

4.11 NOISE

The CPA Project will create environmental noise and vibration, primarily resulting from project construction activities. This section evaluates existing noise levels within the project area, the project's potential to result in significant noise impacts, and mitigation measures designed to reduce significant impacts to a less-than-significant level.

Project construction will occur for an extended period at certain project activity sites. Thus, at these sites construction noise is considered a medium-duration rather than a temporary effect. Construction-phase noise for other project activity will only temporarily raise noise levels in the vicinity of construction sites. Long-term project effects due to project operations could include elevation of noise levels near the Eagle Valley Water Treatment Plant and near Flow Control Facility Nos. 1 and 2.

Environmental noise is measured in units called A-weighted decibels (dBA). The A-weighting is used to account for human hearing's reduced sensitivity to low- and very high-pitched sound. The normal range of human hearing extends from the threshold of hearing at about 0 dBA to painful sound at about 130 dBA. Noise levels associated with various sources of sound are shown on Figure 4.11-1. In general, people can perceive a 3 dBA difference in noise level with a difference of 8 to 10 dBA perceived as "twice as loud."

Environmental noise levels typically fluctuate over time, and different types of noise descriptors are used to account for this variability. Useful noise descriptors measure time-average noise levels; these descriptors include equivalent noise level (L_{eq}), day/night noise level (L_{dn}), and Community Noise Equivalent Level (CNEL). The L_{eq} is the actual time-averaged noise level, while L_{dn} and CNEL are 24-hour noise descriptors calculated from the L_{eq} . L_{dn} and CNEL account for greater sensitivity of most people to nighttime noise. Both the L_{dn} and CNEL noise descriptors are commonly used in establishing long-term noise exposure guidelines for specific land uses. The maximum sound level

(L_{max}) and the L_{eq} for a certain percentage (typically a number of minutes in an hour) used as criteria for noise control or limitations.

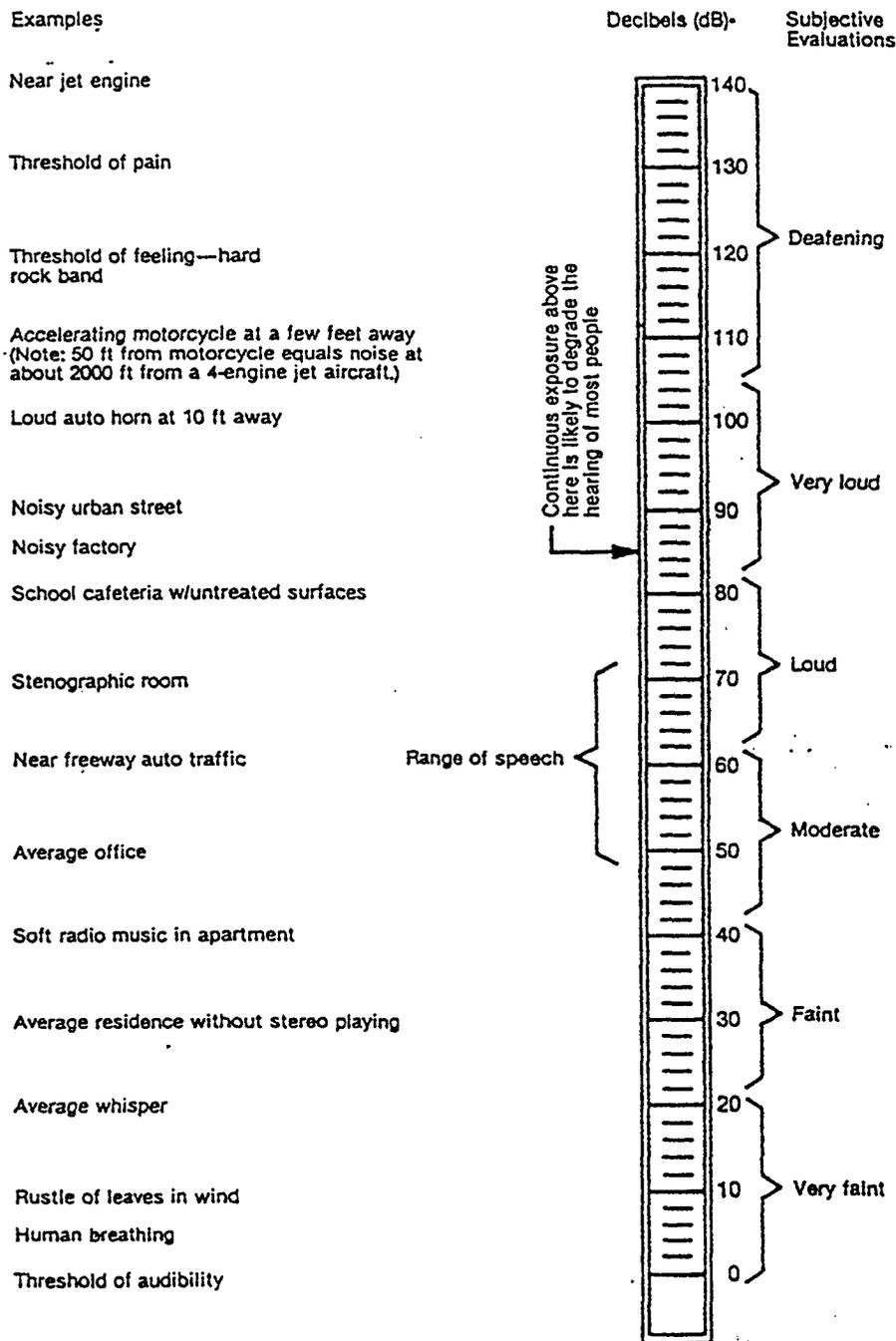
4.11.1 Regulatory Setting

Portions of the project are within the jurisdiction of Riverside and Orange Counties and the City of Corona, and within the sphere of influence of the City of Irvine. These local agencies have established policies and regulations concerning generation and control of noise that do not adversely affect their citizens and noise-sensitive land uses. The various policies and regulations established to achieve control of adverse environmental noise are not absolute prohibitions but recognize the necessity and inevitability of noise associated with an urbanized technological society.

The local governments utilize two basic methods to promote noise/land use compatibility. The first method is associated with local agency functions of planning, zoning, and the issuance of discretionary permits. The policies, guidelines, and control mechanisms are usually embodied in the Noise Element of the agency's General Plan. This method is primarily used on projects with long-term or permanent effects on the noise environment such as highways, manufacturing or heavy industry, airports, and transit or intermodal facilities. This method typically uses the CNEL index in dBA units to quantify noise levels.

