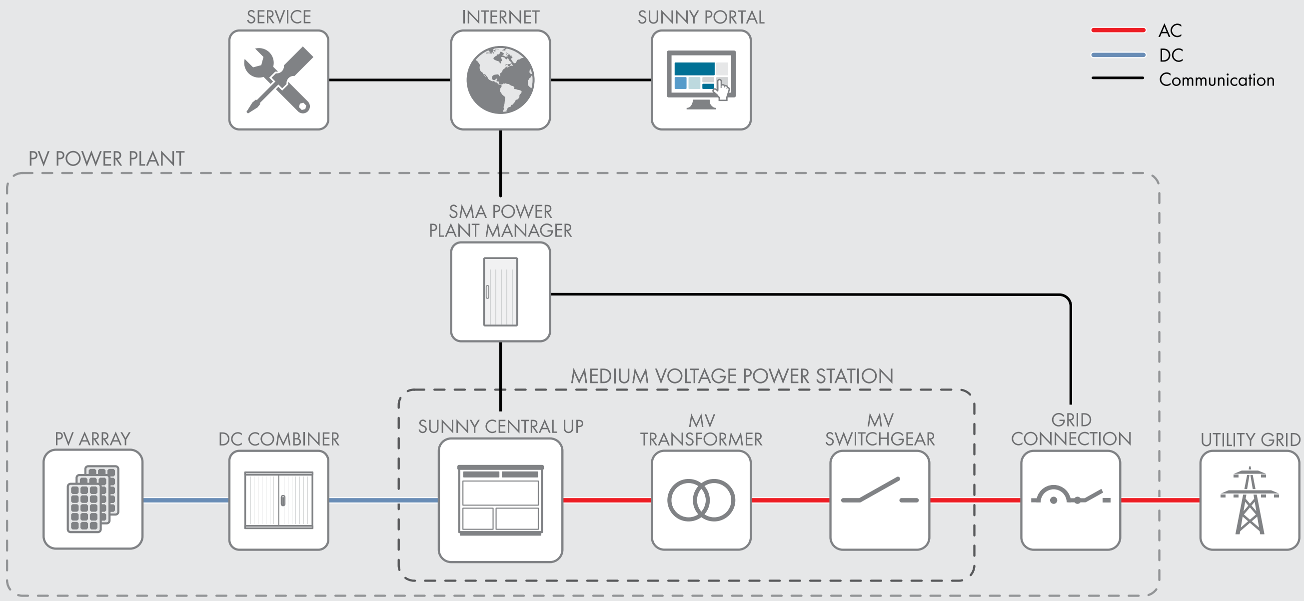
1) Data based on inverter. Further details can be found in the data sheet of the inverter. Cold weather -37° is an option.
2) KNAN = Natural ester fluid with natural air cooling
3) Efficiency measured at inverter without internal power supply
4) Efficiency measured at inverter with internal power supply
5) Harmonics are within IEEE 1547-2018 limits with at least two inverters in operation.

