



Chipmunk Solar

Exhibit O

Noise Assessment

Case No. 21-0960 EL BGN

CHIPMUNK SOLAR NOISE ASSESSMENT





Report Title:

Chipmunk Solar Noise Assessment

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1.0 INTRODUCTION

The Chipmunk Solar Project (“Facility”) is a photovoltaic power facility proposed in Pickaway County, Ohio. The Facility is proposed to have a nameplate capacity of up to 400 MW. To inform the Ohio Power Siting Board (“OPSB”) permitting process, RSG was hired by the developer of the Facility, Chipmunk Solar, LLC, to perform a Noise Assessment of existing acoustical conditions in the area and sound emissions of the primary sound-producing Facility components, namely inverters, trackers, and transformers. This report of the assessment includes:

- A Facility description;
- Sound level limits applicable to the facility;
- Sound level monitoring procedures and results;
- Operational sound propagation modeling procedures and results;
- Construction noise modeling; and
- Results.

A primer of acoustical terminology used in this report can be found in Appendix A.

2.0 FACILITY DESCRIPTION

The Facility is an up to 400 MW photovoltaic facility located in Pickaway County, Ohio. The Facility area is approximately 3,700 acres north and east of Williamsport, Ohio, about 34 kilometers (21 miles) south of Columbus, Ohio. The Facility is bordered on the south by Mill Street (US-22), on the north by SR-56, and intersected by Yankeetown Pike, Water Street, Chillicothe Pike, and Pherson Pike.

The Village of Williamsport is located to the southwest of the Facility and includes suburban residential areas. The remaining Facility area is primarily agricultural with rural residences and farmsteads. A total of 568 residences, two churches, three cemeteries, and two schools are included in this assessment and are shown along with Facility elements in Figure 1. Six of the 568 residences were considered participating in this analysis.

The primary operational sound sources include three high-voltage substation transformers (approximately 150 MVA each) and 120 inverter skids. Each skid includes an inverter and a medium voltage transformer ("MVT"). Secondary operational sound sources include the solar tracking motors of which there are approximately 10,680 throughout the solar arrays. Sound emissions from all of these sources are analyzed in this assessment.

Typical operations of the Facility would include transformers and inverters operating during the day with periodic operation of the solar tracker motors. Only transformers would typically operate at night; however, the inverters may operate sometimes at night for VAR support. Trackers would not operate at night.

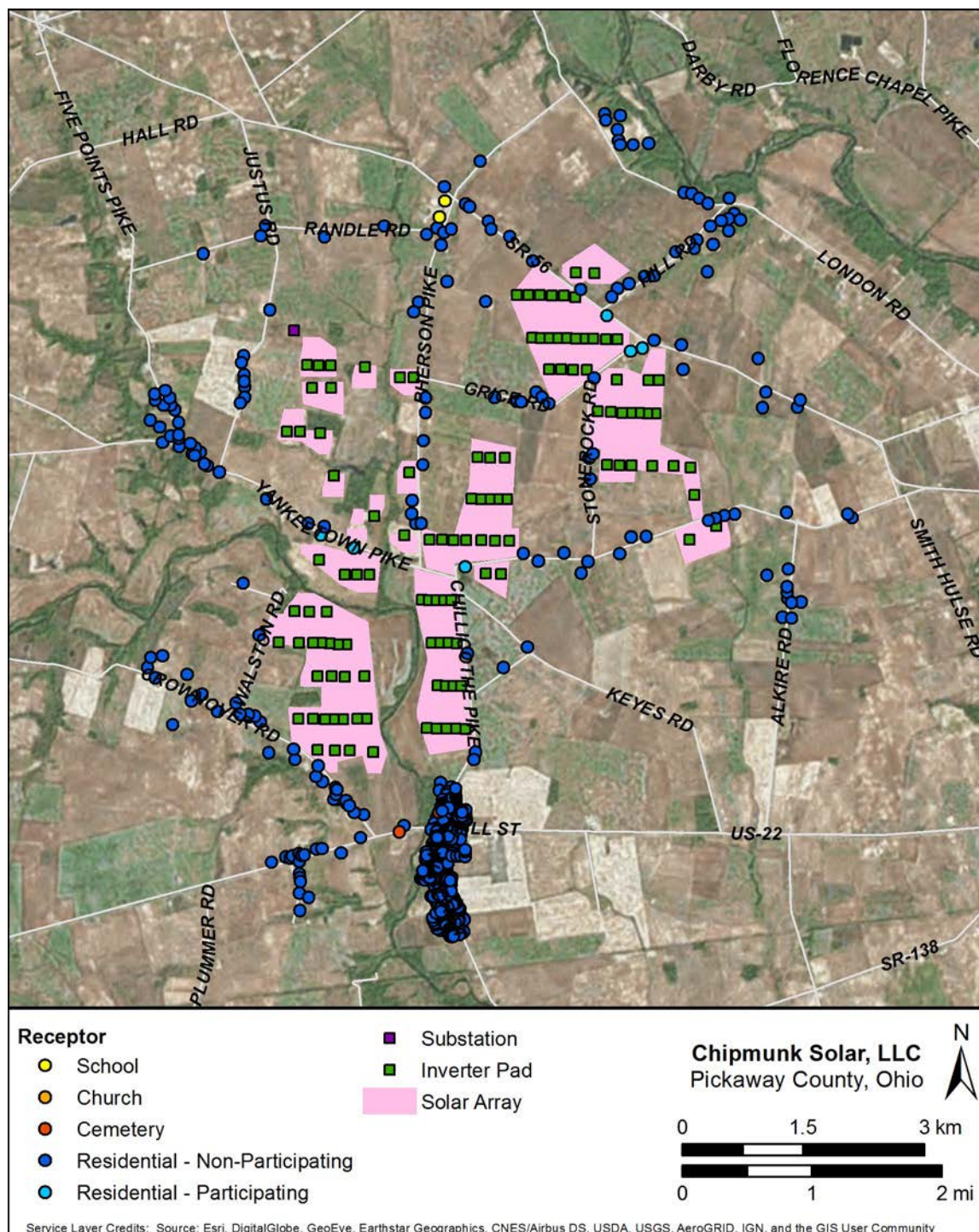


FIGURE 1: FACILITY AREA MAP

3.0 APPLICABLE SOUND LEVEL LIMITS

State noise policy applicable to this Facility can be found in Ohio Administrative Code (“OAC”) Chapter 4906-4 Section 8(A), which is reproduced below. This Section requires that information on noise be provided including:

- Projected sound levels at the nearest property boundary due to construction;
- Projected sound levels at the nearest property boundary due to operation;
- Descriptions of mitigation measures; and
- A preconstruction background sound level study.

The OAC provides a specific sound level limit for wind power projects but does not provide sound level limits for solar power projects. This assessment applies the wind power project operational sound level limit to the solar Facility. The design threshold used in this assessment for non-participating sensitive receptors is the measured ambient sound level plus 5 dB for both daytime and nighttime periods. That is, the design threshold during the daytime is the measured daytime ambient sound level plus 5 dB, and the nighttime design threshold is the measured nighttime ambient sound level plus 5 dB.

Based on background sound monitoring conducted at four locations throughout the Facility Area (see Section 4.0), the average existing daytime and nighttime equivalent continuous sound levels (L_{eq}) are 41 dBA and 36 dBA, respectively. This sets the daytime design threshold at 46 dBA and the nighttime design threshold at 41 dBA.

4.0 SOUND LEVEL MONITORING

4.1 PROCEDURES

Background sound levels were measured at four locations around the Facility area. A map showing all four monitor locations is provided in Figure 2. Continuous monitoring was conducted over a week period from August 4 through August 11, 2021.

Equipment

Sound levels were measured using ANSI/IEC Class 1 sound level meters, including Cesva SC310 and Svantek 979. All meters logged A-weighted and 1/3 octave band equivalent continuous sound levels once each second continuously through the monitoring period. Audio recordings were made at each location to aid in source identification and soundscape characterization. The Svantek 979 meters include internal recording devices, while the Cesva SC310 meters were attached to an external audio recorder (Roland R-05 or R-09HR).

Each sound level meter's microphone was mounted on a wooden stake at a height of approximately 1.5 meters (5 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 an ONSET anemometer which recorded average wind speed and wind gust speed data once per minute and was installed at microphone height (1.5 meters). Other meteorological data was taken from the National Weather Service ASOS station in Chillicothe, OH (RZT).

Data Processing

Following the collection of the meters, data was downloaded, processed, and summarized into 10-minute, overall day, overall night, and full monitoring-period length durations. For each 10-minute period, equivalent average (L_{eq}), upper 10th percentile (L_{10}), median (L_{50}), and lower 10th percentile (L_{90}) sound levels were also calculated.

During analysis, sound level data was removed from the dataset to maintain the integrity of the background sound levels during the periods that would cause false sound level readings or artificially high levels. These periods include:

- Wind speeds above 5 m/s (11 mph);
- Precipitation and thunderstorm events;
- Anomalous events; or

- Equipment interactions by RSG staff, other people, or animals.

Precipitation events were obtained from nearby airport data and were corroborated through both analysis of sound level spectrograms and from the audio recordings. There were brief periods of rain on August 7 and 9.

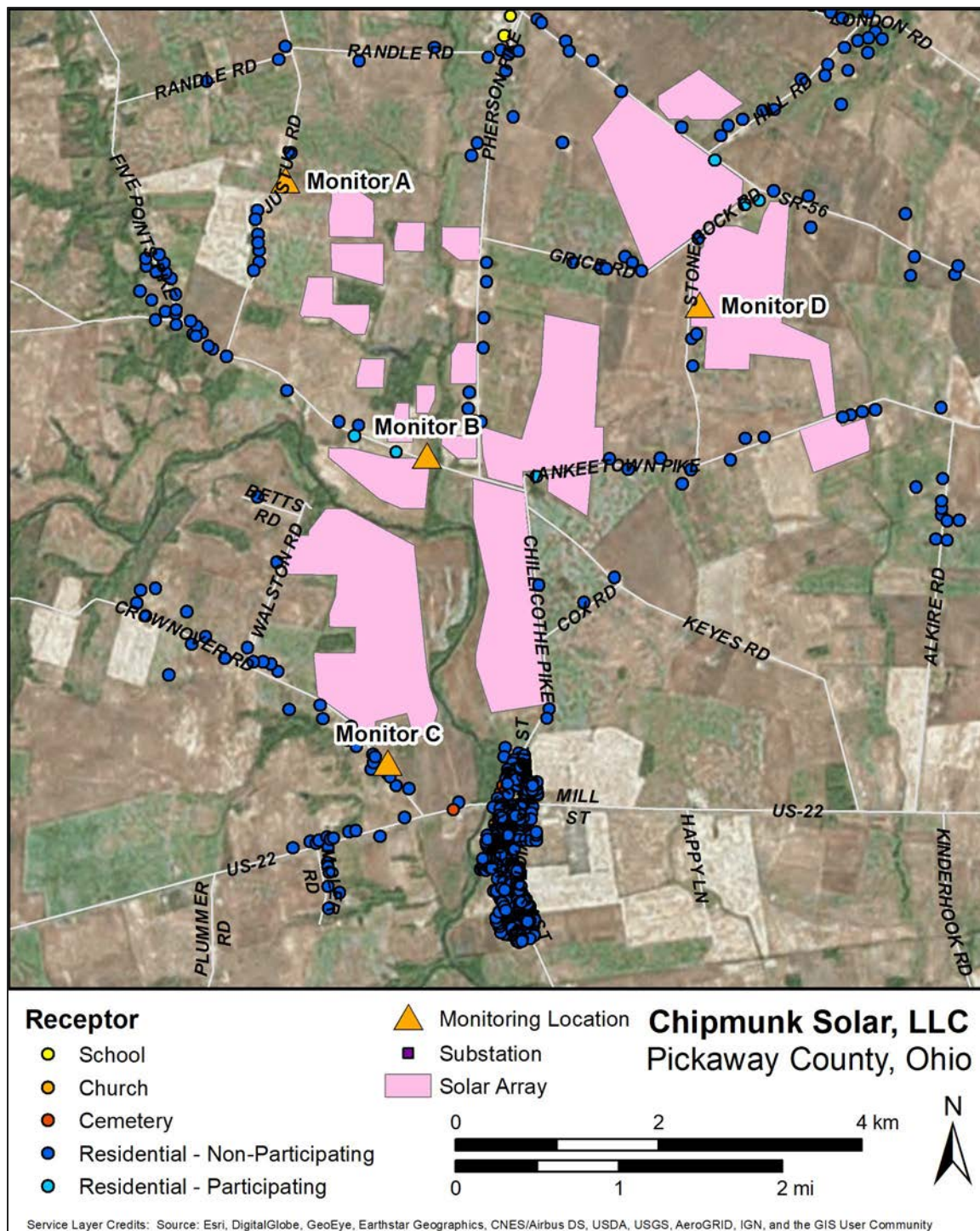


FIGURE 2: MAP OF MONITOR LOCATIONS

Location Descriptions

Monitor A

Monitor A was located at a residential setback along Justus Road, about 290 meters (950 feet) south of the residence located at 20366 Justus Road and about 350 meters (1,150 feet) west of the center of the proposed substation location. The monitor was setback approximately 25 meters (80 feet) east of Justus Road and measured a soundscape that is representative of residences on the northwestern side of the Facility area. A map and photograph of the monitor location is shown in Figure 3.

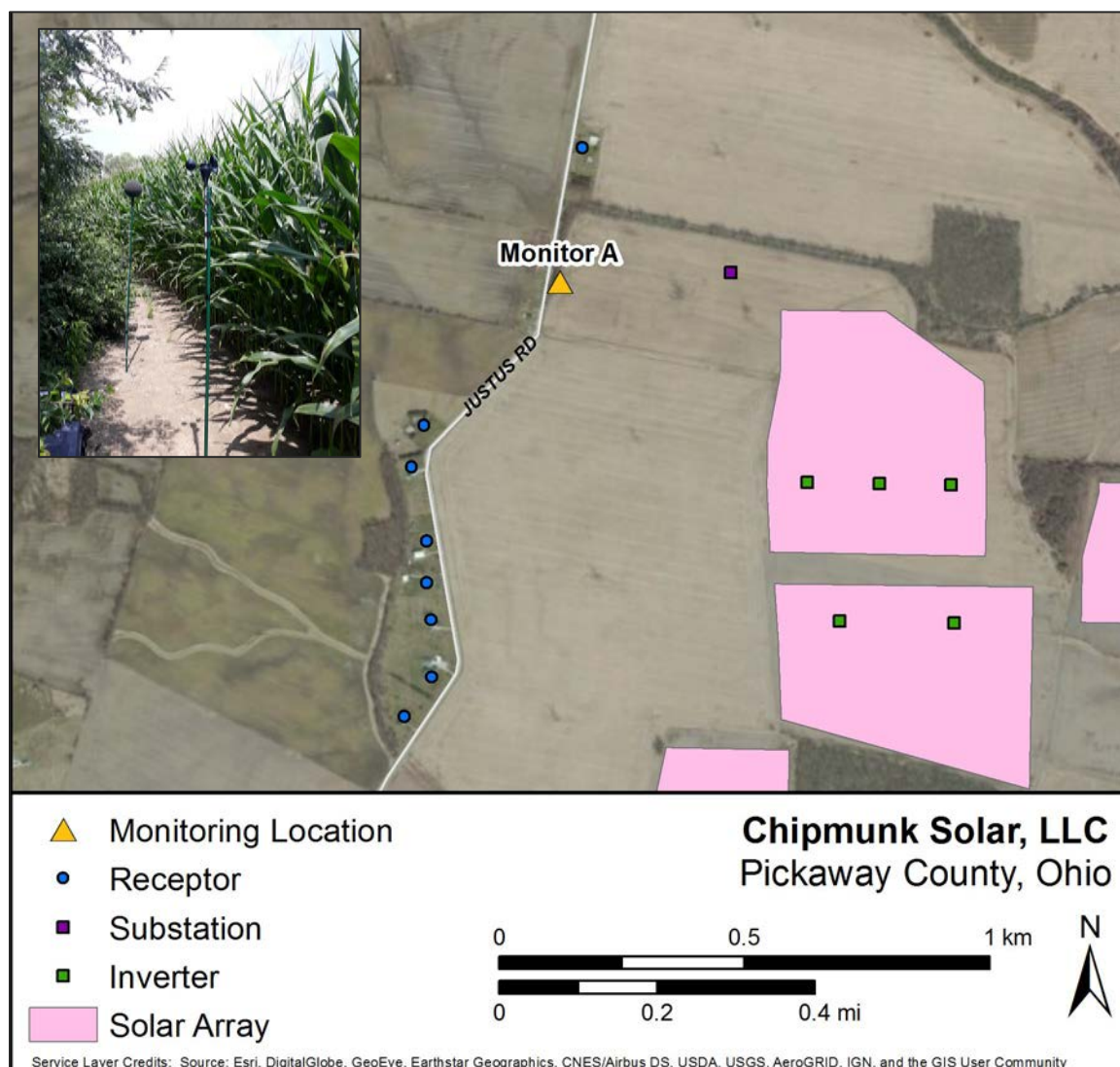


FIGURE 3: MAP AND PHOTOGRAPH OF MONITOR A LOCATION

Monitor B

Monitor B was in the western portion of the Facility area, at a residential setback along Yankeetown Pike. The meter was placed about 310 meters (1,020 feet) east of the residence located at 9627 Yankeetown Pike and setback approximately 35 meters (115 feet) north of the roadway. This monitor measured a soundscape that is representative of residences on the western side of the Facility area. A map and photograph of the monitor location is shown in Figure 4.

