

## 3.4 NOISE AND VIBRATION

This section describes the potential for impacts related to noise and ground-borne vibration resulting from implementation of the proposed South San Francisco Ferry Terminal Project. The primary noise concerns related to the project would result from the addition of ferry traffic to the San Francisco Bay and the Oyster Point Marina Park (Marina) and the associated noise levels experienced by nearby sensitive receptors including residential live-aboards in the Marina, recreational users of the Marina and Bay Trail, and sensitive wildlife (aquatic and terrestrial).

Preparation of this section used data from various sources, including the *South San Francisco Municipal Code*, the *East of 101 Area Plan*, and the *Oyster Point Ferry Terminal Transportation Report* prepared by Wilbur Smith Associates (included as Appendix F of this EIR/EA). Full bibliographic entries for all reference materials are provided in Section 3.4.4 (References).

The 2003 WTA PEIR for the expansion of ferry service in the Bay Area evaluated environmental impacts related to shipboard noise impacts to passengers and crew, noise impacts to receptors along the shoreline during en route ferry operations, increases in ambient noise levels from proposed terminal operations, and impacts to wildlife. As this is a project-level analysis that tiers from and incorporates the 2003 WTA PEIR, this section evaluates the site-specific environmental impacts related to substantial temporary and/or permanent increase in ambient noise levels in the vicinity of the project site; exposure of residents or businesses to excessive noise levels or ground-borne vibration; and whether this exposure would be in excess of standards established in the East of 101 Area Plan and the City's Noise Ordinance, or any other applicable standards.

One comment letter related to noise and vibration was received in response to the December 17, 2004, Notice of Preparation (NOP) circulated for the project. This letter was received from the City/County Association of Governments of San Mateo County; it was related to noise caused by overflights at the project site. The NOP and a summary of issues raised during the Public Scoping process are included in Appendix A of this EIR/EA.

### 3.4.1 ENVIRONMENTAL SETTING

#### ■ Fundamentals of Sound and Environmental Noise

##### *Sound*

Sound is created when objects vibrate, resulting in air pressure variations characterized by their amplitude (loudness) and frequency (pitch). The standard unit of sound amplitude is the decibel (dB). The decibel scale is logarithmic; it describes the physical intensity of the pressure variations. The pitch of the sound is related to the frequency of the pressure variation. The sensitivity of a human ear to sound is frequency-dependent.

The A-weighted decibel scale (dBA) measures sound intensity while discriminating against frequencies in a manner approximating that of the human ear.

### Environmental Noise

Noise is “unwanted” sound. A typical noise environment consists of a base of steady “background” noise that is the sum of many distant and indistinguishable noise sources. Superimposed on this background is the noise from individual distinguishable local sources. These can vary from an occasional aircraft or train passing by to the virtually continuous noise from traffic on a local roadway. Table 3.4-1 lists representative environmental noise levels.

Table 3.4-1 Representative Environmental Noise Levels		
Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	—110—	Rock Band
Jet Fly-over at 100 feet		
	—100—	
Gas Lawnmower at 3 feet		
	—90—	
		Food Blender at 3 feet
Diesel Truck going 50 mph at 50 feet	—80—	Garbage Disposal at 3 feet
Noisy Urban Area during Daytime		
Gas Lawnmower at 100 feet	—70—	Vacuum Cleaner at 10 feet
Commercial Area		Normal Speech at 3 feet
Heavy Traffic at 300 feet	—60—	
		Large Business Office
Quiet Urban Area during Daytime	—50—	Dishwasher in Next Room
Quiet Urban Area during Nighttime	—40—	Theater, Large Conference Room (background)
Quiet Suburban Area during Nighttime		
	—30—	Library
Quiet Rural Area during Nighttime		Bedroom at Night, Concert Hall (background)
	—20—	
		Broadcast/Recording Studio
	—10—	
Threshold of Human Hearing	—0—	Threshold of Human Hearing

SOURCE: California Department of Transportation 1998

Several descriptors are commonly used to gauge the noise exposure level of individuals and communities. These descriptors are sensitive to noise intensity over time and, in some cases, to the time of day when the noise occurs. Those that are applicable to this analysis are as follows:

- $L_{eq}$ , the *equivalent energy noise level*, is the average acoustic energy content of noise over any chosen exposure time. The  $L_{eq}$  is the constant noise level that would deliver the same acoustic energy to the ear as the actual time-varying noise over the same exposure time.  $L_{eq}$  does not depend on the time of day during which the noise occurs.
- $L_{dn}$ , the *day-night average noise level*, is a 24-hour average  $L_{eq}$  with a 10 dBA “penalty” added to noise during the hours of 10:00 P.M. to 7:00 A.M. to account for increased nighttime noise sensitivity. Because of this penalty, the  $L_{dn}$  would always be higher than its corresponding 24-hour  $L_{eq}$  (e.g., a constant 60 dBA noise over 24 hours would have a 60 dBA  $L_{eq}$ , but a 66.4 dBA  $L_{dn}$ ).
- CNEL, the *community noise equivalent level*, is an  $L_{dn}$  with an additional dBA “penalty” for the evening hours between 7:00 P.M. and 10:00 P.M.

Community noise exposures are typically represented by 24-hour descriptors, such as a 24-hour  $L_{eq}$ ,  $L_{dn}$ , or CNEL. One-hour and shorter-period descriptors are useful for characterizing noise caused by short-term activities, such as the operation of construction equipment.

