4.8 Noise and Vibration

This section describes the existing ambient noise in the vicinity of the proposed Project and the anticipated noise impacts of the proposed Project to residents and other sensitive receptors. Mitigation measures to reduce or avoid noise impacts are identified, as needed. The noise measurements and estimates used in this section are drawn from the *East Cat Canyon Oil Field Redevelopment Project Noise and Vibration Impact Analysis Report* completed by Behrens and Associates, Inc. (February 2015 and updated March 2016) and peer reviewed by the County's consultant, Aspen Environmental Group, in 2017. This technical study is provided in full as Appendix L of this EIR. Alternatives to the proposed Project are discussed in Section 5.0.

4.8.1 Environmental Setting

4.8.1.1 Noise

Fundamentals of Noise

Noise may be defined as unwanted sound, which is generally measured on a logarithmic scale and expressed in decibels (dBA). The pitch or loudness causes the objectionable nature of the noise. It is often objectionable because it is disturbing or annoying. Pitch depends on the frequency of the vibrations that produce the sound. Higher pitched signals sound louder to humans than sounds with a lower pitch. Loudness is the amplitude of sound waves combined with the reception characteristics of the ear. The assessment of noise utilizes specialized terminology not used in everyday speech; therefore, to assist in understanding the subsequent analysis, Table 4.8-1 provides definitions for these technical terms.

Table 4.8-1. Summary of Acoustical Terms

Term	Definition
Decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
A-Weighted Sound Level (dBA)	The sound level in decibels as measured on a sound level meter using the A weighted filter network. The A-weighted filter de-emphasizes the very low and very high frequency components of sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Ambient Noise Level	The composite noise from all sources resulting in the existing normal level of environmental noise at a given location.
Intrusive	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, time of occurrence, presence of pure tones, and impulsiveness.
Equivalent Noise Level (Leq)	The average dBA level, on an equal energy basis, during the measurement period.
Maximum Noise Level (Lmax)	The maximum noise level during a sound measurement period.
Minimum Noise Level (Lmin)	The minimum noise level during a sound measurement period.
Percentile Noise Level (Ln)	The noise level exceeded during 'n' percent of the measurement period, where 'n' is a number between 0 and 100 (e.g., L90 refers to the dBA level occurring 90 percent of the time during a sound measurement period)
Day/Night Noise Level (Ldn)	The average A-weighted noise level during a 24-hour day obtained after the addition of 10 dB to levels measured in the night between 10 p.m. and 7 a.m.

Table 4.8-1. Summary of Acoustical Terms

Term	Definition
Community Noise Equivalent Level (CNEL)	The average A-weighted noise level during a 24-hour day obtained after the addition of 5 dB to sound levels in the evening from 7 p.m. to 10 p.m. and after the addition of 10 dB to sound levels in the night between 10 p.m. and 7 a.m.

Sound levels in decibels are calculated on a logarithmic basis and therefore the sound pressure levels are not added arithmetically. An increase of 10 dBA represents a tenfold increase in acoustic energy, while 20 dBA is 100 times more intense, 30 dBA is 1,000 times more intense, and so forth. There is a relationship between the subjective noisiness or loudness of a sound and its level. Each 10 dBA increase in sound level is perceived as approximately a doubling of loudness over a wide range of amplitudes. When two sounds of equal sound pressure level are added, the result is a sound pressure level that is approximately 3 dBA higher. For example, if the sound level from one backhoe operating is 80 dBA, then it would be 83 dBA when two backhoes are operating at the same distance from the receptor. Noise levels do not change much when a quieter noise source is added to relatively louder ambient noise levels. For example, if a 60 dBA noise source is added to 70 dBA ambient noise levels, the resulting ambient noise level is 70.4 dBA.

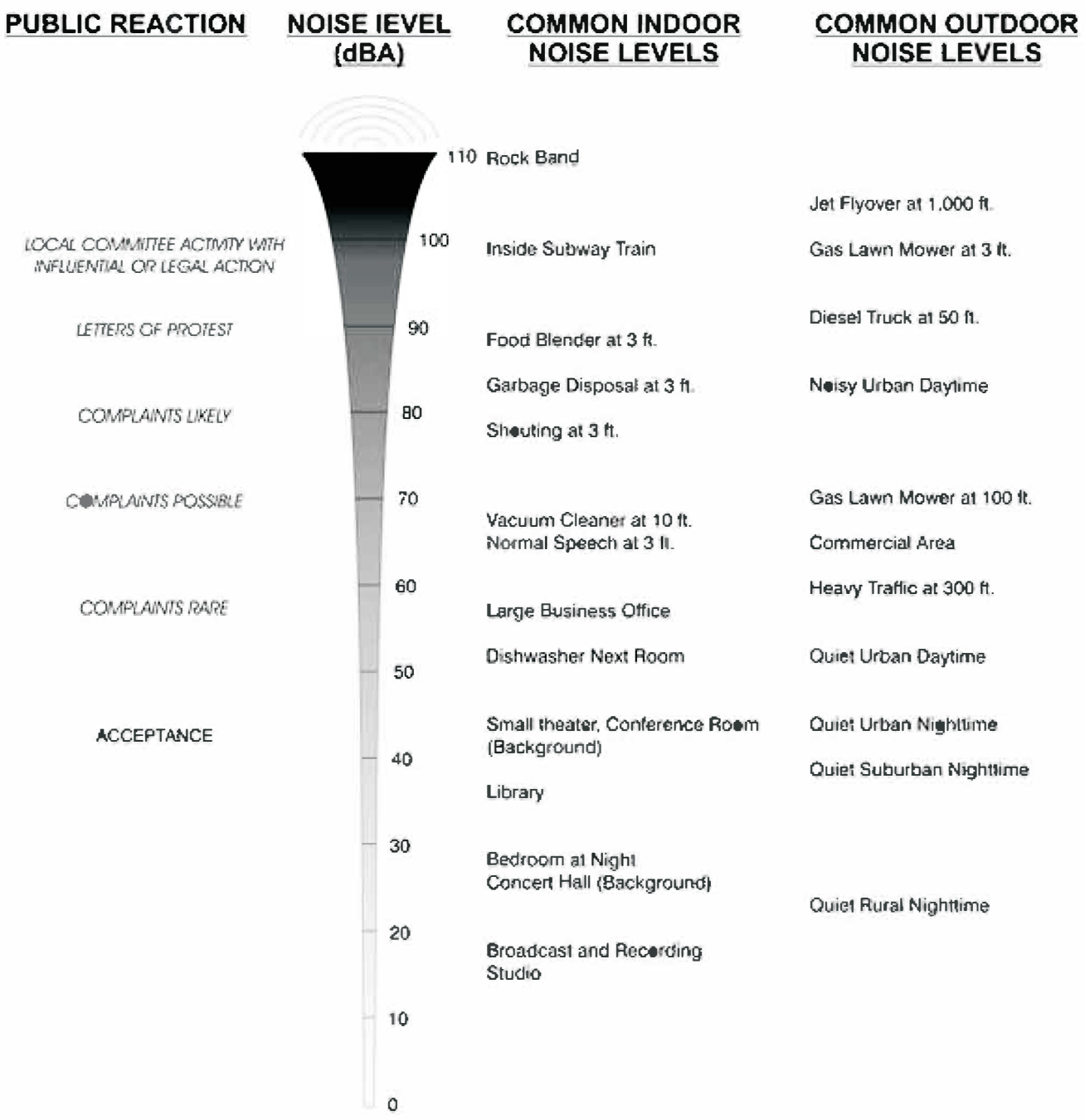
Human Response to Noise Levels

No satisfactory way exists to measure the subjective effects of noise, or to measure the corresponding reactions of annoyance and dissatisfaction. This lack of a common standard is due primarily to the wide variation in individual thresholds of annoyance and habituation to noise. Thus, an important way of determining a person's subjective reaction to a new noise is by comparison with the ambient noise environment.

Noise levels are generally considered low when ambient levels are below 50 dBA, moderate in the 50 to 65 dBA range, and high above 65 dBA (FTA, 2006). Although people often accept the higher levels associated with very noisy urban residential and residential-commercial zones, high noise levels are nevertheless considered to be an annoyance and may be adverse to public health. In general, the more the level or the tonal (frequency) variations of a noise exceed the existing ambient noise level or tonal quality, the less acceptable the new noise will be, as judged by the exposed individual. When comparing changes to sound levels from similar sources (for example, changes in traffic noise levels), an increase of 3 dBA is considered to be a just-perceivable difference, 5 dBA is clearly perceivable, and 10 dBA is considered a doubling in perceived loudness. Figure 4.8-1 illustrates typical noise levels for common sounds.

Noise-Sensitive Receptors

Noise-sensitive land uses (i.e., sensitive receptors) include: residential dwellings; transient lodging; hospitals and other long-term care facilities; public or private educational facilities; libraries; churches; and places of public assembly (Santa Barbara County, 2009 and 2015). Sensitive receptors located in the proposed Project vicinity include those that could be affected by proposed Project activities within the oil field and those along travel routes utilized by proposed Project-related truck trips.



Source: Aera, 2016.

Figure 4.8-1

Noise Levels of Common Sounds

East Cat Canyon Oil Field. Noise sensitive receptors (NSRs) were identified on all sides of the proposed Project site with the exception of the west and northwest property boundary which is occupied by oil and gas facilities similar to those planned at the proposed Project site. All identified oil field NSRs were included in the noise and vibration impact analysis. In locations where a cluster of residences exists, the residence nearest the proposed Project site is identified by distance. Figure 4.8-2 identifies eight NSRs in the vicinity of the proposed Project site that will be used as points of analysis throughout this study with respect to impacts from oil field construction and operational activities. Table 4.8-2 provides the distance of NSR 1 through NSR 8 to the oil field boundary and the closest proposed new well pad.

