

4.12 Noise and Vibration

4.12.1 Introduction

This section analyzes and evaluates the potential impacts of the Project regarding noise and vibration at the Rodeo Refinery and Santa Maria Site. Discussed are the physical and regulatory settings, the baseline for determining environmental impacts, the significance criteria used for determining environmental impacts, and potential impacts associated with Project construction and demolition, the transitional phase, and operation and maintenance.

The Project also includes the Pipeline Sites—four regional pipelines serving the Santa Maria Site and the Rodeo Refinery. The Santa Maria Site is connected to the Rodeo Refinery by approximately 200 miles of subterranean pipeline, crossing San Luis Obispo, Santa Barbara, Kern, Kings, Fresno, Merced, Stanislaus, San Joaquin, Alameda, and Contra Costa Counties. Phillips 66 proposes to empty and clean the pipelines at existing maintenance access points to be decommissioned or sold; they would not be excavated as part of this Project. No physical changes would occur.

4.12.1.1 **Noise and Vibration Background**

Noise

Noise is typically described as dissonant, unwanted, or objectionable sound, and the terms noise and sound are used more or less synonymously in this section. The human ear responds to a very wide range of sound intensities. The decibel (dB) scale used to describe sound is a logarithmic rating system that accounts for the large differences in audible sound intensities, from low to high volumes. When addressing the effects of noise on people, it is necessary to consider the frequency response of the human ear, or those frequencies that people hear the best. Sound measuring instruments are therefore often designed to “weight” sounds based on the way people hear. The frequency weighting most often used to evaluate environmental noise is “A-weighting” because it best reflects how humans perceive sound in the mid-frequency range. Measurements from instruments using this system, and associated noise levels, are reported in *A-weighted decibels*, or the dBA scale. Using this scale, changes in sound levels are perceived as follows: 3 dBA as barely perceptible, 5 dBA as readily perceptible, and 10 dBA as a doubling or halving of noise (Caltrans 2013). Therefore, a 70-dBA sound level will be perceived as about twice as loud as a 60-dBA sound level. People generally cannot detect differences of 1 to 2 dBA in a complex acoustical environment, such as urban outdoor situations.

On the logarithmic scale used to measure noise, a doubling of sound-generating activity (i.e., a doubling of the sound energy) causes a 3-dBA increase in average sound produced by that source, not a doubling of the loudness of the sound (which requires a 10-dBA increase). For example, if traffic on a road is causing a 60-dBA sound level at a nearby location, a doubling of the number of vehicles on this same road in the same amount of time would cause the sound level at that location to increase to 63 dBA.

For any noise source, several factors affect the efficiency of sound transmission traveling from the source, which in turn affects the potential noise impact at offsite locations. Important factors include distance from the source, frequency of the sound, absorbency and roughness of the intervening ground (or water) surface, the presence or absence of obstructions such as buildings and their absorbency or reflectivity, and the duration of the sound. Table 4.12-1 presents typical sound levels of some familiar noise sources and activities.

Table 4.12-1. Typical Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock Band
Jet flyover at 1,000 feet		
	100	
Gas lawnmower at 3 feet		
	90	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	80	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawnmower at 100 feet		Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet		
	60	
		Larger business office
Quiet urban daytime		Dishwasher in next room
	50	
Quiet urban nighttime		Theater, larger conference room (background)
Quiet suburban nighttime		
	40	
		Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	30	
		Broadcast/recording studio
	20	
	10	
	0	

Source: Caltrans 2013

Although a measured A-weighted noise level will adequately indicate the level of environmental noise at any instant in time, community noise levels typically vary by time. Several noise descriptors have been developed to characterize community noise by the total acoustical energy content of the noise over defined periods of time or by characterizing the loudest sound levels over a given time interval. Several useful noise metrics are described below.

- **L_{eq}**: The L_{eq} is the constant sound level that would contain the same acoustic energy as the varying sound level, during the same time period (i.e., the average noise exposure level for the given time period).
- **L_n**: The sound level exceeded n percent of a specified time interval, often 1 hour. For example, the L₉₀ is the sound exceeded 90 percent of the time.
- **L_{max}**: The instantaneous maximum noise level measured during the measurement period of interest.

- **Day-night noise level (DNL):** The energy average of the A-weighted sound levels occurring during a 24-hour period that accounts for the greater sensitivity of most people to nighttime noise by weighting noise levels at night (“penalizing” nighttime noises). Noise between 10:00 p.m. and 7:00 a.m. is weighted (penalized) by adding 10 dBA to take into account the greater annoyance of nighttime noises.
- **Community noise equivalent level (CNEL):** Similar to the DNL, the CNEL adds a 5-dBA penalty for the evening hours between 7:00 p.m. and 10:00 p.m. in addition to a 10-dBA penalty between the hours of 10:00 p.m. and 7:00 a.m.

The effects of noise on people can include general annoyance, interference with mental concentration, interference with speech communication, sleep disturbance, stress-related disease, and, in the extreme, hearing impairment (Caltrans 2013).

Vibration

Most perceptible indoor vibration is caused by sources within buildings such as operation of mechanical equipment, movement of people, or slamming of doors. Typical outdoor sources of vibration waves that propagate through the ground and create perceptible ground-borne vibration in nearby buildings include construction equipment, steel-wheeled trains, and truck traffic on rough roads. If the roadway is fairly smooth, the vibration from rubber-tired traffic is rarely perceptible. Building damage due to vibration is also rare; but in extreme cases, such as during hydraulic breaking during demolition or pile-driving during construction, vibration could cause cosmetic or structural damage to buildings (FTA 2018).

Several metrics are used to describe ground-borne vibration. The following is a summary of metrics that are applicable to the analysis of ground-borne vibration impacts associated with the Project:

- **Vibration decibels (VdB):** The vibration velocity level in decibel scale.
- **Peak particle velocity (PPV):** The peak signal value of an oscillating vibration velocity waveform. Expressed in inches per second in the United States.
- **Root mean square (rms):** The square root of the arithmetic average of the squared amplitude of the signal.

Human response to vibration is difficult to quantify. Vibration can be felt or heard well below a level that would result in damage to a structure. VdB is commonly used to describe the perception of groundborne vibration, and PPV is most frequently used to describe vibration impacts to structures but can also be used to describe vibration impacts related to perception. The typical background level in residential areas is about 50 VdB, and most people generally cannot detect levels below about 65 VdB. A vibration level of 85 VdB in a residence can result in strong annoyance (FTA 2018). However, note that the duration of a vibration event has an effect on human response, as does the frequency of the event. Generally, as the duration of a vibration event increases, the potential for adverse human response increases. In addition, while people have varying sensitivities to vibrations at different frequencies, in general, they are most sensitive to low-frequency vibration that can be felt.

4.12.2 Environmental Setting

4.12.2.1 *Physical Conditions*

This section describes the noise environment of the Rodeo Refinery, on which the Project would be built and operated, and of the Santa Maria Site, which would be shut down and demolished. Because the Pipeline Sites would be cleaned and either decommissioned or sold, detailed information about the noise environments at those sites is unnecessary for an assessment of Project impacts, and they are not included in the following description of noise conditions.

Section 4.11, *Land Use and Planning*, provides a detailed description of land uses in the vicinity of the Rodeo Refinery and the Santa Maria Site. That information is summarized below as necessary to describe the noise environments of the Project.

Rodeo Refinery

The Rodeo Refinery is located in an unincorporated area of Contra Costa County. The general plan land use designation for the refinery is Heavy Industry (Contra Costa County 2010), and it is zoned for heavy industrial use (Contra Costa County 2005).