The second method applied by local government agencies is used primarily to ensure short-term peace and quiet. The policies and performance criteria take the form of noise control, zoning, or grading ordinances. The noise control ordinances address many forms of noise pollution. These are usually associated with fixed noise sources such as a noisy air compressor or car-wash machinery, but also apply to noise-producing activities including construction. The noise control ordinance method typically uses the L_{eq} index in dBA units to quantify noise levels that may not be

Some common, easily recognized sounds are listed below in order of increasing sound intensity levels in decibels. The sound levels shown for occupied rooms are typical general activity levels only and do not represent criteria for design.



*dB are "average" values as measured on the A-scale of a sound-level meter
(From *Concepts In Architectural Acoustics*; M. David Egan, McGraw Hill, 1972.)

COMMON SOUNDS IN DECIBELS

Figure 4.11-1

exceeded for a certain percentage of time. The ordinances may also control hours of operation or require special equipment such as mufflers.

Some specific limitations and exemptions for construction noise are provided in the ordinances applicable to the CPA Project. Tables 4.11-1 through 4.11-4 summarize the applicable regulations of the County of Riverside, City of Corona, County of Orange, and (for reference purposes) City of Irvine that could be applied to the project.

The noise from licensed motor vehicles operating on public roads is regulated by the California Vehicle Code, which preempts the establishment of different noise standards for these vehicles. Local and state law enforcement officers are authorized to enforce the vehicle code, which includes regulation of motor vehicle noise levels, muffler systems, braking systems, alarm systems, and car stereo systems.

Although a decibel noise limit is specified, noise control ordinances use a time-and-noise-level-related criterion to determine if a violation is occurring. For example, in the City of Corona for noise affecting an industrial, manufacturing, or agricultural type of land use, outside, between the hours of 7 a.m. to 10 p.m., the maximum allowable noise level is specified as 75 dBA. This level may be exceeded, however, by up to 5 dBA for up to 30 minutes in any hour, by more than 5 dBA but less than 10 dBA (i.e., just under 85 dBA) for up to 15 minutes in any hour, can be just under 90 dBA for 5 minutes in any hour, and up to 95 dBA for 1 minute. Thus, during any daytime hour, noise sources could produce an average noise level of 84 dBA L_{eq} and comply with the ordinance sound level standard of 75 dBA, provided that the time duration limits were not exceeded. The noise may not exceed 95 dBA on the affected property at any time, unless the ambient noise level already exceeds 95 dBA, in which case it may not exceed the ambient level. Interior noise standards are more restrictive with respect to both allowable noise level and the duration of offending noise, but apply only to residential and designated noise-sensitive land uses.

4.11.2 Regional Setting

The project stretches between Lake Mathews in Riverside County to just north of the El Toro Marine Corps Air Station, (MCAS) in Orange County. Areas of potential project noise impacts contain a broad range of land uses, each with differing ambient noise characteristics. Project construction activity will affect undeveloped land, land in agricultural production, areas of low-intensity passive recreational use, and land used for semi-rural residential and associated agrarian or equestrian purposes. Long-term project operations noise will affect land currently in agricultural production and undeveloped land expected to remain in open-space passive park use. All of the project areas of concern are currently affected by a variety of environmental noise sources, including highways and aircraft overflight. The amount and character of existing environmental noise differ among the various locations of potential project noise impacts. The ambient noise environment in the area of the proposed project facilities is summarized in Table 4.11-5.

The recorded noise levels from Table 4.11-5 are plotted in order of increasing noise level on Figure 4.11-2. This figure shows that the existing ambient noise environments in the project vicinity may be grouped into four noise classes, with the median L_{eq} of each successive class differing by 6 to 8 dBA. The locations in the quietest noise class (L_{eq} of 34 to 40 dBA) include Agua Chinon (during periods of no jet aircraft activity), Bedford Canyon portal site, and Eagle Valley East. The next quietest noise class (L_{eq} of low to mid-40s dBA) includes the Santiago portal area (near the Edison Easement), Bedford Canyon portal site (with some aircraft activity), Williams Canyon (away from Santiago Canyon Road traffic), and Agua Chinon (with some jet activity). The next loudest class (L_{eq} from 48 to 52 dBA) contains Rancho Sonado (roughly halfway between eastern and western Santiago Canyon portal sites), alternative Williams Canyon portal site, Agua Chinon (with jet activity), and Lake Mathews (observation/visitor area and base of dam). The loudest noise level class of interest (L_{eq} of 56 to 58 dBA) consists of the Santiago

Table 4.11-1

COUNTY AND CITY OF RIVERSIDE NOISE CONTROL STANDARDS

County of Riverside	
From: RIVERSIDE COUNTY BUILDING ORDINANCE 457, Section 1, G. Enacted 9/19/89.	
G.	Construction Noise
1.	Whenever a construction site is within one-quarter (1/4) of a mile of an occupied residence or residences, no construction activities shall be undertaken between the hours of 6:00 p.m. and 6:00 a.m. during the months of June through September, and between the hours of 6:00 p.m. and 7:00 a.m. during the months of October through May, if said construction activities generate excessive noise. Excessive noise shall be defined as noise that is sufficient to awaken an average, reasonable person from a state of normal sleep.
2.	The generation of excessive noise shall be a violation of this Ordinance and the building official, or his designee, shall have the authority to cite a violator upon the filing of a written complaint by a resident or residents living near the construction site, verifying that excessive noise has been generated at the construction site. Failure to correct a noise violation shall authorize the building official, or his designee, to abate the noise as public nuisance.
City of Riverside	
The City's Noise Element contains the following language applicable to new facilities on page 339:	
Noise Procedure	
Proposed Land Use that will produce noise levels in excess of the "acceptable" noise level on the Land Use Compatibility Chart (Figure VI.II) for existing, adjoining parcels shall be required to have acoustical studies prepared and mitigate the anticipated noise intrusion.	
Note: The "acceptable" category noise criteria vary with type of land use, but 65 CNEL is appropriate according to County staff.	

Canyon site, for which two 24-hour L_{eq} noise measurements were recorded.

Although Agua Chinon experiences noise levels spanning all classes, and some sites may straddle adjacent noise classes, the four noise level classes fairly represent the noise environment existing in the project area before project implementation. Furthermore, the baseline noise level environments are established to an adequate degree by the measurement data for Lake Mathews, Eagle Valley, Bedford Canyon, and Santiago Canyon project locations. The Agua

Chinon noise environment is generally very quiet except for intermittent jet noise from aircraft operating out of the nearby MCAS. The airstation is the predominant source of noise affecting this site.

