4.5 NOISE

The purpose of this section is to analyze project-related noise impacts on site and to surrounding land uses. Mitigation measures are also recommended to avoid or reduce the project's impacts. This section evaluates long-term buildout conditions of the proposed facility for both the co-located and stand-alone scenarios. Impacts would be the same for both scenarios. Information in this section is based on the *Seawater Desalination Project at Huntington Beach – Acoustical Analysis* (RBF Consulting 2010b, Appendix F to the SEIR), the *City of Huntington Beach General Plan* (City of Huntington Beach 1996), and the *City of Huntington Beach General Plan EIR* (City of Huntington Beach 1995). Refer to Appendix F, Noise, for the assumptions used in this analysis.

BACKGROUND

NOISE SCALES AND DEFINITIONS

Sound is technically described in terms of the loudness (amplitude) of the sound and frequency (pitch) of the sound. The standard unit of measurement of the loudness of sound is the decibel (dB). Since the human ear is not equally sensitive to sound at all frequencies, a special frequency-dependent rating scale has been revised to relate noise to human sensitivity. The A-weighted decibel scale (dBA) performs this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear.

Decibels are based on the logarithmic scale. The logarithmic scale compresses the wide range in sound-pressure levels to a more usable range of numbers in a manner similar to the Richter scale used to measure earthquakes. In terms of human response to noise, a sound 10 dBA higher than another is judged to be twice as loud, and 20 dBA higher four times as loud, and so forth. Everyday sounds normally range from 30 dBA (very quiet) to 100 dBA (very loud). For comparison, examples of typical noise levels generated by construction equipment are shown on Figure 4.5-1, Typical Construction Equipment Noise Generation Levels.

In general, a 3 dBA change in sound-pressure level is considered a "just detectable" difference in most situations. A 5 dBA change is readily noticeable, and a 10 dBA change is considered a doubling (or halving) of the subjective loudness. It should be noted that a 3 dBA increase or decrease in the average traffic noise level is realized by a doubling or halving of the traffic volume, or by about a 7-mile-per-hour (mph) increase or decrease in speed.

For each doubling of distance from a point noise source, the sound level would decrease by 6 dBA. In other words, if a person is 100 feet from a machine and moves to 200 feet from that source, sound levels would drop approximately 6 dBA. For each doubling of distance from a source, like a roadway, noise levels are reduced by 3 to 5 dB, depending on the ground cover between the source and the receiver.

Numerous methods have been developed to measure sound over a period of time. These methods include the following: (1) the Community Noise Equivalent Level (CNEL), (2) the Equivalent Sound Level (Leq), and (3) Day/Night Average Sound Level (Ldn). These methods are described as follows.

COMMUNITY NOISE EQUIVALENT LEVEL (CNEL)

The predominant community noise-rating scale used in California for land use compatibility assessments is the CNEL. The CNEL reading represents the average of 24 hourly readings of equivalent levels, known as Leqs, based on an A-weighted decibel with upward adjustments added to account for increased noise sensitivity in the evening and nighttime periods. These adjustments are +5 dBA for the evening, 7:00 p.m. to 10:00 p.m., and +10 dBA for the night, 10:00 p.m. to 7:00 a.m. CNEL may be indicated by "dBA CNEL" or just "CNEL."

EQUIVALENT SOUND LEVEL (Leq)

The Leq is the sound level containing the same total energy over a given sample time period. The Leq can be thought of as the steady sound level, which, in a stated period of time, would contain the same acoustic energy as the time-varying sound level during the same period. Leq is typically computed over 1-, 8-, and 24-hour sample periods.

DAY/NIGHT AVERAGE SOUND LEVEL (Ldn)

Another commonly used method is the day/night average level, or Ldn. The Ldn is a measure of the 24-hour average noise level at a given location. It was adopted by the U.S. Environmental Protection Agency (EPA) for developing criteria for the evaluation of community noise exposure. It is based on a measure of the average noise level over a given time period called the Leq. The Ldn is calculated by averaging the Leqs for each hour of the day at a given location after penalizing the "sleeping hours" (defined as 10:00 p.m. to 7:00 a.m.) by 10 dBA to account for the increased sensitivity of people to noises that occur at night. The maximum noise level recorded during a noise event is typically expressed as Lmax. The sound level exceeded over a specified timeframe can be expressed as Ln (e.g., L90, L50, L10). L50 equals the level exceeded 50% of the time, L10 is 10% of the time, etc.

NOISE ATTENUATION

Noise barriers provide approximately a 5 dBA noise reduction (additional reduction may be provided with a barrier of appropriate height, material, location, and length). A row of buildings provides up to 5 dBA noise reduction with a 1.5 dBA reduction for each additional row up to a maximum reduction of approximately 10 dBA. The exact degree of noise attenuation depends on the nature and orientation of the structure and intervening barriers.

HEALTH EFFECTS RELATED TO NOISE

Human response to sound is highly individualized. Annoyance is the most common issue regarding community noise. The percentage of people claiming to be annoyed by noise generally increases with the environmental sound level. However, many factors also influence people's response to noise. These factors can include the character of the noise, the variability of the sound level, the presence of tones or impulses, and the time of day of the occurrence. Additionally, non-acoustical factors, such as the person's opinion of the noise source, the ability to adapt to the noise, the attitude towards the source, and the predictability of the noise, all influence a person's response. As such, response to noise varies widely from one person to another and with any particular noise, individual responses will range from "not annoyed" to "highly annoyed."

When the noise level of an activity rises above 70 dBA, the chance of receiving a complaint is possible, and as the noise level rises, dissatisfaction among the public steadily increases. However, an individual's reaction to a particular noise depends on many factors, such as the source of the sound, its loudness relative to the background noise, and the time of day. The reaction to noise can also be highly subjective, and the perceived effect of a particular noise can vary widely among individuals in a community.