The Rodeo Refinery includes developed land occupied by an existing active petroleum refinery (the Rodeo Site) and substantial areas of undeveloped land (Figure 4.12-1). The Rodeo Site is wholly occupied by industrial facilities. I-80 runs through the Rodeo Refinery in a southwest to northeast direction and divides the Rodeo Site from the undeveloped portion and from the Carbon Plant to the southeast of the Rodeo Refinery. The Rodeo Site is surrounded by buffer areas, ranging between 300 to 600 feet in width, that separate it from nearby land uses, so no noise-sensitive land uses are located immediately adjacent to the Rodeo Site. Existing land uses in the vicinity of the Rodeo Site include industrial, commercial, office, residential, and vacant land.

San Pablo Bay, the Union Pacific/Amtrak railroad right-of-way, and the NuStar Energy tank farm abut the Rodeo Site to the north. A small residential enclave (i.e. Tormey) is located along Old County Road north of the NuStar Energy tank farm. The Bayo Vista residential neighborhood of Rodeo, several schools, at least one daycare center, several churches, and a few commercial establishments are located south of the Rodeo Refinery.

An apartment complex at the eastern edge of Bayo Vista is the closest sensitive receptor to the Project activities on the Rodeo Site. Although construction activities would occur throughout the Rodeo Site, most work would be minor, involving new piping and modifications of existing equipment and infrastructure. Demolition of three existing tanks and construction of the PTU and STU on the site, which would involve pile driving, are the activities closest to the apartment complex property line (approximately 1,475 feet).

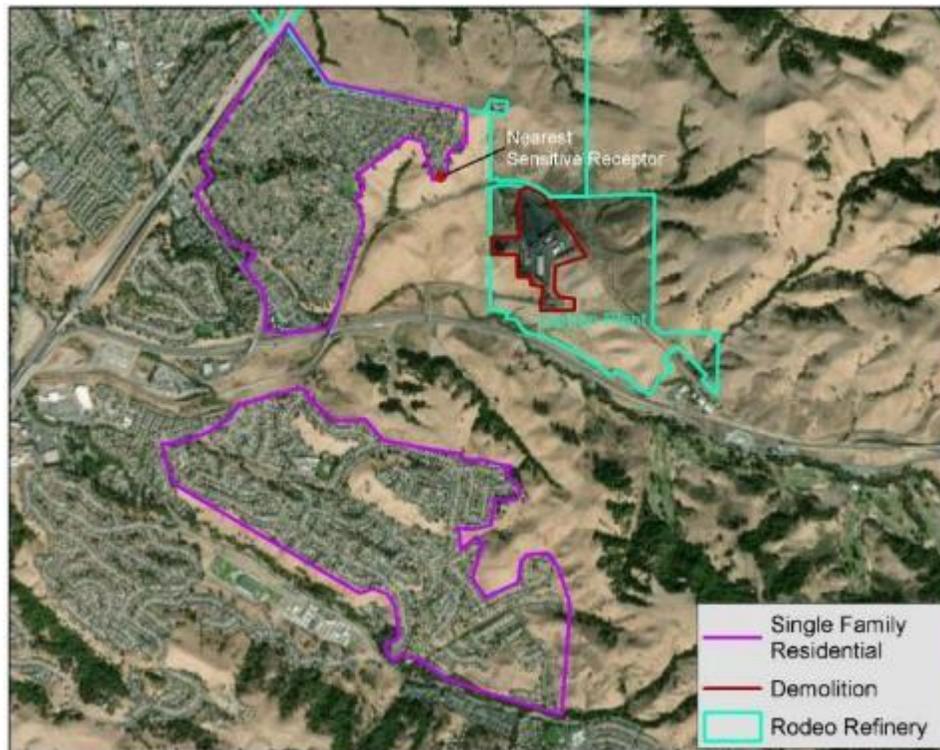
No schools are within 0.5 mile of the Rodeo Site. The two closest schools are a Montessori academy on Parker Avenue (approximately 0.8 mile from the PTU area) and the Rodeo Hills Elementary School on Rodeo Avenue (approximately 1.0 mile from the PTU area). Most commercial uses in the vicinity are located in an area centered on San Pablo Avenue/Parker Avenue, approximately 0.5 mile southwest of the Rodeo Site.

The Carbon Plant is located on the Rodeo Refinery property east of I-80 and consists of an operating petroleum coke processing plant (Figure 4.12-2). The site is zoned for heavy industrial land use (Contra Costa County 2005). It is surrounded by vacant land to the north and west, land zoned for industrial uses to the east, residential open space to the northwest, and State Route 4 and agricultural land uses to the south. The nearest sensitive receptors are single-family homes located approximately 1,500 feet northwest of the Carbon Plant Site. The Crockett Hills Regional Park is located approximately 0.7 mile east of the Carbon Plant.



Source: Google Earth V 7.3.3.7786 (July 2019). Boundaries based on Contra Costa County 2005.

Figure 4.12-1. Key Land Uses and Location of Nearest Sensitive Receptor – Rodeo Refinery