Environmental noise generated by airstation operations has been extensively studied, documented, and regulated. Over the past 15 years, noise levels were stable, decreased, and then stabilized again at the lower, current levels. Noise events occur throughout the daytime and

Table 4.11-2

CITY OF CORONA STATIONARY NOISE SOURCE STANDARDS

TYPE OF LAND USE	MAXIMUM ALLOWABLE NOISE LEVELS			
	EXTERIOR NOISE LEVEL		INTERIOR NOISE LEVEL	
	7 a.m. to 10 p.m.	10 p.m. to 7 a.m.	7 a.m. to 10 p.m.	10 p.m. to 7 a.m.
Single-, Double- and Multi-Family Residential	55 dBA	50 dBA	45 dBA	35 dBA
Other Sensitive Land Uses	55 dBA	50 dBA	45 dBA	35 dBA
Commercial Uses	65 dBA	60 dBA	Not applicable	Not applicable
Industrial, Manufacturing or Agricultural	75 dBA	70 dBA	Not applicable	Not applicable

D. Special Provisions

2. Construction noise. Construction activities that generate noise and are adjacent to residential or sensitive land uses shall be limited to Monday through Saturday, from 6 a.m. to 8 p.m. and Sundays and federal holidays from 10 a.m. to 6 p.m. Construction activities are construction, repair, remodeling, demolition, grading and other activities associated with the construction and development of real property.

3. Noise devices. In accordance with Chapter 9.24, no loudspeaker, bells, gongs, buzzers, mechanical equipment or other sounds, attention-attracting, or communication device associated with any use adjacent to residential or sensitive land uses shall be discernible beyond the boundary line of the parcel, except fire protection devices, burglar alarms and church bells. Noise generated by these sources shall be enforced by the police department.

evening periods, with occasional noise events as late as 10:00 p.m. during the entire year without significant seasonal variation. The future use of the airbase property is uncertain, with the potential for continued flight activity. For purposes of this report, continuation of the existing conditions will be presumed.

Aircraft noise effects on the Agua Chinon area notwithstanding, the measured noise levels and respective noise environments are consistent with the intensity of development within the project's area of potential noise impact. Thus, they will adequately serve as benchmarks for comparison with predicted project-generated noise levels.

4.11.3 Impact Significance Criteria

The severity of an environmental noise impact, and thus its significance, is often based upon the response magnitude (physiological, physical, social, political) that is expected to be or is actually elicited from one or more reasonable persons of normal sensibilities affected by the noise. Likewise, behavioral responses may be considered when evaluating noise impact significance on nonhuman species.

Because of the wide diversity of an individual's response to noise, it is nearly impossible to predict how any one individual will be affected by and respond to noise within the commonly occurring range of noise intensities associated

Table 4.11-3

COUNTY OF ORANGE NOISE CONTROL STANDARDS

From: Division 6 NOISE CONTROL of the Orange County Code.

Sec. 4-6-4. Designated noise zone.

The entire territory of Orange County, including incorporated and unincorporated territory, is hereby designated as "Noise Zone 1." (Ord. No. 2700, § 1, 9-19-73; Ord. No. 2870, § 1, 10-1-75).

Sec. 4-6-5. Exterior noise standards.

(a) The following noise standards, unless otherwise specifically indicated, shall apply to all residential property within a designated noise zone:

NOISE STANDARDS

Noise Zone	Noise Level	Time Period
1	55 dBA (A)	7:00 a.m. - 10:00 p.m.
	50 dBA (A)	10:00 p.m. - 7:00 a.m.

Sec. 4-6-7. Special provisions.

The following activities shall be exempted from the provisions of this article:

(e) Noise sources associated with construction, repair, remodeling, or grading of any real property, provided said activities do not take place 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.

Excerpt from Orange County Noise Element Chapter 4:

OBJECTIVES AND POLICIES

B. Objectives, Assumptions and Definitions

In general, any development that results in a situation where there is an unacceptable level of noise in any living area (interior or exterior) must be mitigated or the project or use revised to avoid the conflict.

Note: Application of Chapter 4 policies assumes a discretionary permit will be required for the project.

with environmental noise. However, groups of persons, acting independently or in concert, do tend to behave as a community. Many studies have documented the substantially consistent relationship between the nature of noise impact and the intensity of response. This knowledge has led to the establishment of noise level

guidelines and legal limits associated with the generation of noise that could affect a noise-sensitive receptor. These guidelines and limits are usually established on a local basis by local government bodies and are considered to reflect societally common concerns and goals regarding a desirable environment. These regulations were

Table 4.11-4

**CITY OF IRVINE NOISE CONTROL STANDARDS
(Sphere of Influence Only)**

<p>From: Irvine Code Ord. 84-18 Pollution Chapter 3. NOISE</p> <p>Sec. VI.K-305. Special provisions.</p> <p>(1) Construction activities and agricultural operations may occur between 7:00 a.m. and 7:00 p.m. Mondays through Fridays, and 9:00 a.m. and 6:00 p.m. on Saturdays. No construction activities shall be permitted outside of these hours or on Sundays and federal holidays unless a temporary waiver is granted by the manager of building and safety or his authorized representatives. Trucks, vehicles, and equipment that are making or are involved with material deliveries, loading, or transfer of materials, equipment service, maintenance of any devices or appurtenances for or within any construction project in the city shall not be operated or driven on city streets outside of these hours or on Sundays and federal holidays unless a temporary waiver is granted by the City. Any waiver granted shall take impact upon the community into consideration. No construction activity and agricultural operation will be permitted outside of these hours except in emergencies including maintenance work on the city rights-of-way that might be required.</p> <p>Note: From the Noise Element, Open Space-Parks are clearly compatible up to a 70 dBA CNEL.</p>
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discussed and summarized previously in Section 4.11.1.

Because these guidelines and limits have been established by and for society, their use in evaluating the significance of project environmental noise impacts is appropriate. The planning and regulatory documents of the local governmental agencies discussed in Section 4.11.1 dictate that long-term or permanent project effects should be evaluated against noise/land use compatibility planning criteria, and short to medium-term, temporary effects are appropriately evaluated against noise ordinance limits.

Therefore, the project will be considered to result in a significant impact if one or more of the following were to occur:

- ▶ the project's long-term or permanent noise impacts exceed the local planning guidelines for the affected land use;
- ▶ the project will cause substantial, or potentially substantial, adverse changes in

the ambient noise conditions within the area affected by the project (e.g., increase long-term ambient noise by 5 to 10 dBA; or short-term ambient noise by 20 dBA) and these changes will impact noise-sensitive receptors; or

- ▶ the project's temporary noise and operations impacts exceed the local noise regulation ordinance.

