

SECTION 8 NOISE

This section presents the potential noise and vibration-related effects associated with the Proposed Project. This section begins with a description of the general characteristics of noise, followed by a discussion of the applicable Federal, State and local noise regulations. A qualitative analysis of potential noise-related effects associated with Proposed Project facilities is provided in Section 8.4. Mitigation measures to avoid, eliminate or reduce effects to a less than significant level are also provided, where appropriate. Finally, Section 8.5 identifies noise-related effects found not to be significant.

8.1 GENERAL CHARACTERISTICS OF NOISE

Commonly heard sounds have complex frequency and pressure characteristics. Accordingly, sound measurement equipment has been designed to account for the sensitivity of human hearing to different frequencies. Correction factors for adjusting actual sound pressure levels to correspond with human hearing have been determined experimentally. For measuring noise in ordinary environments dBA correction factors are employed. The adjustment for human hearing de-emphasizes the very low and very high frequencies of sound in a manner similar to the response of the human ear. Therefore, the dBA measurement is a good correlation to a human's subjective reaction to noise. As a result, the dBA scale is the basis for most noise ordinances and standards.

Environmental noise is generally evaluated and described in three ways. First, the L_{eq} dBA is the average noise for a given period, usually a 1-hour or 24-hour period, at a given location. The L_{dn} dBA is the average day/night noise level. This represents the dBA noise level during a 24-hour period obtained after adding 10 dBA to measured noise levels (L_{eq} dBA) between the hours of 10:00 p.m. and 7:00 a.m. The addition of 10 dBA to the measured noise levels is intended to represent the public's sensitivity to nighttime noises.

The Community Noise Equivalent Level (CNEL) is the equivalent dBA sound level during a 24-hour day, obtained after the addition of approximately 5 dBA to sound levels (L_{eq} dBA) in the evening from 7:00 p.m. to 10:00 p.m., and the addition of 10 dBA to sound levels (L_{eq} dBA) in the night between 10:00 p.m. to 7:00 a.m. This measure of CNEL adds the extra sensitivity to noise during the early evening in addition to nighttime hours.

The effect of noise on people can be listed in three general categories (Beranek 1988):

1. Subjective effects of annoyance, nuisance, and dissatisfaction;
2. Interference with activities such as speech, sleep, and learning; and
3. Physiological effects such as startling and hearing loss.

In most cases, environmental noise produces effects in the first two categories only. However, workers in industrial situations may experience noise effects in the third category. Measuring the effects of noise, or the corresponding variations in individual thresholds of annoyance and habituation to noise, is subject to individual preferences and experiences. Thus, an important way of determining a person's subjective reaction to a new noise is by comparing it to the existing or "ambient" environment to which that person has adapted. The more a new noise exceeds current ambient noise level, the less acceptable it is expected to be to listeners.

Table 8-1 lists average noise levels of various common sources as they would be experienced compared to a normal conversation between two people 5 feet apart (estimated to be 60 dBA). The perceived loudness presented in **Table 8-1** is based on the normal conversation baseline of 60 dBA, and is the effect the listener would interpret the noise source over the conversation. For example, a single truck noise level of 80 dBA would be interpreted by the listener as four times the loudness of the conversation.

Noise Source (distance)	Average Noise (dBA)	Subjective Impression	Perceived Loudness ^a
Jet Takeoff (at 200 feet)	120	Pain Threshold	32
Ambulance Siren (at 100 feet) Pile Driver (at 5 feet)	100	Very Loud	16
Motorcycle (at 25 feet) Freight Cars (at 50 feet)	90		8
Typical Construction Site	85		6
Single Truck (at 25 feet) Pneumatic Drill (at 50 feet) Kitchen with Garbage Disposal Running	80		4
Urban Shopping Center Freeway (at 100 feet)	70	Moderately Loud	2
Single Car (at 25 feet)	65		1.5
Normal Conversation (at 5 feet) Vacuum Cleaner (at 10 feet)	60		1
Residential Area During Day Light Traffic (at 100 feet) Private Business Office	50		0.5
Recreational Area	45		0.37
Residential Area at Night Rural Area During Day	40	Quiet	0.25
Rural Area at Night	35		0.18
Quiet Whisper	30		0.12
Recording Studio	20		0.06
-	10	Hearing Threshold	-

^a Perceived loudness compared to a normal conversation between two people five feet apart or 60 dBA.
Source: U.S. EPA 1974 and compilation of data from a number of private and governmental agency sources.

