

3.13 NOISE

This section describes existing environmental conditions related to noise and vibration in the area surrounding Buena Vista Lagoon and the beach, nearshore, and offshore locations identified for materials disposal/reuse. Pertinent policies and regulations in these project areas are summarized here but described in more detail in Appendix B. Impacts associated with implementation of lagoon enhancement are disclosed for all alternatives. Baseline conditions in this section are based on site-specific data collected in 2014 as well as information referenced from the 2012 RBSP EA/Final EIR (SANDAG 2011) for materials placement sites. These sites are located along the coastline and noise conditions are primarily affected by wave action, which is relatively consistent over time and therefore remains valid for this analysis.

3.13.1 EXISTING CONDITIONS

Noise

Sound is a vibratory disturbance created by a moving or vibrating source that is capable of being detected by the hearing organs. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and, in the extreme, hearing impairment.

In its most basic form, a continuous sound can be described by its frequency or wavelength (pitch) and its amplitude (loudness). Frequency is expressed in cycles per second, or hertz. Frequencies are heard as the pitch or tone of sound. High-pitched sounds produce high frequencies; low-pitched sounds produce low frequencies. The amplitude of pressure waves generated by a sound source determines the loudness of that source, typically expressed as sound-pressure levels, described in units of decibels (dB).

The human ear is not equally sensitive to all frequencies within the sound spectrum. To accommodate this, the A-scale, which approximates the frequency response of the average young ear when listening to most everyday sounds, was devised. When people make relative judgments of the loudness or annoyance of a sound, their judgments correlate with the A-scale sound levels of those sounds. Therefore, the “A-weighted” noise scale is used for measurements and standards involving the human perception of noise. Noise levels using A-weighted measurements are written dB(A) or dBA.

Decibels are measured on a logarithmic scale that quantifies sound intensity in a manner similar to the Richter scale used for earthquake magnitudes. Thus, a doubling of the energy of a noise source, such as a doubling of traffic volume, would increase the noise level by 3 dB; a halving of

the energy would result in a 3 dB decrease. It is widely accepted that the trained ear, however, can barely perceive noise level changes of 3 dBA (Caltrans 2009).

Table 3.13-1 shows the relationship of various noise levels to commonly experienced noise events.

**Table 3.13-1
Typical Noise Levels**

| Common Outdoor Activities | Noise Level (dBA) | Common Indoor Activities |
|-----------------------------------|-------------------|--|
| | — 110 — | Rock band |
| Jet fly-over at 1000 feet | — 100 — | |
| Gas lawn mower at 3 feet | — 90 — | |
| Diesel truck at 50 feet at 50 mph | — 80 — | Food blender at 3 feet Garbage disposal at 3 feet |
| Noisy urban area, daytime | — 70 — | Vacuum cleaner at 10 feet Normal speech at 3 feet |
| Gas lawn mower, 100 feet | — 60 — | |
| Commercial area | — 50 — | Large business office Dishwasher next room |
| Heavy traffic at 300 feet | — 40 — | Theater, large conference room (background) |
| Quiet urban daytime | — 30 — | Library Bedroom at night |
| Quiet urban nighttime | — 20 — | |
| Quiet suburban nighttime | — 10 — | Broadcast/recording studio |
| Quiet rural nighttime | — 0 — | |
| Lowest threshold of human hearing | — 0 — | Lowest threshold of human hearing |

Source: Caltrans 2009

Noise Descriptors

Several rating scales (or noise “metrics”) exist to analyze adverse effects of noise on a community. These scales include the equivalent noise level (L_{eq}), the day/night average sound level (DNL or L_{dn}), and the community noise equivalent level (CNEL). Average noise levels over a period of minutes or hours are usually expressed as dBA L_{eq} , meaning the equivalent noise level for that period of time. The period of time averaging may be specified; $L_{eq(8)}$ would be a 8-hour average. When no period of time is specified, a 1-hour average is assumed. It is important to understand that noise of short duration, that is, time substantially less than the averaging period, is averaged into ambient noise during the averaging period. Thus, a loud noise lasting many seconds or a few minutes may have minimal effect on the measured sound level averaged over a 1-hour period. To evaluate community noise impacts, the descriptor (CNEL)

was developed to account for human sensitivity to nighttime noise. CNEL represents the 24-hour average sound level, with a 5 dB penalty for noise occurring during the evening and a 10 dB penalty for noise occurring at night.

Noise-Sensitive Receptors

Noise-sensitive receptors are generally considered humans engaged in activities, or utilizing land uses, that may be subject to stress of substantial interference from noise. Activities usually associated with sensitive receptors include, but are not limited to, studying, convalescence, and sleeping. Land uses often associated with sensitive receptors include residential dwellings, hotels and motels, hospitals, nursing residences, education facilities, and libraries.

The noise-sensitive uses (primarily residences) that would be located in proximity to construction activities from the implementation of the Enhancement Project are located near the lagoon basins west and southeast of I-5, and adjacent to the materials placement sites (i.e., nearby beaches). In addition to residences, there are several schools (Army/Navy Academy, Academy by the Sea/Camp Pacific) and churches (North Coast United Methodist Church, Oceanside United Reform Church) located within proximity (approximately ¼ mile) of the lagoon.

Vibration

Vibration is the periodic oscillation of a medium or object with respect to a given reference point. Sources of vibration include natural phenomena (e.g., earthquakes, volcanic eruptions, ocean waves, landslides), and those introduced by human activity (e.g., explosions, machinery, traffic, trains, construction equipment). Typical outdoor human sources of perceptible vibration are construction equipment, train wheels, and traffic on rough roads. Construction activity can also result in varying degrees of groundborne vibration, depending on the type of equipment, methods employed, and site geology. Vibration sources may be continuous, (e.g., operating factory machinery) or transient in nature (e.g., explosions). Vibration levels are depicted in terms of amplitude and frequency relative to displacement, velocity, or acceleration.

Vibration amplitudes are commonly expressed as peak particle velocity (PPV) or root-mean-square (RMS) vibration velocity in inches per second (in/sec). PPV is typically used in the monitoring of the stresses experienced by buildings. Although the effects of vibration may be imperceptible at low levels, moderate and high levels of vibration may be detectible and produce damage to nearby buildings (e.g., loosening and cracking of plaster or stucco coatings). Similar to airborne sound, vibration velocity can be expressed in decibel notation as vibration level (VdB). The range of vibration that is relevant to this analysis occurs from approximately 50 VdB

(the typical background vibration level) to 100 VdB (the general threshold where minor damage can occur to fragile buildings) (FTA 2006).

Although PPV is appropriate for evaluating the potential for building damage, it is not always suitable for evaluating human response to vibration. The response of the human body to vibration relates well to average vibration amplitude. Therefore, vibration impacts on humans are evaluated in terms of RMS vibration velocity. The background vibration velocity level in residential areas is usually 50 VdB or lower, which is well below the threshold of perception for humans of approximately 65 VdB.

Vibration-sensitive receptors are generally considered humans engaged in activities, or utilizing land uses, that may be subject to substantial interference from vibration. Activities and land uses often associated with vibration-sensitive receptors (i.e., structural damage and human annoyance) can be similar to those associated with noise-sensitive receptors.

Existing Noise Environment

The existing noise environment in the vicinity of the project site is influenced primarily by roadway noise emanating from vehicular traffic on I-5, SR 78, Jefferson Street, Carlsbad Boulevard, and other local roadways within the residential areas; periodic passenger and freight train traffic; and ocean waves breaking on nearby beaches. Noise is considered for two noise environments: Buena Vista Lagoon and the materials placement sites (i.e., nearby beaches in Oceanside and North Carlsbad).

Buena Vista Lagoon

The lagoon area is surrounded by a predominantly urban/suburban environment. The primary noise source within the area is transportation noise (vehicular traffic on I-5, Coast Highway 101/Carlsbad Boulevard, and local roadways; passenger and freight railroad traffic; and aircraft over-flights). Other adjacent land uses that generate noise include retail shopping and bars/restaurants, and commercial and residential landscape maintenance. Vehicles traveling on local roadways, landscaping equipment, and recreational activities generate noise levels that typically range from approximately 55 to 90 dBA at 50 feet from the source.