Community noise environments are generally perceived as “quiet” when the 24-hour average noise level is below 45 dBA, “moderate” in the 45 to 60 dBA range, and “loud” above 60 dBA. Very noisy urban residential areas are usually around 70 dBA  $L_{dn}$  /CNEL. Along major thoroughfares, roadside noise levels are typically between 65 and 75 dBA  $L_{dn}$  /CNEL. A 5 dBA increment to an existing one-hour  $L_{eq}$ , or to the  $L_{dn}$  /CNEL is commonly used as a threshold for an adverse community reaction to a noise increase. But there is evidence that 5 dBA may not be significantly protective in residential areas where  $L_{dn}$  /CNEL is already high (i.e., above 60 dBA); in these areas limiting noise increases to 3 dBA or less is recommended (Federal Transit Administration 1995). Any noise intrusions that cause short-term interior levels to rise above 45 dBA at night can disrupt sleep. Eight-hour or longer exposures to noise levels greater than 85 dBA can cause permanent hearing damage.

Noise sources are generally classified as either a point source or line source. A point source would be a horn or a single piece of machinery relatively close to a receptor or a cluster of sources, like a construction site, that is relatively far away from a receptor. A line source would be a nearly continuous stream of point sources like a busy highway or a long railroad train. In general the rate of attenuation for a point source is 6 dB for every doubling of distance relative to a source’s level at a reference distance. The rate of attenuation for a line source is generally 3 dB per doubling of distance. For a source that is in between a point source and line source such as a road where cars are spaced out, the rate of attenuation is approximately 4.5 dB per doubling of distance. Other than distance, a sound level can change based on wind sources, intervening terrain or barriers, ground surfaces, and the atmosphere.

## *Underwater Sound*

When measuring underwater sound there is a different reference level than the reference level for air to calculate the decibel level. The reference level for air is 20 microPascals ( $\mu\text{Pa}$ ) and the reference level for sound pressure levels underwater is 1  $\mu\text{Pa}$ . Because the sound levels use different reference levels the two cannot readily be compared.

Underwater sound propagation can be affected by many factors including water temperature, pressure, salinity, and air bubble occurrence. The attenuation losses due to absorption in water are less than the attenuation of sound in air. In most cases, sound in water will travel farther than sound in air.

## *Ground-borne Vibration*

Vibrating objects in contact with the ground radiate energy through that medium; if a vibrating object is massive enough and/or close enough to the observer, its vibrations are perceptible. The rumbling sound caused by the vibration of room surfaces is called ground-borne noise. The ground motion caused by vibration is measured as particle velocity in inches per second and in the U.S. is referenced as vibration decibels (VdB).

The background vibration velocity level in residential and educational areas is usually around 50 VdB. The vibration velocity level threshold of perception for humans is approximately 65 VdB. A vibration velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels for many people. Most perceptible indoor vibration is caused by sources within buildings such as the operation of mechanical equipment, movement of people, or the slamming of doors. Typical outdoor sources of perceptible groundborne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the groundborne vibration from traffic is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration velocity level, and 100 VdB, which is the general threshold where minor damage can occur in fragile buildings.

### ■ Noise Effects on Wildlife

As noted above, noise has the potential to affect humans through sleep disturbance, speech interference, and workplace hearing loss. However when wildlife are exposed to man-made noise sources, they can have a variety of impacts, some of them can be damaging. In general, man-made noise can affect animal behavior, mask acoustic signals, and affect their physiology including causing hearing loss.

In marine mammals, underwater sound pressure levels have been shown to cause disruption of activities, including but not limited to, migration, breeding, care of young, predator avoidance or defense, and feeding.

## ■ Ferry Noise Sources

The major source of noise from ferries operating at full power is from ferry engine exhaust and water propulsion or wake noise (for fast ferries). When ferries are not operating at full power, for example when idling, the main engine is replaced by other sources, including the use of horns, as the primary noise generators.

For shipboard noise the sound levels experienced on board can vary substantially from the interior passenger areas, in the forward decks, and in the aft areas near the engine. The sources of shipboard noise include the engine exhaust, fluid-dynamic noise, heating, and ventilation noise.

Underwater sound levels measured for existing vessels identified in the 2003 WTA PEIR ranged from 152 dB (referenced at 1  $\mu$ Pa at 1 meter) to 177 dB (referenced at 1  $\mu$ Pa at 1 meter). The measurement for a tanker at 177 dB was used in the 2003 WTA PEIR to represent a worst-case condition for a fast ferry operating at full power.

Noise measurements for ferry boats in operation were completed in the 2003 WTA PEIR for the expansion of the ferry terminal service. The measurements were taken June 2003 by URS from a boat as the ferries passed by at full service speed and the results are shown below in Table 3.4-2. The table shows the average results of three of the representative vessels measured during the survey, the Mare Island, Del Norte, and Peralta. The measurements were taken at full power (approximately 25 knots) and had an ambient noise level of approximately 60 dBA. The results showed that the maximum noise exposure level was not at the closest point of approach (CPA), but rather after the boat had passed and there was an open line of sight to the engine side of the boat.