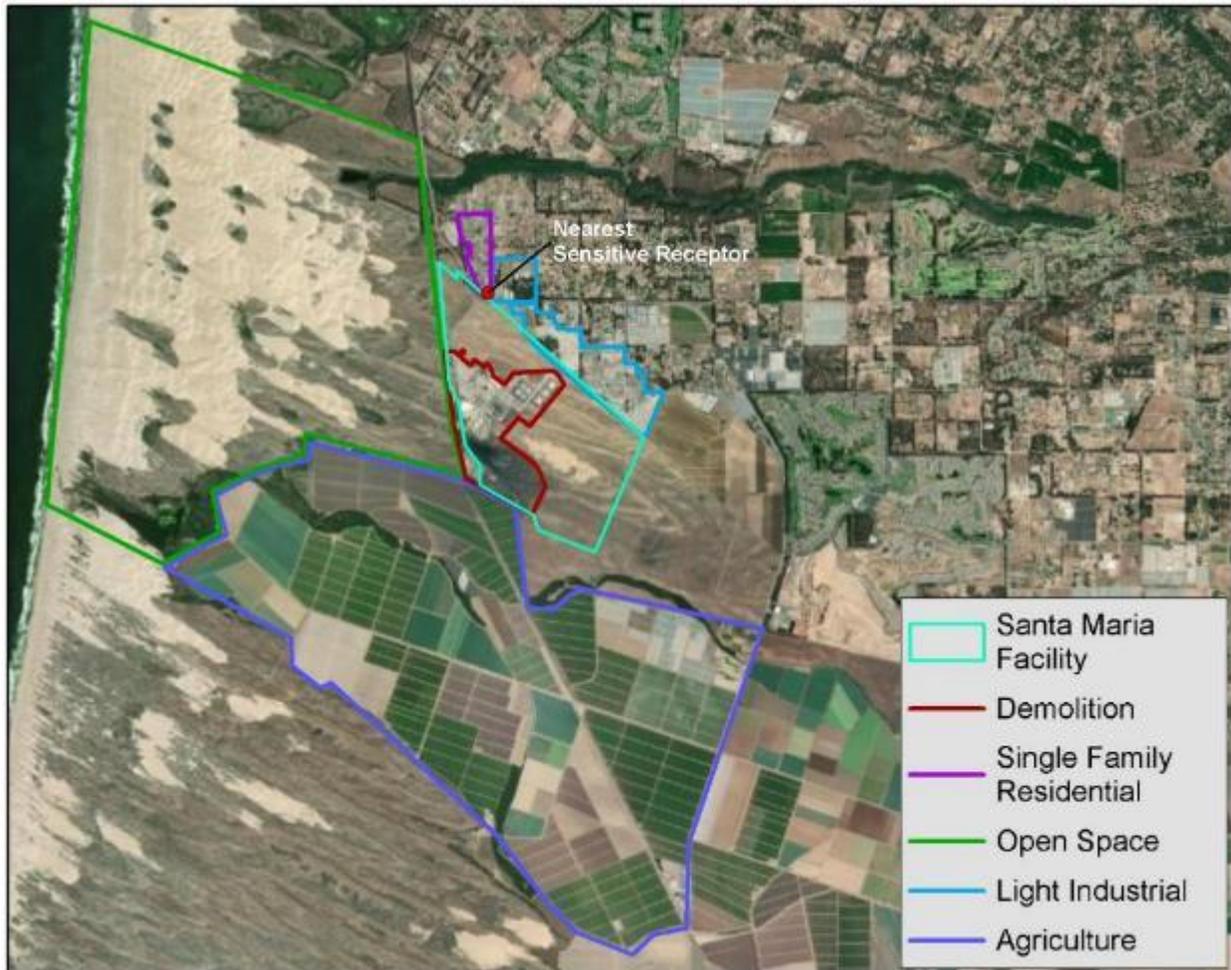


Source: Google Earth V 7.3.3.7786 (July 2019). Boundaries based on Contra Costa County 2005.

Figure 4.12-2. Key Land Uses and Location of Nearest Sensitive Receptor – Carbon Plant

Santa Maria Site

The Santa Maria Site is an active petroleum refinery; in addition to the refinery, this property includes vacant land east and west of the refinery (Figure 4.12-3). The Santa Maria Site is designated as coastal appealable, and surrounding lands are designated flood hazard, agricultural, open space, and recreational. The site itself is zoned for industrial uses (San Luis Obispo County 2021). Surrounding land uses include industrial and residential (suburban and rural) to the north, agriculture to the south, recreation and commercial to the east, and open space to the west. The nearest sensitive receptors are single-family homes located approximately 2,000 feet to the north of the refinery.



Source: Google Earth V 7.3.3.7786 (July 2016). Boundaries based on San Luis Obispo County 2021.

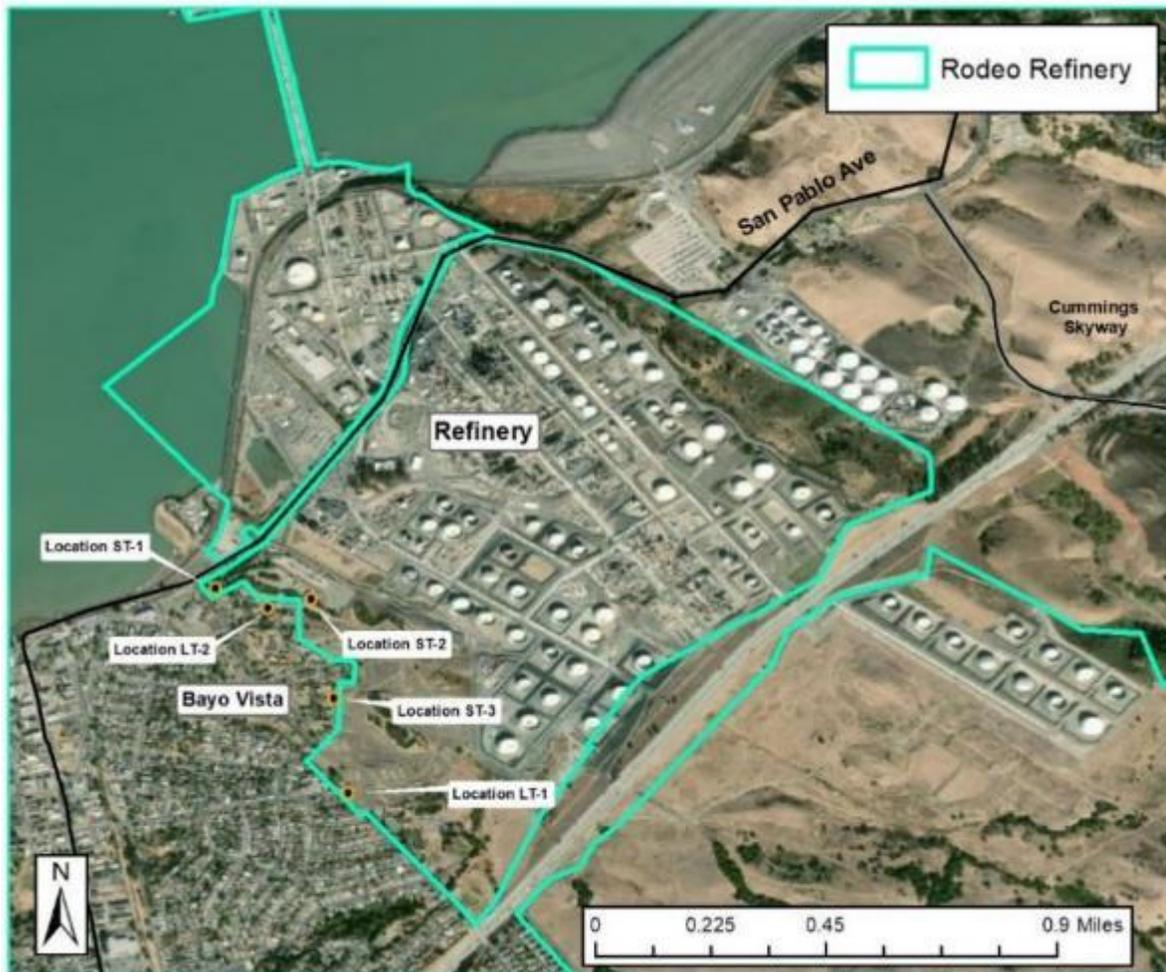
Figure 4.12-3. Key Land Uses and Location of Nearest Sensitive Receptor – Santa Maria Refinery

4.12.2.2 Baseline Ambient Noise Levels

Rodeo Refinery

The ambient noise environment at the Rodeo Site is dominated by existing operations at the refinery, vehicular traffic on I-80, and rail traffic on the Union Pacific/Amtrak railroad tracks. Baseline noise measurements, both long term and short term, were collected at representative locations around the Rodeo Site in 2006 as part of the environmental impact report for a previous project at the Rodeo Refinery, and additional measurements were taken in 2012 (ESA 2012). Because refinery operations have remained essentially the same with respect to noise generation since then, data from these measurements are used to evaluate Project-related increases in noise levels at sensitive receptors.

The noise-monitoring locations for both monitoring events are shown in Figure 4.12-4. The noise monitoring locations have varying line-of-sight views of the refinery processing area and the overall refinery due to the surrounding topography. Table 4.12-2 summarizes the range of hourly sound levels measured at each of the long-term noise monitoring locations and the resulting calculated DNL. Table 4.12-2 also identifies the time and measured sound levels at several short-term monitoring locations.



Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Note: LT = long-term noise monitoring locations; ST = short-term monitoring locations

Figure 4.12-4. Rodeo Site Noise Measurement Locations

Table 4.12-2. Ambient Noise Levels at Monitored Locations, dBA

Site ^a	Location	Measurement Period	Noise Level in dBA	
			L _{eq}	DNL
LT-1	Near the Rodeo Refinery fenceline near the former Hillcrest Elementary School	24-Hour (January 2006)	51–58	61
		24-Hour (December 2012)	49–58	60
LT-2	Near the Rodeo Refinery fenceline near terminus of Trigger Road	24-Hour (January 2006)	56–60	65
		24-Hour (December 2012)	54–66	65
ST-1	At the intersection of San Pablo Avenue and California Street	12:10–12:20 p.m. (January 2006)	68	NA
ST-2	At the end of Trigger Road near the Rodeo Refinery boundary	12:28–12:38 p.m. (January 2006)	61	NA
ST-3	Residence on Tullibee Road	12:45–12:55 p.m. (January 2006)	58	NA

Source: *Contra Costa County 2006; ESA 2012*

Notes: dBA = A-weighted decibels
DNL = Day-night noise level
L_{eq} = Average noise exposure level for the given time period
NA = Not Applicable

^a. Locations correspond to those illustrated in Figure 4.12-4.

The nearest sensitive receptors to the Carbon Plant (single-family homes) are exposed to noise associated with State Route 4, which is closer (on the south) to the receptors than the Carbon Plant. Pursuant to the Noise Element of the Contra Costa County General Plan, the noise level associated with State Route 4 in this area is 72-dBA DNL at a distance of 100 feet from the centerline (Contra Costa County 2005). The affected single-family homes are located between 130 and 4,150 feet from the centerline of State Route 4. Assuming standard distance attenuation for a line source, the calculated existing noise levels at distances of 130 and 4,150 feet are 71- and 56-dBA DNL, respectively.

Santa Maria Site

The nearest sensitive receptors to the Santa Maria Site are located north of the refinery, approximately 270 to 680 feet from State Route 1, which is closer to the receptors than the refinery at the Santa Maria Site. According to the Noise Element of the San Luis Obispo County General Plan, noise levels are expected to reach 60-dBA DNL at a distance of 136 feet from State Route 1 in this vicinity (San Luis Obispo County 1992). Assuming standard distance attenuation for a line source, the calculated existing noise levels at distances of 270 and 680 feet from State Route 1 are approximately 5,757- and 5,353-dBA DNL, respectively.

4.12.2.3 Regulatory Setting

The following provides a discussion of the regulations established by Contra Costa and San Luis Obispo Counties to limit noise exposure and ground-borne vibration at sensitive land uses. No state or federal regulations apply to community noise.

Noise Element of the Contra Costa County General Plan

The Noise Element of the Contra Costa County General Plan (Contra Costa County 2010) sets various goals and policies that apply to all development projects in the county. Most of these policies address land use compatibility for evaluating the acceptability of existing and future exterior noise levels for new projects, such as commercial and residential developments, and for proposing noise-sensitive receptors; thus, they are not directly applicable to the Project, which is in an existing industrial zone.

The General Plan also identifies land use compatibility guidelines for various land uses, shown in Table 4.12-3 (Contra Costa County 2010). Contra Costa County uses these guidelines, along with future noise contour maps contained in the general plan, as a guide for evaluating the compatibility of noise sensitive projects in potentially noisy areas.

The Noise Element of the general plan also establishes a DNL criteria for outdoor noise levels in residential areas of 60 dBA. However, the county recognizes that a DNL of 60 dBA or less may not be achievable in all residential areas due to economic or aesthetic constraints. In addition, Policy 11-8 of the Contra Costa County General Plan Noise Element pertains to construction activities as being concentrated during the day time to minimize effects on adjacent noise-sensitive adjacent land uses (Contra Costa County 2010).

Table 4.12-3. Land Use Compatibility for Community Noise Environments, dBA

Land Use Category	Community Noise Exposure, DNL or CNEL			
	Normally Acceptable ^a	Conditionally Acceptable ^b	Normally Unacceptable ^c	Clearly Unacceptable ^d
Residential—Low-Density, Single-Family, Duplex, Mobile Homes	< 60	55 to 70	70 to 75	> 75
Residential—Multi Family	< 65	60 to 70	70 to 75	> 75
Transient Lodging—Motels, Hotels	< 65	60 to 70	70 to 80	> 80
Schools, Libraries, Churches, Hospitals, Nursing Homes	< 70	60 to 70	70 to 80	> 80
Auditoriums, Concert Halls, Amphitheatres	--	< 70	--	> 65
Sports Arena, Outdoor Spectator Sports	--	< 75	--	> 70
Playgrounds, Neighborhood Parks	< 70	--	67.5 to 75	> 72.5
Golf Courses, Riding Stables, Water Recreation, Cemeteries	< 75	--	70 to 80	> 80
Office Buildings, Business, Commercial and Professional	< 70	67.5 to 77.5	> 75	--
Industrial, Manufacturing, Utilities, Agriculture	< 75	70 to 80	> 75	--

Source: Noise Element, Figure 11-6, in Contra Costa County 2010.

Notes: CNEL = Community noise equivalent level
dBA = A-weighted decibel
DNL = Day-night noise level

- ^a. Normally Acceptable: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
- ^b. Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design.
- ^c. Normally Unacceptable: New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.
- ^d. Clearly Unacceptable: New construction or development clearly should not be undertaken.

Contra Costa County Municipal Code and General Plan

Contra Costa County does not have an ordinance that specifically addresses noise or ground-borne vibration and would apply to the proposed Project demolition and construction activities, such as decibel limits at adjacent land uses. Noise complaints within the unincorporated area of the county are addressed through application of peace disturbance sections of the County Code. Contra Costa County General

Plan Noise Element Policy 11-8 specifies that “construction activities shall be concentrated during the hours of the day that are not noise-sensitive for adjacent land uses and should be commissioned to occur during normal work hours of the day to provide relative quiet during the more sensitive evening and early morning periods.” The Project demolition and construction activities would be conducted during daytime or normal working hours on industrial-zoned land. Project operational noise from mechanical equipment would not be substantially different than existing noise emanating from equipment presently in use at the Project site.

Noise Element of the San Luis Obispo County General Plan

Noise Element goals applicable to the proposed Project include protecting the residents of San Luis Obispo County from the harmful and annoying effects of exposure to excessive noise and preserving the tranquility of residential areas by preventing the encroachment of noise-producing uses. The Project would eliminate a noise-producing land use.

San Luis Obispo County Municipal Code

San Luis Obispo County limits construction noise impacts by limiting construction to daytime hours. The noise limit standards presented in Sections 23.06.044 through 23.06.050 do not apply to noise sources associated with construction, if such activities do not take place before 7:00 a.m. or after 9:00 p.m. any day except Saturday or Sunday, or before 8:00 a.m. or after 5:00 p.m. on Saturday or Sunday.

4.12.3 Significance Criteria

Based on CEQA Guidelines Appendix G, a project would have significant adverse noise impacts if it would result in:

- a. 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;
- b. Generation of excessive ground-borne vibration or ground-borne noise levels; or
- c. 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 2 miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels.

4.12.4 CEQA Baseline

Baseline conditions reflect the 2019 operation and maintenance of the Rodeo Refinery and Santa Maria Site as petroleum refineries, including operation and maintenance activities. The baseline setting also includes the applicable regulatory framework to protect environmental resources, which are described above.

4.12.5 Approach to Analysis

4.12.5.1 Construction Noise Impacts

Contra Costa County does not have noise-related performance standards for short-term construction activities; however, per General Plan Policy 11-8, the County restricts construction to typical daytime or normal working hours as a standard condition of approval for development projects. The County also uses project-specific conditions of approval to regulate construction noise levels at sensitive project sites, e.g., residential areas. Short-term noise level increases from construction activities would be considered substantial if construction noise conducted outside normal working hours is distinctly audible.

