ENVIRONMENTAL IMPACT ANALYSIS

4.10 NOISE

Acronyms

dB	decibel
dBA	A-weighted decibel
CadnaA	Decibel Computer Aided Noise Abatement
Cal/OSHA	California Division of Occupational Safety and Health
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CNEL	Community Noise Equivalent Level
EIR	Environmental Impact Report
Hz	Hertz
In/s	Inches per second
In/s2	Inches per second squared
L	Sound level
LdB	Sound level Decibel
LFG	Landfill gas
Leq	Energy equivalent sound level
Ldn	Day/night average sound level
Lmax	A-weighted noise level during the measurement period
Lmin	Computer Aided Noise Abatement Minimum A-weighted noise level during the measurement period
OSHA	Occupational Safety and Health Administration
PPA	Peak particle acceleration
PPV	Peak particle velocity
P-waves	Primary or compression waves
R-waves	Rayleigh waves
S-waves	Secondary or shear waves
SB	Senate Bill
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency

4.10.1 Environmental Setting

4.10.1.1 Terminology and Fundamentals of Environmental Acoustics

The decibel (dB) is the preferred unit used to measure sound levels utilizing a logarithmic scale to account for large ranges in audible sound intensities. A general rule for the decibel scale is that a ten dB increase in sound is perceived as a doubling of loudness by the human ear. For example, a 55 dB sound level will sound twice as loud as a 45 dB sound level. The average healthy person cannot detect differences of one dB whereas a five dB change is clearly noticeable.

Several sound measurement descriptors are used to assess the effects of sound on the human environment. These include the energy equivalent sound level (Leq,) which is the level of a constant sound that has the same sound energy as the actual fluctuating sound. It is similar to the average sound level. The day-night sound level, (Ldn,) is similar to the 24-hour Leq except that a ten dB penalty is added to sound levels between 10:00 pm and 7:00 am to account for the greater sensitivity of people to sound at night. The Community Noise Equivalent Level (CNEL) also places a weighted factor on sound events occurring in the evening hours. The L90 value is the sound level (L) that is exceeded 90 percent of the time and is often used to describe the background or residual sound level.

Acoustics is defined as the science of sound, including the generation, transmission, and effects of sound waves, both audible and inaudible. Noise, on the other hand, is generally defined as loud, unpleasant, unexpected or undesired sound that disrupts or interferes with normal human activities. Although exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to environmental noise is annoyance. The objectionable nature of sound is caused by its pitch or loudness. Pitch is the height or depth of a tone or sound wave, depending on the relative rapidity (frequency) of the sound vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. Loudness is intensity of sound waves combined with the reception characteristics of the ear. Intensity is a measure of the amplitude or height of the sound wave. Frequency describes the sound's pitch and is measured in Hertz (Hz), while intensity describes the sound's loudness and is measured in dB.

The dB is the preferred unit for measuring sound that indicates the relative amplitude (height) of a particular sound wave. The zero (0) on the decibel scale is based on the lowest sound level that a healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic scale. Thus, an increase of ten dB represents a ten–fold increase in acoustic energy, while a 20 dB increase is 100 times more intense, and a 30 dB increase is 1,000 times more intense. There is a direct relationship between the subjective noisiness or loudness of a sound and its intensity. Each ten dB increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. The A–weighted decibel (dBA) is a method of sound measurement, which assigns weighted values to selected frequency bands in an attempt to reflect how the human ear responds to sound. Definitions of common acoustical terms are summarized below in **Table 33**. The range of human hearing is from zero dBA (the threshold of hearing) to about 140 dBA which is the threshold of pain. Examples of noise and their dBA levels are shown in **Table 34**. In general, a three to five dBA change in community noise levels starts to become noticeable, while one to two dBA changes are generally not perceived. Quiet suburban areas typically have noise levels in the range of 40–50 dBA, while those along arterial streets are in the 50–60 dBA or greater range. Normal conversational levels are in the 60–65 dBA ranges.

In addition to the actual instantaneous measurements of sound levels, the duration of sound is important since sounds that occur over a long period of time are more likely to be an annoyance or cause direct physical damage or environmental stress. To analyze the overall noise levels in an area, noise events are combined for an instantaneous value or averaged over a specific time period. The time–weighted measure is referred to as equivalent sound level and represented by).Leq The percentage of time that a given sound level is exceeded also can be designated as L10, L50, and L90. The subscript denotes the percentage of time that the noise level was exceeded during the measurement period. Namely, an L10 indicates the sound level is exceeded ten percent of the time and is generally taken to be indicative of the highest noise levels experienced at the proposed Project Site. The L90 is that level exceeded 90 percent of the time and this level is often called the base level of noise at a location. The L50 sound (that level exceeded 50 percent of the time) is frequently used in noise standards and ordinances.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within ±1 dBA. The data is then imported into computer sound models. These computer models are used to predict environmental noise levels from sources such as roadways and airports over a given area using equal sound level contours. The accuracy of the predicted models depends upon the distance the receptor is from the noise source and natural attenuation caused by structures and other sound barriers. The closer to the noise source, the greater is the model’s accuracy (±1–2 dBA).