The dBA noise measurements are on a logarithmic scale. Therefore, increases in noise levels are not interpreted incrementally. As a result, increases in noise level can be described in the following way (Beranek 1988):

- Except in carefully controlled laboratory experiments, humans cannot perceive a change of 1 dBA;
- Outside the laboratory, a 3 dBA change is considered a reasonable perceivable difference;
- A change in level of at least 5 dBA is required before any noticeable change in community response would be expected; or
- A 10 dBA change is subjectively heard as approximately a doubling in loudness.

In general, noise environments acceptable to the public are derived upon the overall activity occurring in the area. As a result, a residential area would have a different acceptable noise level than a commercial area. It should be noted that noise levels in given sensitive areas (e.g., hospitals, day care centers, and schools) require quieter noise environments than other more active locations (e.g., shopping centers and manufacturing facilities). As a result, most local ordinances, regulations, and codes make allowances for the land use and types of sensitive environments in establishing noise limits for given land uses.

8.2 AREA-WIDE NOISE LEVELS

The existing noise environment in the Water Authority's Proposed Project areas could range from quiet and serene in rural areas (e.g., 35 to 45 dBA), to noisy in urban locations (e.g., 55 to 65 dBA). In general, the rural project areas are located in the eastern or northern portions of San Diego County away from coastal communities while the more noisy areas are located in the greater San Diego metropolitan area or in the vicinity of local coastal population centers.

Area-wide noise levels are the sum of the noise source in the region. Additionally, the noise environment is dependent on the distance from specific noise sources (e.g., freeways, major roads, airports, processing facilities, and construction equipment). Consequently, a location near a busy shopping center or freeway would have a considerably louder environmental noise setting than a location in a wilderness area or rural park.

8.3 REGULATORY SETTING

8.3.1 Federal

Federal codes, primarily the Occupational Safety and Health Act of 1970 (OSHA), govern worker exposure to noise levels. These regulations would be applicable to the construction, operation and maintenance of Proposed Project facilities and limit worker exposure to noise levels of 85 decibels (dB) or lower over an 8-hour period (Title 29, CFR, Section 1910.95).

The U.S. DOT has developed regulations under Title 23, CFR, Section 772 that govern highway noise design standards for new federally aided highways. These design standards are provided in **Table 8-2**.

Design Noise Level (L₁₀ dBA)^a	Description of Land Use Category
55 Interior	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums. This level applies when no exterior noise sensitive land use or activity is identified.
60 Exterior	Amphitheaters, particular parks or portions of parks, or open spaces which are dedicated or recognized by appropriate local authorities for activities requiring special qualities of serenity and quiet.
70 Exterior	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, picnic areas, recreation areas, playground, active sports areas, and parks.
75 Exterior	Developed land, properties or activities not included in the above categories.

^a L₁₀ dBA = Noise levels exceeded 10 percent of time on the A-weighted scale.

The U.S. EPA has established general guidelines for noise levels in sensitive areas in order to provide state and/or local governments guidance in establishing local laws, ordinances, rules, or standards. The U.S. EPA guidelines suggest that the average residential outdoor noise level be 55 dBA, and the indoor level be 45 dBA (U.S. EPA 1974). The indoor level also applies to sensitive noise receptors such as hospitals, schools, and libraries.

8.3.2 State

As with Federal standards, State of California regulations (California Noise Exposure Regulations and Title 8, CCR, Section 5095) address worker exposure to noise levels. These regulations limit worker exposure to noise levels of 85 dB or lower over an 8-hour period. The State has not established noise levels for various non-work-related environments.

8.3.3 Local

San Diego County and other local governments have established guidelines for noise levels. Generally, these guidelines are provided to reduce nuisance noise levels and do not reflect human health concerns.

For San Diego County, transportation-related noise levels are governed by the County's General Plan, which specifies that exterior noise levels up to 60 dBA CNEL are considered to be compatible with most residential land uses. Exterior noise levels between 60 and 75 dBA CNEL are conditionally compatible; therefore, requiring mitigation measures to reduce the levels to 60

dBA CNEL, if possible. Noise levels exceeding 75 dBA CNEL are considered to be incompatible with residential land uses (San Diego County 1980).

Construction-related noise is governed by the County's noise abatement requirements. These requirements make it unlawful to operate construction equipment on Sundays and stipulate that lawful operation of construction equipment can only occur Monday through Saturday between the hours of 7 a.m. and 7 p.m. The noise ordinance establishes a maximum of 75 dB for no more than 8 hours during any 24-hour period in residential areas.

