EXHIBIT I – ANTICIPATED NOISE/INTERFERENCE WITH COMMUNICATION SIGNALS

As stated in the Arizona Corporation Commission Rules of Practice and Procedure R14-3-219: Describe the anticipated noise emission levels and any interference with communication signals which will emanate from the proposed facilities.

Introduction

A noise study was conducted to determine the potential noise impacts that would result from construction and operation of the proposed Project. The study involved conducting a noise survey to determine the current ambient noise levels. Noise due to construction and operation of Project was then modeled to determine additional noise impacts.

This exhibit provides background information on environmental sound, including descriptions of the sound metrics used throughout the report; applicable noise standards and regulations; the results of the ambient sound measurement program; and an assessment of the potential noise impacts from development and operation. Interference with communication signals is also evaluated.

Existing Sound Levels

The ambient noise in the vicinity of the Project Site is dominated by trains on the railroad located between the west edge of the Project and the community of Randolph, traffic noise from SR 87, existing industrial uses in the immediate vicinity, the existing Coolidge Generating Station, and agricultural activities on the Project Site and surrounding agricultural lands. To determine reasonable estimates for the existing noise levels in the vicinity of the Project, noise monitoring was conducted at locations in the surrounding area.

Ambient sound measurements were conducted from August 11 through August 13, 2021, to determine the existing soundscape in the vicinity of the Project, including the existing Coolidge Generating Station. All the sound measurements were collected using three Larson Davis Model 831c precision integrating sound-level meters that meet the ANSI Standards for Type 1 precision instrumentation at two long-term monitoring sites and nine short-term monitoring sites. During the measurement program, microphones were fitted with windscreens, and set upon a tripod approximately 5 feet above ground and located out of the influence of any reflecting surfaces. The sound analyzer was calibrated at the beginning and end of the measurement period. The sound level meters were programmed to sample and store A-weighted (dBA) and octave band-specific sound level data, including Equivalent Sound Level (L_{eq}) and Day-Night Average Sound Level (L_{dn}) sound levels.[5,6]

Results of the ambient sound survey indicate that daytime L_{eq} sound levels at the measurement locations ranged from 48.2 dBA in proximity to the west edge of the Project and 51.5 dBA at the east edge of the Project. The complete noise technical report for the Project, titled *Noise Technical Report for the Coolidge Expansion Project* and dated November 2021, is included as Exhibit I-1. Please refer to Exhibit I-1 for a complete list of all monitoring results at the short-term and long-term monitoring sites.

[5] The Leq is defined as the single sound pressure level that, if constant over the stated measurement period, would contain the same sound energy as the actual monitored sound that is fluctuating in level over the measurement period.

[6] The Ldn represents a 24-hour A-weighted sound level average where sound levels during the nighttime hours of 10:00 p.m. to 7:00 a.m. have an added 10 dB weighting.

Noise Impacts from Proposed Project

Noise levels resulting from construction and operation of the Project were evaluated with respect to noise guidelines and policies as established by Pinal County, Arizona, and Federal agencies. No federal laws, regulations, or standards that directly affect this Project with respect to noise were identified. However, there are guidelines at the federal level that direct the consideration of a broad range of noise issues. For example, the U.S. Environmental Protection Agency (EPA) has published a guideline that specifically addresses issues of community noise (EPA 1974). This guideline, commonly referred to as the "levels document," recommends a threshold for noise levels affecting residential land use of L_{dn} <55 dBA for exterior levels. Additionally, the Department of Housing and Urban Development's *Noise Guidebook,* Chapter 2, Section 51.101(a)(8), proposes that exterior areas of frequent human use follow the EPA's 55 L_{dn} threshold. However, the same Section indicates that a noise level of 65 dBA L_{dn} could be considered acceptable (HUD 2009).

Section 050306-ENO of the Pinal County Municipal Ordinance provides noise limits for excessive noise levels at specific identified land use areas. The Pinal County Municipal Ordinance only applies to unincorporated areas of the County. The City of Coolidge is an incorporated area but does not have an established noise regulation; therefore, the Pinal County Municipal Ordinance applies to the City of Coolidge. However, power plant equipment during normal operation is exempt from these noise limits, as described in 050306-ENO Section 9 – Exemptions. The Pinal County noise regulations are further discussed in the attached noise report (Exhibit I-1).

For purposes of conservative noise impact analysis with respect to anticipated Project operation, the suggested external noise thresholds of 55 dBA L_{dn}, was utilized.

Construction

Typical construction activities at the Project Site would result in a transient increase in the ambient noise level resulting from the operation of construction equipment, as the construction of the Project is expected to occur over a 3-year timeframe. The increase in noise level would be proportional to the distance to the noise source. The extent of the noise effects would depend on the type of construction activity, duration of the construction activity, and the distance between the noise source and receiver. It is anticipated that construction activities would take place during daylight hours (dawn to dusk) up to six days a week (Monday–Saturday).

Predicted construction-generated noise levels at nearby noise sensitive areas (NSAs) were calculated using the Federal Highway Administration's Roadway Construction Noise Model. Estimates of noise from the construction of the Project are based on a roster of the maximum amount of construction equipment used on a given day. Estimated noise levels from construction activities at the closest residential receptor from the center of the construction site were estimated to be approximately 56.8 dBA L_{eq} and 61.8 dBA L_{dn}. Construction noise impacts are further discussed in the attached noise report (Exhibit I-1).

Operations

To determine the potential noise impact from the expected operation of the proposed Project, detailed noise modeling was conducted. Exhibit I-1 provides detailed information on the inputs used to populate the refined model.

The SoundPlan Essential Model Version 5.1 (SoundPlan) was used to estimate sound levels from Project operation at noise sensitive receivers. SoundPlan assesses noise levels near industrial noise sources based on International Organization for Standardization (ISO) 9613-2 standard for noise propagation calculations. The SoundPlan model accounts for sound wave divergence and attenuation factors resulting from air absorption, ground coverage, and barrier and structure shielding.

Modeling included 16 GE LM6000 gas turbine generator packages, 16 SCR units, eight GSU transformers, and other ancillary equipment, such as lube oil fin-fan coolers, gas compressors, and auxiliary transformers. A complete list of equipment included in the model, assumptions, references, and calculation methods are included in Exhibit I-1.

The analysis shows that the sound levels emitted by the proposed Project will be less than 55 dBA L_{dn} at all evaluated noise receptors with exception of the closest sensitive receptor. The projected L_{dn} value at the closest sensitive receptor, residences south of the Project, is estimated to be 59.7 dBA when no background noise is included and 63.1 dBA when background noise is added, which is above the recommended 24-hour average day and night EPA-recommended value of 55 dBA L_{dn}.

The modeled noise levels were then added to the ambient noise levels that were measured to determine the potential cumulative effect the Project could present. The results of this analysis showed a change in noise levels that ranged from 0.5 to 2.6 dBA at the evaluated receptors. The human perception for change in sound level (i.e., potential increase above ambient) is estimated as 2.6 dBA. In general, an increase of 3 decibels (dB) or below is perceived by the human ear as barely noticeable. Therefore, the proposed operation would not result in a substantial permanent increase in ambient noise levels in the vicinity of the Project.

Corona Noise

Audible noise associated with transmission lines as a result of corona discharge is a function of line voltage. Transmission line audible noise is characterized by crackling, frying, sputtering, and low-frequency tones which are best described as humming sounds. Audible noise from transmission lines primarily occurs during foul weather conditions. Noise above existing ambient levels is not expected to occur outside the proposed transmission line right-of-way (ROW) for the Project.

Communication Interference

High-voltage transmission line radio frequency noise is not expected to be noticeable outside the immediate vicinity of the transmission lines. Radio interference is most likely to affect the amplitude modulation (AM) broadcast band; frequency modulation (FM) radio is rarely affected by transmission lines. Only AM receivers located immediately adjacent to the transmission line have the potential to be affected by radio interference, and the effect may only be significant during rainy weather.

The radiated noise field intensity diminishes with increasing frequency. At frequencies above 30 Megahertz, the radiated noise field intensity is so low it is difficult to detect. Therefore, FM radio reception and cellular telephone communication are above the frequency range where radio interference has been experienced with previous projects, and no objectionable interference is expected with any of the Project components. At the frequency range of FM radio or above, any rare instance of interference would generally be due to microsparks, which can be identified and corrected.

