3.13 Noise

3.13.1 Physical Setting

Introduction and Methodology

This section characterizes the existing noise levels and regulatory environment in the SBSP Restoration Project Area. It includes a summary of the physical setting, existing noise levels, as well as a description of the regulatory setting. Applicable regional, state, and local plans and policies concerning noise were reviewed during preparation of this section.

Acoustic Fundamentals

Noise is generally defined as sound that is loud, disagreeable, unexpected, or unwanted. Sound, as described in more detail below, is mechanical energy transmitted in the form of a wave because of a disturbance or vibration, and as any pressure variation in air that the human ear can detect.

Sound Properties. A sound wave is introduced into a medium (air) by a vibrating object. The vibrating object (*e.g.*, vocal chords, the string, and sound board of a guitar or the diaphragm of a radio speaker) is the source of the disturbance that moves through the medium. Regardless of the type of source creating the sound wave, the particles of the medium through which the sound moves are vibrating in a back-and-forth motion at a given frequency (pitch). The frequency of a wave refers to how often the particles vibrate when a wave passes through the medium. The frequency of a wave is measured as the number of complete back-and-forth vibrations of a particle per unit of time. If a particle of air undergoes 1,000 longitudinal vibrations in two seconds, then the frequency of the wave would be 500 vibrations per second. A commonly used unit for frequency is cycles per second, called hertz (Hz).

Each particle vibrates as a result of the motion of its nearest neighbor. For example, the first particle of the medium begins vibrating at 500 Hz and sets the second particle of the medium into motion at the same frequency (500 Hz). The second particle begins vibrating at 500 Hz and thus sets the third particle into motion at 500 Hz. The process continues throughout the medium; hence each particle vibrates at the same frequency, which is the frequency of the original source. Subsequently, a guitar string vibrating at 500 Hz will set the air particles in the room vibrating at the same frequency (500 Hz), which carries a sound signal to the ear of a listener that is detected as a 500 Hz sound wave.

The back-and-forth vibration motion of the particles of the medium would not be the only observable phenomenon occurring at a given frequency. Because a sound wave is a pressure wave, a detector could be used to detect oscillations in pressure from high to low and back to high pressure. As the compression (high-pressure) and rarefaction (low-pressure) disturbances move through the medium, they would reach the detector at a given frequency. For example, a compression would reach the detector 500 times per second if the frequency of the wave were 500 Hz. Similarly, a rarefaction would reach the detector 500 times per second if the frequency of the wave were 500 Hz. Thus, the frequency of a sound wave refers not only to the number of back-and-forth vibrations of the particles per unit of time but also to the number of compression or rarefaction disturbances that pass a given point per unit of time. A detector could be used to detect the frequency of these pressure oscillations over a given period of time. The

period of the sound wave can be found by measuring the time between successive high-pressure points (corresponding to the compressions) or the time between successive low-pressure points (corresponding to the rarefactions). The frequency is simply the reciprocal of the period; thus an inverse relationship exists so that as frequency increases, the period decreases, and vice versa.

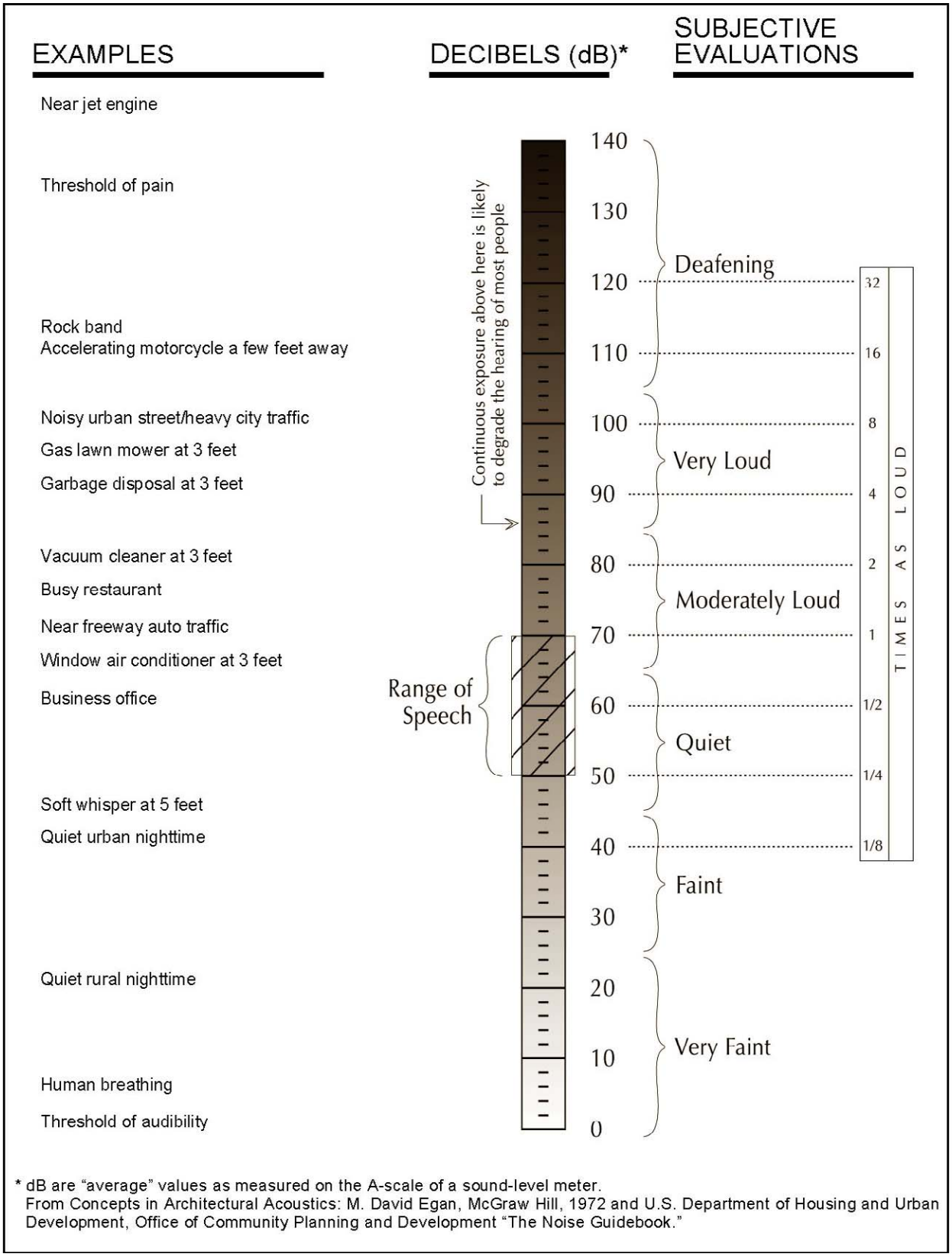
A wave is an energy transport phenomenon that transports energy along a medium. The amount of energy carried by a wave is related to the amplitude (loudness) of the wave. A high-energy wave is characterized by high amplitude; a low-energy wave is characterized by low amplitude. The amplitude of a wave refers to the maximum amount of displacement of a particle from its rest position. The energy transported by a wave is directly proportional to the square of the amplitude of the wave. This means that a doubling of the amplitude of a wave is indicative of a quadrupling of the energy transported by the wave.

Sound and the Human Ear. Because of the ability of the human ear to detect a wide range of sound-pressure fluctuations, sound-pressure levels are expressed in logarithmic units called decibels (dB) to avoid a very large and awkward range in numbers. The sound-pressure level in decibels is calculated by taking the log of the ratio between the actual sound pressure and the reference sound pressure squared. The reference sound pressure is considered the absolute hearing threshold (California Department of Transportation 1998). Use of this logarithmic scale reveals that the total sound from two individual 65 dBA sources is 68 dBA, not 130 dBA (*i.e.*, doubling the source strength increases the sound pressure by three dBA).

Because the human ear is not equally sensitive to all sound frequencies, a specific frequency-dependent rating scale was devised to relate noise to human sensitivity. An A-weighted dB (dBA) scale performs this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear. The basis for compensation is the faintest sound audible to the average ear at the frequency of maximum sensitivity. This dBA scale is used by most authorities to regulate environmental noise. Typical indoor and outdoor noise levels are presented in Figure 3.13-1 using this scale.

With respect to how humans perceive and react to changes in noise levels, a 1 dBA increase is imperceptible, a 3 dBA increase is barely perceptible, a 6 dBA increase is clearly noticeable, and a 10 dBA increase is subjectively perceived as approximately twice as loud (Egan 1988), as presented in Table 3.13-1. Table 3.13-1 was developed on the basis of test subjects' reactions to changes in the levels of steady-state pure tones or broad-band noise and to changes in levels of a given noise source. It is probably most applicable to noise levels in the range of 50 to 70 dBA, as this is the usual range of voice and interior noise levels. For these reasons, a noise level increase of 6 dBA or more is typically considered significant and/or substantial in terms of the degradation of the existing noise environment.

Sound Propagation and Attenuation. As sound (noise) propagates from the source to the receptor, the attenuation, or manner of noise reduction in relation to distance, is dependent on surface characteristics, atmospheric conditions, and the presence of physical barriers. The inverse-square law describes the attenuation caused by the pattern in which sound travels from the source to receptor. Sound travels uniformly outward from a point source in a spherical pattern with an attenuation rate of 6 dBA per



Source: EDAW 2006

Figure 3.13-1 Typical Noise Levels

Table 3.13-1 Subjective Reaction to Changes in Noise Levels of Similar Sources

CHANGE IN LEVEL, DBA	SUBJECTIVE REACTION	FACTOR CHANGE IN ACOUSTICAL ENERGY
1	Imperceptible (Except for Tones)	1.3
3	Just Barely Perceptible	2.0
6	Clearly Noticeable	4.0
10	About Twice (or Half) as Loud	10.0
Source: Egan 1988		

doubling of distance (dBA/DD). However, from a line source (*e.g.*, a road), sound travels uniformly outward in a cylindrical pattern with an attenuation rate of 3 dBA/DD. The surface characteristics between the source and the receptor may result in additional sound absorption and/or reflection. Atmospheric conditions such as wind speed, temperature, and humidity may affect noise levels. Furthermore, the presence of a barrier between the source and the receptor may also attenuate noise levels. The actual amount of attenuation is dependent upon the size of the barrier and the frequency of the noise. A noise barrier may be any natural or human-made feature such as a hill, tree, building, wall, or berm (California Department of Transportation 1998).

All buildings provide some exterior-to-interior noise reduction. A building constructed with a wood frame and a stucco or wood sheathing exterior typically provides a minimum exterior-to-interior noise reduction of 25 dBA with its windows closed, whereas a building constructed of a steel or concrete frame, a curtain wall or masonry exterior wall, and fixed plate glass windows of one-quarter-inch thickness typically provides an exterior-to-interior noise reduction of 30 to 40 dBA with its windows closed (Paul S. Veneklasen & Associates 1973, cited in California Department of Transportation 2002).

