Appendix K Noise Impact Analysis

Appendix

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MEMORANDUM

DATE: July 17, 2024

TO: Gabrielle Stephens, Project Manager, SCS Engineers

FROM: J.T. Stephens, Principal/Noise and Vibration Specialist

SUBJECT: Noise Impact Analysis: Proposed Landfill Gas to Renewable Natural Gas Project at Coyote Canyon Landfill, Newport Beach, California

INTRODUCTION AND PROJECT DESCRIPTION

This noise impact analysis has been prepared to evaluate the potential impacts associated with construction and operation of a proposed Landfill Gas-to-Renewable Natural Gas Facility (LFG to RNG) Project (proposed project) located at 20662 Newport Coast Drive in the City of Newport Beach (City), Orange County (County), California. The proposed project is located within the existing Coyote Canyon Sanitary Landfill (CCSL). The City will be the California Environmental Quality Act (CEQA) lead agency. This memorandum is intended to satisfy the City's requirement for a project-specific noise impact analysis and examines the impacts of the project to noise-sensitive uses near the project site. To properly account for the noise impacts associated with the proposed project, noise level impacts are assessed based on noise measurement data gathered in the vicinity of the project site (from January 10, 2022, to January 12, 2022) and modeled stationary source noise levels using the program SoundPLAN incorporating information from the proposed project's design engineer.

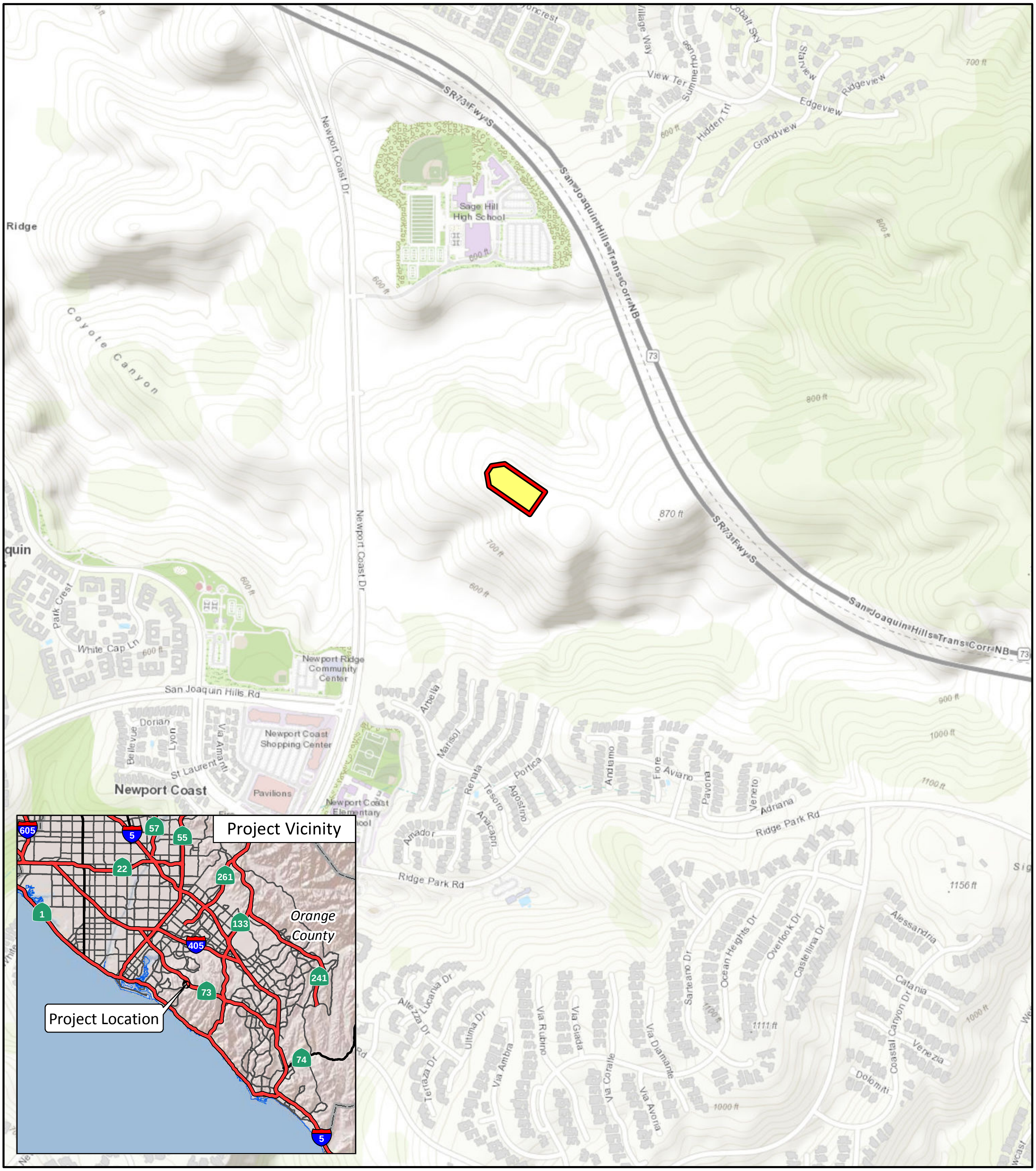
Location and Description

The project site is located near the center of the CCSL, approximately 925 feet east of Newport Coast Drive. Figure 1, below, shows the proposed project location. Currently, the project site contains an existing County flare and blower station along with a cell tower and associated generator.

While the proposed project is located within the existing CCSL, none of the existing operations at the CCSL will be under common ownership or control with the proposed project. The proposed project, once operational, consists of a variety of pieces of equipment, as shown in Figure 2, including the following pieces which generate noise:

- Feed Compressors
- Compressor Feed Oil Coolers
- Compressor Feed After Coolers
- TSA Pretreatment Skid

- Chiller
- Membrane Skid
- Recycle Compressor
- Recycle Compressor Oil Cooler
- Recycle Compressor After Cooler
- Deoxo Dryer
- Deoxo After Cooler
- Off-Spec Gas Flare
- NRU
- NRU Vacuum Rinse Skids
- NRU Vacuum Rinse Skid Oil Coolers
- NRU Vacuum Rinse Skid After Coolers
- Flare
- Thermal Oxidizer



LEGEND

Project Location

FIGURE 1

Coyote Canyon Landfill
Gas-to-Renewable Natural Gas Project
Project Location

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FEET

SOURCE: Esri World Topo Map (2021)

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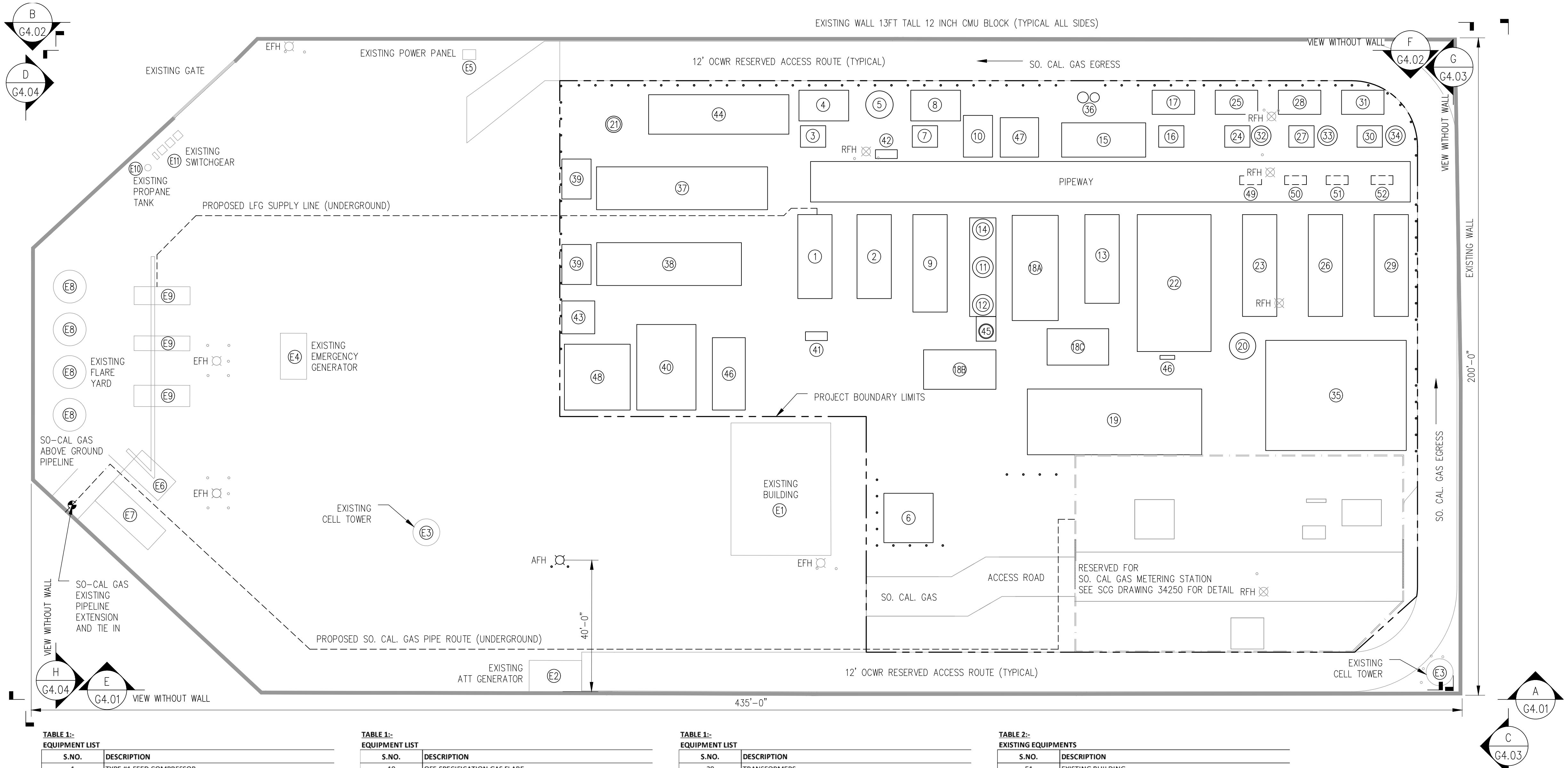