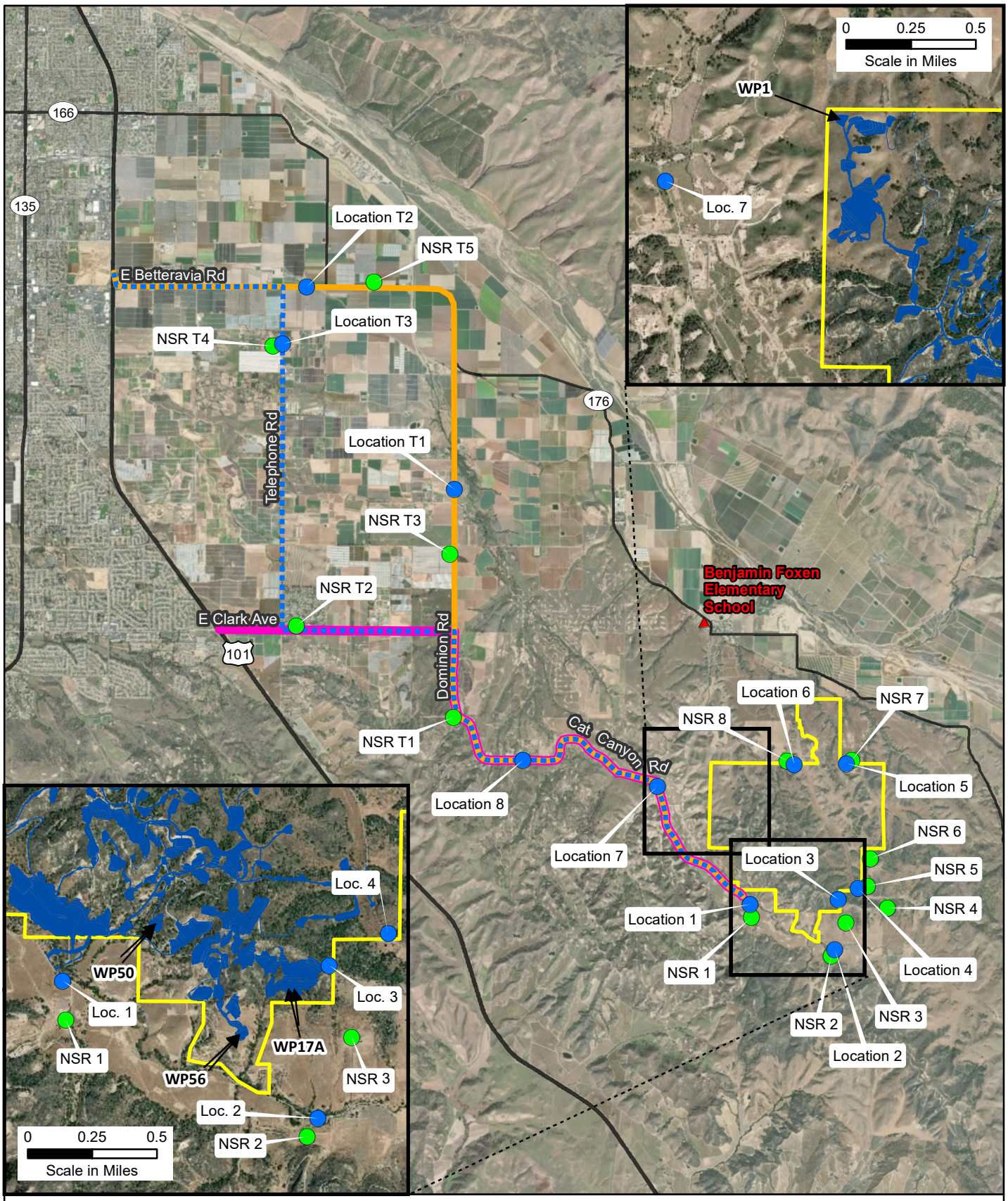
Table 4.8-2. Oil Field NSR Locations: Distance to Oil Field Boundary and Nearest Proposed New Well Pad

NSR	Distance to Oil Field	Distance to Proposed New Well Pad
1	1,350 feet	1,350 feet
2	1,820 feet	6,884 feet (1.3 mile)
3	850 feet	6,884 feet (1.3 mile)
4	1,900 feet	8,976 feet (1.7 mile)
5	400 feet	7,920 feet (1.5 mile)
6	550 feet	7,392 feet (1.4 mile)
7	450 feet	6,336 feet (1.2 mile)
8	350 feet	2,640 feet

Truck Route Segments. The travel routes associated with the proposed Project include highways, arterial streets, and collector streets. The traffic noise analysis in this study considers the travel routes up to their intersection with Highway 101. All routes reach Highway 101 where they continue either to the north (construction and operation trips) or south (construction trips) . Figure 4.8-2 identifies five NSRs along the proposed travel routes that are used as points of analysis in this section. The traffic NSRs were selected due to their proximity to the affected road (exposure to traffic noise and vibration from the road). These receptors along truck routes are identified as NSR T1 through NSR T5 and include the following:

- NSR T1 includes a residence located 90 feet from the Dominion Road centerline, south of Clark Avenue.
- NSR T2 includes a residence located 27 feet from the Clark Avenue centerline, east of Telephone Road.
- NSR T3 includes a residence located 40 feet from the Dominion Road centerline, north of Clark Avenue.
- NSR T4 includes a residence located 34 feet from the Telephone Road centerline, north of Clark Avenue.
- NSR T5 includes a residence located 25 feet from the Betteravia Road centerline, east of Telephone Avenue.

Pipeline Alignment. The proposed new 14-mile natural gas pipeline would be constructed along Cat Canyon Road, Dominion Road, Clark Avenue, and Graciosa Road (refer to Figure 2-10). Receptors along these roadways primarily include residences. The eastern portion of the natural gas line is represented by NSR 1 and T1 (Cat Canyon Avenue) and NSR T2 (Clark Avenue), as shown in Figure 4.8-2. As the proposed natural gas pipeline travels west along Clark Avenue, it travels past Lake Marie Estates, a residential developed located on the north side of Clark Avenue, and eventually through the community of Orcutt located west of Highway 101. As the pipeline traverses Orcutt, it passes a mix of residential and commercial developments, as well as sensitive receptors including schools and churches. As the pipeline route exits the Town of Orcutt and heads south, it terminates in undeveloped land along Graciosa Road.



Noise Sensitive Receptor (NSR)

Ambient Noise Measurement Location

Aera Energy LLC Property

Travel Routes

Project Option 1

Project Option 2

Project Option 3

0 1 2
Scale in Miles

Figure 4.8-2

Noise Sensitive Receptor and Ambient Sound Measurement Locations

Measured Ambient Noise Conditions

East Cat Canyon Oil Field. Long-term (24 hour) noise measurements were conducted on February 11, 2014 at eight (8) locations near the proposed Project site. These measurements are intended to represent typical daytime and nighttime ambient noise conditions at residential locations nearest the proposed Project site. The results of these measurements are provided in Table 4.8-3, with their locations shown in Figure 4.8-2.

Table 4.8-3. Oil Field NSR Locations: 24 Hour Ambient Noise Measurements

		Daytime (7:00 a.m. to 9:00 p.m.)		Nighttime (9:00 p.m. to 7:00 a.m.)	
Location	Representative NSRs	Average Leq (dBA)	Lowest Hourly Leq (dBA)	Average Leq (dBA)	Lowest Hourly Leq (dBA)
1	NSR 1	57.4	46.5	51.4	37.4
2	NSR 2	54.5	45.6	52.9	34.1
3	NSR 3	38.4	27.8	30.4	25.3
4	NSRs 4, 5, and 6	40.4	20.8	30.3	20.4
5	NSR 7	38.0	27.7	32.6	28.2
6	NSR 8	38.4	23.2	33.7	16.6
7	—	64.2	58.2	60.4	51.6
8	—	66.9	56.8	63.1	28.8

Source: Behrens and Associates, 2015 (see EIR Appendix L)

Truck Route Segments. Short-term (20 minute) noise measurements were conducted on February 12, 2014 at three (3) locations along the proposed travel routes. These measurements are intended to represent typical traffic noise levels along different sections of the proposed routes. The results of these measurements are provided in Table 4.8-4, with their locations shown in Figure 4.8-2.

Table 4.8-4. Truck Route NSR Locations: 20 Minute Ambient Noise Measurements

Location	Start Time	Approximate Distance to Road Centerline	Leq (dBA)
T1	1:37 p.m.	15	67.9
T2	12:58 p.m.	24	72.5
T3	12:30 p.m.	15	68.5

Source: Behrens and Associates, 2015 (see EIR Appendix L)

Pipeline Alignment. Ambient noise conditions along the proposed natural gas pipeline route on Cat Canyon Road are shown in Table 4.8-3 as Locations 7 and 8. Ambient noise levels along the Clark Avenue segment of the proposed natural gas pipeline route are expected to differ between those within the community of Orcutt (west of Highway 101) and those outside (east of Highway 101). While ambient noise measurements were not conducted along these segments, daytime noise levels east of Highway 101 are expected to be similar to Locations 7 and 8 for Cat Canyon Road (Table 4.8-3) and TR1 for Dominion Road (Table 4.8-4), which range between 64-68 dBA Leq. Within the community of Orcutt, increased traffic levels along Clark Avenue from residential and commercial uses (compared to those occurring east of Highway 101) are expected to slightly increase expected daytime levels to 70-75 dBA Leq. Ambient daytime levels along the rural portion of Graciosa Road are expected to be like those recorded along rural Cat Canyon Road and Dominion Road (ranging between 64-68 dBA Leq).

4.8.1.2 Vibration

Vibration is a phenomenon related to noise, with common man-made sources being trains, large vehicles on rough roads, and construction activities such as blasting, pile-driving, and operating heavy earth-moving equipment (FTA, 2006). Vibration is defined as the mechanical motion of earth or ground, building, or other type of structure, induced by the operation of any mechanical device or equipment located upon or affixed thereto. Low frequency noise can also create vibration. Vibration generally results in an oscillatory motion in terms of the displacement, velocity, or acceleration of the ground or structure(s) that causes a normal person to be aware of the vibration by means such as, but not limited to, sensation by touch or visual observation of moving objects.

The groundborne energy of vibration has the potential to cause annoyance and structural damage. Vibration can be felt outdoors, but the perceived intensity of vibration effects is much greater indoors due to the shaking of structures. Several land uses are considered sensitive to vibrations, and include residential areas, hospitals, libraries, schools, and churches. Additionally, certain land uses such as cultural and historic resources, and laboratories are typically sensitive to vibration.

