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2 Section 4.9 provides a detailed description of existing noise environment at the Amorco
3 Marine Oil Terminal (Amorco Terminal) Lease Consideration Project (Project) study
4 area, and identification of sensitive receptors. Applicable regulations of the local
5 community are also discussed. For purposes of discussion, a brief description of the
6 generation and characteristics of sound and how sound is measured is also provided.

7 4.9.1 CONCEPTS AND TERMINOLOGY

8 4.9.1.1 Terminology

9 This noise analysis relies on the following standard noise-related terms and principles.

- 10 • **Environmental noise:** Environmental noise is defined as unwanted sound
11 resulting from vibrations in the air. Excessive noise can cause annoyance and
12 adverse health effects. Annoyance can include sleep disturbance and speech
13 interference. It can also distract attention and make activities more difficult to
14 perform (U.S. Environmental Protection Agency [USEPA], 1978).
- 15 • The range of pressures that create noise is broad. Noise is, therefore, measured
16 on a logarithmic scale, expressed in **decibels (dB)**. Noise is typically measured
17 on the **A-weighted scale (dBA)**, which has been shown to provide a good
18 correlation with human response to sound and is the most widely used descriptor
19 for community noise assessments (Harris 1998).
- 20 • To describe the time-varying character of environmental noise, various statistical
21 noise descriptors are typically used.
 - 22 – **L_{max}:** L_{max} is the maximum noise level generated by a source at a specified
23 distance.
 - 24 – **Leq:** Leq is the equivalent noise level over a specified period of time (i.e., one
25 hour). It is a single value of sound that includes all of the varying sound
26 energy in a given duration.
 - 27 – **L₉₀, L₅₀, and L₁₀:** These are the A-weighted sound levels that are exceeded
28 at the specified percentage of time. For example, L₉₀ is the sound level
29 exceeded 90 percent of the time and is often considered the background, or
30 residual, noise level. Similarly, L₁₀ is the sound level exceeded 10 percent of
31 the time and is commonly used as a measurement of intrusive sounds such
32 as aircraft overflight.
 - 33 – **L_{dn}:** L_{dn}, or day-night noise level, is the A-weighted sound level over a 24-
34 hour period with an additional 10 dB penalty imposed on sounds that occur at
35 night between 10 p.m. and 7 a.m.

- 1 – **CNEL:** CNEL, or Community Noise Equivalent Level, is similar to L_{dn} and is
2 the A-weighted sound level over a 24-hour period with an additional 10 dB
3 penalty imposed on sounds that occur between 10 p.m. and 7 a.m., and 5 dB
4 penalty imposed on sounds that occur in the evening between 7 p.m. and 10
5 p.m. CNEL was developed in California for evaluating noise levels in
6 residential communities. CNEL will always be higher than L_{dn} for the same
7 location; therefore, it is appropriate and conservative to use CNEL when L_{dn} is
8 not available or when comparing calculated noise to an L_{dn} threshold.

9 **4.9.1.2 General Noise Concepts**

10 Sound travels through the air as pressure waves caused by some type of vibration. In
11 general, sound waves travel away from a noise source at ground level in a
12 hemispherical pattern. The energy contained in a sound wave is spread over an
13 increasing area as it travels away from the noise source. Typical A-weighted noise
14 levels for various sound sources are summarized in Table 4.9-1.

15 The nature of dB scales is such that individual dB ratings for different noise sources
16 cannot be added directly to give the sound level for the combined noise from all
17 sources. Instead the combined noise level produced by multiple noise sources is
18 calculated using logarithmic summation. For example, if one source produces a noise
19 level of 80 dBA, then two of the identical sources side by side would generate a
20 combined noise level of 83 dBA, or an increase of only 3 dBA.

21 People generally perceive a 10 dBA increase in a noise source as a doubling of
22 loudness. Also, most people cannot detect differences of less than 2 dBA between
23 noise levels of a similar nature, while most could probably perceive a change of
24 approximately 5 dBA. When a new intruding sound is of a different nature than the
25 background sound, such as a horn sounding in heavy vehicle traffic, most people can
26 detect changes as low as 1 dBA. When distance is the only factor considered, sound
27 levels from isolated point sources of noise are reduced by approximately 6 dBA for
28 every doubling of distance. The following formula can also be used to determine noise
29 reduction at any distance from an isolated point source:

$$30 \quad L_2 = L_1 - (20 \times \log_{10}(r_2/r_1))$$

31 Where: L_1 is the noise level at reference distance (r_1)

32 L_2 is the noise level at receptor distance (r_2)

33 When the noise source is on a continuous line, such as vehicle traffic on a highway,
34 sound levels decrease by approximately 3 dBA for every doubling of distance.