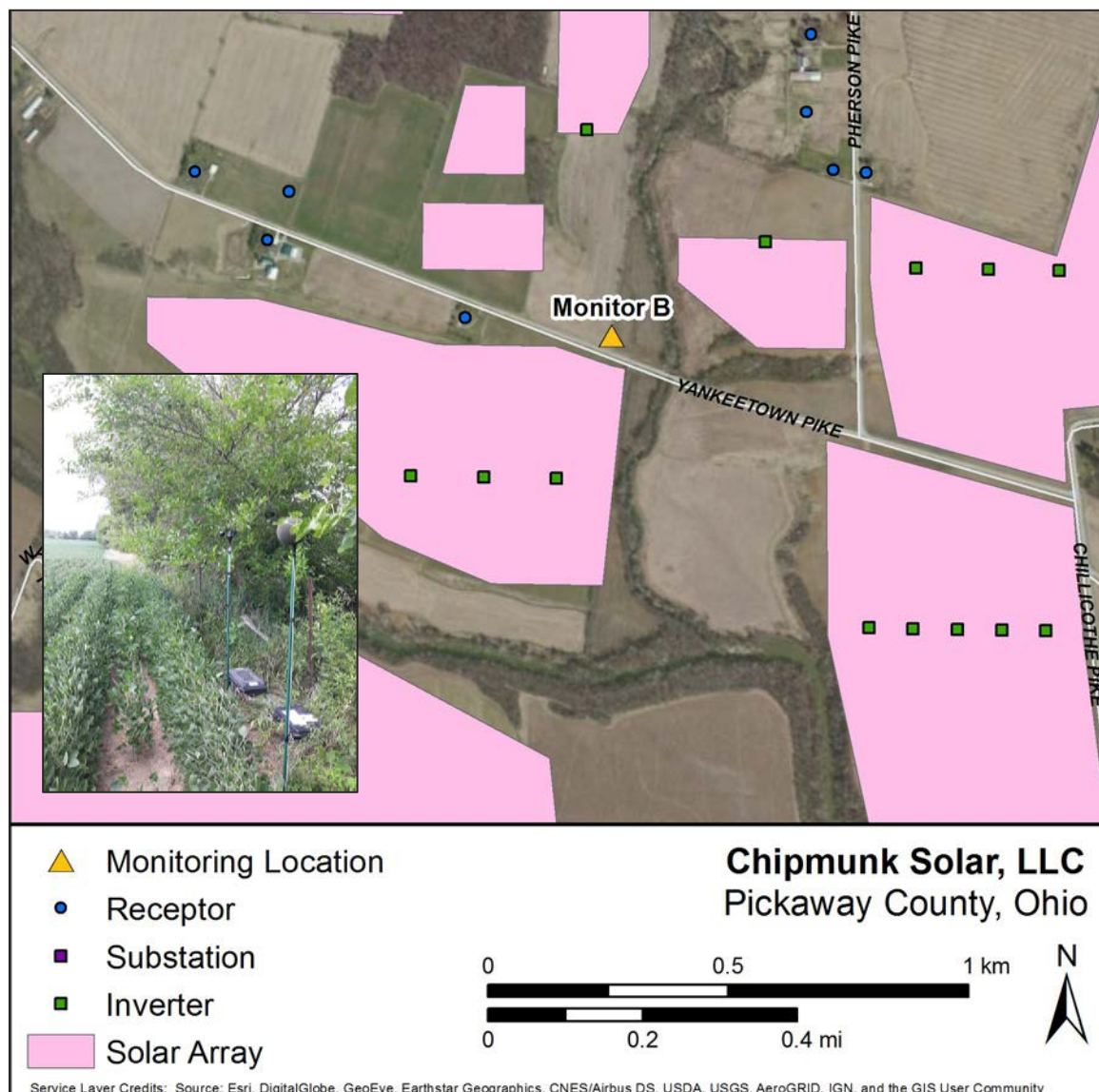


FIGURE 4: MAP AND PHOTOGRAPH OF MONITOR B LOCATION

Monitor C

Monitor C was in the southwestern portion of the Facility area, about 1,130 meters (3,700 feet) northeast of Williamsport. The monitor was located across Williamsport Crownover Mill Road from several residences. The monitor was setback approximately 45 meters (145 feet) east of Williamsport Crownover Mill Road. This monitor is representative of residences on the southwestern side of the Facility area. A map and photograph of the monitor location is shown in Figure 5.

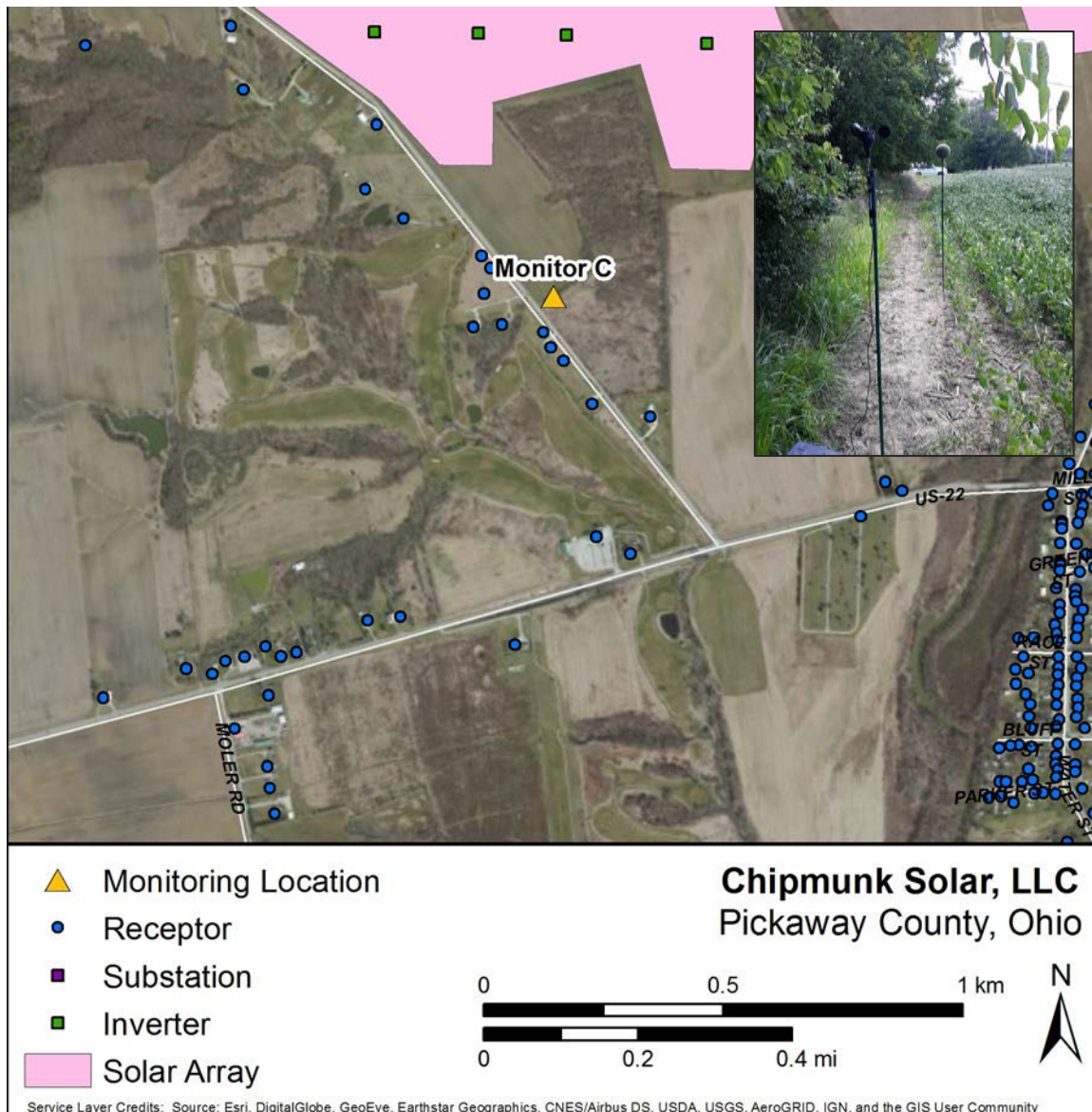


FIGURE 5: MAP AND PHOTOGRAPH OF MONITOR C LOCATION

Monitor D

Monitor D was located at a residential setback along Stonerock Road in the northern portion of the Facility area. The monitor was located about 280 meters (920 feet) north of the residence at 21246 Stonerock Road and setback approximately 100 meters (305 feet) east of Stonerock Road. The monitor measured a soundscape that is representative of residences on the northern side of the Facility area. A map and photograph of the monitor location is shown in Figure 6.

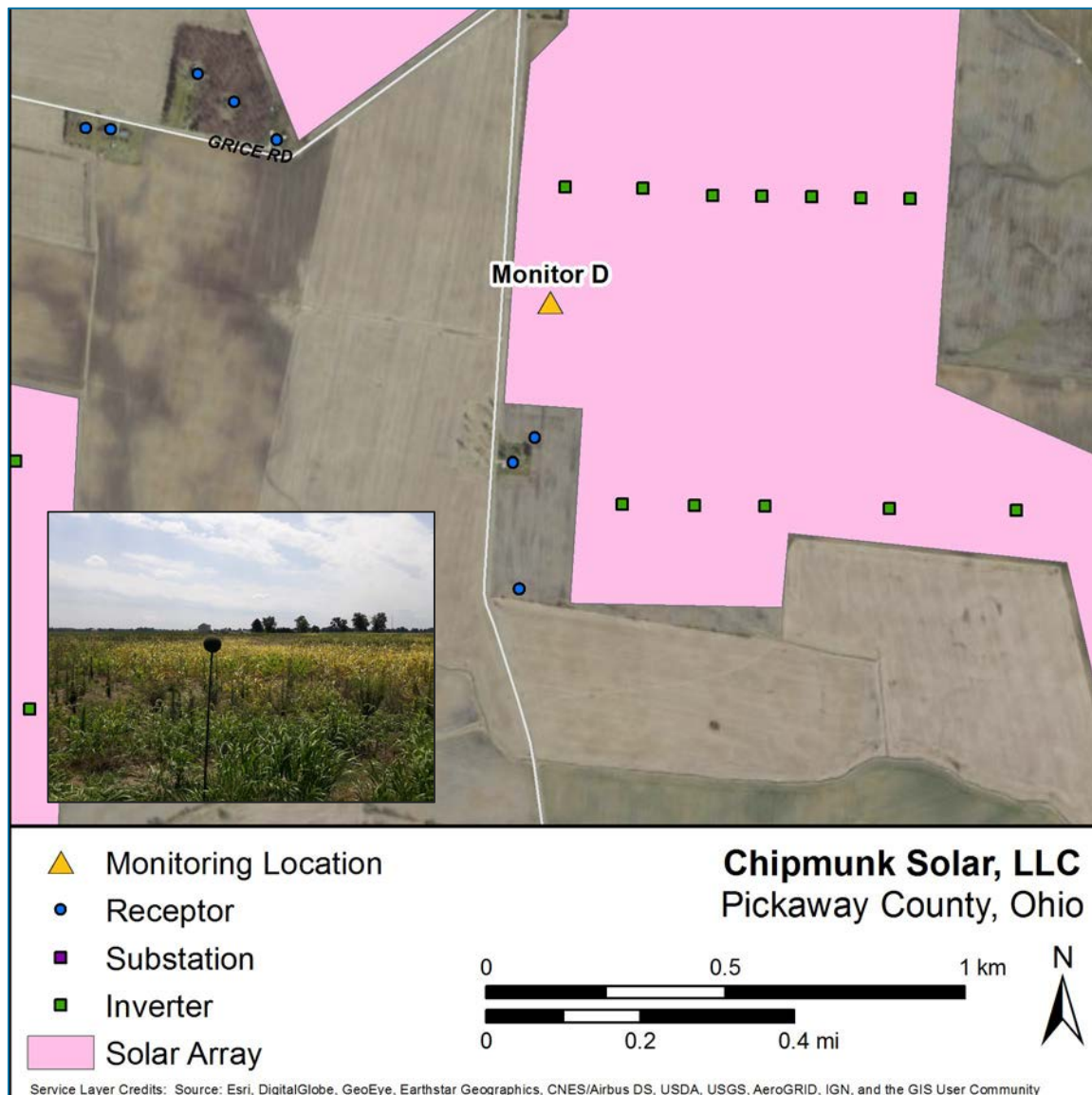


FIGURE 6: MAP AND PHOTOGRAPH OF MONITOR D LOCATION

4.2 BACKGROUND SOUND LEVEL SUMMARY

An overall summary of the monitor results is provided in this Section, followed by time-history graphs for each monitor in Section 4.3. Sound levels for each location are summarized into daytime, nighttime, and entire period levels in Table 1. It includes equivalent continuous average (L_{eq}), upper 10th percentile (L_{10}), median (L_{50}), and lower 10th percentile (L_{90}) sound levels. The nighttime L_{eq} across the Facility area is 36 dBA, and the daytime L_{eq} across the Facility area is 41 dBA. As discussed in Section 3.0, this sets the nighttime design threshold for nonparticipating sensitive receptors at 41 dBA and the daytime design threshold for nonparticipating sensitive receptors at 46 dBA.

TABLE 1: SUMMARY OF BACKGROUND SOUND LEVELS¹

Site	Sound Pressure Level (dBA)			
	L_{eq}	L_{90}	L_{50}	L_{10}
Overall				
A	37	17	24	35
B	44	17	27	44
C	44	24	32	43
D	34	17	25	34
Day				
A	38	20	27	37
B	46	22	30	46
C	45	29	35	45
D	35	20	27	35
Daytime Average	41			
Daytime Threshold	46			
Night				
A	33	16	21	28
B	42	16	20	37
C	39	21	27	39
D	31	16	21	29
Nighttime Average	36			
Nighttime Threshold	41			

¹ High frequency biogenic sound was filtered out of the data during periods where it was present using an ANS weighting (defined in ANSI S12.100, "Methods to Define and Measure the Residual Sound in Protected Natural and Quiet Residential Areas") which simply discounts sound levels above the 1 kHz 1/1st octave band, the frequency range in which the biogenic sounds occur.

4.3 MONITOR RESULTS BY LOCATION

For display purposes, the one-second data that was collected is displayed in 10-minute summarized values in the time history-graphs to show overall trends. Sound levels are plotted along with wind speed to show relating trends. Time periods during which data was removed for the sound level summary presented in Section 4.2 are indicated with color-coded markers. Sound level data during periods when the entire 10-minute interval was excluded for wind, rain, or anomalies are still present in these graphs as lighter colors, with the darker colors representing 10-minute intervals where there were no data exclusions or only partial data exclusions.² The duration of each time history graph is one week, and each graph exhibits day/night shading where night is defined as 22:00 to 7:00 and shaded grey.

² For some 10-minute periods, shorter durations within the 10-minutes are excluded due to wind, rain, or anomalies, but the rest of the 10-minute interval is still used in the summary. These periods are shown in the darker colors (Leq and L90) as only some of the 10-minute period was excluded.

Monitor A

Background sound level monitoring results for Monitor A are shown in Figure 7. The primary background sound sources include geophonic and biogenic sounds such as wind passing over foliage, birds and insects, and occasional local traffic and aircraft. Insect sounds resulted in elevated nighttime sound levels. High frequency biogenic sound was filtered out of the data during periods where it was present¹ for the determination the background sound levels summarized in Table 1. Periods of high winds and brief periods of rain were removed from the data.

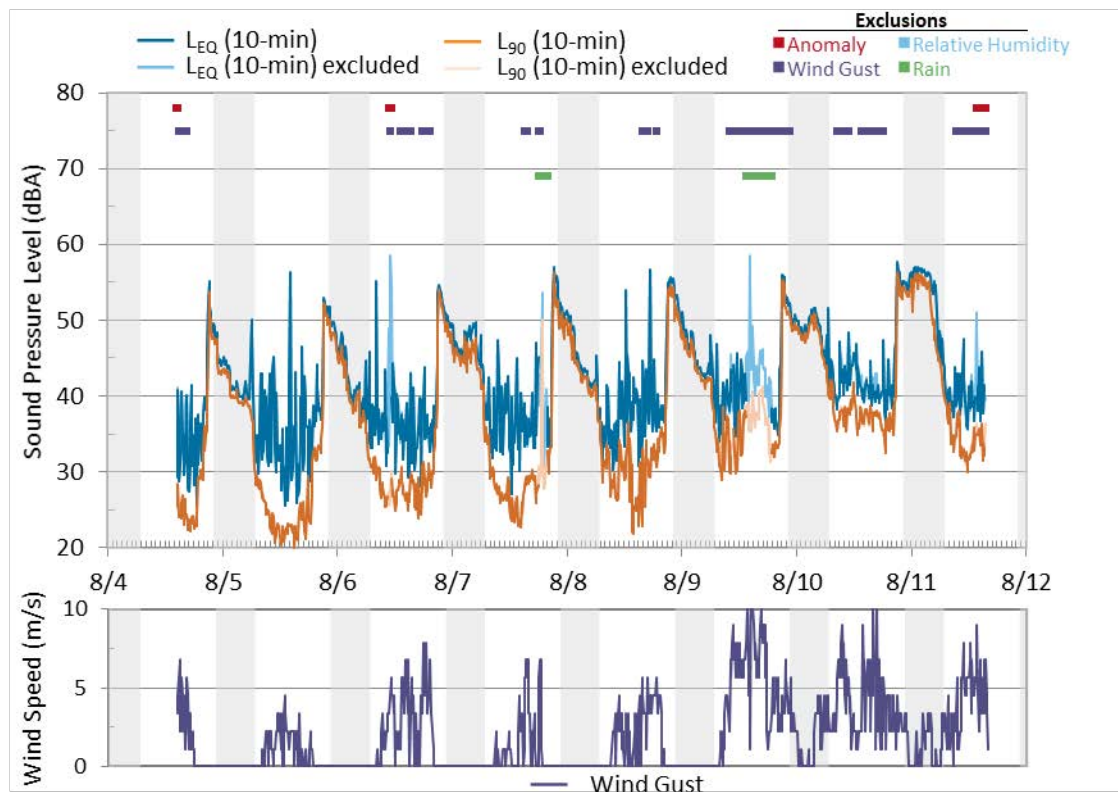


FIGURE 7: SOUND PRESSURE LEVELS OVER TIME - MONITOR A, AUGUST 4 TO 11, 2021

Monitor B

Background sound level monitoring results for Monitor B are shown in Figure 8. Background sound levels included geophonic and biogenic sounds and occasional local traffic and aircraft. Again, high frequency biogenic sound was filtered out of the data during periods where it was present for the determination the background sound levels. Periods of high winds and brief periods of rain were removed from the data.

