Appendix E

Noise Technical Report for the Carryover Storage and San Vicente Dam Raise EIR/EIS

Prepared by EIP, a division of PBS&J

Noise Technical Report
San Diego County Water Authority
Carryover Storage and
San Vicente Dam Raise Project

Prepared for:

San Diego County Water Authority
3211 Fifth Avenue
San Diego, CA 92103

Department of the Army
Los Angeles District,
Corps of Engineers
300 North Los Angeles Street
Los Angeles, CA 90012

Prepared on behalf of:
PBS&J
9275 Sky Park Court, Suite 200
San Diego, CA 92123

Prepared by:

EIP
ASSOCIATES
A division of
PBS&J
353 Sacramento Street, Suite 1000
San Francisco, CA 94111
(415) 362-1500

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Table of Contents

1.0 INTRODUCTION 1

2.0 ALTERNATIVE 1: SAN VICENTE 100,000 AF (PROPOSED ACTION) 1

2.1 Environmental Setting 1
2.1.1 Study Area 1
2.1.2 Background 1
2.2 Project Description 3
2.3 Characteristics of Sound, Noise and Vibration 4
2.4 Noise and Vibration Regulations 8
2.4.1 Federal 8
2.4.2 Local 8
2.5 Affected Environment 10
2.5.1 Existing Noise Environment 10
2.5.2 Sensitive Noise Receptors 13
2.6 Impact Analysis 13
2.6.1 Methodology 13
2.6.2 Construction Impacts 14
2.6.3 Operational Impacts 18
2.7 Mitigation 19

3.0 ALTERNATIVE 2: MOOSA 100,000 AF 20

3.1 Environmental Setting 20
3.2 Project Description 20
3.3 Noise and Vibration Regulations 21
3.4 Affected Environment 21
3.4.1 Existing Noise Environment 21
3.4.2 Sensitive Noise Receptors 21
3.5 Impact Analysis 24
3.5.1 Methodology 24
3.5.2 Construction Impacts 24
3.5.3 Operational Impacts 29
3.6 Mitigation 30

4.0 ALTERNATIVE 3: SAN VICENTE 50,000 AF + MOOSA 50,000 AF 31

4.1 Environmental Setting 31
4.2 Project Description 31
4.3 Noise and Vibration Regulations 32
4.4 Affected Environment 32
4.5 Impact Analysis 32
4.5.1 Methodology 32
4.5.2 Construction Impacts 32
4.5.3 Operational Impacts 36
4.6 Mitigations 35

REFERENCES 36

APPENDIX: NOISE CALCULATIONS

List of Tables

Table 1 Representative Environmental Sound Levels 5
Table 2 Factors that Affect Individual Judgment of a Sound's "Noisiness" 6
Table 3 Human Response to Different Levels of Groundborne Vibration 7
Table 4 San Diego County Noise Ordinance Exterior Noise Standards 9
Table 5 Daytime Noise Levels Measurements at Selected Locations On/Around the San Vicente Site 11
Table 6 Calculated Existing Roadway Noise Levels at Selected Noise-Sensitive Locations Near the San Vicente Site 11
Table 7 Noise Ranges of Typical Construction Equipment 15
Table 8 Construction Noise Levels at Closest Residential Receptor (San Vicente) 15
Table 9 Calculated Roadway Noise Levels at Selected Locations Near the San Vicente Site 17
Table 10 Daytime Noise Levels Measurements at Selected Locations On/Around the Moosa Site 23
Table 11 Calculated Existing Roadway Noise Levels at Selected Noise-Sensitive Locations Near the Moosa Site 23
Table 12 Construction Noise Levels at Closest Residential Receptor (Moosa) 26
Table 13 Calculated Roadway Noise Levels at Selected Noise-Sensitive Locations Near the Moosa Site 28
Table 14 Vibration Source Levels for Construction Equipment 28
Table 15 Calculated Roadway Noise Levels at Selected Noise-Sensitive Locations Near the San Vicente Site and the Moosa Site 35

List of Figures

Figure 1 Regional Location Map 2
Figure 2 Noise Measurement Locations – San Vicente Site 12
Figure 3 Noise Measurement Locations – Moosa Site 22

1.0 INTRODUCTION

The overall purpose of the Carryover Storage and San Vicente Dam Raise Project (CSP) is to substantially increase the reliability and flexibility of the regional water supply by providing the San Diego County Water Authority (Water Authority) with facilities to accumulate and store approximately 100,000 acre feet (AF) of water. Through the use of carryover storage, water can be accumulated during wetter years/seasons, when supplies are available, and used in drier years/seasons or during droughts, when supplies are in higher demand. Carryover storage would provide approximately 100,000 AF of local storage and facilitate the reliable and efficient delivery of water to residents of the Water Authority service area through the year 2030.

2.0 ALTERNATIVE 1: SAN VICENTE 100,000 AF (PROPOSED ACTION)

2.1 Environmental Setting

2.1.1 Study Area

The San Vicente Dam and Reservoir are located in south central San Diego County (**Figure 1**). The reservoir is formed by a 220-foot-high concrete gravity dam. The dam and reservoir are owned and operated by the City of San Diego for water supply purposes, mainly to supply the Alvarado Water Treatment Plant. The reservoir is bordered on the south by the community of Lakeside, on the east by the Barona Tribal lands, and on the north and west by mostly undeveloped land that is within the jurisdiction of the County of San Diego. Scattered residences occur both to the north and south of the reservoir, and extensive mining operations occur to the southwest. Access to the dam site is via Vigilante Road and Moreno Avenue.

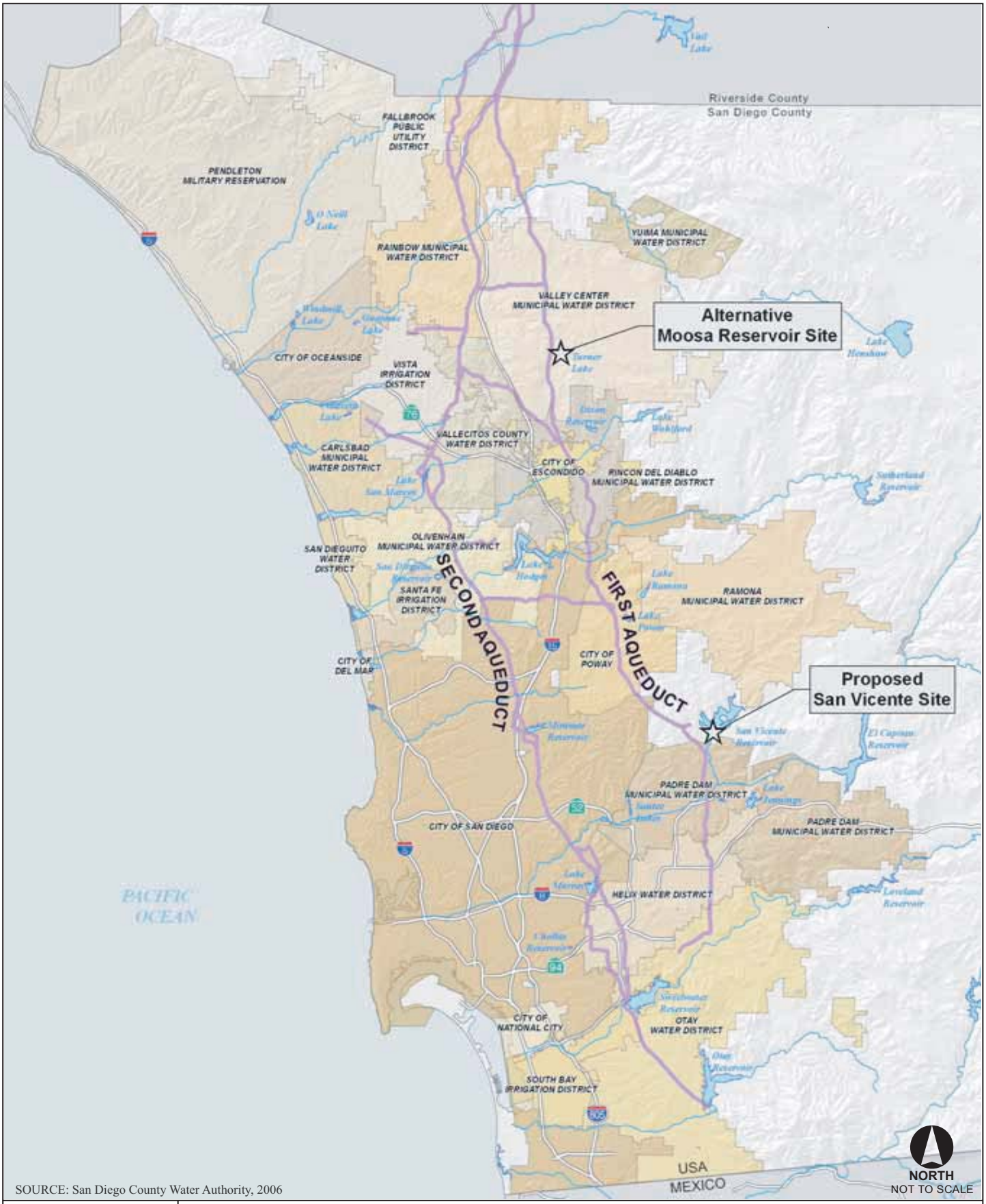
2.1.2 Background

Major facilities that currently exist at the project site include San Vicente Dam and Reservoir, a marina, water conveyance facilities, access roads, and City of San Diego facilities, including a maintenance yard, trailers, and a reservoir keeper house.