MEDIUM VOLTAGE POWER STATION 4400-S2-US / 4600-S2-US

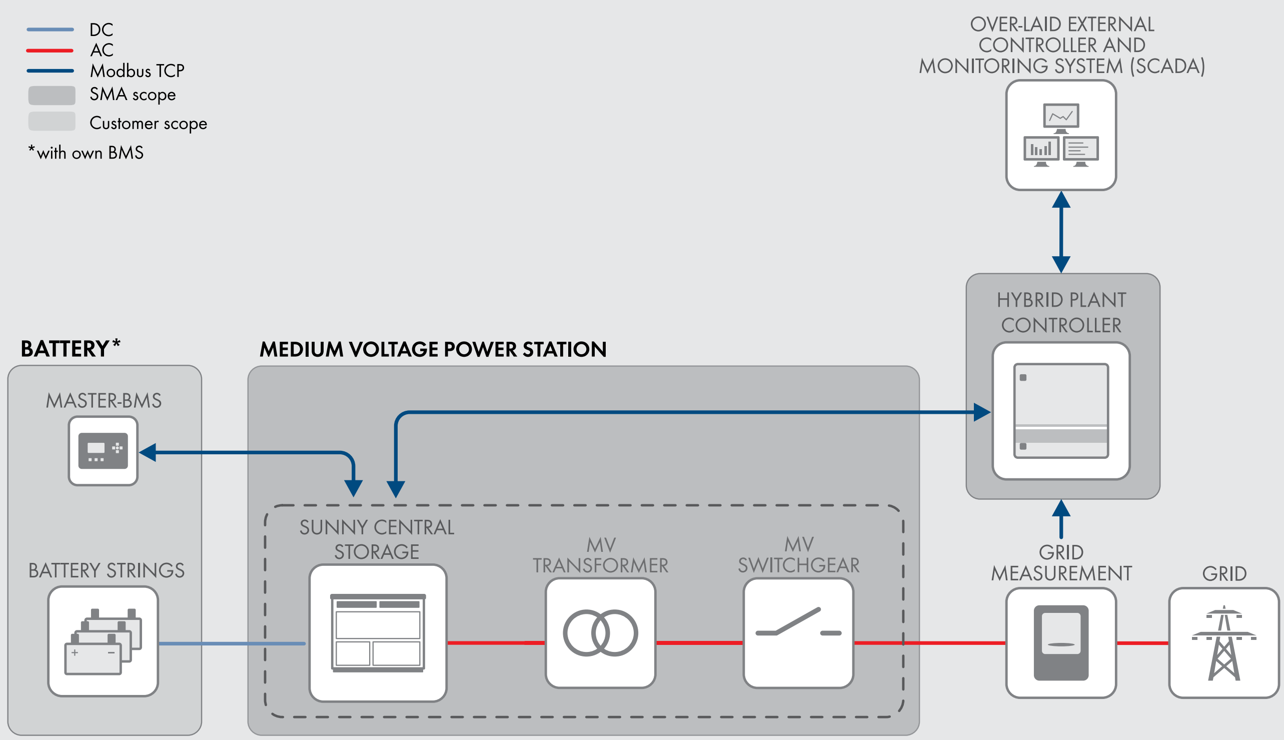
Technical Data	MVPS 4400-S2-US	MVPS 4600-S2-US
Input (DC)		
Available inverters	1 x SC 4400 UP-US or 1 x SCS 3800 UP-US or 1 x SCS 3800 UP-XT-US	1 x SC 4600 UP-US or 1 x SCS 3950 UP-US or 1 x SCS 3950 UP-XT-US
Max. input voltage	1500 V	1500 V
Number of DC inputs	dependent on the selected inverter	
Integrated zone monitoring	○	
Available DC fuse sizes (per input)	200 A, 250 A, 315 A, 350 A, 400 A, 450 A, 500 A	
Output (AC) on the medium-voltage side		
Rated power with SC-UP-US (at -25°C to +35°C / 40°C optional 50°C)[1]	4400 kVA / 3960 kVA	4600 kVA / 4140 kVA
Rated power with SCS-UP-US (at -25°C to +25°C / 40°C optional 50°C)[1]	3800 kVA / 3230 kVA	3960 kVA / 3365 kVA
Charging power with SCS-UP-XT-US (at -25°C to + 25°C / 40°C optional 50°C)[1]	3950 kVA / 3300 kVA	4130 kVA / 3455 kVA
Discharging power with SCS-UP-XT-US (at -25°C to + 25°C / 40°C optional 50°C)[1]	4400 kVA / 3740 kVA	4600 kVA / 3910 kVA
Typical nominal AC voltages	12 kV to 34.5 kV	12 kV to 34.5 kV
AC power frequency	50 Hz / 60 Hz	50 Hz / 60 Hz
Transformer vector group Dy11 / YNd11 / YNy0	● / ○ / ○	● / ○ / ○
Transformer cooling methods	KNAN[2]	KNAN[2]
Transformer efficiency: Standard / Eco Design 1 / Eco Design 2	● / ○ / ○	● / ○ / ○
Max. total harmonic distortion	< 3%	
Reactive power feed-in (up to 60% of nominal power)	○	
Power factor at rated power / displacement power factor adjustable	1 / 0.8 overexcited to 0.8 underexcited	
Inverter efficiency		
Max. efficiency[3] / European efficiency[3] / CEC weighted efficiency[4]	98.7% / 98.6% / 98.5%	98.7% / 98.6% / 98.5%
Protective devices		
Input-side disconnection point	DC load-break switch	
Output-side disconnection point	Medium-voltage vacuum circuit breaker	
DC overvoltage protection	Surge arrester type I	
Galvanic isolation	●	
Internal arc classification medium-voltage control room (according to IEC 62271-202)	IAC A 20 kA 1 s	
General Data		
Dimensions equal to 20-foot HC shipping container (W / H / D)	6058 mm / 2896 mm / 2438 mm	
Weight	< 18 t	
Self-consumption (max. / partial load / average)[1]	< 8.1 kW / < 1.8 kW / < 2.0 kW	
Self-consumption (stand-by)[1]	< 370 W	
Degree of protection according to IEC 60529	Control rooms IP23D, inverter electronics IP54	
Environment: standard / harsh	● / ○	
Degree of protection according to IEC 60721-3-4 (4C1, 4S2 / 4C2, 4S4)	● / ○	
Maximum permissible value for relative humidity	95% (for 2 months/year)	
Max. operating altitude above mean sea level 1000 m / 2000 m	● / ○	
Fresh air consumption of inverter	6500 m^3/h	
Features		
DC terminal	Terminal lug	
AC connection	Outer-cone angle plug	
Tap changer for MV-transformer: without / with	● / ○	
Shield winding for MV-Transformer: without / with	● / ○	
Station enclosure color	RAL 7004	
Transformer for external loads: without / 10 / 20 / 30 / 40 / 50 / 60 kVA	● / ○ / ○ / ○ / ○ / ○ / ○	
Medium-voltage switchgear: without / 3 feeders 2 cable feeders with load-break switch, 1 transformer feeder with circuit breaker, internal arc classification IAC A FL 20 kA 1 s according to IEC 62271-200	● / ○	
Short circuit rating medium voltage switchgear (25 kA 1 s)	○	
Integrated oil containment: without / with	● / ○	
Industry standards (for other standards see the inverter datasheet)	IEC 60076, IEC 62271-200, IEC 62271-202, EN50588-1 IEEE 1547-2018[5], IEEE C37.100.1, IEEE C57.12, C37.20.9, UL 1741 listed, CSC Certificate, UL 347	
● Standard features ○ Optional features — Not available		
Type designation	MVPS-4400-S2-US	MVPS-4600-S2-US