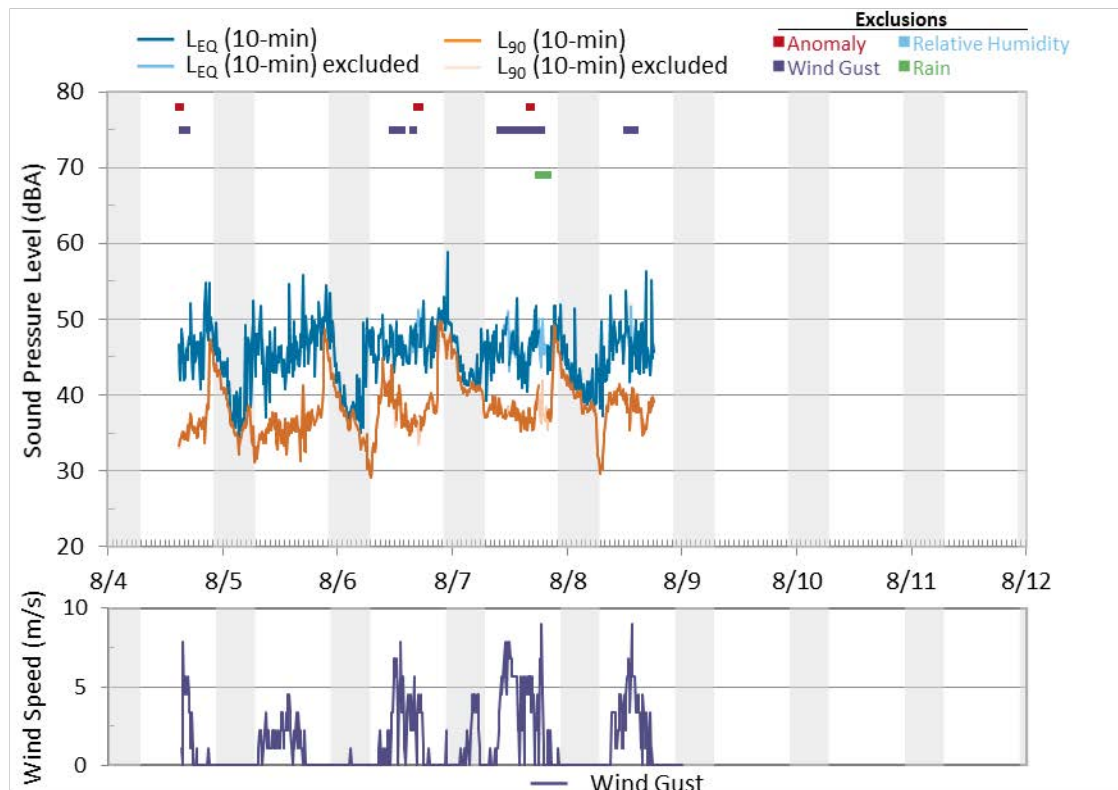


FIGURE 8: SOUND PRESSURE LEVELS OVER TIME - MONITOR B, AUGUST 4 TO 9, 2021

Monitor C

Background sound level monitoring results for Monitor C are shown in Figure 9. Background sound levels were generated primarily by local traffic, distant traffic along US-22, geophonic and biogenic sounds and occasional aircraft. Again, high frequency biogenic sound was filtered out of the data during periods where it was present for the determination the background sound levels. Periods that included the operation of lawn equipment in close proximity of the sound level meter, periods of high winds and brief periods of rain were removed from the data.

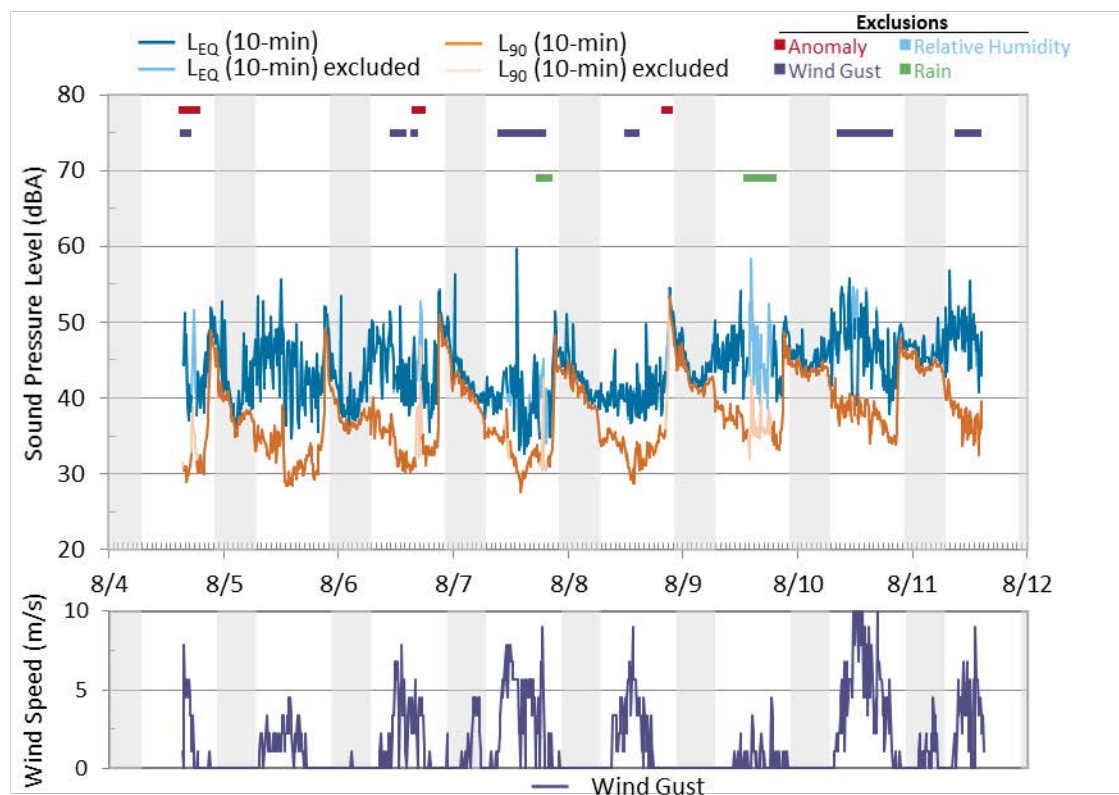


FIGURE 9: SOUND PRESSURE LEVELS OVER TIME - MONITOR C, AUGUST 4 TO 11, 2021

Monitor D

Background sound level monitoring results for Monitor D are shown in Figure 10. The primary background sound sources include geophonic and biogenic sounds such as wind passing over foliage, birds and insects, and occasional local traffic and aircraft. Insect sounds resulted in elevated nighttime sound levels. High frequency biogenic sound was filtered out of the data during periods where it was present for the determination the background sound levels. Periods of high winds and brief periods of rain were removed from the data.

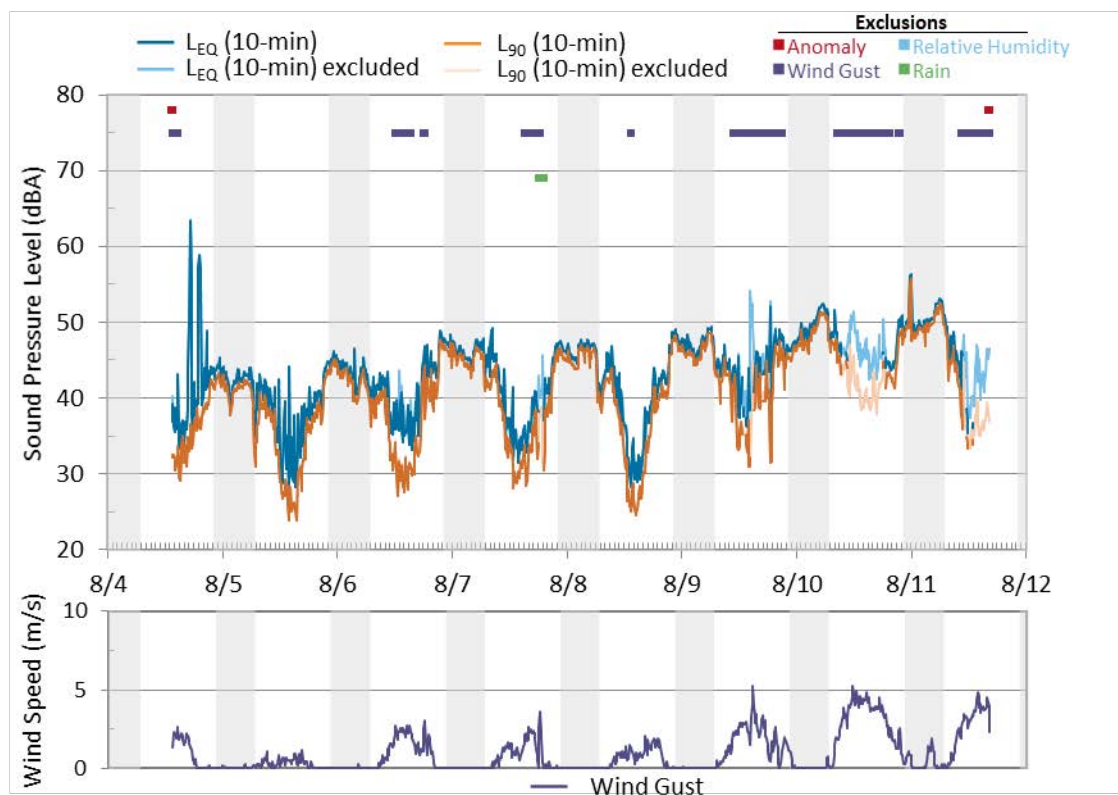


FIGURE 10: SOUND PRESSURE LEVELS OVER TIME - MONITOR D, AUGUST 4 TO 11, 2021

5.0 SOUND PROPAGATION MODELING

5.1 PROCEDURES

ISO 9613-2 & CadnaA

Modeling for the 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 also assumes downwind sound propagation between every source and every receiver, 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.

Model Inputs and Assumptions

The study area was modeled with half hard and half porous ground at the substation ($G=0.6$) and porous ground ($G=1.0$) throughout the remainder of the study area. A temperature of 10 degrees Celsius with 70 percent relative humidity was used.

A total of 575 discrete receivers were placed at residences, churches, cemeteries, and schools surrounding the Facility Area at a height of 4 meters (13 feet) above ground level. In addition, a grid of receivers spaced 20 meters by 20 meters was setup at a height of 1.5 meters above ground covering approximately 147 sq. km. (57 sq. mi.) around the Facility Area.

Modeled equipment includes the following:

- **Array Inverter Skids** – There are 120 inverter skids scattered throughout the Facility. Each skid includes an inverter and a medium voltage transformer (MVT). These convert the DC electricity generated by the solar panels to low-voltage AC power to medium-voltage AC power for transmission to the substation. Each inverter is modeled with a sound power level of 91 dBA. Each MVT is modeled with a sound power level of 81 dBA. The combined sound power level for each skid is 91 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 daytime and nighttime hours.
- **Substation Transformer** – There will be three substation transformers which step up the medium voltage AC power to the high voltage of the transmission line. Each substation transformer is modeled with a sound power of 96 dBA with cooling fans on and 92 dBA with cooling fans off. The fans typically will operate only during daylight.
- **Tracking Motors** – There will be 10,680 tracking motors, which tilt the solar panels to follow the sun. One tracking motor is located on each row of panel modules. 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_{eq} levels that are about 11 dB lower than the maximum sound level during operation. These have a sound power level of 67 dBA L_{eq} .

All equipment were modeled at the manufacturer's published maximum broadband sound power levels. For modeling purposes, octave band data were estimated based on RSG measurements of similar equipment or published spectra.

Results calculated with these parameters are used to model the average sound level during the following scenarios:

- 1) **Daytime** – This assumes the Facility is generating its nameplate capacity. All equipment is producing maximum sound emissions and transformer cooling fans are operating.
- 2) **Nighttime** – This assumes that the Facility is not producing any energy. Inverters are operating for VAR control, but tracking motors are not operating. Transformers are energized, but the substation transformer cooling fans are off.

The sources operating under each scenario are shown in Table 2. The highest sound levels occur during the daytime scenario, as all equipment would be operating at their maximum sound output at the same time.

TABLE 2: EQUIPMENT OPERATION SCENARIOS

Sound Source	Operation Scenario	
	Daytime	Nighttime
Inverter Skids (Inverters & MVT)	y	y
Tracking Motors	y	n
Substation Transformer with Fans	y	n
Substation Transformer without Fans	n	y

Model input parameters are listed in Appendix B including the modeled sound power spectra for each source.

5.2 MODEL RESULTS

A summary of the sound propagation model results is provided in Table 3, and Appendix C provides a list of the calculated overall sound pressure levels at each discrete receiver. As shown in Table 3, all residences are projected at 38 dBA or less during the daytime and nighttime, which is below the nighttime Facility daytime and nighttime design thresholds of 46 and 41 dBA, respectively.

TABLE 3: SUMMARY OF MODELED SOUND PRESSURE LEVELS (dBA)

Receptor Type	Daytime Sound Level – Leq (dBA)			Nighttime Sound Level – Leq (dBA)		
	Min.	Max.	Avg.	Min.	Max.	Avg.
Non-Participating Residences	13	38	20	11	38	18
Participating Residences	30	35	33	28	33	31
Schools (2)	19	21	na	17	18	na
Churches (2)	16	20	na	14	18	na
Cemeteries (3)	22	23	22	19	21	20
Worst-Case Non-Participating Property Boundary		45			44	

The highest sound level of 38 dBA during the day and at night would be experienced at Receptor ID-32. This residence is located in the northern portion of the Facility area and is about 110 meters (360 feet) from the nearest inverter. The modeled sound level at Receptor ID-32 is due primarily to the adjacent inverters. Sound levels at this location are lower at night without operation of the trackers but the difference is less than 1 dB. The closest receptor to the Facility substation (ID-6) is modeled to have a daytime sound level of 37 dBA with the operation of the transformer cooling fans and a nighttime sound level of 33 dBA without the cooling fans. A map of projected sound levels throughout the Facility Area is provided in Figure 11 for the daytime scenario and Figure 12 for the nighttime scenario.