Since the sensitivity to noise increases during the evening and at night (because excessive noise interferes with the ability to sleep) 24–hour descriptors have been developed that incorporate artificial noise penalties that are added to quiet–time noise events. The CNEL is a measure of the cumulative noise exposure in a community during a 24–hour period. The Ldn is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three–hour period are grouped into the daytime period.

Noise sources occur in two forms: 1) point sources, such as stationary equipment, loudspeakers, or individual motor vehicles; and 2) line sources, such as a roadway with a large number of point sources (motor vehicles). Sound generated by a point source typically diminishes (attenuates) at a rate of six dBA for each doubling of distance from the source to the receptor at acoustically “hard” sites and 7.5 dBA at acoustically “soft” sites (United States Department of Transportation [USDOT], Federal Highway Administration. For example, a 60 dBA noise level measured 50 feet from a point source at an acoustically hard site would be 54 dBA 100 feet from the source and 48 dBA 200 feet from the source. Sound generated by a line source typically attenuates at a rate of three dBA and 4.5 dBA per doubling of distance from the source to the receptor for hard and soft sites, respectively. Sound levels can also be attenuated by man-made or natural barriers. Solid walls, berms, or elevation differences typically reduce point and line source noise levels by five to ten dBA (USDOT, FHWA, 2006). Sound levels for a source may also be attenuated three to five dBA by a first row of houses and 1.5 dBA for each additional row of houses (T.M. Barry and J.A. Reagan, 1978).

Table 33 Definitions of Acoustical Terms

Terms	Definitions
dB, Decibel	Unit of measurement of sound level
dBA, decibel A-Weighted	A unit of measurement of sound level corrected to the A–weighted scale, as defined in ANSI S1.4–1971 (R1976), using a reference level of 20 micropascals (0.00002 Newtons per square meter).
A – Weighted Scale	A sound measurement scale, which corrects the pressures of individual frequencies according to human sensitivities. The scale is based upon the fact that the region of highest sensitivity for the average ear is between 2,000 and 4,000 Hz. Sound levels are measured on a logarithmic scale in decibels, dB. The universal measure for environmental sound is the A–weighted sound level, dBA.
Hz, Hertz	Unit of measurement of frequency, numerically equal to cycles per second.
Loudness	A listener's perception of sound pressure incident in his ear.
L01, L10, L50, L90	The A–weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Leq, Equivalent Noise Level	Also called the equivalent continuous noise level. It is the continuous sound level that is equivalent, in terms of noise energy content, to the actual fluctuating noise existing at the location over a given period, usually one hour. Leq is usually measured in hourly intervals over long periods in order to develop 24–hour noise levels.
CNEL, Community Noise Equivalent Level	The CNEL is a measure of the cumulative noise exposure in the community, with greater weights applied to evening and night time periods. This noise descriptor is the equivalent noise level over a 24–hour period mathematically weighted during the evening and night when residents are more sensitive to intrusive noise. The daytime period is from 7:00 am to 7:00 pm; evening from 7:00 pm to 10:00 pm; and nighttime from 10:00 pm to 7:00 pm. A weighting factor of one dB is added to the measured day levels defined as 7:00 am to 7:00 pm, evening levels (7:00 pm to 10:00 pm) have a weighting factor of three and ten dB to the night time levels (10:00 pm to 7:00 am). The weighted levels over a 24–hour period are then averaged to produce the single number CNEL rating.
Ldn, Day/Night Noise Level	The same as CNEL except that the evening time period is not considered separately, but instead it is included as part of the daytime period. Measurements of both CNEL and Ldn in the same residential environments reveal that CNEL is usually slightly higher (by less than one dB) than Ldn due to the evening factor weighting.
Lmin, Lmax	The minimum and maximum A–weighted noise level during the measurement period.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Table 34 Typical Sound Levels Measure in the Environment