SRP utilizes field intensity instrumentation capable of measuring radiated noise and interference from 150 Kilohertz up to 1 Gigahertz. These instruments are used for investigating reports of unusual relatively high transmission line noise, as well as for compiling ambient noise level data.

Radio interference is expected to be minimal, due to the predominately industrial and suburban character of the area along the Project and the proposed ROW widths for the Project. Furthermore, SRP is ready to address radio interference resulting from construction and operation of the transmission line with corrective measures such as smoothing nicks on the conductor surface or tightening hardware. In addition to any transmission repairs, relevant corrective actions may include adjusting or modifying receivers; adjusting, repairing, replacing, or adding antennas; antenna signal amplifiers; filters or lead-in cables; or other corrective actions. Based on the design parameters and physical configuration of the proposed facilities for the Project, no objectionable noise and interference with radio signals is anticipated.

Conclusions

Predicted Project construction noise levels may temporarily exceed 55 dBA, but activities causing these temporary elevated noise levels could be permitted given prior written approval and will operate during allowable construction process hours as presented in Section 050306-ENO of the Pinal County Municipal Ordinance.

The noise impact assessment indicated that noise generated by the Project will be higher than 55 dBA L_{dn} at the nearest noise receptors. However, the noise impact from the Project alone at the nearest receptor (59.7 dBA L_{dn}) is lower than the ambient sound level measured at this same location under existing conditions (60.5 dBA L_{dn}).

The impact from the Project on the cumulative sound levels (ambient noise levels combined with the predicted noise levels generated by the Project) is estimated to yield an increase of 0.5 to 2.6 decibels over existing ambient noise levels at the nearest noise receptors. In general, a 3 dB increase is perceived by the human ear as barely noticeable. Therefore, the proposed addition of the Project will have a minimal noise impact on the nearest residential receptor in the vicinity of the Project.

Audible noise from transmission lines primarily occurs during foul weather conditions. Noise above existing ambient levels is not expected to occur outside the proposed transmission line ROW for the Project.

No objectionable noise and interference with radio signals is anticipated.

References

Environmental Protection Agency. 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. Available at: http://www.nonoise.org/library/levels/levels.htm/. Accessed October 2021.

Housing and Urban Development. 2009. HUD Noise Guidebook. Available at: https://www.hudexchange.info/resource/313/hud-noise-guidebook/. Accessed October 2021.

EXHIBIT I-1 – NOISE TECHNICAL REPORT FOR THE COOLIDGE EXPANSION PROJECT

This page intentionally left blank.

Noise Technical Report for the Coolidge Expansion Project

NOVEMBER 2021

PREPARED FOR

Salt River Project Power Generation

PREPARED BY

SWCA Environmental Consultants

NOISE TECHNICAL REPORT FOR THE COOLIDGE EXPANSION PROJECT

Prepared for

Salt River Project
1521 Project Drive
Tempe, Arizona 85281
Attention: William McClellan, Spence Wilhelm, and Joseph Gardner

Prepared by

SWCA Environmental Consultants
20 East Thomas Road, Suite 1700
Phoenix, Arizona 85012
www.swca.com

SWCA Project No. 65028

November 2021

CONTENTS

Appendices

Figures

Tables

1 INTRODUCTION

SWCA Environmental Consultants (SWCA) prepared this noise technical report in support of the proposed Coolidge Expansion Project. The project, an 820-MW generating facility, would be developed by Salt River Project Agricultural Improvement and Power District (SRP). The project would be located in Pinal County within the city of Coolidge at 859 East Randolph Road.

This report presents the analysis and noise impact estimates for the construction and operation of the Coolidge Expansion Project at noise sensitive areas (NSAs) to demonstrate that the proposed activities associated with this project will not result in a substantial permanent increase in ambient noise levels in the vicinity of the project.

2 PROJECT AND STUDY DESCRIPTION

Coolidge Generating Station is an existing electric generating facility that is owned and operated by SRP. The facility currently consists of 12 simple cycle combustion turbines (General Electric [GE] LM6000PC) and ancillary equipment that produce approximately 575 MW of electrical gross output at ISO conditions at project elevation. As a peaking facility, it runs only a limited amount of time when needed, up to the limit of its operating permits, to supplement base-load generation resources or firm renewable generation resources.

SRP proposes to expand the existing Coolidge Generating Station through the installation of equipment and facilities within the existing power plant boundary (95 acres) and the parcel directly to the south of the existing power plant (approximately 100 acres). The Coolidge Expansion Project will include the installation of GE LM6000PC combustion turbines with a nameplate capacity of approximately 820 MW.

Potential noise impacts from construction and operation of the project were evaluated by determining the projected increases over ambient conditions and potential exposure of sensitive receptors to excessive noise from the proposed noise-generating sources.

Construction of the Project will consist of earth work (e.g., site grading, clearing & grubbing) and construction of the site buildings, mechanical and electrical work. Predicted construction-generated noise levels at nearby NSAs were calculated using the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM). The RCNM is FHWA's national model for the prediction of construction noise

Among project components, the sources with potential to impact ambient noise levels are the 16 GE LM6000 gas turbine generator packages, 16 selective catalytic reduction (SCR) units, eight generator step-up (GSU) transformers, and other ancillary equipment, such as lube oil fin-fan coolers, gas compressors, and auxiliary transformers.

The noise impact evaluation for the operation of the project, provided herein, consists of computer noise modeling using SoundPLAN Essential Version 5.1 and assessment of the outputs as they pertain to the sound (noise) standards and nearest NSAs (i.e., nearest residences).

3 SOUND FUNDAMENTALS – BACKGROUND

Sound is defined as a form of energy that is transmitted by pressure variations, which the animal or human ear can detect. Noise can be defined as any unpleasant or unwanted sound that is unintentionally added to a desired sound or environment. The noise effects in humans include interference with communication, learning, rest, or sleep and physiological health effects.

There are two main properties of sound: the amplitude and the frequency. Amplitude refers to the level of energy that reaches the ear (how loud we perceive the sound), while frequency is the number of cycles or oscillations per unit of time completed by the source. Frequency is normally expressed in hertz (Hz).

Sound power is defined as the measurement of the ability of a source to make sound. It is independent of the acoustic environment in which is located. The sound power level (L_{pw}) of a source is the amount of energy it produces relative to a reference value and is normally expressed in decibels. The decibel is a logarithmic scale to describe the sound pressure ratio.

Humans perceive a frequency range of about 20 Hz to about 20,000 Hz. An internationally standardized frequency weighting, the A-weighting scale, was designed to approximate the audible range of frequencies of a healthy human ear. The A-weighting scale corresponds to the fact that the human ear is not as sensitive to sound at the lower frequencies as it is at the higher frequencies.

3.1 Definition of Acoustical Terms

A number of different descriptors of time-averaged sound levels are used to account for fluctuations of sound intensity over time. The sound descriptors calculated by the sound meters and used in this report to describe environmental sound are defined below. Additionally, the following acoustical terms are used throughout this analysis:

- Ambient sound level is defined as the composite of noise from all sources near and far, the normal or existing level of environmental noise at a given location.
- Decibel (dB) is the physical unit commonly used to measure sound levels. Technically, a dB is a unit of measurement that describes the amplitude of sound equal to 20 times the base 10 logarithm of the ratio of the reference pressure to the sound of pressure, which is 20 micropascals (µPa). In acoustics, sound levels represented in dB express the true unweighted noise level.
- Sound measurement is further refined by using a decibel A-weighted sound level (dBA) scale that more closely measures how a person perceives different frequencies of sound; the A-weighting reflects the sensitivity of the ear to low or moderate sound levels.
- Equivalent noise level (L_{eq}) is the energy average A-weighted noise level during the measurement period.
- The root-mean-squared maximum noise level (L_{max}) characterizes the maximum noise level as defined by the loudest single noise event over the measurement period.
- Day-night sound level (L_{dn}) is the A-weighted equivalent sound level for a 24-hour period with an additional 10 dB weighting imposed on the equivalent sound levels occurring during night-time hours (10 p.m. [22:00] to 7 a.m. [07:00]).
- Daytime Sound Level (L_d) is defined as the equivalent sound level for a 15-hour period between 7 a.m. (07:00) and 10 p.m. (22:00).
- Nighttime Sound Level (L_n) is defined as the equivalent sound level for a 9-hour period between 10 p.m. (22:00) and 7 a.m. (07:00).
- Residual sound level (L_{90}) is the level that is exceeded 90% of the time over a specified period. The residual sound level excludes intruding sound from sporadic anthropogenic noises, wildlife, and wind gusts that raise the average and maximum levels over a measurement period.