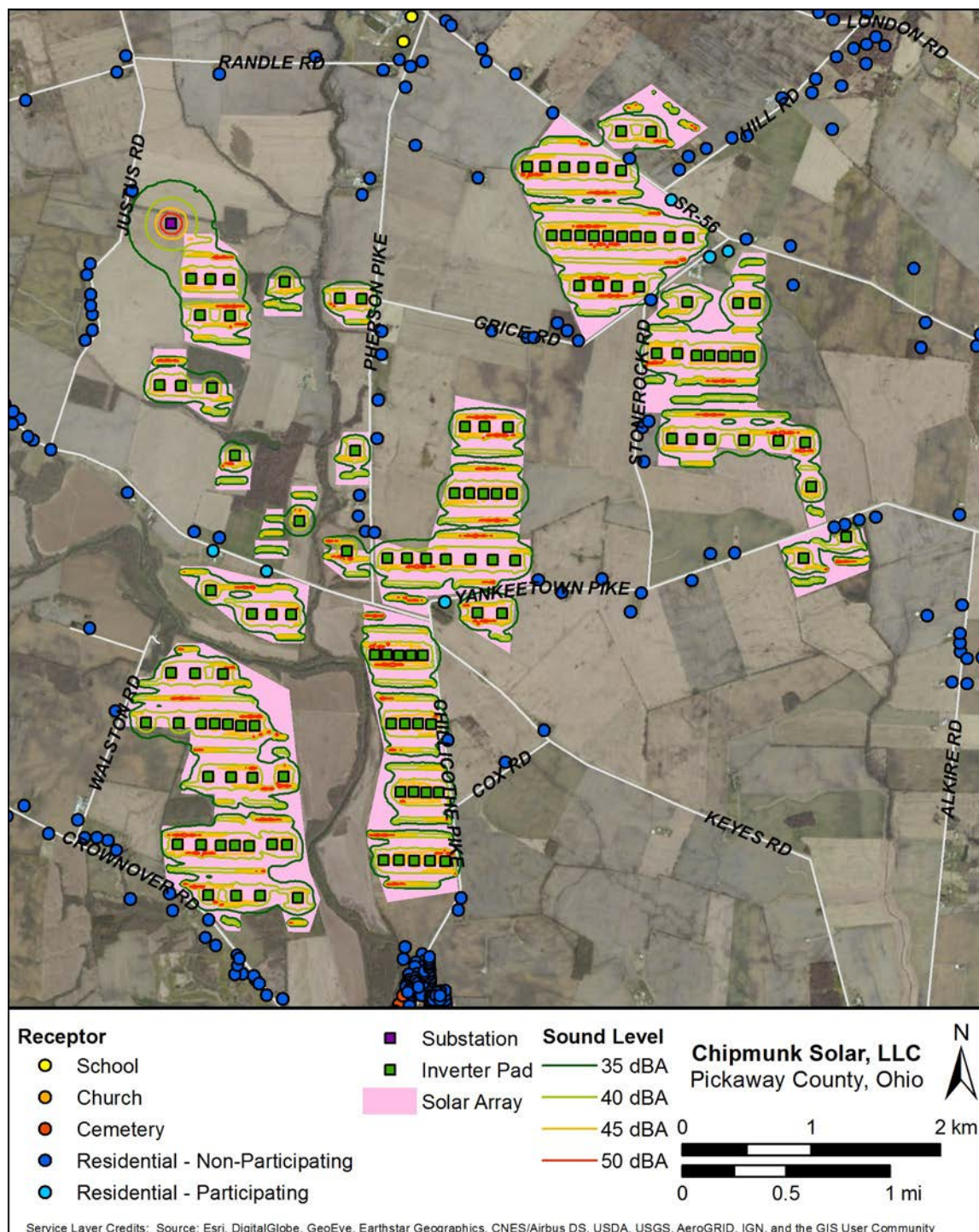


FIGURE 11: SOUND PROPAGATION MODEL RESULTS, DAYTIME

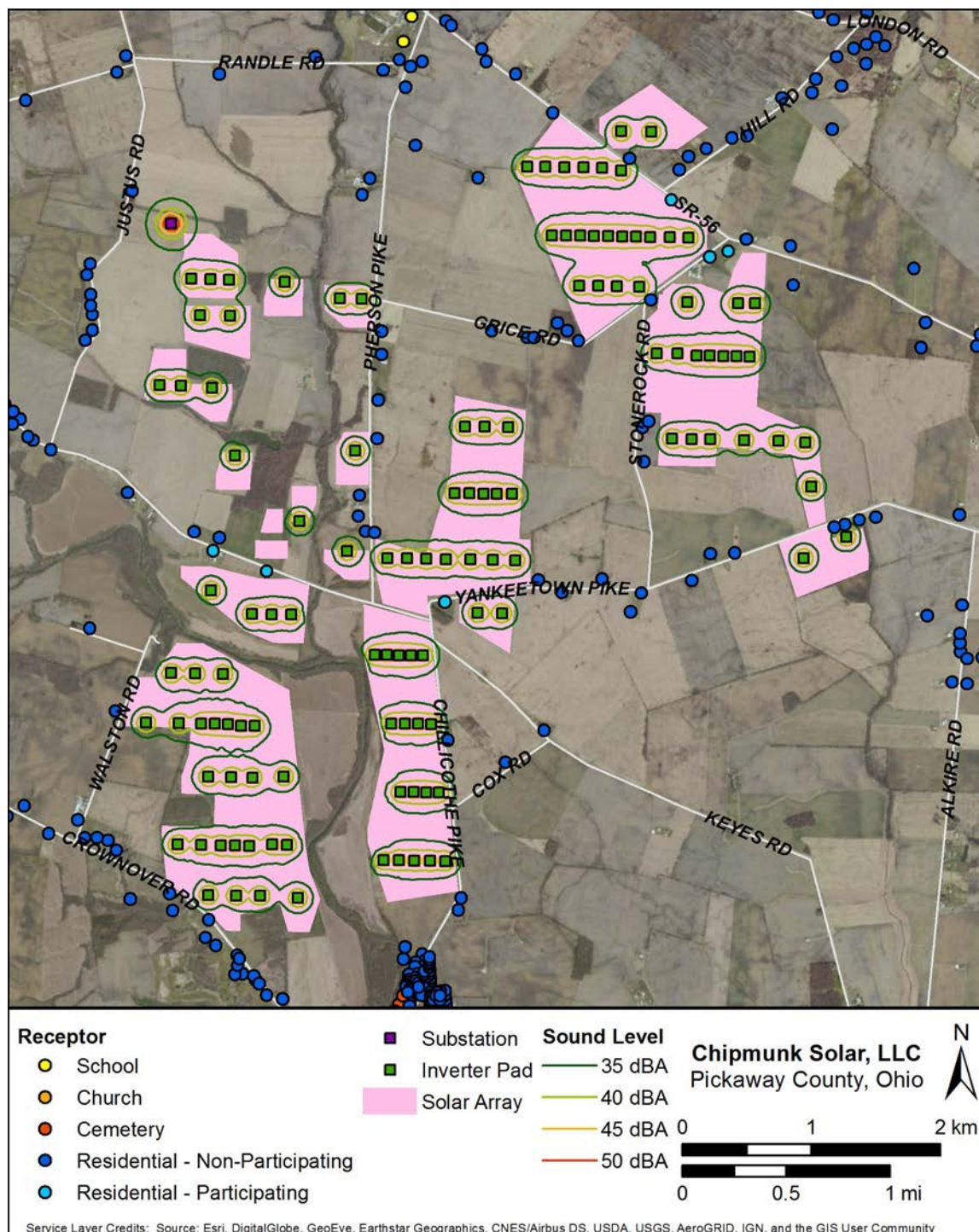


FIGURE 12: SOUND PROPAGATION MODEL RESULTS, NIGHTTIME

6.0 CONSTRUCTION NOISE

Construction activities include road construction, substation construction, trenching, inverter installation, piling and racking. In any given area, construction will be relatively short in duration, particularly for road construction, trenching, piling, and racking. Construction of substations typically lasts longer than these other activities. Road construction would take place within and adjacent to the solar arrays. Trenching would take place along the underground collection line routes. Inverter installation would take place at each inverter pad location. Piling and racking will take place throughout the solar arrays.

Equipment used for each activity will vary. Representative pieces of equipment⁴ are shown in Table 4 along with the approximate maximum average sound pressure levels at 15 meters (50 feet) and 90 meters (300 feet), the closest distance between a non-participating residence and a solar array where racking and piling will take place.

⁴ Sound source information was obtained from Project 25-49 Data, National Cooperative Highway Research Program, October 2018. For the pile driving equipment, noise data for a representative solar array post driver was used.

TABLE 4: SOUND LEVELS FROM CONSTRUCTION EQUIPMENT ASSUMING NO ATTENUATION FROM TREES OR TERRAIN

Equipment	Sound Pressure Level at 90 meters (300 feet) (dBA) ⁵	Sound Pressure Level at 15 meters (50 feet) (dBA)
Excavator	60	76
Dozer	64	80
Grader	63	79
Roller	66	82
Dump Truck	66	82
Concrete Mixing Truck	65	81
Concrete Pumper Truck	68	84
Flatbed Truck	58	74
Crane	58	74
Trencher	64	80
Plate Compactor	59	75
Forklift	72	88
Small Pile Driver	68	84
HDD	71	87
Skid Steer	63	79

⁵ Assumes hard ground around construction site, and ISO 9613-2 propagation with no vegetation reduction. Actual sound levels will likely be lower given the prevalence of vegetation and soft ground around the site.

7.0 CONCLUSIONS

RSG conducted a sound level assessment of the Facility that included background sound level monitoring of the existing environment in and around the Facility area and sound propagation modeling to predict operational sound levels at nearby residences.

Summary and conclusions are as follows:

1. Sound sources in the existing soundscape include agricultural activities, traffic noise, aircraft overflights, and biogenic and geophonic sounds.
 - a. The average daytime background L_{eq} across the Facility area was 41 dBA.
 - b. The average nighttime background L_{eq} across the Facility area was 36 dBA.
2. Based on OPSB precedents, a Facility design threshold of 5 dB above existing L_{eq} was established, creating a daytime goal of 46 dBA and a nighttime goal of 41 dBA for non-participating residences. All residences were assumed to be non-participating.
3. While the Facility transformers are typically the only sources that operate at night from a solar project, there may be times that the inverters for this Facility will operate at night for VAR control. As such, this assessment conservatively assumed:
 - a. Daytime – The Facility is generating its nameplate capacity. All equipment is producing maximum sound emissions and transformer cooling fans are operating.
 - b. Nighttime – The Facility is not producing any energy. Inverters are operating for VAR control, but tracking motors are not operating. Transformers are energized, but the substation transformer cooling fans are off.
4. Sound propagation modeling was conducted in accordance with ISO 9613-2 at 614 receptors throughout the Facility area.
5. Model results are summarized in Section 5.2, and provided in tabular format in Appendix C. All non-participating receptors are 38 dBA or less during the daytime and nighttime, meeting the daytime and nighttime design thresholds.
6. Sound levels due to construction are summarized in 6.0.

APPENDIX A. 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”).⁶ 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 13.

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.

⁶ 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.

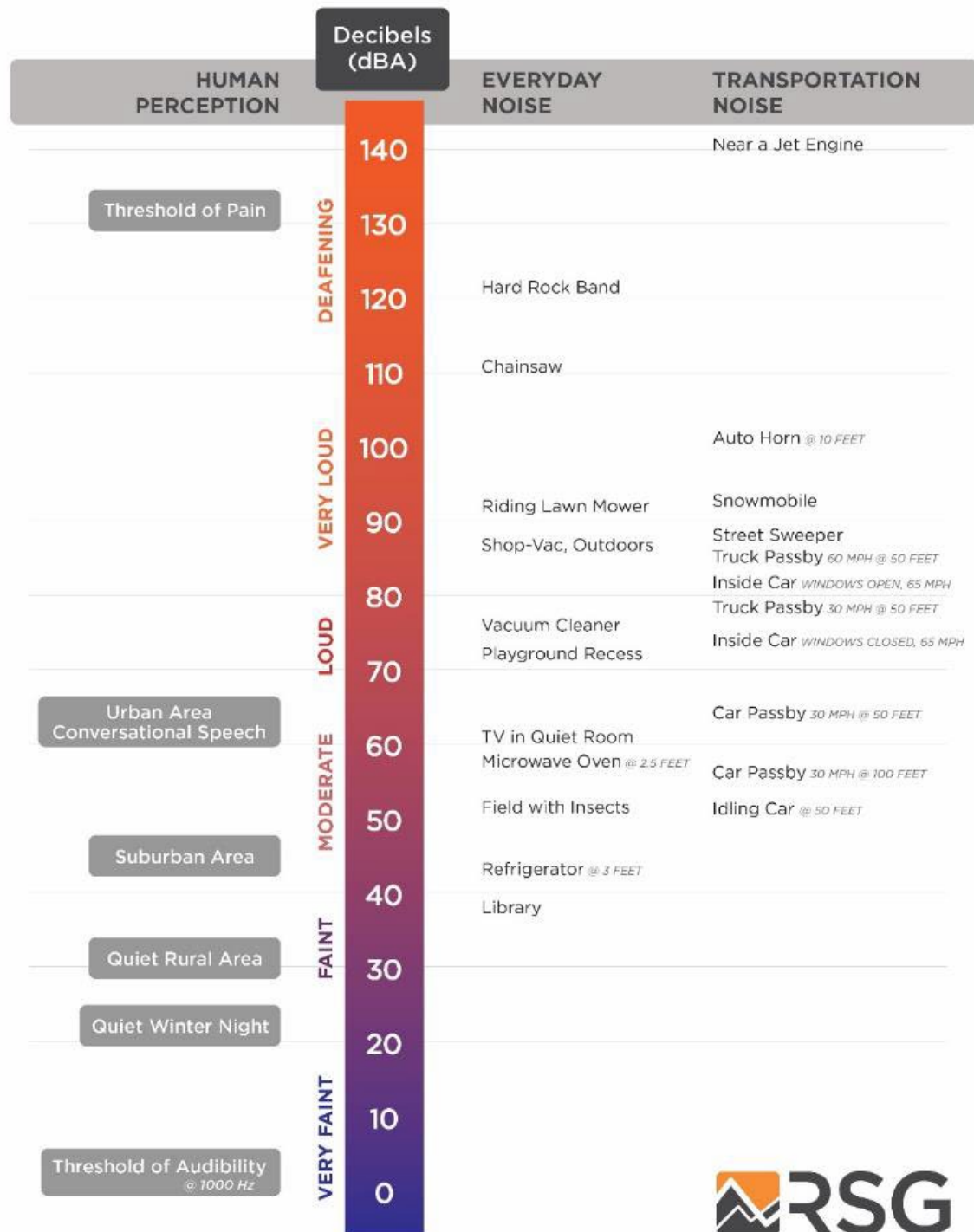


FIGURE 13: A SCALE OF SOUND PRESSURE LEVELS FOR TYPICAL SOUND SOURCES

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. 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.⁷ 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_{EQmax}.

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 14. 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 figure). The simplest descriptor is the average sound level, known as the Equivalent Continuous

⁷ 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.

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.

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 14, 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.

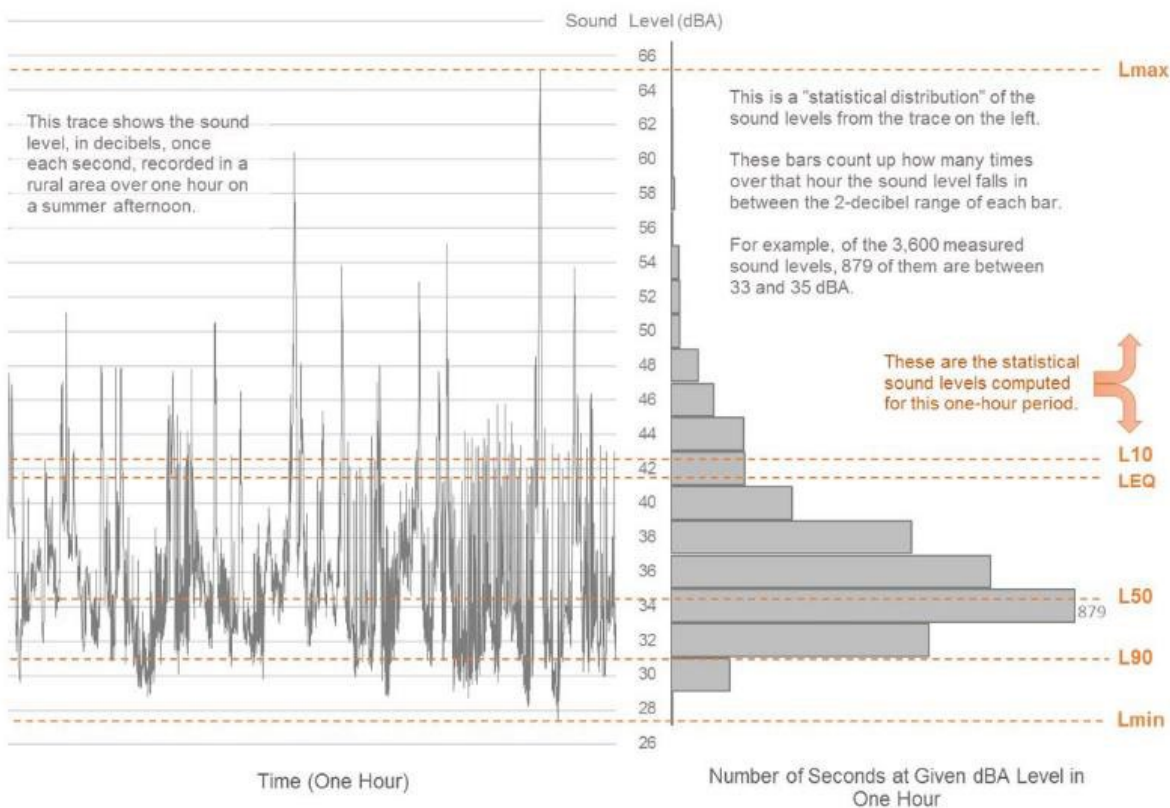


FIGURE 14: EXAMPLE OF DESCRIPTIVE TERMS OF SOUND MEASUREMENT OVER TIME

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 L_{50} , and half the time it is quieter than L_{50} . Note that L_{50} (median) and L_{EQ} (mean) are not always the same, for reasons described in the previous section.