A–Weighted Sound Level in dBA	Outdoor	Indoor	Subjective Impression
Pain Threshold			
130	• Jackhammer • Stock Car Races		
120	• Ambulance Siren • Leaf Blower (110 dBA) • Rock Concert (110 dBA) • Car Horn (110 dBA)	• Baby Crying on Shoulder (110 dBA)	
100	• Snowmobile • Lawnmower (96dBA) • Backhoe (75-95 dBA) • Pile driver at 50' (90-105 dBA)		Very Loud
90	• Motorcycle at 25' • Propeller Airplane flyover at 1000' (88 dBA) • Diesel Truck at 50' @ 40mph (84 dBA)	• Shouted Conversation • Vacuum cleaner (60-85 dBA)	
80	• Car at 25' @ 65mph (77 dBA)	• Garbage Disposal • Ringing Telephone • Living Room Music or TV (70-75 dBA)	Moderately Loud
70		• Dishwasher (55-70 dBA) • Normal Conversation (60-65 dBA)	
60	• Air-conditioner at 100'	• Sewing Machine	
50		• Refrigerator	
40	• Quiet Residential Area		Quiet
30			
20	• Rustling of Leaves	• Whispering at 5'	
10			
0	Threshold of Hearing		

4.10.1.2 Fundamentals of Ground Vibration

Ground vibration can be defined as oscillatory displacement of the ground as a result of a disturbance (excitation) from vibration source. The disturbance propagates away from the source by means of vibration waves. The main vibration waves are the: “primary” or “compression” waves (P-waves), “secondary” or “shear” waves (S-waves), and Rayleigh waves (R-waves). The first two waves are called “body waves”. The third one is a type of a surface wave as it is confined to a zone near the surface. The motion of ground particles associated with a P-wave is the back and forth movements along the direction of the wave travel. The motion of ground particles associated with an S-wave is in a direction transverse to the direction of the wave. For R-waves, the motion of ground particles has both horizontal and vertical components and these movements attenuate rapidly with depth. Since Rayleigh waves are confined to a narrow zone along the surface of the ground, they tend to carry more energy and do not attenuate with distance as much as the P-waves or S-waves. The main properties of ground vibration are the vibration amplitude – the maximum displacement and the vibration frequencies.

Ground vibration can induce vibration of buildings and structures that it supports. Construction as well as traffic induced vibration in buildings can be a common source of annoyance affecting residents and, in some cases, can degrade the performance of precision measuring equipment (MRI, etc.). Any perceptible vibration from extraneous sources tends to result in residential concerns about possible building (structure) damage, even when the associated amplitudes of vibration are much, much lower than those barely sufficient to cause superficial damage such as cracks stucco or drywall. Also, vibration below the threshold of perception can affect people through their sense of hearing if causes airborne noise from rattling objects or building surfaces. Traffic (including heavy trucks) on major highways, rarely generates vibration amplitudes high enough to cause any type of structural or cosmetic damage and in most instances the resulting vibrations would not be perceptible. Traffic along secondary roadways closer to residences where vehicles travel over potholes or other discontinuities in the pavement can induce high enough vibration levels to result in complaints from the residents. Freight trains and light-rail trains can also be significant sources of ground vibration.

Most construction and traffic induced vibration involve sources of vibration at or near the surface, making the R-waves the primary waves of concern. Even when the actual vibration sources are below the surface (e.g., pile driving) R-waves form at the surface within a short distance from the location of the source. Therefore, propagation of vibration from construction or traffic sources is typically modeled assuming R-waves. Vibration can be continuous or transient. According to the California Department of Transportation (Caltrans) Vibration Guidance Manual (2013a), the following vibration sources result in the continuous vibration:

- excavation equipment,
- static compaction equipment,
- tracked vehicles,
- traffic on a highway,
- vibratory pile drivers,
- pile-extraction equipment, and
- vibratory compaction equipment.

Transient and low-rate repeated vibration may result from the following activities:

- impact pile drivers,
- blasting,
- drop balls,
- “pogo stick” compactors, and
- crack-and-seat equipment.

The effects of vibration on people or structures is primarily a function its amplitude and frequency. The typical frequency range of interest in ground and building vibration is from one to 80 Hz. Most of construction and traffic induced vibration occurs in the frequency range of ten to 30 Hz. Single-number vibration amplitude limits for construction are generally set assuming the corresponding vibration frequencies are between ten and 30 Hz.

The ground and building vibration can be measured directly using velocity transducers or accelerometers. The most common descriptors for ground and building vibration amplitude is the peak particle velocity (PPV) and peak particle acceleration (PPA) defined in inches per second (in/s) and inches per second squared (in/s^2), respectively. Similarly, to noise, the amplitude of vibration is also commonly expressed in decibels. The most common descriptors here are the vibration velocity level and vibration acceleration level.