<i>Vessel</i>	<i>L<sub>eq</sub> at CPA(325 ft)</i>	<i>L<sub>max</sub> at 325 ft</i>	<i>L<sub>max</sub> at 1000 ft</i>	<i>L<sub>max</sub> at 3520 ft</i>	<i>L<sub>max</sub> at 4922 ft</i>
Mare Island	72.3	79.5	69.8	58.8	48.6
Del Norte*	68.1	79.8	70.1	59.2	56.3
Peralta	63.6	87	77.3	66.4	63.5
Average	69.3	83.6	73.9	63	60.1

SOURCE: Adopted from Exterior Noise Measurements Table April 2003, 2003 WTA PEIR, URS, June 2003; EIP Associates 2005

\* Average of reported measurements

## ■ Existing Noise Levels

The primary noise sources at the project site include airplane fly-bys from the nearby San Francisco International Airport approximately two miles to the south and background noise which includes vehicle noise from US 101 approximately 1.5 miles to the west. Noise sources also include local sources such as the movement of boats in the marina and vehicles in the parking areas around the yacht club and recreational areas at Oyster Point. An ambient noise measurement taken at the site by EIP Associates on August 26,

2005 showed an existing noise level of 53 dBA. The ambient noise levels may include local noise sources, traffic noise sources from nearby streets, and occasional airplane fly-bys of up to 84 dBA according to the City's General Plan.

### ■ Sensitive Noise Receptors

The closest sensitive noise receptors in the area of the project site would be the live-aboard residents located in boats docked in the marina and persons using the open space and recreational areas around the marina. Currently there are residential live-aboards located throughout the Marina. There are 33 live-aboards located on Docks 11, 12, 13, and 14; eight of which live in the last 25 percent of the docks (approximately 100 feet from the end of the docks) (Johnson 2005).

## 3.4.2 REGULATORY FRAMEWORK

### ■ Federal Regulations

#### *U.S. Environmental Protection Agency*

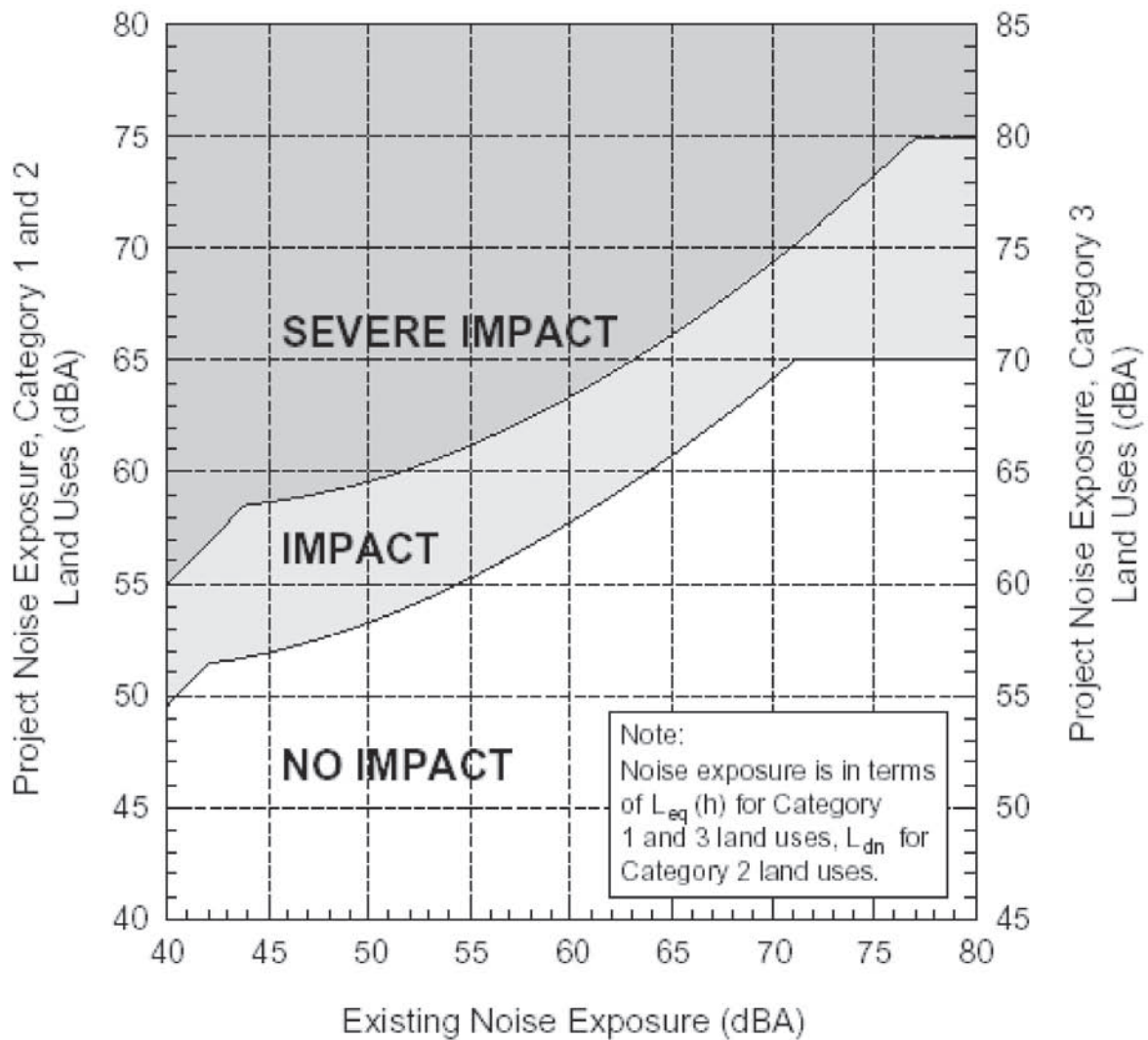
The U.S. Environmental Protection Agency (U.S. EPA) under the *Noise Control Act of 1972* has developed guidelines for acceptable noise level limits for residential land uses. The limits set forth for residential uses are 55 dBA  $L_{dn}$  for outdoors and 45 dBA  $L_{dn}$  for indoors. These are recommendations based on a factor of safety and are not standards or regulations.