L_{90} is often a good representation of the “ambient sound” in an area. This 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 B. MODEL INPUT DATA

TABLE 5: MODEL PARAMETER SETTINGS

Model Parameter	Setting
Atmospheric Absorption	Based on 10°C and 70% RH
Foliage	No Foliage Attenuation
Ground Absorption	ISO 9613-2 spectral, G=0 on concrete equipment pads, G=0.6 at substation, and G=1 elsewhere
Receiver Height	1.5 meters for sound level isolines and 4.0 meters discrete receptors
Search Radius	8,000 meters from each source

TABLE 6: MODELED SOUND POWER SPECTRA, dBZ UNLESS OTHERWISE NOTED

Source	1/1 Octave Band Sound Power (dBZ)									Sum (dBA)	Sum (dBZ)	Reference
	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz			
Substation Transformer ONAN ⁸	29	46	82	89	94	79	68	62	50	92	96	NEMA TR-1 SPL & RSG measured representative spectrum
Substation Transformer ONAF ⁸	52	61	87	93	98	88	83	77	68	96	100	NEMA TR-1 SPL & RSG measured representative spectrum
Inverter	81	86	87	86	88	82	79	86	83	91	94	Test Report
MVT	46	46	46	46	46	46	46	46	46	66	74	Test Report
Tracker					70					67	70	Calculated based on test report ⁹

⁸ ONAN – Oil Natural Air Natural (Fans off), ONAF – Oil Natural Air Forced (Fans On)

⁹ The representative test report used to define sound levels for the trackers indicated a sound pressure level of 74.5 dB at 0.3 meters and 69.6 dB at 1 meter under 100% load.

TABLE 7: SOURCE INPUT DATA

Source	Modeled Sound Power Level (dBA)		Relative Height (m)	Coordinates UTM NAD83 Z17N		Absolute Elevation (m)
	Day	Night		X (m)	Y (m)	
Sub Transformer	96.1	91.8	3.0	316181	4390059	242
Sub Transformer	96.1	91.8	3.0	316163	4390064	242
Sub Transformer	96.1	91.8	3.0	316198	4390057	242
Inverter Skid	90.8	90.8	1.75	317173	4387755	232
Inverter Skid	90.8	90.8	1.75	317545	4387522	238
Inverter Skid	90.8	90.8	1.75	321082	4387468	230
Inverter Skid	90.8	90.8	1.75	321413	4387632	230
Inverter Skid	90.8	90.8	1.75	321141	4388019	231
Inverter Skid	90.8	90.8	1.75	320704	4389441	236
Inverter Skid	90.8	90.8	1.75	320573	4389443	237
Inverter Skid	90.8	90.8	1.75	319809	4389572	241
Inverter Skid	90.8	90.8	1.75	319636	4389575	241
Inverter Skid	90.8	90.8	1.75	319489	4389577	242
Inverter Skid	90.8	90.8	1.75	319343	4389579	242
Inverter Skid	90.8	90.8	1.75	317760	4386717	241
Inverter Skid	90.8	90.8	1.75	317853	4386716	241
Inverter Skid	90.8	90.8	1.75	317945	4386714	241
Inverter Skid	90.8	90.8	1.75	318037	4386713	240
Inverter Skid	90.8	90.8	1.75	318130	4386711	239
Inverter Skid	90.8	90.8	1.75	317887	4386185	238
Inverter Skid	90.8	90.8	1.75	317991	4386183	239
Inverter Skid	90.8	90.8	1.75	318094	4386182	239
Inverter Skid	90.8	90.8	1.75	318197	4386180	239
Inverter Skid	90.8	90.8	1.75	317960	4385654	238
Inverter Skid	90.8	90.8	1.75	318058	4385652	238
Inverter Skid	90.8	90.8	1.75	318155	4385651	238
Inverter Skid	90.8	90.8	1.75	318253	4385649	239
Inverter Skid	90.8	90.8	1.75	318304	4385118	239
Inverter Skid	90.8	90.8	1.75	318185	4385120	239
Inverter Skid	90.8	90.8	1.75	318065	4385122	239
Inverter Skid	90.8	90.8	1.75	317946	4385124	238
Inverter Skid	90.8	90.8	1.75	317826	4385126	235
Inverter Skid	90.8	90.8	1.75	316870	4384848	235
Inverter Skid	90.8	90.8	1.75	316685	4384851	243
Inverter Skid	90.8	90.8	1.75	316468	4384855	248
Inverter Skid	90.8	90.8	1.75	317077	4385244	232
Inverter Skid	90.8	90.8	1.75	316963	4385246	232

Source	Modeled Sound Power Level (dBA)		Relative Height (m)	Coordinates UTM NAD83 Z17N		Absolute Elevation (m)
	Day	Night		X (m)	Y (m)	
Inverter Skid	90.8	90.8	1.75	317054	4385775	232
Inverter Skid	90.8	90.8	1.75	316826	4386165	235
Inverter Skid	90.8	90.8	1.75	316723	4386167	236
Inverter Skid	90.8	90.8	1.75	316620	4386181	236
Inverter Skid	90.8	90.8	1.75	316517	4386183	235
Inverter Skid	90.8	90.8	1.75	316414	4386184	234
Inverter Skid	90.8	90.8	1.75	316240	4386187	235
Inverter Skid	90.8	90.8	1.75	315985	4386192	240
Inverter Skid	90.8	90.8	1.75	319903	4390771	242
Inverter Skid	90.8	90.8	1.75	319669	4390775	243
Inverter Skid	90.8	90.8	1.75	318940	4390503	243
Inverter Skid	90.8	90.8	1.75	319081	4390500	242
Inverter Skid	90.8	90.8	1.75	319228	4390498	242
Inverter Skid	90.8	90.8	1.75	319374	4390495	243
Inverter Skid	90.8	90.8	1.75	319521	4390493	244
Inverter Skid	90.8	90.8	1.75	319668	4390470	243
Inverter Skid	90.8	90.8	1.75	319783	4389959	241
Inverter Skid	90.8	90.8	1.75	319132	4389970	242
Inverter Skid	90.8	90.8	1.75	319240	4389968	242
Inverter Skid	90.8	90.8	1.75	319349	4389966	242
Inverter Skid	90.8	90.8	1.75	319458	4389964	242
Inverter Skid	90.8	90.8	1.75	319566	4389962	242
Inverter Skid	90.8	90.8	1.75	319675	4389960	241
Inverter Skid	90.8	90.8	1.75	319892	4389957	241
Inverter Skid	90.8	90.8	1.75	320044	4389954	240
Inverter Skid	90.8	90.8	1.75	320191	4389952	240
Inverter Skid	90.8	90.8	1.75	320664	4389030	236
Inverter Skid	90.8	90.8	1.75	320561	4389031	237
Inverter Skid	90.8	90.8	1.75	320458	4389033	238
Inverter Skid	90.8	90.8	1.75	320355	4389035	238
Inverter Skid	90.8	90.8	1.75	320251	4389037	238
Inverter Skid	90.8	90.8	1.75	317163	4384831	228
Inverter Skid	90.8	90.8	1.75	316784	4385236	233
Inverter Skid	90.8	90.8	1.75	316675	4385238	235
Inverter Skid	90.8	90.8	1.75	316566	4385240	238
Inverter Skid	90.8	90.8	1.75	316414	4385243	240
Inverter Skid	90.8	90.8	1.75	316230	4385246	244
Inverter Skid	90.8	90.8	1.75	316809	4385766	234

Source	Modeled Sound Power Level (dBA)		Relative Height (m)	Coordinates UTM NAD83 Z17N		Absolute Elevation (m)
	Day	Night		X (m)	Y (m)	
Inverter Skid	90.8	90.8	1.75	316646	4385769	233
Inverter Skid	90.8	90.8	1.75	316467	4385772	234
Inverter Skid	90.8	90.8	1.75	316583	4386568	234
Inverter Skid	90.8	90.8	1.75	316366	4386572	237
Inverter Skid	90.8	90.8	1.75	316181	4386575	235
Inverter Skid	90.8	90.8	1.75	317608	4388299	236
Inverter Skid	90.8	90.8	1.75	321093	4388362	232
Inverter Skid	90.8	90.8	1.75	320887	4388378	233
Inverter Skid	90.8	90.8	1.75	320621	4388382	235
Inverter Skid	90.8	90.8	1.75	320360	4388387	236
Inverter Skid	90.8	90.8	1.75	320213	4388389	237
Inverter Skid	90.8	90.8	1.75	320061	4388392	237
Inverter Skid	90.8	90.8	1.75	318847	4387450	240
Inverter Skid	90.8	90.8	1.75	318673	4387453	239
Inverter Skid	90.8	90.8	1.75	318499	4387456	239
Inverter Skid	90.8	90.8	1.75	318309	4387459	239
Inverter Skid	90.8	90.8	1.75	318157	4387462	239
Inverter Skid	90.8	90.8	1.75	318010	4387464	238
Inverter Skid	90.8	90.8	1.75	317858	4387467	238
Inverter Skid	90.8	90.8	1.75	318793	4388481	239
Inverter Skid	90.8	90.8	1.75	318608	4388484	239
Inverter Skid	90.8	90.8	1.75	318456	4388487	239
Inverter Skid	90.8	90.8	1.75	318746	4387040	239
Inverter Skid	90.8	90.8	1.75	318556	4387043	239
Inverter Skid	90.8	90.8	1.75	317110	4387029	230
Inverter Skid	90.8	90.8	1.75	316958	4387031	231
Inverter Skid	90.8	90.8	1.75	316806	4387034	231
Inverter Skid	90.8	90.8	1.75	316673	4388261	238
Inverter Skid	90.8	90.8	1.75	316499	4388788	240
Inverter Skid	90.8	90.8	1.75	316636	4389345	240
Inverter Skid	90.8	90.8	1.75	316403	4389349	241
Inverter Skid	90.8	90.8	1.75	317658	4389477	239
Inverter Skid	90.8	90.8	1.75	317490	4389480	235
Inverter Skid	90.8	90.8	1.75	320182	4389450	239
Inverter Skid	90.8	90.8	1.75	320105	4389052	239
Inverter Skid	90.8	90.8	1.75	319942	4389054	239
Inverter Skid	90.8	90.8	1.75	318822	4387964	239
Inverter Skid	90.8	90.8	1.75	318703	4387966	239

Source	Modeled Sound Power Level (dBA)		Relative Height (m)	Coordinates UTM NAD83 Z17N		Absolute Elevation (m)
	Day	Night		X (m)	Y (m)	
Inverter Skid	90.8	90.8	1.75	318600	4387967	239
Inverter Skid	90.8	90.8	1.75	318491	4387969	239
Inverter Skid	90.8	90.8	1.75	318377	4387971	239
Inverter Skid	90.8	90.8	1.75	316489	4387217	232
Inverter Skid	90.8	90.8	1.75	316255	4388805	239
Inverter Skid	90.8	90.8	1.75	316092	4388808	239
Inverter Skid	90.8	90.8	1.75	316630	4389626	241
Inverter Skid	90.8	90.8	1.75	316484	4389629	241
Inverter Skid	90.8	90.8	1.75	316337	4389631	241
Inverter Skid	90.8	90.8	1.75	317059	4389607	238
Trackers ¹⁰	66.8	0	1.4			

¹⁰ This is a representative tracker. There are 10,680 trackers proposed for the Facility.