4.10.1.3 Sensitive Receptors and Existing Noise Environment

Six representative sensitive receptors (residential land uses) were selected for evaluations that are located within areas that could be potentially impacted by noise generated by the proposed Project. Stantec measured the day- and night-time ambient noise levels at each of the six identified sensitive receptors on October 21 and 22, 2015 using a Bruel & Kjaer Type 2236 noise meter. The sensitive receptors, proximity to the proposed Project site, and the ambient noise level are presented in **Table 35**. Ambient noise measurement data collection sheets are included as Appendix J. The locations of the sensitive receptors are shown in **Figure 4.10-1**.

Table 35 Sensitive Receptors in Close Proximity to Project Site

Receptor Identification	Receptor Type	Receptor Location	Distance from proposed Project (feet)	Daytime Ambient Noise Level (Leq)*	
				Day	Night
R1	Residence	5471 Mount Helena Avenue, Los Angeles	2,389	54.0	56.8
R2	Residence	1233 Cedaredge Avenue, Los Angeles	3,033	65.2	64.3
R3	Residence	325 Woodcliffe Road, Pasadena	2,970	54.5	47.8
R4	Residence	1600 Glen Oaks Boulevard, Pasadena	2,607	37.1	47.1
R5	Residence	1037 Marengo Drive, Glendale	4,271	43.4	39.1
R6	Residence	2840 Glenoaks Canyon Road, Glendale	2,281	46.4	46.5

*Data collected by Stantec Personnel on 10/21-22/2015 during daytime and nighttime hours.

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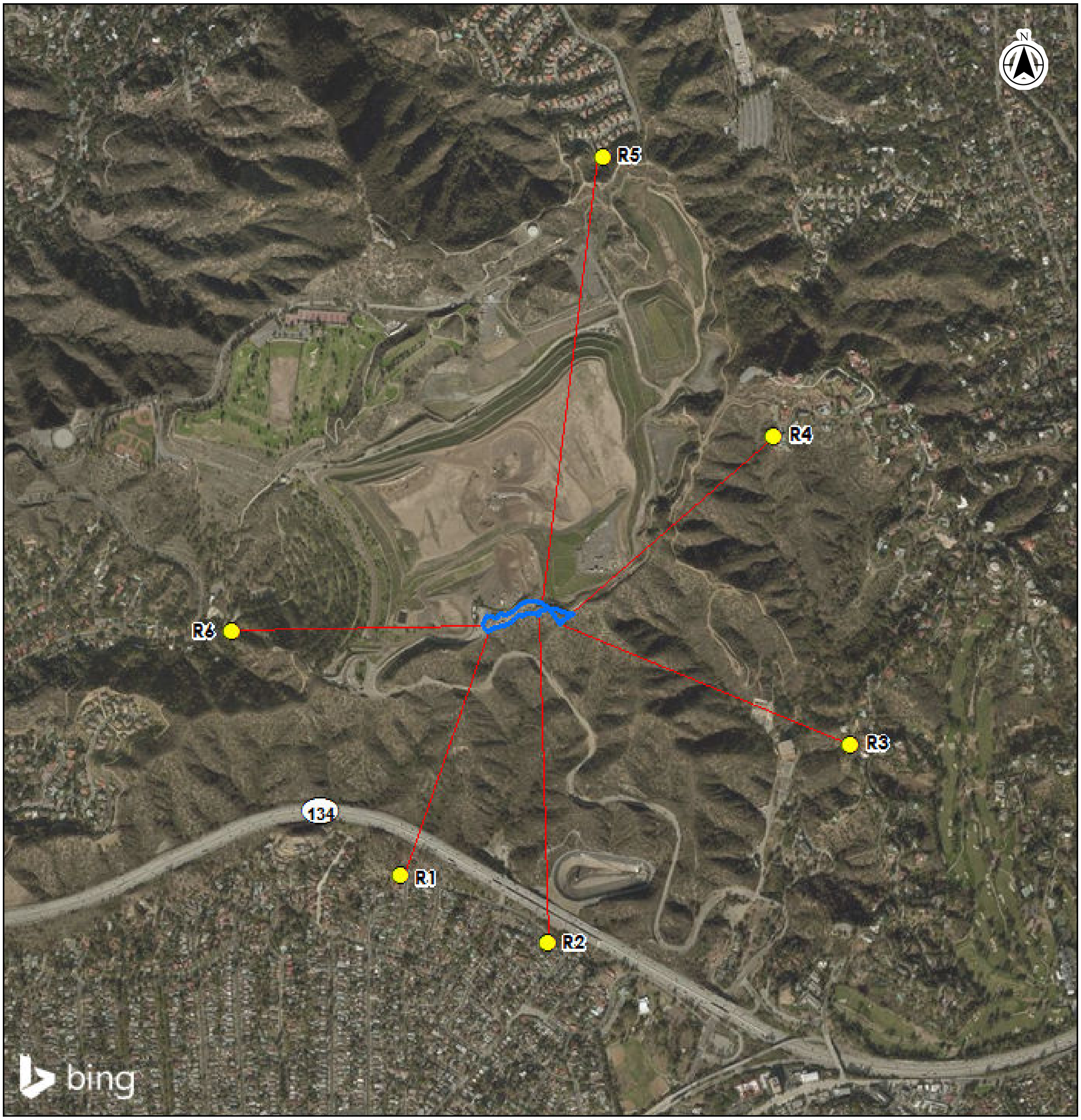