Finally, maximum acceptable noise levels from fixed noise sources (e.g., operational noise) are a function of the type of land use, time of day and range from 45 to 70 dBA L_{eq} .

Noise-related policies included in city general plans and ordinances typically concern noise levels in residential developments. These policies generally establish maximum acceptable noise levels (e.g., 65 dBA CNEL) for construction-related noise and provide parameters for acceptable construction activity hours (e.g., 7 a.m. to 7 p.m. only).

Maximum fixed-source noise levels (i.e., operational noise) are also typically governed by city noise ordinances and generally range from 45 dBA L_{eq} (for residential areas) to 75 dBA L_{eq} (for commercial and manufacturing areas) (City of San Diego 1984).

While specific city policies are not enumerated herein, but would be considered in the necessary environmental review process conducted for projects prior to construction, **Table 8-3** provides an example of compatible and incompatible land uses for various CNEL noise levels as established by the City of San Diego (City of San Diego 1979).

8.4 IMPACTS AND MITIGATION

8.4.1 Environmental Consequences

8.4.1.1 Standards of Significance

The assessment of potential noise impacts considers the introduction of anticipated noise levels generated during project construction and operation to ambient noise levels in areas where sensitive receptors exist.

Noise impact analysis is based on the type of noise-emitting operations, the noise levels commonly associated with those operations, the duration of those operations, the proximity of sensitive receptors, and the anticipated noise reduction over distance and topography.

Projects would have a significant effect on the environment if noise generated during construction or operation would:

- Result in a significant increase in noise levels to sensitive receptors in the area; or
- Conflict with applicable noise restrictions or standards imposed by regulatory agencies.

**Table 8-3
City of San Diego CNEL Noise Levels**

Land Use	Annual Community Noise Equivalent Levels in Decibels					
	50	55	60	65	70	75
Outdoor Amphitheaters (may not be suitable for certain types of music)						
Schools and Libraries						
Nature Preserves and Wildlife Preserves						
Residential-Single Family, Multiple Family, Mobile Homes, and Transient Housing						
Retirement Homes, Intermediate Care Facilities, and Convalescent Homes						
Hospitals						
Parks and Playgrounds						
Office Buildings, Business, and Professional						
Auditoriums, Concert Halls, Indoor Arenas, and Churches						
Riding Stables and Water Recreational Facilities						
Livestock Farming and Animal Breeding						
Commercial-Retail, Shopping Centers, Restaurants, and Movie Theaters						
Commercial-Wholesale, Industrial Manufacturing, and Utilities						
Agriculture (except livestock), Extractive Industry, and Farming						
Cemeteries						

Source: City of San Diego 1979.

INTERPRETATION:

	Compatible – The average noise level is such that indoor and outdoor activities associated with the land use may be carried out with essentially no interference from noise.
	Incompatible – The average noise level is so severe that construction costs to make the indoor environment acceptable for performance of activities would probably be prohibitive. The outdoor environment would be intolerable for outdoor activities associated with the land use.

8.4.2 Impacts and Mitigation Measures

This section identifies the potentially significant adverse program-level impacts and required mitigation measures for the Proposed Project. **Table 8-4** presented at the end of this section identifies the potential program-level impacts of each of the Proposed Project facilities. This program-level analysis is not intended to describe or address the impacts in detail; detailed evaluations of the impacts of specific projects will be conducted as part of a site-specific CEQA review.

Unless otherwise noted, all identified impacts are considered to be potentially significant adverse impacts. Corresponding mitigation measures, unless otherwise noted, are expected to be sufficient to reduce impacts to a less than significant level.

Noise Impact 1: *Noise generated during construction of Proposed Project facilities could result in temporary increases in noise levels at sensitive receptors.*

Construction of facilities could generate noise at several local sensitive receptors (e.g., schools, hospitals, day care centers, residential areas) in the area that exceed established criteria or local regulations and codes. The construction-related noise levels would be from, but not necessarily limited to, the use of heavy equipment at the site or vehicles transporting material to or from the construction site.

Pipeline construction would cause localized, temporary short-term increases in noise levels. Actual noise levels resulting from construction activities would vary depending on the type of equipment used, the number of concurrent activities, and the distance to a particular receiver. Normally, nighttime noise levels would not be affected because most work would be limited to daylight hours.