San Vicente Dam and Reservoir

San Vicente Dam was constructed in 1943. The existing dam is 220 feet high with a crest length of 963 feet. The spillway is a 275-foot-long section near the center of the dam. The spillway crest elevation is 650 feet above mean sea level (AMSL).

San Vicente Reservoir is the southern terminus for the Water Authority's First Aqueduct, a pipeline corridor that contains San Diego Pipelines 1 and 2. The current storage capacity of the reservoir is approximately 90,000 AF. At this water elevation, the reservoir surface area is approximately 1,100 acres. In addition to water supply, the existing reservoir also provides public recreational facilities, including boating, fishing, and water skiing.



SOURCE: San Diego County Water Authority, 2006

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FIGURE 1
Regional Location Map

Emergency Storage Project

In August 1996, the Water Authority's Board of Directors approved the Emergency Storage Project (ESP) to provide local water storage to meet emergency needs within the Water Authority's service area, an initiative central to the agency's overall mission to deliver a reliable supply of water to the region. The regional water supply system is vulnerable to hazards, such as strong seismic activities in southern California, severe floods, or prolonged droughts.

The Water Authority's ESP was designed to improve the reliability of the region's existing water supply system by the addition of approximately 90,000 AF of reservoir storage in San Diego County. The approved ESP includes the following major components: a new dam, pipeline, and pump station at Olivenhain (complete); the Lake Hodges Pump Station and pipeline (under construction); the San Vicente Pipeline (under construction); and the San Vicente Pump Station/Surge Control Facility (under construction). The ESP also includes raising the existing San Vicente Dam by 54 feet in order to provide approximately 52,100 AF of emergency storage capacity. The Water Authority has not yet implemented the San Vicente Dam raise component of the ESP, and is now proposing to combine the approved ESP dam raise with a higher dam raise to accommodate the CSP.

Several of the project components of the San Vicente ESP are currently under construction. The San Vicente Pipeline Project (SVP) consists of an 11-mile-long pipeline connecting the San Vicente Reservoir to the Water Authority's Second Aqueduct. The SVP consists of constructing the pipeline tunnel, three vertical tunnel shafts, and a tunnel portal. The tunnel portal is located downstream of the San Vicente Dam. Construction of the SVP will be complete March 2009. The San Vicente Pump Station and Surge Control Facility construction is also ongoing in the vicinity of the dam. The construction timeframe for these ESP components is December 2006 to August 2009.

The ESP was evaluated in an Environmental Impact Report/Environmental Impact Statement (EIR/EIS) (SCH No. 93011028) for which the Water Authority was Lead Agency under the California Environmental Quality Act (CEQA) and the U.S. Army Corps of Engineers (Corps) was Lead Agency under the National Environmental Policy Act (NEPA). The Water Authority's Board of Directors certified the Final EIR/EIS on August 15, 1996. The Corps issued a Record of Decision (ROD) for the EIR/EIS on August 4, 1997, and a 404 Permit under the Clean Water Act (Permit No. 95-2009200-DZ) on August 18, 1997.

2.2 Project Description

The Proposed Action would be to raise the San Vicente Dam an additional 63 feet beyond the approved ESP dam raise, increasing the capacity of the San Vicente Reservoir by an additional 100,000 AF. The combined ESP/CSP would increase the existing reservoir capacity by approximately 152,100 AF, and increase the overall dam height by up to 117 feet. With implementation of both the ESP and CSP, the total dam height would be 337 feet with a spillway crest of 766 feet AMSL.

No additional conveyance facilities beyond those being constructed for the ESP would be needed for the additional carryover expansion of the San Vicente Reservoir. The dam raise would be accomplished using roller compacted concrete (RCC). The RCC would be placed against the downstream side of the existing dam. It is not technically advisable, nor economically feasible, to raise the dam for ESP purposes, and then raise it again at a later time for carryover storage purposes.

The Proposed Action would require the construction of two saddle dams to the west of the main dam, and relocation of the San Vicente Marina and marina access road. New marina facilities would replace the existing marina that would be inundated by the dam raise and subsequent reservoir inundation. The marina facilities would be shifted west of the existing location as part of the Proposed Action. The Proposed Action would also include construction of a new inlet/outlet facility and installation of a bypass pipeline extending from the easterly saddle dam to the First Aqueduct Diversion Structure north of the proposed marina. During construction, temporary staging areas would be established to accommodate construction equipment, supplies, and materials. The staging areas would be located on City-owned property south or southwest of the existing dam and/or within the marina expansion area.

Four options are being evaluated for the source of aggregate material for RCC production. There are three on-site quarry options and one offsite option. Only one of the on-site quarry alternatives will be selected for aggregate production. The offsite quarry option involves the hauling of aggregate from an existing offsite commercial quarry. The location of the offsite quarry is still to be determined. However, several alternative quarry locations will be identified for analysis.

Construction of the San Vicente Dam raise would require lowering water levels in the reservoir prior to construction. The construction drawdown is expected to take up to one year, depending on local watershed inflows. The construction timeframe for the dam raise is approximately three years. Once construction is complete, refilling of the reservoir is expected to take three to five years, depending on the availability of imported water and local watershed inflows. The total time required to lower the reservoir, construct the dam raise, and refill the reservoir to the new water level would be approximately eight years.

For the Proposed Action, the Corps has determined that the jurisdictional ordinary high water mark (OHWM) for the reservoir is the existing San Vicente Dam spillway at 650 feet AMSL. This is also the baseline for the evaluation of existing environmental resources, and impacts to those resources.

2.3 Characteristics of Sound, Noise and Vibration

Sound is created when vibrating objects produce pressure variations that move rapidly outward into the surrounding air. The main characteristics of these air pressure waves are amplitude, which we experience as a sound's "loudness," and frequency, which we experience as a sound's "pitch." The standard unit of sound amplitude is the decibel (dB); it is a measure of the physical magnitude of the pressure variations relative to the human threshold of perception. The human ear's sensitivity to sound amplitude is frequency-dependent; it is more sensitive to sound with a frequency at or near 1,000 cycles per second than to sound with much lower or higher frequencies.

Most "real world" sounds (e.g., a dog barking, a car passing, etc.) are complex mixtures of many different frequency components. When the average amplitude of such sounds is measured with a sound level meter, it is common for the instrument to apply different adjustment factors to each of the measured sound's frequency components. These factors account for the differences in perceived loudness of each of the sound's frequency components relative to those that the human ear is most sensitive to (i.e., those at or near 1,000 cycles per second). This practice is called "A-weighting." The unit of A-weighted sound amplitude is also the decibel. But in reporting measurements to which A-weighting has been applied, an "A" is appended to dB (i.e., dBA) to make this clear. **Table 1** lists the A-weighted average sound levels commonly encountered in various environmental situations.

Table 1
Representative Environmental Sound Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	—110—	Rock Band
Jet Fly-over at 100 feet		
	—100—	
Gas Lawnmower at 3 feet		
	—90—	
		Food Blender at 3 feet
Diesel Truck going 50 mph at 50 feet	—80—	Garbage Disposal at 3 feet
Noisy Urban Area during Daytime		
Gas Lawnmower at 100 feet	—70—	Vacuum Cleaner at 10 feet
Commercial Area		Normal Speech at 3 feet
Heavy Traffic at 300 feet	—60—	
		Large Business Office
Quiet Urban Area during Daytime	—50—	Dishwasher in Next Room
		Theater, Large Conference Room
Quiet Urban Area during Nighttime	—40—	(background)
Quiet Suburban Area during Nighttime		
	—30—	Library
		Bedroom at Night, Concert Hall
Quiet Rural Area during Nighttime		(background)
	—20—	
		Broadcast/Recording Studio
	—10—	
Lowest Threshold of Human Hearing	—0—	Lowest Threshold of Human Hearing

Source: California Department of Transportation, *Technical Noise Supplement*, October 1998.

Noise is the term generally given to the "unwanted" aspects of intrusive sound. Many factors influence how a sound is perceived and whether or not it is considered annoying to a listener. These include not only the physical characteristics of a sound, but also non-acoustic factors that influence the judgment of listeners regarding the "unwantedness" of a sound, the most important of which are presented in **Table 2**. Excessive noise can negatively affect the physiological or psychological well-being of individuals or communities.

Table 2
Factors that Affect Individual Judgment of a Sound's "Noisiness"

Primary Acoustic Factors
Sound Level
Sound Frequency
Sound Duration
Secondary Acoustic Factors
Frequency Characteristics of the Sound
Fluctuations in Sound Level
Fluctuations in Sound Frequency
Rise-Time of the Sound (e.g., Is it "fast" like an automobile horn, or "slow" like an approaching train?)
Localization of Sound Source (Is it obvious where the sound is coming from, or not?)
Non-Acoustic Factors
Physiology of the Listener (Is the listener's hearing ability acute, or not?)
Listener's Adaptation from Past Experience (e.g., How long has the listener lived near the airport?)
Listener's Activity During Exposure (Was the listener sleeping, working, etc.?)
Predictability of When the Sound Will Occur (e.g., Is it an expected noon-time whistle or a random car horn)
Listener's Judgment of Personal Benefit from Activity Producing the Sound (e.g., Has the repair work being done on a street been long requested by local residents?)
Individual Differences and Personalities

Source: Adapted from *Handbook of Noise Control*, Cyril M. Harris, 1979.