Legend

Sensitive Noise Receptor

Proposed Power Plant Facility Boundary

Stantec

Project Location
Glendale, CA

Project No.: 2057123300
Prepared by JT on 2017-07-18
Technical Review by CH on 2017-07-18

Client/Project
City of Glendale Water and Power
Biogas Renewable Generation Project
Environmental Impact Report

Figure No.
4.10-1

Title
Sensitive Noise Receptor Map

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4.10.2 Laws, Ordinances, Regulations and Standards

4.10.2.1 Federal

Federal regulations safeguard the hearing of workers exposed to occupational noise, enforced by Occupational Safety and Health Administration (OSHA) (e.g. 29 Code of Federal Regulations [CFR] 1919.120). For example, it is unlawful for employees to be exposed to noise levels in excess of 115 dBA for more than 15 minutes during any working day. The United States Environmental Protection Agency (USEPA) has developed guidelines on recommended maximum noise levels to protect public health and welfare (USEPA, 1978). The USEPA identifies a 24-hour exposure level of 70 dBA as the level of environmental noise which will prevent any measurable hearing loss over a lifetime. Likewise, levels of 55 dBA outdoors and 45 dBA indoors are identified as activity interference and annoyance (USEPA, 1978).

4.10.2.2 State

California encourages each local government to perform noise studies and implement a noise element as part of their general plan. Standards and implementation are administered by the /Cal/OSHA which are based on the USEPA occupational guidelines to protect the hearing of workers.

According to Cal/OSHA, the standard is set at the noise threshold where hearing loss may occur from long–term exposures. The maximum allowable level is 90 dBA averaged over an eight-hour time period.

Senate Bill (SB) 4 Section 2, Article 3, Section 3160.(a)(4) requires that operators consider, among several other items, potential noise pollution.

4.10.2.3 Local

City of Glendale

The City Noise Ordinance (GMC Chapter 8.36) applies the most stringent noise limits of all the affected cities of 55 to 60 dBA Leq, depending on the type of residential, for the daytime period (7:00 am to 10:00 pm) and 45 dBA Leq for the nighttime period (10:00 pm to 7:00 am) at the nearest residential property. Also, the noise level cannot exceed 65 dBA Leq at any time at an adjacent commercial property, and 70 dBA Leq at any time at an adjacent industrial property.

Chapter 8.36.050 Minimum and Maximum Ambient Noise Levels, states, A) Where the actual ambient is less than the presumed ambient, the actual ambient shall control and any noise in excess of the actual ambient, plus five dBA, shall be a violation. B) Where the actual ambient is equal to or more than the presumed ambient, the actual ambient shall control and any noise may not exceed the actual ambient by more than five dBA; however, in no event may the actual ambient exceed the presumed noise standards by five dBA.

The Glendale Noise Ordinance (Chapter 8.36.080) prohibits noise from construction activity for certain time periods. Construction buildup, structures, or Projects may take place between 7:00 am and 7:00 pm Monday through Saturday. Construction will not be allowed at any time on a Sunday or on holidays.

4.10.3 Methodology and Thresholds of Significance

4.10.3.1 Methodology

The noise levels that could occur from construction and operation of the proposed Project were modeled using the Computer Aided Noise Abatement (CadnaA) modeling software. The following considerations were used in the model:

- Terrain;
- Noise source in full octave band;
- Wind speed and direction;
- Ground condition; and
- Barrier effects from buildings.

The modelled construction and operation noise levels were then added to the ambient noise levels recorded at the nearest sensitive receptors and compared to the thresholds of significance summarized below.

