

Saratoga Solar Project

Public Service Commission of Wisconsin
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Appendix N
Sound Study Report

Saratoga Solar Project Sound Study Report



Prepared for:
Saratoga Solar Project, LLC
422 Admiral Boulevard
Kansas City, MO 64106

Prepared by:
Stantec Consulting Services Inc.
1165 Scheuring Road
De Pere, Wisconsin 54115

Stantec Project No: 193708352
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Abbreviations

AC	Alternating Current
dB	Decibel
dB(Z) or dBZ	Decibel (unweighted)
dB(A) or dBA	Decibel (A-weighted)
dB(C) or dBc	Decibel (C-weighted)
DC	Direct Current
Hz	Hertz
L_{eq}	Equivalent continuous sound level
MW	Megawatt
NSA	Noise sensitive area
Project	Saratoga Solar Project
PSC or PSCW	Public Service Commission of Wisconsin
PV	Photovoltaic
Saratoga	Saratoga Solar Project, LLC.
SLM	Sound Level Meter

REVISIONS HISTORY

Revision No.	Revision Purpose	Date	Revised By
0	Original	April 12, 2022	MML



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1	Review	April 13, 2022	MJB
2	Review	April 13, 2022	JJB



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1.0 Introduction

Saratoga Solar Project, LLC. (Saratoga Solar) proposes to construct and operate the Saratoga Solar Project (Project) in the Town of Saratoga, in Wood County, Wisconsin. The Project Area is approximately 986 acres of primarily pine plantation and agricultural land within the fenced areas. The Project will consist of an approximately 150.5-megawatts (MW) alternating current (AC) east-west tracking solar array, a 50MW AC battery energy storage system (BESS), and associated facilities.

Stantec Consulting Services Inc. (Stantec) completed a pre-construction ambient sound survey (ambient sound survey) and predictive sound modeling analysis in compliance with the Public Service Commission of Wisconsin (PSCW) requirements and guidance. The ambient sound survey included measurements at five monitoring stations located throughout the Project Area to determine the existing acoustical environment. Work was completed in accordance with the PSCW document "Measurement Protocol for Sound and Vibration Assessment of Proposed and Existing Electric Power Plants" (Sound Protocol).

Predictive operation sound modeling was also completed at proposed locations, as per the Sound Protocol, for the solar inverter stations, BESS, and substation transformer. The maximum sound impact from the operating Project at a non-participating residence or noise sensitive area (NSA) during the daytime with equipment in full operation was modeled to be 40.5 A-weighted decibels (dBA).

The results of the sound measurements demonstrate that the Project meets all regulatory requirements and will be operated in a manner that sound, due to its operation, does not exceed 50 dBA (daytime) or 45 dBA (nighttime) at a non-participating residence or occupied community building.



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2.0 Project Description

The Project Area is located primarily on agricultural land within the Town of Saratoga, Wood County, Wisconsin. The Project will consist of an east-west tracking solar panel system and associated facilities, with a nameplate capacity of up to 150.5 MW AC.

In addition to photovoltaic modules and single access trackers, the Project will include inverter stations, an electrical collection system, access roads, a Project substation, BESS, and perimeter security fencing. Saratoga Solar retained the services of Stantec to conduct a pre-construction sound survey and predictive operational sound modeling to assess the existing sound in the Project Area and anticipated sound due to the operation of the Project.

The solar arrays will be constructed on predominantly red pine plantation parcels roughly bounded by Bell Road to the east, Rangeline Road to the west, Evergreen Avenue to the north, and Blue Ridge Lane to the south. The electricity generated by the solar facility will be routed to an electrical substation and BESS located on the west-central portion of the Project Area. The predominant land use of the area for the Project is pine plantation and agricultural land with surrounding rural residential development.

The main sources of sound emissions from the operational Project will be the solar inverter stations, substation transformer, and BESS (inverters and cooling system).

Solar panels produce direct current (DC) voltage which must be converted to AC voltage through a series of inverters. Solar energy facilities operate by converting solar radiation into electricity, meaning the solar generation portion of the Project will only produce electricity between sunrise and sunset. After sunset, the site no longer receives solar radiation, and the solar inverters will shift into stand-by mode.

The proposed 150.5-MW Project sound assessment includes 53 primary and alternate solar inverters located within the array perimeter fencing. The maximum sound power level of each solar inverter assumed in the analyses is approximately 94.8 dBA.

The Project will include BESS facilities located in the north-central portion of the Project Area. The BESS ventilation systems are expected to operate at a sound pressure level of approximately 86.2 dBA at the source. The BESS inverters systems are expected to operate at a sound pressure level of approximately 104.5 dBA at the source.

One main power transformer will be installed in the Project substation in the west-central portion of the Project Area. The analysis performed for this report assumes the sound power level of the substation transformer at the source is 107.7 dBA.

The Project solar inverters are generally expected to run during the times that the solar array will be generating power (daylight hours). The equipment will be energized during the nighttime but will produce minimal sound. The BESS and substation are expected to operate during both daytime and nighttime hours.



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Based on the PSCW Sound Protocols described in Section 3.0 and the identified sensitive areas, five baseline noise monitoring locations were chosen by Stantec for the pre-construction study in early-2022. Monitoring points chosen were discussed with the PSCW and approved prior to the survey. Figure 1 displays the final Project array boundaries and the pre-construction monitoring locations.



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3.0 Sound Level Requirement

Sound is caused by vibrations that generate waves of minute pressure fluctuations in the surrounding air. Sound levels are typically measured using a logarithmic decibel (dB) scale. Unwanted sound or sound that causes disturbance or annoyance is often called noise. The terms sound and noise are used interchangeably in this report.

Human hearing varies in sensitivity for different sound frequencies. The ear is most sensitive to sound frequencies between 800 and 8,000 Hertz (Hz) and is least sensitive to sound frequencies below 400 Hz or above 12,500 Hz. Consequently, several different frequency weighting schemes have been used to approximate the way the human ear responds to noise levels. The dB(A) scale is the most widely used for regulatory requirements as it discriminates against low frequencies similar to the response of the human ear. The decibel (C-weighted) sound level (dBC) does not discriminate against low frequencies. Unweighted sound levels are generally reported as dB or dBZ.

State and local noise regulations were reviewed, and no regulations directly applicable to a solar facility were identified. In the absence of existing pertinent regulations, and under the guidance of the PSCW, the rules for monitoring followed the PSCW's Sound Protocols.

Due to the absence of regulations related to noise generated by solar energy projects, and consistent with prior PSCW decisions, guidance for wind energy systems (Wis. Admin. Code ch. PSC 128) was used to assess noise at area receptors. Under this regulation, nighttime hours are the hours beginning at 10:00 p.m. and ending at 6:00 a.m. daily, and daytime hours are the hours beginning at 6:00 a.m. and ending at 10:00 p.m. daily. The noise limits apply at the outside wall of a nonparticipating residence or occupied community building. Applying the sound regulations applicable to wind energy systems to this project, the solar energy system must be designed so that the noise attributable to the constructed operating system does not exceed 50 dBA during daytime hours and 45 dBA during nighttime hours.

Sunrise and sunset times on the longest day of the year (June 21) will be approximately 5:13 a.m. to 8:38 p.m. Therefore, the majority of the operation of the solar facility, and therefore the noise production, will occur during the daytime hours as defined by Wis. Admin. Code PSC section 128.14.



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4.0 Pre-Construction Monitoring: Measurements

Pre-construction sound measurements were completed at monitoring sites ML-S-1, ML-S-2, ML-S-3, M-SL-4, and ML-S-5. Four short-term (10-minute) sound level measurements were conducted at each of the five locations for the morning, midday, evening, and night measurements. The samples were taken in accordance with the PSCW requirements and consultation regarding the approved periods. Daylight hours during the sampling periods of March 3rd and 4th, 2022 were from approximately 6:27 a.m. to 5:48 p.m.

4.1 MEASUREMENT METHODOLOGY

Ambient sound measurements were made at noise monitoring areas ML-S-1, ML-S-2, ML-S-3, M-SL-4, and ML-S-5. Stantec considered locations that represent the overall Project layout, with locations near residences with potential solar arrays in multiple directions. Consideration was also made to represent residences that have differing levels of impact from existing vehicle traffic. Meteorological data was acquired from AccuWeather at the beginning of each monitoring period. Four short-term (10-minute) sound level measurements were conducted at each of the five locations with a sample taken in accordance with the PSCW requirement of four specific periods:

- 1) Morning (6 a.m. – 8 a.m.)
- 2) Midday (12 noon – 2 p.m.)
- 3) Evening (6 p.m. – 8 p.m.)
- 4) Night (10 p.m. – 12 midnight)

Sound measurements were acquired on March 3rd and 4th, 2022. The midday, evening, and night readings were collected on March 3rd, and the morning reading was collected the following day on March 4th.

The morning samples were collected from 6:42 a.m. to 7:52 a.m. on March 4, 2022. During the monitoring period, the local temperature was approximately 9 to 16 degrees Fahrenheit. The relative humidity was 61 to 72 percent and wind speeds ranging from 1 to 2 miles per hour. No precipitation occurred during the monitoring. The day was clear and sunny. Each of these parameters falls within the suggested ranges for noise measurement.

The midday samples were collected from 12:01 p.m. to 1:13 p.m. On March 3, 2022. During the monitoring period, the local temperature was approximately 26 to 28 degrees Fahrenheit. The relative humidity was 28 to 32 percent and winds were moderate with speeds from 7 to 8 miles per hour. No precipitation occurred during the monitoring period. The day was overcast. Each of these parameters falls within the suggested ranges for noise measurement.

The evening samples were collected from 5:52 p.m. to 7:00 p.m. on March 3, 2022. During the monitoring period the local temperature was approximately 23 to 25 degrees Fahrenheit. The relative humidity was 31 to 41 percent and winds were light at 2 to 3 miles per hour. No precipitation occurred during the monitoring period. The evening sky was overcast. Each of these parameters falls within the suggested ranges for noise measurement.