#### *Federal Transit Administration*

The Federal Transit Administration has developed guidelines for transit projects and criteria for determining impacts to sensitive land uses. The land uses are separated into three categories based on their noise sensitive uses. Category 1 includes land where quiet is an essential element for operation such as outdoor amphitheaters, Category 2 includes residences and areas where people generally sleep, and Category 3 includes institutional buildings where quiet is important such as for schools, libraries, and churches. Category 3 also includes recreational areas to some degree, areas where people would be engaged in activities that would require quiet such as reading would be considered a sensitive use.

Areas that require quiet but would not require special considerations for nighttime (Categories 1 and 3) use an hourly equivalent sound level for significance, and for Category 2 where there is a penalty for the time of day due to a heightened annoyance for noise levels at night, an  $L_{dn}$  is used to determine impact levels.

This analysis uses the following Federal Transit Administration's noise impact criteria shown in Figure 3.4-1 and shows that for an area with a baseline  $L_{dn}$  between 60 dBA and 65 dBA an increase greater than 5 dBA is considered severe.



Source: Federal Transit Administration, 1995, Figure 3-1.

**FIGURE 3.4-1  
Noise Impact Criteria for Transit Projects**

The FTA also provides guidance for evaluation of groundborne vibration and groundborne noise impacts associated with transit projects. For projects that would involve rubber tire vehicles only (i.e. no steel rail), a vibration impact is unlikely except for unusual circumstances. Projects that have the potential to include vibration impacts are when there would be design features with uneven surfaces such as speed bumps, projects that would locate heavy buses or truck near vibration sensitive buildings, and when there would be operation of vehicles inside or underneath a building. If a project does not include any of these features it is unlikely to have the potential for groundborne vibration. If a project does contain one of the features listed above, the screening level for a rubber tire project would be 50 feet for Category 2 land uses and 100 feet for Category 1 land uses.

### ***U.S. Fish and Wildlife Service***

The U.S. Fish and Wildlife Service (FWS) have determined significance criteria to be 60 dBA CNEL at the line of habitat.

### ***Marine Mammal Protection Act***

The *Marine Mammal Protection Act* (MMPA) was amended to identify two levels of harassment of marine mammals. The MMPA Level B harassment refers to disturbance without injury and is triggered when the received underwater sound pressure levels are at or above 160 dB (referenced at 1  $\mu$ Pa). Level A harassment involves injury and is triggered when received underwater sound pressure levels are at or above 180 dB (referenced at 1  $\mu$ Pa).

The Act also provides that the National Marine Fisheries Service (NMFS) and FWS may authorize, for periods of as long as one year, the unintentional taking by harassment of small numbers of marine mammals if the taking (harassment) will have a negligible impact on the affected species or stock.

### ***Occupational Safety and Health Administration***

The Occupational Safety and Health Administration regulate noise levels in industrial environments under the Department of Labor. OSHA regulations require that the time-averaged noise level of any work environment be limited to 90 dBA for any 8-hour period.

## **■ Local Regulations**

The California Government Code requires that a noise element be included in the general plan of each county and city in the state. Each local government's goals, objectives, and policies for noise control are established by the noise element of the general plan and the passage of specific noise ordinances. In the South San Francisco General Plan, the project site is shown to be in the East of 101 Area Plan.

## East of 101 Area Plan

The East of 101 Area Plan Noise Element establishes policies to provide acceptable noise levels for anticipated land uses. These policies have been used to set criteria for the control of noise generated by individual aircraft flyover noise and for average noise levels. The purpose of these criteria is to reduce the various potential effects of noise on people, including sleep disturbance, reduced physical and mental performance, annoyance, and interference with speech communication. The East of 101 Area Plan does not specifically address residents living at the Oyster Point Marina Park (Marina), and instead identifies the area as commercial development. The requirements for commercial land uses such as industrial, office, and retail indicate that the interior calculated hourly noise levels during the daytime should not exceed an  $L_{eq}$  of 45 dBA and an instantaneous maximum noise levels should not exceed 60 dBA. The Noise Element also establishes a policy to ensure that new development be designed so that the average noise level does not exceed an  $L_{eq}$  of 60 dBA at the nearest open space or recreational area such as the Bay Trail and other shoreline amenities.

## City of South San Francisco Municipal Code

The City of South San Francisco has adopted a Noise Ordinance (Chapter 8-32 of the South San Francisco Municipal Code), which identifies ambient baseline noise levels, noise standards for various sources, specific noise restrictions, exemptions, and variances for sources of noise within the city. The noise levels are used as baseline criteria for noise levels for different land use categories. The baseline ambient noise levels for the Oyster Point Marina Park (Marina) have been included in Table 3.4-3 below. The noise standards apply to all noise sources with the exception of any vehicle that is operated upon any public highway, street or right-of-way, or to the operation of any off-highway vehicle, to the extent that it is regulated in the State Vehicle Code, and all other sources of noise that are specifically exempted.