TABLE 1:-
EQUIPMENT LIST

S.NO.	DESCRIPTION
1	TYPE #1 FEED COMPRESSOR
2	TYPE #2 FEED COMPRESSOR
3	TYPE #1 COMPRESSOR FEED OIL COOLER
4	TYPE #1 COMPRESSOR FEED AFTERCOOLER
5	H2S REMOVAL VESSEL
6	LN2 PAD
7	TYPE #2 FEED COMPRESSOR OIL COOLER
8	TYPE #2 FEED COMPRESSOR AFTERCOOLER
9	TSA PRE-TREATMENT SKID
10	CHILLER
11	TSA ADSORBER VESSEL A (6' DIA.)
12	TSA ADSORBER VESSEL B (6' DIA.)
13	MEMBRANE SKID
14	VOC POLISHING VESSEL
15	TYPE #1 RECYCLE COMPRESSOR
16	TYPE #1 RECYCLE COMPRESSOR OIL COOLER
17	TYPE #1 RECYCLE COMPRESSOR AFTERCOOLER
18A	DEOXO SKID
18B	DEOXO DRYER
18C	DEOXO AFTERCOOLER

TABLE 1:-
EQUIPMENT LIST

S.NO.	DESCRIPTION
19	OFF-SPECIFICATION GAS FLARE
20	NRU BUFFER VESSEL
21	COMPRESSED AIR RECEIVER
22	NRU W/ADSORBERS
23	#1 NRU VAC. RINSE SKID
24	#1 NRU VAC. RINSE OIL COOLER
25	#1 NRU VAC. RINSE AFTERCOOLER
26	#2 NRU VAC. RINSE SKID
27	#2 NRU VAC RINSE OIL COOLER
28	#2 NRU VAC. RINSE AFTERCOOLER
29	#3 NRU VAC. RINSE SKID
30	#3 NRU VAC. RINSE OIL COOLER
31	#3 NRU VAC. RINSE AFTERCOOLER
32	#1 NRU DRYER VESSEL
33	#2 NRU DRYER VESSEL
34	#3 NRU DRYER VESSEL
35	THERMAL OXIDIZER
36	OILY WATER SEPARATOR
37	POWER DISTRIBUTION E-HOUSE
38	POWER DISTRIBUTION E-HOUSE BOP

TABLE 1:-
EQUIPMENT LIST

S.NO.	DESCRIPTION
39	TRANSFORMERS
40	OPERATOR/CONTROL SHELTER
41	STAGE #1 INLET PARTICULATE FILTER
42	STAGE #2 INLET PARTICULATE FILTER
43	UTILITY INTERTIE SWITCHGEAR
44	TSA BLOWDOWN TANK 30,000 Gal
45	H2S POLISHING VESSEL
46	STORAGE CONTAINER
47	CONDENSATE TANK
48	PARKING AREA
49	NRU RINSE COMPRESSOR INLET FILTER A
50	NRU VACUUM COMPRESSOR INLET FILTER A
51	NRU RINSE COMPRESSOR INLET FILTER B
52	NRU VACUUM COMPRESSOR INLET FILTER B

TABLE 2:-
EXISTING EQUIPMENTS

S.NO.	DESCRIPTION
E1	EXISTING BUILDING
E2	EXISTING ATT GENERATOR
E3	EXISTING CELL TOWER
E4	EXISTING EMERGENCY GENERATOR
E5	EXISITNG POWER PANEL
E6	EXISITNG PAD
E7	EXISITNG TANK
E8	EXISTING FLARE
E9	EXISTING BLOWERS PAD
E10	EXISTING PROPANE TANK
E11	EXISTING SWITCHGEAR

LEGENDS

RFH–EXISTING FIRE HYDRANT TO BE REMOVED INCLUDES PIV,BOLLARDS & ASSOCIATED ABOVE GROUND FP — RFH

EFH–EXISTING FIRE HYDRANT RETAINED — EFH

AFH–ADDED FIRE HYDRANT — AFH

GAS LINES

PROJECT BOUNDARY LIMITS

SO. CAL. GAS METERING STATION LIMITS

CONFIDENTIAL

TOPOGRAPHY NOTE:
BASED ON TOPO FURNISHED BY D.WOOLLEY & ASSOCIATES
DATE: 03-23-2022.

ISSUED FOR CUP

LSA

FIGURE 2

0 20 40
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SOURCE: Biogas Engineering

Coyote Canyon Landfill
Gas-to-Renewable Natural Gas Project
Site Plan

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Surrounding Sensitive Receptors

The nearest sensitive receptors to the proposed project are the existing Sage High School located approximately 1,400 feet to the north and existing single-family homes in the Tesoro Community approximately 1,250 feet to the south.

CHARACTERISTICS OF SOUND

Noise is usually defined as unwanted sound. Noise consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, and sleep.

To the human ear, sound has two significant characteristics: pitch and loudness. Pitch is generally an annoyance, while loudness can affect the ability to hear. Pitch is the number of complete vibrations, or cycles per second, of a wave resulting in the tone's range from high to low. Loudness is the strength of a sound that describes a noisy or quiet environment and is measured by the amplitude of the sound wave. Loudness is determined by the intensity of the sound waves combined with the reception characteristics of the human ear. Sound intensity refers to how hard the sound wave strikes an object, which in turn produces the sound's effect. This characteristic of sound can be precisely measured with instruments. The analysis of a project defines the noise environment of the project area in terms of sound intensity and its effect on adjacent sensitive land uses.

Measurement of Sound

Sound intensity is measured through the A-weighted scale to correct for the relative frequency response of the human ear. That is, an A-weighted noise level de-emphasizes low and very high frequencies of sound similar to the human ear's de-emphasis of these frequencies. Unlike linear units (e.g., inches or pounds), decibels are measured on a logarithmic scale representing points on a sharply rising curve.

For example, 10 decibels (dB) is 10 times more intense than 1 dB, 20 dB is 100 times more intense than 1 dB, and 30 dB is 1,000 times more intense than 1 dB. Thirty decibels (30 dB) represent 1,000 times as much acoustic energy as 1 dB. The decibel scale increases as the square of the change, representing the sound pressure energy. A sound as soft as human breathing is about 10 times greater than 0 dB. The decibel system of measuring sound gives a rough connection between the physical intensity of sound and its perceived loudness to the human ear. A 10 dB increase in sound level is perceived by the human ear as only a doubling of the loudness of the sound. Ambient sounds generally range from 30 dB (very quiet) to 100 dB (very loud).

Sound levels are generated from a source, and their decibel level decreases as the distance from that source increases. Sound dissipates exponentially with distance from the noise source. For a single-point source, sound levels decrease approximately 6 dB for each doubling of distance from the source. This drop-off rate is appropriate for noise generated by stationary equipment. If noise is produced by a line source (e.g., highway traffic or railroad operations), the sound decreases 3 dB for each doubling of distance in a hard site environment. Similarly, line sources with intervening absorptive vegetation or line sources that are located at a great distance to the receptor would decrease 4.5 dB for each doubling of distance.

There are many ways to rate noise for various time periods, but an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. The equivalent continuous sound level (L_{eq}) is the total sound energy of time-varying noise over a sample period. This is the metric used by the City for stationary sources.

Noise impacts can be described in three categories. The first category is audible impacts that refer to increases in noise levels noticeable to humans. Audible increases in noise levels generally refer to a change of 3.0 dB or greater because this level has been found to be barely perceptible in exterior environments. The second category, potentially audible, refers to a change in the noise level between 1.0 and 3.0 dB. This range of noise levels has been found to be noticeable only in laboratory environments. The last category is changes in noise levels of less than 1.0 dB, which are inaudible to the human ear. Only audible changes in existing ambient or background noise levels are considered potentially significant.

Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Exposure to high noise levels affects the entire system, with prolonged noise exposure in excess of 75 dBA increasing body tensions, thereby affecting blood pressure and functions of the heart and the nervous system. In comparison, extended periods of noise exposure above 90 dBA would result in permanent cell damage. When the noise level reaches 120 dBA, a tickling sensation occurs in the human ear even with short-term exposure. This level of noise is called the threshold of feeling. As the sound reaches 140 dBA, the tickling sensation is replaced by the feeling of pain in the ear. This is called the threshold of pain. A sound level of 160–165 dBA will result in dizziness or loss of equilibrium. The ambient or background noise problem is widespread and generally more concentrated in urban areas than in outlying less developed areas.

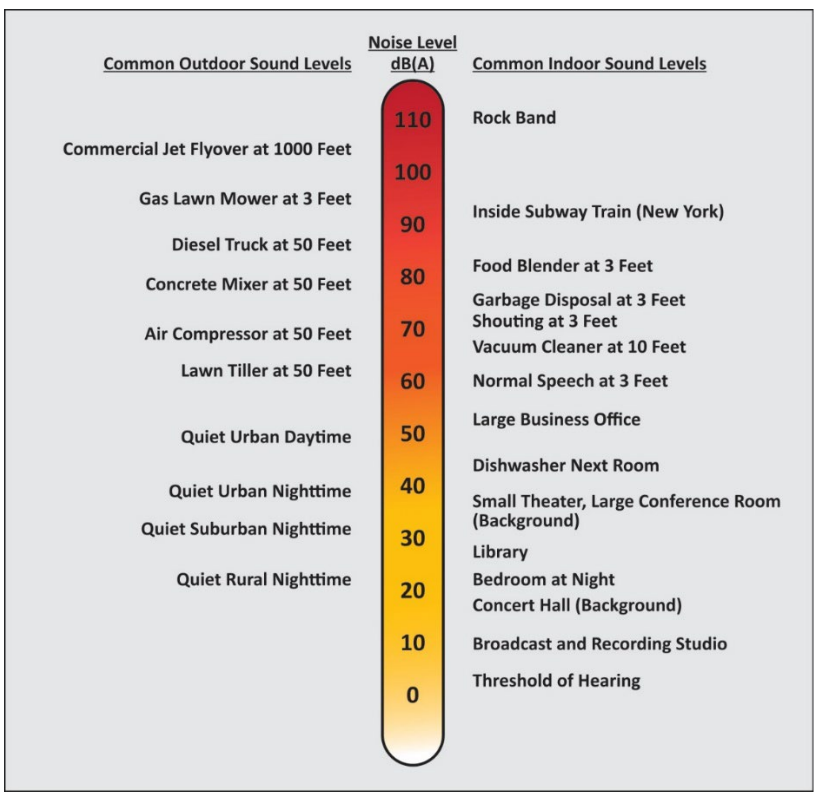
Table A lists full definitions of acoustical terms, and Table B shows common sound levels and their sources.

Table A: Definitions of Acoustical Terms

Term	Definitions
Decibel, dB	A unit of level that denotes the ratio between two quantities proportional to power, the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
Frequency, Hz	Of a function periodic in time, the number of times that the quantity repeats itself in one second (i.e., number of cycles per second).
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. The A-weighting filter deemphasizes the very low and very high frequency components of the sound in a manner similar to the frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this assessment are A-weighted, unless reported otherwise.
Equivalent Continuous Noise Level, L_{eq}	The level of a steady sound that, in a stated time period and at a stated location, has the same A-weighted sound energy as the time varying sound.
Ambient Noise Level	The all-encompassing noise associated with a given environment at a specified time, usually a composite of sound from many sources at many directions, near and far; no particular sound is dominant.
Intrusive	The noise that 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.

Source: *Handbook of Acoustical Measurements and Noise Control* (Harris, Cyril M., 1991).

Table B: Common Sound Levels and Noise Sources



Source: LSA Associates, Inc. (2016).

CHARACTERISTICS OF VIBRATION

Vibration refers to ground-borne noise and perceptible motion. Ground-borne vibration is almost exclusively a concern inside buildings and is rarely perceived as a problem outdoors, where the motion may be discernible. Typically, there is more adverse reaction to effects associated with the shaking of a building. Vibration energy propagates from a source through intervening soil and rock layers to the foundations of nearby buildings. The vibration then propagates from the foundation throughout the remainder of the structure. Building vibration may be perceived by occupants as the motion of building surfaces, the rattling of items on shelves or hanging on walls, or a low-frequency rumbling noise.

Typical sources of ground-borne vibration are construction activities (e.g., blasting, pile driving, and operating heavy-duty earthmoving equipment), steel-wheeled trains, and occasional traffic on rough roads. Problems with both ground-borne vibration and noise from these sources are usually localized to areas within approximately 100 ft of the vibration source, although there are examples of ground-borne vibration causing interference out to distances greater than 200 ft (FTA 2018). When roadways are smooth, vibration from traffic, even heavy trucks, is rarely perceptible. It is assumed for most projects that the roadway surface will be smooth enough that ground-borne vibration from street traffic will not exceed the impact criteria; however, the construction of the project could result in ground-borne vibration that may be perceptible and annoying.

Ground-borne vibration has the potential to disturb people and damage buildings. Although it is very rare for typical construction activities to cause even cosmetic building damage, it is not uncommon for construction processes such as blasting and pile driving to cause vibration of sufficient amplitudes to damage nearby buildings (FTA 2018). Ground-borne vibration is usually measured in terms of vibration velocity, either the root-mean-square (RMS) velocity or peak particle velocity (PPV). The RMS is best for characterizing human response to building vibration, and PPV is used to characterize potential for damage. Decibel notation acts to compress the range of numbers required to describe vibration. Vibration velocity level in decibels is defined as:

$$L_v = 20 \log_{10} [V/V_{ref}]$$

where L_v is the vibration velocity in decibels (VdB), "V" is the RMS velocity amplitude, and "V_{ref}" is the reference velocity amplitude, or 1×10^{-6} inches/second (in/sec) used in the United States.

APPLICABLE NOISE STANDARDS

City of Newport Beach

The City regulates noise based on the criteria presented in the Noise Element of the General Plan as well as the Municipal Code. As discussed below, the City does not have adopted construction noise thresholds; therefore, Federal Transit Administration (FTA) criteria will be used to assess potential construction noise impacts.

City of Newport Beach Noise Element of the General Plan

The City of Newport Beach has adopted a Noise Element of the General Plan to control noise in the planning process in order to ensure that Newport Beach residents will be protected from excessive noise intrusion. The following presents the applicable policies to the proposed project:

Noise Policies. To protect City of Newport Beach residents from excessive noise, the Noise Element contains the following policies related to the Project:

N 4.1 ***Stationary Noise Sources:*** *Enforce interior and exterior noise standards outlined in Table N3 (also shown in Table C of this analysis), and in the City's Municipal Code to ensure that sensitive noise receptors are not exposed to excessive noise levels from stationary noise sources, such as heating, ventilation, and air conditioning equipment.*

Table C: Noise Standards

Land Use Categories		Allowable Noise Levels (dBA)			
		Interior [a,b]		Exterior [a,b]	
Categories	**Uses**	**Interior Noise Level (L_{eq}) 7 am to 10 pm**	**Interior Noise Level (L_{eq}) 10 pm to 7 am**	**Exterior Noise Level (L_{eq}) 7 am to 10 pm**	**Exterior Noise Level (L_{eq}) 10 pm to 7 am**
Residential	Single Family, Two Family, Multiple Family (Zone I)	45	40	50	50
	Residential Portions of Mixed Use Developments (Zone III)	45	40	60	50
Commercial Industrial	Commercial (Zone II)	N/A	N/A	65	60
	Industrial of Manufacturing (Zone IV)	N/A	N/A	70	70
Institutional	Schools, Day Care Centers, Churches, Libraries, Museums, Health Care Institutions (Zone I)	45	40	55	50

SOURCE: EIP Associates, 2006

[a] If the ambient noise level exceeds the resulting standard, the ambient shall be the standard.

[b] It shall be unlawful for any person at any location within the incorporated area of the City to create any noise or to allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such a person which causes the noise level when measured on any other property, to exceed either of the following:

- The noise standard for the applicable zone for any fifteen-minute period;
- A maximum instantaneous noise level equal to the value of the noise standard plus twenty dBA for any period of time (measured using A-weighted slow response).
- In the event the ambient noise level exceeds the noise standard, the noise standard applicable to said category shall be increased to reflect the maximum ambient noise level.
- The noise standard for the residential portions of the residential property falling within one hundred feet of a commercial property, if the intruding noise originates from that commercial property.
- If the measurement location is on a boundary between two different noise zones, the lower noise level standard applicable to the noise zone shall apply.