There are several different methods that are used to quantify vibration levels. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal and is most frequently used to describe vibration impacts to buildings. The PPV velocity is normally described in inches per second. Table 4.8-5 summarizes typical human response to transient (infrequent) vibration.

Table 4.8-5. Typical Human Response to Transient Vibration, PPV

Human Response	Vibration (inches per second)
Severe	2.00
Strongly Perceptible	0.90
Distinctly Perceptible	0.24
Barely Perceptible	0.035

Source: Caltrans, 2004

Table 4.8-6. Maximum Vibration Levels for Preventing Damage, PPV

Structure and Condition	Limiting Vibration (inches per second)
Engineered Structures	1.0–1.5
Residential Structures in Good Repair with Gypsum Board Walls	0.4–0.5
Residential Structures, Plastered Walls	0.2–0.3

Source: Caltrans, 2004

Table 4.8-7. Oil Field NSR Locations: 24 Hour Ambient Vibration Measurements

Location	Representative NSRs	Maximum Measured PPV (inches per second)
1	NSR 1	0.010
2	NSR 2	0.011
3	NSR 3	0.007
4	NSR 4, 5, and 6	0.006
5	NSR 7	0.001
6	NSR 8	0.001
7	—	0.017
8	—	0.074

Source: Behrens and Associates, 2015 (see EIR Appendix L)

Table 4.8-6 presents maximum vibration levels for preventing damage to various structure types and conditions.

Measured Ambient Vibration Conditions

East Cat Canyon Oil Field. Long-term (24 hour) vibration measurements were conducted on February 11, 2014 at eight (8) locations near the proposed Project site. These measurements are intended to represent typical maximum vibration levels occurring at residential locations nearest the proposed Project site. The results of these measurements are provided in Table 4.8-7, with their locations shown in Figure 4.8-2.

Truck Route Segments. Short-term (20 minute) vibration measurements were conducted on February 12, 2014 at three (3) locations along the proposed travel routes. These measurements are intended to repre-

sent typical maximum traffic vibration levels along different sections of the proposed routes. The results of these measurements are provided in Table 4.8-8, with their locations shown in Figure 4.8-2.

Table 4.8-8. Truck Route NSR Locations: 20 Minute Ambient Vibration Measurements

Location	Start Time	Approximate Distance to Road Centerline	Maximum Measured PPV (inches per second)
T1	1:37 p.m.	15	0.059
T2	12:58 p.m.	24	0.017
T3	12:30 p.m.	15	0.014

Source: Behrens and Associates, 2015 (see EIR Appendix L)

Pipeline Alignment. The proposed new 14-mile natural gas pipeline would be constructed along Cat Canyon Road, Dominion Road, Clark Avenue, and Graciosa Road (refer to Figure 2-10). Vibration occurring along these roadways under existing conditions is expected to be from vehicle movements on these roadways. Therefore, the expected baseline vibration levels are expected to be like those presented in Table 4.8-8 for Locations T1, T2, and T3 along Dominion Road and Clark Avenue.

4.8.2 Regulatory Setting

4.8.2.1 State

California Government Code Section 65302

This code encourages each local government entity to implement a noise element as part of its general plan. In addition, the California Governor's Office of Planning and Research has developed guidelines for preparing noise elements, which include recommendations for evaluating the compatibility of various land uses as a function of community noise exposure. These recommendations have been incorporated into the local plans and policies discussed below.

4.8.2.2 Local

Santa Barbara County Comprehensive Plan

The Noise Element of the County Comprehensive Plan provides specific policies related to noise implications of proposed development. The following policies of the Noise Element are relevant to the proposed Project (County of Santa Barbara, 2009):

- In the planning of land use, 65 dBA Day-Night Average Sound Level should be regarded as the maximum exterior noise exposure compatible with noise-sensitive uses unless noise mitigation features are included in project designs.

County of Santa Barbara Land Use and Development Code

Section 35.52 of the County's Land Use and Development Code provides development standards for the location and operation of oil and gas facilities within inland portions of the County. Development Code Section 35.52.050.B.1 includes the following standards applicable to all drilling and production noise effects and sources (County of Santa Barbara, 2018):

- *35.52.050.B.1.b: Setbacks. In addition to the well spacing and setback requirements of County Code Chapter 25 (Petroleum Code), Section 25-21 (Spacing and location), oil or gas drilling or related facilities shall not be allowed within 500 feet of an occupied residence within a residential or commercial zone.*

- *35.52.050.B.1.g: Noise. Drilling or production operations that are within or adjacent to a lot zoned residential or commercial shall not exceed a maximum daytime noise level of 65 dB(A) and shall not be conducted between the hours of 9 p.m. and 7 a.m. of the next day, unless noise generating facilities are sufficiently insulated to reduce the outside night time level to 50 dB(A) at or beyond the project property boundary.*
- *35.52.050.B.1.h: Noise Sensitive Locations. Production facilities shall be designed and housed to ensure the noise generated by the facilities as measured at any noise sensitive location shall be equal to or below the existing noise level of the that noise sensitive location. Measures to reduce adverse impacts (due to noise, vibration, etc.) to the maximum extent feasible shall be used for facilities located adjacent to noise sensitive locations as identified in the Noise Element of the Comprehensive Plan (e.g., use of electrical hydraulic surface pumping units).*
- *35.52.050.B.1.i: Truck Operation Hours and Routes. It shall be prohibited to operate trucks exceeding one and a half tons for use in oil and gas operations between the hours of 9 p.m. and 7 a.m. upon streets within a residential neighborhood. This prohibition shall not apply in an emergency as determined by the County Sheriff, Fire Department, or Petroleum Administrator. This regulation shall go into effect and apply to streets and parts of streets only after signs giving notice of the prohibition are posted at entrances to the affected streets or parts of streets. Truck routes shall be reviewed for proposed oil and gas facilities to ensure that oil field support traffic is not routed through residential neighborhoods, unless alternative routes do not exist.*

Development Code Section 35.52.050.B.2 includes the following additional standards applicable to production operational noise sources (County of Santa Barbara, 2018):

- *35.52.050.B.2.c: Monitoring System. A monitoring system to measure off-site impacts, including noise, vibration, odor, and air or water quality degradation, may be required as a condition of approval.*

4.8.3 CEQA Environmental Thresholds

The County's Environmental Thresholds and Guidelines Manual provides the following CEQA thresholds of significance for noise (County of Santa Barbara, 2015):

a. A proposed development that would generate noise levels in excess of 65 dBA CNEL and could affect sensitive receptors would generally be presumed to have a significant impact.

b. Outdoor living areas of noise sensitive uses that are subject to noise levels in excess of 65 dBA CNEL would generally be presumed to be significantly impacted by ambient noise. A significant impact would also generally occur where interior noise levels cannot be reduced to 45 dBA CNEL or less.

c. A project will generally have a significant effect on the environment if it will increase substantially the ambient noise levels for noise-sensitive receptors adjoining areas. Per item (a) above, this may generally be presumed when ambient noise levels affecting sensitive receptors are increased to 65 dBA CNEL or more. However, a significant effect may also occur when ambient noise levels affecting sensitive receptors increase substantially but remain less than 65 dBA CNEL, as determined on a case-by-case level.

d. Noise from grading and construction activity proposed within 1,600 feet of sensitive receptors, including schools, residential development, commercial lodging facilities, hospitals or care facilities, would generally result in a potentially significant impact. According to EPA average construction noise is 95 dBA at a 50 feet distance from the source. A 6 dBA drop occurs with a doubling of the distance from the source. Therefore, locations within 1,600 feet of the construction site would be affected by noise

levels over 65 dBA. To mitigate this impact, construction within 1,600 feet of sensitive receptors shall be limited to weekdays between the hours of 8 a.m. to 5 p.m. only. Noise attenuation barriers and muffling of grading equipment may also be required. Construction equipment generating noise levels above 95 dBA may require additional mitigation.

Thresholds (a) through (c) are generally applied to post-construction noise, whereas Threshold (d) specifically applies to construction noise. Limiting exterior noise exposure for these land uses to a level no greater than 65 dB(A) CNEL is meant to ensure that interior noise levels are at or below 45 dB(A) CNEL. This interior noise criterion is mandated by the State for multiple-family residential development, hospitals and lodging facilities. The County of Santa Barbara also applies the 45 dB(A) CNEL interior criterion for all new residential housing types, not simply multi-family residences. This criterion is applicable for design of new residences. Only the exterior 65 dB(A) CNEL threshold is applicable to projects that have potential impacts to existing residences and other sensitive receptors.

In addition to compliance with the County's 65 dBA CNEL threshold described above, additional thresholds of significance pertaining to potential noise impacts were derived from a review of CEQA Appendix G. Based on this review, impacts are also considered significant if the Project or alternatives would result in:

- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.

As discussed earlier, when comparing sound levels an increase of 3 dBA is considered to be a just-perceivable difference, a 5 dBA increase is clearly perceivable, and a 10 dBA increase is considered a doubling in perceived loudness from a source. To provide the most conservative analysis, noise impacts are considered significant should construction or operation exceed daytime ambient noise at a sensitive receptor by 5 dBA or exceed the lowest nighttime ambient noise levels at a sensitive receptor by 3 dBA. These thresholds are consistent with other environmental review conducted by the County of Santa Barbara with respect to the noise thresholds described above from a review of CEQA Appendix G.

With respect to vibration, the County of Santa Barbara does not specify a quantitative threshold within the County's Environmental Thresholds and Guidelines Manual. Therefore, a vibration threshold of 0.2 inches per second is utilized as a threshold for assessing the potential for damage to residential structures (refer to Table 4.8-5). Furthermore, a level of 0.2 inches per second is utilized as the threshold for nearest occupied residential structures to minimize the potential for human annoyance (refer to Table 4.8-5).

4.8.4 Environmental Impacts and Mitigation Measures

The following discussion pertains to construction and operational noise generated by the proposed Project. The Notice of Preparation (NOP) and scoping for this EIR identified public concern regarding noise generated during proposed flare events (an emergency device that would be used as needed). This issue is discussed under Impact Noise-2 (Operational Noise) below.