3.2 Sound Levels of Representative Sounds and Noises

The U.S. Environmental Protection Agency (EPA) has developed an index to assess noise impacts from a variety of sources using residential receptors. If L_{dn} values exceed 65 dBA, residential development is not recommended (EPA 1979). Noise levels in a quiet rural area at night are typically between 32 and 35 dBA. Quiet urban night-time noise levels range from 40 to 50 dBA.

Noise levels during the day in a noisy urban area are frequently as high as 70 to 80 dBA. Noise levels above 110 dBA become intolerable; levels higher than 80 dBA over continuous periods can result in hearing loss. Levels above 70 dBA tend to be associated with task interference. Levels between 50 and 55 dBA are associated with raised voices in a normal conversation.

Table 1 presents sound levels for some common noise sources and the human response to those decibel levels.

Table 1. Sound Levels of Representative Sounds and Noises

Source and Distance	Sound Level (dBA)	Human Response
Jet takeoff (nearby)	150	
Jet takeoff (15 m/50 feet)	140	
50-hp siren (30 m/100 feet)	130	
Loud rock concert (near stage)	120	Pain threshold
Construction noise (3 m/10 feet)	110	Intolerable
Jet takeoff (610 m/2,000 feet)	100	
Heavy truck (8 m/25 feet)	90	
Garbage disposal (0.6 m/2 feet)	80	Constant exposure endangers hearing
Busy traffic	70	
Normal conversation	60	
Light traffic (30 m/100 feet)	50	Quiet
Library	40	
Soft whisper (4.5 m/15 feet)	30	Very quiet
Rustling leaves	20	
Normal breathing	10	Barely audible
Threshold of hearing	0	

Source: Beranek (1988).

Table 2 provides criteria that have been used to estimate an individual's perception of increases in sound. In general, an average person perceives an increase of 3 dBA or less as barely perceptible. An increase of 10 dBA is perceived as a doubling of the sound.

Table 2. Average Human Ability to Perceive Changes in Sound Levels

Increase in Sound Level (dBA)	Human Perception of Sound
2–3	Barely perceptible
5	Readily noticeable
10	Doubling of the sound
20	Dramatic change

Source: Bolt Beranek and Newman, Inc. (1973).

4 EXISTING CONDITIONS

4.1 Existing Land Use and Site Conditions

The project area is located within the Lower Colorado River Valley subdivision of the Sonoran Desertscrub Biotic Community with an elevational range of approximately 1,440 to 1,451 feet above mean sea level (amsl). The project area is located 0.3 mile east of Arizona State Route 87/Arizona State Route 287, 0.3 mile south of East Randolph Road, and 0.1 mile north of East Kleck Road. The project area is bordered by North Vail Road on the east. An existing transmission line runs north-south just outside the west project boundary, and Union Pacific Railroad tracks run parallel to the west boundary, approximately 0.03 mile west of the project area. Land uses in the surrounding area include agriculture, residential, and industrial development.

The mean annual temperature is 70 degrees Fahrenheit (°F) with average maximum temperatures ranging from 66°F to 106°F and average minimum temperatures from 36°F to 76°F. Average annual precipitation is only 9 inches. Most of the precipitation occurs during the winter from December through March and during the “monsoonal” months of July and August (U.S. Climate Data 2021).

4.2 Existing Sound Conditions

4.2.1 *Measurement Locations*

SWCA performed an ambient noise survey from August 11 through 13, 2021. The purpose of the survey was to characterize the noise environment in the vicinity of the project. Monitoring locations are mapped on Figure 1 and are listed below in Table 3. Appendix A provides photographs of the long-term monitoring locations.

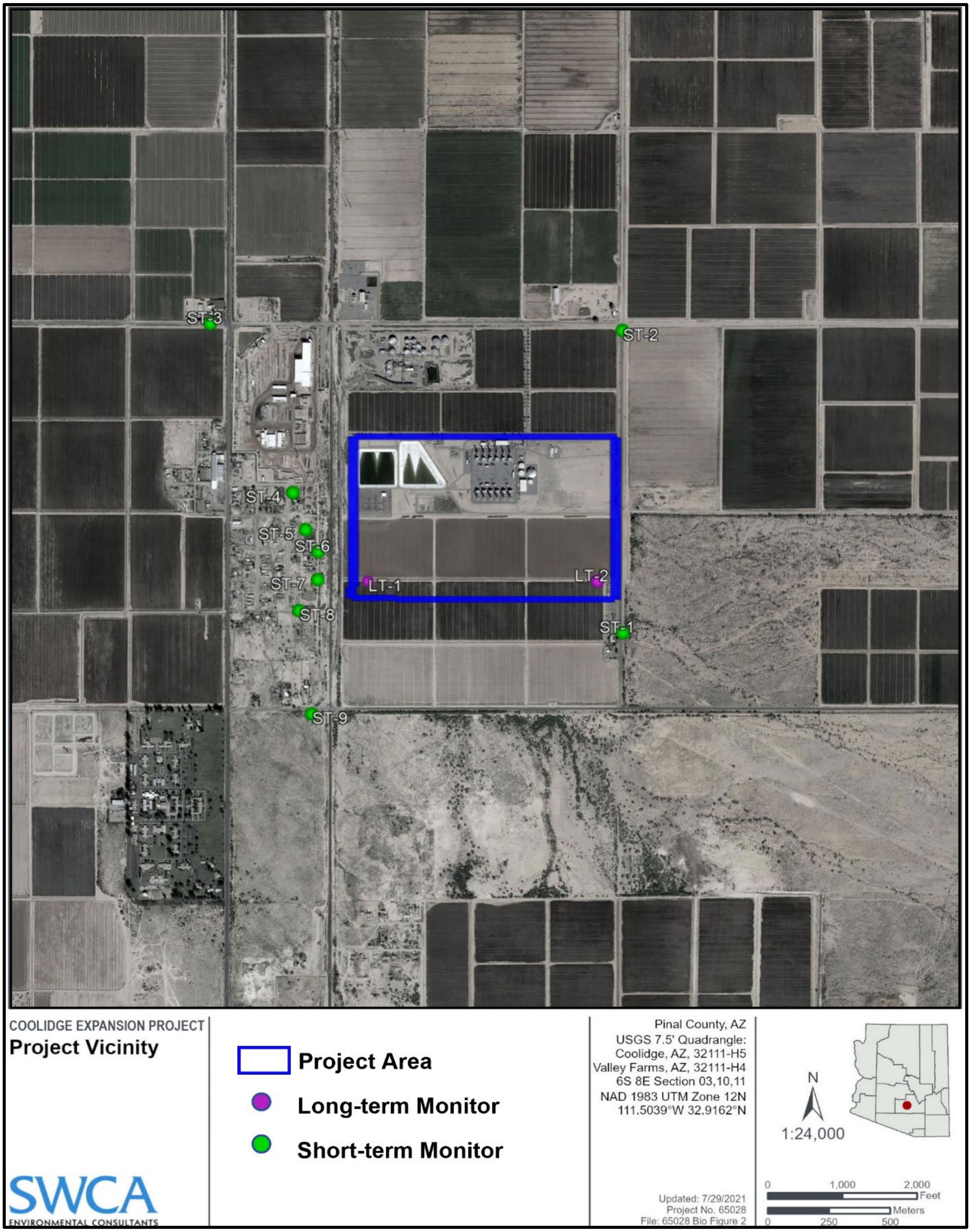

Figure 1. Local area map.