As part of the Draft General Plan Update EIR, the City of Carlsbad has prepared existing noise contours (ranging from 60 to 70 dBA CNEL) for major roadways within the City (Carlsbad 2014g). Table 3.13-2 summarizes existing average 24-hour traffic noise levels (in dBA CNEL) along major roadways in the vicinity of the project site.

**Table 3.13-2
Traffic Noise Contours – Existing Conditions**

| Roadway | Roadway Segment | Existing CNEL at 100 feet from Streets; 200 feet from I-5 (dBA) | Distance to Contours, feet | | |
|---------------|--|---|----------------------------|-------------|-------------|
| | | | 70 dBA CNEL | 65 dBA CNEL | 60 dBA CNEL |
| Carlsbad Blvd | North of Carlsbad Village Drive | 62 | 20 | 50 | 140 |
| I-5 | Las Flores Dr. to Carlsbad Village Dr. | 79 | 710 | 980 | 1,360 |
| SR 78 | I-5 to Jefferson Street | 77 | 570 | 800 | 1,100 |
| Marron Road | West of El Camino Real | 69 | 90 | 200 | 330 |

Source: Carlsbad 2014g

As shown in Table 3.13-2, the location of the 60 dBA CNEL contour ranges from 140 to 1,360 feet from the centerline of these major roadways. Up to 60 dBA CNEL is typically considered acceptable in residential environments.

In addition to vehicle traffic, the NCTD rail line, which is adjacent to Carlsbad Boulevard in the west part of Buena Vista Lagoon, generates heavy rail noise from BNSF Railway freight trains, Amtrak passenger trains, and NCTD commuter trains. Existing 24-hour average noise levels at sensitive receptors adjacent to the rail line exceed 70 dBA CNEL due to day-night rail activities.

To document the existing ambient noise levels, short-term daytime noise measurements were taken on August 21 and 22, 2014, around the lagoon near proposed construction activity and noise-sensitive receptors (i.e., residences). Six short-term (ST) daytime noise measurements (15-minute duration) were taken in accordance with applicable American National Standards Institute (ANSI) standards using a Larson-Davis Model 820 sound level meter. A 15-minute measurement is considered a “snapshot” of the average noise level (L_{eq}) at a given time; the sound level may vary depending on time, day, or season. Noise measurement locations are shown in Figure 3.13-1, and the corresponding equivalent hourly average (L_{eq}) and maximum (L_{max}) ambient noise levels are shown in Table 3.13-3.

As shown in Table 3.13-3, the primary noise sources included local and distant vehicle traffic, and natural sources (wind, birds, sea waves, etc.). Vehicle traffic noise on I-5 and Carlsbad Boulevard dominated the ambient noise environment. Average daytime hourly noise levels documented by the short-term measurements range from approximately 48 to 67 dBA L_{eq} , with maximum noise levels from 63 to 88 dBA (L_{max}). The noise measurement at location ST-05 included rail line noise from a passing train, which accounted for the maximum noise level of 88 dBA (L_{max}). Noise monitoring field data sheets are included in Appendix J.

**Table 3.13-3
Ambient Noise Measurements – Buena Vista Lagoon**

| Measurement Number | General Location | Date | L _{eq} (dBA) | L _{max} (dBA) | Noise Sources |
|--------------------|---|-----------|-----------------------|------------------------|---|
| ST-01 | City of Oceanside, commercial area north of SR 78 | 8/21/2014 | 67 | 77 | Vehicular traffic on I-5, SR 78, and local roads. |
| ST-02 | City of Carlsbad, along Jefferson St near lagoon and residences | 8/21/2014 | 62 | 74 | Vehicular traffic on Jefferson St and Marron Rd; wind rustling tree leaves. |
| ST-03 | City of Oceanside, at residences near lagoon along Coast Hwy | 8/21/2014 | 48 | 63 | Distant vehicular traffic on Carlsbad Blvd; wind rustling tree leaves. |
| ST-04 | City of Oceanside, near residences along Coast Hwy near Audubon Nature Center | 8/21/2014 | 62 | 80 | Vehicular traffic on Carlsbad Blvd. |
| ST-05 | City of Oceanside, along Coast Hwy, near railroad | 8/22/2014 | 61 | 88 | Vehicular traffic on Coast Hwy/Carlsbad Blvd; train horns, and wind rustling tree leaves. |
| ST-06 | City of Oceanside, near beach residences along existing channel/weir | 8/22/2014 | 54 | 64 | Ocean breeze and crashing waves. |

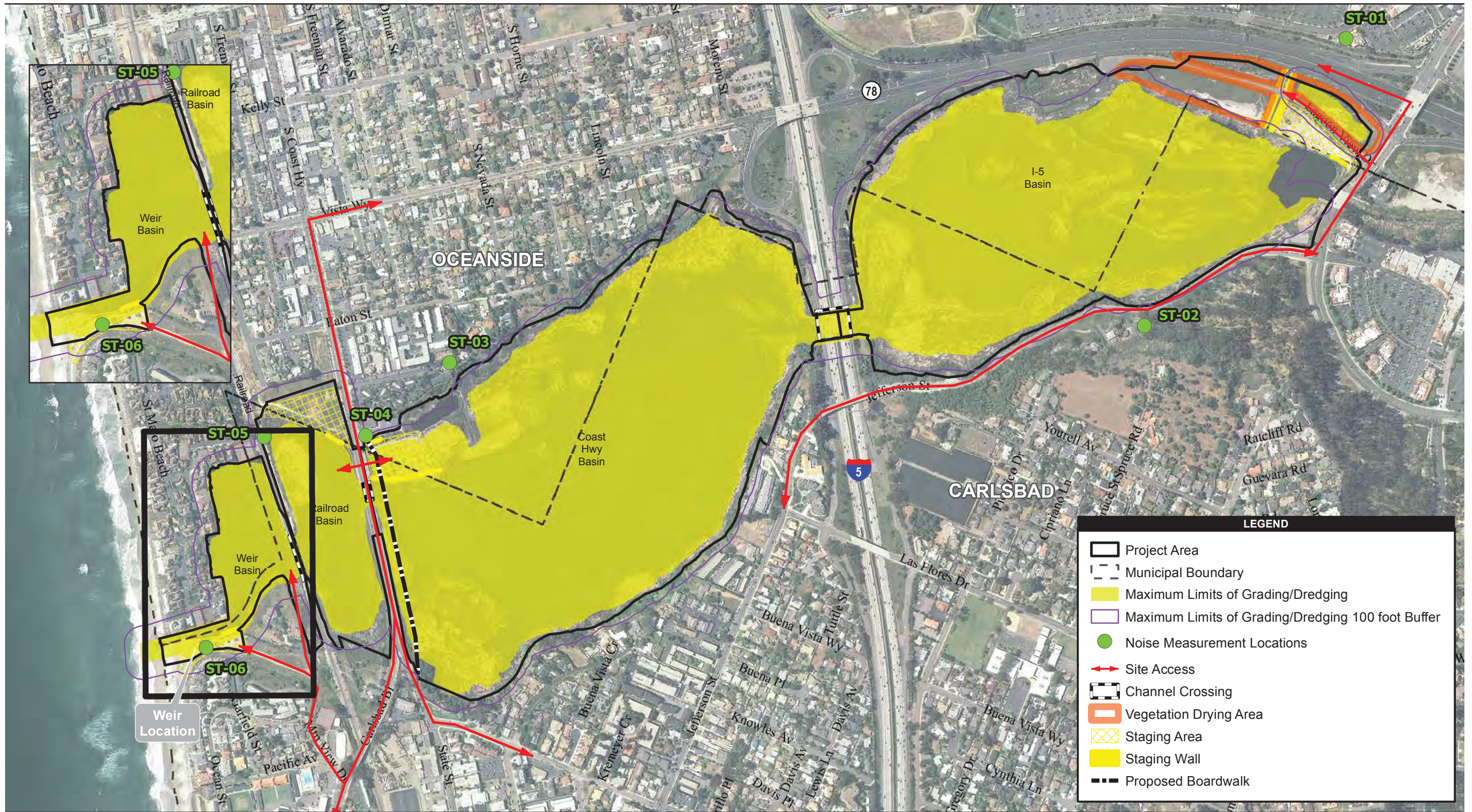
Notes: dBA = A-weighted decibels; L_{eq} = equivalent noise level; L_{max} = maximum instantaneous noise level during a specific period of time; ST= Short Term

Source: Data compiled by AECOM in 2014

Materials Disposal/Reuse

Ambient noise measurements previously taken in support of the 2012 RBSP (SANDAG 2011) are representative for each of the proposed onshore materials placement sites. The principal source of noise at onshore materials placement sites is surf activity of the ocean, primarily breaking waves and the interaction of water, rocks, and sand in the surf area. Noise levels vary with the tide, wave height, and sand-rock composition, but in general onshore materials placement sites have relatively high background noise levels due to constant surf activity. This is typical of a beach environment. The proposed beach placement sites are also open to the public and have frequent recreational users and special events that generate noise, particularly during the warmer months. At night, noise generated by people using the beach decreases, but the primary source of noise from wave activity continues at the same levels as during the daytime. The measured noise levels, and additional noise sources associated with the individual materials placement sites, are described in Table 3.13-4. Figure 2-10 illustrates the materials placement sites relative to adjacent coastal land uses.