Per the City of Glendale's Noise Ordinance (Chapter 8.36 of the Glendale Municipal Code), single family residences shall not be exposed to exterior noise levels exceeding 45 dBA during nighttime or 55 dBA during daytime. Where the actual ambient noise level is less than the presumed ambient (e.g., 45 dBA during nighttime or 55 dBA during daytime), the actual ambient shall control and any noise in excess of the actual ambient, plus five dBA, shall be a violation. Where the actual ambient is equal to or more than the presumed ambient, the actual ambient shall control and any noise may not exceed the actual ambient by more than five dBA; however, in no event may the actual ambient exceed the presumed noise standards by five dBA. Based on these noise ordinance requirements, the noise level thresholds applicable to the proposed Project are summarized below in **Table 36**.

Table 36 Noise Impact Thresholds for Project Construction and Operation

Receptor	Exiting Ambient Noise Level (dBA)[1]		Presumed Ambient Noise Level (dBA)		Applicable Noise Limits (dBA)	
	Day	Night	Day	Night	Day	Night
R1	54	56.8	54	50	59	55
R2	65.2	64.3	60	50	65	55
R3	54.5	47.8	54.5	47.8	59.5	52.8
R4	37.1	47.1	37.1	47.1	42.1	52.1
R5	43.4	39.1	43.4	39.1	48.4	44.1
R6	46.4	46.5	46.4	46.5	51.4	51.5

Notes:
Day and night sound levels expressed in Leq.
1. Data collected by Stantec Personnel during daytime and nighttime hours.
2. Five dB above the Presumed Ambient Sound Level

On-Site Construction Noise

Construction of the proposed Project will result in noise from the operation of conventional construction equipment and associated vehicles. All construction related activities will be conducted during the work week (Monday through Friday) between the hours of 7:00 am and 7:00 pm. Equipment uses (types, number, loading factors) were modelled for all phases of construction with the demolition phase having the highest noise levels. The demolition phase was therefore used as the worst-case scenario used to analyze potential construction noise impacts from the proposed Project. The results of the noise attenuation modeling for the proposed Project construction are summarized below in **Table 37**. Modeled noise level contour maps are included in Appendix H.

Table 37 Noise Level Summary for Project Construction

Receptor	Presumed Ambient	Construction Noise	Combined Noise Ambient + Construction[1]	Increase from Ambient	Exceed 5 dBA Increase? Exceed 55 dBA Exterior Noise Standard?
	Day (dBA)	Day (dBA)	Day (dBA)	Day (dBA)	
R1	54.0	40.3	54.2	0.2	No No
R2	60.0	44.1	60.1	0.1	No Yes
R3	54.5	43.4	54.8	0.3	No No
R4	37.1	41.0	42.5	5.4	Yes No
R5	43.4	38.6	44.6	1.2	No No
R6	46.4	35.9	46.8	0.4	No No

Notes:
Sound levels expressed in Leq.
1. Logarithmic addition of Presumed Ambient Daytime Sound Level and project case

On-Site Stationary Point-Source Noise (Operation)

Operation of the proposed Project would result in noise from the operation of stationary power generating and ancillary equipment including but not limited to compressors, coolers, pumps, exhaust fans, exhaust stacks and louvers. Landfill gas (LFG) would be combusted in four reciprocating General Electric Jenbacher Model J 620 GS-16 engines to generate electricity. A list of equipment and assumed noise levels generated by the project are provided as Appendix H. There is not expected to be an increase in motor vehicle use associated with project operation that would lead to a substantial increase in transportation noise levels beyond those that already occur at the site.

Per applicable municipal requirements, single family residences shall not be exposed to exterior noise levels exceeding 45 dBA during nighttime or 55 dBA during daytime. Where the actual ambient noise level is less than the presumed ambient (e.g., 45 dBA during nighttime or 55 dBA during daytime), the actual ambient shall control and any noise in excess of the actual ambient, plus five dBA, shall be a violation. Where the actual ambient is equal to or more than the presumed ambient, the actual ambient shall control and any noise may not exceed the actual ambient by more than five dBA; however, in no event may the actual ambient exceed the presumed noise standards by five dBA. The City has more stringent noise standards applicable to sensitive receptors potentially affected by the proposed Project and they have therefore been adopted as thresholds for determining potentially significant noise impacts. The noise level thresholds applied to the proposed Project are summarized below in **Table 38**.

Table 38 Noise Impact Thresholds for Project Operation

Receptor	Exiting Ambient Noise Level (dBA)[1]		Presumed Ambient Noise Level (dBA)		Applicable Noise Limits (dBA)	
	Day	Night	Day	Night	Day	Night
R1	54	56.8	54	50	59	55
R2	65.2	64.3	60	50	65	55
R3	54.5	47.8	54.5	47.8	59.5	52.8
R4	37.1	47.1	37.1	47.1	42.1	52.1
R5	43.4	39.1	43.4	39.1	48.4	44.1
R6	46.4	46.5	46.4	46.5	51.4	51.5

Notes:
Day and night sound levels expressed in Leq.
1. Data collected by Stantec Personnel during daytime and nighttime hours.
2. Five dB above the Presumed Ambient Sound Level

The expected daytime and nighttime noise generated by the engines as well as ancillary equipment was combined with the presumed ambient sound levels using the CadnaA modeling software. The following considerations were used in the model:

- Terrain;
- Noise source in full octave band;
- Wind speed and direction;
- Ground condition; and
- Barrier effects from buildings.