Noise Descriptors. The selection of a proper noise descriptor for a specific source is dependent upon the spatial and temporal distribution, duration, and fluctuation of the noise. The noise descriptors most often encountered when dealing with traffic, community, and environmental noise are defined below (California Department of Transportation 1998, Lipscomb and Taylor 1978).

- L_{max} (Maximum Noise Level): The maximum instantaneous noise level during a specific period of time. The L_{max} may also be referred to as the "peak (noise) level";
- L_{min} (Minimum Noise Level): The minimum instantaneous noise level during a specific period of time;
- L_X (Statistical Descriptor): The noise level exceeded X percent of a specific period of time;
- L_{eq} (Equivalent Noise Level): The energy mean (average) noise level. The instantaneous noise levels during a specific period of time in dBA are converted to relative energy values. From the sum of the relative energy values, an average energy value is calculated, which is then converted back to dBA to determine the L_{eq}. In noise environments determined by major noise events, such

as aircraft overflights, the L_{eq} value is heavily influenced by the magnitude and number of single events that produce the high noise levels;

- L_{dn} (Day-Night Noise Level): The 24-hour L_{eq} with a 10 dBA "penalty" for noise events that occur during the noise-sensitive hours between 10 pm and 7 am. In other words, 10 dBA is "added" to noise events that occur in the nighttime hours, and this generates a higher reported noise level when determining compliance with noise standards. The L_{dn} attempts to account for the fact that noise during this specific period of time is a potential source of disturbance with respect to normal sleeping hours;
- CNEL (Community Noise Equivalent Level): The CNEL is similar to the L_{dn} described above, but with an additional 5 dBA "penalty" added to noise events that occur during the noise-sensitive hours between 7 pm to 10 pm, which are typically reserved for relaxation, conversation, reading, and television. If using the same 24-hour noise data, the reported CNEL is typically approximately 0.5 dBA higher than the L_{dn}; and
- SENL (Single Event [Impulsive] Noise Level): The SENL describes a receiver's cumulative noise exposure from a single impulsive noise event, which is defined as an acoustical event of short duration and involves a change in sound pressure above some reference value. SENLs typically represent the noise events used to calculate the L_{eq}, L_{dn}, and CNEL.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level L_{eq}, which corresponds to a steady-state A-weighted sound level containing the same total energy as a time-varying signal over a given time period (usually one hour). The L_{eq} is the foundation of the composite noise descriptors such as L_{dn} and CNEL, as defined above, and shows very good correlation with community response to noise.

Negative Effects of Noise on Humans. Negative effects of noise exposure include physical damage to the human auditory system, interference, and disease. Exposure to noise may result in physical damage to the auditory system, which may lead to gradual or traumatic hearing loss. Gradual hearing loss is caused by sustained exposure to moderately high noise levels over a period of time; traumatic hearing loss is caused by sudden exposure to extremely high noise levels over a short period. Gradual and traumatic hearing loss may both result in permanent hearing damage. In addition, noise may interfere with or interrupt sleep, relaxation, recreation, and communication. Although most interference may be classified as annoying, the inability to hear a warning signal may be considered dangerous. Noise may also be a contributor to diseases associated with stress, such as hypertension, anxiety, and heart disease. The degree to which noise contributes to such diseases depends on the frequency, bandwidth, and level of the noise, and the exposure time (California Department of Transportation 1998).

Vibration. Vibration is the periodic oscillation of a medium or object. The rumbling sound caused by the vibration of room surfaces is called structure borne noise. Sources of groundborne vibrations include natural phenomena (*e.g.*, earthquakes, volcanic eruptions, sea waves, landslides) or human-made causes (*e.g.*, explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, such as factory machinery, or transient, such as explosions. As is the case with airborne sound, groundborne vibrations may be described by amplitude and frequency.

Vibration amplitudes are usually expressed in peak particle velocity (PPV) or root mean squared (RMS), as in RMS vibration velocity. The PPV and RMS velocity are normally described in inches per second (in/sec). PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is often used in monitoring of blasting vibration because it is related to the stresses that are experienced by buildings (FHWA 1995, California Department of Transportation 2002).

Although PPV is appropriate for evaluating the potential for building damage, it is not always suitable for evaluating human response. It takes some time for the human body to respond to vibration signals. In a sense, the human body responds to average vibration amplitude. The RMS of a signal is the average of the squared amplitude of the signal, typically calculated over a one-second period. As with airborne sound, the RMS velocity is often expressed in decibel notation as vibration decibels (VdB), which serves to compress the range of numbers required to describe vibration (FHWA 1995). This is based on a reference value of one microinch per second (μin/sec).

The background vibration-velocity level in residential areas is usually approximately 50 VdB. Groundborne vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels (FHWA 1995).

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 is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration-velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings. Construction activities can generate groundborne vibrations, which can pose a risk to nearby structures. Constant or transient vibrations can weaken structures, crack facades, and disturb occupants (FHWA 1995).

Construction vibrations can be transient, random, or continuous. Transient construction vibrations are generated by blasting, impact piledriving, and wrecking balls. Continuous vibrations result from vibratory piledrivers, large pumps, horizontal directional drilling, and compressors. Random vibration can result from jackhammers, pavement breakers, and heavy construction equipment. Table 3.13-2 describes the general human response to different levels of groundborne vibration-velocity levels.

3.13.2 Regional Setting

The communities along San Francisco Bay are primarily urban in character; however, open space and other undeveloped areas (including ecological reserves, wildlife refuges, and parks) fringe the southern portion of the Bay and are scattered in and around the communities.

Noise Sensitive Uses

Noise-sensitive land uses generally include those uses where exposure to noise would result in adverse effects, as well as uses where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Other noise-sensitive land uses include schools,

Table 3.13-2 Human Response to Different Levels of Groundborne Noise and Vibration

VIBRATION-VELOCITY LEVEL	HUMAN REACTION
65 VdB	Approximate threshold of perception.
75 VdB	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find that transportation-related vibration at this level is unacceptable.
85 VdB	Vibration acceptable only if there are an infrequent number of events per day.
Note: VdB = vibration decibels referenced to 1 μinch/second and based on the root mean square (RMS) velocity amplitude. *Source*: FHWA 1995	

hospitals, convalescent facilities, parks, hotels, offices, places of worship, libraries, and other uses where low interior noise levels are essential. Refer to Figures 3.9-2 through 3.9-4 in Section 3.9, Land Use, for the locations of existing land uses surrounding the SBSP Restoration Project Area, which include nearby noise-sensitive receptors. The locations of these uses in relationship to pond complexes are further discussed below.

As discussed in Section 3.9, Land Use, current land uses in the SBSP Restoration Project Area primarily consist of commercial, industrial, and open space uses adjacent to the pond complexes. Residential sensitive land uses, including schools, are typically located further from the pond complexes, divided by either highway or railroad corridors. Exceptions are the community of Alviso to the east of Pond A8 (divided by the Guadalupe River) and the Eden Shores development next to the ELER.

Existing Noise Levels and Sources

The existing noise environment within the SBSP Restoration Project Area and the regional area is primarily influenced by surface transportation noise emanating from vehicular traffic on nearby roadways (*e.g.*, I-880, SR 84, SR 92, US 101, SR 237), aircraft overflights from nearby airports, railroad operations along railway lines, office uses, and industrial/commercial uses, as discussed separately below. Intermittent noise from outdoor activities at surrounding residences (*e.g.*, people talking, operation of landscaping equipment, car doors slamming, and dogs barking) though minor, also influences the existing noise environment.

Ambient noise levels in urban areas vary widely, depending on the proximity to noise sources and their specified land uses.

Project Setting

The majority of the SBSP Restoration Project Area is near freeways, commercial uses, and industrial uses, as shown in Figures 3.9-2 through 3.9-4 in Section 3.9, Land Use. However, some residential areas are in the vicinity of the SBSP Restoration Project Area. The existing noise environment of each pond complex and the locations of sensitive receptors are discussed below. No noise monitoring was conducted within any of the pond complexes to define the actual noise levels from inside the pond complexes.

Eden Landing

The Eden Landing pond complex is in the City of Hayward, in Alameda County. The City of Union City is to the east and the City of Fremont abuts the pond complex to the south. Noise levels in this area are primarily influenced by vehicular traffic on SR 92, adjacent to and north of the pond complex, and I-880, approximately 1.5 miles to the east. The Hayward General Plan identifies noise contours for major roadways within its jurisdiction. Noise levels within 50 ft (15 meters [m]) of SR 92 range from 75 to 79 L_{dn} (City of Hayward 2003a). Other local noise sources are associated with passing trains and airplanes flying overhead. The Union Pacific Railroad is located less than a mile east of the pond complex. The Hayward Executive Airport is located approximately 2.5 miles to the north. Currently, no major noise sources occur within the Eden Landing pond complex since salt production operations ceased when CDFG acquired the property. With the exception of the trails along the ACFCC, the entire pond complex is closed to the public. Other recreational uses occur within the ELER. Intermittent noises can be heard in the vicinity of these recreational areas.

No sensitive receptors exist within the Eden Landing pond complex. Open space and commercial and industrial uses surround the pond complex to the north, east and south, and San Francisco Bay shoreline is to the west. The nearest sensitive receptors are residences within the Eden Shores development (off Eden Shores Drive in the City of Hayward) approximately 300 ft (91 m) north of Pond E6A. Sensitive residences are also located approximately 1,000 ft (305 m) east of Pond E4C (off Carmel Way in Union City).

Ponds E8A, E8X and E9. Ponds E8A, E8X, and E9 are located in the central portion of the Eden Landing pond complex, and are surrounded by existing ponds to the north, west, and east, and by OAC to the south. No major noise sources are generated from the operation of these ponds, and as such noise levels on site are primarily influenced by the activities described above (traffic from SR 92, overflights, and recreation within the ELER). Sensitive land uses are located approximately 4,000 ft (1,219 m) east of the eastern boundary of Pond E8X, the nearest location to such uses.

Ponds E12 and E13. Ponds E12 and E13 are located in the north-central portion of the Eden Landing pond complex, and are surrounded by existing ponds to the north, west, and south. The ELER is located to the east. No major noise sources are generated from the operation of these ponds, and as such noise levels on site are primarily influenced by the activities described above (traffic from SR 92, overflights, and recreation within the ELER). The nearest sensitive land uses are located approximately 6,000 ft (1,829 m) from the eastern boundary of Pond E13.