Table 3.4-3 Noise Level Standards		
Cumulative Number of Minutes in a 1-Hour Period	Maximum Allowable Noise Level (dBA)	
	Daytime 7 A.M.–10 P.M.	Nighttime 10 P.M.–7 A.M.
30	65	60
15	70	65
5	75	70
1	80	75
0	85	80

SOURCE: East of 101 Area Plan 1994

Construction activities are exempt from the noise level standards listed in Table 3.4-3 during the hours of 8:00 A.M. and 8:00 P.M. on weekdays, 9:00 A.M. and 8:00 P.M. on Saturdays, and 10:00 A.M. and 6:00 P.M. on Sundays and holidays. The exemption is only allowed if the construction equipment does not produce a noise level greater than 90 dBA at 25 feet from the source or 90 dBA outside of the property line, whichever is greater.

### 3.4.3 IMPACTS AND MITIGATION MEASURES

#### ■ Methodology

Effects of noise levels are evaluated by determining the impacts on sensitive receptors from the impacts of noise from implementation of the project. Noise emissions for the proposed ferry boats were used from existing ferry boats currently in operation in the San Francisco Bay Area. Noise measurements for ferry boats in operation were completed in the 2003 WTA PEIR for the expansion of the ferry terminal service and shown above in Table 3.4-2. Because the measurements in the table were taken using full-service speed, and because there is an enforced no-wake speed of approximately 3 to 5 knots inside the Oyster Point Marina Park (Marina), the use of the full-speed noise measurements for arrival and departure would be conservative.

The fast ferries used in the 2003 WTA PEIR and the majority in the San Francisco Bay Area do not meet the proposed air emissions standards included in this project. The newest boat in the San Francisco ferry system is the Solano which is in operation and runs from Vallejo to San Francisco. The Solano meets the EPA standards for air emissions from new ferry boats, and was the newest boat in the San Francisco ferry system at the time of this document. The Solano is a 300-passenger boat, approximately twice the size of the proposed 149-passenger boat proposed with this project. The Solano was chosen to measure for idling noise emissions as it currently meets the EPA's air requirements and is the newest ferry in the system. The Solano was chosen to best represent the project's projected ferry emissions. Measurements were taken while the Solano was docking near the San Francisco Ferry Building on August 31, 2005, by EIP Associates. As the Solano is a larger vessel than the ferry proposed for this project, the idling noise emissions would be conservative for this project. Idling measurements for the Solano showed an  $L_{eq}$  of 70.2 dBA at approximately 50 feet from the idling ferry boat and a background of 58.1 dBA before arrival and 64.6 dBA after departure. Calculations to remove the background component of the measurement showed the idling ferry boat contribution to be approximately 69.4 dBA at 50 feet from the boat.

Calculations for noise propagation in the Marina assumed the ferry source to be a point source and therefore the noise will attenuate at a rate of 6 dB per doubling of distance.

#### ■ Environmental Criteria

Based on environmental criteria developed by the WTA, and in accordance with the requirements of CEQA and NEPA and all applicable state and federal environmental laws, the project would have an adverse effect on the environment if it would do any of the following:

- Expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinances, or applicable standards of other agencies
- Expose persons to or generate excessive groundborne vibration or groundborne noise levels
- Cause substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project

- Cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project
- Expose people residing or working in the project area to excessive noise levels for a project located within 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, or for a project within the vicinity of a private air strip
- Expose ferry passengers and crew to noise levels greater than Occupational Safety and Health Administration standards
- Expose residents and noise-sensitive land use to “impacts” as defined by the Federal Transit Administration
- Expose terrestrial wildlife to 60 A-weighted dB Community Noise Equivalent Level (or greater) per the U.S. Fish and Wildlife Service
- Expose aquatic wildlife to underwater sound pressure levels at or above 160 dB, the National Marine Fisheries Service

This analysis will use the City of South San Francisco Noise Standards, as specified in Table 3.4-3.

### ■ Impacts and Mitigation Measures Incorporated from 2003 WTA PEIR

The 2003 WTA PEIR (URS, 2003) included many impacts and mitigation measures that are either addressed in this document or are not applicable to this project. A table of impacts and mitigation measures from the PEIR is included as Appendix H of this document and includes a column showing how the PEIR impacts and MMs are applied to this project (i.e., *IR*—Incorporated by Reference, *AD*—Addressed in EIR, and *NA*—Not Applicable). For noise and vibration, the following impacts and mitigation measures from the PEIR would apply to the project and are assumed to be incorporated in this project by reference.

- **Impacts:** NOI-1, NOI-2, NOI-4
- **MMs:** NOI-2.1, NOI-4.1

### ■ Impacts and Mitigation

Threshold	Would the project expose people residing or working in the project area to excessive noise levels for a project located within 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, or for a project within the vicinity of a private air strip?
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**Impact 3.4-1      The proposed project would not expose people residing or working in the project area to excessive noise levels due to proximity to airport-related noise sources.**

The proposed project is located approximately two miles from the San Francisco International Airport. Noise measurements taken on site showed the ambient levels at the site to be approximately 53 dBA during daytime hours and contour levels from the East of 101 Area Plan indicate that the exposure level at the project site is less than 65 dBA CNEL.