All quantitative descriptors used to measure environmental noise exposure recognize the strong correlation between the high acoustical energy content of a sound (i.e., its loudness and duration) and the disruptive effect it is likely to have as noise. Because environmental noise fluctuates over time, most such descriptors average the sound level over the time of exposure, and some add "penalties" during the times of day when intrusive sounds would be more disruptive to listeners. The descriptors used in this analysis are defined as follows:

- **L_{eq}**, the equivalent energy noise level, is the constant noise level that would deliver the same acoustic energy to the ear as the actual time-varying noise over the same exposure time. L_{eq} would be the same regardless of the time of day during which the noise occurs.

- **L_{dn}**, the day-night average noise level, is a 24-hour average L_{eq} with a 10 dBA "penalty" added to noise during the hours of 10:00 PM to 7:00 AM to account for increased nighttime noise sensitivity. Because of this penalty, the L_{dn} would always be higher than its corresponding 24-hour L_{eq} (e.g., a constant 60 dBA noise over 24 hours would have a 60 dBA L_{eq}, but a 66.4 dBA L_{dn}).

- **CNEL**, the community noise equivalent level, is an L_{dn} with an additional 5 dBA "penalty" for the evening hours between 7:00 PM and 10:00 PM.

Community noise exposures are most often represented by 24-hour descriptors, such as L_{dn} or CNEL. One-hour and shorter-period descriptors are useful for characterizing noise caused by short-term activities, such as the operation of construction equipment. Community noise environments are generally perceived as "quiet" when the L_{dn}/CNEL is below 45 dBA, "moderate" in the 45 to 60 dBA range, and "loud" above 60 dBA. Very noisy urban residential areas are usually around 70 dBA

L_{dn}/CNEL. Along major roadways, noise levels are typically between 65 and 75 dBA L_{dn}/CNEL. Any noise intrusions that cause short-term interior levels to rise above 45 dBA at night can disrupt sleep. Eight-hour or longer exposures to noise levels greater than 85 dBA can cause permanent hearing damage.

Vibrating objects in contact with the ground radiate energy through that medium; if a vibrating object is massive enough and/or close enough to the observer, its vibrations are perceptible. The ground motion caused by vibration from sources other than blasting should be characterized in terms of inches per second and can be represented by vibration decibels (VdB) relative to a reference level of 1 micro-inch per second (similar to the practice of representing sound decibels relative to the air pressure reference level at the threshold of human hearing).

There is an alternative way of characterizing vibration magnitude that is particularly useful in cases where vibration has the potential for causing structural damage, particularly from blasting and other construction activities. Peak particle velocity (PPV) is defined as the maximum instantaneous peak velocity induced by the vibration. Groundborne vibration from blasting results when some of the explosive energy not utilized in breaking rock travels through the ground in all directions as wave motion. This wave motion travels mainly along the surface with its energy level rapidly decreasing with distance from the blast.

The general human response to different levels of groundborne vibration levels is described in **Table 3**. Most perceptible indoor vibration is caused by sources within buildings such as the operation of mechanical equipment, movement of people, or the slamming of doors. Typical outdoor sources of perceptible groundborne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the groundborne vibration from traffic is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings.

Table 3
Human Response to Different Levels of Groundborne Vibration

Vibration Velocity Level	Human Reaction
65 VdB	Approximate threshold of perception for many people.
75 VdB	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find that transportation-related vibration at this level is unacceptable.
85 VdB	Vibration acceptable only if there are an infrequent number of events per day.

Source: Transit Noise Impact and Vibration Assessment, Federal Transit Administration, May 2006.

2.4 Noise and Vibration Regulations

2.4.1 Federal

U.S. Office of Surface Mining Reclamation and Enforcement

The U.S. Office of Surface Mining Reclamation and Enforcement (OSM) has established guidelines related to blasting for surface mining activities. The OSM guidelines include requirements that the operator distribute a blasting schedule, post blasting signs, and control access within blasting area. OSM has established air blast and ground vibration limits at the location of any dwelling, public building, school, church, or community building outside the permit area. The standard PPV damage threshold for residential structures is 2.0 inches per second. This requirement is based on the findings and recommendations of several reports made by the former U.S. Bureau of Mines.

2.4.2 Local

San Diego County General Plan

The Noise Element of the San Diego County General Plan acknowledges that "the most appropriate basic unit of measure for community noise" is the dBA, that "the most appropriate unit of measure for the cumulative effects of community noise" is CNEL.

The San Diego County Noise Element also contains Policy 4b that establishes the following requirements:

"Because exterior community noise equivalent levels (CNEL) above 60 decibels and/or interior CNEL levels above 45 decibels may have an adverse effect on public health and welfare, it is the policy of the County of San Diego that:

1. *Whenever it appears that new development will result in any (existing or future) noise sensitive land use being subjected to noise levels of CNEL equal to 60 decibels (A) or greater, an acoustical analysis shall be required.*

2. *If the acoustical study shows that noise levels at any noise sensitive land use will exceed CNEL equal to 60 decibels, modifications shall be made to the development which reduce the exterior noise level to less than CNEL of 60 decibels (A) and the interior noise level to less than CNEL of 45 decibels (A).*

   If modifications are not made to the development in accordance with paragraph 2 above, the development shall not be approved unless a finding is made that there are specifically identified overriding social or economic considerations which warrant approval of the development without such modification; provided, however, if the acoustical study shows that sound levels for any noise sensitive land use will exceed a CNEL equal to 75 decibels (A) even with such modifications, the development shall not be approved irrespective of such social or economic considerations."

San Diego County Municipal Code

San Diego County has also adopted a Noise Ordinance (Chapter 4, Noise Abatement and Control, of the San Diego County Municipal Code), which identifies exterior noise standards, specific noise restrictions, exemptions, and variances for sources of noise within the County. The exterior noise standards established in the County's Noise Ordinance are identified in **Table 4**, along with the exterior noise levels that are prohibited.

Construction noise is also governed by the County's Noise Ordinance. This ordinance restricts the allowable hours of construction to 7:00 a.m. through 7:00 p.m., Monday through Saturday, excluding legal holidays. Further, noise levels associated with construction activities at residential receptors within any 24-hour period are not to exceed 75 dB, averaged over an eight-hour period.

Table 4
San Diego County Noise Ordinance Exterior Noise Standards

Zone	Limit One-Hour dBA[1]	Time Period
R-S, R-D, R-R, R-MH, A-70, A-72, S-80, S-81, S-87, S-88, S-90, S-92, R-V, and R-U Use Regulations with a density of less than 11 dwelling units per acre.	50 dBA	7:00 AM – 10:00 PM
	45 dBA	10:00 PM – 7:00 AM
R-RO, R-C, R-M, C-30, S-86, RV AND R-U Use Regulations with a density of 11 or more dwelling units per acre.	55 dBA	7:00 AM – 10:00 PM
	50 dBA	10:00 PM – 7:00 AM
S-94 and all other commercial zones.	60 dBA	7:00 AM – 10:00 PM
	55 dBA	10:00 PM – 7:00 AM
M-50, M-52, M-54	70 dBA	Anytime
S-82, M-58, and all other industrial zones.	75 dBA	Anytime

Source: San Diego County Municipal Code.

Note:

1. If the measured ambient level exceeds the applicable limit, the allowable one-hour average sound level shall be the ambient noise level.

San Diego County Water Authority

The Water Authority uses blasting criteria to protect existing facilities and nearby structures based on the criteria developed by the former U.S. Bureau of Mines. The criteria set the maximum PPV as a function of frequency, ranging from 0.5 inches per second for frequencies between 2.5 and 10.0 Hertz (Hz), and 2.0 inches per second for a blasting frequency of 40 Hz. The Water Authority has included requirements for construction blasting in their standard specifications, including the following:

- 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.

2.5 Affected Environment

2.5.1 Existing Noise Environment

Land adjacent to the San Vicente Reservoir and Dam is primarily undeveloped with some existing industrial and residential uses to the south (along Vigilante Road and Moreno Avenue). The industrial land uses include quarry operations, which affect the existing noise environment in the project vicinity. The closest residential unit to the project site is located near one of the quarry areas. Because of the presence of the quarry and associated operations, this area has a relatively high ambient noise environment. Further west of the industrial area, there are residential land uses along State Route 67. To the east of the dam, the area is primarily undeveloped with some scattered residential uses.

In the vicinity of the project site, industrial operations and vehicular traffic are the primary sources of noise. Existing daytime noise levels were monitored at six locations at or near the project site and the surrounding vicinity on October 4, 2006 (see **Figure 2**). The monitoring locations represent the noise levels experienced at the project site, and for the existing sensitive land uses near the project site and along the primary access routes to the project site. Noise levels were monitored using a Larson-Davis Laboratories Model 720 sound level meter, which satisfies the American National Standards Institute (ANSI) for general environmental noise measurement instrumentation. The sources responsible for the measured noise and measurement data at each location are presented in **Table 5**. Although motor vehicle traffic was found to have the primary influence on noise levels near roadways in the project site vicinity, noise from industrial operations was also a significant contributor to total noise levels for receptors along Vigilante Road.