Noise sources in the vicinity of offshore materials placement sites are primarily weather- and ocean-related but can also include aircraft over-flights, and military, commercial, and pleasure-related boating activities.



SANDAG 2012; Sangis 2014; Everest 2014; AECOM 2014

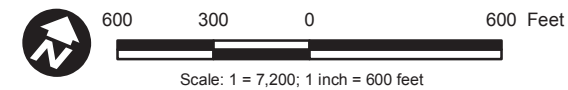


Figure 3.13-1
Noise Conditions

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**Table 3.13-4
Existing Noise Environment at the Materials Placement Sites**

| Materials Placement Site | Noise Sources | Ambient Noise Level (L_{eq}) | Nearby Sensitive Noise Receptors |
|---------------------------------|---|---|---|
| Oceanside | Ocean wave noise, residential and commercial landscape equipment, vehicular traffic on the local arterial system, highways, and freeways; rail noise and aircraft over-flights. | Beach – 69 dBA L_{eq} . Residences above the beach – 62 to 63 dBA L_{eq} (nighttime). Materials placement site location 25 feet west of the bluff – 69 dBA L_{eq} . | Single- and multi-family residences east of the beach and riprap slope, with 5- to 10-foot setbacks, and facing South Pacific Street south of Buccaneer Beach Park, elevated approximately 20 feet above the residences to the west, thus providing partial views to the beach. |
| North Carlsbad | Ocean wave noise, residential landscape equipment, vehicular traffic on the local arterial system, highways, and freeways; rail noise and aircraft over-flights. | Beach – 69 dBA L_{eq} . Nighttime noise at residences close to the beach – 68 to 69 dBA L_{eq} . | Single- and multi-family residences adjacent to the north end of the beach. The east façades of these residences front Ocean Street. The Army and Navy Academy school is also adjacent to the beach south of Pacific Avenue. |

Source: SANDAG 2011

Noise and Vibration Regulations

The relevant noise and vibration policies and regulations applicable to the Enhancement Project are discussed within this section. Key information for the Cities of Carlsbad and Oceanside is summarized below. A full description of the regulatory setting for this document can be found in Appendix B. The following laws, regulations, policies, and plans are applicable to this resource area:

- Federal Transportation Administration (FTA) Vibration Guidance
- Noise Control Act of 1972
- California Code of Regulations Title 24
- California Department of Transportation (Caltrans) Vibration Guidance
- City of Carlsbad, Municipal Code, Section 8.48.010 Noise
- City of Carlsbad, General Plan, Noise Element
- City of Oceanside, Municipal Code, Chapter 38 Noise Control
- City of Oceanside, General Plan, Noise Element
- City of Oceanside, Grading Ordinance

Noise Regulations

Federal and state noise regulations have been established to protect public health and safety and prevent disruption of various human activities. The EPA Office of Noise Abatement and Control

issued the federal Noise Control Act of 1972, which established programs and guidelines to identify and address the effects of noise on public health and welfare and the environment. However, EPA transferred responsibilities for regulating noise control policies from the federal government to state and local governments.

Title 24 of the CCR (i.e., the California Building Standards Code) provides acoustical regulations for exterior-to-interior sound insulation. Title 24 regulations require that interior noise levels generated by exterior noise sources shall not exceed 45 dB L_{dn} , with windows closed, in any habitable room for residential uses.

Local jurisdictions have established criteria to regulate noise through the development of general plan noise elements and noise ordinances, which are generally intended to promote and/or protect the public health and comfort of residents. Generally, activities conducted in compliance with local noise ordinances would not result in significant impacts. Noise ordinances can restrict both overall noise levels generated, as well as hours of specific activities, regardless of noise generated. If an activity operates outside of the limits set by ordinances, a noise variance or exemption can be granted by the jurisdiction, particularly if the project is in the interest of the public and provides a public benefit. If not granted, activities can only proceed in compliance with the ordinance.

City of Carlsbad

Construction hours limitations. Section 8.48.010 Noise, of the City's Municipal Code, limits allowable construction hours but does not limit construction noise levels. Construction activities are allowed to occur Monday through Friday between the hours of 7 a.m. to 6 p.m. and on Saturdays from 8 a.m. to 6 p.m., and are not allowed all day on Sunday and any federal holidays, with exceptions to the limits on the hours of construction, including for projects that are "in the interest of the general public," as discussed in detail below.

Exemptions. "The building official, city engineer, or other official designated by the city manager may modify the hours of construction specified in Section 8.48.010. In making a determination to lengthen or shorten the hours of construction, the city official shall consider the following:

- a. Whether the project is an emergency repair required to protect the health and safety of any member of the community;
- b. Whether the construction would be less objectionable at night than during daylight hours;
- c. The character and nature of the neighborhood in the vicinity of the work site;

- d. The potential for great economic hardship;
- e. If the work is in the interest of the general public;
- f. Whether there is a previously unforeseen effect on the health, safety or welfare of the public; and
- g. Any history of complaints regarding compliance with the limitation on hours of construction.

(Carlsbad 2014h)

City of Oceanside

The City's General Plan Noise Element prohibits construction noise in excess of 85 dB at 100 feet from the source of noise, and prohibits construction activities between 6:00 p.m. and 7:00 a.m. when such activities exceed the existing ambient noise level by 5 dB or more. The Noise Element also indicates that a special permit may be granted to extend construction hours by the Director of Public Works if "extenuating circumstances exist" (Oceanside 1974).

Chapter 38 Noise Control, of the Oceanside Municipal Code limits operational noise, as 1-hour average sound levels (dBA L_{eq}) depending on the zoning district and time of day. The sound level limit applies at any point on or beyond the boundary of the property on which the sound is produced. The sound level limit at a location on a boundary between two zoning districts is the arithmetic mean of the respective limits for the two zones. Section 38.15 indicates that exceptions to the noise limits can be granted for construction, maintenance, or other public improvement activities by government agencies or public utilities by the city manager or designee. The noise limits for various zones are summarized in Table 3.13-5.

Table 3.13-5
Maximum Allowable 1-Hour Average Sound Level (dBA L_{eq})

| Zone | 7:00 a.m. to 9:59 p.m. | 10:00 p.m. to 6:59 a.m. |
|---|-----------------------------------|------------------------------------|
| Residential (Residential Estate, Residential Single Family, Residential Medium Density) | 50 | 45 |
| Residential (Residential High Density, Residential Tourist) | 55 | 50 |
| Commercial | 65 | 60 |
| Industrial | 70 | 65 |
| Downtown | 65 | 55 |
| Agricultural | 50 | 45 |
| Open Space | 50 | 45 |

Notes: dB = A-weighted decibel.

Source: Oceanside 2008

Section 38.15 Exemptions for construction, maintenance or other public improvement activities by government agencies or public utilities.

“Notwithstanding anything in this chapter (38 Noise Control) to the contrary, the city manager, or the manager's designee, on a case-by-case basis, may authorize construction, maintenance or other public improvement activities by a government agency or a public utility, that exceed the noise, duration or hour of work limits established by this chapter, upon a determination that the authorization furthers the public interest.” (Oceanside 2008)

The City's Grading Ordinance (Ordinance No. 81-20) states that grading and equipment operations within ½ mile of a structure used for human occupancy can only be conducted Monday through Friday between the hours of 7:00 a.m. to 6:00 p.m. Further, the noise levels associated with any construction equipment should not exceed 85 dB at a distance of 100 feet (Oceanside 1974).