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The night samples were collected from 9:49 p.m. to 10:58 p.m. on March 3, 2022. During the monitoring period the local temperature was approximately 12 to 18 degrees Fahrenheit. The relative humidity was 62 to 65 percent and winds were light at 0 to 1 mile per hour. No precipitation occurred during the monitoring period. The night sky was clear. Each of these parameters falls within the suggested ranges for noise measurement.

A Larson Davis Sound Advisor 831C Sound Level Meter (SLM) was used to measure the octave band and broadband sound pressure levels in the selected locations. The meter was set to A-scale (dBA), slow response with a 3-dB exchange rate for the octave band readings, with concurrent L_{eq} measurements made in both flat scale (dB or dBZ), and in C-scale (dBC). The following procedures were used during the sound measurements at the locations:

- Calibrate SLM;
- Fit SLM with windscreen and mount on a tripod with the microphone oriented toward proposed substation or solar array at a height of approximately four feet above the ground surface;
- Program the SLM to acquire at least 10 one-minute scans of ambient sound;
- Acquire sample, which is digitally recorded in the SLM's integral data logger by downloading data to a spreadsheet using Larson Davis software.

4.2 MEASUREMENT LOCATIONS

Measurement locations were originally chosen so that sound received at a measurement point would be representative of sound that may be heard at a residential or other sensitive receptor. Measurement locations were selected in coordination with the PSCW.

Table 4.1 lists the distance between each measurement point and the nearest sound source (inverter, substation, or BESS).



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TABLE 4.1 MEASUREMENT POINT DISTANCES FROM NEAREST INVERTER, BESS, OR SUBSTATION

Measurement Location to Inverter, BESS, or Substation		Brief Description of Measurement Location
ML-ID	Distance (feet)	
ML-S-1	2,275	Located in the north-central portion of the Project along Evergreen Avenue.
ML-S-2	1,060	Located in the mid-section of the Project near the intersection of County Highway 13 and Tower Road.
ML-S-3	758	Located in the eastern portion of the Project along Tower Road.
ML-S-4	2,050	Located in the south-central portion of the Project along County Highway 13.
ML-S-5	1,420	Located in the southern portion of the Project along Blue Ridge Lane.



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5.0 Pre-Construction Monitoring Results and Observations

Sound level monitoring results are reported as energy-equivalent (L_{eq}) sound levels, where the L_{eq} is the level of steady sound with the same total energy as the time-varying sound energy averaged over a given period or as percentile levels (L_n), where L_n is the noise level exceeded for n% of the measurements

ML-S-1

Monitoring location ML-S-1 is located in the north-central portion of the Project along Evergreen Avenue. The location was chosen to be representative of nearby residences in the area. The predominant source of sound at the location was vehicular traffic. Additional noises noted throughout monitoring included leaves rustling, dog barking, and avian noise. Tables 5.1 and 5.2 summarize the results of the sound measurement readings near the solar array inverters at monitoring location ML-S-1.

TABLE 5.1 SOUND PRESSURE LEVEL MEASUREMENTS SUMMARY AT ML-S-1

Sound Levels	dBA				dBC			
	Morning	Midday	Evening	Night	Morning	Midday	Evening	Night
L_{eq}	50.2	51.2	46.4	37.4	58.9	57.8	51.6	47.8
L_{10}	52.6	46.6	39.7	40.4	54.3	48.0	43.9	43.4
L_{50}	43.9	38.9	34.5	34.8	56.8	51.9	47.3	45.0
L_{90}	41.0	34.3	31.4	30.3	60.7	57.8	52.4	49.1

TABLE 5.2 UNWEIGHTED OCTAVE-BAND ANALYSIS SUMMARY AT ML-S-1

dBZ	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Morning	58.7	56.4	54.4	48.6	46.9	48.0	46.7	39.9	34.2	26.0
Midday	55.5	53.1	53.6	49.5	48.3	46.8	47.9	43.8	36.9	30.2
Evening	52.7	47.8	44.7	38.1	38.3	40.3	44.6	38.3	27.8	18.1
Night	47.8	45.4	43.9	39.5	33.4	32.4	34.2	29.5	24.9	18.5

ML-S-2

Monitoring location ML-S-2 is located in the central portion of the Project near the intersection of County Highway 13 and Tower Road. The predominant source of sound at the location was vehicle traffic from Highway 13. Additional noises noted throughout monitoring included leaves



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rustling, cars passing, and avian noise. Tables 5.3 and 5.4 summarize the results of the sound measurement readings near the solar array inverters at monitoring location ML-S-2.

TABLE 5.3 SOUND PRESSURE LEVEL MEASUREMENTS SUMMARY AT ML-S-2

Sound Levels	dBA				dBC			
	Morning	Midday	Evening	Night	Morning	Midday	Evening	Night
Leq	47.1	52.4	53.2	46.9	58.9	63.4	60.1	56.1
L₁₀	49.6	52.5	51.1	50.9	51.0	51.1	48.1	42.3
L₅₀	43.4	43.5	45.6	40.1	54.6	57.6	53.7	48.5
L₉₀	35.5	35.5	35.3	25.2	59.7	66.0	60.2	56.2

TABLE 5.4 UNWEIGHTED OCTAVE-BAND ANALYSIS SUMMARY AT ML-S-2

dBZ	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Morning	54.2	50.6	50.8	47.0	35.5	36.6	39.3	34.5	24.3	22.5
Midday	57.8	53.5	58.1	50.7	45.0	42.4	44.1	39.7	29.0	26.2
Evening	43.8	53.7	52.5	46.7	43.3	43.4	45.8	39.9	30.0	26.7
Night	52.4	46.7	45.0	41.5	34.9	36.5	40.3	33.6	19.1	16.3

ML-S-3

Monitoring location ML-S-3 is located in the eastern portion of the Project along Tower Road. The location was chosen to be representative of nearby residences in the area. The predominant source of sound at the location was distant vehicle traffic. Additional noises noted throughout monitoring included leaves rustling, cars passing, and avian noise. Tables 5.5 and 5.6 summarize the results of the sound measurement readings near the solar array inverters at monitoring location ML-S-3.

TABLE 5.5 SOUND PRESSURE LEVEL MEASUREMENTS SUMMARY AT ML-S-3

Sound Levels	dBA				dBC			
	Morning	Midday	Evening	Night	Morning	Midday	Evening	Night
Leq	40.2	53.8	36.9	35.5	50.8	57.3	47.4	49.3
L₁₀	36.1	43.4	29.3	30.2	47.1	45.3	40.9	39.8
L₅₀	31.9	35.0	25.2	27.1	49.2	47.8	42.7	42.7
L₉₀	29.6	31.7	22.8	25.6	50.9	52.0	51.0	48.3



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TABLE 5.6 UNWEIGHTED OCTAVE-BAND ANALYSIS SUMMARY AT ML-S-3

dBZ	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Morning	47.5	44.6	40.3	38.3	31.4	32.0	28.4	30.2	20.8	18.1
Midday	49.2	43.4	43.8	39.8	42.7	44.8	46.3	39.0	27.9	25.3
Evening	47.7	39.5	35.7	28.0	23.3	21.8	22.6	30.0	16.8	14.7
Night	49.5	41.4	35.6	32.4	26.3	21.3	21.1	27.4	17.4	15.4

ML-S-4

Monitoring location ML-S-4 is located in the south-central portion of the Project along County Highway 13. The location was chosen to be representative of nearby residences in the area. The location was chosen to be representative of nearby residences in the area. The predominant source of sound at the location was heavy vehicle traffic on Highway 13. Additional sounds included rustling leaves and avian noise. Tables 5.7 and 5.8 summarize the results of the sound measurement readings near the solar array inverters at monitoring location ML-S-4.

TABLE 5.7 SOUND PRESSURE LEVEL MEASUREMENTS SUMMARY AT ML-S-4

Sound Levels	dBA				dBC			
	Morning	Midday	Evening	Night	Morning	Midday	Evening	Night
Leq	75.8	75.2	68.2	58.3	80.3	81.4	74.3	61.9
L10	78.7	77.8	71.6	56.7	59.8	53.5	45.9	39.1
L50	64.3	60.8	51.2	34.3	67.9	64.4	55.4	43.4
L90	47.5	42.4	34.0	28.7	81.4	81.0	73.3	60.2

TABLE 5.8 UNWEIGHTED OCTAVE-BAND ANALYSIS SUMMARY AT ML-S-4

dBZ	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Morning	63.9	59.3	72.0	65.8	64.1	67.8	68.2	62.3	47.7	45.0
Midday	58.4	58.3	64.9	70.0	74.0	66.2	66.0	61.8	46.7	43.2
Evening	50.7	53.2	64.9	63.8	63.4	59.9	59.7	56.3	39.1	35.3
Night	45.3	44.5	49.5	48.0	46.8	47.9	50.8	48.0	29.6	26.3

ML-S-5

Monitoring location ML-S-5 is located in the southern portion of the Project along Blue Ridge Lane. The location was chosen to be representative of nearby residences in the area. The predominant source of sound at the location was distant vehicle traffic. Additional noises noted throughout



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monitoring included leaves rustling, passing cars, and avian noise. Tables 5.9 and 5.10 summarize the results of the sound measurement readings near the solar array inverters at monitoring location ML-S-5.