APPENDIX C. MODEL RESULTS FOR EACH RECEPTOR

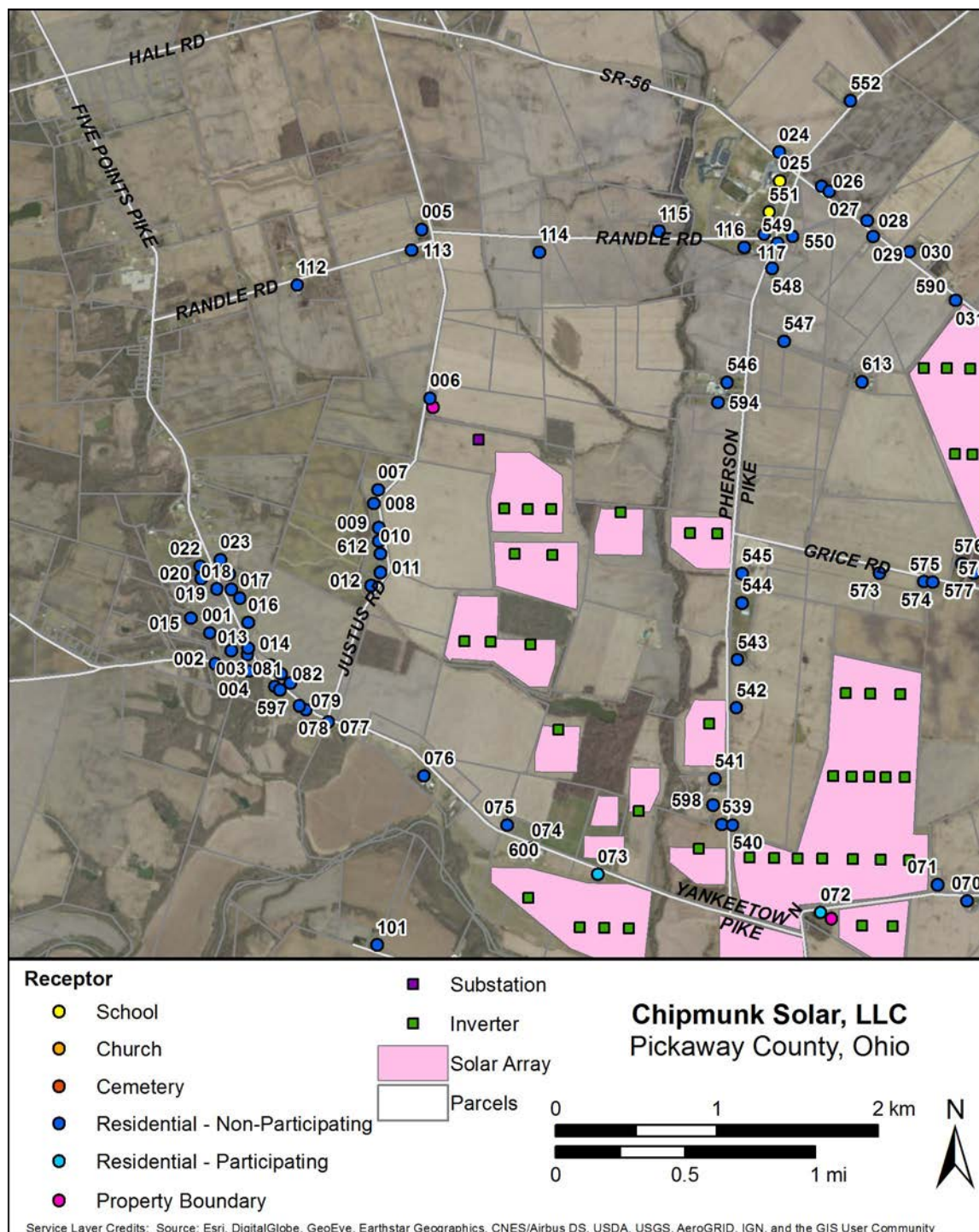


FIGURE 15: MAP OF RECEIVER IDS - NORTHWESTERN AREA

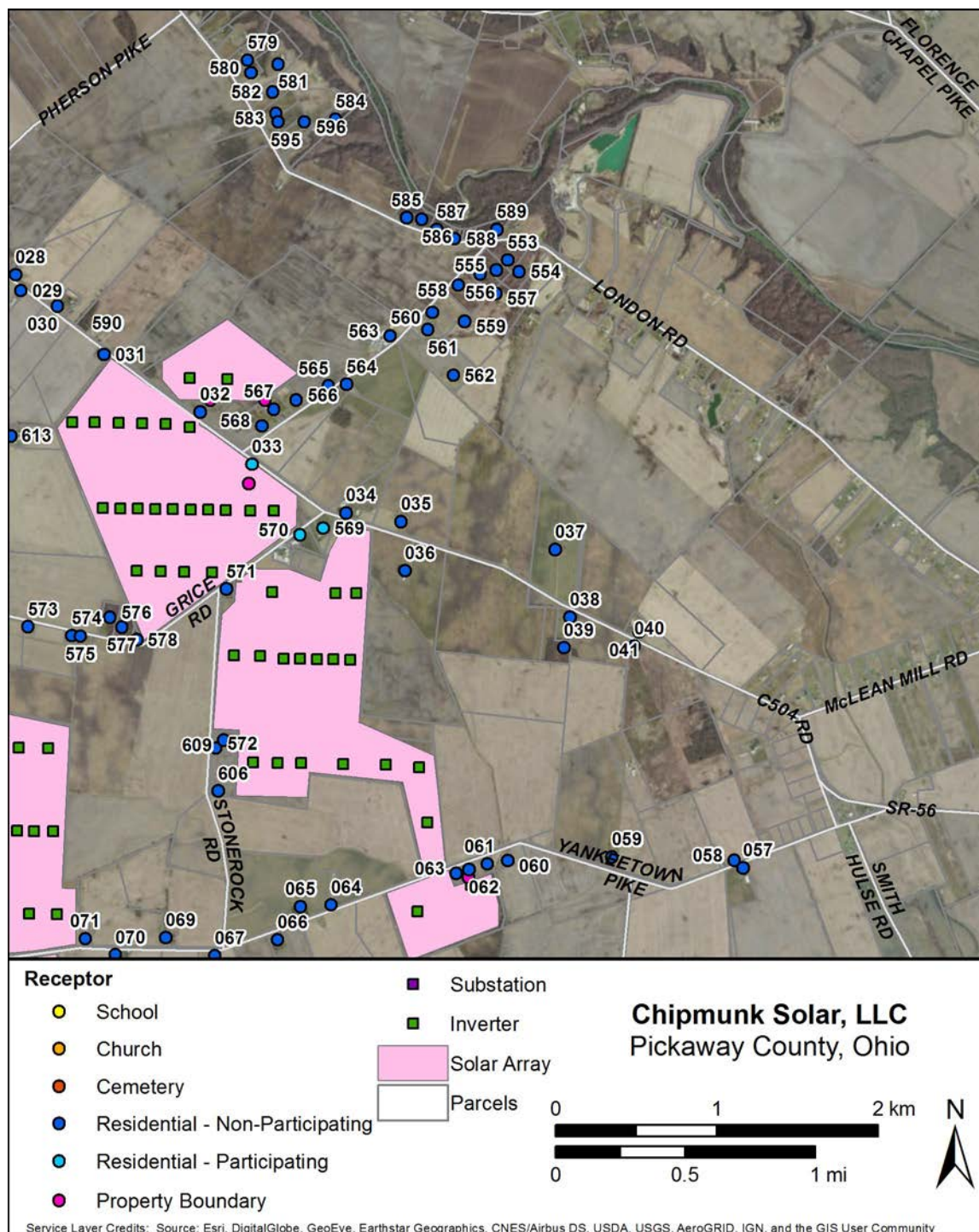


FIGURE 16: MAP OF RECEIVER IDS - NORTHEASTERN AREA

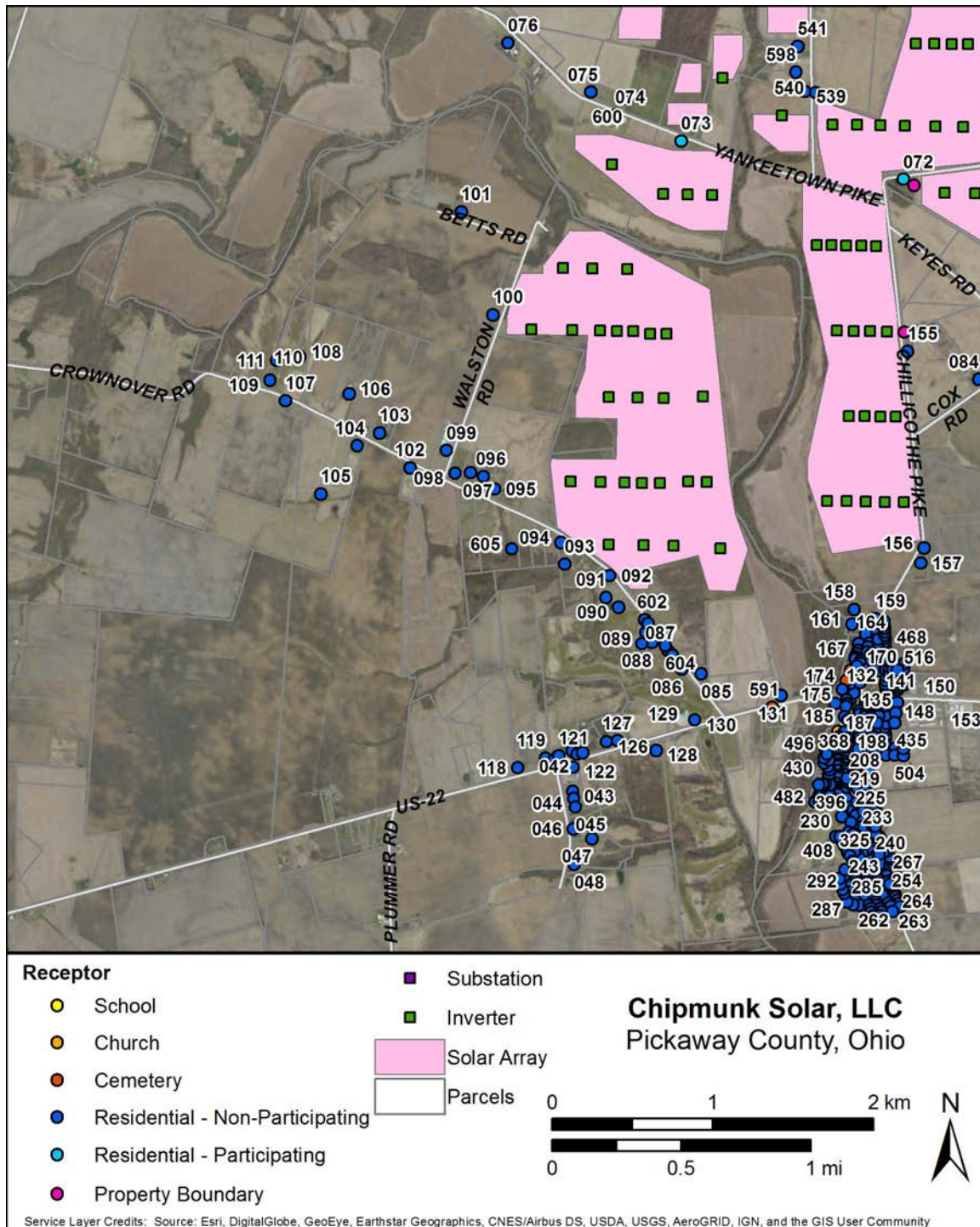


FIGURE 17: MAP OF RECEIVER IDS - SOUTHWESTERN AREA

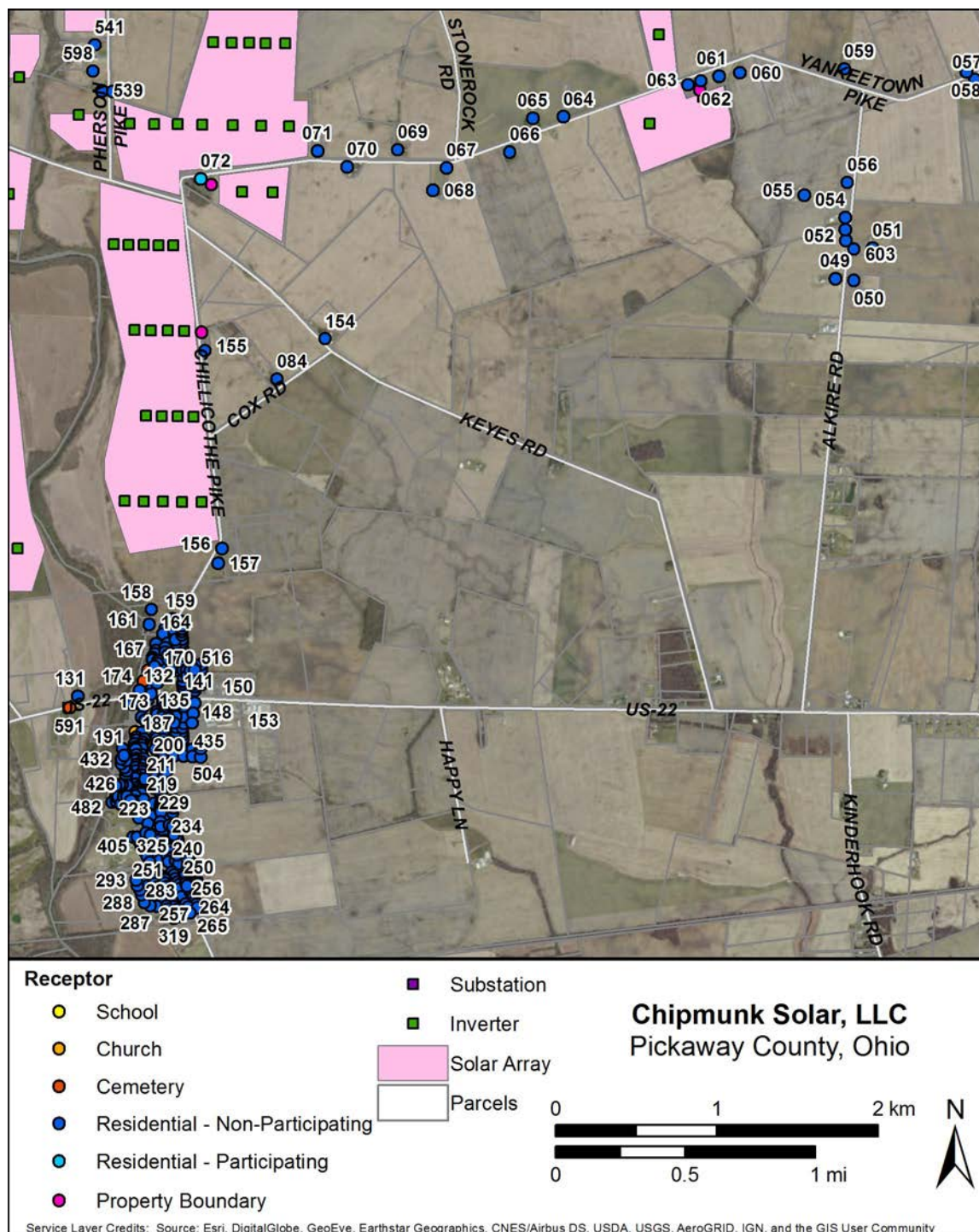


FIGURE 18: MAP OF RECEIVER IDS - SOUTHEASTERN AREA

TABLE 8: MODEL RESULTS & RECEPTOR COORDINATES

Recept or ID	Receptor Type	Status	Modeled Sound Pressure Level (dBA)		Relative Height (m)	Coordinates UTM NAD83 Z17N		Absolute Elevation (m)
			Day	Night		X (m)	Y (m)	
001	Residential	Non-Participating	19	16	4	314512	4388859	251
002	Residential	Non-Participating	18	15	4	314548	4388671	241
003	Residential	Non-Participating	20	17	4	314644	4388750	250
004	Residential	Non-Participating	19	16	4	314755	4388621	244
005	Residential	Non-Participating	21	18	4	315828	4391362	247
006	Residential	Non-Participating	37	33	4	315877	4390315	246
007	Residential	Non-Participating	32	28	4	315554	4389748	247
008	Residential	Non-Participating	31	27	4	315529	4389663	246
009	Residential	Non-Participating	28	25	4	315560	4389512	245
010	Residential	Non-Participating	27	24	4	315568	4389352	245
011	Residential	Non-Participating	26	24	4	315570	4389235	244
012	Residential	Non-Participating	26	23	4	315513	4389155	245
013	Residential	Non-Participating	20	17	4	314746	4388726	249
014	Residential	Non-Participating	21	19	4	314751	4388764	250
015	Residential	Non-Participating	18	16	4	314395	4388950	252
016	Residential	Non-Participating	22	19	4	314748	4388923	251
017	Residential	Non-Participating	22	19	4	314700	4389077	252
018	Residential	Non-Participating	22	19	4	314646	4389130	253
019	Residential	Non-Participating	20	18	4	314556	4389133	252
020	Residential	Non-Participating	19	17	4	314459	4389198	253
021	Residential	Non-Participating	22	19	4	314631	4389226	253
022	Residential	Non-Participating	20	17	4	314451	4389273	253
023	Residential	Non-Participating	22	19	4	314579	4389313	254
024	Residential	Non-Participating	19	16	4	318041	4391842	243
025	School	Non-Participating	19	17	4	318045	4391664	243
026	Residential	Non-Participating	21	18	4	318307	4391631	243
027	Residential	Non-Participating	21	18	4	318353	4391599	243
028	Residential	Non-Participating	23	20	4	318589	4391416	245
029	Residential	Non-Participating	23	21	4	318624	4391316	245
030	Residential	Non-Participating	25	23	4	318850	4391223	245
031	Residential	Non-Participating	31	29	4	319137	4390922	246
032	Residential	Non-Participating	38	38	4	319732	4390566	245
033	Residential	Participating	34	33	4	320057	4390242	244
034	Residential	Non-Participating	30	28	4	320638	4389940	241
035	Residential	Non-Participating	27	25	4	320980	4389886	240
036	Residential	Non-Participating	30	28	4	321002	4389581	239

Recept or ID	Receptor Type	Status	Modeled Sound Pressure Level (dBA)		Relative Height (m)	Coordinates UTM NAD83 Z17N		Absolute Elevation (m)
			Day	Night		X (m)	Y (m)	
037	Residential	Non-Participating	21	18	4	321936	4389713	238
038	Residential	Non-Participating	21	19	4	322027	4389293	238
039	Residential	Non-Participating	21	20	4	321991	4389102	237
040	Residential	Non-Participating	19	17	4	322425	4389114	237
041	Residential	Non-Participating	18	16	4	322456	4389200	236
043	Residential	Non-Participating	18	15	4	316245	4383321	251
044	Residential	Non-Participating	17	15	4	316249	4383276	251
045	Residential	Non-Participating	17	15	4	316260	4383223	251
046	Residential	Non-Participating	16	14	4	316247	4383085	250
047	Residential	Non-Participating	16	14	4	316363	4383026	250
048	Residential	Non-Participating	15	13	4	316254	4382867	249
049	Residential	Non-Participating	17	14	4	322234	4386505	233
050	Residential	Non-Participating	16	14	4	322349	4386493	233
051	Residential	Non-Participating	16	14	4	322466	4386694	234
052	Residential	Non-Participating	17	15	4	322297	4386742	233
053	Residential	Non-Participating	18	15	4	322294	4386811	233
054	Residential	Non-Participating	18	16	4	322293	4386883	234
055	Residential	Non-Participating	20	18	4	322041	4387022	233
056	Residential	Non-Participating	19	16	4	322308	4387100	234
057	Residential	Non-Participating	15	13	4	323101	4387739	235
058	Residential	Non-Participating	16	13	4	323045	4387785	235
059	Residential	Non-Participating	20	18	4	322288	4387806	234
060	Residential	Non-Participating	29	28	4	321641	4387782	233
061	Residential	Non-Participating	33	32	4	321514	4387761	232
062	Residential	Non-Participating	38	38	4	321400	4387729	234
063	Residential	Non-Participating	36	36	4	321321	4387705	233
064	Residential	Non-Participating	26	24	4	320548	4387509	236
065	Residential	Non-Participating	26	24	4	320356	4387499	238
066	Residential	Non-Participating	24	22	4	320214	4387291	239
067	Residential	Non-Participating	24	22	4	319824	4387194	240
068	Residential	Non-Participating	24	22	4	319739	4387052	240
069	Residential	Non-Participating	26	25	4	319521	4387304	242
070	Residential	Non-Participating	29	28	4	319207	4387198	242
071	Residential	Non-Participating	33	32	4	319024	4387298	243
072	Residential	Participating	35	33	4	318299	4387125	242
073	Residential	Participating	33	30	4	316919	4387364	239
074	Residential	Participating	30	28	4	316507	4387526	241

Recept or ID	Receptor Type	Status	Modeled Sound Pressure Level (dBA)		Relative Height (m)	Coordinates UTM NAD83 Z17N		Absolute Elevation (m)
			Day	Night		X (m)	Y (m)	
075	Residential	Non-Participating	28	26	4	316356	4387668	242
076	Residential	Non-Participating	24	22	4	315841	4387973	242
077	Residential	Non-Participating	22	20	4	315247	4388307	246
078	Residential	Non-Participating	22	19	4	315110	4388381	247
079	Residential	Non-Participating	21	19	4	315069	4388408	247
080	Residential	Non-Participating	21	19	4	315011	4388547	249
081	Residential	Non-Participating	21	18	4	314917	4388528	249
082	Residential	Non-Participating	21	19	4	314954	4388605	249
083	Residential	Non-Participating	22	19	4	314891	4388659	250
084	Residential	Non-Participating	28	26	4	318771	4385882	241
085	Residential	Non-Participating	24	21	4	317044	4384051	233
086	Residential	Non-Participating	24	22	4	316922	4384078	239
087	Residential	Non-Participating	25	23	4	316836	4384195	245
088	Residential	Non-Participating	25	23	4	316735	4384243	245
089	Residential	Non-Participating	25	23	4	316675	4384238	244
090	Residential	Non-Participating	28	26	4	316528	4384464	249
091	Residential	Non-Participating	29	27	4	316449	4384525	248
092	Residential	Non-Participating	33	32	4	316473	4384662	250
093	Residential	Non-Participating	30	28	4	316193	4384733	242
094	Residential	Non-Participating	31	29	4	316168	4384867	248
095	Residential	Non-Participating	26	24	4	315757	4385201	251
096	Residential	Non-Participating	26	23	4	315688	4385278	252
097	Residential	Non-Participating	25	23	4	315606	4385300	252
098	Residential	Non-Participating	24	22	4	315511	4385298	254
099	Residential	Non-Participating	24	22	4	315458	4385439	256
100	Residential	Non-Participating	31	29	4	315747	4386283	245
101	Residential	Non-Participating	25	23	4	315550	4386924	243
102	Residential	Non-Participating	22	19	4	315230	4385331	254
103	Residential	Non-Participating	21	19	4	315043	4385548	254
104	Residential	Non-Participating	20	18	4	314904	4385470	256
105	Residential	Non-Participating	18	16	4	314676	4385168	255
106	Residential	Non-Participating	21	18	4	314852	4385793	257
107	Residential	Non-Participating	18	15	4	314455	4385749	257
108	Residential	Non-Participating	19	16	4	314548	4386022	258
109	Residential	Non-Participating	17	15	4	314361	4385878	258
111	Residential	Non-Participating	18	15	4	314401	4386000	257
112	Residential	Non-Participating	20	17	4	315055	4391016	251