**CEQA Conclusion:** The impact of exposing people residing or working in the project area to excessive noise levels would be less than significant. No mitigation would be required.

Threshold	Would the project expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinances, or applicable standards of other agencies?
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**Impact 3.4-2            Implementation of the project would not result in noise that would be above the standards established in the noise ordinance and would not expose live-aboard residents to levels above the standards.**

Implementation of the project would introduce a ferry boat at the Oyster Point Marina Park (Marina) and there would be an increase in ambient noise levels due to arrivals, departures, and idling of the ferries. The Oyster Point Marina Park (Marina) live-aboards would be the closest sensitive receptors to the proposed ferry route through the Marina. The boats docked in slips at the end of the Docks 11, 12, 13, and 14 would be as close as 75 feet to the ferry boats during operation which would have an arrival/departure approximately twice per hour during the morning and evening commute hours (7:00 A.M.–9:00 A.M. and 4:00 pm – 6:00pm). Table 3.4-4 shows the results of calculations of a potential ferry arrival, departure, and idling for a total time of 15 minutes. The noise exposure of a live-aboard in the last slip on dock 11 (closest to ferry route and terminal) was calculated for the 15 minute ferry arrival and an hourly  $L_{eq}$  assuming two arrivals per hour and a background of 53 dBA for the rest of the time period. To calculate the noise exposure for the 1,000 feet route from the entrance to the marina to the docking point, the route was broken into three segments with the noise levels at the center of each segment to be representative of each time period.

Table 3.4-4            Noise Calculations for Live-Aboard at 75 Feet from Ferry During Operation			
Noise Source	Duration (minutes)	$L_{eq}$ (dBA)	City Standard (dBA)
<b>Approach and Departure (1,000 feet at no wake speed)</b>			
$L_{eq}$ (@ 625 feet from the source)	2	63.6	
$L_{eq}$ (@ 225 feet from the source)	2	72.1	
$L_{eq}$ (@ 125 feet from the source)	1	77.2	80
<b>Idle</b>	10	60.7	
<b>Total Arrival/Departure</b>	15	68.3	70
<b><math>L_{eq}</math> Hourly (Arrival/Departure)</b>	60	65.4	65
SOURCE:    EIP Associates 2005			

The noise levels experienced by boats at the end of Dock 11 (worst case: within 75 feet of the ferry route and 150 feet from the ferry during idling) would not experience noise levels above the standards established in the noise ordinance with implementation of the proposed ferry terminal. An instantaneous ferry pass-by noise ( $L_{max}$  at 75 feet) of 81.6 would not exceed the noise ordinance level of 85 dBA. The total length of

ferry arrival/departure time would be fifteen minutes, and have a noise exposure level of 69.4 dBA this would not exceed the limits of the noise ordinance of 70 dBA.

The 2003 WTA PEIR established that there would be no adverse impacts for residential uses along the shoreline when a ferry-to-shoreline distance of 130 feet was maintained. For terminal approach and departure safety, the ferry boat would not be operating at full service speed within 130 feet of the terminal. Therefore, no noise impacts would occur to residents that could be living along the shoreline near the terminal. In addition, as shown in Table 3.4-2 above, at a distance of 4,922 feet (or two-thirds of a mile) the maximum noise level ( $L_{max}$ ) would be below detectable levels at the shoreline. This distance corresponds to the recommended distance from shore identified in the 2003 WTA PEIR to minimize wake wash impacts.

The noise levels experienced by the live-aboard residents would be greatest for live-aboards near the end of the docks along the ferry route (Docks 11, 12, 13, and 14) and the slips that are farther from the end of the dock (closer to shore) would experience reduced noise levels due to the noise attenuation with distance. In addition, noise levels would be greater for live-aboards on Dock 11 (closest to the terminal dock) from the noise associated with the idling of the ferry boat while docked.

These calculations were completed using a conservative noise estimate with ferry noise emissions using full power during arrival and departure, and an idling noise measurement from a 300-passenger boat. Since the noise levels represented in Table 3.4-4 did not exceed the noise standards using the conservative estimates, and since the noise levels would be less at a no wake speed and the idling noise for a smaller (149-passenger boat) would be less than that for the 300-passenger boat, there would be no adverse noise impacts associated with operation of the ferries in the Marina to the existing residential live-aboards.

The City's East of 101 Area Plan also specifies a limit for the average noise level from new development to be less than 60 dBA at the nearest open or recreational space. The shoreline and Marina are considered to be recreational space as it is used for various recreational activities and also contains the San Francisco Bay Trail. Table 3.4-5 shows calculations of potential noise levels experienced by a person at the shoreline, approximately 600 feet from the ferry route in the Marina and approximately 500 feet from the boat during idling. The  $L_{eq}$  hourly is below the City's noise limit standards. Therefore the impacts to recreational users of the Marina would be minimal.

**Table 3.4-5 Noise Calculations for Ferry Arrival and Departure at the Shoreline**

Noise Source	Duration (min)	$L_{eq}$ (dBA)	City Standard (dBA)
Approach and Departure at 600 feet ( $L_{max}$ )	5	63.9	
Idle	10	54.6	
Total Arrival/Departure	15	60	
$L_{eq}$ Hourly (2 arrival/departures)	60	52.9	60

SOURCE: EIP Associates 2005

**CEQA Conclusion:** The potentially significant impact on residential uses along the shoreline would be reduced to less than significant with compliance with the ferry-to-shoreline distance of 130 feet as established by the 2003 WTA PEIR.