TABLE 5.9 SOUND PRESSURE LEVEL MEASUREMENTS SUMMARY AT ML-S-5

Sound Levels	dBA				dBC			
	Morning	Midday	Evening	Night	Morning	Midday	Evening	Night
Leq	59.3	60.1	49.9	36.9	61.5	67.4	56.0	49.7
L₁₀	54.3	50.2	44.8	40.8	48.0	44.1	41.1	41.9
L₅₀	39.7	31.8	29.8	25.8	50.3	47.0	44.0	43.3
L₉₀	35.7	28.4	25.1	22.8	57.6	55.5	49.3	48.7

TABLE 5.10 UNWEIGHTED OCTAVE-BAND ANALYSIS SUMMARY AT ML-S-5

dBZ	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Morning	50.1	48.8	48.5	46.8	53.3	49.1	52.9	45.3	32.1	28.4
Midday	60.3	61.1	54.8	56.5	53.4	52.0	52.1	46.6	35.4	31.7
Evening	45.9	46.4	49.4	39.6	40.9	38.9	43.9	36.3	22.5	19.6
Night	46.0	40.7	35.2	34.3	33.3	28.8	24.3	22.6	13.3	11.4



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6.0 Predicted Sound Analysis Methods

Approximately 53 inverters will be installed within the Project Area. A sound power level of 94.8 dBA at the source was utilized for the solar inverters in this analysis, including a tonal penalty of 5 dBA. The inverters will convert electricity only when the sun is shining; therefore, the inverters and will operate in stand-by mode between sunset and sunrise.

The maximum sound pressure level for the BESS ventilation systems is expected to be approximately 86.2 dBA at the source. The BESS inverters systems are located on skids adjacent to the BESS enclosures and are expected to operate at a sound pressure level of approximately 104.5 dBA at the source. Actual sound at the exterior of the BESS may be less due to the dampening of sound from the enclosures. This analysis assumes one transformer at the Project's substation will be installed with a sound power level of 107.7 dBA.

Sound attenuates between the source and receptors due to a variety of factors, including but not limited to, atmospheric absorption, interaction with the ground, and attenuation due to vegetation and ground cover. Sound impact is also dependent on the distance between the sound source and a receptor. Locations of the inverters and transformers are based on the current layout of the Project provided by Saratoga Solar. Residences within approximately 1.25 miles of the Project facilities were identified and included in the analysis. Elevations for the facilities and receptors were calculated within the model, using the elevation data within the modeling software.

Sound results were calculated using CadnaA by Datakustik, which utilizes conservative ISO 9613-2 algorithms to estimate sound propagation and atmospheric absorption. The parameters and assumptions made in developing the estimates include the following:

- All inverters, the BESS, and the substation were considered as operating for the daytime analysis.
- The BESS equipment and substation were considered as operational for the nighttime analysis.
- Sound signatures for noise sources as listed in Section 7, Table 7.1.
- A ground attenuation factor of 0.5 (on a scale of 0.0 representing hard ground to 1.0 representing porous ground) was modelled.
- Meteorological conditions used were conducive to sound propagation (10 degrees Celsius and 70 percent relative humidity).



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7.0 Assessment of Sound Impacts during Operation

The Project as currently proposed includes 53 inverters within the solar generation arrays, a substation, and 96 BESS units with ventilation and 12 BESS inverters. The nearest residence (R-1050) to a solar inverter is approximately 810 feet based on the current Project design (including primary and alternate arrays).

Table 7.1 provides the sound emission levels used to predict the impact on the surrounding environment.

TABLE 7.1 SOUND EMISSION SOURCES

Equipment Type	Octave Band Sound Power Level (dB)									Total Sound (dBA)
	31.5 Hz	63.0 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	
Solar Inverter	83.9	88.7	97.4	94.4	91.4	87.7	85.6	87.4	79.9	94.8
Substation Main Power Transformer	96.4	104.4	107.1	106.3	105.3	102.3	100.2	95.3	84.5	107.7
BESS Inverter	58	70.4	83.3	97.3	96.5	96.5	98.9	98.3	94.6	104.5
BESS External (e.g., HVAC)	82.1	78.7	79.2	86.8	85	78.7	77.5	73	74.7	86.2

To assess the expected sound at receptors near the Project, Wisconsin guidance for wind energy systems (Wis. Admin. Code PSC ch. 128) was utilized. Under this regulation, nighttime hours are the hours beginning at 10:00 p.m. and ending at 6:00 a.m. daily and daytime hours are the hours beginning at 6:00 a.m. and ending at 10:00 p.m. daily. The sound limits apply at the outside wall of a nonparticipating residence or occupied community building. The energy system must be designed so that the sound attributable to the proposed system does not exceed 50 dBA during daytime hours and 45 dBA during nighttime hours.

A daytime sound analysis was completed including the solar inverters, Project substation and BESS operating at full load. The solar inverters will only operate when the sun is shining; therefore, the majority of the operational noise from the array area is expected to occur during daytime hours. An additional analysis was completed to determine nighttime noise, when the solar inverters will only be operating in standby mode, limiting sound from the Project to the substation and BESS.

Results of the sound analysis at 548 receptors located within approximately 1.25 miles of the Project are provided in tabular format in Appendix B. Sound contours from daytime operation, with all facilities operating at full load, are displayed in Figure 1. The figure displays the overall expected sound levels from within the solar array, substation, and BESS, with a ground attenuation of 0.5. Table 7.2 provides a summary of the average expected sound at receptors within approximately 1.25 miles of the Project due to daytime (full load) operation. Nighttime operation will result in lower sound emission.



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TABLE 7.2 SUMMARY OF SOUND AT RECEPTORS DUE TO DAYTIME PROJECT OPERATION

Maximum Sound Level	Number of Receptors
35 dB(A) or less	539
35.1 dB(A) to 40 dB(A)	8
40.1 dB(A) to 45 dB(A)	1
Greater than 45.0 dB(A)	0

Results demonstrate that the maximum expected daytime sound from Project operation is 40.5 dBA. Nighttime noise will be substantially less within the solar array areas, as all equipment will be energized, but operating in stand-by mode, only, and thereby producing minimal sound. The BESS and substation are expected to operate during both daytime and nighttime hours. Nighttime sound levels from operation of the substation and BESS equipment are predicted to be a maximum of 36.9 dBA at the nearest receptor.

An analysis was completed to demonstrate the expected effect of the fully operational Project on existing ambient conditions in the Project Area. Daytime ambient sound, expected Project sound, and expected changes due to operation of the Project at full load are provided in Table 7.3. Results demonstrate that increases of the average daytime sound levels (L_{eq}) in the Project Area during operation are not expected to be greater than one dB at the measurement locations. Sound levels at the quietest times of the day, as represented by the L_{90} , does indicate that increases can be expected during those times.



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TABLE 7.3 SUMMARY – DAYTIME AMBIENT SOUND AND INCREASE DUE TO PROJECT

<i>Average of Afternoon and Evening Measurements</i>	ML ID	Leq (dBA)	L10 (dBA)	L50 (dBA)	L90 (dBA)	Leq (dBC)	L10 (dBC)	L50 (dBC)	L90 (dBC)
Measured Ambient	ML-S-1	49	44	37	33	56	46	50	56
	ML-S-2	53	52	45	35	62	50	56	64
	ML-S-3	51	41	32	29	55	44	46	52
	ML-S-4	73	76	58	40	79	51	62	79
	ML-S-5	57	48	31	27	65	43	46	53
Project Maximum Operations (Solar Inverters, Substation and BESS in Operation)	ML-S-1	32	32	32	32	41	41	41	41
	ML-S-2	41	41	41	41	49	49	49	49
	ML-S-3	40	40	40	40	47	47	47	47
	ML-S-4	37	37	37	37	45	45	45	45
	ML-S-5	38	38	38	38	46	46	46	46
Total Noise	ML-S-1	50	45	38	36	56	47	51	56
	ML-S-2	53	52	46	42	62	52	57	64
	ML-S-3	51	43	41	40	55	49	50	53
	ML-S-4	73	76	58	42	79	52	62	79
	ML-S-5	58	49	39	38	65	48	49	54
Increase Over Ambient	ML-S-1	1	1	1	3	0	1	1	0
	ML-S-2	0	0	1	7	0	2	1	0
	ML-S-3	0	2	9	11	0	5	4	1
	ML-S-4	0	0	0	2	0	1	0	0
	ML-S-5	1	1	8	11	0	5	3	1



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An additional analysis was completed to demonstrate the expected effect of the Project on existing ambient conditions during nighttime hours when only the Project substation and BESS are operational. Nighttime ambient sound, expected Project sound, and expected changes due to operation of the substation and BESS are provided in Table 7.4. Results demonstrate that the increase in average nighttime sound levels (L_{eq}) in the Project Area are not expected to be greater than one dB at the measurement locations.

TABLE 7.4 SUMMARY – NIGHTTIME AMBIENT SOUND AND INCREASE DUE TO PROJECT

<i>Nighttime Measurements</i>	ML ID	L_{eq} (dBA)	L_{10} (dBA)	L_{50} (dBA)	L_{90} (dBA)	L_{eq} (dBC)	L_{10} (dBC)	L_{50} (dBC)	L_{90} (dBC)
Measured Ambient	ML-S-1	37	40	35	30	48	43	45	49
	ML-S-2	47	51	40	25	56	42	49	56
	ML-S-3	36	30	27	26	49	40	43	48
	ML-S-4	58	57	34	29	62	39	43	60
	ML-S-5	37	41	26	23	50	42	43	49
Project Maximum Operations (Substation and BESS in operation)	ML-S-1	<20	<20	<20	<20	<20	<20	<20	<20
	ML-S-2	35	35	35	35	40	40	40	40
	ML-S-3	<20	<20	<20	<20	<20	<20	<20	<20
	ML-S-4	32	32	32	32	39	39	39	39
	ML-S-5	31	31	31	31	38	38	38	38
Total Noise	ML-S-1	37	40	35	30	48	43	45	49
	ML-S-2	47	51	41	35	56	44	50	56
	ML-S-3	36	30	28	27	49	40	43	48
	ML-S-4	58	57	36	34	62	42	44	60
	ML-S-5	38	41	32	32	50	43	44	49
Increase Over Ambient	ML-S-1	0	0	0	0	0	0	0	0
	ML-S-2	0	0	1	10	0	2	1	0
	ML-S-3	0	0	1	1	0	0	0	0
	ML-S-4	0	0	2	5	0	3	1	0
	ML-S-5	1	0	6	9	0	1	1	0



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8.0 Summary

On March 3rd and 4th, 2022, Stantec completed pre-construction sound measurements at the locations near the proposed solar array, substation, and BESS for the Saratoga Solar Project. The purpose of the survey was to quantify the existing acoustical environment prior to the construction of the facility. Noise measurements were made at monitoring sites ML-S-1, ML-S-2, ML-S-3, ML-S-4, and ML-S-5 throughout the proposed Project Area. Short-term (10-minute) sound level measurements were conducted at each of the five locations with a sample taken in accordance with the PSCW requirement of four specific testing periods. Based upon the L_{eq} values, the background sound levels varied during the time periods when samples were acquired.