Applicant proposed Avoidance and Minimization Measure (AMM) are listed in Appendix C. Table 4.8-9 lists the AMMs specific to noise.

Table 4.8-9. Applicant Proposed Avoidance and Minimization Measures Related to Noise

AMM No.	Measure
NOISE-1	**Temporary Acoustical Barriers at WP1.** During drilling operations at WP1, a temporary acoustical barrier at least 16 feet in height should be installed along the north and west sides of the pad. In addition, 16-foot high acoustical barriers should be installed along the north, south, and west sides of the generator, along four sides of the drawworks, and the north, south, and west sides of the mud pumps.
NOISE-2	**Temporary Acoustical Barriers at WP50.** During drilling operations at WP50, temporary acoustical barriers at least 16 feet in height should be installed along the northwest and southwest sides of the generator and drawworks, and the southwest and southeast sides of the mud pumps.
NOISE-3	**Temporary Acoustical Barriers at WP56**. During drilling operations at WP56, a temporary acoustical barrier at least 16 feet in height should be installed along the south and east sides of the pad. In addition, 16 foot high acoustical barriers should be installed along the south and east sides of the generator and mud pumps, and the four sides of the drawworks.
NOISE-4	**Temporary Acoustical Barriers at WP17A.** During drilling operations at WP17A, a temporary acoustical barrier at least 16 feet in height should be installed along the south and east sides of the pad. In addition, 16 foot high acoustical barriers should be installed along the south and east sides of the generator, the south, east and west sides of the drawworks, and the south side of the mud pumps.
NOISE-5	**Pre-Drilling Noise Modeling**. Before the commencement of drilling operations at the remaining well pads, create drilling noise models to determine the mitigation measures, if any, required at each pad to ensure a less than significant impact.
NOISE-6	**WP16A and WP17A Drilling/Construction**. Avoid concurrent grading operations at WP16A and drilling operations at WP17A.

4.8.4.1 Oil Field Development & Operation

Impact NOISE-1: Construction Noise

Construction would require the use of heavy equipment for site preparation and grading, well drilling, installation of new well equipment, paving, and other proposed oil production facilities (installation of new supporting equipment, new roads and pipelines, etc.). Section 2.6 (Construction) details all construction activities that would occur as part of the proposed Project. Noise impacts from these activities would be a function of the equipment utilized, the equipment location, the timing and duration of the noise-generating activities, and their distance to sensitive receptors. During each stage of development, a different mix of equipment would be operating at any given time and noise levels would vary based on the number of pieces of equipment in operation and the location of the activity. Furthermore, construction equipment would not be used continuously throughout the workday.

General Construction Noise (All Construction Except Well Drilling)

To evaluate the potential proposed Project construction noise impact, the Noise Technical Study (Appendix L) identified the construction periods with the greatest noise-generating potential by reviewing the proposed Project construction schedule and equipment lists provided by the proposed Project Applicant. A period from both Phase I and Phase II construction activities was selected for analysis. The periods with the most construction equipment/activities and thus the greatest potential to cause a significant noise impact were during the Year 1, Month 6 (Phase I) and Year 4, Month 8, during Phase II. The construction activities taking place during each period are identified in Table 4.8-10. These construction activities would only occur during daytime hours.

Table 4.8-10. Worst-Case Scenario: Temporary Construction Noise

Phase I: Year 1, Month 6	Phase II: Year 4, Month 8
Activity: ▪ Central Processing Facility Construction ▪ Steam Generation Site Construction ▪ Well Pad and Roadway Grading ▪ Installation of Gathering & Distribution Pipelines ▪ Installation of Electrical Power Distribution ▪ Well Hook-Ups	**Activity:** ▪ Central Processing Facility Construction ▪ Steam Generation Site Construction ▪ Well Pad and Roadway Grading

Source: Behrens and Associates, 2015 (see EIR Appendix L)

Thresholds Utilized

The following discussion identifies predicted construction noise impacts potentially exceeding any of the following two thresholds. Note that it is assumed that construction activities (non-well drilling related) would be limited to the daytime hours.

1. Threshold of 65 dBA CNEL at a sensitive receptor. (County's Environmental Thresholds and Guidelines Manual)
2. Exceed daytime ambient noise levels by more than 5 dBA at a sensitive receptor (Appendix G, significant increase over-ambient daytime threshold). This threshold is included to determine if temporary construction noise would significantly impact daytime ambient noise levels at NSR locations in the project vicinity. As discussed earlier, an increase of 5 dBA over ambient conditions is a clearly perceivable change and is used as a threshold for noise impacts during daytime hours.

Impact Analysis

Tables 4.8-11 and 4.8-12 show modelled temporary construction noise levels during peak construction periods at each NSR location during Phases I and II, respectively. As presented in Table 4.8-11, at NSR 1 the ambient noise level is 57.4 dBA and the construction noise level would be 49.7 Leq (average dBA level). Since the construction noise is lower than the ambient noise level, the construction noise would not be audible at the NSR. However, since construction noise is presented as an average dBA level (Leq), there could be momentary spikes in noise at NSR 1. Likewise, at the other NSR locations, 2 through 8, the construction noise levels are lower than all ambient conditions for both peak Phase I and Phase II construction.

As shown in Tables 4.8-11 and 4.8-12, **peak general construction activities would not exceed the 5 dBA or 65 CNEL thresholds, resulting in less than significant temporary noise impacts at each NSR location, as shown in Figure 4.8-2 (Class III).**

Table 4.8-11. Phase I (Year 1, Month 6) Construction Noise Levels (dBA)

	Daytime Noise Analysis			County Threshold Analysis	
Location	Average Measured Daytime Ambient Noise Level	Average Estimated Construction Noise Level (Leq) at Location	Estimated Noise Level Greater than 5 dBA Over Ambient?	Average Estimated Construction Noise Level (CNEL)[1]	Estimated Noise Level Greater than 65 dBA CNEL (County of Santa Barbara Threshold)?
NSR 1	57.4	49.7	NO	57.2	NO
NSR 2	54.5	34.3	NO	41.8	NO
NSR 3	38.4	30.4	NO	37.9	NO
NSR 4	40.4	27.4	NO	34.9	NO

Table 4.8-11. Phase I (Year 1, Month 6) Construction Noise Levels (dBA)

	Daytime Noise Analysis			County Threshold Analysis	
Location	Average Measured Daytime Ambient Noise Level	Average Estimated Construction Noise Level (Leq) at Location	Estimated Noise Level Greater than 5 dBA Over Ambient?	Average Estimated Construction Noise Level (CNEL)[1]	Estimated Noise Level Greater than 65 dBA CNEL (County of Santa Barbara Threshold)?
NSR 5	40.4	32.8	NO	40.3	NO
NSR 6	40.4	32.4	NO	39.9	NO
NSR 7	38.0	21.7	NO	29.2	NO
NSR 8	38.4	30.2	NO	37.7	NO

Note: The noise level assumptions from each piece of construction equipment utilized during these measurements are presented in Appendix L, Tables 6-2 and 6-3.
1 - To calculate CNEL, 7.5 dBA was added to the average estimated drilling noise level.
Source: Behrens and Associates, 2015 (see EIR Appendix L)

Table 4.8-12. Phase II (Year 4, Month 8) Construction Noise Levels (dBA)

	Daytime Noise Analysis			County Threshold Analysis	
Location	Average Measured Daytime Ambient Noise Level	Average Estimated Construction Noise Level (Leq) at Location	Estimated Noise Level Greater than 5 dBA Over Ambient?	Average Estimated Construction Noise Level (CNEL)[1]	Estimated Noise Level Greater than 65 dBA CNEL (County of Santa Barbara Threshold)?
NSR 1	57.4	46.7	NO	54.2	NO
NSR 2	54.5	31.6	NO	39.1	NO
NSR 3	38.4	27.6	NO	35.1	NO
NSR 4	40.4	27.5	NO	35.0	NO
NSR 5	40.4	31.2	NO	38.7	NO
NSR 6	40.4	31.1	NO	38.6	NO
NSR 7	38.0	26.3	NO	33.8	NO
NSR 8	38.4	29.8	NO	37.3	NO

Note: The noise level assumptions from each piece of construction equipment utilized during these measurements are presented in Appendix L, Tables 6-2 and 6-3.
1 - To calculate CNEL, 7.5 dBA was added to the average estimated drilling noise level. Source: Behrens and Associates, 2015 (see EIR Appendix L)

Well Drilling Noise

The drilling of proposed new wells is a major noise source associated with the proposed Project. That is because, once drilling commences, it typically proceeds 24 hours per day until the well hole is completed (to avoid collapse of the hole). General construction activities analyzed above within Tables 4.8-11 and 4.8-12 would occur during daytime hours.

Each well is expected to take approximately 6 to 12 days to complete, including drilling rig mobilization and demobilization. Actual drilling is anticipated to take 5 to 7 days per well. A tentative drilling schedule for each of the 296 new wells would include assembly, drilling, and de-mobilization of the drilling rig. One, sometimes two, drilling rigs will be used. Drilling crews typically work in two 12-hour shifts, one starting at noon and one starting at midnight. Other construction activities associated with the proposed Project (installation of new supporting equipment, new roads and pipelines, etc.) are assumed to occur during daylight hours Monday through Saturday. As shown in Section 2 (Project Description), Table 2-3, the pro-

cess of drilling all new wells would span approximately 19 years. As shown in Table 2-3, the number of wells drilled per year ranges between 3 and 95 per year.

In an effort to ensure the drilling noise assessment would be as accurate as possible, noise measurements were conducted at and around an operating drill rig to measure the sound levels of key equipment that comprise the drill rig. The results of those sound level surveys were used during the modeling of drilling noise for the proposed Project. Details of these measurements are provided in Appendix L. The resulting equipment noise levels used in the modeling are presented in Table 4.8-13. During drilling operations, the drilling rig is scheduled to operate 24 hours per day.