Local roads would be used by trucks traveling to and from the project site during dam construction. Existing peak hour traffic L_{eq}s at noise-sensitive land uses adjacent to these roads were estimated using the Federal Highway Administration's Traffic Noise Model (TNM). This model calculates the average noise level at specific locations based on traffic volumes, average speeds, roadway geometry, and site environmental conditions. The existing peak-hour traffic Leqs were calculated using peak-hour traffic volumes provided by Linscott, Law & Greenspan, Engineers. The estimated existing peak-hour L_{eq}s at the selected local noise-sensitive land uses are presented in **Table 6.**

Table 5
Daytime Noise Levels Measurements at Selected Locations On/Around the San Vicente Site

Noise Measurement Location/Time		Noise Sources	Noise Level Statistics		
			L_{eq}	L_{min}	L_{max}
#1	Project site near San Vicente Dam, 100 feet from existing dam. Start time: 1:55 PM.	Primary: Beeping from dam operations. Secondary: Aircraft overflights, construction noise.	44.6	35.5	69.4
#2	Project site, parking lot near base of proposed on-site quarry. Start time: 2:15 PM.	Primary: Construction operations and vehicular traffic along access road. Secondary: Aircraft overflights, mechanical noise from adjacent buildings.	55.1	48.5	70.2
#3	12417 Vigilante Road, north side 8 feet from roadway edge. Start time: 3:00 PM.	Primary: Vehicular traffic on Vigilante Road, industrial activities at adjacent Hanson quarry. Secondary: Leafblower operation (at residence).	66.9	51.5	77.8
#4	12345 Moreno Avenue, east side 5 feet from intersection of Moreno Avenue and Vigilante Road. Start time: 3:20 PM.	Primary: Vehicular traffic on Vigilante Road and Moreno Avenue. Secondary: Industrial activities at nearby Hanson quarry.	62.5	48.1	76.7
#5	Deer Hill Estates, 150 feet from east side of SR 67. Start time: 3:55 PM.	Primary: Vehicular traffic on SR 67.	65.8	44.3	77.0
#6	Byron Road, 150 feet from west side of SR 67. Start time: 4:30 PM.	Primary: Vehicular traffic on SR 67.	69.2	54.3	78.5

Source: EIP Associates, a division of PBS&J, 2006.

Measurements were made on October 4, 2006. Each measurement was 10 minutes in duration

L_{eq} is the average noise level over the measurement period, L_{min} is the minimum instantaneous noise level measured during the 10-minute period, while L_{max} is the maximum instantaneous noise level measured during the 10-minute period.

Table 6
Calculated Existing Roadway Noise Levels at Selected Noise-Sensitive Locations Near the San Vicente Site

Receptor	Roadway Segment	Noise Sensitive Uses	Peak Hour L_{eq} (dBA)[1]
12417 Vigilante Road	Vigilante Road, Moreno Avenue to SR 67	Residential	63.9
12345 Moreno Avenue	Moreno Avenue, South of Vigilante Road	Residential	65.3
Deer Hill Estates	SR 67, North of Vigilante Road	Residential	68.5
Byron Road	SR 67, South of Vigilante Road	Residential	68.7

Source: EIP Associates, a division of PBS&J, 2006.

Notes:

1. Noise levels calculated using FWHA's TNM. Noise levels calculated during the PM peak hour at the setback of the identified receptors. Based on traffic data from Linscott, Law, & Greenspan Engineers' *Traffic Impact Analysis San Vicente Dam Raise* November 2006.

Legend	
#	Noise Measuring Location

NORTH
NOT TO SCALE

Source: EIP Associates, a Division of PBS&J, 2006.

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FIGURE **2**
Noise Measuring Locations - San Vicente

2.5.2 Sensitive Noise Receptors

Sensitive noise receptors typically include residential development, schools, and hospitals. Under certain conditions, habitat areas can also be considered to be sensitive receptors, such as when noise levels exceed 60 dBA in nesting areas for least Bell's vireo *(Vireo bellii)* and California gnatcatcher *(Polioptila californica californica)* during the respective breeding seasons. Federal regulatory guidelines establish the following breeding seasons for these two species: February 15 through August 30 for the least Bell's vireo, and April 10 through July 31 for the California gnatcatcher.

The project site is approximately 2,000 feet from the nearest residential receptor to the east of the dam, and approximately 4,000 feet from the nearest residential receptor to the south. The residential receptors to the south are approximately 1,500 feet from the southeast and southwest quarry sites. In addition to the receptors in the vicinity of the project site, there are also residential land uses located near roadways in the project vicinity including along State Route 67.

2.6 Impact Analysis

2.6.1 Methodology

The analysis in this section focuses on the nature and magnitude of the change in the noise environment due to implementation of the project. The primary sources of noise associated with the project would be associated with construction activities, including construction vehicle trips to and from the project site. Construction noise levels are calculated using FHWA's Roadway Construction Noise Model (RCNM).

Other sources of noise would be the operational activities within the project site, including the new vehicle trips to/from the project site and recreational activities associated with areas around the enlarged reservoir. Noise levels associated with pump stations and on-site activities are identified and compared with the applicable standards to determine whether substantial permanent increases in ambient noise levels would occur. Future noise levels for the roadways that are utilized by vehicles traveling to and from the project site are calculated using TNM and compared with standards of significance to determine whether substantial permanent increases in ambient noise levels would occur.

The County's Municipal Code provides standards for stationary and recreational noise sources that might effect nearby noise-sensitive land uses. The Municipal Code standards do not necessarily account for increases in ambient noise levels that could be substantial, but yet still below the applicable standards or noise increases to areas where the existing noise level is greater than the applicable standards. Therefore, this analysis uses the noise impact criterion of 3 dB. For projects proposed in areas that are currently at or in excess of the County's exterior noise standards, a less than 3 dB increase in noise levels due to the project would not be considered a significant impact. This is a City of San Diego Traffic Noise Significance Threshold as presented in the City's guidelines.

2.6.2 Construction Impacts

General Daytime Construction Activities

Construction activities associated with the Proposed Action would involve the use of heavy equipment during land clearing, demolition of structures, and construction phases of access roads, dams, and pipelines. Increased noise levels would also be associated with quarry and batch plant operations. Construction equipment would include cranes, bulldozers, compactors, graders, excavators, generators, compressors, and miscellaneous trucks and equipment. Construction activities would also involve the use of smaller power tools, generators, and other equipment that are sources of noise. During each stage of construction there would be a different mix of equipment operating, and noise levels would vary based on the amount of equipment in operation and the location of the activity.

The United States Environmental Protection Agency (EPA) has compiled data regarding the noise generating characteristics of typical construction activities. These data are presented in **Table 7**. These noise levels would diminish rapidly with distance from the construction site at a rate of approximately 6 dBA per doubling of distance. For example, a noise level of 86 dBA measured at 50 feet from the noise source to the receptor would reduce to 80 dBA at 100 feet and 74 dBA at 200 feet. The closest residential receptor to both on-site quarry options downstream of the dam is approximately 1,500 feet to the south. The closest residential receptor to the dam construction zone is approximately 2,000 feet to the east. However, because the project site is located in a valley, which opens to the south, noise from the project site would be expected to result in higher noise levels to the south than in the other directions.

Construction noise levels at the closest residential receptors to the south of the on-site quarry options and to the east of the project site were calculated using the FHWA's RCNM. As shown in **Table 8**, noise levels for construction equipment (at 1,500 feet) would result in maximum instantaneous noise levels at the nearby sensitive receptors of 54.0 dBA L_{max} (at 1,500 feet) and 51.5 dBA L_{max} (at 2,000 feet). In addition, the maximum average construction noise levels of 50.1 dBA L_{eq} at 1,500 feet and 47.6 dBA L_{eq} at 2,000 feet would be less than the existing daytime peak-hour roadway noise levels of 63.9 dBA and 65.3 dBA L_{eq} calculated for residents along Vigilante Road and Moreno Avenue, respectively. General daytime construction activities associated with the Proposed Action would comply with the 75 dBA L_{eq} noise standard set by the San Diego County Noise Ordinance. Therefore, the Proposed Action would not result in significant impacts associated with the general daytime construction activities.

Construction activities associated with the Proposed Action could result in noise levels in excess of 60 dB within nearby habitats that are occupied by the California gnatcatcher. Indirect construction noise impacts during the breeding season of the California gnatcatcher would be significant. The least Bell's vireo would not be affected by indirect impacts from construction noise because construction activities are limited to the area south of the dam and possibly in the marina area, away from potential vireo habitat.

Table 7
Noise Ranges of Typical Construction Equipment

Construction Equipment	Noise Levels in dBA Leq at 50 feet
Front Loader	73–86
Trucks	82–95
Cranes (moveable)	75–88
Cranes (derrick)	86–89
Vibrator	68–82
Saws	72–82
Pneumatic Impact Equipment	83–88
Jackhammers	81–98
Pumps	68–72
Generators	71–83
Compressors	75–87
Concrete Mixers	75–88
Concrete Pumps	81–85
Back Hoe	73–95
Pile Driving (peaks)	95–107
Tractor	77–98
Scraper/Grader	80–93
Paver	85–88

Source: U.S. Environmental Protection Agency, *Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances*, December, 1971

Machinery equipped with noise control devices or other noise-reducing design features does not generate the same level of noise emissions as that shown in this table.