Alviso

The Alviso pond complex is located bayward of the cities of Fremont, San Jose, Sunnyvale, and unincorporated Santa Clara County. A small portion of the pond complex is located within the City of Mountain View. The primary local noise sources in the area include transportation systems and airports. US 101 and SR 237 are to the south of the pond complex, and generate vehicular traffic noise. According to the City of Mountain View General Plan, 1990 noise levels on US 101 and SR 237 ranged from 72 to 76 dB (L_{dn}) and 65 to 74 dB (L_{dn}), respectively; these noise levels were expected to be similar in 2005

(City of Mountain View 1992). Airport operations, including plane flights to and from the Palo Alto Municipal Airport (less than 1.5 miles west of the pond complex) and the Moffett Federal Airfield (immediately south of Pond AB2) also contribute to local noise levels at the pond complex. Currently, there are no major noise sources within the pond complex, with the exception of the railroad that crosses the pond complex. Intermittent noises can be heard in the vicinity of recreational facilities (see Section 3.7, Recreation Resources, for a description of these locations).

No sensitive receptors exist within the Alviso pond complex. Most of the Alviso ponds are surrounded by commercial and industrial uses, the Bay, and active Cargill Inc. (Cargill) ponds. The nearest sensitive receptors are residences in the community of Alviso, about 600 ft (183 m) east of Pond A8.

Pond A6. Pond A6 is located on the bayward side of the Alviso pond complex, surrounded by water on three of four sides: the Bay to the north and Guadalupe and Alviso sloughs to the west and east, respectively. Pond A6 is surrounded by other ponds to the south. No major noise sources are generated from the operation of this pond, and as such noise levels on site are primarily influenced by external noise sources including aircraft overflights and recreation adjacent to the pond. The closest sensitive land uses (community of Alviso) are more than 13,000 ft (3,962 m) to the southeast.

Pond A8. Pond A8 is located on the southeastern portion of the Alviso pond complex, surrounded to the north, south, and west by other ponds, and to the east by the community of Alviso. The Guadalupe River separates the pond from the community. No major noise sources are generated from the operation of this pond, and as such noise levels on site are primarily influenced by external noise sources including traffic along SR 237, overflights, and recreation adjacent to the pond. The closest sensitive uses within the community of Alviso are located approximately 600 ft (183 m) to the east.

Pond A16. Pond A16 is located at the eastern edge of the Alviso pond complex, surrounded by ponds to the north, east, and west. The New Chicago Marsh and the Refuge EEC are located to the south. Recreational trails are provided around Pond A16, and are the major noise source at the pond. In addition, external noise sources including traffic along SR 237 and overflights influence the noise environment at this pond. The nearest sensitive land use is the community of Alviso, located approximately 2,000 ft (610 m) to the south. The noise level along SR 237 (south of Pond A6) is approximately 77 dBA (CNEL) at 50 ft (15 m), based on the vehicle volume traveling along the highway. Noise levels decrease to 55 dBA (CNEL) at approximately 2,300 ft (701 m) from SR 237.

Ravenswood

The Ravenswood pond complex is adjacent to the Dumbarton Bridge on the west side of the Bay. It is contained within the City of Menlo Park, but is bordered to the northwest and southeast by the cities of Redwood City and East Palo Alto, respectively. Noise levels in this pond complex are greatly influenced by vehicular traffic on SR 84 (Dumbarton Bridge) which extends through the pond complex, and on Bayfront Expressway, along the western boundary of the pond complex). The noise level along SR 84 is approximately 75 dBA (CNEL) based on the vehicle volume traveling along the highway. Noise levels decrease to 55 dBA (CNEL) at approximately 1,500 ft (457 m) from SR 84. Other noise sources include the Union Pacific Railroad less than a quarter mile south of the pond complex, and airplanes flying

overhead to and from the San Carlos Airport (situated less than five miles to the northwest). No major noise sources exist within the pond complex. Intermittent noises can be heard in the vicinity of recreational facilities (see Section 3.7, Recreation Resources, for descriptions of these locations). No sensitive receptors occur within the Ravenswood pond complex. The nearest sensitive receptors are less than 500 ft (152 m) south of Pond SF2 (off University Avenue) and more than 700 ft (213 m) south of Pond R3.

Pond SF2. Pond SF2 is located in the western portion of the pond complex, surrounded by the Bay to the east, and by other ponds to the north and west. SR 84 and PG&E substation is also located to the north. The Ravenswood Open Space Preserve is located to the south of the pond. SR 84 forms the northern boundary of the pond. No major noise sources are generated from the operation of this pond, and as such noise levels on site are primarily influenced by external noise sources including traffic along SR 84, overflights, and recreation adjacent to the pond (along SR 84 and within the Preserve). The nearest sensitive land uses are located less than 500 ft (152 m) to the south.

3.13.3 Regulatory Setting

Noise is regulated in the SBSP Restoration Project Area and the regional area through implementation of local general plan policies and noise regulations. Local general plans identify general principles intended to guide and influence development plans, and noise regulations set forth specific standards and procedures for addressing particular noise sources and activities.

The purpose of noise regulations is to protect the health and welfare of the public by minimizing excessive, unreasonable, and unnecessary noise. Each jurisdiction defines unacceptable noise levels, and in most cases, noise level standards and work hour limitations, to achieve this goal.

Eden Landing

City of Hayward

The City of Hayward General Plan identifies and describes the existing noise sources in the City, projects noise levels in the future, and provides policies and strategies to protect the public health, safety and welfare against the adverse effects of excessive noise (City of Hayward 2003a).

Appendix N of the General Plan specifies noise guidelines for new development (City of Hayward 2003a). New development projects must meet acceptable noise level standards established in the Land Use Compatibility Standards for Community Noise Environments. Normally acceptable noise levels for residential and school land uses for transportation noise sources are as follows:

- Residential uses (low-density single family, duplex, mobile homes): 45 to 60 dBA (L_{dn} or CNEL);
- Multi-family residential, transient lodging: 45 to 65 dBA (L_{dn} or CNEL); and
- Schools/libraries: 45 to 70 dBA (L_{dn} or CNEL).

However, additional considerations are provided below for residential uses:

1. The maximum acceptable exterior noise level in residential areas is an L_{dn} of 55 dB for single-family development and an L_{dn} of 60 dB for multi-family development.

The City of Hayward Section 4.1.03 of the Municipal Code Noise states that "it shall be unlawful for any person in the City of Hayward to cause, suffer, permit or allow the repeated or persistent emission of any noise or sound produced by any such person, or by any animal or fowl, or any mechanical means, within his possession, ownership or control, which by reason of its raucous nature shall disturb the peace and quiet of any person or persons in the City of Hayward." Although the Code does not specify noise limitations for stationary sources, Section 4.1.03 of the Municipal Code prohibits construction noise[1] level more than six dB above the local ambient level at any point outside the property plane before 7 am and after 7 pm daily except on Sundays and holidays. On Sundays and holidays the restrictions apply to before 10 am and after 6 pm. (City of Hayward 2003b).

In addition, the Code states that "no person shall produce, suffer or allow to be produced by any machine, animal or device, or any combination of same, on or abutting areas zoned or used for residential purposes, a construction noise level more than 6 dB above the local ambient level at any point outside the property plane before the hour of 7 am and after the hour of 7 pm daily except on Sundays and holidays. On Sundays and holidays the restrictions of this subsection shall apply before 10 am and after 6 pm."

The City Manager or its designee may provide exception permits in cases where the applicants can show that a diligent investigation of available noise abatement techniques indicates that immediate compliance with the requirements would be impractical or unreasonable. However, appropriate conditions to minimize public detriment caused by such exceptions would be required (City of Hayward 2003b).

Alviso

Fremont

Noise is regulated in Fremont through enforcement of Municipal Code performance standards and implementation of General Plan policies.

Article 19, Section 8-21904 of the Fremont Municipal Code contains noise performance standards for the land uses within the City, at the property line nearest the source of a suspected violation. The maximum noise generated by such use cannot exceed 60 dBA when adjacent uses are residential, park or institutional uses. Less stringent standards apply to adjacent commercial or industrial uses (65 to 70 dBA, respectively). Excluded from these standards are occasional sounds generated by the movement of railroad equipment, temporary construction activities, or warning devices (City of Fremont 2004).

[1] According to Section 4-1.03(b)(1)iii), "construction" means any site preparation, assembly, erection, substantial repair, alteration, dismantling, intentional destruction or removal of structures, utilities, public or private right-of-way surfaces, or similar property, and other activities incident thereto.

San Jose

The City of San Jose General Plan identifies goals and policies to reduce noise impact on people. Specifically, its goal is to minimize noise levels through noise reduction and suppression techniques, as well as appropriate land use policies. The City's acceptable noise level objectives are 55 L_{dn} for long-range exterior noise quality level, and 60 L_{dn} for the short-range exterior noise quality level (City of San Jose 2004).

Chapter 20 of the City of San Jose Municipal Code provides exterior noise standards for specific land use districts. Noise level standards vary from a maximum noise level of 55 (*e.g.*, residential) to 70 dBA (*e.g.*, industrial or open space next to industrial uses) unless a conditional use permit is granted. The Municipal Code does not specifically call out noise exemptions for construction activities (City of San Jose 2004b).

Sunnyvale

The goals of the Noise Sub-Element of the City of Sunnyvale General Plan is to maintain a compatible noise environment for all land uses in the community, reduce transportation noise, and maintain or achieve acceptable limits for the levels of noise generated by land use operations and single-events. The General Plan identifies policies and action statements to achieve these goals.

Section 16.08.110 of the Sunnyvale Municipal Code specifies noise limitations and hour of construction. The section describes qualitative noise standards which include no loud environmentally disruptive noises (*i.e.*, air compressors without mufflers, continuously running motors or generators, loud playing musical instruments, and radios) if such noises is a nuisance to adjacent residential neighborhoods. Construction is permitted between 7 am and 6 pm. Monday through Friday, and 8 am and 5 pm on Saturdays. Construction activities are prohibited within the City on Sundays and national holidays. Exceptions to these hours are permitted only for homeowners.

The City of Sunnyvale Municipal Code does not provide noise limitations for stationary noises.

Santa Clara County

The Santa Clara County General Plan provides noise compatibility standards for land use within the County, as well as strategies and policies to ensure that residents are free from noise that affects their health and wellbeing (Santa Clara County 1994). Satisfactory noise levels range from 45 to 55 L_{dn} for residential uses, hotel uses, parks, open space reserves, and wildlife refuges, 65 L_{dn} for public or semi-public facilities (church, hospital, nursing home, school, libraries, civic buildings), 65 L_{dn} for other non-hotel commercial uses and agricultural uses, and 70 L_{dn} for industrial uses.

Relevant noise strategies, policies, and implementation include:

Strategy #1: Prevent or Minimize Noise Conflicts.

C-HS 24. Environments for all residents of Santa Clara County free from noises that jeopardize their health and well-being should be provided through measures which promote noise and land use compatibility.

C-HS 25. Noise impacts from public and private projects should be mitigated.

C-HS(i) 25. Prohibit construction in areas which exceed applicable interior and exterior standards, unless suitable mitigation measures can be implemented.