1) Data based on inverter. Further details can be found in the data sheet of the inverter. Cold weather -37° is an option.
2) KNAN = Natural ester fluid with natural air cooling
3) Efficiency measured at inverter without internal power supply
4) Efficiency measured at inverter with internal power supply
5) Harmonics are within IEEE 1547-2018 limits with at least two inverters in operation.

PV system diagram



Storage system diagram



NX Horizon

Smart Solar Tracking System

Serving as the backbone on over 50 gigawatts of solar power plants around the world, the NX Horizon™ smart solar tracker system combines best-in-class hardware and software to help EPCs and asset owners maximize performance and minimize operational costs.

Flexible and Resilient by Design

With its self-aligning module rails and vibration-proof fasteners, NX Horizon can be easily and rapidly installed. The self-powered, decentralized architecture allows each row to be commissioned in advance of site power, and is designed to withstand high winds and other adverse weather conditions. On a 838 megawatt project in Villanueva, Mexico, these design features allowed for the project to go online nine months ahead of schedule.

TrueCapture and Bifacial Enabled

Incorporating the most promising innovations in utility scale solar, NX Horizon with TrueCapture™ smart control system can add additional energy production by up to six percent. Further unlocking the advantages of independent-row architecture and the data collected from thousands of sensors across its built-in wireless network, the software continuously optimizes the tracking algorithm of each row in response to site terrain and changing weather conditions. NX Horizon can also be paired with bifacial PV module technology, which can provide even more energy harvest and performance. With bifacial technology, NX Horizon outperforms conventional tracking systems with over 1% more annual energy.

Quality and Reliability from Day One

Quality and reliability are designed and tested into every NX Horizon component and system across our supply chain and manufacturing operations. Nextracker is the leader in dynamic wind analysis and safety stowing, delivering major benefits in uptime and long-term durability NX Horizon is certified to UL 2703 and UL 3703 standards, underscoring Nextracker's commitment to safety, reliability and quality.

Features and Benefits

6 years in a row

Global Market Share Leader

50 GW

Delivered on 6 Continents

Best-in Class

Software Ecosystem and Global Services

Up to 6%

Using TrueCapture Smart Control System

GENERAL AND MECHANICAL	
Tracking type	Horizontal single-axis, independent row.
String voltage	1,500 V_{DC} or 1,000 V_{DC}
Typical row size	78-90 modules, depending on module string length.
Drive type	Non-backdriving, high accuracy slew gear.
Motor type	24 V brushless DC motor
Array height	Rotation axis elevation 1.3 to 1.8 m / 4'3" to 5'10"
Ground coverage ratio (GCR)	Configurable. Typical range 28-50%.
Modules supported	Mounting options available for virtually all utility-scale crystalline modules, First Solar Series 6 and First Solar Series 4.
Bifacial features	High-rise mounting rails, bearing + driveline gaps and round torque tube.
Tracking range of motion	Options for ±60° or ±50°
Operating temperature range	SELF POWERED: -30°C to 55°C (-22°F to 131°F) AC POWERED: -40°C to 55°C (-40°F to 131°F)
Module configuration	1 in portrait. 3 x 1,500 V or 4 x 1,000 V strings per standard tracker. Partial length trackers available.
Module attachment	Self-grounding, electric tool-actuated fasteners.
Materials	Galvanized steel
Allowable wind speed	Configurable up to 200 kph (125 mph) 3-second gust
Wind protection	Intelligent wind stowing with symmetric dampers for maximum array stability in all wind conditions
Foundations	Standard W6 section foundation posts

ELECTRONICS AND CONTROLS	
Solar tracking method	Astronomical algorithm with backtracking. TrueCapture™ upgrades available for terrain adaptive backtracking and diffuse tracking mode
Control electronics	NX tracker controller with inbuilt inclinometer and backup battery
Communications	Zigbee wireless communications to all tracker rows and weather stations via network control units (NCUs)
Nighttime stow	Yes
Power supply	SELF POWERED: NX provided 30 or 60W Smart Panel AC POWERED: Customer-provided 120-240 V_{AC} circut

INSTALLATION, OPERATIONS AND SERVICE	
PE stamped structural calculations and drawings	Included
Onsite training and system commissioning	Included
Installation requirements	Simple assembly using swaged fasteners and bolted connections. No field cutting, drilling or welding.
Monitoring	NX Data Hub™ centralized data aggregation and monitoring
Module cleaning compatibility	Compatible with NX qualified cleaning systems
Warranty	10-year structural, 5-year drive and control components.
Codes and standards	UL 3703 / UL 2703 / IEC 62817