Table 4.8-13. Modeled Drilling Rig Equipment Noise Levels

Equipment	Quantity in Model per Well Drilled	Sound Level at 50 Feet (dBA)
Drawworks Loader	1	86.7
Generator	1	84.3
Mud Pumps	2	77.7
Shaker	2	56.4
Air Valve	1	68.9

Source: Behrens and Associates, 2015 (see EIR Appendix L)

Thresholds Utilized

The following discussion identifies predicted well drilling noise impacts potentially exceeding any of the following three thresholds:

1. Daytime construction and operations threshold of 65 dBA CNEL at a sensitive receptor. (County's Environmental Thresholds and Guidelines Manual)
2. Exceed daytime ambient noise levels by more than 5 dBA at a sensitive receptor (Appendix G, significant increase over-ambient daytime threshold). This threshold is included to determine if temporary drilling noise would significantly impact daytime ambient noise levels at NSR locations. As discussed earlier, an increase of 5 dBA over ambient conditions is a clearly perceivable change and is used as a threshold for noise impacts during daytime hours.
3. Exceed nighttime ambient noise levels by more than 3 dBA at a sensitive receptor (Appendix G, significant increase over-ambient nighttime threshold). This threshold is included to determine if temporary drilling noise would significantly impact nighttime ambient noise levels at NSR locations. As discussed earlier, an increase of 3 dBA over ambient conditions is considered to be a just-perceivable difference and is used as a threshold for noise impacts during nighttime hours due to the sensitivity of receptors at night (sleeping hours).

Impact Analysis

Four well pads were selected to assess the drilling noise impact (see Figure 4.8-2). These four pads were selected because they are the closest to NSRs and thus have the highest potential to create a significant noise impact. For each modeled pad, the loudest drilling equipment (drawworks loader and generators) were positioned on the side of the drilling rig with the shortest distance to the proposed Project property line and closest NSRs. The four pads assessed are:

- WP1
- WP50
- WP56
- WP17A

The proposed Project Applicant has committed to AMMs to abate noise generated during construction activities (refer to Appendix C and introduction to Section 4.8.4), including the use of temporary acoustical barriers at Well Pads 1, 50, 56, and 17A (AMMs NOISE-1 thru NOISE-4), as well as avoiding concurrent grading operations at Well Pad 16A and drilling operations at Well Pad 17A (AMM NOISE-6). An additional AMM (AMM NOISE-5) requires drilling noise modeling at the remaining well pads prior to the commencement of drilling to determine if noise abatement measures are required. Table 4.8-14 presents predicted mitigated well drilling noise levels at these four nearest well pad locations at the nearest NSRs with implementation of the AMMs as described in Appendix C and compares the predicted mitigated noise levels against applicable thresholds. The predicted well drilling mitigated noise contours at each of the four well pad locations are shown in Appendix L, Figures 7-5 through 7-8.

As shown in Table 4.8-14, with the implementation of AMMs, temporary noise during well drilling would not significantly impact any NSR location. Because well drilling on other proposed well pads (besides the four analyzed) would be at much greater distances to any NSR, noise levels would be similar or less than those presented in Table 4.8-14. Mitigation Measure (MM) NOISE-1, which incorporates the AMMs, identifies additional noise abatement measures, as well as monitoring and notification requirements. **With the implementation of MM NOISE-1, well drilling noise impacts would be less than significant (Class II)**.

Mitigation Measures

MM NOISE-1 **Prepare a Construction Noise Control Plan.** The Project Applicant shall provide a Construction Noise Control Plan (Plan) to the County of Santa Barbara (Planning and Development). The Plan is intended to avoid and minimize noise from construction activities and shall include, but is not limited to, the following elements:

a. Inclusion of avoidance and minimization measures (AMMs) NOISE-1 through NOISE-4, and NOISE-6 (provided in EIR Table Ap.C-1, Applicant Proposed Avoidance and Minimization Measures), which includes utilizing temporary acoustical barriers at Well Pads 1, 50, 56, and 17A, as well as avoiding concurrent grading operations at Well Pad 16A and drilling operations at Well Pad 17A.

b. Conduct drilling noise models at all remaining well pads to determine what mitigation, if any, is required at each pad to ensure drilling noise does not exceed 5 dBA over ambient daytime conditions, 3 dBA over ambient nighttime conditions, and County of Santa Barbara thresholds at noise sensitive receptors (AMM NOISE-5).

c. During active well drilling within any well pad, the Applicant shall conduct two (2) exterior noise samples per week (1-hour Leq) between 10:00 p.m. and 7:00 a.m. at the nearest identified sensitive receptor(s) to the well pad to determine the accuracy of modelled construction noise levels versus ambient conditions. The results of these noise samples shall be provided weekly to County P&D.

d. Should an obtained noise samples (required under item #3) exceed those of predicted models by greater than 3 dBA at occupied sensitive receptor(s) during nighttime hours (exterior), the Applicant shall inform the Count of Santa Barbara within 24-hours and present a plan of action to attenuate noise levels to achieve modelled levels.

Table 4.8-14. Mitigated Drilling Noise Levels at NSRs by Well Pad

	Daytime Noise Analysis			Nighttime Noise Analysis			County Threshold Analysis	
Location	Average Measured Daytime Ambient Noise Level	Average Estimated Drilling Noise Level (Leq) at Location	Estimated Noise Level Greater than 5 dBA Over Ambient?	Average Measured Nighttime Ambient Noise Level	Average Estimated Drilling Noise Level (Leq) at Location	Estimated Noise Level Greater than 3 dBA Over Ambient?	Average Estimated Construction Noise Level (CNEL)[1]	Estimated Noise Level Greater than 65 dBA CNEL (County of Santa Barbara Threshold)?
Well Pad #1								
NSR 1	57.4	14.1	NO	51.4	14.1	NO	21.6	NO
NSR 2	54.5	15.1	NO	52.9	15.1	NO	22.6	NO
NSR 3	38.4	9.3	NO	30.4	9.3	NO	16.8	NO
NSR 4	40.4	20.6	NO	30.3	20.6	NO	28.1	NO
NSR 5	40.4	22.6	NO	30.3	22.6	NO	30.1	NO
NSR 6	40.4	24.7	NO	30.3	24.7	NO	32.2	NO
NSR 7	38.0	23.4	NO	32.6	23.4	NO	30.9	NO
NSR 8	38.4	35.1	NO	33.7	35.1	NO	42.6	NO
Well Pad #50								
NSR 1	57.4	29.2	NO	51.4	29.2	NO	36.7	NO
NSR 2	54.5	26.7	NO	52.9	26.7	NO	34.2	NO
NSR 3	38.4	19.1	NO	30.4	19.1	NO	26.6	NO
NSR 4	40.4	21.0	NO	30.3	21.0	NO	28.5	NO
NSR 5	40.4	20.9	NO	30.3	20.9	NO	28.4	NO
NSR 6	40.4	21.6	NO	30.3	21.6	NO	29.1	NO
NSR 7	38.0	10.8	NO	32.6	10.8	NO	18.3	NO
NSR 8	38.4	16.4	NO	33.7	16.4	NO	23.9	NO

Table 4.8-14. Mitigated Drilling Noise Levels at NSRs by Well Pad

	Daytime Noise Analysis			Nighttime Noise Analysis			County Threshold Analysis	
Location	Average Measured Daytime Ambient Noise Level	Average Estimated Drilling Noise Level (Leq) at Location	Estimated Noise Level Greater than 5 dBA Over Ambient?	Average Measured Nighttime Ambient Noise Level	Average Estimated Drilling Noise Level (Leq) at Location	Estimated Noise Level Greater than 3 dBA Over Ambient?	Average Estimated Construction Noise Level (CNEL)[1]	Estimated Noise Level Greater than 65 dBA CNEL (County of Santa Barbara Threshold)?
Well Pad #56								
NSR 1	57.4	35.7	NO	51.4	35.7	NO	43.2	NO
NSR 2	54.5	31.8	NO	52.9	31.8	NO	39.8	NO
NSR 3	38.4	30.8	NO	30.4	30.8	NO	38.3	NO
NSR 4	40.4	25.9	NO	30.3	25.9	NO	33.4	NO
NSR 5	40.4	20.2	NO	30.3	20.2	NO	27.7	NO
NSR 6	40.4	17.3	NO	30.3	17.3	NO	24.8	NO
NSR 7	38.0	8.9	NO	32.6	8.9	NO	16.4	NO
NSR 8	38.4	10.6	NO	33.7	10.6	NO	18.1	NO
Well Pad #17A								
NSR 1	57.4	33.9	NO	51.4	33.9	NO	41.4	NO
NSR 2	54.5	28.4	NO	52.9	28.4	NO	35.9	NO
NSR 3	38.4	32.3	NO	30.4	32.3	NO	39.8	NO
NSR 4	40.4	23.4	NO	30.3	23.4	NO	30.9	NO
NSR 5	40.4	24.0	NO	30.3	24.0	NO	31.5	NO
NSR 6	40.4	21.0	NO	30.3	21.0	NO	28.5	NO
NSR 7	38.0	10.6	NO	32.6	10.6	NO	18.1	NO
NSR 8	38.4	12.7	NO	33.7	12.7	NO	20.2	NO

1 - To calculate CNEL, 7.5 dBA was added to the average estimated drilling noise level.
Source: Behrens and Associates, 2015 (see Appendix L)

e. Identify means and methods (Best Management Practices) to ensure temporary mobile and stationary construction noise levels are reduced to the maximum extent. These methods may include, but are not limited to:

   1. All noise-producing construction equipment and vehicles using internal combustion engines shall be equipped with mufflers, air-inlet silencers where appropriate, and any other shrouds, shields, or other noise-reducing features in good operating condition and appropriate for the equipment that meet or exceed original factory specifications. Mobile or fixed "package" equipment (e.g., arc-welder, air compressors) shall be equipped with shrouds and noise control features that are readily available for that type of equipment.
   2. As feasible, conduct well drilling nearest sensitive receptors during the cooler months, to increase the chances that windows are closed at sensitive receptor locations.
   3. Limit unnecessary idling of construction equipment.
   4. Electric-powered equipment shall be used instead of pneumatic or internal combustion power equipment, where feasible.
   5. The use of noise-producing signals, including horns, whistles, alarms, and bells, shall be limited to safety warning purposes only.
   6. During construction, communication or music systems shall not be audible at any adjacent receptor.

f. Inform nearby residents and other noise sensitive receptors within 2,640 feet of oil field work areas (well pad) and 300 feet of natural gas pipeline/transmission line work areas of anticipated noise disturbances two to four weeks prior to construction, including a contact telephone number to register noise complaints.

g. Establishment of a telephone number for use by the public to report any nuisance noise conditions associated with construction activities. The Project Applicant shall ensure that a liaison is assigned to respond to all public construction noise or vibration complaints in a timely manner, and either (a) the telephone number is staffed by the noise liaison during construction hours; or (b) the phone number is connected to an automatic answering feature, with date and time stamp recording, to answer calls when the phone is unattended. Noise and vibration complaints shall be forwarded to the County of Santa Barbara within 24 hours, along with the Owner/Applicant's initial response to the complaint.

h. The noise complaint telephone number shall be posted at public entrance(s) to the oil field in a manner visible to passersby and provided individually to potentially affected residences.

i. The Plan shall detail personnel assigned to receive and respond to noise and vibration complaints, how the Project Applicant and its contractor(s) will respond to noise and vibration complaints, how resolution of those complaints will be documented, and methods for conflict resolution in the event a noise or vibration complaint cannot be resolved immediately.