The effects of noise are often only transitory, but adverse effects can be cumulative with prolonged or repeated exposure. The effects of noise on the community can be organized into six broad categories:

- Noise-induced hearing loss
- Interference with communication
- Effects of noise on sleep
- Effects on performance and behavior
- Extra-auditory health effects
- Annoyance.

Although it often causes discomfort and sometimes pain, noise-induced hearing loss usually takes years to develop. Noise-induced hearing loss can impair the quality of life through a reduction in the ability to hear important sounds and to communicate with family and friends. Hearing loss is one of the most obvious and easily quantified effects of excessive exposure to noise. While the loss may be temporary at first, it could become permanent after continued exposure. When combined with hearing loss associated with aging, the amount of hearing loss directly caused by the environment is difficult to quantify. Although the major cause of noise-induced hearing loss is occupational, substantial damage can be caused by non-occupational sources.

According to the U.S. Public Health Service, nearly 10 million of the estimated 21 million Americans with hearing impairments owe their loss to noise exposure. Noise can mask important sounds and disrupt communication between individuals in a variety of settings. This process can cause anything from slight irritation to a serious safety hazard, depending on the circumstance. Noise can disrupt face-to-face communication and telephone communication, and the enjoyment of music and television in the home. It can also disrupt effective communication between teachers and pupils in schools, and it can cause fatigue and vocal strain in those who need to communicate in spite of the noise.

Interference with communication has proved to be one of the most important components of noise-related annoyance. Noise-induced sleep interference is one of the critical components of community annoyance. Sound level, frequency distribution, duration, repetition, and variability can make it difficult to fall asleep and may cause momentary shifts in the natural sleep pattern or level of sleep. It can produce short-term adverse effects on mood changes and job performance, with the possibility of more serious effects on health if it continues over long periods. Noise can cause adverse effects on task performance and behavior at work, as well as non-occupational and social

settings. These effects are the subject of some controversy since the presence and degree of effects depends on a variety of intervening variables. Most research in this area has focused mainly on occupational settings, where noise levels must be sufficiently high and the task sufficiently complex for effects on performance to occur.

Recent research indicates that more moderate noise levels can produce disruptive after-effects, commonly manifested as a reduced tolerance for frustration, increased anxiety, decreased incidence of "helping" behavior, and increased incidence of "hostile" behavior. Noise has been implicated in the development or exacerbation of a variety of health problems, ranging from hypertension to psychosis. As with other categories, quantifying these effects is difficult due to the amount of variables that need to be considered in each situation. As a biological stressor, noise can influence the entire physiological system. Most effects seem to be transitory, but with continued exposure, some effects have been shown to be chronic in laboratory animals.

Annoyance can be viewed as the expression of negative feelings resulting from interference with activities, as well as the disruption of one's peace of mind and the enjoyment of one's environment. Field evaluations of community annoyance are useful for predicting the consequences of planned actions involving highways, airports, road traffic, railroads, or other noise sources. The consequences of noise-induced annoyance are privately held dissatisfaction, publicly expressed complaints to authorities, and potential adverse health effects, as discussed above. In a study conducted by the U.S. Department of Transportation, the effects of annoyance to the community were quantified. In areas where noise levels were consistently above 60 dBA CNEL, approximately 9% of the community is highly annoyed. When levels exceed 65 dBA CNEL, that percentage rises to 15%. Although evidence for the various effects of noise have differing levels of certainty, it is clear that noise can affect human health. Most of the effects are, to a varying degree, stress related.

GROUND-BORNE VIBRATION

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. The peak particle velocity (PPV) or the root mean square (RMS) velocity is usually used to describe vibration amplitudes. PPV is defined as the maximum instantaneous peak or vibration signal, while RMS is defined as the square root of the average of the squared amplitude of the signal. PPV is typically used for evaluating potential building damage, whereas RMS is typically more suitable for evaluating human response. Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of vibration. Man-made vibration issues are therefore usually confined to short distances (i.e., 500 feet or less) from the source.

Both construction and operation of projects can generate ground-borne vibration. In general, demolition of structures preceding construction generates the highest vibrations. Construction equipment, such as vibratory compactors or rollers, pile drivers, and pavement breakers, can generate perceptible vibration during construction activities. Heavy trucks can also generate ground-borne vibrations that vary depending on vehicle type, weight, and pavement conditions.

SENSITIVE RECEPTORS

Human response to noise varies widely depending on the type of noise, time of day, and sensitivity of the receptor. The effects of noise on humans can range from temporary or permanent hearing loss to mild stress and annoyance due to such things as speech interference and sleep deprivation.

Prolonged stress, regardless of the cause, is known to contribute to a variety of health disorders. Noise, or the lack thereof, is a factor in the aesthetic perception of some settings, particularly those with religious or cultural significance. Certain land uses are particularly sensitive to noise, including schools, hospitals, rest homes, long-term medical and mental care facilities, and parks and recreation areas. Residential areas are also considered noise sensitive, especially during nighttime hours.

REGULATORY SETTING

It is difficult to specify noise levels that are generally acceptable to everyone. What is annoying to one person may be unnoticed by another. Standards may be based on documented complaint activity in response to documented noise levels, or based on studies on the ability of people to sleep, talk, or work under various noise conditions. However, all such studies recognize that individual responses vary considerably. Standards usually address the needs of most of the general population.