Predictive modeling analyses were completed to assess the sound expected from operation of the Project. The analyses considered 53 solar inverters, 96 BESS units, 12 BESS inverters, and one substation in full operation during the daytime. The solar generation facility will operate converting power during daytime hours only. Sound from the solar inverters will be minimal during the nighttime hours, due to equipment operating in an energized stand-by mode. Therefore, an additional nighttime analysis was completed to assess the sound from the Project substation and BESS facilities only.

The sound signatures of the equipment are based on information provided by manufacturers for equipment similar to what is expected to be installed for the Project. The maximum sound impact at a residence is predicted to be approximately 40.5 dBA with all equipment in operation during daytime hours. The maximum nighttime sound is expected to be less than 37.0 at receptors.

The noise limit criteria for a wind energy system (adopted for this analysis) are outlined in Wisconsin Administrative Code chapter PSC 128. Under this regulation, the wind energy system must be operated in a manner that does not exceed 50 dBA during daytime hours and 45 dBA during seasonal nighttime hours (April 1 through September 30). This report demonstrates that the sound expected at nearby residences, due to operation of the Saratoga Solar Project, complies with this state standard, and will not exceed the 50 dBA daytime or 45 dBA nighttime limits as described in PSC128.



**SARATOGA SOLAR PROJECT
SOUND STUDY REPORT**

APRIL 2022

FIGURE 1 –SOUND MEASUREMENT LOCATIONS

V:\1937\active\19370835203_data\gis_cad\gimxds\Sound_Stud\fig1_sound_measuring_locations_193708352.mxd Revised: 2022-05-05 By: carner

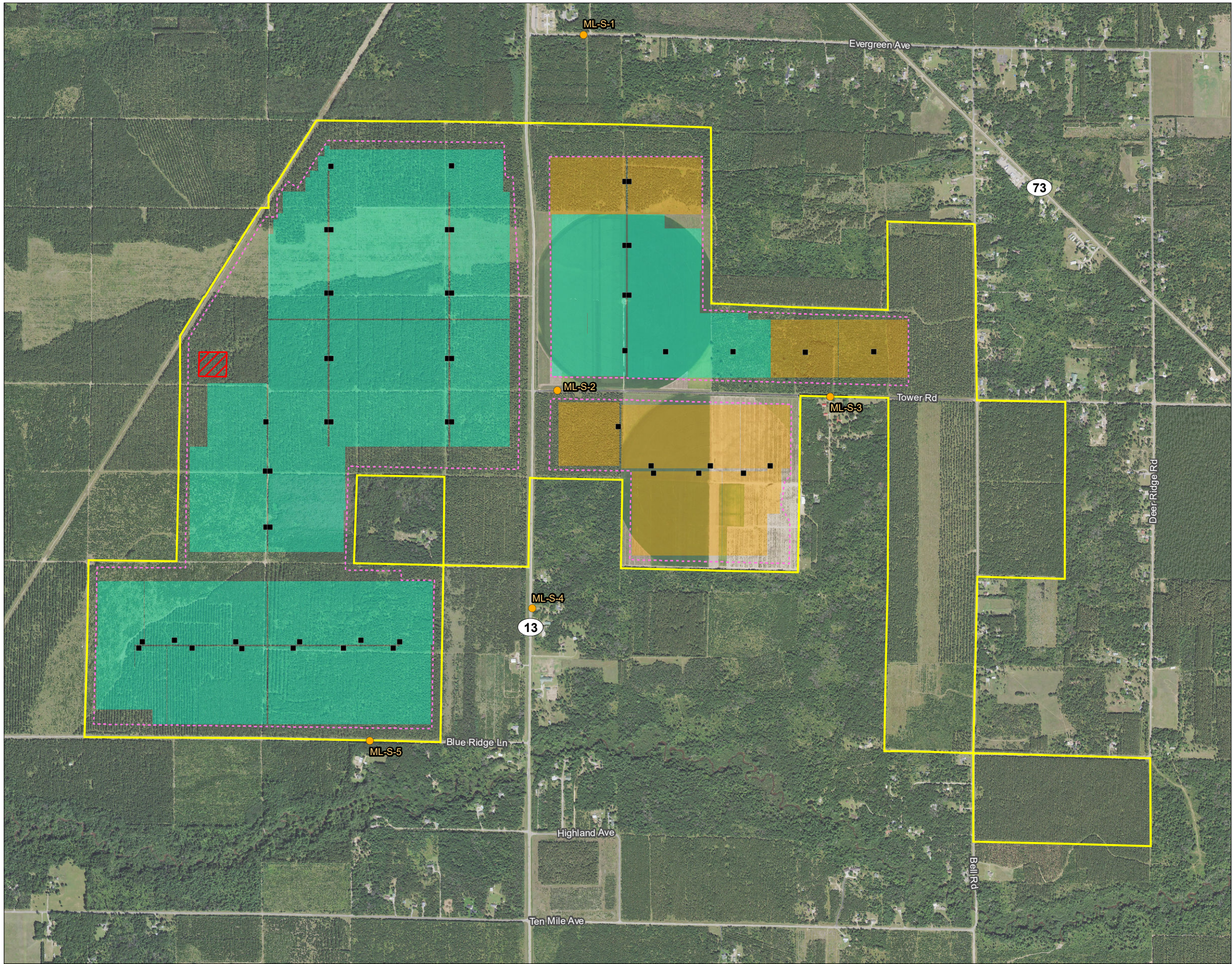
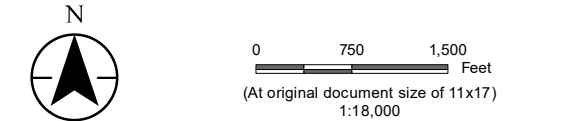


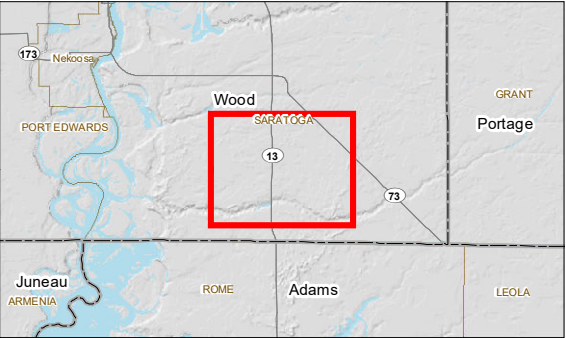
Figure No. 1
Title Sound Monitoring Locations

Client/Project 193708352
Saratoga Solar Project, LLC
Saratoga Solar Project

Project Location Wood County, WI
Prepared by CA on 2022-01-05
TR by SR on 2022-01-12
IR by AR on 2022-05-05



- Legend
- Project Area
 - Sound Monitoring Location
 - Inverter
 - Project Substation
 - Solar PV Array Area - Primary
 - Solar PV Array Area - Alternate
 - Boundary Fence



Notes
1. Coordinate System: NAD 1983 StatePlane Wisconsin Central FIPS 4802 Feet
2. Data Sources: Stantec, Saratoga Solar Project, LLC, WDNR, WisDOT
3. Orthophotography: 2020 NAIP



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FIGURE 2 – SARATOGA SOLAR OPERATIONAL SOUND ISOLINES

V:\1937\active\19370835203_data\gis_cad\gismxd\Sound_Stud\fig2_sound_results_193708352.mxd Revised: 2022-05-05 By: carner