San Luis Obispo County limits construction noise impacts by exempting construction noise that occurs during daytime hours, specifically between 7:00 a.m. and 9:00 p.m. any day, except Saturdays and Sundays, or before 8:00 a.m. or after 5:00 p.m. on Saturdays and Sundays.

4.12.5.2 Operational Noise Impacts

Contra Costa County does not have an ordinance that specifically addresses noise. Noise complaints within the unincorporated area of Contra Costa County are addressed through application of peace disturbance sections and generic nuisance ordinances of the Contra Costa County Code. In the absence of quantitative limits, a proposed project would result in a significant impact if it is deemed likely to disturb existing sensitive receptors. The Noise Element of the Contra Costa County General Plan provides guidance for this assessment.

The Noise Element of the general plan states: “a change in level of at least 5 dBA is required before any noticeable change in community response would be expected.” To assess changes in the ambient noise environment resulting from the proposed Project, the following significance criteria take into account both the absolute change in noise levels resulting from the Project and the relationship between the resultant noise level and Contra Costa County’s noise/land use compatibility criteria shown in Table 4.12-3:

- Where the resultant noise level would remain *normally acceptable* for the affected land use, a change of 5-dBA DNL or more would be considered significant;
- Where the resultant noise level would be in the range described as *conditionally acceptable* or *normally unacceptable*, a change of 3-dBA DNL or more over existing noise levels would be considered significant; and
- Where the resultant noise level would be *clearly unacceptable*, any increase in noise over existing levels would be considered significant.

4.12.5.3 Groundborne Vibration Impacts

Contra Costa County has not established guidelines to assess impacts associated with ground-borne vibration. However, Caltrans has developed a guidance manual for specifically assessing vibration impacts associated with construction (Caltrans 2020). Table 4.12-4 presents a synthesis of various vibration impact criteria for assessing vibration damage to structures; Table 4.12-5 presents a synthesis of criteria relating to human perception of ground-borne vibration.

Table 4.12-4. Guideline for Vibration Damage Potential Threshold Criteria

Structure and Condition	Maximum Peak Particle Velocity (inches/second)	
	Transient Sources	Continuous / Frequent Intermittent Sources
Extremely Fragile Historic Buildings, Ruins, Ancient Monuments	0.12	0.08
Fragile Buildings	0.2	0.1
Historic and Some Old Buildings	0.5	0.25
Older Residential Structures	0.5	0.3
New Residential Structures	1.0	0.5
Modern Industrial/Commercial Buildings	2.0	0.5

Source: Caltrans 2020

Table 4.12-5. Guideline for Vibration Annoyance Potential Criteria

Human Response	Maximum Peak Particle Velocity (inches/second)	
	Transient Sources	Continuous / Frequent Intermittent Sources
Barely Perceptible	0.04	0.01
Distinctly Perceptible	0.25	0.04
Strongly Perceptible	0.9	0.10
Severe	2.0	0.4

Source: Caltrans 2020

San Luis Obispo Code Section 23.06.060 specifically exempts ground-borne vibration associated with construction activities if it occurs between 7:00 a.m. and 9:00 a.m. It also exempts vibration associated with moving sources such as trucks and railroads. Ground-borne vibration associated with demolition that occurs outside the exempt hours would be significant if it would be perceptible at or beyond the Santa Maria Site.

4.12.6 Discussion of No Noise Impacts

Review and comparison of the environmental setting and Project characteristics with each of the significance criteria stated above indicate no impacts associated with noise related to Project operations and maintenance would result for CEQA Checklist criteria a and b as regards to operation of the Santa Maria Site and the operation and decommissioning of the Pipeline Sites. The following discussion supports the reasoning for this conclusion.

- a. *Would the Project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?*
- b. *Would the Project result in generation of excessive groundborne vibration or groundborne noise levels?*

With demolition of the Santa Maria Site, there would be no operation and maintenance noise or vibration impacts at that site.

The Pipeline Sites would be emptied and cleaned. Decommissioning activities at the Pipeline Sites would closely resemble existing routine maintenance activities, e.g., vehicles and potable equipment use, which include periodic cleaning of the pipelines. Accordingly, noise and vibration levels would not be increased above baseline levels and would therefore not exceed applicable standards. Therefore, no impact would occur associated with noise or vibration from decommissioning and operation of the Pipeline Sites.

- c. *For a project located within the vicinity of a private airstrip or in an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?*

No public use airports or private airstrips are located within a 2-mile radius of the Rodeo Refinery or the Santa Maria Site, and those sites are not located within an airport land use plan. Therefore, the Project would not expose people to excessive noise levels, and people working at the Project sites would not be exposed to excessive levels of aircraft noise. There would be no impact.

4.12.7 Direct and Indirect Impacts of the Proposed Project

Table 4.12-6 presents a summary of the potential noise and ground-borne vibration impacts, as well as significance determinations for each impact.

Table 4.12-6. Summary of Impacts

Impact	Significance Determination		
	LTS	LTSM	SU
Impact 4.12-1. Demolition and construction activities associated with the Project would not generate noise levels in excess of standards established by Contra Costa County or San Luis Obispo County (as applicable).			
Rodeo Refinery and Santa Maria Site			
<i>Construction/Demolition Including Transitional Phase^a</i>	✓		
Impact 4.12-2. Operation of the Project would not result in exposure of persons to noise levels in excess of standards established by Contra Costa County.			
Rodeo Refinery			
<i>Operation and Maintenance</i>	✓		
Impact 4.12-3. The Project would not generate ground-borne vibration or ground-borne noise levels.			
Rodeo Refinery and Santa Maria Site			
<i>Construction/Demolition Including Transitional Phase^a</i>	✓		
<i>Operation and Maintenance</i>	✓		

Notes: LTS = Less than significant, no mitigation proposed
 LTSM = Less-than-significant impact with mitigation
 SU = Significant and unavoidable

^a. Transitional phase applies only to Rodeo Refinery

IMPACT 4.12-1

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

Construction/Demolition: Less Than Significant, No Mitigation Proposed

Noise levels associated with typical demolition and construction activities vary during different periods of activity, depending upon the activity location(s) and the number and types of equipment commonly used. Given that complexity, both spatially and in timing, of the demolition and construction noise emissions associated with the Project, typical demolition and construction scenarios were modeled using the Federal Highway Administration’s Road Construction Noise Model to assess the Project’s potential to exceed the applicable thresholds at the Rodeo Refinery and Santa Maria Site.

Typical noise levels produced by various types of demolition and construction equipment are shown in Table 4.12-7.

Table 4.12-7. Construction Equipment Sound Levels (dBA)

Equipment Description	Sound Level at 50 Feet (dBA) ^a
Backhoe	78
Compactor (ground)	83
Compressor (air)	78
Crane	81
Dozer	82
Drill Rig Truck	79
Dump Truck	76
Excavator	81
Forklift ^b	67
Front End Loader	79
Small Generator for Lighting	73
Generator	81
Grader	85
Hydra Break Ram	90
Man Lift	75
Impact Pile Driver	101
Paver	77
Pumps	81
Roller	80
Tractor	84

Source: Federal Highway Administration 2006

Notes: dBA = A-weighted decibel

^a The sound levels presented in the table are the actual measured values summarized in the Roadway Construction Noise Model User's Guide (Federal Highway Administration 2006) unless the actual measured value is unavailable, in which case the equipment specifications are used.