Chapter VIII, Section B-11 of the Santa Clara County Code prohibits unnecessary, excessive, and annoying noise to ensure public health, welfare and safety (Santa Clara County 2003). It provides maximum exterior noise limits for specific land uses during specified time periods. Permissible noise levels range from 45 to 75 dBA, for residential uses during the night (10 pm to 7 am) to heavy industrial uses anytime during the day, respectively. Residential public space is limited to 55 dBA during the daytime hours (7 am to 10 pm). Higher noise levels are permitted for construction and demolition activities. The maximum noise levels for repetitively scheduled and relatively long-term operation stationary equipment ranges from 60 to 70 dBA between the hours of 7 am to 7 pm, depending on the land use. Noise levels for nonscheduled, intermittent short-term operation increases by 15 dBA above the stationary source. Variance to noise provisions may be authorized by the Director, assuming that permitted conditions included by the Director are protective.

The Santa Clara County Code also provides exterior noise limits for various receiving land use categories. For one- to two- story residential uses, noise levels cannot exceed 45 and 55 dBA for more than 30 minutes in any hour from 10 pm to 7 am and from 7 am to 10 pm, respectively (Santa Clara County 2003).

Mountain View

The City of Mountain View 1992 General Plan (City of Mountain View 1992) provides noise acceptability guidelines for specific land uses and identifies policies to meet the City's goal to reduce noise and its effects on people. Normally acceptable, external noise levels for public, residential, and passive open space range from 40 to 55 L_{dn} or CNEL. Conditionally acceptable noise levels for these uses range from 55 to 65 L_{dn} or CNEL; levels above 65 L_{dn} are either potentially or normally unacceptable. Acceptable noise levels for commercial, intensive open space, and industrial uses are higher.

Section 8.23 of the Mountain View Municipal Code provides limitations on the hours of construction. Construction activity (any physical activity on the construction site or in the staging area, including the delivery of materials) is limited to the hours of 7 am and 6 pm, Monday through Friday (City of Mountain View 2003). Construction activity is not permitted on Saturday or Sunday or holidays unless prior written approval is granted by the building official. Construction hours can be modified by the building official, with sufficient notice and as long as appropriate signage is installed.

The City of Mountain View Municipal Code does not provide noise limitations for stationary noises.

Ravenswood

Menlo Park

The City of Menlo Park, Policy Document (Adopted December 1, 1994) does not provide goals or policies associated with minimization of noise.

Section 8.06.030 of the Menlo Park Municipal Code defines the noise limitations within City boundaries. For all sources of sound measured from any residential property, the night- and day-time noise limitations are 50 dBA and 60 dBA, respectively (City of Menlo Park 2004). Construction activities are allowed between the hours of 8 am and 6 pm Monday through Friday. Exceptions are granted when a use permit is issued by the City that specifically allows noise levels to be exceeded, but this requires posting of signage with the permitted hours of construction). Limitations are also set for powered equipment that is operated on a temporary, occasional or infrequent basis between the hours of 8 am and 6 pm Monday through Friday. No piece of equipment is allowed to generate levels in excess of 85 dBA at 50 ft (15 m).

Other Relevant Plans In the Region

Union City

The Health and Safety Element of the Union City General Plan Policy Document discusses the noise environment in the City, provides maximum allowable noise levels based on land uses, and identifies policies and implementation programs to achieve the goal of protecting public health and welfare (City of Union City 2002).

Union City provides the maximum allowable noise exposure by land use. Normally acceptable noise levels for residential uses, including schools, are as follows:

- Residential Uses (low-density single family, duplex, mobile homes): 45 to 60 dBA (L_{dn} or CNEL); and
- Multi-family residential, group homes, motels/hotels, schools, libraries, churches, hospitals, extended care: 45 to 60 dBA (L_{dn} or CNEL).

Section 9.40 of the Union City Municipal Code identifies noise limits for various land uses. For residential property, the Code prohibits noise levels more than 10 dBA above the local ambient noise at any point outside of the property plane. The noise limitation is less stringent for commercial and industrial property; the Code permits up to 12 dBA above the local ambient noise level at any point outside of the property line (City of Union City 2002).

Section 9.40.053 identifies noise restrictions associated with construction activities. Construction, alteration, or repair activities are authorized by valid City permit between the hours of 8 am and 8 pm. Monday through Friday, 9 am to 8 pm on Saturday, and 10 am to 6 pm on Sunday and holidays if at least one of the following noise limitations are met: 1) no individual piece of equipment shall produce a noise level exceeding 83 dBA at a distance of 25 ft (8 m), or 2) the noise level at any point outside the property plane of the project shall not exceed 86 dBA. Exception permits are permitted in accordance with

Section 9.40.060 as long as appropriate conditions to minimize the public detriment caused by such exceptions are implemented (City of Union City 2002).

City of Newark

The City of Newark General Plan includes a Noise chapter that describes noise characteristics, levels, standards and criteria, and sources, and provides policies and programs to achieve the City's goals to reduce noise impacts. The chapter identifies the exterior noise exposure limits for various community noise environments and noise emissions standards, including the maximum allowable noise levels from construction equipment operating in the City of Newark. Relevant policies include maintaining standards for acceptable noise levels for all residential, industrial, and commercial development and for noise-sensitive uses such as hospitals and schools; and reducing unnecessary, excessive and annoying noises within the City (City of Newark 1992). Title 17 of the Municipal Code provides restrictions on uses within certain zoning districts (including industrial uses) that produce noise.

Palo Alto

The Natural Environment chapter of the City of Palo Alto Comprehensive Plan includes a subsection on noise. The subsection identifies noise sources within the City, noise levels adjacent to roadways, and goals, policies, and programs to address community noise, and provides a land use noise compatibility chart presenting acceptable and unacceptable noise levels. Relevant policies include encouraging the location of land uses in areas with compatible noise, evaluating the noise effects of a project, protecting sensitive noise receptors, and identifying noise reduction measures.

Chapter 9.10 of the City of Palo Alto Municipal Code require protection of its citizens from excessive, unnecessary and unreasonable noises from any and all sources in the community (City of Palo Alto, No date). It provides noise limits for residential, commercial, and industrial properties, and identifies exceptions to these noise limits. Construction, alteration and repair activities which are authorized by valid City building permit shall be prohibited on Sunday and holidays, and shall be prohibited except between the hours of 8 am and 6 pm Monday through Friday, and 9 am and 6 pm on Saturday provided that no individual piece of equipment exceeds 110 dBA at a distance of 25 ft (8 m), the noise level at any point outside of the property plane does not exceed 110 dBA, and signage is appropriately posted.

East Palo Alto

The City of East Palo Alto General Plan (December 1999) includes a Noise Element that describes existing noise sources, provides policies and programs to achieve the City's goals to reduce noise impacts, and provide noise standards and land use compatibility guidelines.

Section 8.52 of the East Palo Alto Municipal Code prohibits the continued and unreasonably loud, unnecessary unusual noise which disturbs the peace and quiet of any neighborhood or which causes any discomfort or annoyance to any person of normal sensitivity residing in the area. It also provides exterior noise level standards for sensitive uses (single / multiple family residence, school, hospital, church or public library properties) in and adjacent to the City. Specifically, noise levels are restricted to 55 to

75 dBA during the daytime hours (7 am to 10 pm) and 50 and 70 dBA (10 pm to 7 am) during the nighttime hours, depending on the duration of noise (City of East Palo Alto 2003). Exemptions are provided for noise sources associated with demolition, construction, repair, remodeling or grading of property, provided such activities do not occur between the hours of 8 pm and 7 am.

Redwood City

The Noise Element of the Redwood City General Plan identifies the objectives and general policies to minimize noise impacts on people, reduce the impact of point noise sources, and reduce ambient noise levels. Applicable policies to achieve such objectives include limiting the hours of operation at all noise generation sources wherever practicable and requiring all exterior noise sources (*e.g.*, construction operations, air compressors, and pumps) to use available noise suppression devices and techniques to bring exterior noise down to acceptable levels compatible with adjacent land uses (City of Redwood City 1990).

Chapter 24, Noise Regulation, of the Redwood City Municipal Code prohibits excessive and unreasonable noises (including but not limited to noise levels by machinery, construction equipment or device) at more than 110 dB measured within a residential district of the City at a distance of 25 ft (8 m) from the machinery, equipment or device (City of Redwood City 2003). Section 24.32 prohibits construction activities in a residential district or within 500 ft (152 m) of a residential district between the hours of 8 pm and 7 am Monday through Friday or at any time on Saturday, Sunday or holidays if the noise level exceeds the local ambient measured at any point within the residential district and outside of the plane of subject property.

3.13.4 Environmental Impacts and Mitigation Measures

Approach to Analysis

Construction

Construction activities would occur under the SBSP Restoration Project Alternatives B and C and Phase 1 actions only. They do not apply to the No Action Alternative (Alternative A and the Phase 1 No Action).

Construction Noise. Noise impacts would depend on the type of activity, the equipment used, and the distance from sensitive receptors. A discussion of the typical construction equipment that would be used and their associated noise levels, the distances of the SBSP Restoration Project sites from sensitive receptors, and projected noise levels at the sensitive receptors from construction and operation of the Project are presented below.

In general, construction activities would include excavation, backfilling, material transport, and other miscellaneous activities (using both land- and water-based equipment). On-site construction equipment would likely include an excavator, front-end loader, bulldozer, forklift, vibratory roller, dump truck, and water truck. A crane and piledriver may also be used during construction activities. Water-based equipment may include small barges, and hydraulic or bucket dredges. According to USEPA, noise levels for typical construction equipment range from 74 to 101 dBA at 50 ft (15 m) without feasible

control measures, as indicated in Table 3.13-3. Noise levels could decrease by 1 dBA to as much as 16 dBA with feasible noise control measures, such as intake mufflers, exhaust mufflers, and engine shrouds in accordance with manufacturers' specifications.

Table 3.13-3 Typical Construction-Equipment Noise Levels for Various Types of Equipment

TYPE OF EQUIPMENT	NOISE LEVEL IN DBA AT 50 FT	
	WITHOUT FEASIBLE NOISE CONTROL	WITH FEASIBLE NOISE CONTROL[1]
Dozer or Tractor	80	75
Excavator	88	80
Front-end Loader	79	75
Backhoe	85	75
Vibratory Roller	74	74
Crane	83	75
Truck	91	75
Piledriver	101	95
Water Pump	76	75
Diesel Generator	78	75

Note:
[1] Feasible noise control includes the use of intake mufflers, exhaust mufflers, and engine shrouds in accordance with manufacturers' specifications.
Source: EPA 1971, FTA 1995

Tables 3.13-4 and 3.13-5 show the distances of the nearest sensitive receptors from construction and O&M activities at each pond complex or Phase 1 action site. Short-term construction activities would include general earthmoving activities using the equipment identified in Table 3.13-1. It should be noted that Tables 3.13-4 and 3.13-5 present distinctions between general construction activities and piledriving activities. General construction activities can occur anywhere within the pond complexes, so the edges of the ponds closest to sensitive receptors were used to determine the approximate distance to the nearest sensitive receptors. Piledriving activities would be required to install new or repair existing water control structures. The existing and proposed water control structures are shown in the program alternative maps (Figures 2-4a through 2-5c and Figures 2-7a through 2-7c) and the Phase 1 restoration plans (Figures 2-9, 2-10, 2-15 through 2-17, and 2-21) in Chapter 2, Description of Alternatives. As such, the distance from piledriving activities to the nearest sensitive receptors can be better approximated. The assumptions of the distances form work sites form the basis of the analyses presented in this section. Long-term activities would include O&M activities (including use of piledrivers) and operation of pumps.