PLAN REQUIREMENTS and TIMING: The Construction Noise Control Plan shall be submitted to P&D for review and approval prior to the issuance of the Zoning Clearance.

Permittee shall implement the requirements of the Construction Noise Control Plan as specified in the approved Plan. Prior to the start of each well drilling activity, baseline nighttime metering results shall be submitted to P&D for those locations identified in the County-approved Noise Control Plan.

MONITORING: P&D staff and/or its consultant shall conduct periodic site inspections during well drilling and pipeline installation and shall review required noise metering results and public complaints.

Impact NOISE-2: Operational Noise

Operation noise would occur from the following activities, which are discussed further below:

- Production noise operations include wellhead pumps, which include the movement of pumpjacks. A pumpjack is the aboveground drive for a reciprocating piston pump in an oil well. It is used to mechanically lift liquid out of the well. The movement of the above-ground pumpjack generates noise through its mechanical motion. In addition to wellhead operations, other production activities include equipment noise at the oil field central processing facility and at the steam generator facility.
- Maintenance of new wells would require the use of heavy equipment for workover drilling and site maintenance (removal of vegetation, clearing of dirt and debris after storm events, and potentially resurfacing of access roads). Workover drilling is required over time when the rate of flow from the drilled well has decreased and needs to be restored. Noise impacts from these activities would be a function of the equipment utilized, the equipment location, the timing and duration of the noise-generating activities, and their distance to sensitive receptors.
- Noise generated by the trucking of light- and blended-crude oil to/from the oilfield to Aera's Belridge Producing Complex near Bakersfield, with noise occurring from each truck movement along the travel routes between the oil field and U.S. 101.

Production Noise Operations

In an effort to ensure the production noise impact assessment would be as accurate as possible, noise measurements were conducted at and around the same or equivalent steam generators, pumps, and motors that are similar to those that are planned for use at the proposed Project site. Details of this equipment and these measurements are provided in Appendix L. The modeled production equipment is assumed to operate 24 hours a day. Production activities at the central processing facility, steam generation site, and wellhead production equipment were included in the construction of two production noise models.

Thresholds Utilized

The following discussion identifies predicted well drilling noise impacts potentially exceeding any of the following three thresholds:

1. Threshold of 65 dBA CNEL at a sensitive receptor. (County's Environmental Thresholds and Guidelines Manual)
2. Exceed daytime ambient noise levels by more than 5 dBA at a sensitive receptor. This threshold is included to determine if temporary drilling noise would significantly impact daytime ambient noise levels at NSR locations. As discussed earlier, an increase of 5 dBA over ambient conditions is a clearly perceivable change and is used as a threshold for noise impacts during daytime hours.

3. Exceed nighttime ambient noise levels by more than 3 dBA at a sensitive receptor. This threshold is included to determine if temporary drilling noise would significantly impact nighttime ambient noise levels at NSR locations. As discussed earlier, an increase of 3 dBA over ambient conditions is considered to be a just-perceivable difference and is used as a threshold for noise impacts during nighttime hours due to the sensitivity of receptors at night (sleeping hours). Impact Analysis

Table 4.8-14 presents the predicted production noise levels at each NSR location for both Phase I and II of the proposed Project. Noise contour maps of the predicted Phase I and Phase II production noise models are shown in Appendix L, Figures 8-1 and 8-2. Table 4.8-15 shows that the Phase I and Phase II production noise levels would not exceed any applicable threshold at NSRs. As a result, no noise mitigation measures are recommended during production operations. **Therefore, production equipment operation would result in a less than significant impact during the modeled production operations (Class III)**.

As discussed earlier, scoping for this EIR identified public concern regarding noise generated during proposed flare events (an emergency device that would be used as needed). Flare noise would be from the burning of gas, limited in duration, and localized to the source. This periodic temporary noise would not alter the noise levels presented in Table 4.8-15.

Maintenance

Short-term maintenance activity noise levels would be similar to or less than those identified above for well development and construction, including workover drill rig operations. The frequency of workover drilling for the proposed new 296 wells developed under the proposed Project is unknown but would not occur until each well has been operational for some time. While unknown, the nearby active Cat Canyon West oil field conducted 32 well workovers in 2016 for a mature oil field. **To ensure proposed Project workover drilling (which could be 24-hours per day) does not impact sensitive receptors, MM NOISE-2 (Maintenance Noise Control Plan) is proposed to reduce noise impacts to a less than significant level (Class II)**.

Crude Oil Truck Hauling

An analysis of the potential traffic noise impact associated with the proposed Project was conducted for the three travel routes between proposed between the proposed Project and U.S. 101, as shown in Figure 4.8-2. Four trucking scenarios were modeled:

- **Existing**: The Existing scenario represents current, existing traffic conditions as measured in January 2014
- **Existing Plus Project Trips**: The existing plus Project scenario represents current traffic conditions with the inclusion projected traffic generated by the proposed Project.
- **Future**: The Future scenario includes current conditions with a growth factor of 0.5 percent each year over 20 years and the cumulative traffic effects of other approved and pending projects in the proposed Project area.
- **Future plus Project Trips**: The future plus Project scenario adds the proposed Project traffic volume into the Future scenario.

Additional details of the truck trip noise model are provided in Appendix L.

Thresholds Utilized

To assess the potential traffic noise impact, CNEL noise levels were predicted at the property lines of the each of the modeled scenarios. A significant impact would occur:

1. If the addition of the project traffic to either the existing or future scenarios causes the CNEL noise level to increase above 65 dBA CNEL at any NSR location. (County's Environmental Thresholds and Guidelines Manual)
2. Where existing (or future existing) noise conditions without project trips exceed 65 dBA CNEL at an NSR location, an increase of 3 dBA CNEL is considered significant per CEQA Appendix thresholds (utilizing the most conservative thresholds of 3 dBA over existing as trips could occur during the nighttime hours).

Impact Analysis

Noise from additional proposed Project-related trips to existing and future noise conditions at NSR locations along the haul routes is shown in Tables 4.8-16 and 4.8-17, respectively.

Table 4.8-16. Project Traffic Noise Impacts: Existing Conditions

Location	Haul Route Option	Existing Conditions CNEL (dBA)	Existing Plus Project CNEL (dBA)	Increase (dBA) – Exceed 3 dBA CNEL?
NSR T1 (Dominion Rd s/o Clark Ave)	Options 1, 2, 3	58.7	61.6	+2.9 – NO
NSR T2 (Clark Ave e/o Telephone Rd)	Options 1 and 2	65.7	68.1	+2.4 – NO
NSR T3 (Dominion Rd n/o Clark Ave)	Option 3	66.7	69.1	+2.4 – NO
NSR T4 (Telephone Ave n/o Clark Ave)	Option 2	66.3	68.1	+1.8 – NO
NSR T5 (Betteravia Rd e/o Telephone Ave)	Option 3	68.3	69.3	+1.0 – NO

Source: Behrens and Associates, 2015 (see EIR Appendix L)

Table 4.8-17. Project Traffic Noise Impacts: Future Conditions

Location	Haul Route Option	Existing Conditions CNEL (dBA)	Future Plus Project CNEL (dBA)	Increase (dBA) – Exceed 3 dBA CNEL?
NSR T1 (Dominion Rd s/o Clark Ave)	Options 1, 2, 3	59.4	61.7	+2.3 – NO
NSR T2 (Clark Ave e/o Telephone Rd)	Options 1 and 2	66.4	68.5	+2.1 – NO
NSR T3 (Dominion Rd n/o Clark Ave)	Option 3	66.9	69.6	+2.7 – NO
NSR T4 (Telephone Ave n/o Clark Ave)	Option 2	66.4	68.1	+1.7 – NO
NSR T5 (Betteravia Rd e/o Telephone Ave)	Option 3	68.8	69.6	+0.8 – NO

Source: Behrens and Associates, 2015 (see EIR Appendix L)

As shown in Tables 4.8-16 and 4.8-17, the addition of proposed Project-related traffic to the haul routes would not exceed any applicable noise threshold at NSRs located along these travel routes. **Therefore, vehicle trips associated with proposed Project operation would result in a less than significant impact (Class III)**.