The results of the noise attenuation modeling for the proposed Project operation are summarized below in **Table 39**. Modeled noise level contour maps are included in Appendix H.

Table 39 Noise Level Summary for Project Operation

Receptor	Presumed Ambient		Facility Noise		Combined Noise Ambient + Facility		Noise Limit		Exceed Limit?
	Day (dBA)	Night (dBA)	Day (dBA)	Night (dBA)	Day (dBA)	Night (dBA)	Day (dBA)	Night (dBA)	
R1	54.0	50.0	38.0	38.0	54.1	50.3	59.0	55.0	No
R2	60.0	50.0	40.0	40.0	60.0	50.4	65.0	55.0	No
R3	54.5	47.8	40.6	40.6	54.7	48.6	59.5	52.8	No
R4	37.1	47.1	35.2	35.2	39.3	47.4	42.1	52.1	No
R5	43.4	39.1	35.1	35.1	44.0	40.6	48.4	44.1	No
R6	46.4	46.5	29.9	29.9	46.5	46.6	51.4	51.5	No

Notes:
Day and night sound levels expressed in Leq.
1. Logarithmic addition of Presumed Ambient Daytime Sound Level and project case
2. Logarithmic addition of Presumed Ambient Nighttime Sound Level and project case

As show in **Tables 38** and **39**, operation of the proposed Project with the use of four General Electric Jenbacher Model J 620 GS-16 engines would not result in an exceedance of an applicable daytime or nighttime noise standard at any of the sensitive receptor locations. Operation related noise would therefore not expose persons to or generate noise levels in excess of established standards and potential impacts would be less than significant.

4.10.3.2 Thresholds of Significance

As determined in the Initial Study, the proposed Project is not located within an airport land use plan or within two miles of a public or public use airport. The closest public airport is the Hollywood Burbank Airport, located approximately ten miles west of the proposed Project site therefore there would be no impacts on an airport land use plan or on any airport. The following two checklist questions were evaluated in this Environmental Impact Report (EIR).

In accordance with Appendix G of the State CEQA Guidelines, the proposed Project would have a significant impact related to noise if it would result in:

- Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the proposed Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- Generation of excessive groundborne vibration or groundborne noise levels.

4.10.4 Project Impacts

Threshold: Would the proposed Project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

4.10.4.1 Construction Noise

Construction of the proposed Project will result in noise from the operation of conventional construction equipment and associated vehicles. All construction related activities will be conducted during the work week (Monday through Friday) between the hours of 7:00 am and 7:00 pm. Equipment uses (types, number, loading factors) were modelled for all phases of construction with the demolition phase having the highest noise levels. The demolition phase was therefore used as the worst-case scenario to analyze temporary construction noise impacts from the proposed Project. The results of the noise attenuation modeling for the proposed Project construction are summarized below in **Table 40**. Modeled noise level contour maps are included in Appendix J.

Table 40 Noise Level Summary for Project Construction

Receptor	Presumed Ambient	Construction Noise	Combined Noise Ambient + Construction[1]	Increase from Ambient	Threshold of Significance Expressed as Increase from Ambient	Exceed Threshold of Significance?
	Day (dBA)	Day (dBA)	Day (dBA)	Day (dBA)	Day (dBA)	
R1	54.0	41.4	54.2	0.2	5	No
R2	60.0	43.9	60.1	0.1	5	No
R3	54.5	42.4	54.8	0.3	5	No
R4	37.1	40.2	41.9	4.8	5	No
R5	43.4	38.0	44.5	1.1	5	No
R6	46.4	34.7	46.7	0.3	5	No

Notes:
Sound levels expressed in Leq.
1. Logarithmic addition of Presumed Ambient Daytime Sound Level and project case

As shown in **Table 40**, proposed Project construction would potentially increase existing noise level levels by less than five dBA at each sensitive receptor. Because the potential increase is less than the applicable threshold of significance of a five dBA increase, construction of the proposed Project would not expose persons to or generate noise levels in excess of established standards. Potential impacts would be less than significant.

Mitigation Measures

No mitigation measures are required.