STATE OF CALIFORNIA GUIDELINES

California Environmental Quality Act

The California Environmental Quality Act (CEQA) (California Public Resources Code, Section 21000 et seq.) was enacted in 1970 and requires that all known environmental effects of a project be analyzed, including environmental noise impacts. Under CEQA, a project has a potentially significant impact if the project exposes people to noise levels in excess of standards established in the local general plan or noise ordinance. Additionally, under CEQA, a project has a potentially significant impact if the project creates a substantial increase in the ambient noise levels in the project vicinity above levels existing without the project. If a project has a potentially significant impact, mitigation measures must be considered. If mitigation measures to reduce the impact to less than significant are not feasible due to economic, social, environmental, legal, or other conditions, the most feasible mitigation measures must be considered.

California Government Code

California Government Code, Section 65302 (f), mandates that the legislative body of each county and city adopt a noise element as part of its comprehensive general plan. The local noise element must recognize the land use compatibility guidelines established by the State Department of Health Services as shown in Table 4.5-1, California Land Use Compatibility Noise Guidelines.

TABLE 4.5-1
CALIFORNIA LAND USE COMPATIBILITY NOISE GUIDELINES

LAND USE CATEGORY	COMMUNITY NOISE EXPOSURE (IN TERMS OF CNEL)			
	NORMALLY ACCEPTABLE	CONDITIONALLY ACCEPTABLE	NORMALLY UNACCEPTABLE	CLEARLY UNACCEPTABLE
Residential – Low Density, Single Family, Duplex, Mobile Homes	50–60	55–70	70–75	75–85
Residential – Multiple Family	50–65	60–70	70–75	70–85
Transient Lodging – Motel, Hotels	50–65	60–70	70–80	80–85
Schools, Libraries, Churches, Hospitals, Nursing Homes	50–70	60–70	70–80	80–85
Auditoriums, Concert Halls, Amphitheaters	NA	50–70	NA	65–85
Sports Arenas, Outdoor Spectator Sports	NA	50–75	NA	70–85
Playgrounds, Neighborhood Parks	50–70	NA	67.5–75	72.5–85
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50–70	NA	70–80	80–85
Office Buildings, Business/Commercial, and Professional	50–70	67.5–77.5	75–85	NA
Industrial, Manufacturing, Utilities, Agriculture	50–75	70–80	75–85	NA

Source: OPR 2003.
Notes:
Normally Acceptable
Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
Conditionally Acceptable
New construction or development should be undertaken only after a detailed analysis of the noise-reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning, will normally suffice.
Normally Unacceptable
New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise-reduction requirements must be made and needed noise insulation features included in the design.
Clearly Unacceptable
New construction or development should generally not be undertaken.
NA: not applicable.

The guidelines rank noise–land use compatibility in terms of “normally acceptable,” “conditionally acceptable,” "normally unacceptable," and “clearly unacceptable” noise levels for various land use types. Single-family homes are “normally acceptable” in exterior noise environments up to 60 CNEL and “conditionally acceptable” up to 70 CNEL. Multiple-family residential uses are “normally acceptable” up to 65 CNEL and “conditionally acceptable” up to 70 CNEL. Schools, libraries, churches, hospitals, and nursing homes, are “normally acceptable” up to 70 CNEL, as are office buildings and business, commercial, and professional uses. In addition, the California Noise Insulation Standard (California Administrative Code, Title 25, Chapter 1, Subchapter 1, Article 4) requires that indoor noise levels in multifamily residences do not exceed a CNEL of 45 dBA.

LOCAL JURISDICTIONS

Local agencies may regulate noise levels of most sources not regulated by the federal or state government. They may provide standards for insulation of noise receivers either within the structure or by placement of noise barriers such as walls; and, through land use decisions, they may reduce noise impacts by separating noise generators from noise-sensitive uses. To provide a satisfactory noise environment and to minimize complaints about community noise, the local jurisdictions have

adopted standards for evaluating the compatibility of land uses with respect to outdoor and certain indoor noise levels. The purpose of the land use compatibility analysis is to screen projects that may require specific design considerations to mitigate noise impacts.

City of Huntington Beach

The City of Huntington Beach (City) has adopted noise objectives and policies in its general plan. These noise objectives and policies pertain to land use impacts, mobile noise sources, and stationary noise sources. The City has also adopted a Noise Ordinance (Chapter 8.40 of the Huntington Beach Municipal Code), which identifies exterior and interior noise standards, specific noise restrictions, exemptions, and variances for sources of noise within the City. The Noise Ordinance applies to all noise sources with the exception of any vehicle that is operated upon any public highway, street, or right-of-way, or to the operation of any off-highway vehicle, to the extent that it is regulated in the State Vehicle Code, and all other sources of noise that are specifically exempted. The City's exterior noise standards are identified in Table 4.5-2, City of Huntington Beach Noise Ordinance Exterior Noise Standards. Table 4.5-3, City of Huntington Beach Noise Ordinance Interior Noise Standards, identifies the City's interior noise standards and prohibited interior noise levels.

In both cases, if the ambient noise level is greater than the identified noise standards, the noise standard becomes the ambient noise level without the offending noise. The Noise Ordinance exempts noise sources associated with construction activities from the City's exterior and interior noise standards provided that a permit has been obtained from the City and that the construction activities do not occur between the hours of 8:00 p.m. and 7:00 a.m. on weekdays and Saturdays, or at any time on Sundays or federal holidays.

City of Costa Mesa

The City of Costa Mesa maintains a comprehensive Noise Ordinance that sets standards for noise levels citywide and provides the means to enforce the reduction of obnoxious or offensive noises. The basic noise standards outline the typical land use compatibility standards of 65 CNEL for exterior areas and 45 CNEL for interior areas. The City of Costa Mesa limits the hours of construction activities from 7:00 a.m. to 8:00 p.m., Monday through Friday, and from 8:00 a.m. to 6:00 p.m. on Saturday.