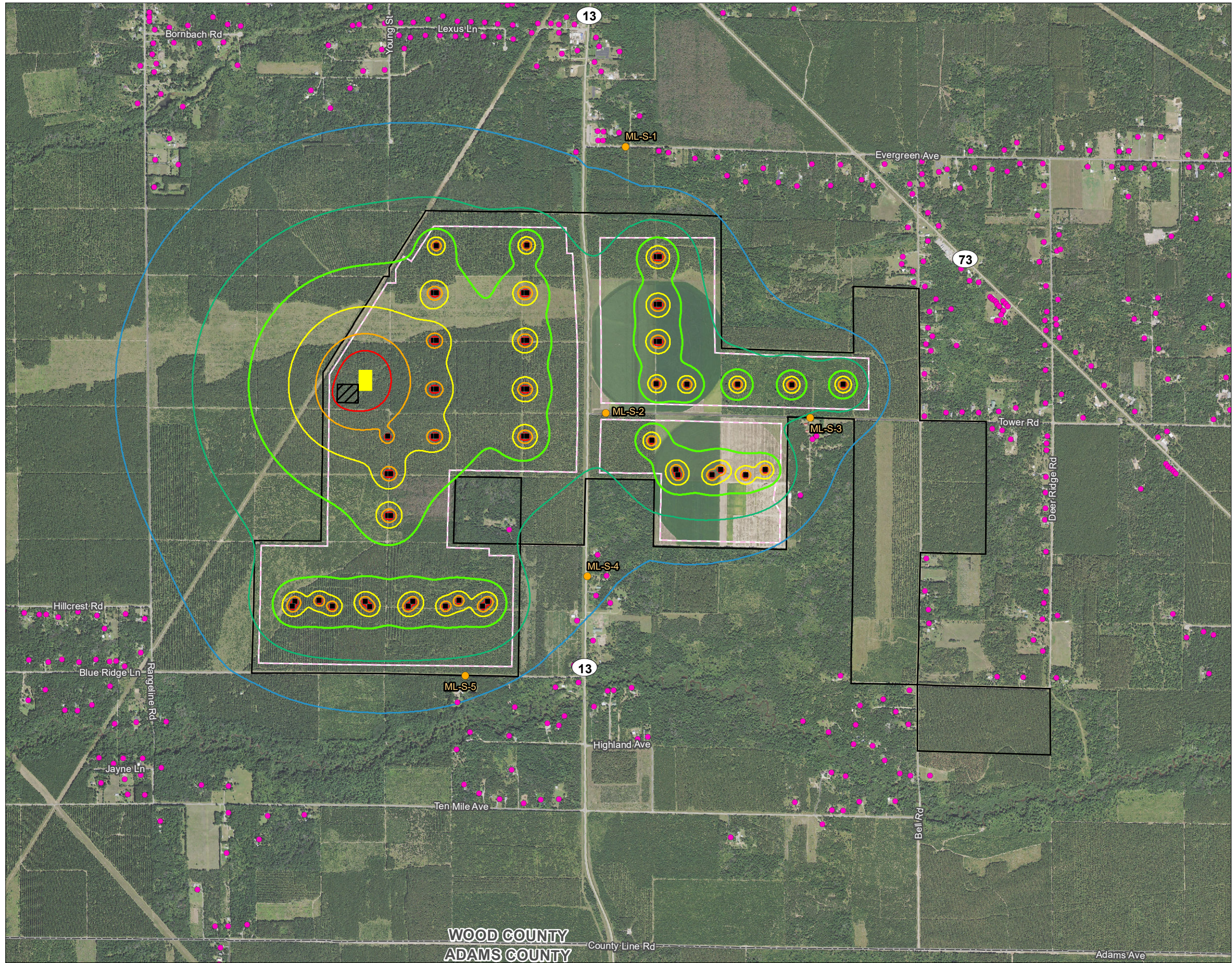


Figure No.

2

Title

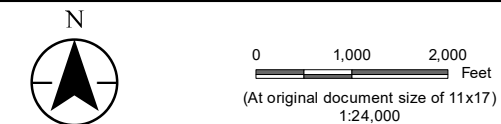
Sound Study Results

Client/Project
Saratoga Solar Project, LLC
Saratoga Solar Project

193708352

Project Location
Wood County, WI

Prepared by CA on 2022-04-12
TR by JS on 2022-04-12
IR by AR on 2022-05-05



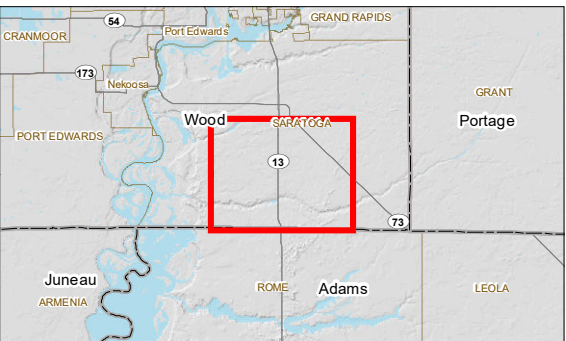
Legend

- Project Area
- Sound Monitoring Location
- Sensitive Receptor
- Solar Inverter
- Boundary Fence
- Project Substation
- Battery Energy Storage System

Sound Study Results

Noise (dBA)

- 35
- 40
- 45
- 50
- 55
- 60



Notes
1. Coordinate System: NAD 1983 StatePlane Wisconsin Central FIPS 4802 Feet
2. Data Sources: Stantec, Saratoga Solar Project, LLC, WDNR, WisDOT
3. Orthophotography: 2020 NAIP



**SARATOGA SOLAR PROJECT
SOUND STUDY REPORT**

APRIL 2022

APPENDIX A – SOUND RECEPTOR TABULAR RESULTS

Appendix A Saratoga Solar Project - Receptor Locations and Total Sound Results (Day and Night)

Rec ID	X (UTM 16)	Y (UTM 16)	Day Sound	Night Sound
R-0006	274,086	4,909,542	<20.0	<20.0
R-0007	274,125	4,909,713	<20.0	<20.0
R-0009	274,174	4,909,468	11.2	<20.0
R-0013	274,188	4,909,534	<20.0	<20.0
R-0014	274,186	4,909,655	<20.0	<20.0
R-0016	274,256	4,909,759	<20.0	<20.0
R-0024	274,274	4,909,477	11.3	<20.0
R-0029	274,457	4,909,475	11.7	<20.0
R-0031	274,515	4,909,472	11.8	<20.0
R-0032	274,514	4,909,450	11.9	<20.0
R-0033	274,579	4,909,582	11.1	<20.0
R-0036	274,599	4,909,833	<20.0	<20.0
R-0037	274,478	4,909,846	<20.0	<20.0
R-0038	274,660	4,909,786	<20.0	<20.0
R-0043	274,719	4,909,845	<20.0	<20.0
R-0048	274,743	4,909,843	<20.0	<20.0
R-0052	274,767	4,909,841	<20.0	<20.0
R-0057	274,803	4,909,831	<20.0	<20.0
R-0061	274,861	4,909,832	<20.0	<20.0
R-0064	274,895	4,909,823	<20.0	<20.0
R-0067	274,923	4,909,826	<20.0	<20.0
R-0068	274,947	4,909,832	<20.0	<20.0
R-0069	274,997	4,909,813	<20.0	<20.0
R-0071	274,956	4,909,689	<20.0	<20.0
R-0074	274,657	4,909,690	<20.0	<20.0
R-0076	274,770	4,909,647	<20.0	<20.0
R-0079	274,664	4,909,575	11.2	<20.0
R-0083	274,655	4,909,514	11.6	<20.0
R-0086	275,065	4,909,799	<20.0	<20.0
R-0090	275,160	4,909,735	<20.0	<20.0
R-0093	275,234	4,909,710	<20.0	<20.0
R-0096	275,163	4,909,657	<20.0	<20.0
R-0106	275,414	4,909,767	<20.0	<20.0
R-0109	275,464	4,909,799	<20.0	<20.0
R-0111	275,514	4,909,798	<20.0	<20.0
R-0113	275,572	4,909,792	<20.0	<20.0
R-0115	275,623	4,909,783	<20.0	<20.0
R-0117	275,736	4,909,781	<20.0	<20.0
R-0119	275,773	4,909,649	<20.0	<20.0
R-0126	275,790	4,909,604	<20.0	<20.0

Rec ID	X (UTM 16)	Y (UTM 16)	Day Sound	Night Sound
R-0128	275,704	4,909,608	<20.0	<20.0
R-0129	275,679	4,909,610	<20.0	<20.0
R-0131	275,636	4,909,610	<20.0	<20.0
R-0132	275,604	4,909,615	<20.0	<20.0
R-0135	275,597	4,909,571	11.1	<20.0
R-0137	275,635	4,909,568	11.1	<20.0
R-0138	275,686	4,909,559	11.1	<20.0
R-0147	275,166	4,909,528	14.4	<20.0
R-0149	275,294	4,909,563	14.1	<20.0
R-0150	275,325	4,909,512	14.4	<20.0
R-0152	275,318	4,909,476	14.7	<20.0
R-0155	275,314	4,909,428	15.0	<20.0
R-0157	275,353	4,909,596	11.0	<20.0
R-0159	275,404	4,909,551	14.1	<20.0
R-0160	275,391	4,909,493	14.5	<20.0
R-0162	275,381	4,909,448	14.8	<20.0
R-0163	275,378	4,909,406	15.1	<20.0
R-0164	275,906	4,909,397	16.4	<20.0
R-0166	275,982	4,909,507	14.0	<20.0
R-0167	276,033	4,909,475	15.9	<20.0
R-0168	276,089	4,909,428	16.2	<20.0
R-0169	276,213	4,909,411	16.2	<20.0
R-0170	276,146	4,909,473	15.8	<20.0
R-0173	276,118	4,909,507	13.9	<20.0
R-0175	276,098	4,909,541	<20.0	<20.0
R-0179	276,019	4,909,611	<20.0	<20.0
R-0191	275,947	4,909,791	<20.0	<20.0
R-0198	276,014	4,909,769	<20.0	<20.0
R-0203	276,142	4,909,777	<20.0	<20.0
R-0205	276,221	4,909,570	<20.0	<20.0
R-0207	276,918	4,909,660	<20.0	<20.0
R-0210	273,185	4,909,010	<20.0	<20.0
R-0212	273,155	4,909,063	<20.0	<20.0
R-0216	273,156	4,909,086	<20.0	<20.0
R-0217	273,157	4,909,115	<20.0	<20.0
R-0220	273,275	4,909,019	<20.0	<20.0
R-0221	273,387	4,909,025	<20.0	<20.0
R-0223	273,540	4,909,074	11.2	<20.0
R-0225	273,630	4,909,028	11.9	<20.0
R-0227	273,706	4,909,010	14.7	<20.0

Appendix A Saratoga Solar Project - Receptor Locations and Total Sound Results (Day and Night)