Threshold	Would the project expose persons to or generate excessive groundborne vibration or groundborne noise levels?
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**Impact 3.4-3                    Implementation of the proposed project would not expose persons to or generate excessive groundborne vibration or groundborne noise levels.**

Groundborne vibration is caused when vibrating objects come in contact with the ground. Ferry vibrations would not be in contact with ground surfaces and would therefore not create a source of groundborne vibration to sensitive receptors.

The new bus terminal in the parking lot would involve rubber tire buses which could cause groundborne vibrations if there is an uneven road surface such as a speed bump or a pot hole. The nearest onshore receptor to the bus route along Marina Boulevard would be the yacht club in the Marina and the Inn at Oyster Point located near the intersection of Oyster Point Boulevard and Marina Boulevard. The yacht club would not be considered a sensitive receptor but the Inn would be a Category 2 land use as defined by the FTA. In the event of an uneven surface along the bus route, a distance of 50 feet from the edge of the road would not result in adverse impacts associated with groundborne vibration.

Construction activities associated with the proposed ferry terminal would require the use of heavy equipment and trucks which are a common source of groundborne vibration. The construction of pilings for the terminal dock would also create groundborne vibrations. The nearest sensitive receptors to the construction activities are water-based live-aboards and would not be subject to groundborne vibrations.

**CEQA Conclusion:** The potentially significant impact on persons by excessive groundborne vibration or groundborne noise levels would be minimal as the Inn at Oyster Point building is located more than 50 feet from the edge of Marina Boulevard. The nearest sensitive receptors to the construction activities are water-based live-aboards and would not be subject to groundborne vibrations. This would be a less than significant impact. No mitigation would be required.

Threshold	Would the project cause substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?
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**Impact 3.4-4                    Implementation of the project would not cause a substantial permanent increase in ambient noise in the project vicinity.**

As shown above in Table 3.4-5, Noise Calculations for Ferry Arrival and Departure at the Shoreline, the ambient hourly  $L_{eq}$  during the operating hours of the ferry would be equal to 53 dBA which is the existing background level at the project site. Although the ambient noise levels inside the Marina would increase, it

would not cause an increase above the City's noise standards. The ferry noise sources would not be substantially higher than the current airport pass-bys, which have been reported by the City's General Plan to be in the vicinity of 84 dBA for areas north of Oyster Point Boulevard.

**CEQA Conclusion:** As the noise level of a pass-by of a ferry is substantially less than the estimated pass-by of an airplane and there is no increase in the hourly  $L_{eq}$  the impact to the ambient noise levels would be considered less than significant. No mitigation would be required.

Threshold	Would the project cause substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?
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**Impact 3.4-5      Implementation of the project would cause substantial temporary increases in ambient noise in the project vicinity during project construction.**

Construction of the proposed project would result in temporary increases in noise in the vicinity of the project due to construction. Primary noise-generating activities would include site development and construction of dock pilings. Vehicle traffic traveling to and from the construction area may also affect noise in the area. Sound levels created by construction equipment vary depending on the type of construction equipment, the operation being performed, and the condition of the equipment. The received sound level depends on the distance between the activity and noise-sensitive receivers and whether local barriers and topography provide shielding effects.

Table 12-1 in the FTA Transit Noise and Vibration Impact Assessment lists typical noise levels for construction equipment at 50 feet from the source. The list ranges from 74 dBA for a roller to 101 dBA for a pile driver during impact. The minimum noise level listed at 74 dBA at 50 feet would result in a noise level of 80 dBA at 25 feet. Equipment or combinations of equipment that would result in a noise level greater than 84 dBA at 50 feet would exceed the construction noise level exemption of 90 dBA at 25 feet.

Pile driving at the site would have the greatest instantaneous noise level and Table 3.4-6 shows the noise attenuation rate of pile driving from the project site. The minimum distance for the nearest residential live-aboard would be approximately 150 feet and would be equal to approximately 91.5 dBA. This would be in excess of the City's construction exemption standard of 90 dBA at 25 feet and above the City's instantaneous noise level standard for the Marina of 85 dBA. The noise level would reach attenuation below the City noise level standard of 85 dBA at approximately 315 feet from the noise source.

<i>Distance to Receptor (feet)</i>	<i>Sound Level at Receptor (dBA)</i>
50	101
100	95
200	89
500	81
1000	75
2000	69
5000	61

SOURCE: EIP Associates 2005

The project would result in noise levels to receptors above the City’s noise level standards. Implementation of MM 3.4-5(a)–(d) below would reduce the impacts of the project by minimizing the impacts to affected residents.