N 4.6 ***Maintenance or Construction Activities:*** *Enforce the Noise Ordinance noise limits and limits on hours of maintenance or construction activity in or adjacent to residential areas, including noise that results from in-home hobby or work-related activities.*

N 5.1 ***Limiting Hours of Activity:*** *Enforce the limits on hours of construction activity.*

City of Newport Beach Municipal Code

Section 10.26.025, Community Noise Control, provides the exterior and interior residential noise standards, which represent the maximum acceptable noise levels as measured from any receiving property in the City. It is considered unlawful to create noise on any property that results in noise levels exceeding 55 dBA L_{eq} for a period of 15 minutes at residential uses during daytime hours from 7:00 a.m. to 10:00 p.m. and 50 dBA L_{eq} for a period of 15 minutes at residential uses during nighttime hours from 10:00 p.m. to 7:00 a.m. For commercial uses, exterior noise levels shall not exceed 65 dBA L_{eq} during daytime hours and 60 dBA L_{eq} during nighttime hours. Maximum instantaneous noise levels may not exceed the above values plus 20 dBA for any period of time.

Section 10.28.040, Construction Activity – Noise Regulations, states:

A. No person shall, while engaged in construction, remodeling, digging, grading, demolition, painting, plastering or any other related building activity, operate any tool, equipment or machine in a manner which produces loud noise that disturbs, or could disturb, a person of normal sensitivity who works or resides in the vicinity, unless authorized to do so in accordance with subsection (B) of this section.

B. The provisions of subsection (A) of this section shall not apply to the following:

1. Work performed on any weekday, which is not a federal holiday, between the hours of 7:00 a.m. and 6:30 p.m.

2. Work performed on a Saturday, in any area of the City that is not designated as a high-density area, between the hours of 8:00 a.m. and 6:00 p.m.

The City's Noise Element and Municipal Code do not provide specific noise level requirements or vibration impact criteria associated with construction activities; therefore, the FTA criteria will be used in this analysis.

Federal Transit Administration

Because the City does not have construction noise level limits, construction noise was assessed using criteria from the *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018). Table D shows the FTA's Detailed Analysis Construction Noise Criteria based on the composite noise levels of the two noisiest pieces of equipment per construction phase. This provides reasonable criteria for assessing construction noise impacts based on the potential for adverse community reaction when the noise criteria are exceeded.

Table D: General Assessment Construction Noise Criteria

Land Use	Daytime 1-hour L_{eq} (dBA)	Nighttime 1-hour L_{eq} (dBA)
Residential	80	70
Commercial	85	85
Industrial	90	90

Source: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).
dBA = A-weighted decibels
FTA = Federal Transit Administration
L_{eq} = equivalent continuous sound level

APPLICABLE VIBRATION STANDARDS

Federal Transit Administration

Construction Damage Criteria

The criteria for environmental impact from ground-borne vibration and noise are based on the maximum levels for a single event. Table E lists the potential vibration building damage criteria associated with construction activities, as suggested in the *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).

FTA guidelines shows that a vibration level of up to 102 VdB (FTA 2018) is considered safe for buildings consisting of reinforced concrete, steel, or timber (no plaster) and would not result in any construction vibration damage. For a non-engineered timber and masonry building, the construction building vibration damage criterion is 94 VdB.

Table E: Construction Vibration Damage Criteria

Building Category	Approximate L_V (VdB)[1]
Reinforced concrete, steel, or timber (no plaster)	102
Engineered concrete and masonry (no plaster)	98
Non-engineered timber and masonry buildings	94
Buildings extremely susceptible to vibration damage	90

Source: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).
[1] RMS vibration velocity in decibels (VdB) re 1 µin/sec.
FTA = Federal Transit Administration
µin/sec = microinches per second
L_V = velocity in decibels
RMS = root-mean-square
VdB = vibration velocity decibels

Construction Annoyance Criteria

The City of Newport Beach has not identified or adopted vibration standards. However, the 2006 General Plan EIR identified a limit of 72 VdB for frequent events (more than 70 vibrations events per day) at residential uses and buildings where people normally sleep. For infrequent events with fewer than 70 vibration events per day, the vibration limit is 80 VdB. It should be noted that the General Plan EIR conservatively identified a residential-nighttime threshold of 72 VdB for all circumstances of vibrational energy; including for construction activities which due to City noise ordinances, would not be expected to occur during the nighttime period (10:00 p.m. to 7:00 a.m.). The 2006 General Plan EIR also identified a limit of 75 VdB for frequent events (more than 70 vibrations events per day) at institutional land uses with primarily daytime uses. For infrequent events with fewer than 70 vibration events per day, the vibration limit is 83 VdB. For the purposes of this analysis, these levels are identified as appropriate for office uses.

THRESHOLDS OF SIGNIFICANCE

Based on *Guidelines for the Implementation of the California Environmental Quality Act* (CEQA), Appendix G, Public Resources Code, Sections 15000–15387, a project will normally have a significant effect on the environment related to noise if it will substantially increase the ambient noise levels for adjoining areas or conflict with adopted environmental plans and the goals of the community in which it is located. The following are the thresholds for potential noise impacts.

The *State CEQA Guidelines* indicate that a project would have a significant impact on noise if it would 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;

- Generation of excessive ground-borne vibration or ground-borne noise levels; or

- For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels.

OVERVIEW OF THE EXISTING NOISE ENVIRONMENT

The primary existing noise sources in the project area are transportation facilities, including State Route 73 (SR 73) and Newport Coast Drive. In addition, periodic aircraft operations are audible on the project site. In order to assess the existing noise conditions in the area, long-term noise measurements were conducted at the project site. Three long-term, 24-hour measurements were taken from January 10, 2022, to January 12, 2022. The locations of the noise measurements are shown on Figure 3, below, and the results are summarized in Table F. Noise measurement data information is provided in Attachment A of this analysis.

Table F: Existing Noise Level Measurements

Location Number	Location Description	Daytime Noise Levels[1] (dBA L_{eq})	Nighttime Noise Levels[2] (dBA L_{eq})	Primary Noise Sources
LT-1	Located at the south side of the project site, near hairpin turn of the access road. On chain-link fence north of the channel.	37.6-48.1	36.5-43.3	Very quiet.
LT-2	Located at the north side of the project site, just south of Sage Hill School. On chain-link fence north of the access road and channel.	44.0-55.9	36.3-49.5	Faint traffic on SR-73.
LT-3	Located at the west side of the project site, approximately 270 feet east of Newport Coast Drive. On sign on the west side of the access road.	49.0-57.5	39.4-53.4	Faint traffic on Newport Coast Drive.

Source: Compiled by LSA (June 2022).

[1] Daytime Noise Levels = noise levels during the hours of 7:00 a.m. to 10:00 p.m.

[2] Nighttime Noise Levels = noise levels during the hours of 10:00 p.m. to 7:00 a.m.

dBA = A-weighted decibels

ft = foot/feet

L_{eq} = equivalent continuous sound level

Aircraft Noise

Airport-related noise levels are primarily associated with aircraft engine noise made while aircraft are taking off, landing, or running their engines while still on the ground. The closest airport to the project site is John Wayne Airport (JWA), approximately 4.8 miles to the northwest. The project site is outside the 60 dBA CNEL noise contour of JWA based on the JWA Airport Impact Zones map in the Airport Environs Land Use Plan (Orange County Airport Land Use Commission 2008), and the 2021 Third Quarter 65 dB CNEL contour (JWA 2021) for JWA. Because the project is located outside of the nearest airport's 60 dBA CNEL contour, no further analysis related to airport noise is required in this report.

LSA

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Project Location

Long-term Noise Monitor Location

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0 175 350

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SOURCE: Google Imagery (2021)

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FIGURE 3

Coyote Canyon Landfill
Gas-to-Renewable Natural Gas Project

Noise Monitoring Locations

Sensitive Land Uses in the Project Vicinity

Certain land uses are considered more sensitive to noise than others are. Examples of these include residential areas, educational facilities, hospitals, childcare facilities, and senior housing. The closest land uses to the project site include the following:

- **North:** Existing Sage Hill High School approximately 1,400 feet from the project site.
- **East:** State Route 73 (SR 73).
- **South:** Existing single-family homes within the Tesoro Community approximately 1,250 feet from the project site.
- **West:** Newport Coast Drive.

PROJECT IMPACT ANALYSIS

The proposed project would result in short-term construction noise and vibration impacts and long-term stationary source noise and vibration impacts as described below.

Short-Term Construction-Related Impacts

Project construction occurring for a duration of 12 months would result in short-term noise and vibration impacts on adjacent land uses. Construction phases include grading, pipeline installation, and equipment installation. Maximum construction impacts during overlapping phases would be short-term, generally intermittent depending on the construction phase, and variable depending on receiver distance from the active construction zone. The duration of impacts in each construction phase generally would be from one day to several months during the overlapping of pipeline and equipment installation phases of construction. The level and types of impacts that would occur during construction are described below.