City of Irvine

The City of Irvine treats construction noise separately in its noise ordinance because it does not represent a chronic, permanent noise source. To limit the potential nuisance from construction noise, especially for adjacent noise-sensitive receptors, the City of Irvine Noise Ordinance (City of Irvine Municipal Code, Section 6-8-205) limits the hours of construction activities from 7:00 a.m. to 7:00 p.m., Monday through Friday and from 9:00 a.m. to 6:00 p.m. on Saturday. Compliance with the City of Irvine's noise ordinance of limiting construction activities to those hours indicated in the Municipal Code would reduce construction noise impacts to a less-than-significant level. Additional "standard" conditions, such as maintaining mufflers in good condition and placing construction staging areas as far from sensitive receptors, would further reduce any construction-related noise impact.

City of Garden Grove

The City of Garden Grove maintains a comprehensive Noise Ordinance within its Municipal Code that establishes citywide interior and exterior noise level standards. The City has adopted a number of policies that are directed at controlling or mitigating environmental noise effects. The City's Noise Ordinance (Municipal Code Section 8.47, Noise Control,) establishes daytime and nighttime noise standards; allowable exterior noise limits for residential uses at 55 dBA between the hours of 7:00 a.m. and 10:00 p.m., and 50 dBA limits the hours of between the hours of 10:00 p.m. and 7:00 a.m. The ordinance is designed to control unnecessary, excessive and annoying sounds generated from a stationary source impacting an adjacent property. Code Section 8.47.060, Special Noise Sources, also includes the following provisions for construction and maintenance activities: "Construction of Buildings and Projects. It shall be unlawful for any person within a residential area, or within a radius of 500 feet there from, to operate equipment or perform any outside construction or repair work on buildings, structures, or projects, or to operate any pile driver, power shovel, pneumatic hammer, derrick, power hoist, or any other construction type devise between the hour of 10:00 p.m. of one day and 7:00 a.m. of the next day in such a manner that a person of normal sensitiveness, as determined utilizing the criteria established in Section 8.47.050(a), is caused discomfort or annoyance unless such operations are of an emergency nature".

City of Fountain Valley

The City of Fountain Valley maintains a comprehensive Noise Ordinance within its Municipal Code that establishes citywide interior and exterior noise level standards. The City's Noise Ordinance (Municipal Code Section 6.28, Noise Control,) establishes daytime and nighttime noise standards; allowable exterior noise limits for residential uses at 55 dBA between the hours of 7:00 a.m. and 10:00 p.m., and 50 dBA limits the hours of between the hours of 10:00 p.m. and 7:00 a.m. The ordinance also addresses construction noise. Noise sources associated with the construction, repair, remodeling or grading are exempt from the above-mentioned requirements, provided that the activities take place between the hours of seven a.m. and eight p.m. Monday through Friday, nine a.m. through eight p.m. on Saturday and at no time on Sunday or any legal holiday.

City of Westminster

The City of Westminster maintains a comprehensive Noise Ordinance within its Municipal Code that establishes citywide interior and exterior noise level standards. The City's Noise Ordinance (Municipal Code Section 8.28, Noise Control,) establishes daytime and nighttime noise standards; allowable exterior noise limits for residential uses at 55 dBA. Noise sources associated with construction repair, remodeling, or grading of any real property, are exempt from the exterior noise standards, provided that the activities do not take place between the hours of eight p.m. and seven a.m. on weekdays, including Saturday, or at any time on Sunday or a federal holiday

City of Santa Ana

The City of Santa Ana has established noise limits through the Noise Ordinance in the Municipal Code and noise standards in the Noise Element of the General Plan. The City's Noise Element establishes daytime noise standards; allowable exterior noise limits for residential uses at 65 CNEL exterior and 45 CNEL interior. Section 18-314(1) of the City of Santa Ana Municipal Code exempts noise sources associated with construction, repair, remodeling, or grading of any real property,

provided these activities are conducted between 7:00 a.m. and 8:00 p.m. Monday through Saturday. Construction is prohibited on Sundays and federal holidays.

City of Newport Beach

The City of Newport Beach Municipal Code establishes allowable exterior noise limits for residential uses at 55 dBA between the hours of 7:00 a.m. and 10:00 p.m., and 50 dBA limits the hours of between the hours of 10:00 p.m. and 7:00 a.m. Construction activities are restricted to the hours between 7:00 a.m. to 8:00 p.m., Monday through Friday, and from 8:00 a.m. to 6:00 p.m. on Saturday.

TABLE 4.5-2
CITY OF HUNTINGTON BEACH NOISE ORDINANCE EXTERIOR NOISE STANDARDS

NOISE ZONE	LAND USES	NOISE LEVEL	TIME PERIOD
1	All Residential Properties	55 dBA Leq 50 dBA Leq	7 a.m. to 10 p.m. 10 p.m. to 7 a.m.
2	All Professional Office and Public Institutional Properties	55 dBA Leq	Anytime
3	All Commercial Properties Except Professional Office	60 dBA Leq	Anytime
4	All Industrial Properties	70 dBA Leq	Anytime

Exterior Noise Levels Prohibited:
It shall be unlawful for any person at any location within the incorporated area of the City to create any noise, or to allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, which causes the noise level when measured on any residential, public institutional, professional, commercial or industrial property, either within or without the City, to exceed the applicable noise standards:

(a) For a cumulative period or more than thirty (30) minutes in any hour;
(b) Plus 5 dBA for a cumulative period of more than fifteen (15) minutes in any hour;
(c) Plus 10 dBA for a cumulative period of more than five (5) minutes in any hour;
(d) Plus 15 dBA for a cumulative period of more than one (1) minute in any hour; or
(e) Plus 20 dBA for any period of time.