Recept or ID	Receptor Type	Status	Modeled Sound Pressure Level (dBA)		Relative Height (m)	Coordinates UTM NAD83 Z17N		Absolute Elevation (m)
			Day	Night		X (m)	Y (m)	
113	Residential	Non-Participating	22	19	4	315762	4391234	248
114	Residential	Non-Participating	25	22	4	316553	4391219	245
115	Residential	Non-Participating	20	17	4	317298	4391351	241
116	Residential	Non-Participating	21	18	4	317824	4391252	241
117	Residential	Non-Participating	22	19	4	317951	4391331	242
118	Residential	Non-Participating	18	15	4	315901	4383465	253
119	Residential	Non-Participating	18	16	4	316075	4383527	251
120	Residential	Non-Participating	18	16	4	316129	4383515	250
121	Residential	Non-Participating	19	16	4	316157	4383541	250
122	Residential	Non-Participating	18	16	4	316247	4383471	251
124	Residential	Non-Participating	19	17	4	316241	4383571	249
125	Residential	Non-Participating	19	17	4	316272	4383551	249
126	Residential	Non-Participating	20	17	4	316454	4383627	248
127	Residential	Non-Participating	20	17	4	316523	4383634	247
128	Residential	Non-Participating	20	18	4	316761	4383576	248
130	Residential	Non-Participating	21	19	4	317002	4383765	235
131	Residential	Non-Participating	22	20	4	317536	4383915	229
132	Residential	Non-Participating	22	20	4	317943	4383932	239
133	Residential	Non-Participating	21	19	4	317972	4383891	239
134	Residential	Non-Participating	22	20	4	317974	4383932	239
136	Residential	Non-Participating	22	20	4	317995	4383931	240
138	Residential	Non-Participating	21	19	4	318065	4383890	239
139	Residential	Non-Participating	21	19	4	318130	4383893	239
140	Residential	Non-Participating	21	19	4	318152	4383893	239
141	Residential	Non-Participating	21	19	4	318192	4383896	239
142	Residential	Non-Participating	21	19	4	318191	4383934	239
144	Residential	Non-Participating	21	19	4	318235	4383933	239
154	Residential	Non-Participating	25	23	4	319070	4386131	240
155	Residential	Non-Participating	35	34	4	318325	4386058	242
156	Residential	Non-Participating	30	28	4	318429	4384833	241
157	Residential	Non-Participating	28	27	4	318408	4384739	241
158	Residential	Non-Participating	26	25	4	317994	4384451	241
159	Residential	Non-Participating	25	24	4	318125	4384395	241
160	Residential	Non-Participating	25	23	4	318143	4384347	240
161	Residential	Non-Participating	25	24	4	317981	4384359	240
162	Residential	Non-Participating	25	23	4	318077	4384334	241
163	Residential	Non-Participating	24	22	4	318123	4384298	240

Recept or ID	Receptor Type	Status	Modeled Sound Pressure Level (dBA)		Relative Height (m)	Coordinates UTM NAD83 Z17N		Absolute Elevation (m)
			Day	Night		X (m)	Y (m)	
164	Residential	Non-Participating	24	22	4	318100	4384263	240
165	Residential	Non-Participating	25	23	4	318066	4384300	240
166	Residential	Non-Participating	24	22	4	318090	4384243	240
167	Residential	Non-Participating	24	22	4	318022	4384238	239
168	Residential	Non-Participating	24	22	4	318020	4384197	240
169	Residential	Non-Participating	24	22	4	318012	4384178	240
170	Residential	Non-Participating	23	21	4	318001	4384155	240
171	Residential	Non-Participating	23	21	4	318000	4384142	240
172	Residential	Non-Participating	23	21	4	318036	4384093	240
173	Residential	Non-Participating	22	20	4	317976	4383996	239
174	Cemetery	Non-Participating	22	20	4	317943	4384008	239
175	Residential	Non-Participating	22	20	4	317919	4383952	239
176	Residential	Non-Participating	21	19	4	317946	4383888	239
178	Residential	Non-Participating	21	19	4	317949	4383865	239
179	Residential	Non-Participating	21	19	4	317876	4383865	237
180	Residential	Non-Participating	21	19	4	317945	4383848	239
186	Residential	Non-Participating	21	19	4	317934	4383785	239
191	Church	Non-Participating	20	18	4	317893	4383693	239
192	Residential	Non-Participating	20	18	4	317933	4383691	239
195	Residential	Non-Participating	20	18	4	317900	4383660	238
196	Residential	Non-Participating	20	18	4	317949	4383650	239
197	Residential	Non-Participating	20	18	4	317900	4383643	239
198	Residential	Non-Participating	20	18	4	317939	4383629	239
199	Residential	Non-Participating	20	18	4	317889	4383618	239
200	Residential	Non-Participating	20	18	4	317937	4383611	239
201	Residential	Non-Participating	20	18	4	317894	4383600	239
202	Residential	Non-Participating	20	17	4	317935	4383591	239
203	Residential	Non-Participating	20	17	4	317897	4383585	238
204	Residential	Non-Participating	19	17	4	317936	4383550	238
205	Residential	Non-Participating	19	17	4	317898	4383551	238
206	Residential	Non-Participating	19	17	4	317897	4383528	238
207	Residential	Non-Participating	19	17	4	317945	4383527	238
208	Residential	Non-Participating	19	17	4	317896	4383514	238
209	Residential	Non-Participating	19	17	4	317936	4383507	238
210	Residential	Non-Participating	19	17	4	317934	4383489	238
211	Residential	Non-Participating	19	17	4	317897	4383491	238
212	Residential	Non-Participating	19	17	4	317894	4383475	238

Recept or ID	Receptor Type	Status	Modeled Sound Pressure Level (dBA)		Relative Height (m)	Coordinates UTM NAD83 Z17N		Absolute Elevation (m)
			Day	Night		X (m)	Y (m)	
213	Residential	Non-Participating	19	17	4	317937	4383463	238
214	Residential	Non-Participating	19	16	4	317894	4383450	238
215	Residential	Non-Participating	19	16	4	317939	4383445	238
216	Residential	Non-Participating	18	16	4	317935	4383425	238
217	Residential	Non-Participating	18	16	4	317900	4383419	238
218	Residential	Non-Participating	18	16	4	317892	4383406	238
219	Residential	Non-Participating	18	16	4	317896	4383368	238
220	Residential	Non-Participating	18	16	4	317932	4383367	237
221	Residential	Non-Participating	18	16	4	317892	4383344	238
222	Residential	Non-Participating	18	16	4	317892	4383327	238
223	Residential	Non-Participating	18	16	4	317933	4383326	237
224	Residential	Non-Participating	18	16	4	317897	4383315	237
225	Residential	Non-Participating	18	16	4	317931	4383311	237
226	Residential	Non-Participating	18	16	4	317893	4383299	237
227	Residential	Non-Participating	18	15	4	317891	4383265	237
228	Residential	Non-Participating	18	15	4	317947	4383275	237
229	Residential	Non-Participating	17	15	4	317972	4383223	236
230	Residential	Non-Participating	17	15	4	317916	4383163	237
231	Residential	Non-Participating	17	15	4	317989	4383204	237
232	Residential	Non-Participating	17	14	4	318005	4383171	236
233	Residential	Non-Participating	17	14	4	317975	4383126	236
234	Church	Non-Participating	16	14	4	318049	4383079	237
235	Residential	Non-Participating	16	14	4	318016	4383057	237
236	Residential	Non-Participating	16	14	4	318072	4383051	238
237	Residential	Non-Participating	16	14	4	318030	4383021	237
238	Residential	Non-Participating	16	14	4	318079	4383021	238
239	Residential	Non-Participating	16	14	4	318082	4383005	238
240	Residential	Non-Participating	16	13	4	318054	4382969	237
241	Residential	Non-Participating	16	13	4	318086	4382991	238
242	Residential	Non-Participating	16	13	4	318095	4382978	238
243	Residential	Non-Participating	16	13	4	318103	4382965	238
244	Residential	Non-Participating	16	13	4	318073	4382928	238
245	Residential	Non-Participating	16	13	4	318113	4382944	238
246	Residential	Non-Participating	15	13	4	318128	4382919	238
247	Residential	Non-Participating	15	13	4	318098	4382888	237
248	Residential	Non-Participating	15	13	4	318142	4382894	238
249	Residential	Non-Participating	15	13	4	318162	4382873	238

Recept or ID	Receptor Type	Status	Modeled Sound Pressure Level (dBA)		Relative Height (m)	Coordinates UTM NAD83 Z17N		Absolute Elevation (m)
			Day	Night		X (m)	Y (m)	
250	Residential	Non-Participating	15	13	4	318123	4382824	238
251	Residential	Non-Participating	15	13	4	318137	4382805	238
252	Residential	Non-Participating	15	12	4	318197	4382796	238
253	Residential	Non-Participating	15	12	4	318142	4382783	237
254	Residential	Non-Participating	15	12	4	318156	4382764	237
255	Residential	Non-Participating	15	12	4	318165	4382745	237
256	Residential	Non-Participating	14	12	4	318174	4382723	237
257	Residential	Non-Participating	14	12	4	318181	4382671	237
258	Residential	Non-Participating	14	12	4	318235	4382700	237
259	Residential	Non-Participating	14	12	4	318245	4382681	237
260	Residential	Non-Participating	14	12	4	318252	4382662	237
261	Residential	Non-Participating	14	11	4	318261	4382642	237
262	Residential	Non-Participating	14	11	4	318206	4382627	237
263	Residential	Non-Participating	14	11	4	318271	4382623	237
264	Residential	Non-Participating	14	11	4	318222	4382605	237
265	Residential	Non-Participating	14	11	4	318278	4382602	237
266	Residential	Non-Participating	14	11	4	318232	4382570	237
267	Residential	Non-Participating	15	12	4	318234	4382769	237
268	Residential	Non-Participating	15	12	4	318229	4382767	237
269	Residential	Non-Participating	15	12	4	318226	4382765	237
270	Residential	Non-Participating	15	12	4	318222	4382763	237
271	Residential	Non-Participating	15	12	4	318218	4382762	237
272	Residential	Non-Participating	15	12	4	318215	4382760	237
273	Residential	Non-Participating	15	12	4	318211	4382759	237
274	Residential	Non-Participating	15	12	4	318206	4382756	237
275	Residential	Non-Participating	15	12	4	318267	4382782	238
276	Residential	Non-Participating	15	12	4	318271	4382775	238
277	Residential	Non-Participating	15	12	4	318274	4382767	238
278	Residential	Non-Participating	14	12	4	318276	4382761	238
279	Residential	Non-Participating	14	12	4	318281	4382752	238
280	Residential	Non-Participating	14	12	4	318233	4382748	237
281	Residential	Non-Participating	14	12	4	318223	4382744	237
282	Residential	Non-Participating	14	12	4	318219	4382742	237
283	Residential	Non-Participating	14	12	4	318214	4382740	237
284	Residential	Non-Participating	14	12	4	318075	4382631	234
285	Residential	Non-Participating	14	12	4	318026	4382612	234
286	Residential	Non-Participating	14	12	4	317997	4382671	233

Recept or ID	Receptor Type	Status	Modeled Sound Pressure Level (dBA)		Relative Height (m)	Coordinates UTM NAD83 Z17N		Absolute Elevation (m)
			Day	Night		X (m)	Y (m)	
287	Residential	Non-Participating	14	12	4	317988	4382616	233
288	Residential	Non-Participating	14	12	4	317949	4382634	233
289	Residential	Non-Participating	15	12	4	317932	4382685	233
290	Residential	Non-Participating	15	12	4	317970	4382734	233
291	Residential	Non-Participating	15	12	4	317923	4382712	232
292	Residential	Non-Participating	15	12	4	317956	4382762	234
293	Residential	Non-Participating	15	12	4	317905	4382742	232
294	Residential	Non-Participating	15	13	4	317929	4382793	234
295	Residential	Non-Participating	15	13	4	317900	4382777	233
296	Residential	Non-Participating	15	12	4	318062	4382797	236
297	Residential	Non-Participating	15	12	4	318038	4382804	236
298	Residential	Non-Participating	15	12	4	318020	4382794	235
299	Residential	Non-Participating	15	12	4	318009	4382773	235
300	Residential	Non-Participating	15	12	4	318015	4382751	235
301	Residential	Non-Participating	15	12	4	318077	4382777	236
302	Residential	Non-Participating	15	12	4	318033	4382733	235
303	Residential	Non-Participating	15	12	4	318075	4382754	236
304	Residential	Non-Participating	14	12	4	318084	4382733	235
305	Residential	Non-Participating	14	12	4	318043	4382715	235
306	Residential	Non-Participating	14	12	4	318094	4382712	235
307	Residential	Non-Participating	14	12	4	318052	4382694	235
308	Residential	Non-Participating	14	12	4	318102	4382693	235
309	Residential	Non-Participating	14	12	4	318061	4382673	234
310	Residential	Non-Participating	14	11	4	318121	4382650	235
311	Residential	Non-Participating	14	11	4	318128	4382633	235
312	Residential	Non-Participating	14	11	4	318087	4382614	235
313	Residential	Non-Participating	14	11	4	318137	4382611	235
314	Residential	Non-Participating	14	11	4	318096	4382593	234
315	Residential	Non-Participating	14	11	4	318156	4382594	235
316	Residential	Non-Participating	14	11	4	318099	4382567	234
317	Residential	Non-Participating	14	11	4	318111	4382546	234
318	Residential	Non-Participating	14	11	4	318164	4382571	235
319	Residential	Non-Participating	13	11	4	318134	4382538	234
320	Residential	Non-Participating	14	11	4	318157	4382547	234
321	Residential	Non-Participating	15	13	4	318219	4382866	238
322	Residential	Non-Participating	15	13	4	318235	4382878	238
323	Residential	Non-Participating	15	13	4	318227	4382895	238

Recept or ID	Receptor Type	Status	Modeled Sound Pressure Level (dBA)		Relative Height (m)	Coordinates UTM NAD83 Z17N		Absolute Elevation (m)
			Day	Night		X (m)	Y (m)	
324	Residential	Non-Participating	15	13	4	318215	4382910	238
325	Residential	Non-Participating	16	14	4	318159	4383017	238
326	Residential	Non-Participating	16	14	4	318156	4383028	238
327	Residential	Non-Participating	16	14	4	318150	4383038	238
328	Residential	Non-Participating	16	14	4	318131	4383052	238
329	Residential	Non-Participating	17	14	4	318122	4383139	238
330	Residential	Non-Participating	17	14	4	318124	4383149	238
331	Residential	Non-Participating	17	14	4	318108	4383156	238
332	Residential	Non-Participating	17	14	4	318126	4383194	238
333	Residential	Non-Participating	17	15	4	318129	4383221	238
334	Residential	Non-Participating	17	15	4	318131	4383245	238
335	Residential	Non-Participating	15	13	4	318197	4382952	238
336	Residential	Non-Participating	16	13	4	318176	4382942	238
337	Residential	Non-Participating	15	13	4	318152	4382931	238
338	Residential	Non-Participating	15	13	4	318024	4382902	236
339	Residential	Non-Participating	15	13	4	317936	4382832	234
340	Residential	Non-Participating	24	22	4	318078	4384216	240
341	Residential	Non-Participating	23	21	4	318077	4384188	240
342	Residential	Non-Participating	23	21	4	318095	4384172	240
343	Residential	Non-Participating	23	21	4	318035	4384133	240
344	Residential	Non-Participating	23	21	4	318032	4384118	240
345	Residential	Non-Participating	23	21	4	318087	4384087	240
346	Residential	Non-Participating	22	20	4	318029	4384053	240
347	Residential	Non-Participating	22	20	4	318028	4384038	240
348	Residential	Non-Participating	22	20	4	318030	4384018	239
350	Residential	Non-Participating	22	20	4	318027	4383996	240
352	Residential	Non-Participating	21	19	4	318066	4383872	239
353	Residential	Non-Participating	21	19	4	318073	4383846	239
354	Residential	Non-Participating	21	19	4	318067	4383823	239
355	Residential	Non-Participating	21	19	4	318024	4383821	239
356	Residential	Non-Participating	21	19	4	318028	4383802	239
357	Residential	Non-Participating	21	18	4	318067	4383802	239
358	Residential	Non-Participating	20	18	4	318062	4383785	239
359	Residential	Non-Participating	20	18	4	318067	4383746	238
360	Residential	Non-Participating	20	18	4	318023	4383709	239
361	Residential	Non-Participating	20	18	4	318065	4383708	238
362	Residential	Non-Participating	20	18	4	318065	4383688	238