Construction Noise Impacts

Two types of short-term noise impacts would occur during project construction, including: (1) equipment delivery and construction worker commutes; and (2) project construction operations.

The first type of short-term construction noise would result from transport of construction equipment and materials to the project site and construction worker commutes. These transportation activities would incrementally raise noise levels on access roads leading to the site. It is expected that larger trucks used in equipment delivery would generate higher noise impacts than trucks associated with worker commutes. The single-event noise from equipment trucks passing at a distance of 50 ft from a sensitive noise receptor would reach a maximum level of 84 dBA L_{max}. However, the pieces of heavy equipment for grading and construction activities would be moved on site just one time and would remain on site for the duration of each construction phase. This one-time trip, when heavy construction equipment is moved on and off site, would not add to the daily traffic noise in the project vicinity. The total number of daily vehicle trips would be minimal when compared to existing traffic volumes on the affected streets, and the long-term noise level changes associated with these trips would not be perceptible. Therefore, equipment transport noise and construction-related worker commute impacts would be short term and would not result in a significant off-site noise impact.

The second type of short-term noise impact is related to noise generated during grading, equipment installation, and pipeline construction on the project site. Construction is undertaken in discrete steps, each of which has its own mix of equipment, and consequently its own noise characteristics. These various sequential phases would change the character of the noise generated on the project site. Therefore, the noise levels vary as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. Table G lists the maximum noise levels recommended for noise impact assessments for typical construction equipment based on a distance of 50 ft between the construction equipment and a noise receptor. Typical operating cycles for these types of construction equipment may involve 1–2 minutes of full power operation followed by 3–4 minutes at lower power settings.

In addition to the reference maximum noise level, the usage factor provided in Table G is utilized to calculate the hourly noise level impact for each piece of equipment based on the following equation:

$$L_{eq}(equip) = E.L. + 10\log(U.F.) - 20\log\left(\frac{D}{50}\right)$$

where: *L_{eq} (equip)* = L_{eq} at a receiver resulting from the operation of a single piece of equipment over a specified time period

E.L. = Noise emission level of the particular piece of equipment at a reference distance of 50 ft

U.F. = Usage factor that accounts for the fraction of time that the equipment is in use over the specified period of time

D = Distance from the receiver to the piece of equipment

Each piece of construction equipment operates as an individual point source. Utilizing the following equation, a composite noise level can be calculated when multiple sources of noise operate simultaneously:

$$Leq\ (composite) = 10 * \log_{10}\left(\sum_{1}^{n} 10^{\frac{Ln}{10}}\right)$$

Once composite noise levels are calculated, reference noise levels can then be adjusted for distance using the following equation:

$$Leq\ (at\ distance\ X) = Leq\ (at\ 50\ feet) - 20 * \log_{10}\left(\frac{X}{50}\right)$$

In general, this equation shows that doubling the distance would decrease noise levels by 6 dBA while halving the distance would increase noise levels by 6 dBA.

Table G: Typical Construction Equipment Noise Levels

Equipment Description	Acoustical Usage Factor (%)	Maximum Noise Level (L_{max}) at 50 ft
Backhoe	16	85
Compressor	100	81
Concrete Mixer	40	85
Concrete Pump	40	85
Crane	16	83
Dozer	40	80
Forklift	50	75
Front [End] Loader	40	79
Grader	8	85
Jackhammer	16	86
Scraper	40	88
Tractor	40	80
Welder	40	74

Sources: Roadway Construction Noise Model (FHWA 2006).
ft = foot/feet
L_{max} = maximum instantaneous sound level

Utilizing the equations from the methodology above and the reference information in Table G, construction noise levels during the pipe installation and equipment installation phases were calculated based on information from the *BioFuels Coyote Canyon Biomethane Facility – Renewable Gas Interconnection Rule 45 Interconnect Detailed Engineering Study Report* (Southern California Gas Company 2022). Construction noise levels during the pipe installation phase, lasting four months, would be 83 dBA L_{eq} at a distance of 50 ft from the construction area. Construction noise levels from equipment installation, lasting twelve months, is expected to be approximately 77 dBA L_{eq} at 50 feet. Additionally, minor grading would be necessary prior to equipment installation and pipe installation, however those noise levels would be similar to the pipeline installation and would be of shorter duration.

Construction noise levels will fluctuate throughout the construction period as equipment moves between the various areas on the project site. In order to assess the specific noise levels at the surrounding receptors, the average noise level experienced during construction was assessed based on the distance of activities to the surrounding receptors which would be 1,700 feet from the property line of the existing school use to the north and 1,380 feet from the existing single-family homes to the south. At those distances, the combined construction noise levels from pipe installation and equipment installation would be 54 dBA L_{eq} and 52 dBA L_{eq}, respectively. Construction noise calculations are provided in Attachment B.

While construction-related, short-term noise levels have the potential to be higher than existing ambient noise levels in the project area under existing conditions, the noise impacts would no longer occur once project construction is completed. As stated above, noise impacts associated with construction activities are regulated by the City’s noise ordinance. The proposed project will be required to comply with the construction hours specified in the City’s Noise Ordinance, which states that construction activities are allowed between 7:00 a.m. and 6:30 p.m., Monday through Friday, and from 8:00 a.m. to 6:00 p.m. on Saturday. No construction is permitted outside of these hours or on Sundays and federal holidays.

As it relates to off-site uses, for informational purposes, construction-related noise impacts would remain below the 80 dBA L_{eq} 8-hour construction noise level criteria as established by the FTA for residential land uses. With adherence to the City's construction hours, construction noise impacts would be considered less than significant.

Construction Vibration Building Damage and Annoyance Potential

Ground-borne noise and vibration from construction activity would be very low at surrounding uses. While there is currently limited information regarding vibration source levels, to provide a comparison of vibration levels expected for a project of this size (as shown in Table H), a large bulldozer, similar to a crane, would generate approximately 87 VdB of ground-borne vibration when measured at 25 ft based on the *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).

The distance to the nearest buildings for vibration impact analysis is measured between the nearest off-site buildings and the project boundary (assuming the construction equipment would be used at or near the project boundary) because vibration impacts occur normally within the buildings. The formula for vibration transmission is provided below.

$$L_v dB\ (D) = L_v dB\ (25\ ft) - 30\ Log\ (D/25)$$

As discussed above, vibration levels above 94 VdB would result in potential damage to non-engineered timber and masonry building and levels above 72 VdB would have the potential to cause annoyance at sensitive residential receptors.

Table H: Vibration Source Amplitudes for Construction Equipment

Equipment		Reference Lv at 25 feet[1]
Pile Driver	Impact, upper range	104
	Impact, typical	93
Hoe Ram		87
Large Bulldozer		**87**
Caisson Drilling		87
Loaded Trucks		**86**
Jackhammer		79
Small Bulldozer		58

Source: *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018).
Note: **Bolded** equipment is similar to that expected to be used during construction.
[1] RMS vibration velocity in decibels (VdB) is 1 µin/sec.
µin/sec = micro-inches per second RMS = root-mean-square L_v = velocity in decibels
FTA = Federal Transit Administration VdB = vibration velocity decibels

The closest off-site structures to the project site are the existing school buildings to the north, approximately 1,400 ft from the potential construction activities and the existing single-family homes to the south, approximately 1,250 ft from the potential construction activities. Using the equations above, the operation of equipment similar to a large bulldozer would generate ground-borne vibration levels of up to 36 VdB at these receptors. At this level, vibration from construction would be well below both the damage and annoyance thresholds as described above. Therefore, this impact would be less than significant and no mitigation would be required.

Long-Term Operational Noise Impacts

Noise impacts associated with the long-term operation of the project must comply with the standards presented in the City's Municipal Code discussed above. Noise associated with the project includes the operation of various pieces of equipment necessary to operate the proposed LFG to RNG plant. It is assumed that all equipment has the potential to operate continuously, 24 hours a day, 7 days a week. As presented below, the proposed oil coolers would be the only equipment that would have variable noise levels based on temperature that is generally tied to higher temperatures during daytime hours and cooler temperatures during the more sensitive nighttime hours.