Table 8
Construction Noise Levels at Closest Residential Receptor (San Vicente)

	Noise Levels at 1,500 feet		Noise Levels at 2,000 feet	
Construction Equipment	**dBA Lmax**	**dBA Leq**	**dBA Lmax**	**dBA Leq**
Backhoe	48.0	44.0	45.5	41.5
Compactor (ground)	53.7	46.7	51.2	44.2
Compressor (air)	48.1	44.1	45.6	41.6
Concrete Batch Plant	53.5	45.2	51.0	42.7
Crane	51.0	43.0	48.5	40.6
Dozer	52.1	48.1	49.6	45.6
Dump Truck	46.9	42.9	44.4	40.4
Front End Loader	49.6	45.6	47.1	43.1
Generator	51.1	48.1	48.6	45.6
Scraper	54.0	50.1	51.5	47.6

Source: EIP Associates, a division of PBS&J, 2006.

Construction noise levels calculated using FHWA's RCNM. L_{eq} is the average noise level over the equipment operation time; L_{max} is the maximum instantaneous noise level measured during the equipment operation time. Actual noise levels in the construction site vicinity would most likely be lower than the calculated values due to attenuation by intervening topography.

Blasting of underlying rock structures would be required for the dam, the on-site quarry options, the new marina road, and the tunneling operations for pipelines. Noise associated with blasting would generally occur at infrequent intervals. The noise levels resulting from blasting activities could vary depending on the subsurface material, amount of charge, and the depth to charge. However, using the noise levels predicted for blasting from FHWA's RCNM, blasting activities could result in a maximum noise level of 64.5 dBA L_{eq} at the nearest residential receptor located approximately 1,500 feet to the south of the dam construction zone. This noise level would be below the County 75 dBA standard for construction activities. Therefore, noise impacts to nearby residents from daytime blasting activities would be less than significant.

Nighttime Construction

Construction of the dam would continue for 24 hours a day, 7 days a week for approximately 18 months. As shown in **Table 8**, the nearest residential receptors to the dam construction zone would be exposed to maximum average noise levels of 50.1 dBA L_{eq} at 1,500 feet and 47.6 dBA L_{eq} at 2,000 feet, which would exceed the County's 45 dBA L_{eq}, nighttime exterior noise standard for residential uses. These residences may be partially shielded by intervening topography, thereby reducing the noise level they would experience. However, this may not be enough to bring the noise levels to below the 45 dBA L_{eq} standard. Therefore, nighttime noise impacts to nearby residents from dam construction would be significant.

The batch plant would need to operate during nighttime hours to supply the dam construction activities. In a worst-case scenario, batch plant operations would be located on the south side of the dam construction zone in the vicinity of the southwest or southeast on-site quarry options, and therefore, would be approximately 1,500 feet from the nearest residential receptors. As shown in **Table 8**, noise levels from batch plant operations would be approximately 45.2 dBA L_{eq} at the nearest residential receptor, which would be slightly above the 45 dBA L_{eq} nighttime noise standard for residential uses. Therefore, nighttime noise impacts to nearby residents from batch plant operations located near the southwest or southeast quarry options would be significant.

If the marina quarry option were selected, batch plant operations would be located near the existing marina and approximately 4,500 feet away from the nearest sensitive receptor. Noise levels from batch plant operations near the marina quarry option would be 35.7 dBA L_{eq}, which is below the 45 dBA L_{eq} nighttime noise standard at this residential receptor. Therefore, nighttime noise impacts to nearby residents from batch plant operations located near the marina quarry option would be less than significant.

Blasting may occur at night for tunneling operations for pipelines and audible noise is expected from these activities. Noise levels from nighttime blasting are expected to be 64.5 dBA L_{eq} at the nearest residential receptor located approximately 1,500 feet to the south of the dam. This exceeds the allowable nighttime noise standard of 45 dBA L_{eq} at nearby residential receptors. Therefore, nighttime noise impacts to nearby residents from blasting associated with tunneling operations would be significant.

Construction Vehicle Trips

Construction of the Proposed Action would also result in increased noise levels along area roadways during the construction period. While this is considered a temporary impact, construction is expected to last approximately 4 to 5 years.

During the peak construction months in Year 2010, the Proposed Action is estimated to generate approximately 550 truck trips per day with an off-site trucking option, and up to 160 truck trips per day with an on-site quarry option. In addition to truck trips, the Proposed Action would generate a maximum of about 900 vehicle trips per day for construction crew vehicles. Calculated roadway noise level increases during construction in Year 2010 at selected locations are presented in **Table 9**. For the off-site trucking option, roadway noise levels along Vigilante Road and Moreno Avenue, which are the only access roads to the project site, would result in a noise level increase of up to 6.2 and 5.9 dBA, respectively, during the PM peak hour. The PM peak hour represents the highest traffic volumes over a 24-hour period during the Year 2010 construction scenario (with and without the Proposed Action). This increase would be in addition to the already high noise environment along those roadways. Using a significance threshold of 3 dB, noise level increases along the identified roadway segments from the off-site quarry option would exceed this criterion. Although less than the off-site trucking option, the Year 2010 maximum noise level increase for the on-site quarry options would also exceed the 3 dB significance threshold. The noise level increases due to construction traffic would be temporary, but would be considered a significant impact of the project as it would exceed the identified thresholds for an extended period of time.

Table 9
Calculated Roadway Noise Levels at Selected Locations Near the San Vicente Site

Receptor	Roadway Segment	Year 2010 Without Proposed Action (dBA)	Year 2010 with Proposed Action (Off-Site Trucking) (dBA)	Year 2010 with Proposed Action (On-Site Quarry) (dBA)	Increase Year 2010 with Proposed Action (Off-site Trucking) (dBA)	Increase Year 2010 with Proposed Action (On-site Quarry) (dBA)	Significance Threshold
12417 Vigilante Road	Vigilante Road, Moreno Avenue to SR 67	64.1	70.3	67.8	**6.2**	**3.7**	**3.0**
12345 Moreno Avenue	Moreno Avenue, South of Vigilante Road	65.6	71.5	68.9	**5.9**	**3.3**	**3.0**
Deer Hill Estates	SR 67, North of Vigilante Road	68.8	69.6	69.2	0.8	0.4	3.0
Byron Road	SR 67, South of Vigilante Road	68.8	69.2	69.0	0.4	0.2	3.0

Source: EIP Associates, a division of PBS&J, 2006.
Notes:
1. Noise levels calculated using FWHA's TNM. Noise levels calculated for the PM peak hour at the setback of the identified receptors. Based on traffic data from Linscott, Law, & Greenspan Engineers' *Traffic Impact Analysis San Vicente Dam Raise* November 2006.

While there would also be noise level increases to residents along SR-67 from construction-related traffic volumes, the noise level increases would not exceed the 3 dB significance threshold (**Table 9**). Therefore, roadway noise impacts to residents along SR-67 due to construction-related traffic volumes would be less than significant.

Construction Vibration

Blasting would generate temporary vibrations in the vicinity of the dam construction zone, on-site quarry options, and new marina road construction areas. As mentioned, the closest receptor is approximately 1,500 feet from the quarry sites. Because vibration diminishes quickly with distance, residents at 1,500 feet would not be expected to result in vibration levels over the damage criteria established for blasting. As with noise from blasting, vibration levels can vary for blasting activities depending on the subsurface material, amount of charge, and depth to charge. Vibration calculations completed by Ogden Associates for blasting activities at the project site during the Emergency Storage Project EIR/EIS in 1995 indicated that vibration levels from blasting would have a PPV of approximately 40 inches per second near the blasting site, and would be reduced below 0.5 inches per second at a distance of approximately 80 feet from the blasting site. The damage threshold for structures is 2.0 inches per second. Because there are no structures within 80 feet of the on-site quarry options, blasting would not exceed the damage thresholds at any structure. Therefore, blasting at the quarry sites under the Proposed Action would not result in exceedance of the damage thresholds at any of the nearby residential receptors.

2.6.3 Operational Impacts

Recreational Vehicle Trips

The Proposed Action would include a larger reservoir and an expanded/relocated marina corresponding to an increase in recreational users and visitor trips, compared to current conditions. During peak summer months, the maximum daily recreational trips could increase from an estimated 225 ADT for the existing marina to possibly up to 360 ADT for the new marina (Weber, 2007). As shown in **Table 5**, existing roadway noise levels at the nearest residential receptors, along Vigilante Road and Moreno Avenue, already exceed the 60 dB CNEL noise standard. Therefore, the 3 dB significance threshold is used to evaluate the increase in roadway noise levels from recreational traffic associated with the Proposed Action. An approximate doubling of traffic is required to increase roadway noise levels by 3 dB. Because the larger marina and reservoir would not result in a doubling of recreational trips, compared to current conditions, the significance threshold of 3 dB would not be exceeded at residential receptors along roadways in the vicinity. Therefore, traffic noise impacts to residents along vicinity roadways due to the increase in recreational trips associated with the expanded marina would be less than significant.

Operational Noise Levels

Because there are no residents near the shoreline of the reservoir, any increase in the number of recreational motorboats using the larger reservoir water surface area, compared to current conditions,

would not exceed the 50 dBA L_{eq} (daytime) and the 45 dBA L_{eq} (nighttime) noise standards for residential uses. Therefore, there would be no noise impacts to nearby residents from an increased number of motorboats using the expanded reservoir.

Inundation level in the Kimball Valley arm of the expanded reservoir would not extend into, or even up to, private properties beyond City of San Diego lands. Nevertheless, the City of San Diego has agreed to place a buoy line (floating barricade) at the mouth of Kimball Valley Creek to prevent boat access into this area. This measure would avoid potential nuisance noise impacts near private properties in Kimball Valley caused by use of recreational motorboats. Therefore, there would be no nuisance noise impacts to residents along the Kimball Valley arm of the expanded San Vicente Reservoir from recreational motorboats.