The determination of substantial noise impact will consider such factors as receptor proximity, time of day, change in noise level, absolute noise level, unusual characteristics of the noise, potential for sleep disturbance, and risk of hearing damage. An increase in the long-term ambient noise level of 5 to 10 dBA is generally considered significant. This is because most people consider these noise level changes from an existing level as "substantially louder" to "twice as loud." For intermittent, temporary noise level increases, a change of more than 20 dBA will be considered significant, based upon most local noise ordinances. The potential impacts of noise

Table 4.11-5

AMBIENT NOISE SURVEY LOCATIONS AND MEASURED NOISE LEVELS

Location	Jurisdiction	Date	Time	L _{eq} Noise Levels (in dBA)
Lake Mathews Dam (roadway)	Riverside County	2/14/90	10:25 a.m.-10:35 a.m.	67.7
Lake Mathews Overlook/Observation Area, M-12	Riverside County	7/12/94	12:13 p.m.-12:23 p.m.	51.9
Base of Lake Mathews Dam	Riverside County	2/14/90	10:52 a.m.-11:02 a.m.	51.4
Eagle Valley East, M-10	Riverside County	7/12/94	11:13 a.m.-11:23 a.m.	38.3
Eagle Valley West, M-11	City of Corona	7/12/94	11:40 a.m.-11:50 a.m.	40.4
Bedford Canyon	Riverside County	2/14/90	3:35 p.m.-3:45 p.m.	43.3
Bedford Canyon, M-9	Riverside County	7/12/94	9:45 a.m.-9:55 a.m.	38.3
Williams Canyon	Orange County	2/15/90	11:58 a.m.-12:08 p.m.	50.9
Santiago Canyon, M-1	Orange County	4/19/94	10:30 a.m.-10:40 a.m.	56.0
Santiago Canyon, M-1	Orange County	4/19/94	10:47 a.m.-10:57 a.m.	56.7
Ridgetop Road (M-2)	Orange County	4/19/94	11:15 a.m.-11:25 a.m.	43.5
Rancho Sonado (between eastern and western Santiago Canyon portal areas), M-3	Orange County	4/19/94	11:45 a.m.-11:50 a.m.	48.4
Santiago Canyon, M-7 ^(a)	Orange County	5/11, 5/12/94	1:00 p.m.-1:00 p.m.	58.2/60.5 ^(b)
Santiago Canyon, M-7 ^(a)	Orange County	5/12, 5/13/94	3:00 p.m.-3:00 p.m.	57.3/60.5 ^(b)

Environmental Impact Report

ENVIRONMENTAL SETTING, IMPACTS, AND MITIGATION
4.11 Noise

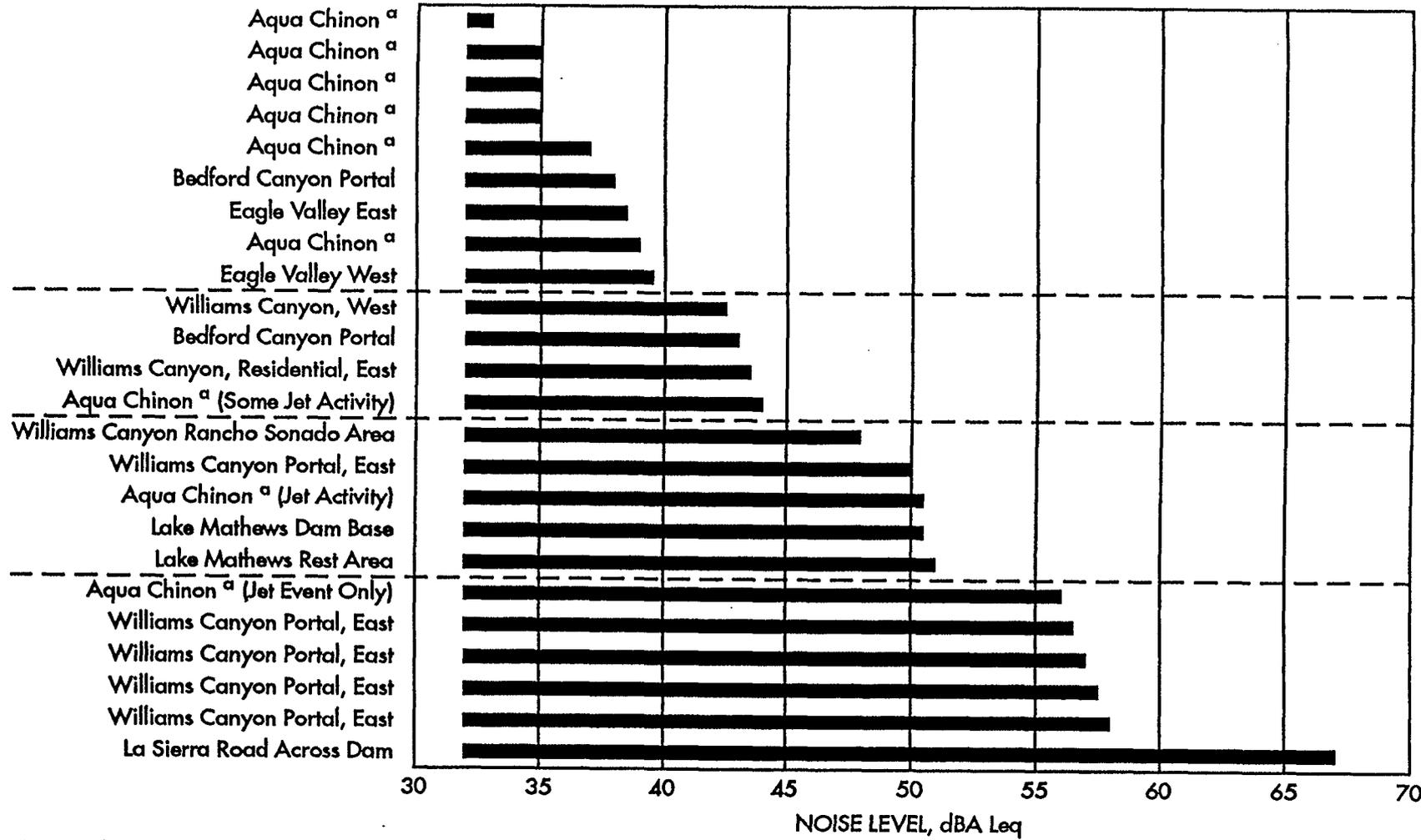
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Table 4.11-5 (continued)

AMBIENT NOISE SURVEY LOCATIONS AND MEASURED NOISE LEVELS

Location	Jurisdiction	Date	Time	L _{eq} Noise Levels (in dBA)
Eastern Santiago Canyon portal site (Edison easement area, M-8)	Orange County	5/11/94	1:25 p.m.-1:40 p.m.	42.8
Agua Chinon Flow Control Facilities 1 and 2	Orange County ^(f)	7/23/91	4:20 p.m.-4:30 p.m.	51.1 ^(e)
Agua Chinon, M-4	Orange County	4/22/94	9:40 a.m.-9:50 a.m.	35.4 ^(d) 35.5 ^(d) 39.9 ^(d) 56.0 ^(d)
Agua Chinon, M-5	Orange County	4/22/94	10:25 a.m.-10:35 a.m.	34.0 ^(d) 35.5 ^(d)
Agua Chinon, M-5	Orange County	4/22/94	10:35 a.m.-10:45 a.m.	36.7
Agua Chinon, M-6	Orange County	4/22/94	10:40 a.m.	44.4 ^(e)
<p>Notes:</p> <p>M-x Designation refers to Woodward-Clyde measurement locations; without designation refers to Chambers Group measurement locations.</p> <p>(a) 24-hour measurement.</p> <p>(b) CNEL, time-weighted average.</p> <p>(c) Jet departure event.</p> <p>(d) Two-minute L_{eq} measurements: minimal jet activity.</p> <p>(e) Two minute L_{eq} measurements: intermittent jet activity.</p> <p>(f) Agua Chinon site is within City of Irvine sphere of influence.</p>				

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^aAqua Chinon represents Flow Control Facilities 1 and 2

DISTRIBUTION OF PROJECT ACTIVITY SITES AND AFFECTED LOCATIONS BY AMBIENT NOISE LEVEL

FIGURE 4.11-2

on wildlife are discussed in Section 4.4, Biological Resources.