Vibration Regulations

There are no specific regulations for vibration from the Cities of Carlsbad or Oceanside. The Federal Transit Administration (FTA) provides guidance for analysis of groundborne noise and vibration related to transportation and construction-induced vibration. The Enhancement Project is not subject to FTA; however, these FTA guidelines serve as a useful tool to evaluate vibration impacts. With respect to human response within residential uses (e.g., annoyance, sleep disruption), FTA recommends a maximum acceptable vibration standard of 80 VdB (FTA 2006).

Caltrans also provides guidance for analysis of groundborne noise and vibration. The Enhancement Project is not subject to Caltrans regulations; however, these guidelines serve as another useful tool to evaluate vibration impacts. Caltrans guidelines recommend that a standard of 0.2 in/sec PPV not be exceeded for the protection of normal residential buildings, and that 0.08 in/sec PPV not be exceeded for the protection of old or historically significant structures (Caltrans 2004).

3.13.2 SIGNIFICANCE CRITERIA

A significant impact to noise would occur if implementation of the Enhancement Project would result in any of the following:

- A. Expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies;
- B. Expose persons to or generate excessive groundborne vibration or ground borne noise levels;

- C. Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project; and
- D. Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

The criteria above are as provided in the CEQA Guidelines, Appendix G, Noise.

3.13.3 IMPACT ANALYSIS

The Enhancement Project is enhancement of the lagoon (various habitat types), infrastructure modifications to existing features, and construction of the Boardwalk parallel to, and east of, existing Carlsbad Boulevard. The project does not involve construction of new permanent structures that would generate noise. Rather, project noise would be generated by activities primarily during the project's multi-year construction period. Post-construction, periodic maintenance activities would be the only long-term potential for operational noise, which would vary by project alternative. Most elements of construction would occur during daylight hours, but dredging activities could occur anytime within a 24-hour period on any day of the week (24/7).

The lagoon noise analysis is generally structured around the type of noise-generating construction activity, then tied to a significance threshold. Thus, the various types of construction activities (materials import/export, staging areas, and lagoon dredging) are considered relative to the standards of the local jurisdictions for daytime and nighttime operations (Criterion A); temporary changes to ambient noise levels with and without the project (Criterion D) are also considered. Vibration and permanent noise are addressed holistically instead of by construction activity type (Criteria B and C).

The materials disposal/reuse analysis reflects both materials transport and placement during enhancement, varying between 562,000 and 833,000 cy, and as part of post-construction maintenance (27,000 cy for the Saltwater and Hybrid Alternatives only). Under the Freshwater Alternative, sediment removal is anticipated to occur every 25 years on average to maintain open water areas and hydraulic capacity of the lagoon, but sediment rates and patterns are difficult to predict in the watershed and that frequency is speculative. Therefore, the Enhancement Project does not assume additional sediment removal as part of this environmental analysis. The noise impact would be temporary and short term.

The following impact analysis is provided in two main parts: Lagoon Enhancement and Materials Disposal/Reuse. Lagoon Enhancement is further subdivided as follows:

- Materials Import/Export on Existing Streets (Daytime Activities, workers and materials)
- Staging Areas/Construction Equipment (Daytime Activities, excludes dredging)
- Dredging within Buena Vista Lagoon (Daytime and Nighttime Activities)
- Vibration and Long-Term Maintenance (Daytime Activities)

Materials disposal is addressed as either Beach/Nearshore or Offshore placement and takes into account noise associated with traffic trips and construction equipment needed for disposal/placement activities.

Lagoon Enhancement

Freshwater Alternative

The Freshwater Alternative includes the dredging and excavation of soils from the lagoon; creation of deep (approximately -9 feet NGVD) fish areas in the northern portion of the Railroad Basin and the southwestern portion of the Coast Highway Basin; construction of the Boardwalk parallel to Carlsbad Boulevard; removal of accumulated sediment and vegetation; and replacement of the existing 50-foot weir with a new 80-foot weir.

Materials Import/Export (Daytime Activities)

Construction of the Enhancement Project would result in additional vehicle trips on the local roadway network from workers commuting and the transport of equipment and materials, including hauling vegetation off-site. Project construction traffic would access local roadways as shown in Figure 2-16, including Carlsbad Boulevard/Coast Highway, Mountain View Drive, and Jefferson Street eventually leading to I-5 and SR 78. Project trip distribution is provided in the traffic study prepared for the project (VRPA 2014; Appendix H) and discussed in Section 3.10 Traffic and Circulation.

The number of construction trips generated by the project is modest, approximately 330 daily trips, for the Freshwater Alternative and on the order of 520 trips for the Saltwater and Hybrid Alternatives. The construction trips are less for the Freshwater Alternative because there would be no changes to Carlsbad Boulevard. The traffic analysis links trip generation to basins and the basins link to likely haul routes. For example, fewer than 50 trips per day (worker vehicles and construction trucks) are estimated from the Weir Basin work and those vehicles would travel on Mountain View Drive. The current daily volume of that street is estimated at 300 trips (Section 3.10). Traffic volumes must double for the noise levels to increase by an audible 3 dB. An additional 50 trips relative to the estimated 300 trips would not reach that threshold. Under this alternative, construction traffic would be approximately 210 trips for Carlsbad Boulevard/Coast

Highway heading either north or south as compared to a volume of 13,000 to 25,000 (depending upon the segment). These additional trips would not be audible relative to existing roadway traffic. An additional 72 trips would be generated from work at the I-5 Basin onto Jefferson Street with volumes of 20,000 near SR 78 and the staging area (no nearby sensitive receptors) and 9,300 along the south side of the lagoon (sensitive receptors on the hillsides farther south). This small number of project trips would not be audible relative to existing roadway traffic.

Existing and existing plus project traffic noise levels were modeled using the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (RD-77-108) for a very conservative 500 additional one-way trips. Output data sheets are provided in Appendix J. Construction traffic could increase traffic noise levels by less than 1 dB for the studied roadway segments. This increase is imperceptible. Under the Freshwater Alternative, **the impact of construction vehicle movements on existing roadways would result in a less than significant temporary or periodic increase in ambient noise levels (Criterion D).**

The subject traffic would occur during the routine construction time period of 7 a.m. to 7 p.m. (or daytime hours). Nighttime work would be associated with dredging inside the lagoon; this is addressed separately below. Under the Freshwater Alternative, **the on-road element of construction would be consistent with applicable standards, and impacts would be less than significant (Criterion A).**

Staging Areas (Daytime Activities, Excluded Dredging)

Construction staging areas would be the concentrated locations of construction noise. Staging areas would occur in four key areas: at Lagoon View Drive, near the Nature Center (east of Carlsbad Boulevard), just west of Carlsbad Boulevard on the north side of the Railroad Basin, and near the existing weir off Mountain View Drive. Figure 3.13-1 shows the staging areas relative to sensitive noise receptors within 100 feet of the construction activity limits. As shown, the Lagoon View staging area is not located near sensitive receptors so it is not discussed further for potential noise impacts. The two staging areas on either side of Carlsbad Boulevard are in the City of Oceanside and the one off Mountain View Drive is in the City of Carlsbad.

Noise levels associated with construction equipment that may be used on the project site are presented in Table 3.13-6 (dredging equipment is discussed separately below). Construction equipment has mandatory backup alarms; therefore, equipment noise levels presented in Table 3.13-6 would be accompanied at times by backup alarm noise.