^b Forklift sound level taken from Illingworth & Rodkin, Inc. 2015.

Rodeo Refinery

At the Rodeo Site three existing storage tanks would be demolished, a new PTU and STU would be constructed, and existing processing units and other facilities would be modified (Section 3.9, *Project Components*; Figure 3-2); all these activities could generate construction noise. The nearest residential receptor (Bayo Vista apartment building) is approximately 1,475 feet to the south of the Rodeo Site, which is a substantial attenuation distance .

The assumed equipment list for a typical demolition scenario includes four excavators, two hydra break rams, two shears, four manlifts, and two front-end loaders. To allow for a conservative analysis, five cranes, two lifts, one generator, one pile driver, and a pump were modeled to represent daytime construction noise activities. Demolition and pile driving activities would be limited to normal daytime working hours. Nighttime construction activities within the industrial zone, if necessary, would be limited to relatively quiet activities, with assumed equipment including two forklifts and six small generators, such as those used for nighttime lighting. For demolition and construction work conducted

near residential areas that could be impacted by noise, activities would be restricted to the hours of 7:30 am to 5:00 pm Monday through Friday, and work would be prohibited on Saturdays, Sundays, and state and federal holidays.

The Road Construction Noise Model default usage percentages were used for both demolition and construction calculations. In addition, an existing earthen berm in the buffer area would eliminate the line of sight between the construction area and the nearest sensitive receptors. That berm would reduce noise by at least 10 dBA, and that estimated shielding was included in the Road Construction Noise Model. The road construction noise model input and output is provided in Appendix E, *Noise Technical Data*.

Demolition activities, including the transitional phase, at the Rodeo Site were calculated to result in hourly sound levels of up to 56-dBA L_{eq} at the nearest residential receptor approximately 1,475 feet away (Bayo Vista apartment building). Assuming that 12 hours of demolition would occur during daytime hours, the calculated DNL of 53 dBA added to the existing DNL of 61 dBA would result in a total DNL of less than 62 dBA and an increase of less than 1 dBA, which would not be perceivable by most persons, thus negligible.

Daytime construction activities at the Rodeo Site were calculated to result in sound levels of up to 55 dBA at the nearest sensitive receptors, while nighttime construction activities were calculated to be 39 dBA. Assuming 15 hours of daytime construction and 9 hours of nighttime construction daily, the calculated DNL of 54 dBA added to the existing DNL of 61 dBA would result in a total DNL of less than 62 dBA and an increase of less than 1 dBA, which would not be perceivable by most persons, thus negligible.

Because noise is instantaneous in nature and does not persist or accumulate in the environment, random noise-generating events during the transitional phase are not expected to coincide in such a manner as to cause a significant noise impact at receptors, particularly given the distances between the Rodeo and Carbon Plant Sites and the nearest sensitive receptor. The impact would be less than significant, and no mitigation is required.

Construction/Demolition Traffic

Construction at the Rodeo Site, including the Transitional Phase, would generate up to 1,000 daily vehicular trips at its peak (Abrams Associates Traffic Engineering 2021). All trucks and the majority of worker vehicles are assumed to arrive and depart via Cummings Skyway and San Pablo Avenue, meaning they would pass by the residences along the adjacent Old County Road, northeast of the Rodeo Refinery. An increase in roadway volumes of 100 percent (a doubling of sound energy) is necessary to cause a barely noticeable 3 dBA increase in noise levels (Caltrans 2013). According to the site-specific traffic study prepared for the Project (Abrams Associates Traffic Engineering 2021), there would be 3,900 vehicles per day on San Pablo Avenue south of Cummings Skyway. Accordingly, Project construction and demolition would not result in a doubling of vehicles during peak construction, and there would not be a perceptible increase in ambient noise levels, i.e., less than 3 dBA.

Per General Plan Policy 11-8, the County restricts construction to typical daytime or normal working hours as a standard condition of approval for development projects. Short-term noise level increases from construction activities would be considered substantial if construction noise conducted outside normal working hours is distinctly audible. However, as shown above, any increases in ambient noise from the Rodeo Site would be barely perceptible or imperceptible and would thus not represent a substantial increase or a nuisance to the surrounding community.

During approximately 7 months of the construction period, the number of vessels calling at the Marine Terminal would increase above baseline levels, but the number of vessels calling at the Marine

Terminal on a peak day would not increase. Accordingly, noise levels resulting from peak-day vessel activity during construction would not increase.

Carbon Plant Site

Demolition

The Carbon Plant would be demolished and removed. The nearest sensitive receptors in the vicinity of the Carbon Plant Site are two single-family residential neighborhoods: Rancho El Pinole Tract 4329 located approximately 1,500 feet (0.28 mile) to the northwest and Rancho El Pinole Tract 5007 approximately 3,100 feet (0.59 mile) to the south, which are substantial attenuation distances. As described earlier, existing noise levels at those residences nearest to State Route 4 further west are estimated, based on their distance from State Route 4, to be 71-dBA DNL and 56-dBA DNL, respectively. The assumed equipment list for the demolition is the same as that assumed for the Rodeo Site. The Road Construction Noise Model default usage percentages were used for demolition calculations.

Modeled demolition noise levels at the sensitive receptors to the northwest of the Carbon Plant Site would reach 66-dBA L_{eq} and modeled demolition noise levels at the receptors to the south would reach 60-dBA L_{eq} . Assuming 8 working hours and low evening and nighttime noise levels of 45-dBA L_{eq} , the DNL associated with the Carbon Plant Site demolition noise at the nearest sensitive receptors would be 63 dBA (northwest) and 57 dBA (south), resulting in no perceptible increase in noise at the sensitive receptors northwest of the Carbon Plant Site and a 2-dBA DNL increase in ambient noise levels at the sensitive receptors south of the Carbon Plant Site. Furthermore, a 2-dBA increase in DNL would not be perceptible by most persons and would thus not represent a substantial increase or a nuisance.

Per General Plan Policy 11-8, the County restricts construction to typical daytime or normal working hours as a standard condition of approval for development projects. Short-term noise level increases from construction activities would be considered substantial if construction noise conducted outside normal working hours is distinctly audible. However, as shown above, any increases in ambient noise from the Carbon Plant Site would be barely perceptible or imperceptible and would thus not represent a substantial increase or a nuisance to the surrounding community. Therefore, noise impacts related to demolition of the Carbon Plant would not exceed an applicable standard. Furthermore, a 2-dBA increase in DNL would not be perceptible by most persons and would thus not represent a substantial increase or a nuisance. Therefore, impacts of onsite noise at the Carbon Plant Site would be less than significant, and no mitigation would be required.

Demolition Traffic

Demolition-related vehicle and truck traffic would access State Route 4 via Franklin Canyon Road and would not pass by existing sensitive receptors. Accordingly, impacts of noise related to Carbon Plant demolition traffic would be less than significant.

Santa Maria Site

Demolition

Under the Project, most existing process equipment and support infrastructure (storage tanks, buildings, onsite piping and pumps) at the Santa Maria Site would be demolished. The nearest sensitive receptors to the Santa Maria Site are approximately 2,000 feet to the north (approximately 0.4 mile), a substantial attenuation distance. Existing ambient noise levels range between 53- and 71-dBA DNL.

Modeled demolition noise at these receptors may reach 63-dBA L_{eq} . Assuming 8 working hours per day and lower evening and nighttime noise levels of 45-dBA L_{eq} , the DNL associated with demolition at the Santa Maria Site would be 59 dBA.