4.11.4 Investigative Methods and Data Sources

A standard approach was used to investigate, analyze, and evaluate the potential project-related environmental noise impacts. In order to adequately describe the various existing noise environments, noise levels were measured at several proposed project locations. Noise was monitored in February 1990 and July 1991 by Chambers Group and in April, May, and July 1994 by Woodward-Clyde Consultants. The noise monitoring results were summarized in Table 4.11-5.

Most of the noise measurements consisted of acquiring short-term (less than 1 hour) L_{eq} noise readings, which are considered representative of the existing daytime noise environments. For the potentially significant noise impact location adjacent to Santiago Canyon Road at Williams Canyon, noise was monitored over 24 hours for two consecutive periods. The measured noise levels are considered baseline noise values that are valid for describing the ambient acoustical environment of areas with similar use and character occurring within the project limits. This noise impact analysis assumes that environmental noise levels will remain stable and will also constitute the existing acoustical environment during and after project construction, except for the Lake Mathews Dam and Williams Canyon locations, where normal increases in traffic volumes on adjacent roads will slightly increase the ambient noise levels.

All noise monitoring was performed by qualified personnel using calibrated instrumentation and suitable methodology. The short-term noise levels were measured using precision digital tripod-mounted, Bruel & Kjaer and CEL sound level meters. The pipeline construction and 24-hour measurements were made with a Larson-Davis precision digital community noise analyzer. The normal standard of practice and care was used when making noise measurements.

Sources of data included General Plan Noise Elements and applicable ordinances from Riverside and Orange Counties and from the Cities of Corona and Irvine. Traffic data and project activity data were obtained from the technical reports prepared by project team members with confirmation, clarification, and any required supplemental information provided by the local government agencies' staff. Published acoustical engineering reference books, environmental planning documents, and California Environmental Quality Act (CEQA) reference texts were consulted as necessary for general technical information.

4.11.5 General Impacts and Mitigation Measures

4.11.5.1 General Impacts Mitigated Through Project Design

The project is a linear project, examples of which include power transmission lines, highways, railroad lines, and aqueducts. However, audible construction activity and permanent noise-producing project operations will occur only at discrete locations. Therefore, the project noise impacts are primarily analyzed on the basis of project-related activity occurring at specific locations along the water conveyance facility route. The one exception is pipe laying, which is analyzed as a linear construction activity over short distances.

Potential noise impacts from the project are expected to occur during the construction phase and will result primarily from the use of construction equipment. Other short-term impacts from construction noise could result from construction traffic and the use of haul routes. Noise impacts will be most noticeable in residential areas in the vicinity of project construction locations. Noise levels will vary depending on the type of equipment used, how it is operated, and how well it is maintained. Standard excavation equipment, such as graders, backhoes, loaders, and trucks, will be used for construction of most project facilities.

Specific construction vehicles, machines, and equipment expected to operate at various locations is described in Section 3.0. In addition to heavy equipment typically operating at construction sites (e.g., bulldozer, motor grader, dump truck, water truck), portal sites may also have rail-mounted equipment such as flat cars, muck cars, and small locomotives operating underground. Spoils transport trucks and materials delivery trucks will also frequent some sites. Additional noise-producing equipment may include transformers, compressors, drills, pumps, generators, and tunnel vent fans.

Project construction activity is expected to be near maximum levels for about 2 years during the approximately 5-year construction period, peaking around the mid-point of the period. Because project construction noise is the primary project noise effect, and because the construction will occur over an extended period, an evaluation of the generation of construction noise is appropriate. Noise from construction activity is generated by the broad array of powered, noise-producing mechanical equipment used in the construction process. This equipment ranges from hand-held pneumatic tools to bulldozers, dump trucks, and front loaders. The exact complement of noise-producing equipment that will be in use at a given construction site during any particular period is difficult to predict. However, the maximum noise levels from construction activity during various phases of a typical construction project have been evaluated, and their use is believed to yield an acceptable prediction of the project's potential noise impacts.

Except for special activities, such as construction blasting, the evaluation of project construction noise impacts is based on typical noise level ranges for industrial construction sites (EPA 1971). Maximum noise level (L_{max}) ranges associated with various construction phases, where all pertinent equipment is present and operating, are (at a reference distance of 50 feet):

▶ Ground Clearing	84 ± 6 dBA
▶ Excavation	89 ± 7 dBA
▶ Foundations	78 ± 3 dBA
▶ Erection	85 ± 7 dBA

▶ Finishing	89 ± 6 dBA
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Because of vehicle technology improvements and stricter noise regulations enacted for licensed vehicles within the past few years, this analysis will use the midpoint noise level shown above. This information indicates that the overall noise level generated on a construction site could reach a maximum short-term noise level of 89 dBA at a distance of 50 feet. Noisy construction activities could be in progress on more than one part of the project site at a given time, although it is unlikely that noise levels on two separate construction areas will peak simultaneously. The magnitude of construction noise levels varies over time because construction activity is intermittent and power demands on construction equipment are cyclical. Assuming a cycle of 25 percent of time at maximum noise level and 75 percent of time at 10 dBA below the L_{max} level, average noise levels (L_{eq}) will be 6 dBA lower than the maximum noise levels.

Noise from construction activity on project sites will decrease with distance, such that the noise levels will be 6 dBA lower for every doubling of distance away from the construction vehicle or activity. For example, if a particular construction activity generated average noise levels of 83 dBA at 50 feet, the L_{eq} at 100 feet will be 77 dBA, 71 dBA at 200 feet, and 65 dBA at 400 feet. This calculated reduction in noise level is based only on losses resulting from spreading of the sound wave as it leaves the source and travels outward. Noise-sensitive uses (i.e., residential) located approximately 400 feet from project construction site boundaries will experience a lower noise level because at 400 feet, an additional 4-dBA reduction in maximum noise level will occur because of soft ground, vegetation, and atmospheric losses between the noise source and the receptor.