**Table 3.13-6
Noise Levels of Typical Construction Equipment**

| Equipment | Maximum Noise Level (dBA L_{max}) 50 feet from Source |
|--|--|
| All Other Equipment (5 horsepower or less) | 85 |
| Backhoe | 80 |
| Boring Jack Power Unit | 80 |
| Chain Saw | 85 |
| Compactor (ground) | 80 |
| Compressor (air) | 80 |
| Concrete Mixer Truck | 85 |
| Concrete Pump | 82 |
| Concrete Saw | 90 |
| Dozer | 85 |
| Dump Truck | 84 |
| Excavator | 85 |
| Flat Bed Truck | 84 |
| Front End Loader | 80 |
| Generator (25 KVA or less) | 70 |
| Generator (more than 25 KVA) | 82 |
| Grader | 85 |
| Horizontal Boring Hydraulic Jack | 80 |
| Hydra Break Ram | 90 |
| Jackhammer | 85 |
| Paver | 85 |
| Pneumatic Tools | 85 |
| Pumps | 77 |
| Scraper | 85 |
| Soil Mix Drill Rig | 80 |
| Tractor | 84 |
| Vacuum Street Sweeper | 80 |
| Vibratory Concrete Mixer | 80 |
| Welder | 73 |

KVA = kilovolt ampere

Source: FTA 2006

As shown in Table 3.13-6, maximum noise levels (dBA L_{max}) from typical equipment operating (excluding pavement breaking or cutting) range from 70 to 85 dBA L_{max} at 50 feet from the source, which averaged over a time period (i.e., L_{eq}) would be a lower noise level. A worst-case equipment usage scenario was developed to assess potential noise impacts associated with lagoon enhancement construction. That scenario includes two dump trucks, a bulldozer, and a large backhoe operating concurrently and in proximity to each other. Over a period of 1 hour, the equipment would operate at an assumed load factor of 40 percent (to account for worker breaks,

change in construction activities, and maintenance), resulting in an average noise level of approximately 81 dBA L_{eq} at 50 feet, which would decrease (or attenuate) conservatively by approximately 6 dBA with each doubling of distance; i.e., 75 dBA L_{eq} at 100 feet, and 69 dBA L_{eq} at 200 feet, etc. For activities that require pavement breaking or cutting, maximum noise levels (dBA L_{max}) would range from 85 to 90 dBA L_{max} at 50 feet from the source, which averaged over a time period (i.e., L_{eq}), with the same assumptions, would be a lower noise level, approximated at 85 dBA L_{eq} at 50 feet.

The City of Carlsbad's Municipal Code does not limit construction noise levels, but limits allowable construction hours to Monday through Friday between the hours of 7 a.m. to 6 p.m. and on Saturdays from 8 a.m. to 6 p.m., excluding federal holidays, with exceptions to the limits on the hours of construction, including for projects that are "in the interest of the general public."

The City of Oceanside's General Plan Noise Element (Oceanside 1974) prohibits construction noise in excess of 85 dB at 100 feet from the source of noise and prohibits construction activities between 6:00 p.m. and 7:00 a.m. when such activities exceed the existing ambient noise level by 5 dB or more.

Figure 3.13-1 illustrates areas of sensitive receptors in proximity to the potential construction activity (staging areas and dredging limits) associated with lagoon enhancement. As shown, sensitive receptors 100 feet or less from the three staging areas are primarily residences near the Weir and Railroad Basins. Construction activity would be periodic (material deliveries, removal of vegetation cleared from the lagoon, construction crew changes, etc.). Haul truck trips in and out of the site could start early and end late in the day to maximize utilizing operational hours of the landfill. Vegetation removal is anticipated to occur over a 6-month period. Widening of the weir would occur over a 1- to 2-month period and be adjacent to residences in Oceanside (St. Malo community) and Carlsbad (various condominium complexes). Given the maximum noise level of the construction equipment anticipated for the Enhancement Project is 81 dBA L_{eq} at 50 feet and 85 dBA L_{max} at 50 feet and the impact 81 dBA L_{eq} at 50 feet and 85 dBA L_{max} at 50 feet, the City of Oceanside's daytime construction noise level limit of 85 dB at 100 feet would not be exceeded at any location. Construction would be limited to daytime hours and Monday through Saturday, so noise would be within the allowable hours established by the Cities of Carlsbad and Oceanside. Overall, **noise levels associated with construction activities at staging areas would not exceed applicable standards, and impacts would be less than significant (Criterion A).**

Infrequent shift changes for the dredge may occur at the staging areas along Carlsbad Boulevard and they could occur at night; refer to the dredge discussion below.

Dredging within Buena Vista Lagoon (Daytime and Nighttime Activities)

Areas proposed for dredging with this alternative are illustrated in Figure 2-13. Generally, dredging would encompass most of the basin areas west of I-5 and would be focused on the center half in the I-5 basin. Dredging may be achieved with diesel and/or electric hydraulic dredges. Dredges can be very different from each other, with some engines totally enclosed, and others exposed on the deck, which are louder.

The exact horsepower, location on the dredge, and configuration of the diesel engines and electric motors that would be part of the dredging system have not yet been determined. For example, noise produced from a hydraulic dredging operation within the Newport Bay area was measured with an average noise level of 73 dBA L_{eq} at 50 feet (USFWS and SDRPJA 2000). This noise level is consistent with a diesel dredge, measured near Ross Island with the engine room door open (Ross Island 2013). The precise electric dredge that could be used for the Enhancement Project is also not known at this time. It is likely that noise levels would be comparable to or less than the electric dredge used to dredge the navigation channels in the Port of Los Angeles, which generates 71.5 dBA L_{eq} at 50 feet (USFWS and SDRPJA 2000). Use of a diesel dredge represents the worst-case scenario. For purposes of this analysis, a noise reference level of 73 dBA L_{eq} at 50 feet for a diesel dredge is reasonable. At a distance of 100 feet, the dredge noise level can be calculated at 67 dBA L_{eq} .

Daytime Dredging

Under the Freshwater Alternative, the dredge equipment would be at least 100 feet from noise-sensitive receptors in the I-5, Coast Highway, and Railroad Basins in Oceanside, and with a calculated noise level of 67 dBA at 100 feet, much less than the daytime construction noise level limit of 85 dB at 100 feet for that jurisdiction. In the Weir Basin, where the dredge could be less than 100 feet from residences, noise levels would also be below the City's regulation. Dredging noise limits would not be exceeded during daytime dredging activities. The City of Carlsbad does not have a daytime construction noise level limit. Dredging would be a bit closer to the southern lagoon boundary in the Coast Highway Basin where residences are generally elevated over the lagoon. Dredging noise levels at 50 feet would be 73 dBA L_{eq} and would be mobile in the water outside any given residence. Under the Freshwater Alternative, **noise levels associated with daytime dredging activity would not exceed applicable standards, and impacts would be less than significant (Criterion A).**

Nighttime Dredging

Dredging activities could occur within the lagoon 6 or 7 days a week, 24 hours a day for a period of 12 to 24 months; therefore, dredging would occur at night. The City of Carlsbad limits

construction hours to Monday through Friday between 7 a.m. to 6 p.m. and on Saturdays from 8 a.m. to 6 p.m., excluding federal holidays, with exceptions to the limits on the hours of construction for projects that are “in the interest of the general public.” If the Enhancement Project is determined by the City to be in the interest of the general public during the application process for a Noise Variance, it would be exempt from limits on construction at night. Lagoon enhancement would substantially improve vector control, which could be considered in the public interest, but that determination has not yet been made.

The City of Oceanside prohibits construction activities between 6:00 p.m. and 7:00 a.m. when such activities exceed the existing ambient noise level by 5 dB or more. Average daytime ambient noise levels documented by the short-term noise measurements performed on the project site ranged from approximately 48 to 67 dB L_{eq} , with maximum noise levels from 63 to 88 dB (L_{max}). At night, ambient levels would be lower due to less community activity and roadway and rail traffic. For this analysis, the referenced noise level for a diesel dredge is 73 dBA L_{eq} at 50 feet. Therefore, dredging at night would exceed the existing ambient noise level by 5 dB or more at certain locations, away from roadway and rail traffic, where ambient levels are lower. The exceedance would likely occur in the Weir Basin where dredging would be closest to residences (St. Malo community) or residences directly at the lagoon edge to the north of the Coast Highway Basin. Elsewhere, the dredging would occur near the center of the basin, where residences are much farther distant.

Under the Freshwater Alternative, the proposed dredging would be outside of allowable daytime construction hours, and exemptions would be required from the Cities of Carlsbad and Oceanside to operate dredging equipment on Sundays and holidays (City of Carlsbad), and Mondays through Saturdays between 6 p.m. and 7 a.m. at night. Under the Freshwater Alternative, 24-hour operations could occur as well as dredging on Sundays/holidays so **nighttime dredging impacts would be considered significant (Criterion A)**. If no exception is issued to allow nighttime work, dredging would be restricted to daytime hours in compliance with local noise regulations.