Demolition activities, including the transitional phase could, at most, result in a 6-dBA increase over ambient noise levels, which would be just perceptible by most persons. This attenuation calculation does not take into consideration the intervening buildings (insertion losses) and topography (terrain losses). A 2,000-foot attenuation distance combined with these other losses are anticipated to result in actual daytime noise impacts that are less than a 6-dBA increase over ambient noise levels at the sensitive receptors. Furthermore, demolition activities are expected to occur during hours that are exempt from Sections 23.06.044 through 23.06.050 of the San Luis Obispo County noise ordinance. Demolition-related vehicle and truck traffic would amount to no more than 36 vehicles per day on utility roads, and these vehicles would not pass by existing sensitive receptors that are located on residential streets. The impact would be less than significant and no mitigation is required.

Mitigation Measure: **None Required**

IMPACT 4.12-2

Operation of the Project would not result in exposure of persons to noise levels in excess of standards established by Contra Costa County.

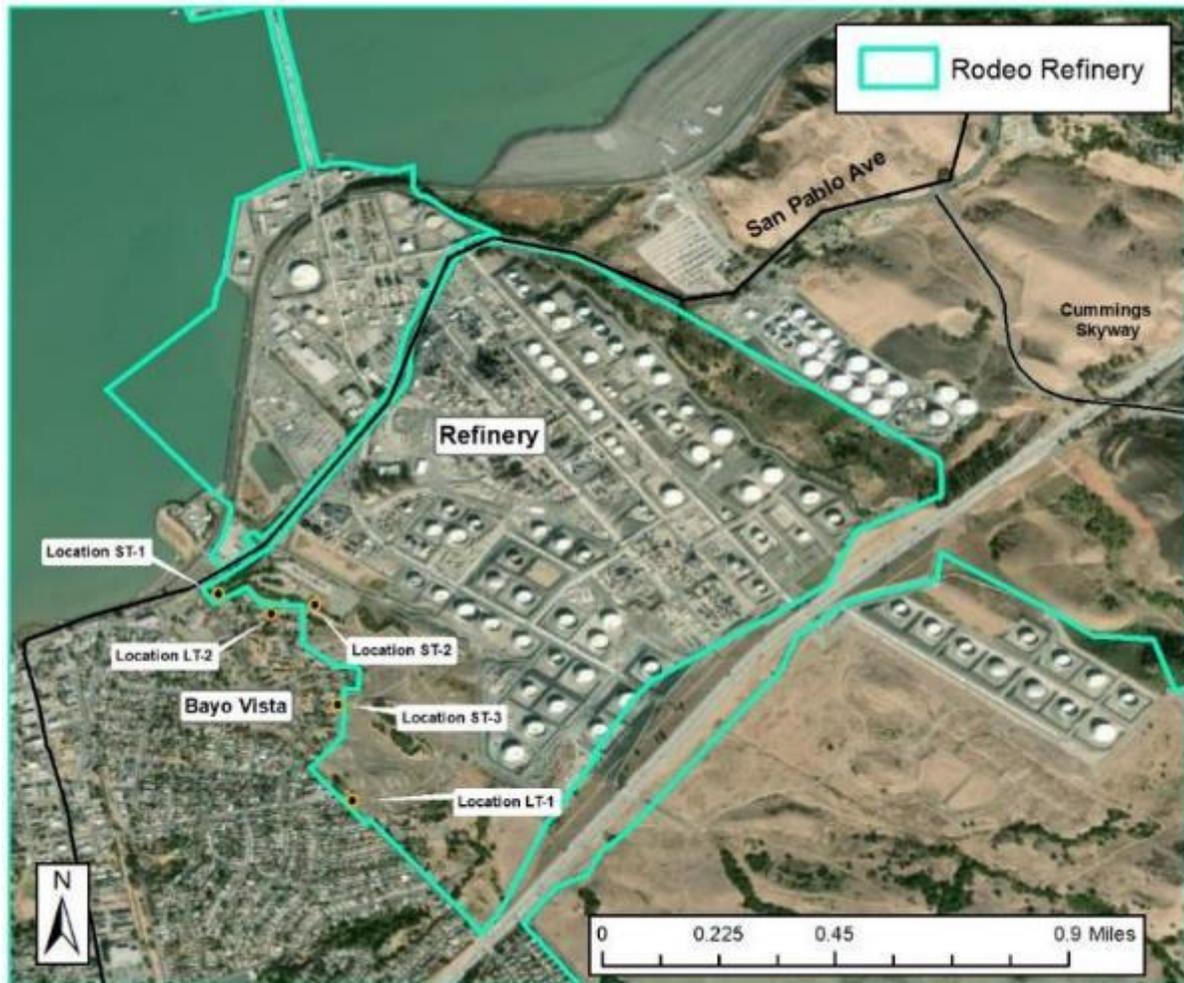
Operation and Maintenance: Less Than Significant, No Mitigation Proposed

Operation of the Project would occur entirely on the Rodeo Site. No operational activity would occur at the Carbon Plant, the Santa Maria Site, or the Pipeline Sites. Accordingly, this analysis considers only impacts of operations at the Rodeo Site, as discussed below.

Rodeo Refinery

Noise generated by new equipment at the Project as received at nearby sensitive receptors was estimated using the Computer Aided Noise Abatement (CadnaA) Noise Model. The CadnaA Noise Model is a software program that enables noise modeling of complex industrial sources using sound propagation factors as adopted by International Organization for Standardization 9613. Atmospheric absorption was estimated for conditions of 10°C and 70 percent relative humidity (i.e., conditions that favor propagation) and computed in accordance with International Organization for Standardization 9613-1. The modeling process included (1) characterizing the noise sources, (2) creating 3-dimensional maps of the site, proposed structures, and vicinity to enable the model to evaluate effects of distance, structural interference, and topography on noise attenuation, and (3) assigning the equipment sound levels to appropriate locations on the site. The CadnaA Noise Model then constructed topographic cross sections to calculate sound levels in the vicinity of the Project site. The new equipment at the Project is expected to operate 24 hours per day.

The modeling effort used modeling receptor locations representing the residences nearest the Rodeo Site. The modeling receptors considered in the noise modeling are depicted in Figure 4.12-5.



Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 4.12-5. Noise Model Receptor Locations

The assessment considered the noise implications of new equipment associated with the Project. The primary noise sources associated with the Project were identified by review of the lists of new process equipment in consultation with Phillips 66. Process equipment sound levels were estimated based on the type and capacity of the equipment and standard sound level estimates for such equipment provided in the CadnaA Noise Model, or by review of similar equipment for sound levels. The equipment locations, numbers, and sound levels used for this evaluation are provided in Table 4.12-8.