Therefore, the maximum hourly construction noise impact at a home 400 feet from the project construction will be 61 dBA L_{eq} . Assuming 7:00 a.m. to 7:00 p.m. operations, attenuation will yield a project-generated CNEL of 58 dBA. Using the CNEL standards, this noise level is compatible on a long-term basis with noise-

sensitive land use, including residential uses, within any of the affected jurisdictions. Short-term exceedances of applicable noise control ordinances could occur, however, and will be discussed below where the project effect will be significant.

Pipeline Construction. The noise level used for analysis of pipeline construction noise impacts was developed by monitoring noise levels generated by installation of buried 12-foot-diameter reinforced concrete pipe similar to that proposed for the CPA Project (Chambers Group 1992). This study found that noise associated with pipeline construction did not exceed an L_{eq} of 75 dBA at a distance of 90 feet from the trench centerline. At a distance of 500 feet from the construction activity, the L_{eq} , based upon distance attenuation only, will be 60 dBA. Additional attenuation due to intervening soft ground, vegetation, and atmospheric losses will reduce the noise level by six dBA to 54 dBA. This level of noise, if it were to occur between 7:00 a.m. and 10:00 p.m., will not exceed temporary or long-term noise level standards. Thus, no impacts will occur beyond 500 feet from the pipeline trench. Effects on noise-sensitive receptors within 500 feet of the pipe-laying activity are evaluated below if they occur in a particular reach.

Special Construction Impacts.

Blasting. If substantial hard rock formations that cannot be graded or excavated with normal construction equipment are encountered during construction, it is possible that construction blasting may be necessary. For excavation requiring blasting, the magnitude of noise impacts will depend on the type of material being excavated, the types of explosives used, the depth of the explosive charge, and the proximity to noise-sensitive receptors. Grading in areas of shallow or exposed bedrock will require blasting, and the resulting noise levels will depend on the depth of the blasting holes. If blasting is necessary, blasting activities will be supervised by a specialist pyrotechnician/blasting engineer.

Blasting of subsurface formations will not typically cause a significant noise disturbance.

Shallow subsurface blasting is more likely to generate very short-duration noise levels that could exceed local noise standards for a few seconds. However standard blasting procedures will include sizing the blast charges so as not to produce peak acoustical overpressures exceeding 122 dBA at any sensitive structure, which will preclude hearing damage or structural damage caused by blasting. All aspects of blasting activity will be the responsibility of the contractor.

Tunnel Boring. A substantial portion of the project will be constructed underground, excavating tunnels that will ultimately be used for water conveyance. Although the machinery used to construct the tunnels (tunnel boring machine [TBM] and spoils removal system) will generate considerable noise, this noise will be confined underground and will not cause noise impacts to aboveground environments except at tunnel portal locations. Worker exposure to underground tunneling noise will be controlled by adhering to all Occupational Safety and Health Administration (OSHA) regulations concerning workplace noise limits and hearing protection requirements as discussed in Section 4.12. Tunnel portal noise will be mitigated where necessary to prevent significant tunnel portal noise impacts. This will be especially important where nighttime tunnel portal noise may cause an impact.

Vibration Impacts. Ground vibrations associated with the project will result primarily from construction activities. However, during operation of the project, facilities such as pumps and generators will also generate ground vibrations. Depending on the type of construction activity or equipment in operation, the local geologic conditions, and the distance to receptors, ground vibrations could be perceptible. In general, project construction activities will occur at a sufficient distance from potential receptors such that vibration will not be perceived.

Locally, if tunnels were to be excavated under residences, there will be the potential for ground vibrations to be felt by the residents. In most cases, project tunnels will be deep and in firm bedrock, so that vibrations will be naturally

attenuated to levels lower than could be perceived by residents, even if the tunnels were excavated directly beneath homes. However, where tunnels will be very shallow (about 30 to 40 feet below a structure) and in relatively soft soils, vibrations could be perceptible at the ground surface.

There are no residences over the proposed Eagle Valley Tunnel or the Foothills Tunnel, so no vibration impact is expected. The proposed tunnel beneath the Santa Ana Mountains passes beneath portions of Silverado Canyon, but away from populated areas. Based on the relatively great distance (several hundreds to thousands of feet) from the proposed tunnels to the nearest residence, and because the proposed tunnels will be excavated in firm to hard rock, it is estimated that construction vibrations will not be perceived by residents along the alignment.

Off-Site Noise Impacts. Off-site noise will be generated by the project. Outside the immediate construction zone, project construction noise levels will not be considered loud enough to cause risk of hearing loss and no other persons will be exposed to hazardous or dangerous noise levels. Noise from spoils transport trucks, delivery trucks, and project worker vehicles will potentially increase highway traffic noise. However, any changes to the ambient noise level near public roads will not be discernable and will not be significant. No mitigation is required.

Sleep Disturbance. The absolute criterion noise level for sleep disturbance is not well defined due to individual variability in the sleep process and tolerance to the effects of ambient noise levels. In general, indoor noise levels of greater than 35 dBA begin to interfere with sleep, while average indoor noise levels of 45 to 50 dBA will cause sleep disturbance with probable awakening. In California, the typical noise reduction provided by a normal wood-framed dwelling, with windows partially open, is 12 dBA, and 20 dBA with windows closed.

Therefore, outdoor noise levels at the building facade of 47 dBA (55 dBA windows closed) would begin to cause sleep disturbance, while an outdoor noise level of approximately 60 dBA (68

dBA windows closed) will likely awaken a normal person, assuming that the typical ambient outdoor noise levels during the sleep period are low. If someone were used to sleeping in the presence of a 60 dBA traffic noise level, then introduction of a new traffic noise at a level of 50 to 55 dBA will probably not be disturbing to the sleeper. If the character of the new noise were unusual or quite different from the ambient traffic noise, then sleep disturbance might occur at the lower 50 to 55 dBA level of the new noise.

With the exception of tunnel boring, project construction will not be conducted at night. Thus, only tunnel boring activities could potentially affect normal nighttime sleep. This will include tunnel portal activity, such as spoils stockpiling and operation of the tunnel vent fans. Long-term operations at the Eagle Valley Water Treatment Plant and Flow Control Facilities, with implementation of the mitigation measures described in Section 4.11.5.1, will not create high noise levels and will be significantly distant from sensitive receptors to not cause sleep disturbance. Therefore, no impacts will occur.

Long-Term Project Impacts. Operations noise impacts will be associated with the Eagle Valley Water Treatment Plant and the two flow-control facilities in the Agua Chinon area. The descriptions and quantity of equipment proposed for use at the water treatment plant have not been determined. However, the general nature of equipment used in water treatment plants and noise-related design criteria are adequate for environmental noise impact analysis.