Vibration and Long-Term Maintenance (Daytime Activities)

Vibration

Vibration-inducing construction equipment could include vibratory rollers, hoe rams, dozers, jackhammers, and haul trucks. With the exception of the dozers/trucks, these equipment types are generally not associated with dredging and habitat enhancement, but some could be associated with construction of the Boardwalk. Although construction activities could generate vibrations perceptible to people in the immediate vicinity of project construction sites, vibration levels dissipate rapidly over short distances (i.e., 50 feet). Groundborne noise and groundborne

vibration levels associated with typical construction equipment are presented in Table 3.13-7. Actual vibration levels are dependent on construction procedures, soil and geologic conditions, and the structural characteristics of structures in proximity.

**Table 3.13-7
Groundborne Vibration and Noise Levels for Typical Construction Equipment**

| Equipment | Peak Particle Velocity in Inches per Second | | | Approximate Lv in VdB ¹ | | | | |
|-----------------------------------|--|---------------|----------------|--|---------------|---------------|----------------|----------------|
| | Groundborne Vibration PPV (in/sec) at 25 Feet | At 50 Feet | At 100 Feet | Groundborne Noise Lv (VdB) (1 micro- inch/second at 25 Feet | At 50 Feet | At 75 Feet | At 100 Feet | At 150 Feet |
| Clam Shovel Drop (slurry wall) | 0.202 | 0.071 | 0.025 | 94 | 85 | 80.5 | 76 | 71.5 |
| Vibratory Roller | 0.210 | 0.074 | 0.026 | 94 | 85 | 80.5 | 76 | 71.5 |
| Hoe Ram | 0.089 | 0.031 | 0.011 | 87 | 78 | 73.5 | 69 | 64.5 |
| Large Bulldozer | 0.089 | 0.031 | 0.011 | 87 | 78 | 73.5 | 69 | 64.5 |
| Caisson Drilling | 0.089 | 0.031 | 0.011 | 87 | 78 | 73.5 | 69 | 64.5 |
| Loaded Trucks | 0.076 | 0.027 | 0.010 | 86 | 77 | 72.5 | 68 | 63.5 |
| Jackhammer | 0.035 | 0.012 | 0.004 | 79 | 70 | 65.5 | 61 | 56.5 |
| Small Bulldozer | 0.003 | 0.001 | 0.0004 | 58 | 49 | 44.5 | 40 | 35.5 |

Source: FTA 2006

Note: These values are based on the field studies conducted by the Federal Transit Administration. Actual vibration levels are dependent on construction procedures, soil and geologic conditions, and the structural characteristics of the receptors.

¹Lv = velocity level in decibels (VdB) referenced to 1 microinch per second and based on the root mean square velocity amplitude

As shown in Table 3.13-7, a vibratory roller has the highest groundborne vibration level of 0.21 in/sec PPV at 25 feet and 0.074 in/sec PPV at 50 feet. The vibratory roller generates a groundborne noise level of 94 VdB at 25 feet and 85 VdB at 50 feet. Vibration may be perceptible near construction activities (within 50 feet). These vibration levels would dissipate rapidly with distance and would be well below the Caltrans Guidelines recommended standard of 0.2 in/sec PPV for the protection of normal residential buildings (Caltrans 2004), and less than the FTA guidelines recommended standard of 80 VdB maximum for human annoyance within residential buildings (FTA 2006). Under the Freshwater Alternative, the Boardwalk element would be constructed well beyond 50 feet from sensitive receptors. **Possible vibration impacts would be less than significant (Criterion B) even if vibration-inducing equipment were utilized.**

Long-Term Habitat Maintenance

No permanent noise-generating uses would be associated with the project. Long-term habitat maintenance activities would be determined during the long-term monitoring program and

adaptive management, and may include plant replacement, weed abatement, cattail thinning, trash removal, and bank protection repair. Impacts would be less than those described above under temporary impacts, and would generate temporary and negligible amounts of noise. Under the Freshwater Alternative, **no substantial permanent increases in ambient noise would occur and impacts would be less than significant (Criterion C).**

Saltwater Alternative

The Saltwater Alternative includes vegetation removal, dredging, and excavation of soils from the lagoon; construction of the Boardwalk; expansion of the channel under Carlsbad Boulevard and replacement of the existing Carlsbad Boulevard bridge; and replacement of the existing 50-foot weir with a 100-foot-wide open inlet to provide tidal exchange.

Materials Import/Export (Daytime Activities)

Under the Saltwater Alternative, construction traffic noise levels would be generally greater than levels described under the Freshwater Alternative, due to replacement of the existing Carlsbad Boulevard bridge (demolition and reconstruction) and more vegetation removal. Specific trip generation numbers would be greater in the Railroad and Coast Highway Basins, which feed into Coast Highway/Carlsbad Boulevard, but would be well below doubling existing traffic volumes. Specifically, project daily trips are estimated to be nearly 400 in this basin and this roadway has volumes of 13,000 to 25,000 (Section 3.10). These additional trips would not be audible relative to existing roadway traffic. Therefore, **the noise traffic analysis discussed above for the Freshwater Alternative is also applicable and impacts would remain less than significant (Criteria A and D).**

Staging Areas (Daytime Activities, Excluded Dredging)

Under the Saltwater Alternative, construction would include demolition and reconstruction of the existing Carlsbad Boulevard bridge in addition to other construction equipment for vegetation removal, weir removal, and building the Boardwalk (Table 3.13-6). The staging area locations would be identical under this alternative. The worst-case equipment scenario would be adequate to estimate the noise levels generated by construction. As noted above, construction noise is of greatest concern when activity is closest to adjacent residential property lines. Removing the weir and widening the channel to allow open tidal exchange would require 3 to 5 months of land-based construction at the location bounded by existing residences (St. Malo to the north in Oceanside and several condominium complexes to the south in Carlsbad). Residences in this area within 100 feet of the activity are shown in Figure 3.13-1. Construction at the Boardwalk would be longer in duration than under the Freshwater Alternative, but this location is nearly 500 feet from residences.

Given that the noise levels of the construction equipment anticipated for the Enhancement Project are 81 dBA L_{eq} at 50 feet and 85 dBA L_{max} at 50 feet, the City of Oceanside's daytime construction noise level limit of 85 dB at 100 feet would not be exceeded. Project construction (excluding dredging) would not occur outside of the allowable hours or days established by the Cities of Carlsbad and Oceanside. Therefore, **project construction (excluding dredging) would not exceed construction noise regulations established by the Cities of Carlsbad or Oceanside, and impacts would be less than significant (Criterion A).**

Dredging

Under the Saltwater Alternative, dredging would be similar to the Freshwater Alternative in location and amount in the Weir, Railroad, and Coast Highway Basins, but greater in the I-5 Basin. While noise standards of the Cities of Oceanside and Carlsbad would not be exceeded during daytime hours, nighttime and weekend dredging activities are proposed within the lagoon. Under the Saltwater Alternative, **24-hour operations could occur, and impacts would be considered significant (Criterion A).** Exemptions would be required from the Cities of Oceanside and Carlsbad to operate dredging equipment on Sundays, holidays, and Mondays through Saturdays between 6 p.m. and 7 a.m. (nighttime).

Vibration and Long-Term Habitat Maintenance

Under the Saltwater Alternative, dredging and vegetation removal activity is highly unlikely to generate vibration given the type of equipment and loose soils to be modified. There may be equipment used for demolition of Carlsbad Boulevard and construction of the Boardwalk/new Carlsbad Boulevard that would generate vibration. The Boardwalk element and bridge demolition would be well beyond 50 feet from sensitive receptors. **Possible vibration impacts would be less than significant (Criterion B) even if vibration-inducing equipment were used.**

No permanent noise-generating uses would be associated with the project. Improvements to the Carlsbad Boulevard Bridge, as described in Section 2.6.2, would include elevating the bridge by approximately 5 feet. While this elevation increase could incrementally increase the projection of traffic noise over distance, the change in elevation is small when compared to the horizontal distance to the nearest sensitive receptor. Given this distance, a perceptible increase in noise would not occur at any sensitive receptor locations in the area. Long-term habitat maintenance activities would be determined during the long-term monitoring program and adaptive management, and may include plant replacement, weed abatement, cattail thinning, trash removal, and bank protection repair. Impacts would generate temporary and negligible amounts of noise. Under the Saltwater Alternative, **no substantial permanent increases in ambient**

noise levels would be generated during long-term maintenance activities, and impacts would be less than significant (Criterion C).