Table 3.13-6 shows the calculated noise levels at various distances associated with construction activities. It also shows the expected noise levels at sensitive receptors at specific ponds. The noise levels were calculated based on the following two assumptions:

Table 3.13-4 Program Alternatives – Distances to the Nearest Sensitive Receptors

POND COMPLEX	APPROXIMATE DISTANCE FROM THE NEAREST CONSTRUCTION (EARTHMOVING) ACTIVITIES (FT) [1]	APPROXIMATE DISTANCE FROM THE NEAREST PILEDRIVING ACTIVITY (OPERATION) (FT) [2]	APPROXIMATE DISTANCE TO THE NEAREST PORTABLE PUMPS (OPERATION) (FT)
Eden Landing	300 (E6A)	1,500 (E6A, E6B)	300 (E6A)
Alviso	600 (A8)	1,000 (A8)	2,200 (A16)
Ravenswood	500 (SF2)	2,000 (SF2)	500 (SF2)

Notes:
Distances are rounded to the nearest 100 ft.
[1] The distances are measured from the edge of the pond closest to the sensitive receptors (residential uses) to the sensitive receptors. Earthmoving activities may occur anywhere within the pond complexes
[2] The distances are measured from the location where piledriving would occur (typically at water control facilities) to the nearest sensitive receptors.
[3] The portable pumps may be operated anywhere within the pond complexes. As such, the nearest approximate distances to sensitive receptors were used.

Table 3.13-5 Phase 1 Actions – Distances to the Nearest Sensitive Receptors

PHASE 1 ACTION PONDS	APPROXIMATE DISTANCE FROM THE NEAREST CONSTRUCTION (EARTHMOVING) ACTIVITIES (FT) [1]	APPROXIMATE DISTANCE FROM THE NEAREST PILEDRIVING ACTIVITY (OPERATION) (FT) [2]	APPROXIMATE DISTANCE TO THE NEAREST ELECTRIC PUMPS (OPERATION) (FT) [3]
Eden Landing			
E12/13	6,000	–	6,000
E8A, E8X, and E9	4,000	–	–
Alviso			
A6	13,000	–	–
A8	600	1,000	–
A16	2,000	–	–
Ravenswood			
SF2	500	2,000	2,200

Notes:
Distances are rounded to the nearest 100.
[1] Distances are measured from the edge of the pond closest to the sensitive receptors (residential uses) to the sensitive receptors.
[2] Distances are measured from the location where piledriving would occur (typically at water control facilities) to the nearest sensitive receptors.
[3] Portable pumps may be used anywhere within the pond complexes. As such, the nearest approximate distance (from the perimeter of the ponds) to sensitive receptors were used.
– = Not Applicable. For Column 2, distances were not measured as there would not be any piledriving activities in the specified ponds. For Column 3, distances were not measured as no electric pumps would be operated at the specified ponds.

Table 3.13-6 Predicted Construction Noise Levels at Various Distances

PROJECT CONSTRUCTION SITES[1]	DISTANCE BETWEEN CONSTRUCTION SITES AND SENSITIVE RECEPTORS (FT)[2]	PREDICTED NOISE LEVELS (DBA)
	50	102
Eden Landing (E6A) – Program Alternatives	300	86
Ravenswood (SF2) – Program Alternatives / Phase 1 Action	500	82
Alviso (A8) Program Alternatives / Phase 1 Action	600	80
Alviso (A16) – Phase 1 Action	2,000	70
Eden Landing (E8A, E8X, and E9) – Phase 1 Action	4,000	64
Eden Landing (E12/E13) – Phase 1 Action	6,000	60
Alviso (A6) – Phase 1 Action	13,000	53

Notes:
Noise levels are based on attenuation at 6 dB for doubling of distance
[1] The nearest sensitive receptors are based on the measurement from the edge of the pond closest to the sensitive receptors to the sensitive receptors.
[2] No sensitive receptors are located within 50 ft (15 m) of the SBSP Restoration Project Area. This distance and associated noise level are presented to identify the assumed equipment noise levels at 50 ft (15 m). The subsequent distances and noise levels show how such noise levels attenuate as distance increases.

- Combined intermittent noise levels of 102 dBA at 50 ft (15 m) without feasible noise control, based on the simultaneous use of the three noisiest types of construction equipment shown in Table 3.13-1; and
- A typical noise-attenuation rate of 6 dBA per doubling of distance.

The assumption associated with the use of the three noisiest types of construction equipment provides for the most conservative analysis of potential noise levels. It should be noted that in many cases, either piledriving is not necessary or construction activities would not occur at the edge of the pond nearest to the sensitive receptors, so noise levels would likely be lower than those reported below. In addition, construction activities would not only occur at the edge of the pond, but would likely be distributed throughout the pond or pond complexes. In those cases, the longer distance between sensitive receptors and the construction work area would further decrease noise levels through distance attenuation.

Construction Traffic-related Noise. As much as 10 to 15 million cubic yards (cy) of fill may be imported to the site for levee construction and/or habitat features over the 50-year planning horizon. The material may be brought to the SBSP Restoration Project Area by trucks and/or barge. Assuming transportation of the fill only occurs via trucks with storage capacity of 20 cy per truck, as many as 750,000 two-way truck trips would be generated. Assuming truck trips would occur over the 50-year planning period, up to 136 one-way truck trips would be generated daily for the delivery of fill material (as described in Section 3.12, Traffic, the actual number may be higher or lower depending on the number of phases and how traffic is distributed throughout each subsequent phase). It is possible that portions of

the fill may be delivered by barge, and the remainder would be delivered by trucks to locations that are spread geographically around the South Bay. Project phasing and the actual amount of imported fill required for each phase have not yet been determined. For the purposes of this analysis, 136 one-way daily trips are used. In addition, short-term construction traffic would consist of up to 25 daily one-way worker commute trips (assuming 10 workers per crew and 2.5 trips per worker per day), and other construction truck trips to deliver equipment and materials. Estimates of these other construction truck trips have not yet been determined and would be determined for each Project phase. Detailed evaluations of traffic-related noise impacts based on more realistic estimates will be conducted as part of the project-level environmental review for future phases of the Project.

Construction Vibration. Construction activities would generate vibration. Vibration levels depend on the specific construction equipment used and operations involved. Vibration generated by construction equipment spreads through the ground and diminishes in magnitude with increases in distance. Table 3.13-7 shows the vibration levels generated by typical construction equipment. The California Department of Transportation's (Caltrans') recommended standard with respect to the prevention of structural building damage is 0.2 in/sec PPV for normal structures, and the Federal Transit Administration (FTA's) maximum-acceptable vibration standard is 80 VdB (Federal Transit Administration 1995) with respect to human annoyance for residential uses. As shown in Table 3.13-7, the highest vibration is generated from impact piledrivers, which would exceed both Caltrans and FTA standards at 25 ft (8 m). The use of trucks, drilling, and bulldozers would also exceed FTA standards at 25 ft (8 m) with respect to human annoyance for residential uses. In general, piledriving would be needed wherever water control structures are located.

Table 3.13-7 Typical Construction Equipment Vibration Levels

EQUIPMENT		PPV AT 25 FT (IN/SEC)[1]	APPROXIMATE LV AT 25 FT[2]
Piledriver (impact)	Upper range	1.518	112
	Typical	0.644	104
Piledriver (sonic)	Upper range	0.734	105
	Typical	0.170	93
Large Bulldozer		0.089	87
Caisson Drilling		0.089	87
Trucks		0.076	86
Jackhammer		0.035	79
Small Bulldozer		0.003	58

Notes:
[1] PPV is the peak particle velocity
[2] Lv is the velocity level in decibels (VdB) referenced to 1 µinch/second and based on the root mean square (RMS) velocity amplitude.
Source: FTA 1995

O&M. Under the No Action Alternative (Alternative A and Phase 1 No Action), O&M activities would involve both piledriving (at limited locations) and limited levee maintenance. Piledriving for O&M purposes would result in noise levels and vibration impacts. Noise levels associated with the use of piledrivers and other equipment during O&M activities are shown in Table 3.13-8. Vibration levels at nearby sensitive receptors from construction activities are shown in Table 3.13-9.

Table 3.13-8 Predicted Noise Levels Associated with O&M Activities

PROJECT O&M SITES	DISTANCE BETWEEN CONSTRUCTION SITES AND SENSITIVE RECEPTORS (FT) [1]	PREDICTED NOISE LEVELS (DBA)
	50[2]	102
Alviso (A8)	1,000	76
Eden Landing (E6A, E6B)	1,500	72
Ravenswood (SF2)	2,000	70

Notes:
Noise levels are based on attenuation at 6 dB for doubling of distance.
[1] The nearest sensitive receptors are based on the measurement from the edge of the pond closest to the sensitive receptors to the sensitive receptors.
[2] No sensitive receptors are located within 50 ft (15 m) of the SBSP Restoration Project Area. This distance and associated noise level are presented to identify the assumed equipment noise levels at 50 ft (15 m). The subsequent distances and noise levels show how such noise levels attenuate as distance increases.

Table 3.13-9 Predicted Vibration Levels at Nearby Sensitive Receptors from Construction Activities

DISTANCE (FT)	PPV (IN/SEC)	APPROXIMATE LV (DVB)	EQUIPMENT USED	PROJECT CONSTRUCTION SITES
300	0.0021	54.6	Bulldozer / Caisson Drilling	Pond E6A
500	0.0009	47.9	Bulldozer / Caisson Drilling	Pond SF2
600	0.0008	45.6	Bulldozer / Caisson Drilling	Pond A8
1000	0.006	63.9	Piledriving	Pond A8 (Program Alternatives/Phase 1 Action)
1,500	0.0032	58.7	Piledriving	Pond E6A, E6B (Program Alternatives/Phase 1 Action)
2,000	0.0021	54.9	Piledriving	Pond SF2 (Program Alternatives/Phase 1 Action)

Note: Vibration Levels generated by piledriving and/or other construction equipment as designated in the 4th column

The SBSP Restoration Project Alternatives B and C and Phase 1 actions would require the operation of portable diesel pumps anywhere within the pond complex where managed ponds are proposed and electric pumps at specific locations within the ponds. The portable pump would be diesel and have a capacity of 20,000 gpm. The frequencies of use of the portable pumps have not yet been determined, but

may be operated continuously for periods of one to two days several times per year. The characteristics and the frequencies of use of the electric pumps would differ. Because the specifications of the pumps have not yet been determined, it is assumed that the pump would generate a noise level of 76 dBA L_{eq} at 50 ft (15 m). Table 3.13-10 shows the calculated noise levels at various distances associated with operation of the pumps, and the expected noise levels at sensitive receptors at specific ponds. This analysis also assumes that the pumps would be operated during the nighttime, sleep-sensitive period, and as such provides a conservative analysis of potential operational noise effects.