In order to calculate the expected impacts due to long-term operational stationary source activities, the software SoundPLAN was used. SoundPLAN is a noise modeling program that allows 3-D calculations to be made taking into account topography, ground attenuation, and shielding from structures and walls. Within the model, the noise library allows for the input of many noise sources and calculates the composite noise levels experienced at any receptor necessary. The results from any calculation can be presented both in both tabular and graphic formats. The proposed operations assumed in this analysis were based on conversations with the project engineer and are conservative in nature (i,e. all operations are occurring simultaneously). Table I provides the sources modeled and their respective sound pressure level at a distance of 3 feet included in the analysis is as follows:

Table I: Equipment Reference Noise Levels

Equipment	Source Height (ft)	Reference Noise Level at 3 ft (dBA L_{eq})
Feed Compressor – #1 and #2	6	92
Compressor Feed Oil Cooler – #1 and #2	10	95
Compressor Feed After Cooler – #1 and #2	13	85
TSA Pretreatment Skid	6	85
Chiller	10	85
Membrane Skid	6	85
Recycle Compressor – #1	6	92
Recycle Compressor Oil Cooler – #1	10	95
Recycle Compressor After Cooler – #1	13	85
Deoxo Dryer	4	85
Deoxo After Cooler	4	85.1
Off-Spec Gas Flare	5	85
NRU	10	93
NRU Vacuum Rinse Skid - #1, #2, and #3	6	93
NRU Vacuum Rinse Skid Oil Cooler- #1, #2, and #3	10	95
NRU Vacuum Rinse Skid After Cooler- #1, #2, and #3	13	85
Flare	5	85[1]
Thermal Oxidizer	4	85[1]

Source: *SCS Engineers, 2022*
[1] Reference noise level at 5ft
dBA = A-weighted decibels
ft = foot/feet　　　L_{eq} = equivalent continuous sound level

Graphics showing the results of the SoundPLAN modeling during full site operations for both daytime and nighttime conditions including the 13 ft perimeter wall, are provided in Attachment C. Table J presents the composite noise levels at the nearest sensitive receptors.

Table J: Noise Level Impacts at Surrounding Sensitive Receptors

Location	Overall Project Noise Level ($dBA\ L_{eq}$)	
	Daytime	Night
High School - North	45.5	42.9
Single-Family Homes - South	48.0	46.6

Source: Compiled by LSA (July 2022).
dBA = A-weighted decibels
L_{eq} = equivalent continuous sound level

The results show that the noise levels at the sensitive receptors to the north and to the south would experience noise levels below the daytime 55 dBA L_{eq} standard and nighttime 50 dBA L_{eq} standard from the proposed project operations, thus the project would not result in an impact to the existing sensitive receptors.

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Attachments:
- A: Noise Measurement Data
- B: Construction Noise Printout
- C: SoundPLAN Printout

ATTACHMENT A

NOISE MEASUREMENT DATA

Noise Measurement Survey – 24 HR

Project Number: SCN2101
Project Name: Coyote Canyon

Test Personnel: Corey Knips
Equipment: Spark 906RC (SN:18906)

Site Number: LT-1 Date: 1/10/2022

Time: From 3:00 p.m. To 3:00 p.m.

Site Location: South end of project site, near hairpin turn of access road. On chain-link fence north of channel.

Primary Noise Sources: Very quiet.

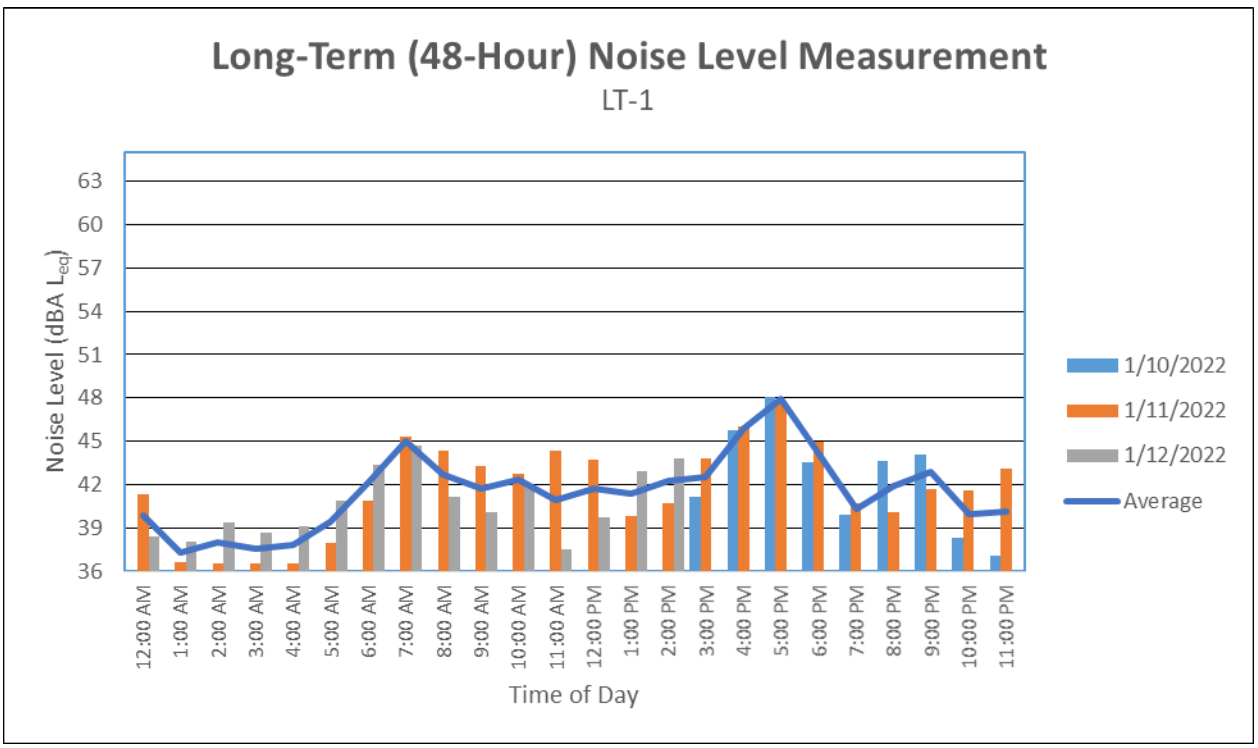
Comments:

Photo:

Long-Term (24-Hour) Noise Level Measurement Results at LT-1

Start Time	Noise Level (dBA L_{eq})			
	1/10/2022	1/11/2022	1/12/2022	Average
3:00 PM	--	41.3	38.4	39.8
4:00 PM	--	36.6	38.0	37.3
5:00 PM	--	36.6	39.4	38.0
6:00 PM	--	36.5	38.7	37.6
7:00 PM	--	36.6	39.1	37.9
8:00 PM	--	37.9	40.9	39.4
9:00 PM	--	40.9	43.3	42.1
10:00 PM	--	45.3	44.7	45.0
11:00 PM	--	44.3	41.2	42.7
12:00 AM	--	43.3	40.1	41.7
1:00 AM	--	42.8	41.9	42.3
2:00 AM	--	44.4	37.6	41.0
3:00 AM	--	43.7	39.7	41.7
4:00 AM	--	39.8	42.9	41.4
5:00 AM	--	40.7	43.8	42.3
6:00 AM	41.2	43.8	--	42.5
7:00 AM	45.7	46.0	--	45.9
8:00 AM	48.1	47.8	--	47.9
9:00 AM	43.5	45.0	--	44.3
10:00 AM	39.9	40.7	--	40.3
11:00 AM	43.7	40.1	--	41.9
12:00 AM	44.1	41.7	--	42.9
1:00 PM	38.4	41.6	--	40.0
2:00 PM	37.1	43.1	--	40.1

Source: Compiled by LSA Associates, Inc. (2022).
dBA = A-weighted decibel
L_{eq} = equivalent continuous sound level



Project Number: SCN2101

Project Name: Coyote Canyon

Test Personnel: Corey Knips

Equipment: Spark 906RC (SN:18907)

Site Number: LT-2 Date: 1/10/2022

Time: From 3:00 p.m. To 3:00 p.m.

Site Location: North end of project site, just south of Sage Hill School. On chain-link fence north of access road and channel.

Primary Noise Sources: Faint traffic on SR-73.