*MM 3.4-5(a) Notification of nearby property owners and Marina residents of project construction before construction begins. A notification packet will be sent to property owners identifying intended construction schedule, duration of noise-generating construction activities, and a telephone number hotline to use for communicating noise complaints.*

*MM 3.4-5(b) Use appropriate sound-control devices on construction equipment no less effective than those provided by the manufacturer. All equipment will be maintained to minimize noise generation and no equipment will have unmuffled exhausts.*

*MM 3.4-5(c) To minimize effects of pile driving on nearby residents, WTA will restrict pile driving to between the hours of 8:00 A.M. and 5:00 P.M. to ensure that driving occurs when residents are more likely to be away from home or able to leave if necessary to avoid noise effects.*

*MM 3.4-5(d) The WTA will ensure the contractor will use the best available technology to minimize noise from pile driving.*

**CEQA Conclusion:** The potentially significant impact related to ambient noise in the project vicinity during project construction would be reduced to less than significant with implementation of mitigation measures MM 3.4-5(a) through MM 3.4-5(d).

Threshold	Would the project expose residents and noise-sensitive land use to “impacts” as defined by the Federal Transit Administration?
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**Impact 3.4-6 Implementation of the proposed project would result in a severe impact as defined by the Federal Transit Administration.**

The three categories that the FTA identifies as sensitive land use are used to identify areas where people are likely to be annoyed by an increase in noise levels. Category 2 identifies land uses where people would be sleeping. While the Marina is identified as a commercial use in the City's General Plan and is also identified as a commercial land use for the purposes of the noise ordinance, under FTA guidelines, the area where the residential live-aboards are located would be considered a sensitive use and subject to stricter noise standards.

Under the FTA guidelines, for an area with an existing ambient noise level of 53 dBA and an  $L_{dn}$  of approximately 57.8 dBA, the criteria for a severe impact in a Category 2 area would be a noise level that exceeds 62 dBA  $L_{dn}$ .

Using the assumptions above, that the ferries would have an arrival/departure approximately twice per hour during the morning and evening commute hours (7:00am – 9:00am and 4:00pm – 6:00pm), the estimated  $L_{dn}$  at the closest live-aboard (end of Dock 11) would be approximately 60.6 dBA. Under these conditions, the  $L_{dn}$  for the closest residential live-aboard would not exceed the FTA criteria.

As the calculation of the ferry noise emissions was also completed using the conservative estimates described above for ferries at full service speed and an idling measurement of a 300-passenger boat, the actual experienced noise level at that distance would also be below the FTA severe impact level.

**CEQA Conclusion:** Because the  $L_{eq}$  hourly of shoreline receptors would be 53 dBA as shown above in Table 3.4-5 and would be equal to the existing ambient noise level, the impact from noise associated with the project would be less than significant. No mitigation would be required.

Threshold	Would the project expose terrestrial wildlife to 60 A-weighted dB Community Noise Equivalent Level (or greater) per the U.S. Fish and Wildlife Service?
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**Impact 3.4-7                      Implementation of the project would not expose terrestrial wildlife to sound levels greater than 60 dBA CNEL.**

As shown in Table 3.4-5, the closest terrestrial wildlife to the project site would be on the shoreline, about 500 feet from a docked ferry. The associated hourly  $L_{eq}$  would be 53 dBA which is equivalent to the existing ambient noise level at the project site. The project would not result in an increase in noise levels at the shoreline. In addition, as shown in Section 3.1 (Biological Resources), there is no sensitive habitat surrounding the project site which would hold sensitive or endangered species.

**CEQA Conclusion:** The impact of sound levels from the project on terrestrial wildlife would be less than significant. No mitigation would be required.

Threshold	Would the project expose aquatic wildlife to underwater sound pressure levels at or above 160 dB, the National Marine Fisheries Service?
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**Impact 3.4-8      Implementation of the project would potentially expose aquatic wildlife to underwater sound pressure levels at or above 160 dB during construction of the terminal.**

As discussed in Section 3.1 (Biological Resources), project construction would include the installation of pilings for the fixed pier. The installation of piles into the substrate would require the driving of piles with equipment which can result in large amounts of noise. Increased underwater sound pressure levels above 180 dB (referenced at 1  $\mu$ Pa) have been known to cause injury and death in fish. The criteria for determining significance is if the underwater pressure level exceeds 160 dB (referenced at 1  $\mu$ Pa), according to the National Marine Fisheries Service.

As the method for construction of the pilings is not known and the number of pilings necessary for construction of the dock has not been determined, the impacts to aquatic wildlife in the area surrounding the construction are considered potentially adverse.

Mitigation measure MM 3.1-8 identified in Section 3.1 (Biological Resources) to reduce the effects of pile driving and the associated sound levels in the surrounding waters would reduce this impact. The measures would reduce the underwater sound levels by reducing the number of piles installed, using equipment that produces less sound pressure, construction timing, or creating an air barrier to reduce the contact of the piles with the surrounding waters.

**Impact 3.4-9      Implementation of the project would not expose aquatic wildlife to underwater sound pressure levels at or above 160 dB during operation of the ferry.**

Impacts associated with operation of the ferry vessels were shown in the 2003 WTA PEIR to be minimal for marine mammals at a distance of 7 meters from the passing ferry. The worst-case estimate of sound pressure levels from a fast ferry during operation was 177 dB (referenced at 1  $\mu$ Pa) at 1 meter. At a distance of 7 meters, the sound levels would be at approximately 160 dB. It is unlikely that a marine mammal would be closer than 7 meters from a ferry in normal operation due to the high speed of the vessel

**CEQA Conclusion:** The impact of the project on marine mammals would be less than significant as the marine mammals would not be exposed to underwater noise levels at a significant level. No mitigation would be required.

### 3.4.4 REFERENCES

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