Table 3.13-10 Predicted Operation Noise Levels of Pumps at Various Distances

NEAREST SENSITIVE RECEPTOR AT PONDS	DISTANCE (FT) [1]	PREDICTED NOISE LEVELS (DBA)
	50	76
Eden Landing (E6A)	300	60
Ravenswood (SF2)	500	56
Alviso (A16)	2,200	43

Note:
[1] No sensitive receptors are located within 50 ft (15 m) of the SBSP Restoration Project Area. This distance and associated noise level are presented to identify the assumed pump equipment noise levels at 50 ft (15 m). The subsequent distances and noise levels show how noise levels attenuate as distance increases.

Long-term Operations. The SBSP Restoration Project Area would be open space, consisting of tidal habitat/managed ponds and passive recreational facilities. New recreational facilities would be constructed only for Alternatives B and C and Phase 1 actions. Under these alternatives, the pond complexes would include recreational facilities that permit walking/hiking/biking, birdwatching, kayaking, viewing wildlife and wetlands, and learning about the history and uses of the area. No active recreational uses (*e.g.*, ball fields) would be constructed. The anticipated noise levels generated by the passive recreational uses would not substantially alter the ambient noise environment, especially in areas where recreation already exists within the pond complexes or is located adjacent to the pond complexes. The low and occasional noise levels generated by recreational users would not be noticeable from off-site locations, especially in relation to the distance from sensitive receptors (in most cases, industrial uses separate the open space uses and residential uses). Noise generated by area roadways and highways, railroads, and overflights, the dominant noise source in the area, would in some cases be much higher than any noise generated from passive recreational users.

Significance Criteria

For the purposes of this EIS/R, a significant noise impact would occur if the Project resulted in the following:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;

- A substantial permanent increase in ambient noise levels in the Project vicinity above levels existing without the Project;
- A substantial temporary or periodic increase in ambient noise levels in the Project vicinity due to construction activities; or
- Exposure of people residing or working in the Project Area to excessive aircraft–generated noise levels.

The quantitative noise standards depend on the jurisdictions where activities would occur (see Section 3.13.2 above), and are discussed below in relation to the SBSP Restoration Project.

The SBSP Restoration Project would not expose people residing or working in the SBSP Restoration Project Area to excessive aircraft-generated noise levels, as no habitable structures would be located within the pond complexes, and the SBSP Restoration Project Area is not in an area with excessive aircraft-generated noise levels.

As explained in Section 3.1.2, while both CEQ Regulations for Implementing NEPA and the CEQA Guidelines were considered during the impact analysis, impacts identified in this EIS/R are characterized using CEQA terminology. Please refer to Section 3.1.2 for a description of the terminology used to explain the severity of the impacts.

Program-Level Evaluation

SBSP Long-Term Alternatives

SBSP Impact 3.13-1: **Short-term construction noise effects.**

Alternative A No Action. Under this alternative, no construction activities would occur within the pond complexes. While limited O&M activities would be ongoing, they are considered part of Project operation and not construction. As such, no construction-generated noise would occur and no impact would occur.

Operation-related noise effects are evaluated in SBSP Impact 3.13-4, below.

Alternative A Level of Significance: No Impact

Alternative B Managed Pond Emphasis. Implementation of Alternative B would involve construction and earthmoving activities for flood management and restoration, associated with the modification of levees (breaching and lowering), excavation of pilot channels, installation of water control structures, creation of nesting islands, creation of tidal habitat, and construction of recreational facilities (trails, interpretative stations, viewing platforms, staging areas, and amenities).

As shown in Table 3.13-6, the exterior noise levels at the nearest sensitive receptor (300 ft [approximately 91 m] at the Eden Landing pond complex would be 86 dBA (L_{eq}). Noise levels would decrease as the distance between construction activities and sensitive receptors increase. The potential for significant noise impacts would depend on the noise limitations established for each agency (see Section 3.13.3

above). Most jurisdictions have exemptions for noise generated from construction activities between specified daytime hours Monday through Friday (see Section 3.13.3). Some jurisdictions also exempt noise levels associated with construction activities that occur between specified hours on Saturday and Sunday. In some cases, exceptions to the hours can be requested. For some jurisdictions, exemptions for construction activities are not identified; however, conditional use permits can be obtained for activities generating noise levels that are expected to exceed noise standards.

Although construction of the SBSP Restoration Project would likely occur during the daytime hours, the exact hours of construction have not yet been determined. If construction activities were to occur during the more noise-sensitive hours (*e.g.*, evening, nighttime, and early morning outside the exempted hours) or construction equipment is not properly equipped with noise control devices, construction-generated source noise may exceed the applicable standards at existing nearby existing noise-sensitive land uses. In addition, if construction activities were to occur during noise-sensitive hours, construction-generated noise levels may result in annoyance and/or sleep disruption to occupants of the existing nearby noise-sensitive land uses and create a substantial temporary increase in ambient noise levels in the Project vicinity. As a result, this impact would be significant, and implementation of SBSP Mitigation Measure 3.13-1 would be required to reduce potentially significant impacts to less than significant.

SBSP Mitigation Measure 3.13-1: Short-term noise effects.

The landowners shall include in construction plans and specifications the following requirement:

- All construction activities shall be limited to the days and hours or noise levels designated for each jurisdiction where work activities occur, as specified below:

  Eden Landing

  - City of Hayward: construction activities shall occur between 7 am and 7 pm Monday through Saturday and 10 am to 6 pm Sunday and holidays only.

  Alviso

  - City of San Jose: construction activities shall not exceed 55 dBA at residential-zoned districts except upon issuance of and in compliance with a Conditional Use Permit;
  - City of Fremont: there are no restrictions for temporary construction activities;
  - City of Sunnyvale: construction activities shall occur between 7 am and 6 pm Monday through Friday and 8 am to 5 pm on Saturday. Construction activities shall not occur during Sunday or national holidays;
  - Santa Clara County: construction activities shall occur during the daytime hours of 7 am to 7 pm Monday through Saturday, except legal holidays; and

- City of Mountain View: construction activities shall occur between 7 am and 6 pm Monday through Friday. Construction activities shall not occur during Saturdays, Sundays or holidays unless prior written approval is granted by the building official.

Ravenswood

- City of Menlo Park: construction activities shall occur between 8 am and 6 pm Monday through Friday only.

- Locate all construction equipment staging areas at the furthest distance possible from nearby noise-sensitive land uses; and
- Construction equipment shall be properly maintained and equipped with noise control, such as mufflers, in accordance with manufacturers' specifications.

Alternative B Level of Significance: Less than Significant with Mitigation

Alternative C Tidal Habitat Emphasis. Implementation of Alternative C would result in similar noise impacts as Alternative B because construction activities would involve the same equipment and construction would occur generally in the same locations relative to the nearby sensitive receptors. Impacts would be potentially significant and SBSP Mitigation Measure 3.13-1 would be required to reduce potential effects to less-than-significant levels.

Alternative C Level of Significance: Less than Significant with Mitigation

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SBSP Impact 3.13-2: **Traffic-related noise impacts during construction.**

Alternative A No Action. Under this alternative, no construction activities would occur within the pond complexes. As such, no construction traffic-related noise would be generated and no impact would occur.

Operation-related noise effects are evaluated in SBSP Impact 3.13-3 below.

Alternative A Level of Significance: No Impact

Alternative B Managed Pond Emphasis. As much as 10 to 15 million cy of fill may be imported to the site for levee construction over the 50-year planning horizon. The material may be brought to the SBSP Restoration Project Area by trucks and/or barge. Assuming transportation of the fill only occurs via trucks with storage capacity of 20 cy per truck, as many as 750,000 two-way truck trips would be generated. Assuming truck trips would occur over the 50-year planning period, up to 136 one-way daily truck trips would be generated daily for the delivery of fill material (as described in Section 3.12, Traffic, the actual number may be higher or lower depending on the number of phases and how traffic is distributed throughout each subsequent phase). It is possible that portions of the fill may be delivered by barge, and the remainder would be delivered by trucks to locations that are spread geographically around

the South Bay. The phasing of projects and the actual amount of imported fill required for each phase have not yet been determined.

Typically, an increase in noise levels is perceptible [3 dBA (CNEL/ L_{dn})] when traffic volumes double along an affected roadway segment. Access to each site is provided via local roadways as described in Section 3.12, Traffic. These haul routes would occur primarily along highways and through industrial and commercial uses. However, it is possible that truck traffic may travel through residential uses. The actual number of truck trips for each phase and the timing of delivery have not been determined. It is possible that a doubling of traffic volumes may occur on local roadways accessing the pond complexes, and thus result in perceptible increases in noise levels. Although construction traffic would be temporary, if delivery of fill were to occur outside permitted construction hours established by local jurisdictions and adjacent to residential areas where sleep disturbance of occupants may occur, then the noticeable change in traffic noise contours of local roadways would be potentially significant. SBSP Mitigation Measures 3.13-1 (above) and 3.13-2 (below) would be required to reduce potential short-term noise impacts associated with the delivery of fill to less-than-significant levels.

SBSP Mitigation Measure 3.13-2: Traffic-related noise.

The landowners shall include in construction plans and specifications the following requirement:

- Contractors shall use haul routes that minimizes traffic through residential areas. Material hauling shall be conducted during the day-time hours only as specified in SBSP Mitigation Measure 3.13-1; and
- A portion of the fill for the construction of the proposed levees that provide flood protection and/or habitat features shall be transported via barge. The percentage of fill transported by barge shall be determined when the amount of construction fill required for each phase of construction has been determined. The contractor shall determine the portion of fill that will be conveyed by barge based on an assessment of the land uses along proposal haul routes.

Alternative B Level of Significance: Less than Significant with Mitigation

Alternative C Tidal Habitat Emphasis. Construction of Alternative C would be similar to that of Alternative B, and as such, impacts associated with short-term traffic noise would be potentially significant and SBSP Mitigation Measures 3.13-1 and 3.13-2 would be required to reduce impacts to less-than-significant levels.