Table 3. Monitoring Locations

Monitor	Monitor Location		Elevation (feet amsl)
	Latitude	Longitude	
LT-1 – West property boundary	32°54'48" N	111°30'32" W	1,445
LT-2 – East property boundary	32°54'48" N	111°29'56" W	1,451
ST-1 – 5310 N Vail Road	32°54'41" N	111°29'52" W	1,441
ST-2 – 4490 N Vail Road	32°55' 22" N	111°29'52" W	1,441
ST-3 – 134 W Randolph Road	32°55'23" N	111°30'57" W	1,449
ST-4 – 4103 N Kennedy Street	32°55'00" N	111°30'44" W	1,448
ST-5 – 3975 N Kennedy Street	32°54'55" N	111°30'42" W	1,445
ST-6 – 5177 E Malcolm X Street	32°54'52" N	111°30'40" W	1,450
ST-7 – 3766 E Newman Street	32°54'48" N	111°30'40" W	1,450
ST-8 – E Bell Street and Hudges Street	32°54'44" N	111°30'43" W	1,450
ST-9 – 5160 E Kleck Road	32° 54'30" N	111°30'41" W	1,449

4.2.2 *Instrument Description*

Noise measurements were collected using three Larson Davis Precision Integrating Sound Level Meter Model 831C meeting the requirements of the American National Standards Institute (ANSI 2013), three PCB PRM831 preamplifiers, and three PCB 377B02 free-field microphones as described in Table 4. Two sets of instrumentation were used at the two long-term monitoring locations, and one set of instrumentation was used for all of the short-term locations.

Each microphone was fitted with an environmental windscreen and bird spikes and set up on a tripod at a height of 5 feet (1.5 m) above ground and placed as far from the influence of vertical reflective sources as possible. All cables were secured to prevent any sounds due to wire movement. All clocks associated with the sound measurement were synchronized using the Larson Davis G4 LD Utility software.

Table 4. Instrumentation

Monitoring Location	Sound Level Meter	Preamplifier	0.5-inch free-field microphone
LT-1	Larson Davis 831C (S/N 0010737)	PRM831 (S/N 58504)	377B02 (S/N 311602)
LT-2	Larson Davis 831C (S/N 0010739)	PRM831 (S/N 58503)	377B02 (S/N 311601)
ST-1, ST-2, ST-3, ST-4, ST-5, ST-6, ST-7, ST-8, ST-9	Larson Davis 831C (S/N 0011451)	PRM831 (S/N 19221)	377B02 (S/N 329129)

Note: S/N = Serial Number.

4.2.3 *Calibration Checks*

The sound level meters were calibrated at the beginning and end of the measurement period using a Larson Davis Model CAL200 Precision Acoustic Calibrator. The Larson Davis CAL200 emits a 1-kHz tone at 114 dB against which the response can be checked. The calibrator has been designed for both field and laboratory use, and the accuracy has been calibrated to a reference traceable to the National Institute of Standards and Technology.

As recommended by Larson Davis, when using a free-field microphone, the pressure level at the microphone diaphragm will be slightly different. Thus, a free field correction of -0.12 dB was applied to the 114.0-dB tone. Thus, the calibration level was set to 113.88 dB. All Larson Davis 831 models showed a response of less than the normal error of 0.50 dB.

4.2.4 *Meteorological Data*

Approximately 48 hours of noise data were collected during the survey and validated against weather data from the Coolidge Station (KAZCOOLI22) located approximately 4.6 miles east of the Project. Survey weather conditions are presented in Table 5.

Table 5. Weather Conditions for August 11 through August 13, 2021

Weather Station	Monitoring Start	Monitoring End	Wind Speed (mph)		Temperature (°F)		Humidity (% relative humidity)	
			Range	Avg.	Range	Avg.	Range	Avg.
Coolidge Station	8/11/2021 11:30	8/13/2021 14:41	0–7	2.9	73–95	84.6	43–85	63

Note: mph = miles per hour; avg. = average.

The American Society for Testing and Materials (ASTM) Standard Guide for Measurement of Outdoor A-Weighted Sound Levels (ASTM 2012) specifies that data should not be used when steady wind speeds exceed 20 km per hour (12.4 miles per hour). No data points were removed from the long-term or short-term sound data sets due to high-wind events.

4.2.5 *Existing Sound Levels*

In order to determine the baseline or ambient sound levels experienced near the project area and at the closest noise-sensitive areas, ambient sound surveys were performed of the area. Long-term and short-term sound monitoring was conducted from August 11 to 13, 2021, to document the acoustic environment in the area surrounding the proposed Project. Table 6 summarizes the measured A-weighted L_{eq}, L_{90}, and L_{dn} (calculated from the measured L_{eq}) for each of the monitoring locations.

Existing conditions at the short-term sound monitoring sites are better represented by the L_{90} parameter. As defined above, the 90th percentile-exceeded sound level, L_{90}, is a metric that indicates the single sound level that is exceeded during 90% of a measurement period although the actual instantaneous sound levels fluctuate continuously.

The L_{90} sound level is typically considered the ambient sound level, as it quantifies the acoustical character of an environment and represents the residual (i.e., ambient) sound level between discrete sound events of short duration, such as bird chirps, dog barks, car horns, etc. The measured L_{90} time intervals are arithmetically averaged to present the background levels of the environment for day and night.

Table 6. Summary of Ambient Sound Measurements

Monitoring Location	Monitoring Start	Monitoring End	Elapsed Time	Measured Sound Levels*				
				L_{eq}	L_{90}	L_{dn}	L_{d}	L_{n}
LT-1 – West property boundary	8/11/2021 12:33	8/13/2021 14:19	48:38	**48.2**	43.0	55.2	47.5	49.0
LT-2 – East property boundary	8/11/2021 13:38	8/13/2021 14:41	48:05	**51.5**	46.8	60.5	46.4	54.9
ST-1 – 5310 N Vail Road	8/13/2021 15:08	8/13/2021 15:32	00:23	43.9	**36.5**	–	43.9	–
ST-2 – 4490 N Vail Road	8/13/2021 14:30	8/13/2021 15:00	00:29	52.1	**41.2**	–	52.1	–
ST-3 – 134 W Randolph Road	8/12/2021 15:17	8/12/2021 15:49	00:32	73.2	**45.0**	–	73.2	–
ST-4 – 4103 N Kennedy Street	8/12/2021 15:57	8/12/2021 16:22	00:25	48.7	**39.7**	–	48.7	–
ST-5 – 3975 N Kennedy Street	8/12/2021 16:33	8/12/2021 16:51	00:18	42.8	**38.3**	–	42.8	–
ST-6 – 5177 E Malcolm X Street	8/13/2021 15:44	8/13/2021 16:05	00:21	44.3	**40.1**	–	44.3	–
ST-7 – 3766 E Newman Street	8/13/2021 16:12	8/13/2021 16:32	00:20	46.1	**40.6**	–	46.1	–
ST-8 – E Bell Street and Hudges Street	8/13/2021 16:56	8/13/2021 17:22	00:26	48.7	**44.8**	–	48.7	–
ST-9 – 5160 E Kleck Road	8/13/2021 17:30	8/13/2021 17:54	00:24	74.7	**38.4**	–	74.7	–

* Data derived from the average 1-hour L_{eq} calculated by logarithmic averaging the number of sound measurements taken at each specific hour.

Measurement duration was sufficient to ensure natural variation in sound levels and meteorological conditions were covered. Observed sources of background sound that contributed to the existing sound level at the monitoring locations included road traffic, birds, insects, trains, and airplanes.

Table 7 provide the sound levels assumed to represent the baseline sound levels at the project area.

Table 7. Representative Ambient Sound Levels

Parameter	Calculated L_{eq} Total (dBA)	Community Sound Level (dBA)		
		L_{day}	L_{night}	L_{dn}
LT-1 (August 11–13, 2021, survey)*	**48.2**	47.5	49.0	55.2
LT-2 (August 11–13, 2021, survey)*	**51.5**	46.4	54.9	60.5

* L_{eq} and L_{dn} values were estimated from L_{day} and L_{night} values.

These sound levels would occasionally increase due to passing vehicular or railroad traffic. There were also temporary increases in the existing sound level from farm equipment (e.g., tractors) used to grow and harvest crops and to raise cattle and other farm animals, or from other commercial or industrial sources identified in the analysis area. During the noise measurements any identifiable dominant background noise source, based on observations of the field technician, was noted. Field data sheets were completed for each measurement and are provided in Appendix B of this report.

4.2.6 *Nearest Receptor Sites*

Noise-sensitive areas generally are defined as locations where people reside or where the presence of unwanted sound may adversely affect the existing land use. Typically, noise-sensitive land uses include residences, hospitals, places of worship, libraries, performance spaces, offices, and schools, as well as nature and wildlife preserves, recreational areas, and parks. The closest receptor is a residence approximately 488 feet south of the nearest project boundary.