2.7 Mitigation

Indirect noise impacts to California gnatcatcher due to construction activities near gnatcatcher habitat during the breeding season shall require the following mitigation measures:

- Pre-construction focused protocol surveys shall be conducted for the California gnatcatcher prior to (within the same season of) any construction activities that are expected to take place during the breeding season. Surveys shall be conducted in suitable habitat within 500 feet of any future construction activities.
- If gnatcatcher nests are observed within the 500-foot buffer, a biologist certified by USFWS with a 10(a) permit for the California gnatcatcher shall conduct weekly monitoring for the presence of the gnatcatcher and gnatcatcher nests.
- If gnatcatchers are present within the 500-foot buffer, then a noise monitoring and mitigation program, as negotiated with the resource agencies, shall be initiated. If noise levels exceed 60 dB Leq within the buffer area during the breeding season, then the construction activities shall be directed away from the area of impact such that noise levels remain below 60 dB L_{eq}.

Prior to initiation of construction activities, noise attenuation barriers may be erected along the southerly and easterly limits of the construction zone downstream of San Vicente Dam to attenuate nighttime noise levels from dam construction activities and blasting for tunneling operations south of the dam. The specific locations and dimensions of the barriers will be based on the recommendations of an acoustician. However, while the noise barriers may reduce nighttime noise levels, these noise abatement measures would not fully mitigate the nighttime noise impacts to below a level of significance. There are no feasible mitigation measures available to reduce these impacts to a level considered less than significant. Therefore, the impacts of the Proposed Action would be significant and unmitigated.

To mitigate significant impacts associated with nighttime noise levels from batch plant operations south of the dam, the Water Authority will implement the following mitigation measure:

- If feasible, the batch plant operations will be located at the location of the on-site Marina Quarry Option. If the batch plant operations cannot be located at the on-site Marina Quarry Option, then the significant nighttime noise impacts from batch plant operations south of the dam would be unmitigated because there are no other feasible mitigation measures available to reduce these impacts to a level considered less than significant.

The significant impacts from increased noise levels along Vigilante Road and Moreno Avenue due to construction traffic cannot be reduced by any measure other than reducing construction-related vehicle trips below the estimated traffic volumes associated with the on-site quarry options. This is not considered practicable due to the round-the-clock construction process for RCC placement. There are no feasible mitigation measures available to reduce these impacts to less than significant. Therefore, the Proposed Action impacts would be significant and unmitigated.

3.0 ALTERNATIVE 2: MOOSA 100,000 AF

3.1 Environmental Setting

Moosa Valley is located in a relatively unpopulated area 3.5 miles northwest of Valley Center in San Diego County (See **Figure 1** above). The site is approximately 15 miles north of the City of Escondido and four miles east of Interstate 15 (I-15). Existing uses within Moosa Valley include Turner Lake, scattered residences, agricultural lands and undeveloped areas. Access to the site is via Old Castle Road, Lilac Road and Betsworth Road.

3.2 Project Description

This alternative would provide for approximately 100,000 AF of carryover storage at Moosa Valley through construction of a new dam and inundation of a natural canyon. A new 384-foot high dam would be constructed. The dam crest elevation would be 1,258 feet AMSL. A saddle dam with spillway would be constructed approximately 1,000 feet to the northeast of the main dam; the spillway elevation would be 1,246 feet AMSL. The saddle dam/spillway would be approximately 84 feet high and 1,090 feet long. Both the main dam and saddle dam would be concrete-face rockfill dams. Dam construction is estimated to take about four years.

The following new conveyance facilities would be required to connect the reservoir to the Water Authority's aqueduct system: three pump stations, flow regulatory storage tank, pipeline, and appurtenant facilities. The Moosa Creek pump station would lift water from the Moosa Reservoir to a flow regulatory storage tank. Water would be conveyed by gravity from the tank to the Second Aqueduct via a 6.4-mile-long, 90-inch-diameter steel pipeline. The pipeline alignment would follow Moosa Creek to Old Castle Road and continue west to the Second Aqueduct on the west side of I-15. The pipeline would be installed within an open-cut trench, except for the portion crossing I-15, which would be in a tunnel. Additional facilities would include a marina, new access roads, and new electrical supply to the pump station and other facilities. A portion of the First Aqueduct located below the reservoir inundation area would require reconstruction.

3.3 Noise and Vibration Regulations

The regulatory setting for the Moosa 100K Alternative is the same as is defined for the Proposed Action (refer to Section 2.4).

3.4 Affected Environment

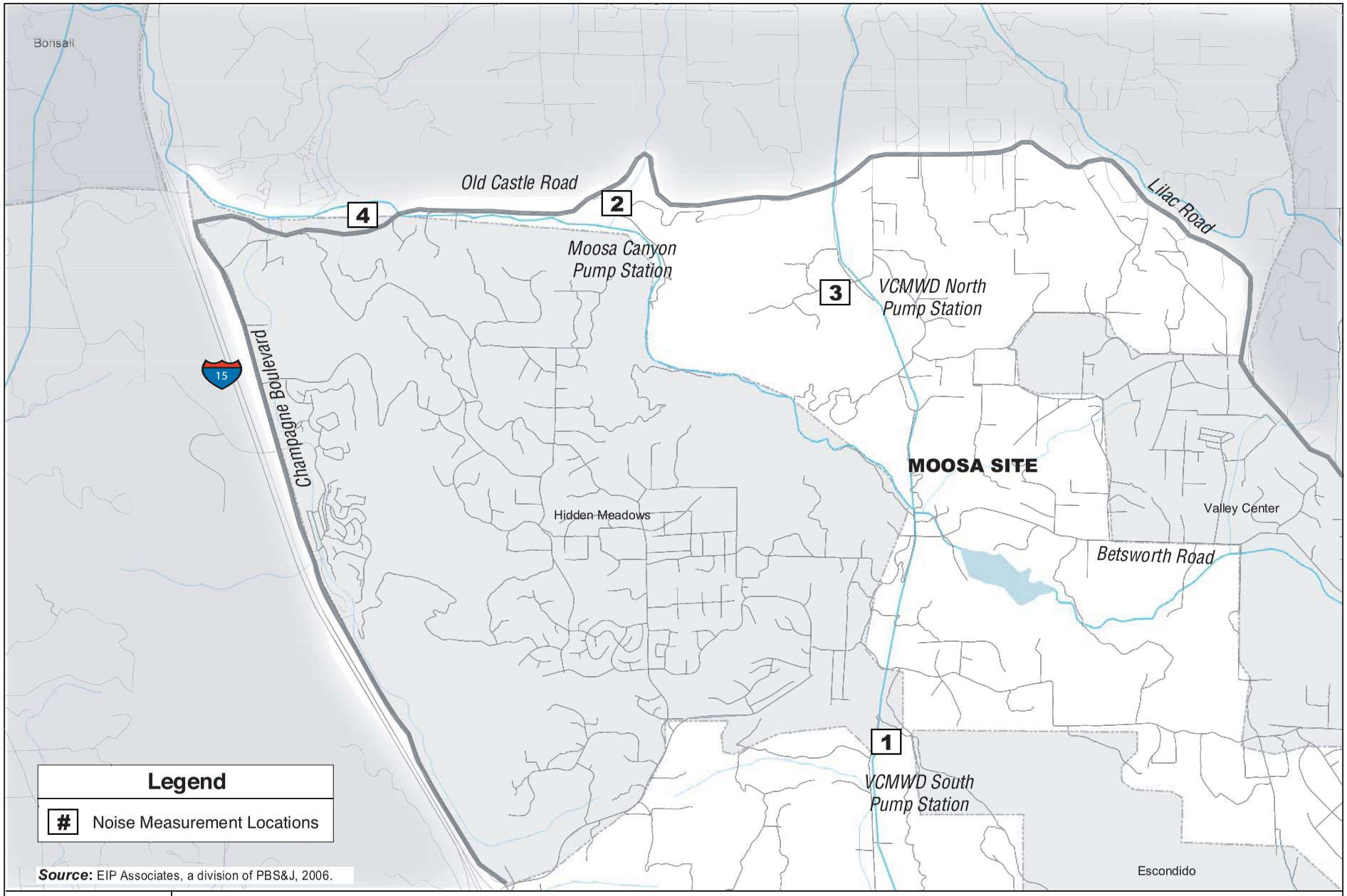
3.4.1 Existing Noise Environment

Moosa Canyon is primarily undeveloped with some existing scattered residential uses. Vehicular traffic is the primary source of noise for most receptors. Existing daytime noise levels were monitored at three locations at or near the pump station locations and one location along Old Castle Road, which is the main entry point for traffic into the Valley, on October 5, 2006 (see **Figure 3**). The monitoring locations represent the noise levels experienced at these locations, and for the existing sensitive land uses along the primary access routes to the project site. Noise levels were monitored using a Larson-Davis Laboratories Model 720 sound level meter, which satisfies the American National Standards Institute (ANSI) for general environmental noise measurement instrumentation. The sources responsible for the measured noise and measurement data at each location are presented in **Table 10**. Although motor vehicle traffic was found to have the primary influence on noise levels near roadways in the project site vicinity, noise for areas more distant from the roadways had identifiable noise sources other than traffic, such as aircraft overflights and construction.