Alternative C Level of Significance: Less than Significant with Mitigation

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SBSP Impact 3.13-3: **Traffic-related noise effects during operation.**

Alternative A No Action. Under this alternative, limited O&M activities would occur. Small crews of workers may be onsite during O&M activities; the number of workers onsite would likely be less than a typical construction worker crew size of five to ten people. The increase in traffic associated with O&M

activities would be minimal (see SBSP Impact 3.12-2, in Section 3.12, Traffic), and is not expected to increase to a level that would generate traffic-related noise. Furthermore, O&M traffic is expected to be primarily passenger vehicles rather than heavy-duty trucks as would be required for construction activities. As such, impacts would be less than significant.

Alternative A Level of Significance: Less than Significant

Alternative B Managed Pond Emphasis. As discussed in Section 3.12, Traffic, the long-term operation of Alternative B is assumed to require approximately one maintenance staff person that would travel to the SBSP Restoration Project Area for maintenance activities on a weekly basis (one or two times a week). The maintenance person would likely be an existing staff member rather than newly hired staff. In addition, consultants and/or staff would be onsite to conduct Adaptive Management Plan monitoring activities; these visits would vary by season; the frequency of their visits cannot be determined at this time. The addition of these trips on the local roadway system to existing volumes is expected to be minor, and traffic noise generated from these additions would be less than significant.

Implementation of this alternative would also result in an increase in overall vehicle miles traveled (VMT) associated with the expected increase in vehicle trips by visitors of the new recreational facilities to the pond complexes. The increase, which would likely steadily rise over the 50-year planning horizon as new recreational facilities are built, cannot be determined at this time. Although there is no current information on the anticipated traffic numbers, it is expected that the increase in traffic would mainly be concentrated during the daytime hours, when recreational facilities are operated and primarily during the weekends. Traffic would likely be dispersed through multiple access routes, including regional highways and local roadways. Because traffic would occur during the day-time, non-sensitive noise hours, when most people are awake and sleep disturbance would not occur, the potential for long-term traffic-related noise impacts would be less than significant. Environmental review would be required during subsequent phases of the Project to ensure that potential impacts are less than significant.

Alternative B Level of Significance: Less than Significant

Alternative C Tidal Habitat Emphasis. Operation of Alternative C would be similar to that defined for Alternative B above. As such, potential long-term traffic-related noise impacts would be less than significant.

Alternative C Level of Significance: Less than Significant

SBSP Impact 3.13-4: **Potential operational noise effects from pump operation and other O&M activities.**

Alternative A No Action. Under this alternative, limited O&M activities would occur associated with levee repair and replacement of water control structures. Piledriving, the loudest equipment, may be needed to replace water control structures along OAC and the levee between Ponds E6A and E6B (Eden Landing pond complex), at Pond A8 (Alviso pond complex), and at the north and northeastern edges of

Pond SF2 (Ravenswood pond complex). The nearest sensitive receptors would be near Pond A8, at a distance of approximately 1,000 ft (305 m) (see Table 3.13-4, column 2). Assuming that other equipment also would be used in conjunction with piledrivers, the combined noise level of 102 dBA at 50 ft (15 m) may be used for determination of impacts at the sensitive receptors. As shown in Table 3.13-8, the noise level at the nearest sensitive receptor would be 76 dBA, which would be greater than acceptable noise levels for residential uses in most jurisdictions. However, because O&M activities would occur during the daytime, non-noise sensitive hours only, and because such activities would occur intermittently within the 50-year planning period (*e.g.*, if a water control structure fails), and such operations would be limited in time (much shorter than the durations anticipated for construction of Alternatives B and C), potential noise effects associated with O&M activities would be less than significant.

Alternative A Level of Significance: Less than Significant

Alternative B Managed Pond Emphasis. Implementation of Alternative B would require the long-term operation of diesel-generated portable pumps at managed ponds. At the nearest sensitive receptor of 300 ft (91 m) (Pond E6A at Eden Landing pond complex), noise levels would be 60 dBA L_{eq} without attenuation (see Table 3.13-10), which exceeds the typical residential noise levels of 45 to 55 dBA for most jurisdictions. Noise levels would decrease as the distances increase. It is possible that noise levels would exceed the noise standards for residential uses established by the cities where these pond complexes occur. Although pumps would likely operate only several days a year, the operation of the pumps may occur during the nighttime period, resulting in sleep disturbance of residential occupants. As such, impacts would be potentially significant. SBSP Mitigation Measure 3.13-4, which requires the use of temporary enclosures, would be necessary to reduce potential impacts to less-than-significant levels.

Long-term noise impacts associated with the operation of recreational facilities would be less than significant as the low and occasional noise levels generated by recreational users would not be noticeable from off-site locations and such noises would be limited to the daytime hours when recreational facilities are opened to the public. As such, impacts would be less than significant.

SBSP Mitigation Measure 3.13-4: Operation of portable pumps.

- Where portable pumps would be operated in the vicinity of sensitive receptors such that noise levels would exceed noise standards established by affected jurisdictions, the landowners shall enclose the portable pump to ensure that a reduction of up to 10 dB at 50 ft (15 m) is achieved and the noise levels of affected jurisdictions are met.

Alternative B Level of Significance: Less than Significant with Mitigation

Alternative C Tidal Habitat Emphasis. Operation of Alternative C would also require the use of portable diesel pumps at managed ponds and the creation of tidal habitat and passive recreational facilities. Due to the similarity of this alternative to Alternative B, the conclusions above would also apply. Impacts would be potentially significant associated with the operation of the portable pumps and

SBSP Mitigation Measure 3.13-4 would be required to reduce potential impacts to less-than-significant levels.

Alternative C Level of Significance: Less than Significant with Mitigation

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SBSP Impact 3.13-5: **Potential vibration effects during construction and/or operation.**

Alternative A No Action. Under this Alternative, piledriving may be needed to replace water control structures along OAC and the levee between Ponds E6A and E6B (Eden Landing pond complex), at Pond A8 (Alviso pond complex), and at the north and northeastern edges of Pond SF2 (Ravenswood pond complex). The nearest sensitive receptors would be at Pond A8, at a distance of approximately 1,000 ft (305 m) (see Table 3.13-4, column 2). Using FTA's recommended procedure for applying a propagation adjustment to reference levels, which accounts for the decrease in vibration levels with an increase in distance from the source to receptor, the predicted worst-case vibration levels (assuming the use of a piledriver) at 1,000 ft (305 m) would be 0.006 in/sec PPV and 63.9 VdB at the nearest vibration-sensitive receptors (see Table 3.13-9). The vibration levels would decrease as the distance increases, and would be temporary lasting only for the duration of the O&M activity. Based on the calculated values, operation of Alternative A would not exceed Caltran's recommended standard of 0.2 in/sec PPV and would not exceed the FTA's maximum-acceptable vibration standard of 80 VdB. As such, potential impacts would be less than significant.

Alternative A Level of Significance: Less than Significant

Alternative B Managed Pond Emphasis. Construction activities under this alternative have the potential to result in varying degrees of temporary groundborne vibration. Construction of Alternative B would require the use of piledrivers at all pond complexes. The nearest sensitive receptor to the piledriving activities is 1,000 ft (305 m) at the Alviso pond complex. The nearest sensitive receptor to other construction equipment (*e.g.*, drilling) generating vibration is 300 ft (91 m).

Using FTA's recommended procedure, the predicted worst-case vibration levels at approximately 300 ft (91 m) would be approximately 0.0021 in/sec PPV and 54 VdB for operation of bulldozer or caisson drill. Vibration levels of piledrivers would be approximately 0.006 in/sec PPV and 63.9 VdB at 1,000 ft (305 m). As the distance of construction activities increase, the levels would decrease from those estimated above. Based on the calculated values, operation of Alternative A would not exceed Caltrans' recommended standard of 0.2 in/sec PPV and would not exceed the FTA's maximum-acceptable vibration standard of 80 VdB. As such, potential impacts would be less than significant.

Alternative B Level of Significance: Less than Significant

Alternative C Tidal Habitat Emphasis. Construction of Alternative C would not involve piledriving at the Eden Landing pond complex. However, other construction equipment would be used, and the vibration levels expected under Alternative B for general construction activities would be applicable. Impacts would be less than significant.

Alternative C Level of Significance: Less than Significant

Project-Level Evaluation

Phase 1 Impact 3.13-1: **Short-term construction noise effects.**

Phase 1 No Action

The following discussion addresses the No Action Alternative (Alternative A) at the project level.

Phase 1 No Action would not require construction activities within the ponds. As such, no impacts would occur.

Operational noise effects are evaluated in Phase 1 Impact 3.13-4 below.

Phase 1 No Action Level of Significance: No Impact

Phase 1 Actions

The following discussion addresses the Phase 1 actions (the first phase of Alternatives B and C) at the project level.

Eden Landing. Salt pond restoration and construction would involve the same type of construction activities and use of equipment as described for SBSP Impact 3.13-1, above.

Based on an assessment of nearby sensitive land uses of 6,000 ft (1,829 m) (Ponds E12 and E13) and 4,000 ft (1,219 m) (Ponds E8A, E8X and E9) (see Table 3.13-5, column 1), exterior noise levels at noise-sensitive receptors would be 60 and 64 dBA (L_{eq}), respectively (see Table 3.13-6). Noise levels would decrease as the distance from the receptors increase. Similar to the explanation in SBSP Impact 3.13-1, if construction activities were to occur during the noise-sensitive hours not exempted by the City of Hayward (7 pm to 7 am Monday through Saturday or 6 pm to 10 am Sunday and holidays), construction-generated noise levels may result in annoyance and/or sleep disruption to occupants of the nearby existing noise-sensitive land uses and create a substantial temporary increase in ambient noise levels in the Project vicinity. As a result, this impact would be potentially significant, and implementation of SBSP Mitigation Measure 3.13-1 would be required to reduce potential impacts to a less-than-significant level.

Alviso. Construction activities at Alviso Ponds A6, A8, and A16 would be similar to those described above for the Eden Landing pond complex. The distances of sensitive receptors from these ponds are approximately 13,000, 600, and 2,000 ft, respectively (3,962, 183, and 610 m, respectively) (see Table 3.13-5, column 1). Exterior noise levels at these receptors would be 53, 80 and 70 dBA (L_{eq}), respectively (see Table 3.13-6). Noise levels would decrease as the distance from the receptors increase. The City of San Jose, where the nearest sensitive receptors are located, does not provide any specific exemptions for construction noise, but identifies acceptable noise levels. Because estimated noise levels would exceed the established noise standards of 55 dBA at two locations, noise impacts would be

potentially significant, and SBSP Mitigation Measure 3.13-1 would be required to reduce potential impacts to less-than-significant levels.

Ravenswood. Construction activities at Ravenswood Pond SF2 would be similar to the ponds described above for the Eden Landing and Alviso pond complexes. The distance of sensitive receptors from SF2 is 500 ft (152 m) (see Table 3.13-5, column 1). Exterior noise levels at the noise-sensitive receptors would be 82 dBA (L_{eq}) (see Table 3.13-6).