Although construction noise would attenuate with distance from the construction area, the noise resulting from heavy equipment operation would probably be detectable in the general area of the construction site. During the day, the noise would typically combine with noise from traffic and other sources, outside and inside. However, at night when the ambient noise level tends to drop, the same construction noise would be more noticeable.

If construction occurred during the evening or nighttime, the noise impacts would be significantly greater because most local regulations and codes specify lower noise limits during these periods. In many cases, noise levels during the evening (6:00 p.m. to 10:00 p.m.) receive a 5 dBA penalty, and noise levels at nighttime (10:00 p.m. to 6:00 a.m.) receive a 10 dBA penalty.

Residences or sensitive receptors in the project area would experience elevated noise levels during daytime construction hours. This background noise would be in excess of normal rural background noise which is typically measured between 35 and 45 dBA.

Impacts associated with pipeline construction could persist in one location over a several-week period as the pipeline spreads through the location. Although daytime noise from construction

activities would be elevated, the impacts would be temporary. No long-term noise effects would result from the pipeline construction period.

Table 8-5 below presents the typical noise levels of various construction equipment that could be utilized during construction activities.

Equipment	Typical Noise Level (dBA) 50 Feet from the Source
Air Compressor	81
Backhoe	80
Compactor	82
Concrete Mixer	85
Concrete Pump	82
Crane, Derrick	88
Crane, Mobile	83
Dozer	85
Generator	81
Grader	85
Impact Wrench	85
Jack Hammer	88
Loader	85
Paver	89
Pneumatic Tool	85
Pump	76
Rock Drill	98
Roller	74
Saw	76
Scraper	89
Truck	88

Source: Federal Transit Administration 1995.

Noise Mitigation Measure 1:

- a) The Water Authority shall ensure that construction activities are conducted consistent with the Water Authority's General Conditions and Standard Specifications, Section 01560 Temporary Controls, including:
- Comply with all local sound control and noise level rules, regulations, and ordinances which apply to any work performed;
 - Equip each internal combustion engine used for any purpose on the job or related to the job with a muffler of a type recommended by the manufacturer. Do not operate internal combustion engines on the project without said muffler; and
 - Noise level requirements shall apply to all equipment on the job or related to the job, including but not limited to trucks and transient equipment that may or may not be owned

by the Contractor. Avoid the use of loud sound signals in favor of light warnings except where required by safety laws for the protection of personnel.

- b) Construction work shall be accomplished on a regularly scheduled eight (8) hour per day work shift basis, Monday through Friday, between the hours of 7:00 a.m. and 5:00 p.m. unless otherwise limited or revised by government permits for construction or as specified elsewhere (Water Authority's General Conditions and Standard Specifications, Section 70.11 [Hours of Work]).
- c) Some idling of construction equipment will occur; however, equipment shall be turned off when not being utilized.
- d) Noise barriers may be necessary around noisy equipment or near a noise sensitive area if other administrative controls cannot be implemented.

Noise Impact 2: *Blasting that may be necessary during construction could create a nuisance at local sensitive receptors.*

Although blasting is not anticipated to be necessary for construction of the Proposed Project facilities, it may be required in isolated instances for constructing facilities or along a pipeline route to remove rocks or other hard surfaces.

The sudden and intense airborne noise potential created by a blast could create adverse reactions for nearby sensitive receptors. Additionally, blasting could create local ground vibrations. The character of the blast and ground vibrations would be dependent upon various factors, such as the type of soil/rock, type of explosive, amount of explosive used, depth of explosion and meteorological conditions. Although, under most conditions, ground vibrations would not effect or damage property, it may result in disturbances to sensitive locations.

Blasting operations may use electronics to detonate a charge. This electronic detonation equipment could be impacted from electronic signaling gear operated by residents or by other activities near the Proposed Project site.

Noise Mitigation Measure 2:

The Water Authority shall ensure that all Blasting activities are conducted consistent with the Water Authority's General Conditions and Standard Specifications, Section 02229 Blasting, including:

- Blasting during construction shall only be conducted when other practicable excavation methods are not available.
- Providing advance written notification of the date and time of any blasting activities to all residents and businesses within 400 feet of the blast area.
- In the event that blasting is necessary, a Blast Plan shall be developed and approved by the local regulatory authority.