Rec ID	X (UTM 16)	Y (UTM 16)	Day Sound	Night Sound
R-0231	273,761	4,909,158	11.7	<20.0
R-0232	273,576	4,909,264	<20.0	<20.0
R-0233	273,867	4,909,205	11.9	<20.0
R-0239	274,020	4,909,254	12.1	<20.0
R-0242	274,127	4,909,256	12.4	<20.0
R-0244	274,193	4,909,226	16.5	<20.0
R-0246	274,302	4,909,264	17.5	<20.0
R-0247	274,353	4,909,263	17.7	<20.0
R-0250	274,440	4,909,259	17.9	<20.0
R-0252	274,408	4,909,204	18.2	<20.0
R-0256	274,499	4,909,098	20.3	<20.0
R-0257	274,428	4,908,993	21.7	<20.0
R-0258	274,386	4,908,990	21.6	<20.0
R-0264	273,952	4,909,429	<20.0	<20.0
R-0265	274,021	4,909,342	11.6	<20.0
R-0268	274,073	4,909,366	11.6	<20.0
R-0270	274,144	4,909,335	12.0	<20.0
R-0273	274,253	4,909,416	11.7	<20.0
R-0274	274,251	4,909,329	12.3	<20.0
R-0278	274,605	4,909,380	15.0	<20.0
R-0282	274,599	4,909,325	17.7	<20.0
R-0285	274,584	4,909,283	18.0	<20.0
R-0287	274,476	4,909,188	18.4	<20.0
R-0288	274,590	4,909,201	18.6	<20.0
R-0290	274,586	4,909,153	20.1	<20.0
R-0292	274,583	4,908,996	22.0	<20.0
R-0295	274,667	4,908,922	22.7	<20.0
R-0297	274,680	4,908,999	22.2	<20.0
R-0299	274,699	4,909,160	20.2	<20.0
R-0306	274,703	4,909,242	18.4	<20.0
R-0312	274,725	4,909,226	18.6	<20.0
R-0313	274,813	4,909,345	17.8	<20.0
R-0321	274,662	4,909,424	14.8	<20.0
R-0324	274,734	4,908,904	23.5	<20.0
R-0325	274,826	4,908,914	24.0	<20.0
R-0326	274,916	4,908,912	24.2	<20.0
R-0329	275,009	4,908,903	24.4	<20.0
R-0331	275,077	4,908,909	24.4	<20.0
R-0335	275,107	4,908,987	23.8	<20.0
R-0336	275,026	4,908,992	23.7	<20.0

Rec ID	X (UTM 16)	Y (UTM 16)	Day Sound	Night Sound
R-0338	274,937	4,909,027	22.9	<20.0
R-0340	274,846	4,909,012	22.3	<20.0
R-0341	274,756	4,908,998	22.3	<20.0
R-0345	274,948	4,909,323	18.0	<20.0
R-0348	275,090	4,909,175	21.3	<20.0
R-0350	275,209	4,909,196	21.2	<20.0
R-0351	275,207	4,909,147	21.6	<20.0
R-0353	275,324	4,909,340	15.6	<20.0
R-0355	275,324	4,909,304	19.5	<20.0
R-0358	275,315	4,909,271	20.8	<20.0
R-0360	275,308	4,909,220	21.1	<20.0
R-0362	275,314	4,909,175	21.4	<20.0
R-0364	275,302	4,909,142	21.7	<20.0
R-0367	275,300	4,909,103	21.9	<20.0
R-0368	275,332	4,909,080	22.1	<20.0
R-0369	275,361	4,909,085	22.1	<20.0
R-0371	275,375	4,909,119	21.8	<20.0
R-0372	275,376	4,909,151	21.6	<20.0
R-0374	275,379	4,909,189	21.3	<20.0
R-0376	275,377	4,909,233	21.0	<20.0
R-0377	275,389	4,909,275	19.7	<20.0
R-0379	275,388	4,909,317	19.4	<20.0
R-0380	275,386	4,909,361	15.4	<20.0
R-0382	275,466	4,909,125	21.7	<20.0
R-0383	275,565	4,909,308	19.5	<20.0
R-0387	275,770	4,909,369	17.7	<20.0
R-0393	275,814	4,909,197	20.2	<20.0
R-0395	275,735	4,908,947	24.5	<20.0
R-0398	275,688	4,908,993	23.7	<20.0
R-0401	275,640	4,908,951	24.1	<20.0
R-0402	275,591	4,908,961	24.0	<20.0
R-0404	275,511	4,908,965	24.0	<20.0
R-0406	275,472	4,908,908	24.8	<20.0
R-0410	275,637	4,908,900	24.8	<20.0
R-0415	275,746	4,908,788	25.9	<20.0
R-0418	275,862	4,908,864	25.0	<20.0
R-0419	275,870	4,908,979	23.7	<20.0
R-0423	275,911	4,909,112	21.6	<20.0
R-0425	275,901	4,909,245	19.8	<20.0
R-0426	275,987	4,909,355	17	<20.0

Appendix A Saratoga Solar Project - Receptor Locations and Total Sound Results (Day and Night)

Rec ID	X (UTM 16)	Y (UTM 16)	Day Sound	Night Sound
R-0429	276,173	4,909,327	16.8	<20.0
R-0431	276,639	4,908,982	20.1	<20.0
R-0437	277,069	4,908,995	18.0	<20.0
R-0440	273,090	4,908,794	<20.0	<20.0
R-0444	273,064	4,908,567	<20.0	<20.0
R-0447	273,209	4,908,616	11.5	<20.0
R-0450	273,175	4,908,754	<20.0	<20.0
R-0454	273,188	4,908,801	<20.0	<20.0
R-0457	273,165	4,908,860	<20.0	<20.0
R-0461	273,172	4,908,927	<20.0	<20.0
R-0463	273,300	4,908,927	<20.0	<20.0
R-0466	273,454	4,908,917	11.6	<20.0
R-0467	273,602	4,908,918	16.2	<20.0
R-0470	273,679	4,908,773	17.4	<20.0
R-0474	274,121	4,908,605	32.6	32.0
R-0478	274,236	4,908,495	33.7	33.0
R-0479	274,357	4,908,610	32.9	32.1
R-0485	274,236	4,908,876	26.8	25.1
R-0488	274,440	4,908,714	32.1	31.2
R-0490	274,572	4,908,714	32.1	31.2
R-0493	274,557	4,908,836	28.3	26.5
R-0495	274,697	4,908,841	28.0	25.7
R-0496	275,180	4,908,895	24.9	<20.0
R-0497	275,273	4,908,888	25.0	<20.0
R-0499	275,358	4,908,873	25.1	<20.0
R-0500	275,496	4,908,702	27.0	<20.0
R-0501	275,652	4,908,771	26.1	<20.0
R-0506	275,879	4,908,811	25.4	<20.0
R-0508	276,002	4,908,772	25.5	<20.0
R-0509	275,848	4,908,713	26.5	<20.0
R-0510	275,885	4,908,657	27.3	<20.0
R-0518	276,109	4,908,378	29.6	<20.0
R-0524	273,249	4,908,343	31.5	31.3
R-0527	273,160	4,908,221	31.8	31.6
R-0530	273,299	4,908,184	32.8	32.6
R-0532	273,147	4,908,054	32.7	32.5
R-0534	275,715	4,908,171	34.4	30.1
R-0536	275,981	4,908,280	30.9	<20.0
R-0540	276,219	4,908,160	32.0	<20.0
R-0541	276,277	4,908,147	31.9	<20.0

Rec ID	X (UTM 16)	Y (UTM 16)	Day Sound	Night Sound
R-0544	276,435	4,908,109	31.8	<20.0
R-0545	276,573	4,908,110	31.0	<20.0
R-0548	276,626	4,907,996	31.8	<20.0
R-0550	276,739	4,907,956	31.3	<20.0
R-0555	276,848	4,908,034	29.8	<20.0
R-0559	276,936	4,907,945	29.9	<20.0
R-0564	277,050	4,907,920	29.2	<20.0
R-0569	277,143	4,908,046	27.6	<20.0
R-0571	277,252	4,907,914	27.9	<20.0
R-0575	277,318	4,908,038	26.2	<20.0
R-0578	277,443	4,907,939	26.0	<20.0
R-0583	277,512	4,907,906	25.8	<20.0
R-0585	277,746	4,907,844	24.7	<20.0
R-0586	277,734	4,907,906	24.2	<20.0
R-0589	277,588	4,908,030	24.4	<20.0
R-0593	277,814	4,908,041	22.7	<20.0
R-0595	277,811	4,907,964	23.1	<20.0
R-0597	277,811	4,907,900	23.6	<20.0
R-0599	277,839	4,907,725	24.7	<20.0
R-0602	277,914	4,907,973	21.8	<20.0
R-0603	277,965	4,907,987	21.1	<20.0
R-0605	278,039	4,907,866	21.2	<20.0
R-0608	278,130	4,907,988	18.5	<20.0
R-0610	278,237	4,907,977	16.1	<20.0
R-0613	278,329	4,907,960	15.8	<20.0
R-0616	278,407	4,908,002	15.2	<20.0
R-0620	278,393	4,908,131	12.2	<20.0
R-0623	278,316	4,908,090	15.1	<20.0
R-0627	278,111	4,908,091	17.2	<20.0
R-0632	278,502	4,907,686	16.2	<20.0
R-0634	278,548	4,907,865	15.1	<20.0
R-0638	278,547	4,907,997	12.2	<20.0
R-0643	278,666	4,908,093	11.1	<20.0
R-0647	278,834	4,908,066	<20.0	<20.0
R-0651	279,013	4,908,053	<20.0	<20.0
R-0655	279,071	4,908,054	<20.0	<20.0
R-0658	279,083	4,907,955	<20.0	<20.0
R-0659	279,032	4,907,953	<20.0	<20.0
R-0663	278,965	4,907,966	<20.0	<20.0
R-0667	278,817	4,907,971	10.9	<20.0

Appendix A Saratoga Solar Project - Receptor Locations and Total Sound Results (Day and Night)