4.3 Regulatory Setting

4.3.1 *Federal*

In 1974 the EPA published *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin on Safety*. In this publication, the EPA evaluated the effects of environmental noise with respect to health and safety and determined an L_{dn} of 55 dBA (equivalent to a continuous noise level of 48.6 dBA) to be the maximum sound level that will not adversely affect public health and welfare by interfering with speech or other activities in outdoor areas.

4.3.2 *State*

No applicable noise regulations were identified for the project.

4.3.3 *Local*

4.3.3.1 PINAL COUNTY

The Pinal County Excessive Noise Ordinance (Section 050306-ENO) prescribes noise limits along property boundaries according to the land use category as shown in Table 8. The Pinal County Municipal Ordinance applies to unincorporated areas of the County. The City of Coolidge is an incorporated area but does not have an established noise regulations applicable to this project, so the Pinal County Municipal Ordinance applies to the City of Coolidge.

Table 8. Limiting Sound Levels for Land Use Districts

Zoning District Classifications	L_{eq} Limits
Residential: CR-1A, CR-1, CR-2, CR-3, CR-4, CR-5, OS, MH, RV, MHP, PM/RVP, TR	60 dBA (7 a.m.–8 p.m.) 55 dBA (8 p.m.–7 a.m.)
Commercial or Business: CB-1, CB-2	65 dBA (7 a.m.–10 p.m.) 60 dBA (10 p.m.–7 a.m.)
Industrial: CI-B, CI-1, CI-2	70 dBA (7 a.m.–10 p.m.) 65 dBA (10 p.m.–7 a.m.)
Rural: CAR, SR, SR-1, SH, GR, GR-5, GR-10	65 dBA (7 a.m.–9 p.m.) 60 dBA (9 p.m.–7 a.m.)

Source: Pinal County (2011).

Note: The L_{eq} limits specified are L_{eq} for a 2-minute time interval. Partial L_{eq} levels may be obtained as necessary to assure an accurate indication of the representative sound environment for the site.

Sound projected from property within one zoning district into property within another zoning district of a lesser sound level limit shall not exceed such lesser sound level limit.

Power plant equipment during normal operation is exempt from these noise limits, as described in 050306-ENO Section 9 – Exemptions.

Additionally, 050306-ENO does not limit noise from construction but does limit the allowed operation times for construction to occur to the following:

- Concrete Work – 5:00 a.m. to 7:00 p.m. from April 15 to October 15 and 6:00 a.m. to 7:00 p.m. from October 16 to April 14.
- Other Types of Construction – 6:00 a.m. to 7:00 p.m. from April 15 to October 15 and 7:00 a.m. to 7:00 p.m. from October 16 to April 14.
- Construction and repair work in non-residential areas, not within 500 feet of a residential property, shall not begin prior to 5:00 a.m. and must stop by 7:00 p.m. or at such other times as authorized by permit.
- Weekends and Holidays Excluded – Construction or repair work shall be limited to 7:00 a.m. to 7:00 p.m. and concrete pouring shall be limited to 6:00 a.m. to 7:00 p.m.+

Construction outside the time periods specified above is allowed if an appropriate permit has been obtained beforehand from the country.

4.3.3.2 CITY OF COOLIDGE

No applicable noise regulations were identified for the project.

5 NOISE IMPACTS

The following section provides results and interpretation of potential impacts from noise generated by the project during construction and operation phases.

5.1 Noise Assessment Components

A noise assessment is based on the following components: a sound-generating source, a medium through which the source transmits, the pathways taken by these sounds, and an evaluation of the proximity to NSAs. Soundscapes are affected by the following factors:

- Source. The sources of sound are any generators of small back-and-forth motions (i.e., motions that transfer their motional energy to the transmission path where it is propagated). The acoustic characteristics of the sources are very important. Sources must generate sound of sufficient strength, approximate pitch, and duration so that the sound may be perceived and can cause adverse effects, compared with the natural ambient sounds.
- Transmission path or medium. The transmission path or medium for sound or noise is most often the atmosphere (i.e., air). For the noise to be transmitted, the transmission path must support the free propagation of the small vibratory motions that make up the sound. Atmospheric conditions (e.g., wind speed and direction, temperature, humidity, precipitation) influence the attenuation of sound. Barriers and/or discontinuities (e.g., existing structures, topography, foliage, ground cover, etc.) that attenuate the flow of sound may compromise the path. For example, sound will travel very well across reflective surfaces such as water and pavement but can attenuate across rough surfaces (e.g., grass, loose soil).
- Proximity to NSAs. An NSA is defined as a location where a state of quietness is a basis for use or where excessive noise interferes with the normal use of the location. Typical NSAs include

residential areas, parks, and wilderness areas, but also include passive parks and monuments, schools, hospitals, churches, and libraries.

5.2 Construction Noise

The noise levels generated by construction equipment vary significantly and depend on a number of different parameters, such as the type, model, size, and condition of the equipment; the operation schedule; and the condition of the area being worked. Additionally, construction projects are accomplished in several different stages. Each stage has a specific equipment mix, depending on the work to be completed. Construction of the project facility is expected to occur over a 3-year timeframe. Typical construction activities would take place during daylight hours (dawn to dusk) up to six days a week (Monday–Saturday). The following sections estimate noise levels related to the construction of the project.

5.2.1 *Equipment and Machinery*

Construction is expected to occur in phases between the years of 2022 and 2025. These phases are expected to include initial sitework and mobilization, material deliveries, earthwork and underground utilities, foundation work, equipment and mechanical work, electrical work, startup/commissioning, operational testing, and final grading/paving. During these construction phases, different equipment will be required on-site that will result in varying emission rates due to construction activities. Noise levels for typical construction equipment that would likely be used at the project are in the approximately 70 to 90 dBA range at a distance of 50 feet, as shown in Table 9.

Table 9. Noise Levels for Common Construction Equipment

Equipment Type	Typical Maximum Noise Levels at 50 Feet (dBA)
Backhoe	80
Belly Dump	76
Compactor	83
Concrete Telebelt	81
Crane	81
Drill Rig	79
Dozer	82
Excavator	81
Forklift	85
Flatbed	74
Grader	85
Generator	81
Loader	79
Scraper	84
Tractor	84
Trencher	80
Truck	75

Source: RCNM Software Version 1.1 (FHWA 2011). Table based on EPA report and measured data.

Construction noise levels were estimated using the RCNM. The RCNM is FHWA's national model for the prediction of construction noise. This software is based on actual sound level measurements from various equipment types taken during the Central Artery/Tunnel Project conducted in Boston, Massachusetts, during the early 1990s (FWHA 2011).

Estimates of noise from the construction of the project are based on a roster of the maximum amount of construction equipment used on a given day. Table 9 showed a list of typical construction equipment and the noise level at 50 feet. The RCNM has noise levels for various types of equipment preprogrammed into the software; therefore, the noise level associated with the equipment is typical for the equipment type and not based on any specific make or model.

The RCNM assumes that the maximum sound level for the project (L_{max}) is the maximum sound level for the loudest piece of equipment. The approximate noise generated by the construction equipment used at the facility has been conservatively calculated based on an estimated project construction equipment roster projected to be used at the construction site, and not considering further attenuation due to atmospheric interference or intervening structures.

The equipment and activities on-site would vary throughout the project, depending on various stages of construction. The predicted noise from construction activity is presented as a worst-case (highest noise level) scenario, where it is assumed that all equipment is present and operating simultaneously on-site for the construction phase. Therefore, noise levels at various distances from the center of the construction site can be predicted and are shown in Table 10.

Table 10. Predicted Construction Noise Levels

Distance (feet)	Construction L_{eq} (dBA)	Construction L_{max} (dBA)*
25	97.2	97.0
50	91.2	91.0
100	85.2	85.0
200	79.1	79.0
250	77.2	77.0
500	71.2	71.0
1,000	65.2	65.0
2,000	59.1	59.0
4,000	53.1	52.9
5,000	51.2	51.0

* Calculated L_{max} is the loudest individual value.

Estimated noise levels from construction activities at the closest NSA from the center of the construction site were estimated to be approximately 56.8 dBA L_{eq} and 61.8 dBA L_{dn}. Regarding the human perception for change in sound level (i.e., potential increase above ambient), is estimated as 5.3 dBA, perceived by the human ear as readily noticeable.

Construction is transient in nature and noise levels vary depending on the activity in progress. Noise impacts to residents due to the construction of the Project would be temporary and intermittent.