Level of Significance After Mitigation

Less than Significant Impact

4.10.4.2 Operational Noise

Operation of the proposed Project would result in noise from the operation of stationary power generating and ancillary equipment including but not limited to compressors, coolers, pumps, exhaust fans, exhaust stacks and louvers. LFG would be combusted in four reciprocating General Electric Jenbacher Model J 620 GS-16 engines to generate electricity. A list of equipment and assumed noise levels generated by the project are provided as Appendix J. There is not expected to be an increase in motor vehicle use associated with project operation that would lead to a substantial increase in noise levels beyond those that already occur at the site.

The results of the noise attenuation modeling for the proposed Project operation are summarized below in **Table 41**. Modeled noise level contour maps are included in Appendix J.

Table 41 Noise Level Summary for Project Operation

Receptor	Presumed Ambient		Facility Noise		Combined Noise Ambient + Facility		Threshold of Significance		Exceed Threshold?
	Day (dBA)	Night (dBA)	Day (dBA)	Night (dBA)	Day (dBA)	Night (dBA)	Day (dBA)	Night (dBA)	
R1	54.0	50.0	38.0	38.0	54.1	50.3	59.0	55.0	No
R2	60.0	50.0	40.0	40.0	60.0	50.4	65.0	55.0	No
R3	54.5	47.8	40.6	40.6	54.7	48.6	59.5	52.8	No
R4	37.1	47.1	35.2	35.2	39.3	47.4	42.1	52.1	No
R5	43.4	39.1	35.1	35.1	44.0	40.6	48.4	44.1	No
R6	46.4	46.5	29.9	29.9	46.5	46.6	51.4	51.5	No

Notes:
Day and night sound levels expressed in Leq.
1. Logarithmic addition of Presumed Ambient Daytime Sound Level and proposed Project case
2. Logarithmic addition of Presumed Ambient Nighttime Sound Level and proposed Project case

As show in **Table 41**, operation of the proposed Project with the use of four General Electric Jenbacher Model J 620 GS-16 engines would not result in an exceedance of an applicable daytime or nighttime noise standard at any of the sensitive receptor locations. Operation related noise would therefore not expose persons to or generate noise levels in excess of established standards and potential impacts would be less than significant.

Mitigation Measures

No mitigation measures are required.

Level of Significance After Mitigation

Less than Significant.

Threshold: Would the Project result in generation of excessive groundborne vibration or groundborne noise levels?

4.10.4.3 Construction Vibration

The proposed Project does not include sources known to generate substantial groundborne vibration such as pile driving, vibratory equipment or explosives. Construction will include the use of limited track mounted equipment during grading activities that has the potential to generate localized ground borne vibration. The City of Glendale Noise Ordinance requires that levels of vibration be below the vibration perception threshold defined as 0.01 in/s. Groundborne vibration levels associated with common construction equipment are summarized in **Table 42**.

Table 42 Vibration Source Amplitudes for Construction Equipment

Equipment	Peak Particle Velocity at 25 Feet (In/Sec)
Vibratory Roller	0.210
Large Bulldozer	0.089
Caisson Drilling	0.089
Loaded Trucks	0.076
Jackhammer	0.035
Small Bulldozers	0.003
Source: Limits derived from data presented in *Caltrans Construction Vibration Guidance Manual*, September 2013	

The peak particle velocity at any distance from a vibration source can be calculated using the following equation: peak particle velocity of equipment at 25 feet x (25/distance to receptor)^n , where n is 1.1 (the value related to the attenuation rate through ground (USEPA, 1978). Using the most conservative vibration source of 0.210 in/s in **Table 42**, the expected resulting vibration at the nearest residence located 2,281 feet from the source would be 0.001 in/sec, or approximately 100 times lower than the threshold of significance. Proposed Project construction would not expose persons to or generate excessive ground borne vibration or ground borne noise levels and potential impacts would be less than significant.

Mitigation Measures

No mitigation measures are required.

Level of Significance After Mitigation

Less than Significant.

4.10.4.4 Operational Vibration

The proposed Project does not include sources known to generate substantial vibration such as pile driving, vibratory equipment, explosives, or low-frequency noise sources. Considering the lack of substantial sources of groundborne vibration during operation and that the nearest sensitive receptor is located more than 2,200 feet from operational noise sources, the proposed Project would not expose persons to or generate excessive ground borne vibration or ground borne noise levels. Potential impacts would be less than significant.

Mitigation Measures

No mitigation measures are required.

Level of Significance After Mitigation

Less than Significant Impact.

4.10.5 Cumulative Impacts

The proposed Project and the proposed Grayson Repowering Project are spatially separated such that they would not have the potential to contribute to cumulative noise impacts.

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