Under the Saltwater Alternative, periodic maintenance would be required to remove approximately 27,000 cy of material and place it on the beach south of the new ocean inlet. That would occur every 16 to 20 months. The maintenance would be accomplished via land-based equipment and would be performed in daytime hours, during normal weekdays over a 2- to 4-week period. Even though close to residences, the noise generated would be within city-specific limits (estimated 81 dB L_{eq} at 50 feet). **Noise impacts from periodic maintenance would be less than significant (Criterion A).**

Hybrid Alternative

The Hybrid Alternative (Options A and B) includes the dredging and excavation of soils from the lagoon; construction of the Boardwalk; construction of a new water control structure (weir) at the I-5 bridge to maintain a freshwater hydrologic regime in the portion of the lagoon east of I-5; expansion of the channel under Carlsbad Boulevard to 110 feet and replacement of the existing Carlsbad Boulevard bridge; and replacement of the existing 50-foot weir near the ocean with a 100-foot-wide open inlet to provide tidal exchange. The Hybrid Alternative, Option A also includes the construction of a channel guide connecting the tidal inlet from the ocean area through the Weir Basin and into the Railroad Basin, creating a perched water level, whereas the Hybrid Alternative, Option B would create an open inlet similar to that described under the Saltwater Alternative.

Materials Import/Export (Daytime Activities)

Under the Hybrid Alternative (Options A and B), construction traffic noise would be generally similar to the Saltwater Alternative due to replacement of the existing Carlsbad Boulevard bridge (demolition and reconstruction). There would be less vegetation removal but construction of the I-5 weir would generate some trips not associated with the other two alternatives. As with the other two alternatives, specific trip generation numbers would be well below doubling of existing traffic volumes (Section 3.10 Traffic and Circulation). These additional trips would not be audible relative to existing roadway traffic. **Therefore, the traffic noise impacts would remain less than significant (Criteria A and D).**

Staging Areas (Daytime Activities, Excluded Dredging)

Under either Hybrid Alternative option, construction would include demolition and reconstruction of the existing Carlsbad Boulevard bridge in addition to use of other construction

equipment for vegetation removal, weir removal, and building the Boardwalk (Table 3.13-6). The worst-case equipment scenario would be adequate to estimate the noise levels generated by construction under this alternative. As noted above, construction noise is of greatest concern when activity is closest to adjacent residential property lines. Removing the weir and widening the channel to allow open tidal exchange would require 3 to 5 months of land-based construction at this location bounded by existing residences (St. Malo to the north in Oceanside and several condominium complexes to the south in Carlsbad). Weir construction under I-5 would be over 600 feet from residences and construction noise would not be perceptible relative to highway noise. Construction at Carlsbad Boulevard/Boardwalk would be nearly 500 feet from residences. The most sensitivity is associated with weir removal and inlet construction.

Given that the noise levels of the construction equipment anticipated for the Enhancement Project are 81 dBA L_{eq} at 50 feet and 85 dBA L_{max} at 50 feet, the City of Oceanside's daytime construction noise level limit of 85 dB at 100 feet would not be exceeded. Project construction (excluding dredging) would not occur outside of the allowable hours or days established by the Cities of Carlsbad and Oceanside. Therefore, **project construction (excluding dredging) would not exceed construction noise regulations established by the Cities of Carlsbad or Oceanside, and impacts would be less than significant (Criterion A).**

Dredging (Daytime and Nighttime Activity)

Under the Hybrid Alternative, Options A and B, dredging would be similar in location and amount in the Weir, Railroad, and Coast Highway Basins to the Saltwater Alternative construction activities and similar to the Freshwater Alternative in the I-5 Basin. While noise standards of the Cities of Oceanside and Carlsbad would not be exceeded during daytime hours, nighttime and weekend dredging activities are proposed within the lagoon. Under the Hybrid Alternative, Options A and B, **24-hour operations could occur, and impacts would be considered significant (Criterion A).** Exemptions would be required from the Cities of Oceanside and Carlsbad to operate dredging equipment on Sundays, holidays, and Mondays through Saturdays between 6 p.m. and 7 a.m. (nighttime).

Vibration and Long-Term Habitat Maintenance

Under the Hybrid Alternative, dredging and vegetation removal activity is highly unlikely to generate vibration given the type of equipment used and loose soils to be modified. There may be equipment used for demolition of Carlsbad Boulevard and construction of the Boardwalk/new Carlsbad Boulevard, and possibly for the I-5 weir, that would generate vibration. The Boardwalk, bridge demolition, and I-5 weir elements would be well beyond 50 feet from

sensitive receptors. **Possible vibration impacts would be less than significant (Criterion B) even if vibration-inducing equipment were utilized.**

No permanent noise-generating uses would be associated with the project. Improvements to the Carlsbad Boulevard Bridge, as described in Section 2.6.3, would include elevating the bridge by approximately 5 feet. While this elevation could incrementally increase the projection of traffic noise over distance, the change in elevation is small when compared to the horizontal distance to the nearest sensitive receptor. Given this distance, a perceptible increase in noise would not occur at any sensitive receptor locations in the area. Long-term habitat maintenance activities would be determined during the long-term monitoring program and adaptive management, and may include plant replacement, weed abatement, cattail thinning, trash removal, and bank protection repair. Impacts would generate temporary and negligible amounts of noise. Under the Hybrid Alternative, **no substantial permanent increases in ambient noise levels would be generated during long-term maintenance activities, and impacts would be less than significant (Criterion C).**

As with the Saltwater Alternative, periodic maintenance would be required to remove approximately 27,000 cy of material and place it on the beach in Carlsbad south of the new ocean inlet. The maintenance would occur every 16 to 20 months. The maintenance would be accomplished via land-based equipment and would be performed in daytime hours, during normal weekdays over a 2- to 4-week period. Although close to residences, the noise generated would be within city specific limits (estimated 81 dB L_{eq} at 50 feet). **Noise impacts from periodic maintenance would be less than significant (Criterion A).**

No Project Alternative

The No Project Alternative would not result in the construction-related vehicle trips, replacement of bridges, or dredging activities proposed under the Enhancement Project alternatives. Under the No Project Alternative, the ambient noise environment would not be affected; therefore, **no impacts would occur (Criteria A, B, C, and D).**

Materials Disposal/Reuse

As part of the enhancement project, dredged materials suitable for beneficial reuse would be placed at the identified beach sites (Oceanside or Carlsbad) and/or nearshore site (Oceanside). Material could also be placed on the Carlsbad beach site as part of annual inlet maintenance. Those materials not suitable for beach or nearshore placement would be transported to LA-5 for offshore placement under Approach 1. Under Approach 2, an overdredge pit would be created to accommodate material not suitable for beach or nearshore placement.

After materials disposal/reuse is completed, no additional operational noise would occur; therefore, the analysis below focuses on construction noise. **No significant permanent noise impacts would occur under the project alternatives for materials disposal/reuse (Criterion C).**

Further, the primary vibration source for materials disposal would be construction equipment used for spreading activities. Sand, without silt or clay, is a poor medium for the transfer of vibrations, and the activity would not involve pile driving, soil compacting, jack-hammering, etc. which more typically generate vibration. Sensitive receptors in the vicinity of the materials placement sites may be aware of groundborne vibrations if the receptors are within 50 feet of sand-spreading activities, but the vibrations would not be disruptive to residences or other sensitive uses. **Vibration impacts would be less than significant (Criterion B).**

Littoral Cell Nourishment

The primary project noise source at noise-sensitive receptors (i.e., residences) during sand placement at beach sites would be from construction equipment as sandy material is moved around the beach, and delivery pipelines are assembled and disassembled. Materials placement would possibly occur 24 hours per day, 7 days per week (24/7) (similar to dredging). Both of the prior similar regionwide beach nourishment projects were constructed via the 24/7 approach.