In the event the ambient noise level exceeds any of the first four noise limit categories above, the cumulative period applicable to said category shall be increased to reflect said ambient noise level. In the event the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level.
Source: City of Huntington Beach Municipal Code, Chapter 8.40.

TABLE 4.5-3
CITY OF HUNTINGTON BEACH NOISE ORDINANCE INTERIOR NOISE STANDARDS

NOISE ZONE	LAND USES	NOISE LEVEL	TIME PERIOD
1	All Residential Properties	55 dBA Leq 45 dBA Leq	7 a.m. to 10 p.m. 10 p.m. to 7 a.m.
2,3,4	All Professional Office, Public Institutional, Commercial, and Industrial Properties	55 dBA Leq	Anytime

Interior Noise Levels Prohibited:
It shall be unlawful for any person at any location within the incorporated area of the City to create any noise, or to allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, which causes the noise level when measured within any other structure on any residential, public institutional, professional, commercial or industrial property to exceed:

(a) The noise standard for a cumulative period or more than five (5) minutes in any hour;
(b) The noise standard plus 5 dBA for a cumulative period of more than one (1) minutes in any hour; or
(c) The noise standard plus 10 dBA for any period of time.

In the event the ambient noise level exceeds any of the first two noise limit categories above, the cumulative period applicable to said category shall be increased to reflect said ambient noise level. In the event the ambient noise level exceeds the third noise limit category, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level.
Source: City of Huntington Beach Municipal Code, Chapter 8.40.

County of Orange

As mandated by the California Government Code, the County of Orange has adopted a noise element as a component of the County of Orange General Plan (County of Orange 2005). The County of Orange Noise Element is administered by the Orange County Planning Division of the Resources and Development Management Department (RDMD) and applies to all unincorporated portions of the County. The Noise Element establishes noise criteria to ensure that each county resident's quality of life is not adversely affected by high noise levels. In general, all outdoor living areas are compatible with noise levels less than CNEL 65 dBA. Similarly, indoor living spaces are compatible with interior noise levels less than CNEL 45 dBA.

The County of Orange has also adopted a noise ordinance. The intent of the County of Orange Noise Ordinance is to control unnecessary, excessive, and annoying sound emanating from unincorporated areas of the County. Section 4-6-7 of the County's Noise Ordinance provides exemptions to the County's noise standards. It specifies that noise sources associated with construction activity are prohibited between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday or at any time on Sunday or a federal holiday.

EXISTING CONDITIONS

PROPOSED DESALINATION FACILITY SITE

Noise Environment

The primary noise sources in the project vicinity include commercial and industrial uses, as well as noise from adjacent local roadways. Both mobile and stationary noise sources contribute to the existing noise levels at the project site. Mobile noise sources consist mainly of car and truck traffic, with high volumes of traffic along Pacific Coast Highway, Magnolia Street, and Beach Boulevard (located west of the subject site). Stationary noise sources within the site vicinity include the AES Huntington Beach Generating Station (HBGS) and commercial/industrial uses located to the north along Edison Avenue and Hamilton Avenue.

Noise-Sensitive Receptors

Existing sensitive receptors located in the project vicinity include residential, school, and park uses located to the north, east, and west of the project site; refer to Table 4.5-4, Sensitive Receptors, for information about these receptors.

TABLE 4.5-4
Sensitive Receptors

TYPE	NAME	DISTANCE FROM PROJECT SITE (FEET)	DIRECTION FROM PROJECT SITE
Residential	Residential Uses	1,010	North
		1,525	East
		285	West
Schools	Edison High School	2,025	Northeast
	William E Kettler School	2,265	North
	John H. Eader Elementary School	2,895	East
Parks	Edison Community Park	925	North

Source: Appendix F, Noise.
Note: The distances provided above from the sensitive receptors to the project site are measured from the nearest project limits boundary to the nearest sensitive receptor.

Existing Noise Levels

In order to quantify existing ambient noise levels in the project area, noise measurements were conducted on November 5, 2009 (refer to Table 4.5-5, Ambient Noise Levels). The noise measurement sites were representative of typical existing noise exposure within and immediately adjacent to the project site. Ten-minute measurements were taken at each site between 10:00 a.m. and 12:00 p.m.

TABLE 4.5-5
AMBIENT NOISE LEVELS

SITE NO.	LOCATION	LEQ (DBA)	L_{MIN} (DBA)	L_{MAX} (DBA)	PEAK (DBA)	TIME
1	Huntington State Beach, adjacent to the project site	47.1	41.2	57.2	82.8	10:25 a.m.
2	Rhodesia Drive, adjacent to the project site	50.0	38.5	68.2	88.8	10:48 a.m.
3	Hatteras Drive and Breton Lane, adjacent to the project site and Edison Community Park	48.4	36.3	62.6	86.1	11:09 a.m.
4	Biscayne Drive and Newland Street, adjacent to the project site and mobile home park	62.6	45.3	80.3	101.9	11:35 a.m.
5	Edison Community Park, adjacent to the project site	53.2	43.6	71.2	95.5	11:57 a.m.

Note:
It should be noted that construction activities (large heavy trucks, equipment, idling, braking, loading, and unloading) in the vicinity of Site 4 resulted in higher noise levels than would normally occur at this location.
Source: Appendix F, Noise.

Noise monitoring equipment used for the ambient noise survey consisted of a Brüel & Kjær Hand-held Analyzer Type 2250 equipped with a 4189 pre-polarized microphone. The monitoring equipment complies with applicable requirements of the American National Standards Institute for Type I (precision) sound-level meters.