Noise Impact 3: *Noise generated during the operation of Proposed Project facilities could result in increased noise levels at sensitive receptors.*

Operation of any of the Water Authority's facilities may require the use of equipment or machinery (e.g., pumps, motors, compressors, or other equipment) that could generate noise levels over those established or those given in local regulations or codes.

Operation of pipelines would not result in any discernible noise. Noise impacts would be limited to inspection of pipelines during daytime hours and would be temporary.

Noise Mitigation Measure 3:

- a) If noise from equipment or machinery operation exceeds the local regulations for noise sensitive locations, low noise equipment or machinery shall be provided to achieve the necessary noise limits.
- b) If low noise equipment or machinery is insufficient in meeting the required noise limits, a noise barrier (e.g., building or other method) shall be placed around the equipment to provide the necessary noise attenuation.
- c) A combination of items (a) and (b) above shall be used to control the noise level to acceptable limits from the equipment or machinery operating at the site.

8.5 EFFECTS FOUND NOT TO BE SIGNIFICANT

None identified.

Table 8-4				
Potential Program-Level Noise Impacts of Proposed Project Facilities				
#	Project	Impact		
		1 ^a	2 ^b	3 ^c
Expand Internal System Capacity				
<i>Flow Regulatory Storage</i>				
1	Hubbard Hill FRS	X	X	X
2	Slaughterhouse Terminal Reservoir	X	X	X
3	North County Distribution Pipeline FRS	X	X	X
4	Mission Trails FRS II	X	X	X
	➤ Mission Trails Tunnel Pipeline and Vent Demolition	X	X	
<i>Projects to Increase Regional Untreated Water Conveyance Capacity</i>				
5	Restore Untreated Water Delivery in La Mesa-Sweetwater Extension	X		
6	Second Crossover Pipeline	X	X	
7	San Diego 24/25/26 FCF	X		X
8	San Diego 12 FCF Expansion	X		X
9	Lower Otay Pump Station	X		X
10	Convert Pipeline 3 to Untreated Water from Crossover to Miramar	X		
Additional Water Treatment Capacity				
<i>Projects to Supplement Treated-Water Aqueducts</i>				
11	Padre Dam Pump Station Expansion	X		X
12	Pipeline from Otay FCF 14 to Regulatory Reservoir	X	X	
13	Poway Pump Station and Treated Water Connection	X		X
14	Escondido-Vista WTP Connection			
	a) Escondido-Vista Pipeline Conversion	X		X
	b) Escondido-Vista Pump Station	X		X
	c) Escondido-Dixon Pipeline	X	X	
<i>Projects to Expand Regional Water Treatment Capacity</i>				
Options for Expanding Regional Treatment Capacity				
15a	Olivenhain WTP – 50 mgd Expansion	X	X	X
15b	Weese WTP – 50 mgd Expansion	X	X	X
15c	Red Mountain WTP – new 50 mgd plant	X	X	X
15d	Diversion Structure WTP – new 100 mgd plant	X	X	X
Additional Seasonal/Carryover Storage				
16	Additional San Vicente Dam Raise Beyond ESP	X	X	
New Conveyance and Supply				
17	Phase I – Seawater Desalination: Project at Encina (50 mgd)			
	➤ Desalination Plant	X		X
	➤ Desalinated Water Conveyance Facilities	X	X	X
18	Expand Existing or Site New Seawater Desalination Plant*			
	Phase II – Seawater Desalination: Expand Capacity up to 100 mgd			
	Phase III – Seawater Desalination: Expand Capacity up to 150 mgd			
Seawater Desalination Site Options for Phases II and III:				
	a) San Onofre – at San Onofre Nuclear Generating Station	X	X	X
	b) Carlsbad – at Encina Power Station	X	X	X
	c) South Bay – at South Bay Power Plant	X	X	X
	d) Encina Water Pollution Control Facility	X	X	X
	e) South Bay Ocean Outfall Site	X	X	X

Table 8-4 (continued)
Potential Program-Level Noise Impacts of Proposed Project Facilities

- * The ultimate level of seawater desalination development in the region would depend largely upon actual regional population growth, economics, availability of other high quality water sources, as well as an evaluation of the performance of the Encina seawater desalination facility, should it be approved and constructed.
- ^a Noise generated during construction of Proposed Project facilities could result in temporary increases in noise levels at sensitive receptors.
- ^b Blasting that may be necessary during construction could create a nuisance at local sensitive receptors.
- ^c Noise generated during the operation of Proposed Project facilities could result in increased noise levels at sensitive receptors.