Rec ID	X (UTM 16)	Y (UTM 16)	Day Sound	Night Sound
R-0669	279,059	4,907,782	<20.0	<20.0
R-0672	279,127	4,908,140	<20.0	<20.0
R-0676	279,269	4,908,132	<20.0	<20.0
R-0680	279,661	4,908,014	<20.0	<20.0
R-0682	279,686	4,907,919	<20.0	<20.0
R-0686	279,703	4,907,739	<20.0	<20.0
R-0689	279,162	4,907,948	<20.0	<20.0
R-0700	279,223	4,907,968	<20.0	<20.0
R-0704	279,432	4,907,943	<20.0	<20.0
R-0706	279,513	4,907,943	<20.0	<20.0
R-0711	279,538	4,908,011	<20.0	<20.0
R-0714	279,429	4,908,019	<20.0	<20.0
R-0716	277,714	4,907,641	26.2	<20.0
R-0719	277,675	4,907,464	27.8	<20.0
R-0720	277,667	4,907,419	28.1	<20.0
R-0721	277,734	4,907,375	27.9	<20.0
R-0725	277,736	4,907,307	28.3	<20.0
R-0728	277,802	4,907,282	27.9	<20.0
R-0733	277,799	4,907,431	27.1	<20.0
R-0735	277,831	4,907,554	25.9	<20.0
R-0739	277,900	4,907,642	24.9	<20.0
R-0744	278,025	4,907,381	25.4	<20.0
R-0746	278,075	4,907,305	25.2	<20.0
R-0748	278,130	4,907,293	24.8	<20.0
R-0753	278,196	4,907,201	23.1	<20.0
R-0754	278,205	4,907,192	23.1	<20.0
R-0755	278,212	4,907,183	23.1	<20.0
R-0756	278,223	4,907,177	23.0	<20.0
R-0757	278,231	4,907,167	23.0	<20.0
R-0758	278,238	4,907,155	23.0	<20.0
R-0759	278,249	4,907,143	22.9	<20.0
R-0760	278,272	4,907,117	22.8	<20.0
R-0761	278,275	4,907,173	22.6	<20.0
R-0762	278,290	4,907,158	22.2	<20.0
R-0763	278,300	4,907,141	21.9	<20.0
R-0764	278,259	4,907,091	23.0	<20.0
R-0765	278,231	4,907,057	23.6	<20.0
R-0766	278,244	4,907,056	23.5	<20.0
R-0767	278,283	4,907,045	22.9	<20.0
R-0772	278,111	4,907,440	24.0	<20.0

Rec ID	X (UTM 16)	Y (UTM 16)	Day Sound	Night Sound
R-0774	278,536	4,907,524	16.7	<20.0
R-0776	278,502	4,907,402	18.3	<20.0
R-0780	278,538	4,907,256	18.5	<20.0
R-0781	278,608	4,907,169	17.4	<20.0
R-0784	278,612	4,907,465	16.4	<20.0
R-0785	278,633	4,907,474	16.2	<20.0
R-0786	278,629	4,907,566	15.9	<20.0
R-0790	279,033	4,907,156	12.2	<20.0
R-0792	279,216	4,907,158	11.0	<20.0
R-0794	279,311	4,907,531	<20.0	<20.0
R-0797	279,465	4,907,633	<20.0	<20.0
R-0799	279,530	4,907,143	<20.0	<20.0
R-0802	279,656	4,907,278	<20.0	<20.0
R-0806	279,726	4,907,597	<20.0	<20.0
R-0808	279,824	4,907,551	<20.0	<20.0
R-0814	279,886	4,907,287	<20.0	<20.0
R-0818	279,861	4,907,131	<20.0	<20.0
R-0821	277,869	4,907,203	27.8	<20.0
R-0823	277,825	4,907,126	28.6	<20.0
R-0828	277,955	4,907,137	27.3	<20.0
R-0829	277,812	4,907,028	29.2	<20.0
R-0833	277,839	4,906,976	29.2	<20.0
R-0835	277,795	4,906,929	29.9	<20.0
R-0837	277,825	4,906,886	29.7	<20.0
R-0841	277,780	4,906,750	30.7	<20.0
R-0844	277,983	4,906,914	27.8	<20.0
R-0850	278,515	4,906,746	20.8	<20.0
R-0855	278,519	4,906,896	20.6	<20.0
R-0858	278,529	4,906,985	19.9	<20.0
R-0859	278,525	4,907,047	19.8	<20.0
R-0861	278,538	4,907,099	19.6	<20.0
R-0863	278,593	4,907,055	19.3	<20.0
R-0866	278,595	4,907,018	19.3	<20.0
R-0868	278,608	4,906,936	19.4	<20.0
R-0872	278,870	4,906,642	15.9	<20.0
R-0874	278,795	4,906,761	16.4	<20.0
R-0878	278,702	4,906,845	17.1	<20.0
R-0882	279,067	4,907,035	12.2	<20.0
R-0884	279,199	4,907,065	11.2	<20.0
R-0886	279,206	4,906,847	11.4	<20.0

Appendix A Saratoga Solar Project - Receptor Locations and Total Sound Results (Day and Night)

Rec ID	X (UTM 16)	Y (UTM 16)	Day Sound	Night Sound
R-0890	279,258	4,906,662	11.0	<20.0
R-0894	279,612	4,906,660	<20.0	<20.0
R-0895	279,635	4,906,827	<20.0	<20.0
R-0897	279,485	4,906,966	<20.0	<20.0
R-0900	279,606	4,907,099	<20.0	<20.0
R-0903	279,742	4,907,110	<20.0	<20.0
R-0909	279,739	4,907,021	<20.0	<20.0
R-0912	279,726	4,906,613	<20.0	<20.0
R-0917	279,738	4,906,714	<20.0	<20.0
R-0918	279,723	4,906,734	<20.0	<20.0
R-0922	279,867	4,907,081	<20.0	<20.0
R-0924	279,855	4,906,989	<20.0	<20.0
R-0928	279,803	4,906,930	<20.0	<20.0
R-0931	279,800	4,906,892	<20.0	<20.0
R-0933	279,926	4,906,888	<20.0	<20.0
R-0937	279,815	4,906,777	<20.0	<20.0
R-0940	279,834	4,906,720	<20.0	<20.0
R-0945	279,824	4,906,598	<20.0	<20.0
R-0948	277,113	4,906,398	37.8	<20.0
R-0949	277,086	4,906,377	38.0	<20.0
R-0955	277,773	4,906,492	30.5	<20.0
R-0959	277,902	4,906,507	28.9	<20.0
R-0961	278,002	4,906,509	27.7	<20.0
R-0963	278,100	4,906,500	26.3	<20.0
R-0965	278,222	4,906,506	24.8	<20.0
R-0969	278,181	4,906,400	25.0	<20.0
R-0971	278,241	4,906,389	24.5	<20.0
R-0973	278,328	4,906,524	23.2	<20.0
R-0975	278,289	4,906,331	23.6	<20.0
R-0977	278,509	4,906,543	20.9	<20.0
R-0980	278,608	4,906,594	20.1	<20.0
R-0984	278,735	4,906,446	17.8	<20.0
R-0992	279,050	4,906,475	12.4	<20.0
R-0996	278,513	4,906,345	21.1	<20.0
R-0998	278,507	4,906,299	21.1	<20.0
R-1000	278,504	4,906,257	21.1	<20.0
R-1004	278,496	4,906,097	20.8	<20.0
R-1009	279,183	4,906,313	11.3	<20.0
R-1011	279,241	4,906,345	10.9	<20.0
R-1012	279,227	4,906,147	<20.0	<20.0

Rec ID	X (UTM 16)	Y (UTM 16)	Day Sound	Night Sound
R-1013	279,239	4,906,134	<20.0	<20.0
R-1014	279,254	4,906,120	<20.0	<20.0
R-1015	279,264	4,906,111	<20.0	<20.0
R-1016	279,272	4,906,101	<20.0	<20.0
R-1017	279,286	4,906,089	<20.0	<20.0
R-1019	279,525	4,906,409	<20.0	<20.0
R-1022	279,630	4,906,464	<20.0	<20.0
R-1029	279,718	4,906,399	<20.0	<20.0
R-1032	279,724	4,906,516	<20.0	<20.0
R-1035	279,803	4,906,515	<20.0	<20.0
R-1037	279,898	4,906,383	<20.0	<20.0
R-1039	280,133	4,906,405	<20.0	<20.0
R-1041	275,224	4,905,896	40.5	36.9
R-1045	275,755	4,905,722	36.9	32.2
R-1050	277,000	4,906,039	37.9	<20.0
R-1052	277,752	4,905,627	26.1	<20.0
R-1054	278,477	4,905,643	18.5	<20.0
R-1056	278,479	4,905,838	19.8	<20.0
R-1064	278,485	4,905,907	20.0	<20.0
R-1065	278,489	4,906,000	20.7	<20.0
R-1068	279,067	4,906,001	11.4	<20.0
R-1069	279,770	4,905,579	<20.0	<20.0
R-1072	279,778	4,905,737	<20.0	<20.0
R-1073	279,814	4,905,711	<20.0	<20.0
R-1074	279,840	4,905,684	<20.0	<20.0
R-1075	279,867	4,905,655	<20.0	<20.0
R-1077	279,893	4,905,625	<20.0	<20.0
R-1081	280,218	4,905,554	<20.0	<20.0
R-1084	280,285	4,905,560	<20.0	<20.0
R-1086	280,348	4,905,549	<20.0	<20.0
R-1088	280,288	4,905,636	<20.0	<20.0
R-1089	280,332	4,905,606	<20.0	<20.0
R-1091	279,898	4,905,713	<20.0	<20.0
R-1094	279,912	4,905,799	<20.0	<20.0
R-1095	279,930	4,905,776	<20.0	<20.0
R-1096	280,014	4,905,798	<20.0	<20.0
R-1097	279,974	4,905,829	<20.0	<20.0
R-1099	280,015	4,905,863	<20.0	<20.0
R-1100	279,968	4,905,912	<20.0	<20.0
R-1102	279,881	4,905,916	<20.0	<20.0