IMPACTS

SIGNIFICANCE CRITERIA

Appendix G of the CEQA Guidelines contains analysis guidelines related to the assessment of noise impacts. These guidelines have been utilized as thresholds of significance for this analysis. As stated in Appendix G, a project may create a significant environmental impact if one or more of the following occurs (14 CCR 15000 et seq.):

- 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 ground-borne vibration or ground-borne 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 above levels existing without the project
- For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels (note: This issue is discussed in Section 7.0, Effects Found Not to be Significant)
- For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels (note: This issue is discussed in Section 7.0, Effects Found Not to be Significant).

Significance of Changes in Ambient Noise Levels

A project is considered to have a significant noise impact where it causes an adopted noise standard to be exceeded for the project site or for adjacent sensitive receptors.

For a discussion of short-term, construction-related noise impacts, refer to Section 4.9, Construction-Related Impacts.

LONG-TERM STATIONARY SOURCES

Proposed Desalination Facility Site

The proposed project involves the implementation of a 50 million gallon per day (mgd) desalination facility and associated improvements, including a 66 kV substation, on a site currently occupied by an existing fuel oil storage tank facility. The project site exists within an industrial area, with the HBGS and Pacific Holdings tank farm located in the project vicinity. The primary noise sources would be the intake pump area, water supply pumps (transfer pumps, reverse osmosis (RO)

pumps, and product water pumps), workshop and storage buildings, transformers, and power control centers. The pump systems would be the most significant noise source at the subject site. High-flow, high-head pumps are typically driven by an electric motor and produce broadband noise without strong tonal components. This noise source is omni-directional and continuous during facility operation.

A total of 31 large electric water pumps are proposed on site (23 operating continuously, 2 operating intermittently, and 6 standby pumps), the largest of which would be utilized indoors.

All indoor pumps would be fully enclosed within the proposed RO building. The amount of noise radiated from the wall surfaces and ventilation system of any given pump housing is controllable over a reasonably wide range. The co-located and stand-alone pumping arrangements have differences related to the outdoor seawater intake pumps. An analysis of each scenario is presented below.

Co-Located Operating Condition

Table 4.5-6, Noise Levels at Nearby Receptors, provides the noise levels resulting from pump operations at four separate locations within the project site. The noise levels at the nearest sensitive receptors from each of these locations have been provided in Table 4.5-6. The calculated noise levels in Table 4.5-6 take into account the distance from the source to the receiver and whether the pumps are enclosed within a building/vault or outdoors. As indicated in Table 4.5-6, the product water pumps would be located 350 feet away from the nearest sensitive receptors. However, these pumps would be located within an underground vault, which would provide attenuation. The seawater intake pumps would be the next closest to sensitive receptors, which are 700 feet west of the influent pump station. This pump station would not be located within an enclosure that would attenuate noise.

TABLE 4.5-6
NOISE LEVELS AT NEARBY RECEPTORS

UNIT	DISTANCE TO NEAREST RECEPTOR[1]		ATTENUATION FROM ENCLOSURES (DBA)[2]	NOISE LEVEL AT RECEPTOR (DBA)[3]
INDOOR PUMPS				
RO PROCESS BUILDING				
• High Pressure RO Feed Pumps and ERS	North	1,020	20	39.5
• Circulation Pumps	East	1,000	20	39.6
• Membrane Cleaning Pumps • Flush Pumps	West	1,533	20	35.9
INDOOR PUMPS				
• R O Process Building	North	1,020	20	39.5
• High Pressure RO Feed Pumps and ERS	East	1,000	20	39.6
• Circulation Pumps • Membrane Cleaning Pumps • Flush Pumps	West	1,533	20	35.9

TABLE 4.5-6 (CONTINUED)

UNIT	DISTANCE TO NEAREST RECEPTOR[1]		ATTENUATION FROM ENCLOSURES (DBA)[2]	NOISE LEVEL AT RECEPTOR (DBA)[3]
OUTDOOR PUMPS				
MAIN PRODUCT WATER PUMP STATION				
• Product Water Pumps 25 MGD • Product Water Pumps 4 MGD	North	1,180	N/A	57.3
	East	2,500	N/A	50.8
	West	350	N/A	67.9
NEXT TO TREATMENT STRUCTURE				
• Filter Effluent Transfer Pumps to HP • Filter Effluent Transfer Pumps to ERS	North	1,400	N/A	54.7
	East	1,545	N/A	53.9
	West	1,030	N/A	57.4
INFLUENT PUMP STATION				
• Seawater Intake Pumps	North	1,860	N/A	47.2
	East	2,250	N/A	45.5
	West	700	N/A	55.6
Combined Noise Levels at the Nearest Sensitive Receptors				
RECEPTOR LOCATION	COMBINED NOISE LEVEL		COMBINED NOISE LEVEL WITH MITIGATION	
North	55.6		43.4	
East	54.6		42.1	
West	59.9		48.7	

RO = reverse osmosis; ERS = energy recovery system; mgd = million gallons per day; HP = high pressure; N/A = not applicable.
Notes:
1 There are no sensitive receptors located to the south of the project site.
2 Attenuation from enclosures is based on ANSI S1.31, *Precision Methods for the Determination of Sound Power Levels of Broadband Noise Sources in Reverberation Rooms*.
3 Calculated using the Inverse Square Law of Noise Propagation.