1 Noise levels can also be affected by several factors other than distance. Topographic
 2 features and structural barriers absorb, reflect, and scatter sound waves and affect the
 3 reduction of noise levels. Atmospheric conditions (wind speed and direction, humidity,
 4 and temperature) and the presence of dense vegetation can also affect the degree to
 5 which sound waves are attenuated over distance.

6 **Table 4.9-1: Typical A-weighted Sound Levels**

Sound Source	Sound Level (dBA)	Typical Human Response
Carrier deck jet operation	140	Painfully loud
Limit of amplified speech	130	
Jet takeoff (200 feet) Auto horn (3 feet)	120	Threshold of feeling and pain
Jet takeoff (2,000 feet) Riveting machine	110	Very annoying
Shout (0.5 feet) New York subway station	100	
Heavy truck (50 feet) Pneumatic drill (50 feet)	90	Hearing damage (8-hour exposure)
Passenger train (100 feet) Helicopter (in flight, 500 feet) Freight train (50 feet)	80	Annoying
Freeway traffic (50 feet)	70	Intrusive
Air conditioning unit (20 feet) Light auto traffic (50 feet)	60	
Normal speech (15 feet)	50	Quiet
Living room Bedroom Library	40	
Soft whisper	30	Very quiet
Broadcasting studio	20	
	10	Just audible
	0	Threshold of hearing

Source: Compiled by TRC

1 **4.9.2 ENVIRONMENTAL SETTING**

2 **4.9.2.1 Noise Characteristics of the Project Area**

3 The Amorco Terminal is located on the Carquinez Strait adjacent to the Benicia-
4 Martinez Bridge to the east and the Shell Martinez Marine Terminal (Shell Terminal) to
5 the west. Noise in the Project area is derived primarily from the mobile sources
6 associated with the bridge (road traffic, railroad) and strait (vessel traffic). Secondary
7 noise sources include industrial activities at the adjacent Shell Terminal and the nearby
8 Shell refinery to the east.

9 To determine the existing noise level at the Project site during typical operation
10 activities, field monitoring was conducted. Noise measurements were taken between
11 5:30 p.m. and 7 p.m. on Thursday, August 1, 2013, associated with the docking and
12 unloading of the ship NISSOS KYTHNOS. The noise measurement period included
13 inactivity prior to ship arrival, approach and docking of the ship, and the crude oil
14 offloading process.

15 The noise monitor was set up on the berth approximately at the midpoint of the berth as
16 shown on Figure 4.9-1. A RION NA-27 integrating sound level meter with an integral
17 data logger, meeting the IEC651:1979/IEC804:1985 requirements for precision Type 1
18 sound level meters, was used. The meter was calibrated at the beginning and at the
19 end of each measurement with a Bruel & Kjaer Model 4231 sound level calibrator.

20 The L_{eq} varied from 54.4 dBA to 61.8 dBA over the monitoring period. L_{max} levels were
21 recorded as high as 78.7 dBA, but these were observed to be attributable to sources
22 outside the Project area, such as airplanes, and trains and vehicles on bridge. Based on
23 the noise measurement data collected and observations of monitoring personnel, noise
24 in the Project area did not vary substantially before, during, or after the docking and
25 unloading process, and no individual sources of increased noise attributable to the
26 Amorco Terminal activities were discernible (TRC 2013).

27 It is important to note that the Amorco Terminal is currently in operation and is already
28 considered a partial contributor to the ambient noise environment at the receptor
29 locations, which would remain unchanged by the Project.

30 **4.9.2.2 Sensitive Receptors**

31 There are no sensitive receptors or sensitive land uses (i.e., hospitals, schools, nursing
32 homes) located near the Amorco Terminal. The nearest residences are located along
33 Miller Avenue and Dineen Street, approximately 1 mile south of the Amorco Terminal.
34 There is also potential for "live-aboard" residences on boats docked at the Martinez
35 Marina, as near as approximately 0.66 mile southwest of the Amorco Terminal.

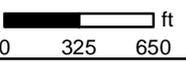


Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

X:\CSLC\Amorco MOT\4.9 Noise\mxd\Figure 4.9-1 Noise Monitoring and Receptor Locations.mxd

Figure 4.9-1
Noise Monitoring and Receptor Locations
 California State Lands Commission
Amorcó Marine Oil Terminal Lease Consideration Project

- Noise Receptor (R)
- Noise Monitor (NM)
- CSLC Lease Boundary


 1:10,000
 1 inch = 833 feet




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1 The residential receptor locations, and their proximity to the Amorco Terminal, are
2 shown on Figure 4.9-1. As seen on Figure 4.9-1, industrial (including the Shell Terminal)
3 and railroad facilities existing between the Amorco Terminal and the residential (R-1)
4 and marina (R-2) receptors would generally contribute more noise at these receptor
5 locations than the Amorco Terminal.