Local roads would be used by trucks traveling to and from the project site during construction. Existing peak hour traffic L_{eq}s at noise-sensitive land uses adjacent to these roads were estimated using the Federal Highway Administration's Traffic Noise Model (TNM). This model calculates the average noise level at specific locations based on traffic volumes, average speeds, roadway geometry, and site environmental conditions. The existing peak-hour traffic L_{eq}s were calculated using peak-hour traffic volumes provided by Linscott, Law & Greenspan, Engineers. The estimated existing peak-hour L_{eq}s at the selected local noise-sensitive land uses are presented in **Table 11**.

3.4.2 Sensitive Noise Receptors

Sensitive noise receptors typically include residential development, schools, and hospitals. Under certain conditions, habitat areas can also be considered to be sensitive receptors, such as when noise levels exceed 60 dBA in nesting areas for least Bell's vireo (Vireo bellii) and California gnatcatcher (Polioptila californica californica) during the respective breeding seasons. Federal regulatory guidelines establish the following breeding seasons for these two species: February 15 through August 30 for the least Bell's vireo, and April 10 through July 31 for the California gnatcatcher.



Source: EIP Associates, a division of PBS&J, 2006.

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FIGURE 3
Noise Measuring Locations - Moosa

Table 10
Daytime Noise Levels Measurements at Selected Locations On/Around the Moosa Site

	Noise Measurement Location/Time	Noise Sources	Noise Level Statistics		
			L_{eq}	L_{min}	L_{max}
#1	Near proposed VCMWD South Pump Station. Start time: 11:55 AM.	Primary: Construction and vehicle traffic in the adjacent valley.	42.9	35.8	74.4
#2	Near proposed Moosa Canyon Pump Station, 20 feet from Pamoosa Road. Start time: 1:30 PM.	Primary: Vehicle traffic along Old Castle Road	49.4	36.9	72.6
#3	Near proposed VCMWD North Pump Station. Start time: 3:25 PM.	Primary: Aircraft overflight.	38.4	34.4	67.8
#4	In front of residential unit at 9144 Old Castle Road. Start time: 5:20 PM.	Primary: Vehicular traffic along Old Castle Road.	70.7	42.1	86.3

Source: EIP Associates, a division of PBS&J, 2006.

Measurements were made on October 5, 2006. Each measurement was 10 minutes in duration

L_{eq} is the average noise level over the measurement period, L_{min} is the minimum instantaneous noise level measured during the 10-minute period, while L_{max} is the maximum instantaneous noise level measured during the 10-minute period.

Table 11
Calculated Existing Roadway Noise Levels at Selected Noise-Sensitive Locations Near the Moosa Site

Roadway Segment	Noise Sensitive Uses	Peak Hour L_{eq} (dBA)[1]
Betsworth Road, west of Lilac Road	Residential	52.6
Lilac Road, north of Betsworth Road	Residential	61.0
Old Castle Road, west of Lilac Road	Residential	66.6
Old Castle Road, east of Champagne Boulevard	Residential	63.5

Source: EIP Associates, a division of PBS&J, 2006.

Notes:

1. Noise levels calculated using FWHA's TNM. Noise levels calculated during the PM peak hour 100 feet from centerline of roadway. Based on traffic data from Linscott, Law, & Greenspan Engineers' *Traffic Impact Analysis San Vicente Dam Raise* November 2006.

In order to construct a reservoir within Moosa Valley all residents that would occur below the inundation line would be removed, including a couple of residents that would be near the water line. However, residents could still be present during construction activities. The closest resident to the Moosa dam site that would be present after construction would be more than 1,500 feet away. The closest resident to each of the pump stations would be approximately 400 feet, 1,500 feet and 800 feet from the Moosa Creek Pump Station, VCMWD North Pump Station, and VCMWD South Pump Station, respectively. Residents are also located along the access roads to the dam site including Betsworth Road, Lilac Road, and Old Castle Road.

3.5 Impact Analysis

3.5.1 Methodology

Refer to Section 2.6.1 for a discussion of the methodology employed to evaluate impacts to noise and vibration.

3.5.2 Construction Impacts

General Construction

Construction activities associated with the Moosa 100K Alternative would involve the use of heavy equipment during land clearing, demolition of structures, and construction phases of access roads, dams, and pipelines. Construction equipment would include cranes, drill rigs, bull dozers, compactors, graders, pumps, generators, compressors, and miscellaneous trucks and equipment. Construction activities would also involve the use of smaller power tools, generators, and other equipment that are sources of noise. During each stage of construction there would be a different mix of equipment operating, and noise levels would vary based on the amount of equipment in operation and the location of the activity.

The United States Environmental Protection Agency (EPA) has compiled data regarding the noise generating characteristics of typical construction activities. These data are presented in **Table 7** above. These noise levels would diminish rapidly with distance from the construction site at a rate of approximately 6 dBA per doubling of distance. For example, a noise level of 86 dBA measured at 50 feet from the noise source to the receptor would reduce to 80 dBA at 100 feet from the source to the receptor, and reduce by another 6 dBA to 74 dBA at 200 feet from the source to the receptor.

Construction operations for the Moosa 100K Alternative would primarily occur at the dam sites. Construction would last approximately 46 months and would experience high noise levels primarily during construction of the dam structure and foundations. The closest residential receptor to the dam site is more than 1,500 feet away. In addition to dam construction, the Moosa 100K Alternative would require construction of pipelines, pump stations, and access roads, which could have a construction zone as close as about 100 feet from a residential receptor.

Construction noise levels for varying distances were calculated using the FHWA's RCNM. As shown in **Table 12**, noise levels for construction equipment would not be expected to result in noise levels above 75.0 dBA L_{eq} for receptors 100 feet or farther from the construction area. General daytime construction activities associated with the Moosa 100K Alternative would comply with the 75 dBA L_{eq} noise standard set by the San Diego County Noise Ordinance. Therefore, daytime construction noise impacts to nearby residents would be less than significant.

Construction activities associated with the Moosa 100K Alternative could result in noise levels in excess of 60 dB within nearby habitats that are occupied by the California gnatcatcher and/or the least Bell's vireo. Indirect construction noise impacts during the breeding season of these species would be significant. Construction activities that would result in noise levels in excess of 60 dB could result in impacts to the California gnatcatcher and least Bell's vireo. Without mitigation to reduce noise levels below 60 dB, noise levels during construction of the Moosa 100K Alternative could result in exceedance of 60 dB in the habitat area during the breeding season. This would be considered a significant impact.

Blasting of underlying rock structures would be required for the dam, and the tunneling operations for the pipelines. Noise associated with blasting would generally occur at infrequent intervals. The noise levels resulting from blasting activities could vary depending on the subsurface material, amount of charge, and the depth to charge. Using the noise levels predicted for blasting from FHWA's RCNM, the calculated average noise level would be approximately 74 dBA L_{eq} at 50 feet, and 68 dBA L_{eq} at 100 feet. The County of San Diego's 75 dBA L_{eq} standard for construction activities applies to average noise levels. Therefore, blasting noise impacts on residents for the Moosa 100K Alternative would be below the County's standard because the residents would be more than 50 feet from the blasting area. Therefore, noise impacts to nearby residents from daytime blasting activities would be less than significant.

Nighttime Construction

Tunneling operations for the Moosa 100K Alternative would involve the majority of the construction equipment listed in **Table 12** for work at the tunnel portals (except for scrapers), and blasting within the tunnel itself. Tunneling operations would continue for 24 hours per day, 7 days per week, for approximately 46 months. The closest residential receptor would be residents of the RV Park, which is between Old Highway 395 and I-15, north of Gopher Canyon Road. The RV Park is approximately 200 feet east of I-15, and depending on where tunneling would occur under I-15, these residents could be as close as 200 feet to the tunneling activities. As shown in **Table 12**, the nearest residential receptors to the I-15 tunnel portal would be exposed to average noise levels of up to 65.6 dBA L_{eq} at 200 feet (i.e., dozers and generators). This would exceed the County's 45 dBA L_{eq}, nighttime exterior noise standard for residential uses. These residences may be partially shielded by intervening topography, thereby reducing the noise level they experience. However, this may not be enough to bring the noise levels to below the 45 dBA L_{eq} standard. Therefore, noise impacts to nearby residents from nighttime activities at the I-15 tunnel portal would be significant.

Table 12
Construction Noise Levels at Closest Residential Receptor (Moosa)

Construction Equipment	Estimated Noise Levels									
	50 feet		100 feet		200 feet		400 feet		1,500 feet	
	dBA L_{max}	dBA L_{eq}	dBA L_{max}	dBA L_{eq}	dBA L_{max}	dBA L_{eq}	dBA L_{max}	dBA L_{eq}	dBA L_{max}	dBA L_{eq}
Auger Drill Rig	84.4	77.4	78.3	71.3	72.3	65.3	66.3	59.3	54.8	47.8
Backhoe	77.6	73.6	71.5	67.6	65.5	61.5	59.5	55.5	48.0	44.0
Blasting	94.0	74.0	88.0	68.0	82.0	62.0	75.9	55.9	64.5	44.5
Compactor (ground)	83.2	76.2	77.2	70.2	71.2	64.2	65.2	58.2	53.7	46.7
Compressor (air)	77.7	73.7	71.6	67.7	65.6	61.6	59.6	55.6	48.1	44.1
Crane	80.6	72.6	74.5	66.6	68.5	60.6	62.5	54.5	51.0	43.0
Dozer	81.7	77.7	75.6	71.7	69.6	65.6	63.6	59.6	52.1	48.1
Dump Truck	76.5	72.5	70.4	66.5	64.4	60.4	58.4	54.4	46.9	42.9
Front End Loader	79.1	75.1	73.1	69.1	67.1	63.1	61.0	57.1	49.6	45.6
Generator	80.6	77.6	74.6	71.6	68.6	65.6	62.6	59.6	51.1	48.1
Scraper	83.6	79.6	77.6	73.6	71.5	67.6	65.5	61.5	54.0	50.1

Source: EIP Associates, a division of PBS&J, 2006.