Table 4.5-6 also presents the combined noise levels from all pumps at the closest sensitive receptors in each direction from the project site. It should be noted that there are no receptors to the south of the project site. As depicted in Table 4.5-6, sensitive receptors located to the west would experience noise levels of 59.9 dBA. When accounting for existing intervening structures (industrial buildings to the north), berms, and tanks (to the west), the anticipated noise levels would be further reduced. Additionally, background noise levels in the project area would be below the combined noise levels in Table 4.5-6. The City's applicable exterior noise standards are 55 dBA between 7:00 a.m. and 10:00 p.m., and 50 dBA between 10:00 p.m. and 7:00 a.m. Therefore, pump noise levels would be potentially significant.

Implementation of Mitigation Measure NOI-1 would reduce this impact by requiring the outdoor pump stations to be located within an enclosure designed to reduce noise levels by at least 20 dBA, reducing the impact to a less-than-significant level.

Stand-Alone Operating Condition

Under the stand-alone operating condition, the primary operational components that would emit noise are the intake pump station, the RO system, the membrane cleaning system, and the product water pump station. The stand-alone operating condition involves use of two existing HBGS once-through cooling pumps, and the replacement of one existing HBGS pump (for a total of three additional duty pumps in comparison to the co-located operating condition). Table 4.5-7, Noise

Levels at Nearby Receptors, provides the noise levels associated with the stand-alone operation resulting from pump operations at four separate locations within the project site. The calculated noise levels in Table 4.5-7 take into account the distance from the source to the receiver and whether the pumps are enclosed within a building/vault or outdoors.

TABLE 4.5-7
NOISE LEVELS AT NEARBY RECEPTORS

UNIT	DISTANCE TO NEAREST RECEPTOR[1]		ATTENUATION FROM ENCLOSURES (DBA)[2]	NOISE LEVEL AT RECEPTOR (DBA)[3]
INDOOR PUMPS				
RO PROCESS BUILDING				
• High Pressure RO Feed Pumps and ERS • Circulation Pumps • Membrane Cleaning Pumps • Flush Pumps	North	1,020	20	39.5
	East	1,000	20	39.6
	West	1,533	20	35.9
OUTDOOR PUMPS				
MAIN PRODUCT WATER PUMP STATION				
PRODUCT WATER PUMPS 25 MGD PRODUCT WATER PUMPS 4 MGD	NORTH	1180	N/A	57.3
	East	2,500	N/A	50.8
	West	350	N/A	67.9
NEXT TO TREATMENT STRUCTURE				
• Filter Effluent Transfer Pumps to HP • Filter Effluent Transfer Pumps to ERS	North	1,400	N/A	54.7
	East	1,545	N/A	53.9
	West	1,030	N/A	57.4
INFLUENT PUMP STATION/HBGS PUMPS				
• Seawater Intake Pumps	North	1,860	N/A	50.2
	East	2,250	N/A	48.5
	West	700	N/A	58.6
RECEPTOR LOCATION	COMBINED NOISE LEVEL		COMBINED NOISE LEVEL WITH MITIGATION	
North	56.2		42.8	
East	55.1		43.0	
West	61.3		48.9	

Note: Combined noise levels are based on noise levels calculated in Table 4.5-7.
RO = reverse osmosis; ERS = energy recovery system; mgd = million gallons per day; HP = high pressure; N/A = not applicable.
Notes:
1 There are no sensitive receptors located to the south of the project site.
2 Attenuation from enclosures is based on ANSI S1.31, *Precision Methods for the Determination of Sound Power Levels of Broadband Noise Sources in Reverberation Rooms*.
3 Calculated using the Inverse Square Law of Noise Propagation.

The seawater intake pumps would be the next closest to sensitive receptors, which are 700 feet west of the influent pump station. This pump station would not be located within an enclosure that would attenuate noise.

Table 4.5-7 also shows combined noise levels at the nearest sensitive receptors in each direction from the project site. It should be noted that there are no receptors to the south of the project site.

As depicted in Table 4.5-7, sensitive receptors located to the west would experience noise levels of 61.3 dBA. When accounting for existing intervening structures (industrial buildings to the north), berms, and tanks (to the west), the anticipated noise levels would be further reduced. Background noise levels in the project area would be below the combined noise levels in Table 4.5-7. The City's applicable exterior noise standards are 55 dBA between 7:00 a.m. and 10:00 p.m., and 50 dBA between 10:00 p.m. and 7:00 a.m. Therefore, pump noise levels would be potentially significant. As a result, implementation of Mitigation Measure NOI-1 would reduce this impact by requiring the outdoor pump stations to be located within an enclosure designed to reduce noise levels by at least 20 dBA. As depicted in Table 4.5-7, the implementation of Mitigation Measure NOI-1 would reduce impacts to a less-than-significant level.

Mobile Sources

A significant increase in traffic noise typically requires a doubling of traffic volumes (Caltrans 1998). The proposed project would generate a nominal amount of noise resulting from mobile sources as a result of employee trips and truck-generated traffic. As stated previously, the proposed desalination facility would employ a total of approximately 18 people, with an average of 5 to 7 people on site per shift on weekdays. It is anticipated that the project would result in an estimated worst-case scenario of 18 round-trip worker trips per day, traveling an estimated maximum distance of 50 miles each way. In addition, facility operation would require a maximum of four truck trips per day for solid waste disposal and chemical delivery. Noise generated by mobile sources as a result of the proposed desalination facility would be less than significant.

Off-Site Pipelines and Underground Pump Stations

Proposed Pipeline Alignment

The proposed project water pipelines would occur entirely underground. Upon completion of construction, these pipelines would not generate noise. As such, noise impacts due to long-term pipeline operations would not be significant.