6 **4.9.3 REGULATORY SETTING**

7 Federal and State laws that may be relevant to the Project are identified in Table 4-1.
8 Local laws, regulations, and policies are discussed below.

9 ***Contra Costa County***

10 Section 11 (Noise Element) of the *Contra Costa County General Plan* establishes the
11 acceptability of proposed new land uses within existing noise-impacted areas in
12 accordance with the State of California General Plan Guidelines, as shown in Table
13 4.9-2. This table can also be used to determine if receptors within a current land use
14 area will be significantly impacted by a proposed new land use in the vicinity. The
15 maximum exterior noise level considered to be “normally acceptable” for single-family
16 residential uses is 60 dBA L_{dn} ; and noise levels of up to 70 dBA L_{dn} are considered to be
17 “conditionally acceptable.” The maximum exterior noise level considered to be “normally
18 acceptable” without condition for industrial uses is 70 dBA L_{dn} . This policy does not
19 apply to temporary noise levels, such as from construction.

20 ***City of Martinez***

21 The Noise Element of the *City of Martinez General Plan* (1985) is implemented under
22 City Ordinance Chapter 8.34 (Noise Control) as follows:

- 23 • Section 8.34.020 (Noise Standards) establishes a standard of 60 dBA L_{dn} for
24 exterior noise.
- 25 • Section 8.34.030 (Noise Regulations) prohibits construction activity before 7 a.m.
26 and after 7 p.m. daily, and before 9 a.m. and after 5 p.m. on weekends and
27 holidays.
- 28 • Section 8.34.060 (Noise Standards for New Construction) requires all new
29 commercial or industrial development to be located within 500 feet of any
30 residential development to be designed and operated within the acceptable
31 standards for noise.

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Table 4.9-2: Noise Level/Land Use Compatibility

Land Use Category	Exterior Day/Night Noise Levels DNL or Ldn, dB						INTERPRETATION
	55	60	65	70	75	80	
Residential— Single Family	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	<p></p> <p>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</p>
Residential— Multiple Family	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	
Transient Lodging— Motels, Hotels	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	<p></p> <p>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.</p>
Schools, Libraries, Churches, Hospitals*, Nursing Homes	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	
Auditoriums, Concert Halls, Amphitheaters	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	<p></p> <p>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.</p>
Sports Arena, Outdoor Spectator Sports	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	
Playgrounds, Parks	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	<p></p> <p>Clearly Unacceptable: New construction or development clearly should not be undertaken.</p>
Golf Courses, Riding Stables, Water Recreation, Cemeteries	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	
Office Buildings, Business Commercial and Professional	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	
Industrial, Manufacturing,	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	Light Gray	

Source: Office of Planning and Research, State of California General Plan Guidelines, Appendix A: Guidelines for the Preparation and Content of the Noise Element of the General Plan, 1998.

*Because hospitals are often designed and constructed with high noise insulation properties, it is possible for them to be satisfactorily located in noisier areas.

1 4.9.4 IMPACT ANALYSIS

2 4.9.4.1 Significance Criteria

3 For the purposes of this analysis, an impact was considered to be significant and
4 require mitigation if, as a result of the Project, it was determined that the following would
5 occur:

- 6 • A violation of local noise ordinances or any other exceedance of applicable noise
7 standards in regulations promulgated at the county, State, or federal level. The
8 lowest applicable noise level criteria is as follows:
 - 9 – The *Contra Costa County General Plan Noise Element* states that the
10 maximum day-night level (L_{dn}) for an industrial land use is 70 dBA
11 (A-weighted sound level)

12 4.9.4.2 Assessment Methodology

13 Environmental impacts are discussed in this section relative to sensitive receptors in the
14 vicinity of the Project. Potential noise impacts relate to continued operation of the
15 offshore portion of the Amorco Terminal, which is already considered a partial
16 contributor to the ambient noise environment at the receptor locations.

17 4.9.4.3 Impacts Analysis and Mitigation Measures

18 The following subsections describe the Project's potential impacts on noise levels at
19 residential receptor locations in the vicinity. Where impacts are determined to be
20 significant, feasible mitigation measures are described that would reduce or avoid the
21 impact.