The noise specifications for process equipment is based on workplace noise exposure guidelines. Equipment is typically specified to produce a sound level of no more than 85 dBA at a distance of 3 feet. This may be accomplished by the use of sound-deadening water treatment, noise barriers, and enclosures where necessary. Assuming that 20 noise sources at the treatment plant produce 85 dBA simultaneously, the resulting noise level from this hypothetical composite source will be approximately 93 dBA at 3 feet.

Most noise-producing machinery will be located within an enclosed building that will provide noise reduction. A typical industrial building of tilt-up concrete construction will provide approximately 30 dBA of noise reduction. Without a building, the noise level at 500 feet would be 54 dBA. With the additional attenuation of a building, the noise level is predicted to be approximately 24 dBA. This noise level is compatible with all adjacent land uses. For the flow control facilities, this noise level does not substantially exceed the ambient noise level, and complies with all planning and ordinance criteria for the open-space/park use. The nearest residences to the water treatment plant are approximately 900 feet from the site boundary. As a result, no impacts to sensitive noise receptors will occur.

No noise will be associated with the operation of the pipelines or tunnels. Thus, no impacts are expected and no mitigation is required for the operation of the pipelines or tunnels.

4.11.5.2 Standard Mitigation Measures

Implementation of the following standard mitigation measure prior to project construction, as necessary for each project facility, will reduce potential construction noise impacts or operational impacts to a less-than-significant level:

- A. Metropolitan will assess the potential for noise generation at each facility and take action to ensure that project noise does not exceed local noise regulation ordinances at the site boundary or planning guidelines for affected land uses and that the project does not cause substantial adverse changes which would impact noise-sensitive receptor. While mitigation will vary by construction and/or operation site, as appropriate, actions taken to ensure impacts are not significant may include, but will not be limited to, the following:

- ▶ Noise-producing project equipment and vehicles using internal combustion engines will be equipped with mufflers, and air-inlet silencers where appropriate, in good operating condition that meet or exceed original factory specification. Mobile or fixed "package" equipment (e.g., arc welders, air compressors) will be equipped with shrouds and noise control features that are readily available for that type of equipment.
- ▶ Mobile or fixed noise-producing equipment that is regulated for noise output by a local, state, or federal agency will comply with such regulation during the project.
- ▶ Electrically powered equipment instead of pneumatic or internal combustion powered equipment may be used, where feasible.
- ▶ Material stockpiles and mobile equipment staging, parking, and maintenance areas will be located as far as practicable from noise-sensitive receptors.
- ▶ Construction site and haul-road speed limits will be established and enforced during the construction period.
- ▶ The hours of construction including noisy maintenance activities and spoils and material transport will be restricted to the periods and days permitted by the local noise or other applicable ordinance. The only exception to this mitigation should be inaudible underground tunneling activity. Noise-producing project activity will comply with local noise control regulations affecting construction activity or exemptions therefrom will be obtained.
- ▶ The use of noise-producing signals, including horns, whistles, alarms, and bells will be for safety warning purposes only.
- ▶ No project-related public address system will exceed local noise ordinances at any adjacent receptor.

- ▶ The on-site construction supervisor will have the responsibility and authority to receive and resolve noise complaints. A clear appeal process to Metropolitan will be established prior to construction commencement that will allow for resolution of noise problems that cannot be immediately solved by the site supervisor.
- ▶ The contractor will develop a project noise control plan, which will have been approved and implemented prior to commencement of any construction activity.
- ▶ Noise control features and plans will be reviewed and approved by a noise control engineering professional.
- ▶ Use of berms or erection of temporary soundwall barriers will be considered where project activity is unavoidably close to noise-sensitive receptors.

Planting of trees and shrubbery, while useful for visual screening, is not an effective noise control mechanism and is not considered a mitigation measure for noise impacts.

4.11.6 Site-Specific Characteristics

The mitigation measures discussed in this section will supplement the standard mitigation measure discussed in Section 4.11.5.2.

4.11.6.1 Outlet Structure

Environmental Setting. The ambient noise levels in the vicinity of the Outlet Structure range from 52 dBA L_{eq} at the Lake Mathews Observation/Rest Area to 68 dBA L_{eq} along La Sierra Road.

Impacts. Construction activity noise will be approximately 52 dBA L_{eq} at the observation/rest area and approximately 56 dBA L_{eq} or below along La Sierra Road. These noise levels satisfy standards, and no significant impact will occur.

Mitigation Measures. No mitigation other than standard Measure A (Section 4.11.5.2) is required.

4.11.6.2 Outlet Tunnel and Pipeline (Reach 1) and Access Road

Environmental Setting. Ambient noise levels are similar to those in the Lake Mathews area and range from 52 dBA to 68 dBA L_{eq} .

Impacts. Pipeline construction noise could affect the two residences located 500 feet from the alignment. There are no ordinance standards. With a noise level of 54 dBA L_{eq} , the 65 dB CNEL planning standard will not be exceeded. Project operations will not create noise. No significant impact will occur.

Mitigation Measures. No mitigation other than standard Measure A (Section 4.11.5.2) is required.

4.11.6.3 Eagle Valley Water Treatment Plant

Environmental Setting. Daytime noise levels at this location are approximately 40 dBA.

Impacts. A substantial and unavoidable increase in noise level will occur during construction-phase activity, which will generate noise levels of 61 dBA L_{eq} at a distance of 400 feet. However, because construction will not affect any sensitive receptors, this increase will not result in a significant impact.

Operations-phase noise will be approximately 24 dBA L_{eq} at the nearest noise-sensitive receptor located 900 feet from the treatment plant. This insignificant noise level will occur after implementation of facility design and operational procedures discussed in Section 4.11.5.2. The mitigated operational noise levels from the water treatment plant will allow for noise-sensitive residential development to occur on adjacent or excess property at a distance of 200 feet or more from the facility's noise-producing equipment. This distance is based upon an outdoor, nighttime

noise level of 49 dBA L_{eq} at the residence that will allow for windows open when sleeping.

Mitigation Measures. No mitigation other than standard Measure A (Section 4.11.5.2) is required.

4.11.6.4 Eagle Valley Pipeline (Reach 2)

Environmental Setting. Ambient noise levels are about 40 dBA in the vicinity of the Eagle Valley Pipeline, increasing in the area of the nearby quarry and highway uses to upper 60s dBA L_{eq} . There is one residence located about 750 feet from the pipeline alignment.

Impacts. Potential construction noise will be approximately 68 dBA L_{eq} at a distance of 200 feet. Noise levels in the immediate vicinity of pipeline construction will be temporarily elevated. Pipeline construction noise will exceed short-term noise standards along portions of the reach but will not affect noise-sensitive uses. However noise levels at distances greater than 500 feet from the pipeline construction will not be significantly elevated. Because the existing residence is located greater than 500 feet from construction, no significant impacts will occur.

Mitigation Measures. No mitigation other than standard Measure A (Section 4.11.5.2) is required.