5.3 Operational Noise

To determine the potential noise impact from these sources, detailed noise modeling was conducted. The noise levels at the identified NSAs in the vicinity of the project from the operation of the GE LM6000 PC SPRINT NxGen combustion turbine generators have been predicted and compared with the relevant noise criteria, including the EPA's L_{dn} of 55 dBA at residential NSAs.

5.3.1 *Operational Activities*

The primary noise sources anticipated due to operation of the proposed power plant are 16 GE LM6000 gas turbine generator packages, 16 SCR units, eight GSU transformers, and other ancillary equipment, such as lube oil fin-fan coolers, gas compressors, and auxiliary transformers. Secondary noise sources are anticipated to include miscellaneous pumps, fans, and compressors. The combustion turbines are housed in a metal enclosure to protect the units from the elements and for noise reduction.

5.3.2 *Noise Profile*

The sound power level (L_{pw}) for each equipment noise source is listed in Table 11. These equipment sound level specifications are provided from the vendors based on standard GE LM6000 PC SPRINT NxGen combustion turbine generator packaged equipment. All equipment sound levels were estimated based on available data from the equipment manufacturers or obtained from other sources or calculations where manufacturer's data were not available.

Table 11. Equipment Sound Power Levels

Project Component	Sound Power Level (dB) at Octave Band Center Frequency (Hz)									Total Sound Power Level (dBA)
	31.5	63	125	250	500	1,000	2,000	4,000	8,000	
Ammonia Skid	90	90	87	89	86	85	80	85	78	90
Auxiliary Skid with Enclosure	84	87	98	93	89	90	88	82	74	95
Combustion Air Inlet Filter	102	102	98	92	87	87	85	83	72	93
Exhaust Expansion Joint	100	101	98	97	95	92	89	87	78	98
Filter House Shell Surface Break-out	105	98	95	70	60	51	59	68	70	81
Gas Compressor Skid	100	101	103	106	103	102	98	95	92	107
Generator Enclosure	107	106	106	94	89	90	86	77	77	95
Generator Ventilation Exhaust	99	96	109	103	93	100	99	100	89	106
GSU Transformer	98	100	106	102	104	93	89	85	82	103
Intake Silencer Shell Break-out	102	98	89	87	86	88	89	84	81	94
Lube Oil Fin-fan Cooler	107	108	101	98	96	92	89	85	78	98
SCR Duct Breach Section	104	99	92	88	77	62	58	55	43	82
SCR Duct Carbon Monoxide Section Sides	106	101	94	90	81	66	62	60	49	85
SCR Duct Carbon Monoxide Section Top	106	101	95	91	82	67	63	61	49	86
SCR Duct SCR Section	106	101	94	90	80	64	60	57	46	85
SCR Duct Section 1 Sides	112	97	81	74	62	45	36	28	13	76

Project Component	Sound Power Level (dB) at Octave Band Center Frequency (Hz)									Total Sound Power Level (dBA)
	31.5	63	125	250	500	1,000	2,000	4,000	8,000	
SCR Duct Section 1 Top	113	105	96	92	83	68	64	62	51	87
SCR Duct Section 2 Sides	115	107	98	94	85	70	66	64	53	89
SCR Duct Section 2 Top	115	107	98	94	85	70	66	64	53	89
SCR Duct Section 3 Sides	114	106	97	93	84	69	65	63	52	88
SCR Duct Section 3 Top	114	106	97	93	84	69	65	63	52	88
SCR Tempering Air Fan Casing	91	91	94	94	91	90	89	84	78	95
SCR Tempering Air Fan Inlet	98	98	100	96	95	94	89	87	82	98
Stack Casing Lower Portion	99	100	98	94	84	72	68	65	54	88
Stack Casing Lower Silencer Portion	100	100	96	92	81	64	60	57	47	86
Stack Casing Upper Portion	100	98	87	67	47	40	39	48	46	75
Turbine Enclosure	108	105	101	95	91	84	85	87	83	95
Turbine Exhaust Stack Exit with SCR and Silencer	130	127	115	100	85	81	78	85	82	104
Turbine Vent Exhaust	103	104	96	91	77	75	74	68	59	86
Turbine Vent Motor and Fan Surface	101	98	99	99	91	89	84	85	80	96

Source: ATCO (2008).

5.3.3 *Assessment Methodology*

Based on the sound power levels for each of the sources, SoundPLAN estimates noise contours of the overall project in accordance with a variety of standards, primarily International Standards Organization (ISO) 9613-2:1996, Acoustics, standards for noise propagation calculations. All sound propagation losses, such as geometric spreading, air absorption, ground absorption, and barrier shielding, are calculated in accordance with these recognized standards.

The model accounts for reflection, from adjacent structures and the ground. The model uses industry-accepted propagation algorithms and accepts sound power levels (in dB) provided by the manufacturer and other sources. The calculations account for classical sound wave divergence, plus attenuation factors resulting from air absorption, basic ground effects, and barrier/shielding. SoundPLAN does not account for noise modulation or refraction.

The sound propagation model considers the following influences:

- sound power levels and locations of noise sources
- distance between noise sources and receivers
- topography of the area
- influence of the absorption provided by the ground
- shielding from structures or vegetation
- air absorption
- meteorological conditions

The ISO 9613-2 methodology provides tables and equations for estimating the atmospheric absorption coefficient corresponding to various temperatures and humidity levels. For estimating noise levels at the NSAs the annual average temperature of 70°F for Coolidge, Arizona, a relative humidity of 4%, and an air pressure of 1013 millibars were employed. Topographic inputs were also included in the model. Calculations were performed using octave band sound power spectra as inputs for each noise source.

The ISO 9613-2 standard estimates sound pressure levels at a specified distance by subtracting the attenuation factors from the source sound power level for each source in octave frequency bands. Attenuation factors include geometrical divergence, atmospheric attenuation, ground effect, and barrier attenuation. These terms are defined as follows.

Geometrical divergence occurs as the source sound power is spread out over an increasing surface area (i.e., as the distance from the source increases). The estimated loss rate is the same for all frequencies. This is considered the most significant loss associated with propagation. Attenuation due to geometrical divergence is highly dependent on the distance between the source and the receiver. Direction also affects the noise level; 0° direct line of sight noise level will be higher than 90° direction line of sight to a stack emission point. Therefore, the differences in ground elevation and receiver height and hub height (source height) are important parameters. Losses due to atmospheric attenuation occur as the energy in the sound wave is transformed to heat. As this attenuation is frequency dependent and high frequencies are more readily attenuated than low frequencies, these losses are highly influenced by humidity and temperature. Ground effect is described according to the parameter Ground Factor, which varies between 0 for surfaces with low porosity (“hard” ground) and 1 for “soft” ground (surfaces including loose dirt, grass, crops, and other vegetation). This factor describes the effect of sound waves reflected off the ground. Parameters influencing the ground effect are the source height, receiver height, and propagation distance between the source and receiver and the ground conditions. Barrier attenuation describes the effect of sound waves refracted around an imperforate element or barrier. A barrier could include human-made objects such as structures, buildings, and fences, as well as topographical features. Therefore, the differences in ground elevation, source height, receiver height, dimensions, and location absorption and reflection coefficients of human-made structures and topographic features are important parameters when estimating barrier attenuation in SoundPLAN.

The following assumptions were made when running SoundPLAN:

- Noise impact calculations were performed using octave band data from 31 Hz to 8 kHz.
- The model assumed all proposed noise-generating sources operated concurrently.
- Noise impacts at the NSAs and depicted in the isopleths were estimated assuming a receiver height of 5 feet above ground level.
- Elevations of the sources and of the receptors examined in the modeling were determined from U.S. Geological Survey Digital Elevation Map (DEM) and are based on North American Datum of 1927. The DEM files each had a 100-foot resolution (7.5-minute DEM providing coverage of 7.5 × 7.5-minute blocks).
- Atmospheric attenuation was modeled using annual average conditions for Coolidge, Arizona (i.e., temperature of 70°F and 4% humidity).
- To better represent the actual conditions of the proposed project and to ensure that both hard and soft ground absorption were considered, acoustically hard sites including surfaces such as pavement and bare hard ground were assumed to have high reflectivity properties and a ground absorption coefficient of 0.0 was used. Ground cover in the vicinity of the project was analyzed using satellite imagery from Google Earth. A higher ground factor of 1.0 was defined for more

absorptive ground, such as vegetation and loose soil. Semi-hard materials such as gravel and sand were assumed to have a ground absorption coefficient of 0.6.