22 Proposed Project

23 **Impact Noise (NO)-1: Cause a violation of local noise ordinances or any other**
24 **exceedance of applicable noise standards in regulations promulgated at the**
25 **county, State, or federal level. (Less than significant.)**

26 Based on the noise measurement data collected and observations of monitoring
27 personnel (TRC 2013), Project operations (i.e., ship docking and unloading process) do
28 not result in a measurable increase in ambient noise at the Project site or in the vicinity,
29 and do not create discernible individual sources of increased noise that would allow the
30 Project to approach the significance threshold of 70 dBA L_{dn} . The existing Project
31 operation noise is considered a partial contributor to the ambient noise environment at
32 the receptor locations, which would remain unchanged by the Project.

33 **Mitigation Measure:** No mitigation required.

1 **Alternative 1: No Project**

2 **Impact NO-2: Effects on noise with no new Amorco Terminal lease. (Less than**
3 **significant.)**

4 Under the No Project Alternative, the Tesoro Refining and Marketing Company, LLC
5 lease would not be renewed and the existing Amorco Terminal would be subsequently
6 decommissioned with its components abandoned in place, removed, or a combination
7 thereof. The decommissioning of the Amorco Terminal would be governed by an
8 Abandonment and Restoration Plan, and noise generated by demolition and removal
9 would be considered construction noise in conformance with the local ordinance.

10 After decommissioning, the No Project Alternative assumes the number of tankers
11 servicing the area would remain essentially the same due to regional demands, and
12 assumes that without the Amorco Terminal, incoming tankers would instead go to the
13 Avon Terminal. Since the contribution of the Project to ambient noise conditions at
14 residential receptors was determined to be negligible, decommissioning the facility and
15 shifting tanker traffic to another local facility would not result in a significant increase or
16 decrease in noise in the vicinity of the Project.

17 **Mitigation Measure:** No mitigation required.

18 **Impact NO-3: Effects on noise by importing crude supplies from non-marine**
19 **sources. (Potentially significant.)**

20 This alternative assumes that there would be no Amorco Terminal to receive crude or
21 transport product and, therefore, Golden Eagle Refinery operations would be dependent
22 on crude oil receipts through non-marine sources to meet regional refining demands.
23 Sources may include land-based transportation such as rail cars and trucks, and/or
24 pipeline connections to other San Francisco Bay Area marine oil terminals, or a
25 combination thereof.

26 Crude oil transportation by rail car would involve constructing additional rail lines and
27 associated handling facilities. Pipeline delivery would require construction of new
28 pipelines and/or the purchase of existing pipeline capacity from other local petroleum
29 refinery competitors. Construction noise would be in conformance with the local
30 ordinance.

31 If an increase in rail transportation volume was selected as an alternative means of
32 crude oil transport to the Golden Eagle Refinery, there is potential for a significant
33 increase in noise in the vicinity since rail activity is already a major source of noise in
34 the vicinity and the railroad is located closer to the residential receptor locations.

1 **Alternative 2: Restricted Lease Taking Amorco Out of Service for Oil Transport**

2 **Impact NO-4: Effects on noise by taking Amorco Terminal out of service for oil**
3 **transport. (Beneficial.)**

4 The Amorco Terminal is an existing facility on land zoned Heavy Industrial. A reduction
5 in noise levels to the Project area are anticipated as a result of a restricted lease.

6 **Mitigation Measure:** No mitigation required.

7 **Cumulative Impact Analysis**

8 Routine operations at the Amorco Terminal would not contribute to cumulative noise
9 impacts. Based on the noise measurement data collected and observations of
10 monitoring personnel (TRC 2013), Project operations (i.e., ship docking and unloading
11 process) do not result in a measurable increase in ambient noise at the Project site or in
12 the vicinity, and do not create discernible individual sources of increased noise that
13 would allow the Project to approach the significance threshold of 70 dBA L_{dn}. The
14 existing Project operation noise is considered a partial contributor to the ambient noise
15 environment at the receptor locations, which would remain unchanged by the Project.

16 **4.9.5 SUMMARY OF FINDINGS**

17 Table 4.9-3 includes a summary of anticipated impacts to existing ambient sound levels.

18 **Table 4.9-3: Summary of Noise Impacts and Mitigation Measures**

Impact	Mitigation Measure(s)
<i>Proposed Project</i>	
NO-1: Cause a violation of local noise ordinances or any other exceedance of applicable noise standards in regulations promulgated at the county, State, or federal level	No mitigation required.
<i>Alternative 1: No Project</i>	
NO-2: Effects on noise with no new Amorco Terminal lease	No mitigation required.
NO-3: Effects on noise by taking Amorco Out of Service for oil transport	Should this alternative be selected, mitigation measures would be determined during a separate environmental review under CEQA.
<i>Alternative 2: Restricted Lease Taking Amorco Out of Service for Oil Transport</i>	
NO-4: Effects on noise by taking Amorco Terminal out of service for oil transport	No mitigation required.

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