Table 4.8-15. Production Noise Levels at NSRs by Phase

	Daytime Noise Analysis			Nighttime Noise Analysis			County Threshold Analysis	
Location	Average Measured Daytime Ambient Noise Level	Average Estimated Production Noise Level (Leq) at Location	Estimated Noise Level Greater than 5 dBA Over Ambient?	Average Measured Nighttime Ambient Noise Level	Average Estimated Production Noise Level (Leq) at Location	Estimated Noise Level Greater than 3 dBA Over Ambient?	Average Estimated Production Noise Level (CNEL)[1]	Estimated Noise Level Greater than 65 dBA CNEL (County of Santa Barbara Threshold)?
Phase I								
NSR 1	57.4	33.0	NO	51.4	33.0	NO	40.5	NO
NSR 2	54.5	23.8	NO	52.9	23.8	NO	31.3	NO
NSR 3	38.4	22.1	NO	30.4	22.1	NO	29.6	NO
NSR 4	40.4	22.7	NO	30.3	22.7	NO	30.2	NO
NSR 5	40.4	26.1	NO	30.3	26.1	NO	33.6	NO
NSR 6	40.4	26.8	NO	30.3	26.8	NO	34.3	NO
NSR 7	38.0	22.7	NO	32.6	22.7	NO	30.2	NO
NSR 8	38.4	25.9	NO	33.7	25.9	NO	33.5	NO
Phase II								
NSR 1	57.4	34.1	NO	51.4	34.1	NO	41.6	NO
NSR 2	54.5	25.9	NO	52.9	25.9	NO	33.4	NO
NSR 3	38.4	24.9	NO	30.4	24.9	NO	32.4	NO
NSR 4	40.4	25.9	NO	30.3	25.9	NO	33.4	NO
NSR 5	40.4	29.1	NO	30.3	29.1	NO	36.6	NO
NSR 6	40.4	29.9	NO	30.3	29.9	NO	37.4	NO
NSR 7	38.0	26.8	NO	32.6	26.8	NO	34.3	NO
NSR 8	38.4	28.7	NO	33.7	28.7	NO	36.2	NO

1 - To calculate CNEL, 7.5 dBA was added to the average estimated drilling noise level.
Source: Behrens and Associates, 2015 (see EIR Appendix L)

Mitigation Measures

MM NOISE-2 **Maintenance Noise Control Plan.** The Project Owner/Applicant shall provide a Maintenance Noise Control Plan (Plan) to Planning and Development for all new wells developed under the proposed Project. The Plan is intended to minimize and avoid noise from workover drilling activities to the maximum extent feasible and shall include details pertaining to the means and methods to ensure temporary mobile and stationary construction equipment noise levels do not exceed 5 dBA (exterior) over daytime ambient or 3 dBA (exterior) over nighttime ambient at any occupied sensitive receptor. These methods may include, but are not limited to:

a. Erect temporary sound abatement walls along the site perimeter and to shield operating equipment to the maximum extent feasible.

b. All noise-producing construction equipment and vehicles using internal combustion engines shall be equipped with mufflers, air-inlet silencers where appropriate, and any other shrouds, shields, or other noise-reducing features in good operating condition and appropriate for the equipment that meet or exceed original factory specifications. Mobile or fixed "package" equipment (e.g., arc-welder, air compressors) shall be equipped with shrouds and noise control features that are readily available for that type of equipment.

c. Conduct workover drilling during the cooler months (evening lows 55 degrees or cooler, to increase the potential that windows are closed at the sensitive receptor locations. If a well workover is required during warmer months, notification to potentially affected sensitive receptors and Santa Barbara County P&D shall be provided, including the duration of the well workover and noise abatement measures to be implemented. Any complaints received shall be provided to Santa Barbara County P&D.

When deemed necessary by P&D or when workover drilling of wells developed under the proposed Project occurs during nighttime hours (10:00 p.m. to 7:00 a.m.) near occupied sensitive receptors, the Project Owner/Applicant shall conduct nighttime sound level measurements at locations to be approved by P&D, ensuring equivalent baseline levels both with and without Project activities are available for comparison.

In the event temporary well development activities exceed 3 dBA over ambient at occupied sensitive receptor(s) during nighttime hours (exterior), the Owner/Applicant shall limit further workover drilling to no more than 3 wells in the same area during any 12-month time period to ensure the affected occupied sensitive receptor is not subject to additional nighttime noise level exceedances.

PLAN REQUIREMENTS and TIMING: The Operations Noise Control Plan shall be submitted to P&D for review and approval prior to the issuance of the Zoning Clearance. Permittee shall implement the requirements of the Operations Noise Control Plan as specified in the approved Plan. Prior to the start of workover well drilling, baseline nighttime metering results shall be submitted to P&D for those locations approved by P&D.

MONITORING: P&D staff and/or its consultant shall conduct periodic site inspections during workover well drilling and shall review required noise metering results and public complaints.

Impact NOISE-3: Vibration

Short-term vibration would be generated during well pad and facility road site preparation, primarily from grading activities and from maintenance activities. However, as discussed in Sections 4.8.2 and 4.8.3, the County does not have established significance thresholds for temporary vibration. Typically, ground-borne vibrations generated by man-made activities attenuate rapidly with distance from the source of the vibration. Ground vibrations from construction activities do not often reach the levels that can damage structures but can achieve the audible and perceptible ranges in buildings very close to the source (FTA, 2006). As shown Appendix L, the nearest NSR locations to construction areas are:

- 1,315 feet from the nearest well pad, well drilling, and roadway grading;
- 1,550 feet from central processing facility construction; and
- 3,900 feet from steam generation site construction.

At these distances, any temporary vibration generated from construction or maintenance activities would attenuate to negligible levels and not be perceptible at adjacent structures. As further shown in Appendix L, the distance from these activities to where vibration would be at "barely perceptible" levels would range between 158 to 398 feet from the source. As shown above, no NSR structures would be located within this distance. Furthermore, any vibration from well operation is not expected to extend beyond the pad boundary. **Therefore, less than significant vibration impacts would occur during proposed Project construction and operation (Class III)**.

4.8.4.2 Power Line Construction and Operation

Impact NOISE-1: Construction Noise

Construction of the 1,500-foot 115 kV power line would require the temporary use of various types of noise-generating construction equipment, both stationary and mobile. At construction locations proximate to NSR 1 (located approximately 1,000 feet east of the proposed power line route), the operation of heavy equipment would likely result in temporary or periodic increases in noise levels over ambient daytime conditions. MM NOISE-1 is proposed to reduce temporary construction noise levels and ensure BMPs are executed throughout construction. With respect to construction of the power line, this would specifically include shielding construction equipment where generated construction noise could adversely affect NSR 1. Sound shields would be of sufficient height, width, and thickness to seek a reduction in generated noise to below 5 dBA over daytime ambient, 65 dBA CNEL (County of Santa Barbara threshold), or a minimum of 10 dBA reduction. Additionally, MM NOISE-1 would ensure the resident at NSR 1 is contacted prior to construction and provided contact information to submit any noise complaints. Nighttime work would not occur during construction of the power line. **Because this noise would be temporary and reduced through implementation of MM NOISE-1, temporary noise from construction of the proposed power line is considered less than significant (Class II)**.

Impact NOISE-2: Operational Noise

Operation of electrical power transmission lines creates corona discharge noise that can affect the ambient noise conditions proximate to the line. The "corona effect" is the ionization of air that occurs at the surface of the energized conductor and suspension hardware due to very high electric field strength at the surface of the metal under certain conditions. Corona generates audible noise during operation of power lines, which is generally characterized as a crackling, hissing, or humming noise. Operational corona

noise is typically most audible near lines operating at 345 kilovolts (kV) and above and is less noticeable on lines operated at lower voltages.

Corona noise from operation of the proposed overhead 115 kV lines is anticipated to be below 20-25 dBA at a distance of 1,000 feet (NSR 1, the nearest sensitive receptor). In comparison to the measured ambient daytime and nighttime noise conditions at NSR 1 presented in Table 4.8-3, corona discharge noise would be below ambient levels and not perceptible at NSR 1. **Therefore, operational noise impacts from the proposed power line would be less than significant (Class III)**.

Impact NOISE-3: Vibration

During construction, minor localized vibration may occur proximate to the work area. The main activity that may generate temporary vibration would be during excavation for transmission structures and from loaded truck trips. However, momentary vibration from these activities would be limited to close proximity of the source and not perceptible at NSR 1 located approximately 1,000 feet from the proposed Project alignment. **Therefore, impacts from construction vibration are less than significant (Class III)**. Once operational, the only vibration source would be maintenance activities, which would likely generate vibration levels equal or less than those generated during construction. **Vibration impacts from maintenance would be less than significant (Class III)**.

4.8.4.3 Natural Gas Pipeline Construction and Operation

Impact NOISE-1: Construction Noise

Construction of the proposed new 14-mile natural gas pipeline would require the temporary use of various types of noise-generating construction equipment, both stationary and mobile. The proposed new natural gas pipeline would be constructed along Cat Canyon Road, Dominion Road, Clark Avenue, and Graciosa Road (refer to Figure 2-10). Receptors along these roadways primarily include residences. As the pipeline traverses Orcutt, it passes a mix of residential and commercial developments, as well as sensitive receptors including schools and churches. Many of these receptors would be located within 100-150 feet of the construction work area. The operation of heavy equipment would likely result in temporary or periodic increases in noise levels over ambient daytime conditions. However, as pipeline construction would move quickly in a linear fashion, these sensitive receptors would only be subject to temporary noise for a limited duration.

MM NOISE-1 is proposed to reduce temporary construction noise levels and ensure BMPs are executed throughout construction. With respect to construction of the natural gas pipeline, the use of noise walls and construction equipment shielding would be limited given the numerous roadway crossings and driveways. However, as required by MM NOISE -1, other available noise abatement BMPs include the use of construction equipment and vehicles with internal combustion engines that are equipped with mufflers and air-inlet silencers where appropriate, and are in good operating condition. Mobile or fixed “package” equipment (e.g., arc-welder, air compressors) shall be equipped with shrouds and noise control features that are readily available for that type of equipment and equipment idling shall be limited. Finally, construction of the natural gas pipeline would occur in a linear fashion, meaning any given receptor would likely only be impacted by construction for several days until work is completed and construction has progressed “down the line.” Therefore, temporary construction would be of short-term and temporary at any given receptor location. Nighttime work would not occur during construction of the natural gas pipeline.

Additionally, MM NOISE-1 would ensure that sensitive receptors along the natural gas pipeline route are contacted prior to construction and provided contact information to submit any noise complaints.

Because this noise would be temporary and reduced through implementation of MM NOISE-1, temporary noise from construction of the proposed natural gas pipeline is considered less than significant (Class II).