4.11.6.5 Bedford Canyon Pipeline (Reach 3)

Environmental Setting. Noise levels in the industrial area, near Temescal Canyon Road, and near I-15 are expected to be in the 50 to 70 dBA range; toward the Bedford Canyon portal ambient noise levels are about 40 dBA.

Impacts. Potential impacts will be the same as described for the Eagle Valley Pipeline (Reach 2) (Section 4.11.6.4). No significant impacts will occur.

Mitigation Measures. No mitigation other than standard Measure A (Section 4.11.5.2) is required.

4.11.6.6 Santa Ana Mountains Tunnel/East Half (Reach 4a)

Environmental Setting. The tunnel portal ambient noise level is approximately 40 dBA L_{eq} .

Impacts. Tunnel construction activity will substantially raise noise levels near the portal area; however, noise-sensitive structures are approximately 2,500 feet distant and are expected to experience an average construction noise level of 43 dBA during the daytime. Nighttime noise from tunnel fans is expected to be a continuous 40 dBA, with occasional noise levels of 49 dBA from spoils stockpiling. Tunnel boring activity will not increase surface noise levels. No significant impacts will occur after mitigation measures are implemented.

Mitigation Measures. Implementation of the following mitigation measures, in conjunction with standard Measure A (4.11.5.2), will reduce potential noise impacts to a less-than-significant level.

- B. Where necessary to avoid impacts to sensitive receptors, tunnel vent fans will be sound attenuated to not exceed a noise level of 80 dBA L_{eq} at a distance of 50 feet.
- C. Where necessary to avoid impacts to sensitive receptors, spoils stockpiling activity will be noise controlled to not exceed a noise level of 89 dBA L_{max} at a distance of 50 feet.

4.11.6.7 Riverside County Spoils Disposal Sites

Environmental Setting. These sites are designated TV-2 through TV-5. All the sites are near sand and gravel mining areas, in industrial zoned land, along Temescal Canyon Road, and

the I-5 freeway. Ambient noise was not measured but is expected to range from 65 to 70 dBA L_{eq} based upon surrounding land use.

Impacts. No noise impacts are expected because noise from spoils transport vehicles will not significantly affect the ambient noise environment.

Mitigation Measures. None required.

4.11.6.8 Santa Ana Mountains Tunnel/West Half (Reach 4b)

Environmental Setting. The ambient noise level at this location is 43 dBA L_{eq} . Residences are located approximately 2,000 feet from the tunnel portal.

Impacts. Construction noise will temporarily elevate daytime noise levels near the portal site. Project construction noise is calculated to be 45 dBA L_{eq} at the nearest residences but will probably be less because of intervening topography. The 45 dBA L_{eq} noise level will not exceed any noise standards. Nighttime noise from tunnel fans or spoils stockpiling will not cause sleep disturbance.

Mitigation Measures. No mitigation other than standard Measure A (Section 4.11.5.2) is required.

4.11.6.9 Santiago Canyon Pipeline (Reach 5)

Environmental Setting. The environmental setting is the same as for the north side of Santiago Canyon Road and as discussed for the Santa Ana Mountains Tunnel/West Half (Section 4.11.6.8). The environmental setting for the south side of Santiago Canyon Road is also the same as that of the Santa Ana Mountains Tunnel/West Half.

Impacts. Pipeline construction noise will be approximately the same as highway noise from Santiago Canyon Road. No significant impacts will occur.

Mitigation Measures. No mitigation other than standard Measures A (Section 4.11.5.2) is required.

4.11.6.10 Foothills Tunnel (Reach 6)

Environmental Setting. The ambient noise conditions for the Foothills Tunnel exit portal in Santiago Canyon are the same as those discussed in Section 4.11.6.8. There are no noise-sensitive land uses in proximity to the tunnel exit portal.

Impacts. Construction of the tunnel portal will not create any significant noise impacts.

Mitigation Measures. No mitigation other than standard Measure A (Section 4.11.5.2) is required.

4.11.6.11 Flow Control Facility No. 1 and Access Road

Environmental Setting. The ambient acoustical environment at this location ranges widely from 34 to 56 dBA L_{eq} .

Impacts. Construction activity will moderately to substantially elevate the noise levels during the daytime hours of construction. The noise levels generated by construction-phase activity will be consistent with Orange County and City of Irvine standards for "acceptable" noise levels for open space use and will not violate the Orange County noise ordinance. Machinery vibration could cause perceptible ground vibration, however. As discussed in Section 4.11.5.2, long-term noise effects after mitigation will be substantially lower than construction noise and will be compatible with the current and proposed use. Therefore, no significant noise impacts will occur.

Mitigation Measures. No mitigation other than standard Measure A (Section 4.11.5.2) is required.

4.11.6.12 Agua Chinon Pipeline (Reach 7) and Flow Control Facility No. 2

Environmental Setting. The environmental setting is the same as described for Flow Control Facility No. 1 and Access Road (Section 4.11.6.11).

Impacts. Potential impacts are the same as those described for Flow Control Facility No. 1 and Access Road (Section 4.11.6.11).

Mitigation Measures. Mitigation measures are the same as described for Flow Control Facility No. 1 and Access Road (Section 4.11.6.11).

Impacts. Based upon their prior (and present) use for sand and gravel mining, no adverse noise impacts are expected to occur because of project activity at the spoils disposal sites.

Mitigation Measures. None required.

4.11.7 Summary of Noise Impacts and Mitigation Measures

Project noise impacts and required site-specific mitigations are summarized in Table 4.11-6. The overall project noise analysis is based on implementation of the standard mitigation practices as given in Section 4.11.5.2.

4.11.6.13 Orange County Spoils Disposal Sites

Environmental Setting. The sites are designated SC-5 near the intersection of Black Star Canyon and Silverado Canyon Roads, and SC-6, the Blue Diamond sand and gravel mining area at the eastern end of Irvine Lake. The acoustical environments of these sites were not measured.

Table 4.11-6

SUMMARY OF NOISE IMPACTS AND MITIGATION MEASURES

Project Component	Potential Impact	Mitigation Measure	Residual Impact
Construction of all project components	Temporary construction noise could substantially increase ambient noise at noise sensitive receptor sites or exceed local noise ordinances.	Sound attenuation measures will be implemented as necessary to ensure that project noise does not exceed local noise regulation ordinances. (Section 4.11.5.3, Measure A)	Less-than-significant.
Santa Ana Mountains Tunnel/East Half (Reach 4a)	Nighttime construction activities could cause sleep disturbance.	Sound attenuation of tunnel vent fans to below 80 dBA L_{eq} at a distance of 50 feet. (Section 4.11.6.6, Measure B) Spoils stockpiling noise limited to 89 dBA L_{max} at 50 feet during nighttime hours. (Section 4.11.6.6, Measure C)	Less-than-significant.