Recept or ID	Receptor Type	Status	Modeled Sound Pressure Level (dBA)		Relative Height (m)	Coordinates UTM NAD83 Z17N		Absolute Elevation (m)
			Day	Night		X (m)	Y (m)	
363	Residential	Non-Participating	20	18	4	318024	4383689	239
364	Residential	Non-Participating	20	18	4	318022	4383673	238
365	Residential	Non-Participating	20	17	4	318065	4383669	238
366	Residential	Non-Participating	20	18	4	318024	4383652	238
367	Residential	Non-Participating	20	17	4	318064	4383647	238
368	Residential	Non-Participating	20	17	4	318032	4383630	238
369	Residential	Non-Participating	19	17	4	318063	4383624	238
370	Residential	Non-Participating	19	17	4	318067	4383605	238
371	Residential	Non-Participating	19	17	4	318059	4383605	238
372	Residential	Non-Participating	19	17	4	318074	4383605	238
373	Residential	Non-Participating	19	17	4	318024	4383607	238
374	Residential	Non-Participating	19	17	4	318096	4383585	238
375	Residential	Non-Participating	19	17	4	318070	4383548	238
376	Residential	Non-Participating	19	17	4	318062	4383527	238
377	Residential	Non-Participating	19	17	4	318017	4383510	238
378	Residential	Non-Participating	19	16	4	318059	4383503	238
379	Residential	Non-Participating	19	16	4	318060	4383484	238
380	Residential	Non-Participating	19	17	4	318021	4383487	238
381	Residential	Non-Participating	18	16	4	318020	4383465	237
382	Residential	Non-Participating	18	16	4	318076	4383459	238
383	Residential	Non-Participating	18	16	4	318058	4383443	237
384	Residential	Non-Participating	18	16	4	318017	4383443	237
385	Residential	Non-Participating	18	16	4	318016	4383426	237
386	Residential	Non-Participating	18	16	4	318056	4383421	237
387	Residential	Non-Participating	18	16	4	318019	4383404	237
388	Residential	Non-Participating	18	16	4	318060	4383400	237
389	Residential	Non-Participating	18	15	4	318014	4383366	237
390	Residential	Non-Participating	18	15	4	318067	4383362	237
391	Residential	Non-Participating	18	15	4	318014	4383340	237
393	Residential	Non-Participating	17	15	4	318058	4383317	237
394	Residential	Non-Participating	17	15	4	318053	4383291	237
395	Residential	Non-Participating	17	15	4	318054	4383270	237
396	Residential	Non-Participating	17	15	4	318011	4383252	237
397	Residential	Non-Participating	17	15	4	318050	4383251	237
398	Residential	Non-Participating	17	15	4	318049	4383230	237
399	Residential	Non-Participating	17	15	4	318055	4383218	237
400	Residential	Non-Participating	17	15	4	318048	4383208	237

Recept or ID	Receptor Type	Status	Modeled Sound Pressure Level (dBA)		Relative Height (m)	Coordinates UTM NAD83 Z17N		Absolute Elevation (m)
			Day	Night		X (m)	Y (m)	
401	Residential	Non-Participating	17	15	4	318052	4383195	237
402	Residential	Non-Participating	17	14	4	318047	4383134	237
403	Residential	Non-Participating	16	14	4	318052	4383104	237
404	Residential	Non-Participating	16	14	4	317947	4383030	236
405	Residential	Non-Participating	16	14	4	317916	4383017	235
406	Residential	Non-Participating	16	14	4	317928	4382998	235
407	Residential	Non-Participating	16	14	4	317959	4383010	236
408	Residential	Non-Participating	16	13	4	317933	4382980	235
409	Residential	Non-Participating	16	13	4	317966	4382996	236
410	Residential	Non-Participating	16	13	4	317947	4382966	235
411	Residential	Non-Participating	16	13	4	317974	4382974	236
412	Residential	Non-Participating	16	13	4	317950	4382954	235
413	Residential	Non-Participating	16	13	4	317991	4382967	236
414	Residential	Non-Participating	16	13	4	317955	4382942	235
415	Residential	Non-Participating	16	13	4	317998	4382947	236
416	Residential	Non-Participating	16	13	4	317967	4382922	235
417	Residential	Non-Participating	15	13	4	317983	4382884	235
418	Residential	Non-Participating	15	13	4	317996	4382850	236
419	Residential	Non-Participating	16	14	4	317880	4383040	234
420	Residential	Non-Participating	16	14	4	317907	4383040	235
421	Residential	Non-Participating	16	14	4	317959	4383066	236
422	Residential	Non-Participating	16	14	4	317988	4383054	236
423	Residential	Non-Participating	16	14	4	318105	4383114	238
424	Residential	Non-Participating	16	14	4	318126	4383104	238
425	Residential	Non-Participating	18	16	4	317835	4383317	237
426	Residential	Non-Participating	18	16	4	317839	4383401	238
427	Residential	Non-Participating	19	16	4	317835	4383426	238
428	Residential	Non-Participating	19	17	4	317838	4383451	238
429	Residential	Non-Participating	19	17	4	317829	4383473	237
430	Residential	Non-Participating	19	17	4	317809	4383495	237
431	Residential	Non-Participating	19	17	4	317835	4383516	237
432	Residential	Non-Participating	19	17	4	317808	4383525	237
433	Residential	Non-Participating	19	17	4	318188	4383579	239
434	Residential	Non-Participating	19	17	4	318144	4383610	239
435	Residential	Non-Participating	19	17	4	318187	4383607	239
436	Residential	Non-Participating	19	17	4	318188	4383628	239
437	Residential	Non-Participating	19	17	4	318140	4383629	239

Recept or ID	Receptor Type	Status	Modeled Sound Pressure Level (dBA)		Relative Height (m)	Coordinates UTM NAD83 Z17N		Absolute Elevation (m)
			Day	Night		X (m)	Y (m)	
438	Residential	Non-Participating	19	17	4	318145	4383653	239
439	Residential	Non-Participating	19	17	4	318191	4383651	239
440	Residential	Non-Participating	19	17	4	318191	4383672	239
441	Residential	Non-Participating	20	17	4	318143	4383677	239
442	Residential	Non-Participating	20	17	4	318188	4383696	239
443	Residential	Non-Participating	20	17	4	318145	4383697	239
444	Residential	Non-Participating	20	18	4	318145	4383724	239
445	Residential	Non-Participating	20	17	4	318188	4383719	239
446	Residential	Non-Participating	20	18	4	318194	4383745	239
447	Residential	Non-Participating	20	18	4	318190	4383790	239
448	Residential	Non-Participating	20	18	4	318150	4383824	239
449	Residential	Non-Participating	20	18	4	318152	4383847	239
450	Residential	Non-Participating	20	18	4	318192	4383854	239
451	Residential	Non-Participating	21	18	4	318157	4383869	239
452	Residential	Non-Participating	21	19	4	318192	4383968	239
453	Residential	Non-Participating	21	19	4	318188	4383987	240
454	Residential	Non-Participating	22	19	4	318190	4384007	240
455	Residential	Non-Participating	22	20	4	318190	4384038	240
456	Residential	Non-Participating	22	20	4	318151	4384072	240
457	Residential	Non-Participating	22	20	4	318184	4384102	240
458	Residential	Non-Participating	23	21	4	318152	4384106	240
459	Residential	Non-Participating	23	20	4	318186	4384117	240
460	Residential	Non-Participating	23	21	4	318187	4384141	240
461	Residential	Non-Participating	23	21	4	318145	4384156	240
462	Residential	Non-Participating	23	21	4	318189	4384165	240
463	Residential	Non-Participating	23	21	4	318189	4384186	240
464	Residential	Non-Participating	23	21	4	318143	4384181	240
465	Residential	Non-Participating	23	21	4	318190	4384207	240
466	Residential	Non-Participating	23	22	4	318148	4384217	240
467	Residential	Non-Participating	23	21	4	318174	4384223	240
468	Residential	Non-Participating	24	21	4	318186	4384249	240
469	Residential	Non-Participating	24	22	4	318144	4384243	240
470	Residential	Non-Participating	24	22	4	318186	4384271	240
471	Residential	Non-Participating	24	22	4	318144	4384265	240
472	Residential	Non-Participating	24	22	4	318184	4384292	240
473	Residential	Non-Participating	24	22	4	318184	4384313	240
474	Residential	Non-Participating	24	22	4	318183	4384333	240

Recept or ID	Receptor Type	Status	Modeled Sound Pressure Level (dBA)		Relative Height (m)	Coordinates UTM NAD83 Z17N		Absolute Elevation (m)
			Day	Night		X (m)	Y (m)	
475	Residential	Non-Participating	25	22	4	318182	4384354	240
476	Residential	Non-Participating	25	23	4	318181	4384377	240
477	Residential	Non-Participating	18	16	4	318086	4383447	238
478	Residential	Non-Participating	17	15	4	318133	4383274	238
479	Residential	Non-Participating	17	15	4	318120	4383257	238
480	Residential	Non-Participating	17	15	4	318082	4383251	238
481	Residential	Non-Participating	17	15	4	318111	4383241	238
482	Residential	Non-Participating	18	15	4	317751	4383257	233
483	Residential	Non-Participating	18	15	4	317777	4383259	235
484	Residential	Non-Participating	18	16	4	317774	4383290	235
485	Residential	Non-Participating	18	15	4	317787	4383290	236
486	Residential	Non-Participating	18	15	4	317804	4383246	235
487	Residential	Non-Participating	18	16	4	317822	4383290	236
488	Residential	Non-Participating	18	15	4	317847	4383266	237
489	Residential	Non-Participating	18	16	4	317843	4383294	237
490	Residential	Non-Participating	18	15	4	317865	4383267	237
491	Residential	Non-Participating	18	16	4	317952	4383402	238
492	Residential	Non-Participating	18	16	4	317841	4383362	238
493	Residential	Non-Participating	18	16	4	317816	4383366	238
494	Residential	Non-Participating	18	16	4	317797	4383365	237
495	Residential	Non-Participating	18	16	4	317774	4383360	235
496	Residential	Non-Participating	20	17	4	317814	4383589	236
497	Residential	Non-Participating	19	17	4	317823	4383550	237
499	Residential	Non-Participating	19	17	4	318017	4383585	238
500	Residential	Non-Participating	19	17	4	318139	4383580	239
501	Residential	Non-Participating	19	17	4	318133	4383546	238
502	Residential	Non-Participating	19	16	4	318193	4383544	239
503	Residential	Non-Participating	19	16	4	318249	4383586	239
504	Residential	Non-Participating	19	16	4	318246	4383542	239
505	Residential	Non-Participating	18	16	4	318300	4383539	239
506	Residential	Non-Participating	19	16	4	318299	4383589	239
507	Residential	Non-Participating	19	17	4	318299	4383621	239
508	Residential	Non-Participating	20	18	4	318263	4383874	239
509	Residential	Non-Participating	21	19	4	318261	4383951	239
510	Residential	Non-Participating	21	19	4	318262	4383970	239
511	Residential	Non-Participating	21	19	4	318260	4383989	239
512	Residential	Non-Participating	21	19	4	318308	4383987	239

Recept or ID	Receptor Type	Status	Modeled Sound Pressure Level (dBA)		Relative Height (m)	Coordinates UTM NAD83 Z17N		Absolute Elevation (m)
			Day	Night		X (m)	Y (m)	
513	Residential	Non-Participating	21	19	4	318264	4384001	239
514	Residential	Non-Participating	21	19	4	318309	4384004	239
515	Residential	Non-Participating	21	19	4	318264	4384021	239
516	Residential	Non-Participating	21	19	4	318303	4384043	239
517	Residential	Non-Participating	22	19	4	318301	4384080	239
518	Residential	Non-Participating	22	20	4	318302	4384112	240
519	Residential	Non-Participating	22	20	4	318264	4384107	239
520	Residential	Non-Participating	22	20	4	318240	4384102	240
521	Residential	Non-Participating	23	21	4	318117	4384078	240
522	Residential	Non-Participating	22	20	4	318191	4384074	240
523	Residential	Non-Participating	22	20	4	318210	4384073	240
524	Residential	Non-Participating	22	20	4	318214	4384040	239
525	Residential	Non-Participating	22	20	4	318235	4384075	240
526	Residential	Non-Participating	22	19	4	318263	4384041	239
527	Residential	Non-Participating	22	20	4	318262	4384077	239
530	Residential	Non-Participating	20	18	4	318251	4383809	239
531	Residential	Non-Participating	20	17	4	318245	4383749	239
532	Residential	Non-Participating	20	18	4	318147	4383789	239
533	Residential	Non-Participating	20	18	4	318135	4383747	239
534	Residential	Non-Participating	20	18	4	318097	4383779	239
536	Residential	Non-Participating	21	18	4	317974	4383764	239
538	Residential	Non-Participating	21	18	4	317955	4383764	239
539	Residential	Non-Participating	34	33	4	317686	4387671	241
540	Residential	Non-Participating	34	33	4	317754	4387667	240
541	Residential	Non-Participating	31	30	4	317641	4387954	242
542	Residential	Non-Participating	32	31	4	317776	4388394	242
543	Residential	Non-Participating	28	26	4	317786	4388692	241
544	Residential	Non-Participating	28	26	4	317811	4389045	241
545	Residential	Non-Participating	30	28	4	317811	4389229	241
546	Residential	Non-Participating	25	23	4	317720	4390413	242
547	Residential	Non-Participating	24	22	4	318074	4390668	243
548	Residential	Non-Participating	23	20	4	317998	4391121	242
549	Residential	Non-Participating	22	19	4	318033	4391279	242
550	Residential	Non-Participating	22	19	4	318127	4391318	243
551	School	Non-Participating	21	18	4	317980	4391469	243
552	Residential	Non-Participating	18	16	4	318487	4392160	245
553	Residential	Non-Participating	16	13	4	321639	4391508	235

Recept or ID	Receptor Type	Status	Modeled Sound Pressure Level (dBA)		Relative Height (m)	Coordinates UTM NAD83 Z17N		Absolute Elevation (m)
			Day	Night		X (m)	Y (m)	
554	Residential	Non-Participating	16	13	4	321711	4391437	233
555	Residential	Non-Participating	17	14	4	321570	4391448	236
556	Residential	Non-Participating	17	15	4	321472	4391419	238
557	Residential	Non-Participating	17	14	4	321566	4391300	236
558	Residential	Non-Participating	18	15	4	321337	4391351	238
559	Residential	Non-Participating	19	16	4	321373	4391127	238
560	Residential	Non-Participating	19	17	4	321174	4391183	240
561	Residential	Non-Participating	20	17	4	321146	4391076	239
562	Residential	Non-Participating	20	18	4	321304	4390793	238
563	Residential	Non-Participating	22	19	4	320912	4391037	240
564	Residential	Non-Participating	25	23	4	320641	4390737	242
565	Residential	Non-Participating	26	24	4	320529	4390727	242
566	Residential	Non-Participating	28	26	4	320331	4390641	243
567	Residential	Non-Participating	30	28	4	320190	4390582	243
568	Residential	Non-Participating	31	30	4	320117	4390480	244
569	Residential	Participating	32	30	4	320497	4389843	242
570	Residential	Participating	34	33	4	320352	4389804	242
571	Residential	Non-Participating	37	36	4	319895	4389467	243
572	Residential	Non-Participating	32	31	4	319833	4388479	241
573	Residential	Non-Participating	28	26	4	318665	4389233	245
574	Residential	Non-Participating	29	27	4	318940	4389178	245
575	Residential	Non-Participating	29	27	4	318992	4389175	244
576	Residential	Non-Participating	31	30	4	319175	4389291	245
577	Residential	Non-Participating	31	30	4	319251	4389232	245
578	Residential	Non-Participating	31	29	4	319340	4389153	244
579	Residential	Non-Participating	15	12	4	320030	4392748	245
580	Residential	Non-Participating	15	13	4	320048	4392670	245
581	Residential	Non-Participating	15	12	4	320218	4392725	245
582	Residential	Non-Participating	16	13	4	320185	4392551	246
583	Residential	Non-Participating	16	14	4	320203	4392419	245
584	Residential	Non-Participating	16	13	4	320573	4392381	243
585	Residential	Non-Participating	18	15	4	321015	4391770	240
586	Residential	Non-Participating	17	15	4	321109	4391761	241
587	Residential	Non-Participating	17	14	4	321200	4391698	240
588	Residential	Non-Participating	17	14	4	321313	4391641	239
589	Residential	Non-Participating	16	13	4	321573	4391698	235
591	Cemetery	Non-Participating	22	19	4	317484	4383842	229

Recept or ID	Receptor Type	Status	Modeled Sound Pressure Level (dBA)		Relative Height (m)	Coordinates UTM NAD83 Z17N		Absolute Elevation (m)
			Day	Night		X (m)	Y (m)	
592	Cemetery	Non-Participating	23	21	4	317974	4384077	240
593	Residential	Non-Participating	19	17	4	316305	4383560	249
594	Residential	Non-Participating	26	23	4	317661	4390287	241
595	Residential	Non-Participating	17	14	4	320218	4392363	244
596	Residential	Non-Participating	16	14	4	320381	4392363	243
597	Residential	Non-Participating	21	19	4	314948	4388506	249
598	Residential	Non-Participating	32	30	4	317631	4387793	240
600	Residential	Non-Participating	29	26	4	316552	4387627	241
601	Residential	Non-Participating	26	24	4	316696	4384309	246
602	Residential	Non-Participating	27	25	4	316691	4384387	248
603	Residential	Non-Participating	17	14	4	322348	4386688	232
604	Residential	Non-Participating	25	23	4	316821	4384227	245
605	Residential	Non-Participating	25	22	4	315863	4384826	241
606	Residential	Non-Participating	31	29	4	319846	4388214	239
607	Residential	Non-Participating	25	22	4	316862	4384167	244
608	Residential	Non-Participating	23	21	4	318099	4384141	240
609	Residential	Non-Participating	33	31	4	319880	4388531	241
610	Residential	Non-Participating	23	21	4	318012	4384100	240
611	Residential	Non-Participating	27	25	4	316711	4384362	247
612	Residential	Non-Participating	27	24	4	315559	4389428	245
613	Residential	Non-Participating	29	27	4	318557	4390419	245



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in

Case No(s). 21-0960-EL-BGN

Summary: Application Exhibit O (Noise Assessment) electronically filed by Mr.
Michael J. Settineri on behalf of Chipmunk Solar LLC