Similar to the impacts discussion above, if construction activities were to occur during the noise-sensitive hours not exempted by the City of Menlo Park (6 pm to 8 am Monday through Friday), construction-generated noise levels may result in annoyance and/or sleep disruption to occupants of the nearby existing noise-sensitive land uses and create a substantial temporary increase in ambient noise levels in the Project vicinity. As a result, this impact would be potentially significant, and implementation of SBSP Mitigation Measure 3.13-1 would be required to reduce potential impacts to less-than-significant levels.

Phase 1 Actions Level of Significance: Less than Significant with Mitigation

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Phase 1 Impact 3.13-2: **Traffic-related noise impacts during construction.**

Phase 1 No Action

The following discussion addresses the No Action Alternative (Alternative A) at the project level.

Phase 1 No Action would not require construction activities within the ponds. As such, no construction-traffic noise would be generated from Phase 1 No Action and no impacts would occur.

Operational noise effects are evaluated in Phase 1 Impact 3.13-3 below.

Phase 1 No Action Level of Significance: No Impact

Phase 1 Actions

The following discussion addresses the Phase 1 actions (the first phase of Alternatives B and C) at the project level.

Eden Landing. Construction activities would require the transport of equipment to and from the pond complex. All soils excavated within Ponds E8A, E9, E8X, E12, and E13 would be reused on site, such that no transport of soil would be required. Truck trips would be associated only with the delivery of equipment at the beginning and end of the construction period, and worker vehicles. Short-term construction traffic would consist of the transportation of the worker crew, which would be up to 25 daily one-way trips, and other construction truck trips delivering equipment and materials. Truck trips would be spread out over the three to five month construction period. As stated in SBSP Mitigation Measure 3.13-1, all construction activities shall be limited to the days and hours or noise levels designated for each

jurisdiction where work activities occur; SBSP Mitigation Measure 3.13-2 would require limiting the use of haul routes through residential areas. The implementation of SBSP Mitigation Measures 3.13-1 and 3.13-2 would reduce potential short-term traffic-related noise impacts to less-than-significant levels.

Alviso. The construction and operational scenario of Phase 1 actions at the Alviso pond complex would be similar to that described for the Eden Landing pond complex above. All soils excavated within Ponds A6, A8, and A16 would be reused on site, such that no transport of soil would be required, and construction activities would require the transport of equipment to and from the pond complex only. Impacts associated with truck-related noise would be less than significant with implementation of SBSP Mitigation Measures 3.13-1 and 3.13-2.

Ravenswood. The construction and operational scenario of Phase 1 actions at the Ravenswood pond complex would be similar to that described in the Eden Landing and Alviso pond complexes above. Impacts associated with truck-related noise would be less than significant with implementation of SBSP Mitigation Measures 3.13-1 and 3.13-2.

Phase 1 Actions Level of Significance: Less than Significant with Mitigation

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Phase 1 Impact 3.13-3: **Traffic-related noise effects during operation.**

Phase 1 No Action

The following discussion addresses the No Action Alternative (Alternative A) at the project level.

Phase 1 No Action would result in limited vehicular traffic associated with O&M activities. However, the increase in traffic would be minimal (as described in SBSP Impact 3.13-3 above), and is not expected to increase to a level that would generate substantial traffic-related noise. In addition, O&M traffic is expected to be primarily passenger vehicles rather than heavy-duty trucks as would be required for construction activities. As such, potential impacts would be less than significant.

Phase 1 No Action Level of Significance: Less than Significant

Phase 1 Actions

The following discussion addresses the Phase 1 actions (the first phase of Alternatives B and C) at the project level.

Similar to the discussion provided in SBSP Impact 3.13-3, the long-term operation of the Phase 1 actions is assumed to require approximately one maintenance staff person that would travel to the pond complexes for maintenance activities on a weekly basis (one or two times a week). The generation of several O&M vehicle trips each week would be less than significant.

Recreational facilities that would be installed as part of the Phase 1 actions include trails, a kayak/boat launch, viewing area, and interpretative stations. The number of visitors to the new recreational facilities has not yet been determined, but would be much less than expected for the Program Alternatives as few recreational opportunities would be developed as part of the Phase 1 actions. As discussed in Section 3.12, Traffic, the provision of Phase 1 recreational facilities is not anticipated to result in a substantial increase in traffic relative to the traffic volume of the local traffic network, particularly since the use of these facilities would likely occur mostly during the weekends, outside of morning and afternoon peak commute traffic hours. Due to the timing of typical access of these facilities and the distribution of vehicular traffic on area roadways accessing the SBSP Restoration Project Area, potential traffic impacts would be less than significant. Similarly, potential traffic-related noise impacts also would be less than significant because they would be limited to the daytime, non-sensitive noise hours when traffic-related noise impacts would not affect sleep disturbance. As such, impacts would be less than significant.

Phase 1 Actions Level of Significance: Less than Significant

Phase 1 Impact 3.13-4: **Potential operational noise effects from pump operation and other O&M activities.**

Operation of the portable diesel-generated pumps is described in SBSP Impact 3.13-4 above. This impact focuses on the use of the electric pumps.

Phase 1 No Action

The following discussion addresses the No Action Alternative (Alternative A) at the project level.

Phase 1 No Action would require limited O&M activities that would generate noise. As described for Alternative A in SBSP Impact 3.13-4 above, piledrivers, as well as other noise-emitting equipment, would be used during O&M activities, generating noise levels of approximately 102 dBA at 50 ft (see Table 3.13-8 above). The nearest sensitive receptors to the ponds would be 4,000, 600, and 500 ft away from Ponds E8A, E8X and E9, Pond A8, and Pond SF2, respectively. Noise levels could be up to 82 dBA at 50 ft at the nearest sensitive receptors (see Table 3.13-6) and could exceed acceptable noise levels for residential uses. However, because O&M activities would occur during daytime, non-noise sensitive hours only, and because such activities would occur intermittently within the 50-year planning period, noise effects would be less than significant.

Phase 1 No Action Level of Significance: Less than Significant

Phase 1 Actions

The following discussion addresses the Phase 1 actions (the first phase of Alternatives B and C) at the project level.

Eden Landing. The long-term operation of Ponds E8A, E9, and E8X would not require the use of any pumps (diesel or electric). The long-term operation of Ponds E12 and E13 would require the use of portable diesel pumps with a capacity of 20,000 gpm, in addition to an existing, enclosed, 10,000 gpm electric pump. The electric pump is currently used once or twice per month for two hours at a time to ensure it is operational. However, under Phase 1, the pump would be operated more frequently during the O&M phase to pump water through the ponds. Under the Phase 1 actions, the existing pump at Ponds E12 and E13 would be operated for a total cumulative duration of up to approximately 40 days per year. The frequency of pumping would vary during the wet (approximately October through April) and dry seasons (approximately April to October), from as little as a few hours once to twice per month during the wet season to two to four hours every day or approximately 24 to 48 hours every ten days during the dry season.

Because the electric pump would be 6,000 ft (1,829 m) from the closest sensitive receptors (see Table 3.13-5, column 3), the pump would generate a noise level below 43 dBA L_{eq} without attenuation (see Table 3.13-10). The actual noise level would likely be lower due to the reduction in noise from the existing enclosure.

The City of Hayward Municipal Code does not provide a qualitative standard for non-construction noises but provides a construction noise limitation of more than six dB above the local ambient level at any point outside the property plane during specific hours. The existing ambient noise level at the sensitive receptors is not known, but the Municipal Code states that in no case shall the local ambient level be considered or determined to be less than 40 dBA. The ambient noise level is assumed to be 40 dBA at the sensitive receptors. Because the existing pump station would result in a noise level of 34 dBA, operation of the proposed pump would not increase ambient noise levels by six dB. As such, the Project would not result in long-term operational noise levels in conflict with the City of Hayward noise ordinance and impacts would be less than significant.

The long-term use of the ponds for recreational facilities is discussed in SBSP Impact 3.13-4 above. Potential impacts would be less than significant.

Alviso. Operation of Ponds A6 and A8 under Phase 1 actions would not require the use of any pumps (portable diesel or electric). The long-term operation of Pond A16 would require the use of portable diesel-powered pumps with a capacity of 20,000 gpm, as discussed generally in Impact 3.13-4 above. The Phase 1 Alviso ponds would not require the use of any electric pumps.

The long-term use of the ponds for recreational facilities is also discussed in SBSP Impact 3.13-4 above. Potential impacts would be less than significant.

Ravenswood. The long-term operation of Pond SF2 would require the use of portable diesel-powered pumps and new electric pumps with a combined capacity of 60,000 gpm. The pumps would likely be located near the intake water control structure at the northwest corner of the pond (near Dumbarton Bridge), approximately 2,200 ft (671 m) north of the closest sensitive receptors (see 3.13-5, column 3). The frequency of pump use would depend on the tides and climate. Operation of the pumps may occur continuously for week-long periods. Assuming the electric pump would operate during the noise

sensitive hours, it would generate a noise level of 43 dBA at 2,200 ft (671 m) without noise enclosures or attenuation (see Table 3.13-10). As described in the regulatory framework above, noise limitations for all sources of sound measured from any residential property are 50 dBA and 60 dBA for the night- and day-time in the City of Menlo Park, respectively. A noise level of 43 dBA would be below the threshold of 50 dBA (L_{dn}) for residential uses per the City's policies. As such, the noise generated during operation of the electric pump would be less than significant.

The long-term use of the ponds for recreational facilities is discussed in SBSP Impact 3.13-4 above. The conclusions of the above discussion would also be relevant and thus this impact would be less than significant.

Phase 1 Actions Level of Significance: Less than Significant with Mitigation

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Phase 1 Impact 3.13-5: **Potential vibration effects during construction and/or operation.**

Phase 1 No Action

The following discussion addresses the No Action Alternative (Alternative A) at the project level.

Similar to the discussion under Alternative A for SBSP Impact 3.13-5 above, vibration from construction equipment would occur from O&M activities. Piledriving generates the highest levels of vibration and would occur at Ponds A8 and SF2. The nearest sensitive receptors would be at Pond A8, at a distance of approximately 1,000 ft (305 m) (see Table 3.13-5, column 2). As discussed for Alternative A above, operation of Phase 1 No Action would not exceed Caltrans or FTA standards. As such, potential impacts would be less than significant.

Phase 1 No Action Level of Significance: Less than Significant

Phase 1 Actions

The following discussion addresses the Phase 1 actions (the first phase of Alternatives B and C) at the project level.

Vibration effects were evaluated in SBSP Impact 3.13-5. Construction activities are not expected to result in vibration levels in excess of Caltrans or FTA standards. As such, potential impacts would be less than significant.

Phase 1 Actions Level of Significance: Less than Significant