Table 4.12-8. Process Equipment Sound Levels

Equipment	Site Location	# Units	Range of Capacity	Sound Power Level (dBA)	
				Range of Sound Levels	Overall Level
PTU Train 1					
Centrifugal Pumps	PTU	48	15 to 74 hp	86 to 95 ^a	106
Screw Pumps		7	8 to 40 hp	87 to 95 ^a	99
Blower		5	25 hp	103 ^b	110
PTU Train 2					
Centrifugal Pumps	PTU	13	3 to 60 hp	76 to 94 ^a	101
Screw Pumps		7	8 to 40 hp	87 to 95 ^a	99
Blower		3	25	103 ^b	108
PTU Train 3					
Centrifugal Pumps	PTU	48	15 to 74 hp	86 to 95 ^a	106
Screw Pumps		7	8 to 40 hp	87 to 95 ^a	99
Blower		5	25 hp	103 ^b	110
General PTU					
Centrifugal Pumps	PTU	7	4 to 150 hp	78 to 99 ^a	103
Spray Pumps		2	50 hp	89 ^a	92
Leaf and Vibratory Filters		38	--	76 to 80 ^b	106
Wet Surface Air Cooler		4	125 hp	110 ^a	116
Scrubber					
Various Pumps	STU	4	25 to 75 hp	81 to 87 ^a	91
PTU FOG Recovery					
Centrifugal	WWTP	20	1 to 74 hp	72 to 95 ^a	99
Screw		1	20 hp	91 ^a	91
Other Pumps		3	3 to 10 hp	76 to 82 ^a	84
Blower		2	20 to 50 hp	103 ^b	106

Notes: dBA = A-weighted decibel
 FOG = Fats, oils and grease
 PTU = Pre-treatment Unit
 STU = sulfur treatment unit
 WWTP = Wastewater Treatment Plant

^a. The sound levels were calculated by the CadnaA Noise Model based on equipment type and capacity and represent conservative estimates of equipment sound levels.

^b. The sound levels were provided by Phillips 66.

Onsite Process Equipment Noise

As stated previously, Project operation would result in a significant noise impact if it causes a 5-dBA increase at a receptor already exposed to noise levels considered to be *normally acceptable*; causes an increase of 3 dBA in at a receptor already exposed to noise levels considered to be *conditionally acceptable*; or causes any increases at a receptor already in an area exposed to *clearly unacceptable* noise levels.

As shown in Table 4.12-9, the estimated DNL from 24-hour operation would range between 51- and 56-dBA DNL, where the existing DNL ranges from 61- to 65-dBA DNL. Cumulative Project operational noise would not cause the existing DNL to increase by more than 1 dBA at sensitive receptors, which is below the 5-dBA incremental threshold.

Table 4.12-9. Modeled Sound Levels of New Process Equipment (dBA)

Receptors	dBA, DNL				
	R1	R2	R3	R4	R5
Estimated DNL from 24-hour Operation	55	51	52	55	56
Existing DNL ^a	61	61	61	65	65
Existing Plus Project DNL	61	61	61	65	65
Increase	0	0	1	0	0
Applicable Threshold Significant?	No	No	No	No	No

Notes: dBA = A-weighted decibels
DNL =Day-night noise level

^a. Measured noise levels presented in Table 4.12-2.

On-Road Vehicle Noise

An increase in roadway traffic volumes of 100 percent (a doubling of sound energy) would be needed to cause a 3-dBA increase in noise levels. Operation of the Project would not result in an increase of the number of permanent employees and, therefore, no increase in commuter light-duty vehicle traffic. In 2019, 70 percent of the truck traffic to and from the Rodeo Refinery was related to petroleum coke movements. Shutting down the Carbon Plant would reduce total daily trucks from the Rodeo Refinery by more than half, from 76 trucks per day on average in 2019 to 44 trucks per day on average during the Project. Accordingly, traffic noise related to the Project would be reduced from baseline levels, although the reduction would be too small to be perceptible by most persons at sensitive receptors.

Rail Traffic

The Project would result in 11.3 additional railcars per day at the Rodeo Site rail unloading rack compared to baseline conditions. These additional railcars would be handled by the existing railroad operation and would not necessitate additional locomotives. Although noise associated with switching railcars would last longer than during baseline conditions because of the additional number of cars, the noise would be of the same magnitude. Because there would be no additional daily train visits, the Project would not result in additional noise events. The rail operations at the Carbon Plant Site, which consisted of three trains per week during 2019, would cease during the Project. Accordingly, the Project would result in a slight, likely imperceptible, decrease in rail-related noise.

Vessels

The Project would not result in an increased number of vessels calling at the Marine Terminal on a peak day. Accordingly, noise levels would not increase as a result of peak-day vessel activity.

Mitigation Measure: None Required

IMPACT 4.12-3

b. Would the Project result in generation of excessive groundborne vibration or groundborne noise levels?

Construction/Demolition: Less Than Significant, No Mitigation Proposed

Construction activities, including during the transitional phase, have the potential to result in varying degrees of temporary ground-borne vibration, depending on the specific construction equipment used and operations involved. Vibration levels associated with typical construction equipment are presented in Table 4.12-10.

Table 4.12-10. Vibration Source Levels for Construction Equipment

Equipment	Peak Particle Velocity (inches/second) at 25 Feet	Approximate Vibration Level LV (dVdB) at 25 feet
Pile Driver (impact)	1.518 (upper range)	112
	0.644 (typical)	104
Pile Driver (sonic)	0.734 upper range	105
	0.170 typical	93
Clam Shovel Drop (slurry wall)	0.202	94
Hydromill	0.008 in soil	66
(Slurry wall)	0.017 in rock	75
Vibratory Roller	0.21	94
Hoe Ram	0.089	87
Large Bulldozer	0.089	87
Caisson Drill	0.089	87
Loaded Trucks	0.076	86
Jackhammer	0.035	79
Small Bulldozer	0.003	58

Source: Federal Transit Administration 2018

Rodeo Refinery

Construction and demolition equipment would produce vibration levels that would be felt in the immediate vicinity of construction activities. However, ground-borne vibration diminishes rapidly with distance from the source, depending on ground/soil characteristics. Based on the information in Table 4.12-10, a pile driver would represent the greatest vibration source at 1.518 PPV at a distance of 25 feet. A PPV of 0.21 is the threshold for potential structural damage; and 0.01 is the level at which groundborne vibration becomes strongly perceptible. The nearest sensitive receptor to the Rodeo Site is located at least 1,475 feet from the proposed work area, which is a substantial attenuation distance. Groundborne vibration associated with a pile driver at that distance would not be expected to exceed 0.30033 PPV, which would not be perceived at sensitive receptors.

For demolition activities at the Carbon Plant, where pile drivers would not be employed, a vibratory roller would be the equipment that would produce the most groundborne vibration at a distance of 25 feet (Table 4.12-10). Because the threshold for damage is 0.21 PPV, demolition activities would

not cause damage outside the Carbon Plant. The vibration level at the nearest sensitive receptor (1,500 feet from the site) would be 0.000452 PPV, which would not be perceived at that receptor.

Santa Maria Site

For demolition activities at the Santa Maria Site, where pile drivers would not be employed, a vibratory roller would be the equipment that would produce the most groundborne vibration at a distance of 25 feet (Table 2.12-10). Because the threshold for damage is 0.21 PPV, demolition activities would not cause damage outside the demolition site. The vibration level at the nearest sensitive receptor (2,000 feet from the demolition site, which is a substantial attenuation distance) would be 0.000293 PPV and would not be perceived at that receptor. The impact would be less than significant and no mitigation is required.

Operation and Maintenance: Less Than Significant, No Mitigation Proposed

Rodeo Refinery

Sources of ground-borne vibration associated with Project operation would include backup generators and air handling units at the Rodeo Site. These pieces of equipment are typically well-balanced because they are designed to produce very low vibration levels throughout their operational life. In most cases, even when there is an imbalance, this equipment contributes to ground vibration levels only in the near vicinity of the equipment, and any such vibration would dissipate within a short distance and would not be felt at receptors at longer distances. Therefore, noise impacts associated with operation and maintenance at the Rodeo Refinery would be less than significant and no mitigation is required.

Mitigation Measure: **None Required**

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