Appendix A Saratoga Solar Project - Receptor Locations and Total Sound Results (Day and Night)

Rec ID	X (UTM 16)	Y (UTM 16)	Day Sound	Night Sound
R-1104	271,884	4,905,479	<20.0	<20.0
R-1106	271,983	4,905,503	14.4	<20.0
R-1108	271,958	4,905,408	14.2	<20.0
R-1111	271,953	4,905,288	14.1	<20.0
R-1115	272,099	4,905,284	16.6	<20.0
R-1116	272,136	4,905,514	17.9	<20.0
R-1117	272,264	4,905,498	18.8	<20.0
R-1120	272,353	4,905,486	20.1	<20.0
R-1123	272,398	4,905,483	20.9	<20.0
R-1127	272,471	4,905,464	21.5	<20.0
R-1130	272,589	4,905,491	23.0	<20.0
R-1136	272,704	4,905,466	24.8	<20.0
R-1137	272,747	4,905,384	25.1	<20.0
R-1142	272,879	4,905,467	29.6	26.4
R-1145	272,994	4,905,437	31.9	29.8
R-1147	272,963	4,905,231	27.2	<20.0
R-1152	275,617	4,905,330	35.7	30.8
R-1154	275,710	4,905,204	32.5	<20.0
R-1158	275,739	4,905,476	35.7	31.0
R-1162	275,808	4,905,593	36.0	31.2
R-1165	275,823	4,905,427	33.9	25.1
R-1171	277,735	4,905,430	25.0	<20.0
R-1178	277,752	4,905,234	23.3	<20.0
R-1182	278,438	4,905,038	<20.0	<20.0
R-1183	278,382	4,905,110	14.3	<20.0
R-1187	278,442	4,905,234	14.6	<20.0
R-1195	278,457	4,905,330	16.4	<20.0
R-1197	278,469	4,905,402	17.7	<20.0
R-1199	278,534	4,905,252	14.2	<20.0
R-1201	279,236	4,905,235	<20.0	<20.0
R-1204	279,313	4,905,090	<20.0	<20.0
R-1206	279,418	4,905,121	<20.0	<20.0
R-1207	279,479	4,905,102	<20.0	<20.0
R-1208	279,756	4,905,062	<20.0	<20.0
R-1211	280,289	4,905,221	<20.0	<20.0
R-1213	280,266	4,905,071	<20.0	<20.0
R-1214	280,422	4,905,030	<20.0	<20.0
R-1217	280,487	4,905,016	<20.0	<20.0
R-1222	271,915	4,905,191	10.9	<20.0
R-1225	271,927	4,905,100	<20.0	<20.0

Rec ID	X (UTM 16)	Y (UTM 16)	Day Sound	Night Sound
R-1226	272,085	4,905,085	14.8	<20.0
R-1229	272,098	4,905,181	16.5	<20.0
R-1230	272,280	4,905,214	18.8	<20.0
R-1232	272,269	4,904,967	18.3	<20.0
R-1235	272,374	4,905,025	19.1	<20.0
R-1238	272,488	4,904,899	20.7	<20.0
R-1240	272,565	4,904,895	21.3	<20.0
R-1242	272,655	4,904,925	22.1	<20.0
R-1243	272,398	4,905,193	20.7	<20.0
R-1244	272,480	4,905,207	21.3	<20.0
R-1248	272,584	4,905,186	22.1	<20.0
R-1250	272,687	4,905,199	24.0	<20.0
R-1252	272,810	4,905,185	25.0	<20.0
R-1255	272,771	4,905,181	24.7	<20.0
R-1256	272,860	4,905,151	25.8	<20.0
R-1260	272,767	4,905,034	24.3	<20.0
R-1261	272,787	4,904,805	23.2	<20.0
R-1262	272,920	4,904,810	24.6	<20.0
R-1268	273,101	4,904,806	26.3	<20.0
R-1271	274,872	4,904,857	35.2	27.5
R-1274	274,943	4,904,675	31.8	<20.0
R-1276	275,219	4,904,819	32.6	<20.0
R-1278	275,181	4,904,647	30.7	<20.0
R-1280	275,415	4,904,711	30.4	<20.0
R-1283	275,483	4,904,696	29.9	<20.0
R-1284	275,519	4,904,754	30.2	<20.0
R-1285	275,472	4,904,929	32.2	<20.0
R-1289	275,612	4,904,953	31.4	<20.0
R-1293	275,703	4,904,803	29.6	<20.0
R-1295	275,786	4,904,894	29.9	<20.0
R-1298	275,824	4,904,897	29.6	<20.0
R-1301	275,933	4,904,907	29.2	<20.0
R-1304	275,961	4,904,595	26.1	<20.0
R-1308	276,020	4,904,607	26.0	<20.0
R-1310	276,966	4,904,670	21.9	<20.0
R-1311	277,120	4,904,596	20.6	<20.0
R-1314	277,205	4,904,936	24.1	<20.0
R-1316	277,618	4,904,831	21.3	<20.0
R-1318	277,457	4,904,781	21.6	<20.0
R-1323	277,316	4,904,752	21.8	<20.0

Appendix A Saratoga Solar Project - Receptor Locations and Total Sound Results (Day and Night)

Rec ID	X (UTM 16)	Y (UTM 16)	Day Sound	Night Sound
R-1327	277,285	4,904,632	20.4	<20.0
R-1333	277,605	4,904,623	17.9	<20.0
R-1335	278,156	4,904,894	14.4	<20.0
R-1339	278,314	4,904,885	<20.0	<20.0
R-1342	278,515	4,904,873	<20.0	<20.0
R-1347	279,442	4,904,865	<20.0	<20.0
R-1350	279,772	4,904,896	<20.0	<20.0
R-1352	279,943	4,904,747	<20.0	<20.0
R-1353	280,011	4,904,835	<20.0	<20.0
R-1358	280,165	4,904,927	<20.0	<20.0
R-1359	271,752	4,904,560	<20.0	<20.0
R-1360	272,686	4,904,603	21.1	<20.0
R-1363	272,773	4,904,563	21.5	<20.0
R-1364	272,830	4,904,595	22.3	<20.0
R-1366	272,952	4,904,589	23.4	<20.0
R-1369	272,693	4,904,451	20.4	<20.0
R-1372	272,851	4,904,374	21.0	<20.0
R-1375	272,835	4,904,465	21.4	<20.0
R-1378	272,933	4,904,485	22.7	<20.0
R-1380	272,954	4,904,367	21.9	<20.0
R-1381	273,043	4,904,206	21.4	<20.0
R-1387	273,301	4,904,415	25.2	<20.0
R-1389	273,466	4,904,400	26.2	<20.0
R-1392	273,461	4,904,238	24.6	<20.0
R-1395	273,696	4,904,211	25.8	<20.0
R-1397	273,920	4,904,210	26.4	<20.0
R-1402	274,895	4,904,360	28.4	<20.0
R-1404	274,856	4,904,573	30.8	<20.0
R-1409	274,985	4,904,301	27.5	<20.0
R-1411	275,108	4,904,260	26.8	<20.0
R-1414	275,186	4,904,439	28.3	<20.0
R-1417	275,357	4,904,248	25.9	<20.0
R-1420	275,468	4,904,249	24.9	<20.0
R-1423	276,899	4,904,175	<20.0	<20.0

Rec ID	X (UTM 16)	Y (UTM 16)	Day Sound	Night Sound
R-1429	277,129	4,904,351	17.4	<20.0
R-1434	277,124	4,904,124	<20.0	<20.0
R-1437	277,190	4,904,117	<20.0	<20.0
R-1439	277,211	4,904,323	14.4	<20.0
R-1440	277,268	4,904,519	19.7	<20.0
R-1457	277,384	4,904,505	17.9	<20.0
R-1461	277,453	4,904,414	14.4	<20.0
R-1463	277,542	4,904,327	<20.0	<20.0
R-1466	277,607	4,904,311	<20.0	<20.0
R-1468	277,289	4,904,166	<20.0	<20.0
R-1473	277,062	4,904,037	<20.0	<20.0
R-1477	277,508	4,904,162	<20.0	<20.0
R-1480	277,726	4,904,308	<20.0	<20.0
R-1482	273,253	4,903,778	17.8	<20.0
R-1484	273,439	4,903,994	22.1	<20.0
R-1487	273,638	4,904,072	24.1	<20.0
R-1490	276,502	4,903,978	<20.0	<20.0
R-1499	273,352	4,903,552	<20.0	<20.0
R-1501	273,430	4,903,549	11.0	<20.0
R-1505	273,548	4,903,554	14.1	<20.0
R-1508	273,380	4,903,423	<20.0	<20.0
R-1512	273,367	4,903,321	<20.0	<20.0
R-1514	273,393	4,903,219	<20.0	<20.0
R-1516	273,388	4,903,121	<20.0	<20.0
R-1519	278,112	4,902,606	<20.0	<20.0
R-1529	277,752	4,905,317	24.0	<20.0
R-1531	277,533	4,904,704	19.9	<20.0
R-1542	275,850	4,908,236	32.2	23.9
R-1543	275,852	4,908,294	30.9	<20.0
R-1544	275,882	4,908,237	31.6	17.3
R-1545	275,886	4,908,291	30.9	<20.0
R-1552	275,590	4,905,058	32.4	<20.0
R-1554	275,254	4,904,230	26.1	<20.0
R-1559	273,061	4,904,527	24.0	<20.0

APRIL 2022

APPENDIX B – PHOTO LOG OF MEASUREMENT LOCATIONS

ML-S-1



Instrument



North



East



South



West

ML-S-2



Instrument



North



East



South



West

ML-S-3



Instrument



North



East



South



West

ML-S-4



Instrument



North



East



South



West