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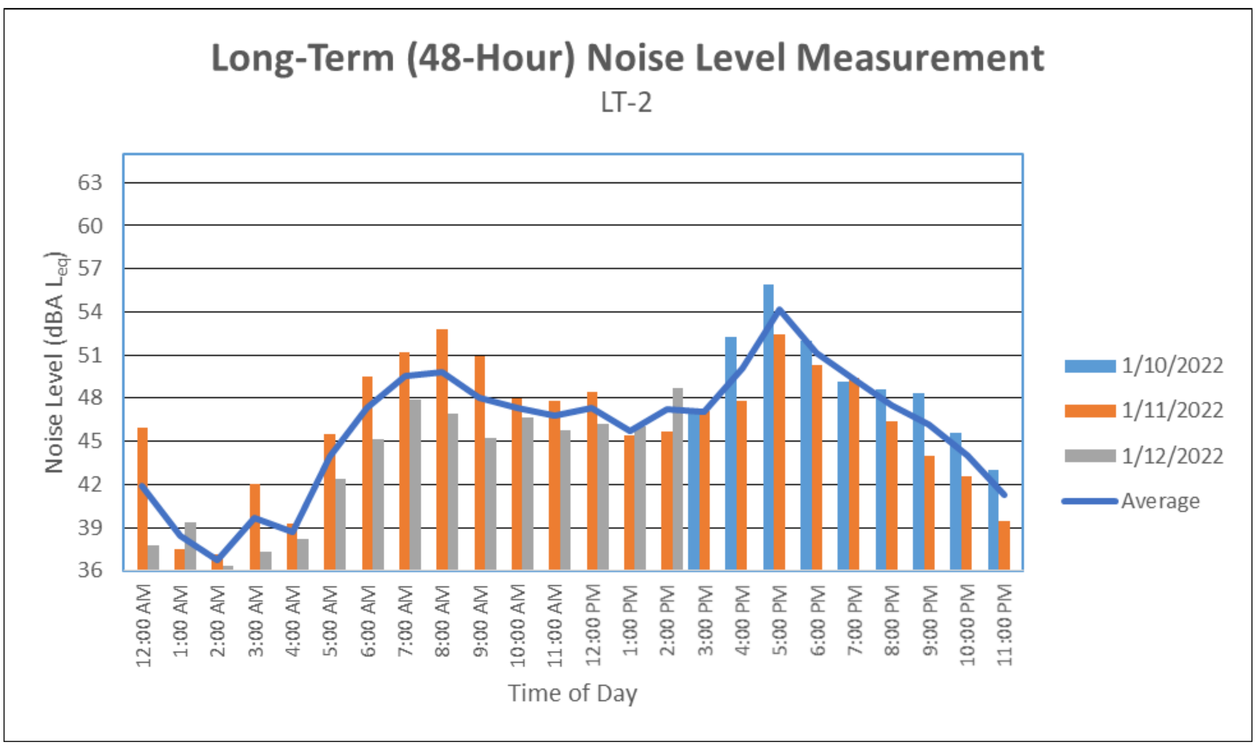
Comments:

Photo:

Long-Term (24-Hour) Noise Level Measurement Results at LT-2

Start Time	Noise Level (dBA L_{eq})			
	1/10/2022	1/11/2022	1/12/2022	Average
3:00 PM	--	46.0	37.8	41.9
4:00 PM	--	37.5	39.4	38.4
5:00 PM	--	37.1	36.3	36.7
6:00 PM	--	42.1	37.3	39.7
7:00 PM	--	39.2	38.2	38.7
8:00 PM	--	45.5	42.4	44.0
9:00 PM	--	49.5	45.1	47.3
10:00 PM	--	51.2	47.9	49.6
11:00 PM	--	52.8	46.9	49.8
12:00 AM	--	50.9	45.2	48.1
1:00 AM	--	48.0	46.6	47.3
2:00 AM	--	47.8	45.8	46.8
3:00 AM	--	48.4	46.2	47.3
4:00 AM	--	45.4	46.1	45.7
5:00 AM	--	45.7	48.7	47.2
6:00 AM	46.9	47.1	--	47.0
7:00 AM	52.3	47.8	--	50.0
8:00 AM	55.9	52.4	--	54.2
9:00 AM	52.0	50.3	--	51.1
10:00 AM	49.1	49.4	--	49.3
11:00 AM	48.6	46.4	--	47.5
12:00 AM	48.3	44.0	--	46.2
1:00 PM	45.5	42.5	--	44.0
2:00 PM	43.0	39.4	--	41.2

Source: Compiled by LSA Associates, Inc. (2022).
dBA = A-weighted decibel
L_{eq} = equivalent continuous sound level



Project Number: SCN2101

Project Name: Coyote Canyon

Test Personnel: Corey Knips

Equipment: Spark 906RC (SN:18908)

Site Number: LT-3 Date: 1/10/2022

Time: From 3:00 p.m. To 3:00 p.m.

Site Location: West side of project site, approximately 270 feet east of Newport Coast Drive, On sign on the west side of the access road.

Primary Noise Sources: Faint traffic on Newport Coast Drive.

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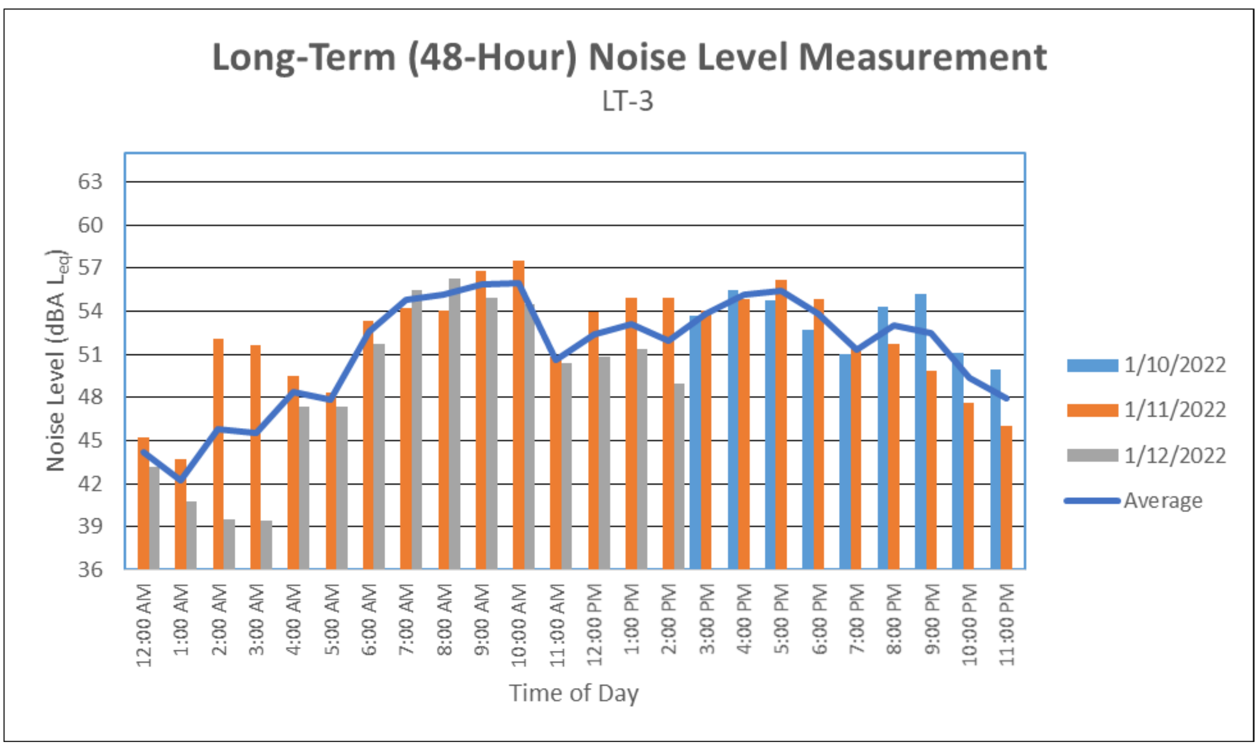
Comments:

Photo:

Long-Term (24-Hour) Noise Level Measurement Results at LT-3

Start Time	Noise Level (dBA L_{eq})			
	1/10/2022	1/11/2022	1/12/2022	Average
3:00 PM	--	45.3	43.1	44.2
4:00 PM	--	43.7	40.7	42.2
5:00 PM	--	52.1	39.6	45.8
6:00 PM	--	51.6	39.4	45.5
7:00 PM	--	49.5	47.3	48.4
8:00 PM	--	48.3	47.4	47.9
9:00 PM	--	53.4	51.7	52.6
10:00 PM	--	54.2	55.5	54.8
11:00 PM	--	54.0	56.3	55.1
12:00 AM	--	56.8	55.0	55.9
1:00 AM	--	57.5	54.5	56.0
2:00 AM	--	50.8	50.4	50.6
3:00 AM	--	53.9	50.8	52.4
4:00 AM	--	54.9	51.4	53.2
5:00 AM	--	54.9	49.0	52.0
6:00 AM	53.7	54.0	--	53.9
7:00 AM	55.5	54.8	--	55.2
8:00 AM	54.7	56.2	--	55.5
9:00 AM	52.7	54.9	--	53.8
10:00 AM	51.1	51.6	--	51.3
11:00 AM	54.3	51.8	--	53.0
12:00 AM	55.2	49.9	--	52.5
1:00 PM	51.1	47.7	--	49.4
2:00 PM	49.9	46.0	--	48.0

Source: Compiled by LSA Associates, Inc. (2022).
dBA = A-weighted decibel
L_{eq} = equivalent continuous sound level



ATTACHMENT B

CONSTRUCTION NOISE CALCULATIONS

Construction Calculations

Phase: Pipe Installation - 4 Months

Equipment	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA)	
					Lmax	Leq
Backhoe	85	16	50	0.5	85	77
Dozer	80	40	50	0.5	80	76
Tractor	80	40	50	0.5	80	76
Pneumatic Tool	86	16	50	0.5	86	78
Welder	74	40	50	0.5	74	70
				Combined at 50 feet	**90**	**83**
				Phase at Receptor 1380 feet	**61**	**54**
				Phase at Receptor 1700 feet	**59**	**52**