- The project was assumed to operate 24 hours per day, so the average noise output would be essentially constant regardless of time of day. The noise attenuation model was set up to represent worst-case noise conditions.

5.3.4 *Operational Noise Impacts*

Calculations were performed using linear octave band power levels as inputs from each noise source. Summaries of the sound propagation model results are presented in the following sections.

5.3.4.1 SOUND LEVELS AT THE NEAREST RECEPTORS

The acoustic model calculated the sound propagation from the project site to the surrounding area based on the sound levels listed in Table 11. The noise impact of the project at the closest noise receptors as described in Section 4.2 is presented in this section.

The predicted sound levels at each evaluated receptor are shown in Table 12. As shown in Table 7, the existing noise levels at the analyzed receptors are over EPA's recommended 55 dBA L_{dn} level. The proposed project is expected to emit operational sound levels that are below existing background sound levels.

Table 12. Estimated Sound Levels

Receptor	Predicted Sound Levels from Project		Measured Background Noise		Cumulative Noise Levels		Potential Noise Increase	
	L_{eq}	L_{dn}	L_{eq}	L_{dn}	L_{eq}	L_{dn}	L_{eq}	L_{dn}
	dBA	dBA	dBA	dBA	dBA	dBA	dBA	dBA
5310 N Vail Road	53.3	59.7	51.5	60.5	55.5	63.1	4.0	2.6
4490 N Vail Road	46.5	52.9	51.5	60.5	52.7	61.2	1.2	0.7
134 W Randolph Road	39.6	46.0	48.2	55.2	48.8	55.7	0.6	0.5
4103 N Kennedy Street	46.4	52.8	48.2	55.2	50.4	57.2	2.2	2.0
3975 N Kennedy Street	46.5	52.9	48.2	55.2	50.4	57.2	2.2	2.0
5177 E Malcolm X Street	47.2	53.6	48.2	55.2	50.7	57.5	2.5	2.3
3766 E Newman Street	47.1	53.5	48.2	55.2	50.7	57.4	2.5	2.2
E Bell Street and Hudges Street	46.7	53.1	48.2	55.2	50.5	57.3	2.3	2.1
5160 E Kleck Road	46.2	52.6	48.2	55.2	50.3	57.1	2.1	1.9

The projected L_{dn} value at the closest sensitive receptor, a residence south of the project, is estimated to be 63.1 dBA when background noise is added, which is above the recommended 24-hour average day and night value of 55 dBA L_{dn}. It is important to note that noise generated from power plant equipment during normal operation is exempt from the noise limits described in Pinal County Ordinance 050306-ENO Section 7.

Regarding the human perception for change in sound level (i.e., potential increase above ambient), is estimated as 2.6 dBA, perceived by the human ear as barely noticeable. Therefore, the proposed operation would not result in a substantial permanent increase in ambient noise levels in the vicinity of the project.

A contour (isopleth) grid map was generated by SoundPLAN software and is presented in Appendix C. The map depicts the extent of noise propagation from the SoundPLAN models that were developed for the noise impact assessment. The noise contour maps illustrate the extent of noise associated with the proposed development. It is important to note that the extent of the impacts depicted in these figures does not include the contribution of the existing background noise.

5.3.5 *Corona Noise*

Operation noise outputs of transmission lines are minimal and generally limited to corona noise and the occasional maintenance vehicle surveying the transmission line. Corona is the ionization of the air that occurs at the surface of the energized conductor and suspension hardware because of very high electric field strength at the surface of the metal during certain conditions.

Corona generates audible noise during operation of high-voltage transmission lines. Under certain conditions, the localized electric field near an energized conductor can be sufficiently concentrated to produce a tiny electric discharge that can ionize air close to the conductors. This partial discharge of electrical energy is called corona discharge, or corona. Several factors, including conductor voltage, shape, diameter, and surface irregularities such as scratches, nicks, dust, or water drops, can affect a conductor's electrical surface gradient and its corona performance. Corona is the physical manifestation of energy loss and can transform discharge energy into very small amounts of sound, heat, and chemical reactions of the air components.

Audible noise from the line can barely be heard in fair weather conditions on higher voltage lines. During wet weather conditions (such as rain or fog), water drops collect on the conductor and increase corona activity so that a crackling or humming sound may be heard near the line. This noise is caused by small electrical discharges from the water drops. However, during heavy rain, the ambient noise generated by the falling raindrops will typically be greater than the noise generated by corona.

5.3.6 *Communication Interference*

Transmission line corona effects associated with the proposed project could interfere with amplitude modulation (AM) radios in vehicles, but only when those vehicles travel under or near the line. Additionally, only AM receivers located very near to transmission lines that are tuned to a weak station have the potential to be affected by radio interference. AM radio frequency interference typically dissipates rapidly with increasing distance from the line. Frequency modulation (FM) radio is rarely affected by corona because corona-generated radio frequency noise currents decrease in magnitude with increasing frequency.

Television reception in local homes is not expected to change as a result of the proposed project. The closest residential receptor is located approximately 465 feet west of the proposed transmission line, and all residences within 1 mile of the route are closer to the existing 500-kV transmission lines than they would be to the proposed project. It is logical to assume that if residents at any of these locations are not currently experiencing interference from the existing lines, they will not experience interference from the more distant line.

Rural residents are more likely to be receiving television by satellite than broadcast in any case. Satellite television frequencies are higher than transmission line frequencies and are not affected by transmission line operation or corona. Cable television service is equally unaffected.

Similarly, wireless computer networks such as Wi-Fi or wireless local area networks operate at high frequencies in the tens to hundreds of megahertz (MHz) or gigahertz (GHz) and use digital coding of the signals. As a result of the high frequencies used by these devices, modulation and processing techniques, effects from interference are unlikely.

Transmission lines do not interfere with cellular phone tower operations or microwave communication paths. This is demonstrated by the fact that cellular phone antennae and microwave receivers are commonly mounted on transmission structures receive the benefits of the additional height provided by the structures.

6 LITERATURE CITED

American National Standards Institute (ANSI). 2013. *Quantities and Procedures for Description and Measurements with an Observer Present – Part 3: Short-term Measurements with an Observer Present, ANSI/ASA S12.9-2013/Part 3.* American National Standards Institute, Inc.

American Society for Testing and Materials (ASTM). 2012. *E1014-12, Standard Guide for Measurement of Outdoor A-Weighted Noise levels*. West Conshohocken, Pennsylvania: American Society for Testing and Materials International.

ATCO. 2008. *Noise Impact Assessment, Coolidge Generating Station, Coolidge, Arizona.* ATCO. June.

Beranek, L.L. (ed.). 1988. *Noise and Vibration Control*. Washington, D.C.: Institute of Noise Control Engineering

Bolt Beranek and Newman, Inc. 1973. *Fundamentals and Abatement of Highway Traffic Noise*. Report Number PB-222-703. Prepared for U.S. Department of Transportation, Federal Highway Administration. Bolt Beranek and Newman, Inc.

Federal Highway Administration (FHWA). 2011. Roadway Construction Noise Model (RCNM). Software Version 1.1. Federal Highway Administration.

Pinal County. 2011. Municipal Ordinance No. 050306-ENO: Regulation of Excessive Noises.

U.S. Climate Data. 2021. *Climate Coolidge – Arizona*. Available at: https://www.usclimatedata.com/climate/coolidge/arizona/united-states/usca0332. Accessed November 18, 2021.

U.S. Environmental Protection Agency (EPA). 1979. Protective Noise Levels, Condensed Version of EPA Levels Document. Available at: http://www.nonoise.org/library/levels/levels.htm.

APPENDIX A

Long-Term Monitoring Location Photographs

Photo A-1. Monitoring Location LT-1.

Photo A-2. Monitoring Location LT-2.

APPENDIX B

Daily Field Data Sheets

Baseline Noise Survey
LT-1 Monitoring Locations

Location: LT-1

Coordinates	Lat:	32 54'45" N			
	Lon:	111 30'32"W			
	Elevation (ft):	940			
Sound Meter	Model :	LD 831C	**Preamplifier**	Model :	PRM831
	S/N:	0010739		S/N:	58504
Microphone	Model :	377B02			
	S/N:	311602			
Monitoring	Start Time:	12.33	**Calibrations**	Pre-Test:	-0.04
	End Time:	2:19		Stop	0.03
				Post-Test:	-0.03

Location Description
West property boundary

Parameter	Value
Duration hh:mm	48:38:00
Memory	99%
Overall Laeq	48.20

Log:

Event	Day	Time	Comment (Dominant Background Noise Source)
			Quiet agricultural setting.