Impact NOISE-2: Operational Noise

The proposed natural gas pipeline would operate underground, therefore, no substantial permanent increase in ambient noise levels would occur. Any maintenance activities generating noise would be short-term and limited in duration, therefore not permanently affecting the ambient noise levels in the area. **Therefore, operational noise impacts from the proposed natural gas pipeline would be less than significant (Class III)**.

Impact NOISE-3: Vibration

During construction, minor localized vibration may occur proximate to the work area. The main activity that may generate temporary vibration would be during trench excavation and from loaded truck trips. However, momentary vibration from these activities would be limited to close proximity of the source. While momentary vibration could be felt by receptors located within 100-feet of a vibration source, they are not considered to be at levels that could damage structures. As noted earlier in Sections 4.8.2 (Regulatory Setting), the County of Santa Barbara does not identify thresholds for vibration. MM NOISE-1 would ensure that sensitive receptors along the natural gas pipeline route are contacted prior to construction and provided contact information to submit any complaints pertaining to vibration. Upon receiving a complaint, MM NOISE-1 (requirements 7 through 9) requires the Project Applicant to resolve such a complaint and provide resolution to the County. **Because perceivable vibration from proposed** P**roject activities would not be felt at any receptor, temporary vibration from construction of the proposed natural gas pipeline is considered less than significant (Class III)**. Once operational, the only vibration source would be maintenance activities, which would likely generate vibration levels less than those generated during construction. **Vibration impacts from maintenance would be less than significant (Class III)**.

4.8.5 Cumulative Effects

Geographic Extent/Context

The geographic context of analysis for cumulative noise impacts was determined by considering the geographic area of adverse impacts of the proposed Project. As discussed in Section 4.8.4, the primary noise impact of the proposed Project would occur during initial drilling of wells and operational workover drilling since installation occurs 24 hours per day until the well hole is completed. Because most cumulative projects identified in Tables 3-1 and 3-2 that could also affect NSRs analyzed for the proposed Project are similar in nature (oil and gas projects), the geographic context for cumulative impacts conservatively included any project within 2-miles from a sensitive receptor location analyzed/affected by the proposed Project, including the ERG and PetroRock project well drilling and workovers, and Foxen Petroleum Pipeline construction as described below.

The geographic extent of cumulative impacts from truck noise is generally limited to other projects within approximately 0.5 miles of any truck route. This maximum area is defined because at distances greater than 0.5 miles, cumulative impulse noise and steady noise would not combine with proposed Project-truck noise and would attenuate to blend in with background noise levels. Furthermore, ground vibrations from trucks and project activities dissipate more rapidly than noise levels, limiting the geographic extent of ground vibration cumulative impacts to the immediate vicinity of the vibration source. Therefore, because no cumulative projects are located within 0.5 miles of NSRs affected by the proposed Project

(including the natural gas pipeline component), cumulative vibration is not analyzed further as vibration would not extend beyond the immediate work area and therefore could not combine with noise from the projects listed in Tables 3-1 and 3-2.

Cumulative Effects

As listed in Section 3.0, Tables 3-1 and 3-2, and shown in Figure 3-1, the following cumulative projects were considered for analysis relative to noise from proposed Project-related work sites or travel routes:

- Cumulative Project 1, ERG West Cat Canyon Revitalization Plan Project, 233 wells steam flooded.
- Cumulative Project 3, PetroRock UCCB, 231 wells cyclic steaming.
- Cumulative Project 4, Foxen Petroleum Pipeline, 2.9 miles crude oil pipeline.

Construction. Cumulatively adverse noise impacts would occur if the projects identified above were constructed concurrently with the proposed Project and within 2-miles of an analyzed sensitive receptor. The potential for cumulative construction noise would be greatest at any sensitive receptors located proximate to two or more work sites.

The cumulative projects identified above would include use of heavy equipment during construction and are expected to generate temporary noise levels during construction and drilling similar to those occurring under the proposed Project. Implementation of MM NOISE-1 is recommended to reduce noise generated by proposed Project construction. Due to the location of affected receptors, temporary construction noise from the ERG and PetroRock projects could be perceptible and combine with temporary Aera Project noise should construction and/or drilling activities overlap. While the potential for construction schedules to overlap and cumulatively generate noise at receptor locations is unknown, as well as the contribution of the variable terrain and wind conditions, even with implementation of MM NOISE-1, temporary construction noise of the proposed Project could have a significant cumulative contribution to temporary noise increases over ambient conditions at some of the sensitive receptors, especially those located near adjacent project property boundaries. The proposed Project's contribution to this cumulative impact could be potentially significant (Class II); however, the well drilling noise impact for ERG has been determined to be significant and unavoidable (Class I). Proposed MM NOISE-3 stipulates coordination efforts amongst the three cumulative projects to reduce cumulative construction noise. **However, because of ERG's contribution to cumulative drilling noise, even with the implementation of MM NOISE-3, cumulative drilling noise would be significant and unavoidable (Class I)**.

Operation and Maintenance. As described in Section 4.8.4.1, permanent noise from operation of the proposed Project would attenuate to below ambient conditions at the nearest sensitive receptors. Therefore, proposed Project operations would have no cumulative contribution to increasing ambient noise levels at receptor locations that could be impacted by cumulative projects. Normal maintenance would generate temporary noise similar or less to that described above for construction. However, such noise would occur much less frequently. Noise from workover drilling activities could have an adverse cumulative contribution and temporarily increase ambient noise levels but are not considered to be cumulatively considerable with the implementation of proposed MM NOISE-2. Such noise could combine with construction and/or well workover noise generated by the cumulative projects identified above at receptor locations proximate to two or more sources. However, with the implementation of proposed MM NOISE-2, the proposed Project's cumulative contribution would be periodic and short-term and would not permanently increase ambient noise conditions. **Therefore, with the implementation of MM NOISE-2, maintenance of the proposed Project would have a less than significant cumulative contribution to increasing ambient noise levels at sensitive receptor locations (Class II)**.

As discussed earlier and shown in Tables 4.8-15 and 4.18-16, the proposed Project would not generate noise from operational vehicle trips that would adversely exceed ambient conditions. However, because they would increase traffic noise levels along the travel routes, they would have an adverse cumulative contribution to permanently increasing ambient noise levels. This contribution is considered to be cumulatively considerable with the potential to be significant in the event the Foxen Petroleum Pipeline is not constructed and increased heavy truck traffic associated with the ERG and PetroRock projects would increase traffic noise along Cat Canyon, Palmer, Dominion and Foxen Canyon roads, as well as Betteravia Road. To reduce this potential cumulative impact, mitigation within the ERG EIR requires that, should the Foxen Petroleum Pipeline not be constructed or is not operational, ERG operational-related truck trips shall not utilize Dominion Road south of Clark Avenue between the hours of 7:00 p.m. and 8:00 a.m., or on weekends and holidays (ERG EIR, MM NOISE-2). This would limit any cumulative traffic noise impact along this roadway segment to be limited to daytime hours, which is less sensitive and prone to variations and increases in traffic noise over time. If the ERG project is approved and **if ERG MM NOISE-2 is implemented, the proposed Project would have a less than significant cumulative contribution from traffic noise to increasing ambient noise levels or impacts to sensitive receptors (Class II)**.

Mitigation Measures

MM NOISE-3 **Prepare a Cumulative Construction Noise Control Plan.** Aera, ERG, and PetroRock shall collectively provide a Cumulative Construction Noise Control Plan (Plan) to P&D that demonstrates how the three projects will coordinate their construction efforts, including well drilling, in such a way so that sensitive receptors within 0.25 miles of any of the three project boundaries will not be subject to noise impacts from more than one project at a time, unless otherwise agreed to by each subject sensitive receptor. The Plan shall include well drilling and workover schedules, potential sensitive receptor locations to be affected by drilling noise, and mitigation to be implemented (either onsite or at the sensitive receptor locations). All complaints shall be submitted immediately to P&D.

PLAN REQUIREMENTS and TIMING: The Cumulative Construction Noise Control Plan shall be submitted to P&D for review and approval prior to the issuance of the Zoning Clearance at the time the second project is requesting zoning clearance, and likewise when the third project requests zoning clearance. Permittees shall implement the requirements of the Cumulative Construction Noise Control Plan as specified in the approved Plan(s). Prior to the start of each well drilling activity, baseline nighttime metering results shall be submitted to P&D for those locations identified in the County-approved Cumulative Construction Noise Control Plan.

MONITORING: P&D staff and/or its consultant shall conduct periodic site inspections during well drilling and shall review required noise metering results and public complaints.

4.8.6 Mitigation Monitoring Program

Table 4.8-18. Mitigation Monitoring and Reporting Plan

MM #	MM Title	Monitoring/ Reporting Action	Timing & Method of Verification	Agency or County Responsibilities	Applicant Responsibilities
Noise					
NOISE-1	Prepare Construction Noise Control Plan	Prepare and implement approved Construction Noise Control Plan to minimize and avoid noise from construction activities to the maximum extent feasible.	Prior to the issuance of Zoning Clearance.	County Plan review and approval. County monitors compliance	Prepare Plan and obtain County approval. Conduct noise modelling for remaining well pads and determine mitigation, if required. Conduct weekly noise monitoring at NSRs during well drilling to ensure accuracy of modelling. Implement noise reduction techniques. Resolve public noise complaints and inform the County of complaint resolution within 48 hours.
NOISE-2	Maintenance Noise Control Plan	Avoid noise from workover drilling activities to the maximum extent feasible	Prior to the issuance of Zoning Clearance.	Plan review and approval County monitors compliance	Implement noise reduction techniques. Limit workover drilling of wells developed under the proposed Project to no more than three (3) annually where occupied sensitive receptors are affected by nighttime noise levels greater than 3 dBA over ambient.
NOISE-3	Prepare Cumulative Construction Noise Control Plan	Prepare and implement approved Cumulative Construction Noise Control Plan to minimize and avoid noise from cumulative construction activities to the maximum extent feasible.	Prior to the issuance of Zoning Clearance 2nd and 3rd projects to request Zoning Clearance.	County Plan review and approval. County monitors compliance	Prepare Plan and obtain County approval. Implement noise reduction techniques. Resolve public noise complaints and inform the County of complaint resolution within 48 hours. No cumulative well drilling to occur within 0.25 miles of sensitive receptors.