Phase: Equipment Installation - 12 months

Equipment	Reference (dBA) 50 ft Lmax	Usage Factor[1]	Distance to Receptor (ft)	Ground Effects	Noise Level (dBA)	
					Lmax	Leq
Crane	83	16	50	0	83	75
Forklift	75	50	50	0	75	72
				Combined at 50 feet	**84**	**77**
				Phase at Receptor 1250 feet	**56**	**49**
				Phase at Receptor 1400 feet	**55**	**48**
				Combined Phases at Receptor 1250 feet	**62**	**55**
				Combined Phases at Receptor 1400 feet	**60**	**54**

Sources: Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances (USEPA 1971). RCNM

[1]- Percentage of time that a piece of equipment is operating at full power.

dBA – A-weighted Decibels

Lmax- Maximum Level

Leq- Equivalent Level

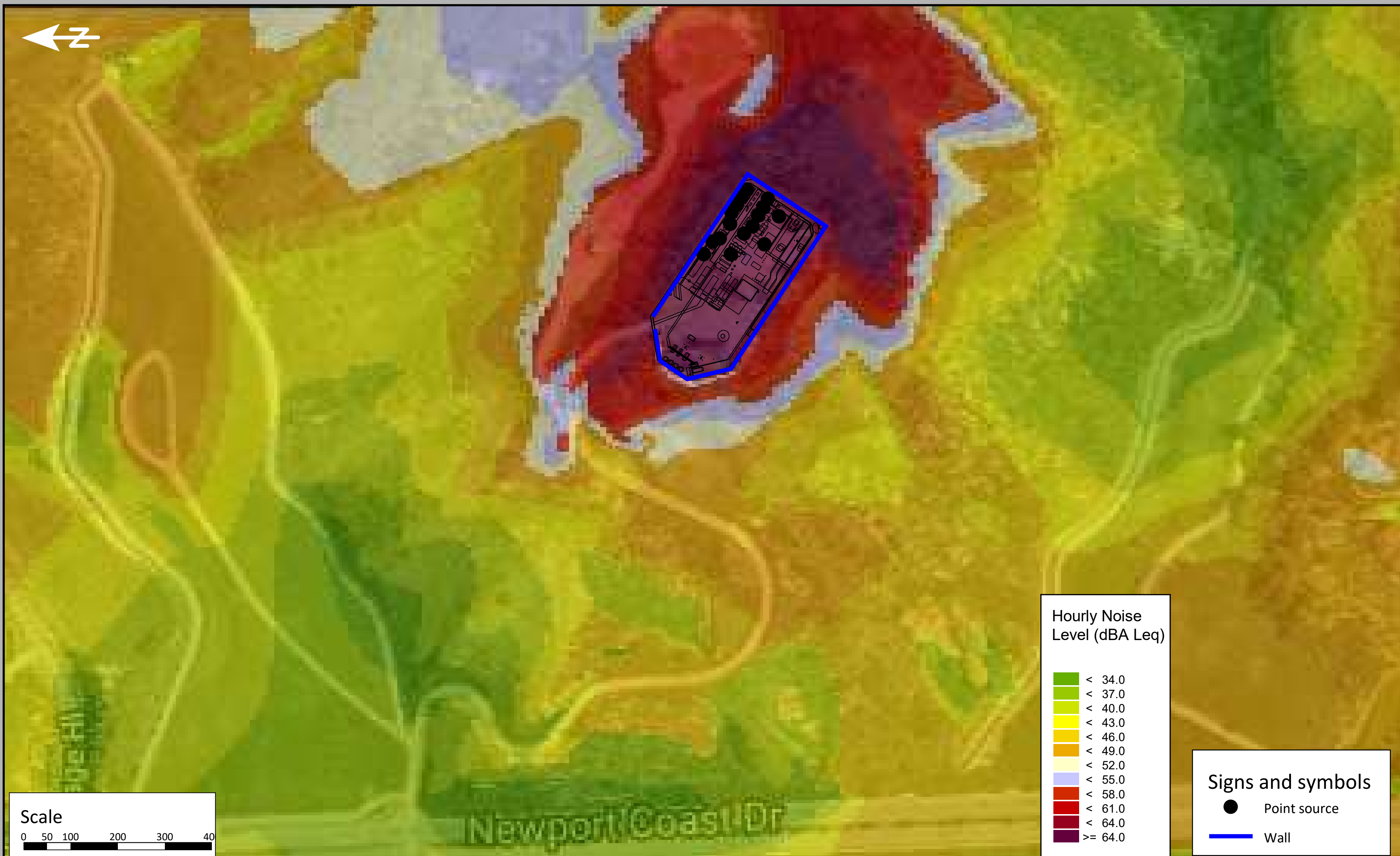
ATTACHMENT C

SOUNDPLAN PRINTOUTS

Coyote Canyon Landfill

Project No. SCN2101

Project Operational Noise Levels - Daytime



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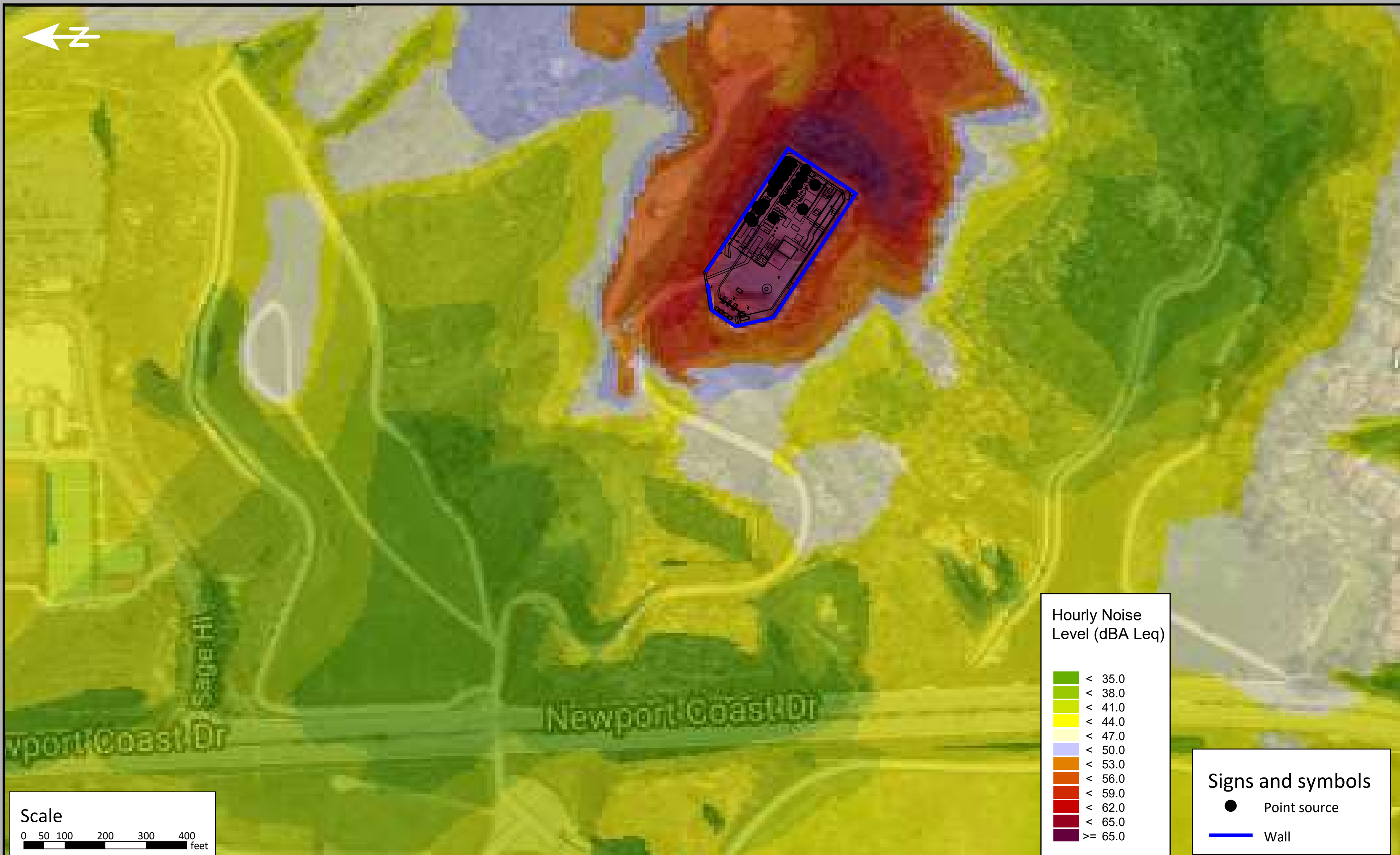
Coyote Canyon Landfill

Project No. SCN2101

Project Operational Noise Levels - Nighttime



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