APPENDIX C

Project Operation Isopleths

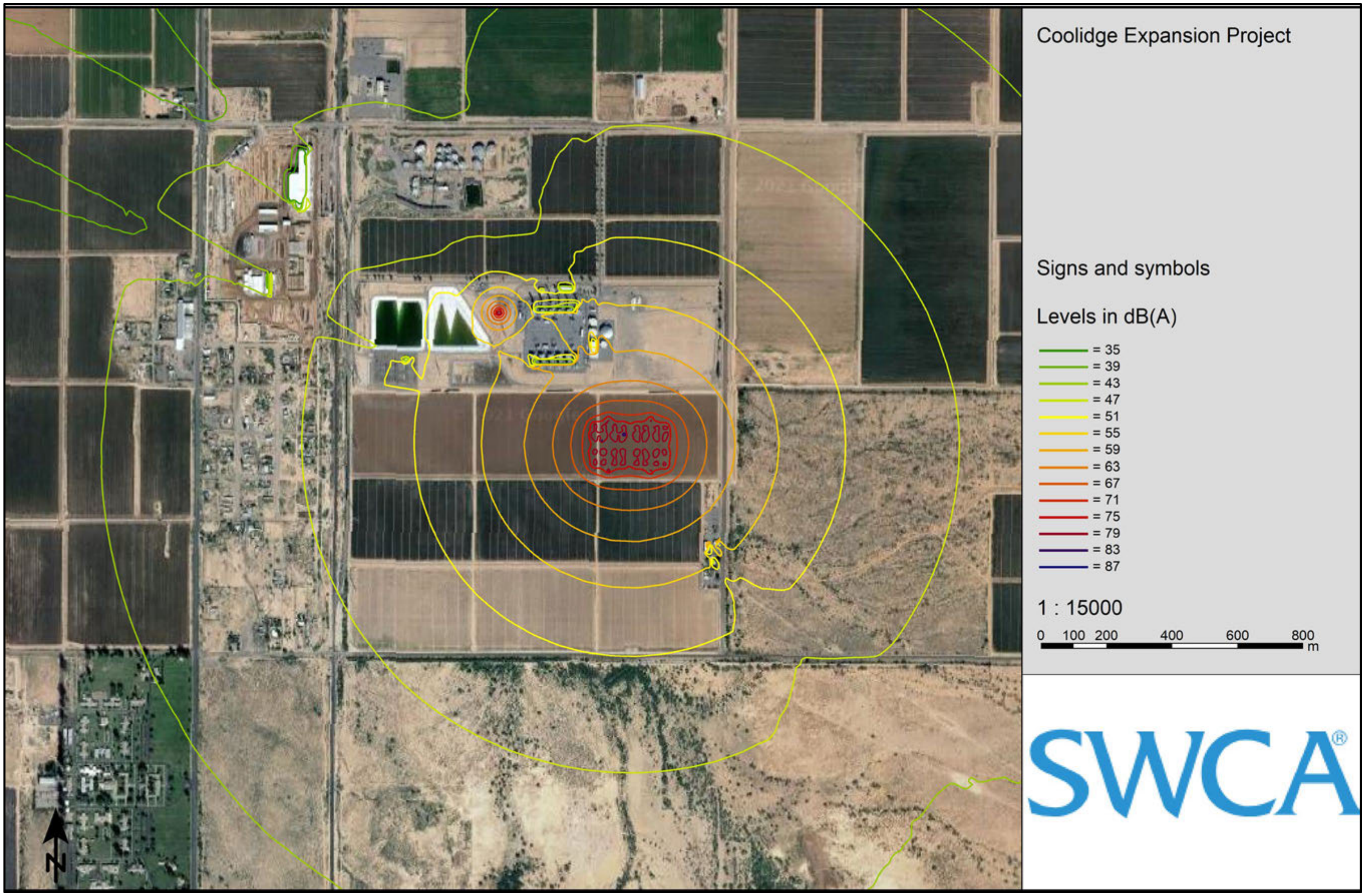

Figure C-1. Project operation noise isopleth.

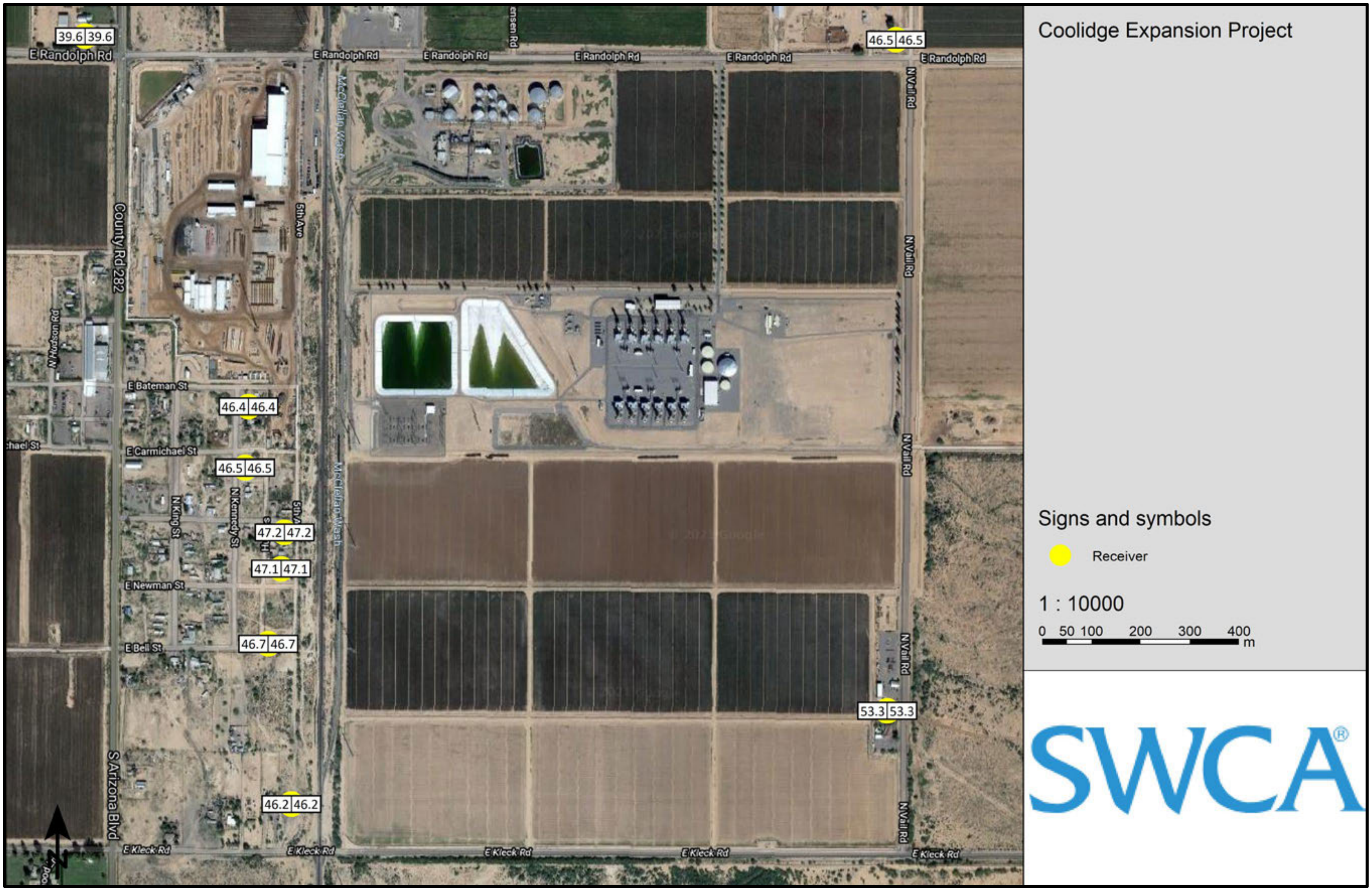

Figure C-2. Project operation noise – single point map.