OC-44 Booster Pump Station

The OC-44 pumping station is proposed to be located underground within an unincorporated area of the County of Orange, along the eastern border of the City of Newport Beach, approximately 1.5 miles south of the University of California, Irvine. The site is within an Orange County Resource Preservation Easement, but outside of the Natural Community Conservation Plan (NCCP)/Habitat Conservation Plan (HCP) area, approximately 0.5 mile north of the San Joaquin Reservoir, where the East Orange County Feeder Number Two and the OC-44 transmission pipelines converge. The OC-44 underground booster pump station would include pumps, two surge tanks to protect the distribution system from sudden pressure changes, telemetry equipment, appurtenances, and three diesel-powered electrical generators for emergency back-up purposes. These generators would be Caterpillar Model 3516 units or similar equipment and would supply approximately 7 megawatts of emergency power for adequate operation of the pump station (in regards to flow and pressure). These diesel-powered generators would require an 8,700-gallon diesel fuel storage tank (assuming a 24-hour emergency period), with a diameter of 8 feet and a depth of 26 feet. The booster pump station would be placed entirely underground to maintain the natural character of the surrounding resource preservation easement.

The pump that would be used is a vertical turbine pump. The pump would be less than 500 horsepower (hp) and produce noise levels of approximately 88 dBA at 3 feet from the source. As the booster pump would both be located underground and contain an adequate amount of acoustical shielding, operations associated with the pump station will not emit noise levels in excess of County of Orange codes. Additionally, as the pumps would be placed underground, the off-site underground booster pump station is not anticipated to adversely affect the NCCP/HCP area along the eastern border of the City of Newport Beach. Impacts in this regard are not anticipated to be significant.

Coastal Junction Booster Pump Station

A second underground booster pump station is proposed within the parking lot of St. Paul's Greek Orthodox Church within the City of Irvine, located at 4949 Alton Parkway. The underground pump station would be constructed within the north/northwestern portion of the church parking lot, in an area used for both parking and volleyball activities. The booster pump station would be placed entirely underground to maintain the appearance and functionality of the existing parking lot.

The underground booster pump station would include pumps, telemetry equipment, appurtenances, and one diesel-powered electrical generator for emergency back-up purposes. This generator would be a Caterpillar Model 3516 unit or similar equipment and would supply approximately 7 megawatts of emergency power for adequate operation of the pump station (in regards to flow and pressure). This diesel-powered generator would require a 1,300-gallon diesel fuel storage tank (assuming a 24-hour emergency period), with a diameter of 6 feet and a depth of 15 feet.

Similar to the OC-44 booster pump station, the pump that would be used is a vertical turbine pump. The pump would be less than 500 hp and produce noise levels of approximately 88 dBA at 3 feet from the source. As the booster pump would be both located underground and surrounded by concrete walls, it would not emit noise levels in excess of City of Irvine codes. Impacts in this regard are not anticipated to be significant.

Magnolia, Brookhurst, and Bristol Pump Stations

The Magnolia and Brookhurst pump stations are located at the intersections of Orangewood Avenue/Magnolia Street and Brookhurst Street/Bixby Avenue in the City of Garden Grove (see Figure 3-3b). The pump stations would be constructed within a disturbed right-of-way. The Bristol Pump Station is located in the City of Santa Ana to the north of the Bear Avenue/Segerstrom Avenue intersection within an area that includes recreational uses. Similar to the OC-44 Booster Pump Station and Coastal Junction Pump Station, these facilities would include pumps, telemetry equipment, flow meters, appurtenances, one diesel-powered electrical generator for emergency back-up purposes and include vertical turbine pumps. The pumps would be less than 500 hp and produce noise levels of approximately 88 dBA at 3 feet from the source. Since the proposed facilities would be both located underground and surrounded by concrete walls, it would not emit noise levels in excess of applicable City codes in which the stations are located. All pump stations will be required to meet the local jurisdiction noise ordinance standards. Impacts in this regard are not anticipated to be significant.

Ground-Borne Vibration - Pump Stations

The pump station equipment would be designed to produce very low vibration levels because to operate efficiently the equipment needs to be well balanced. Equipment that is not well balanced would result in excessive wear and ultimately failure of the equipment. Experience with similar facilities demonstrates a negligible possibility for vibration impacts to surrounding land uses. Vibration design standards for pump equipment generally range from 0.2 to 0.3 inches per second (peak) generally depending on the hp size and style of the equipment.

The closest residence from any of the five pump stations would be at least 95 feet away. Assuming the vibration level previously noted is directly transferred to the surrounding area, the resulting vibration level at a distance of 95 feet would be less than 0.001 inches/second. This vibration level is well below the threshold of human perception for vibration. Thus, because the vibration associated with operation of the pump station would not be perceptible, the vibration impact would be less than significant.

SUMMARY OF IMPACTS

Pump noise levels at the proposed desalination facility site would potentially exceed the City of Huntington Beach's applicable exterior noise standards, and would require measures to comply.

MITIGATION MEASURES

LONG-TERM STATIONARY NOISE SOURCES

Proposed Desalination Facility Site

NOI-1 All pumps located outdoors (i.e., seawater intake pumps, filter effluent transfer pumps, and stand-alone pumps) shall be located within enclosed structures with adequate setback and screening, as necessary, to achieve acceptable noise levels at the property lines of nearby residences in accordance with the City of Huntington Beach's Noise Ordinance. Once the stationary noise sources have been installed, noise levels shall be monitored to ensure compliance with the City's Noise Ordinance. If stationary noise sources exceed levels specified in the City's Noise Ordinance, an acoustical engineer shall be retained by the project applicant to install additional noise attenuation measures in order to meet the applicable noise standard.

Off-Site Pipelines and Booster Pump Stations

None required upon compliance with local noise standards.

MOBILE SOURCES

None required.

UNAVOIDABLE SIGNIFICANT IMPACTS

None have been identified.