At the materials placement sites, diesel engines would be used in bulldozers, loaders, forklifts, and cranes, as required. Noise levels vary, as equipment may come in different sizes and with engines of varying horsepower. Construction equipment noise levels also vary as a function of activity level or duty cycle. In a typical construction project (without pavement cutting or breaking), the loudest short-term noise levels are those of earth-moving equipment under full load, which would be approximately 85 dBA L_{max} at a distance of 50 feet from the source. However, with equipment moving from one point to another, work breaks, and idle time, the long-term noise level averages are lower than louder short-term noise events. A maximum 1-hour average noise level of 80 dBA L_{eq} at 50 feet from the center of construction activities is calculated (SANDAG 2011), but actual field measurements are below. Materials placement may be completed from one end of the site to the other, and work along approximately 100 to 200 feet of beach can typically be completed per day.

Representative noise levels were taken at Mission Beach during sand deposition/maintenance activities similar to those expected to occur with implementation of the Enhancement Project (SANDAG 2011). Working noise levels were measured, and then ambient background noise was mathematically removed, to generate an estimated operational noise level of 74 to 77 dBA at 50 feet. Idling noise levels were estimated at 65 to 68 dBA at 50 feet. These are considered typical

noise levels for beach equipment that may be used for the Enhancement Project. They are lower than the calculated noise levels noted above. To be conservative, the calculated 80 dBA L_{max} at a distance of 50 feet is used in this impact analysis. It is also noted that construction equipment is equipped with mandatory backup alarms, and sand distribution requires construction equipment to back up frequently. Therefore, the diesel engine noise would be accompanied at some times by backup alarm noise.

There may be a need to pump the sand/water slurry mixture for distances greater than 10,000 feet. Figures 2-11 and 2-12 identify possible pump locations at the inlet and at Loma Alta Creek. Diesel engines for slurry pumps are typically housed in an enclosure that provides noise reduction; a noise level of 77 dBA at 50 feet is assumed (FTA 2006).

Oceanside and North Carlsbad – Beach Receptors

Sand placement sites at Oceanside and North Carlsbad have beachfront residences at or near the same elevation as the placement sites, and within 50 feet of the nearest points of planned sand placement. The dominant existing noise at each of these sites is the surf activity, and ambient surf noise levels range from 63 to 71 dBA L_{eq} at the sensitive receptors.

During sand placement, the principal project noise at beachfront residences would be from construction equipment. A peak construction noise event scenario would include a diesel engine under load while sounding a backup alarm in proximity to the nearest residence, and construction equipment noise levels would be anticipated to occasionally exceed 85 dBA L_{max} for a few minutes in a given hour. While noise levels would be noticeable, they would not be considered significant due to the short duration. Hourly noise levels, with equipment moving about the site and breaks for measurement and surveying, are anticipated to be approximately 70 dBA L_{eq} . This noise level would exceed the upper range of the ambient surf noise levels (70 dBA L_{eq}) and would be audible to local residents. Therefore, the City of Oceanside's daytime construction noise level limit of 85 dB at 100 feet would not be exceeded. As the work would move away from any individual receptor, the construction noise level at the receptor would decrease with distance. Noise levels associated with sand placement would attenuate to ambient noise levels at distances of 100 to 175 feet from the spreading equipment.

When nighttime sand placement occurs within 100 feet of a residence, the change in noise environment is anticipated to disturb the sleep of some residents. The proposed sand placement would be outside of allowable daytime construction hours of the Cities of Carlsbad and Oceanside, and exemptions would be required to operate at night and on Sunday. Closing windows would reduce the noise level, but the change in the volume and character of the noise may still disturb sleep. As noted in Table 2-9 Standard Construction Practices, residents would be notified a week in advance of nighttime construction work that would occur within 100 feet,

and work would last no longer than 3 consecutive nights within 100 feet. Early notification allows the residents time to prepare and by allowing only three nights in a row, the residents would be given a break from nighttime noise operations. Regardless, **impacts would be considered significant for nighttime onshore sand placement (Criteria A and D).**

The only noise associated with nearshore disposal would be the pump at the beach in Oceanside pushing material out the pipeline into the ocean. That pump would operate intermittently with a noise level of 77 dBA at 50 feet. This would be well within the City's regulations regarding noise levels (less than 85 dBA at 100 feet) and change relative to ambient condition; however, the pump could operate anytime within the 24/7 construction window. **Nearshore placement requiring nighttime and weekend operation would result in significant noise impacts (Criteria A and D).**

Offshore Disposal Site

Noise from this disposal option would be related to the pump pushing material from the dredge to the monobuoy so the material could be loaded onto a boat for transport to LA-5. Like the pump for the nearshore disposal, the noise level would be within the City's guidance and less than a 5 dB increase from ambient. However, the pump could operate anytime within the 24/7 window. **Thus, offshore disposal requiring nighttime and weekend operation would result in significant noise impacts (Criteria A and D).**

No Project Alternative

The No Project Alternative would not result in sand disposal or placement activities. **The No Project Alternative would not impact the noise environment or cause ground vibration and, therefore, no noise impacts would occur (Criteria A, B, C, and D).**

3.13.4 MITIGATION MEASURES

Except for dredging at night, the noise impacts of the Enhancement Project would be less than significant and no mitigation measures are required. However, due to nighttime dredging associated with enhancement and materials placement activities, significant impacts have been identified for each of the alternatives. To reduce impacts associated with nighttime noise, the Enhancement Project will implement the following mitigation measures:

Noise-1 All construction equipment, fixed or mobile, shall be equipped with properly operating and maintained mufflers.

Noise-2 Exposed engines on dredging equipment shall be housed to the greatest extent possible.

The implementation of Mitigation Measures Noise-1 and Noise-2 would minimize noise generation as properly operating and housed engines and appropriate mufflers run quieter. Even with implementation of these measures, nighttime construction outside of allowed hours would result in significant impacts. Noise walls and limiting dredging and materials placement activities to daytime hours were also considered to reduce this impact, but were rejected, as described below. Noise impacts from nighttime dredging and materials placement remain significant and unavoidable with implementation of the Freshwater, Saltwater, and Hybrid Alternatives.

The use of noise walls was considered as an option for noise reduction. However, the expanse of the lagoon and the continually moving dredge make the placement of noise walls less effective. Many noise-sensitive receptors are located on the bluffs and hillsides surrounding the lagoon and would not receive beneficial noise reduction from a noise wall located at lower elevations (lagoon edge). At sand placement sites, the active work areas on the beaches would shift approximately 100 to 200 feet per day. The construction of noise walls is not efficient when left in place for a very short time before needing to be removed and relocated to another location to keep pace with the noise source. For these reasons, the use of noise walls to reduce noise levels at sensitive receptors during nighttime construction activities was found less effective than controlling noise at the mobile noise source, such as with engine enclosures, where possible (e.g., on dredge equipment).

Limiting dredging and materials placement activities to daytime hours was considered to reduce significant impacts associated with nighttime construction. If such limits were implemented, overall construction time to implement the Enhancement Project would be extended substantially (the specific additional time required for construction would vary depending on export quantity and quality). An extended construction period would result in an increased level of construction-related impacts in a number of resource areas, such as biological resources, as well as a decrease in the efficiency of dredging operations. Dredging equipment operates most efficiently if run continually since dredged material is entrained in a water/sand slurry mixture and transported through a pipeline to either a barge for transport to LA-5, or for direct disposal at a placement site (nearshore or onshore). If dredging is halted once initiated, the pipes must be cleared to avoid having sand settle out and clog pipelines. Therefore, the efficiency of dredging operations is decreased substantially as pipelines are cleared and then primed at the end and start of each dredge period.

For beach placement, spreading the material and potentially extending the discharge pipeline must occur before another load can be placed on the beach. The sequential nature of beach placement means that, if activity is limited to daytime hours and a placement cycle can take up to 5 to 6 hours, then only a single cycle could occur within a typical 8-hour workday as opposed to completing four to five placement cycles within a 24-hour period with continuous dredging/placement activities. This substantial reduction in efficiency leads to an even more substantial increase in schedule. The offshore/nearshore disposal requires the installation of pipelines in the surf zone. When these pipelines are left in place in high wave environments, they can be buried, broken, or plugged; therefore, less exposure time means less chance of those problems. Extending the schedule also exposes the public to a longer period of equipment and pipe on the beach (at least three times longer).