Construction noise levels calculated using FHWA's RCNM. Leq is the average noise level over the equipment operation time. Actual noise levels in the construction site vicinity would most likely be lower than the calculated values due to attenuation by intervening topography.

Blasting may occur at night for tunneling operations for pipelines, and audible noise is expected from these activities. Noise levels from nighttime blasting are expected to be 62 dBA L_{eq} at the nearest residential receptors to the Moosa pipeline tunnel at I-15, located approximately 200 feet away. This would exceed the County's 45 dBA L_{eq}, nighttime exterior noise standard for residential uses. These residences may be partially shielded by intervening topography, thereby reducing the noise level they experience. However, this may not be enough to bring the noise levels to below the 45 dBA L_{eq} standard. Therefore, noise impacts to nearby residents from nighttime blasting activities at the I-15 tunnel would be significant.

Construction Vehicle Trips

Construction of the alternative would result in increased noise levels along area roadways during the construction period. While this is considered a temporary impact, construction would be expected to last approximately 54 months.

During the peak construction months in the Year 2010, the Moosa 100K Alternative is estimated to generate approximately 550 truck trips per day. In addition to truck trips, the project would generate about 1,400 vehicle trips per day for construction crew vehicles. Calculated roadway noise level increases during construction at selected locations are presented in **Table 13**. Roadway noise levels along Betsworth Road, Lilac Road, and Old Castle Road, which are the primary access roads to the project site, would result in a noise level increase of up to 9.3, 2.9 and 3.6 dBA, respectively, during the PM peak hour. The PM peak hour represents the highest traffic volumes over a 24-hour period during the Year 2010 construction scenario (with and without the Moosa 100K Alternative). Using the significance threshold of 3 dB, noise level increases along the identified roadway segments, except Lilac Road, would exceed this criterion. Therefore, roadway noise impacts to residents along Old Castle Road and Betsworth Road due to construction-related traffic volumes would be significant.

Construction Vibration

The Moosa 100K Alternative would result in operation of construction equipment within 100 feet of a residential receptor during placement of pipelines. **Table 14** presents vibration source levels each type of construction equipment. As shown in **Table 14**, operation of construction equipment would not result in particle velocity in excess of 0.5 inches per second at distances greater than 25 feet. Therefore, because the closest sensitive receptor would be at least 100 feet from construction activities, the project would not result in exceedance of the vibration thresholds at any of the nearby residential receptors.

Table 13
Calculated Roadway Noise Levels at Selected Noise-Sensitive Locations Near the Moosa Site

Roadway Segment	Receptor	Year 2010 Without Moosa 100K (dBA)	Year 2010 with Moosa 100K (dBA)	Maximum Increase over Year 2010 Without Moosa 100K (dBA)	Significance Threshold
Betsworth Road, west of Lilac Road	Residential	53.1	62.4	**9.3**	**3.0**
Lilac Road, north of Betsworth Road	Residential	61.2	64.1	2.9	3.0
Old Castle Road, west of Lilac Road	Residential	63.8	67.4	**3.6**	**3.0**
Old Castle Road, east of Champagne Boulevard	Residential	66.9	69.0	2.1	3.0

Source: EIP Associates, a division of PBS&J, 2006.

Notes:

1. Noise levels calculated using FWHA's TNM. Noise levels calculated for the PM peak hour 100 feet from centerline of roadway. Based on traffic data from Linscott, Law, & Greenspan Engineers' *Traffic Impact Analysis San Vicente Dam Raise* November 2006.

Table 14
Vibration Source Levels for Construction Equipment

Construction Equipment	PPV at 25 feet (in/sec)
Pile Driver (Impact)	0.644–1.518
Pile Driver (Sonic)	0.170–0.734
Vibratory Roller	0.210
Hoe Ram	0.089
Large Bulldozer	0.089
Caisson Drilling	0.089
Loaded Trucks	0.076
Jackhammer	0.035
Small Bulldozer	0.003

Source: *Transit Noise Impact and Vibration Assessment*, Federal Transit Administration, May 2006.

The Moosa 100K Alternative would require blasting activities for tunnel and dam construction activities. As previously noted, the closest residential receptor to the dam construction area would be more than 1,500 feet away and the closest existing residential receptor to the tunneling operations would be approximately 200 feet. Blasting would also result in increased vibration in the vicinity of the blasting sites. As with noise from blasting, vibration levels can vary for blasting activities depending on the subsurface material, amount of charge, and depth to charge. Vibration calculations completed by Ogden Associates for blasting activities under the Emergency Storage Project in 1995 indicated that vibration levels from blasting would have a PPV of approximately 40 inches per second near the blasting site, and would be reduced below 0.5 inches per second at a distance of approximately 80 feet from the blasting site. The damage threshold for structures is 2.0 inches per second. Because there are no structures located within 80 feet of the blasting for tunneling operations, blasting would not exceed the damage thresholds at any structure. Therefore, blasting for this alternative would not result in exceedance of the damage thresholds at any of the nearby residential receptors.

3.5.3 Operational Impacts

The Moosa 100K Alternative would include a new reservoir and a marina corresponding to an increase in recreational users and visitor trips, compared to current conditions. During peak summer months, the maximum daily recreational trips could increase up to 360 ADT for the new marina (Weber, 2007). As shown in **Table 11**, existing roadway noise levels at the nearest residential receptors, along Old Castle Road, west of Lilac Road, already exceed the 60 dB CNEL noise standard. Therefore, the 3 dB significance threshold is used to evaluate the increase in roadway noise levels from recreational traffic associated with the Moosa 100K Alternative. An approximate doubling of traffic is required to increase roadway noise levels by 3 dB. Because the new marina and reservoir would not result in a doubling of recreational trips, compared to current conditions, the significance threshold of 3 dB would not be exceeded at residential receptors along roadways in the vicinity. Therefore, traffic noise impacts to residents along vicinity roadways due to the increase in recreational trips associated with the new marina and reservoir would be less than significant.

Operational/maintenance activities for the Moosa 100K Alternative would consist of similar activities to those anticipated for the Proposed Action, including monitoring and maintenance activities. All of these activities would result in noise associated with worker trips to and from the reservoir. Operation and maintenance activities were anticipated to result in about four trips per day; noise associated with these trips would be negligible.

Recreational activities under the Moosa 100K Alternative would include boating and fishing opportunities. A maximum of 291 boats were assumed to operate on the reservoir for four hours on a single maximum use day. A septic system setback would be established to buffer the reservoir from existing or future residences. Therefore, there would be no residential receptor that would be subject to the 50 dBA L_{eq} (daytime) and the 45 dBA L_{eq} (nighttime) noise standards for residential uses from motorboat operations on the reservoir. Therefore, there would be no noise impacts to nearby residents from motorboats operating at Moosa Reservoir.

Operation of the Moosa 100K Alternative would also require installation of new pump stations and pipelines outside of the reservoir area for water delivery. There would be three new pump station constructed in the Moosa 100K study area. Pump stations would be expected to produce constant levels of sound when the pumps are in operation. Noise for construction pumps are listed above in **Table 7** and are estimated to be approximately 68 to 72 dBA L_{eq} at 50 feet. Noise levels for the proposed stationary pumps would have similar noise levels without shielding. However, the Water Authority constructs pump stations that are fully enclosed within a structure. As shown in **Table 10** above, existing noise levels were measured in the area of each of the proposed stations with ambient noise levels ranging from approximately 38 dBA L_{eq} for more remote areas to approximately 50 dBA for areas closer to roadways. Noise levels from operations of the pumps would result in an increase in ambient noise levels for theses areas if unmitigated. The closest residential receptor to a pump station would be 400 feet from the Moosa Creek Pump Station. Using an attenuation factor of 6 dBA per doubling of distance, noise levels from an unenclosed pump station would be approximately 53.9 dBA L_{eq} at the closest residential receptor. This would be in exceedance of the 50 dBA CNEL daytime standard of the San Diego County Noise Ordinance at nearby residential receptors (7:00 a.m. to 10:00 p.m.) and also the 45 dBA CNEL nighttime noise standard of the San Diego County Noise Ordinance at nearby residential receptors (10:00 p.m. to 7:00 a.m.). However, the pump stations would be fully enclosed within a structure to attenuate operational noise levels to meet these noise standards at the nearest residential receptors. Therefore, with implementation of project design features, there would be no noise impacts to nearby residents from pump station operations.

3.6 Mitigation

Mitigation for significant indirect impacts to California gnatcatcher and other noise sensitive species from construction activities will be implemented by the construction contractor, in accordance with construction documents and specifications approved by the Water Authority, and as discussed below. To avoid indirect impacts to noise-sensitive species, no construction activities will take place during the breeding season. If it is not feasible to avoid construction during breeding seasons, the following mitigation measures will be implemented to mitigate indirect measures to a level below significance. Pre-construction focused protocol surveys will be conducted for noise sensitive species prior to (within the same season of) any construction activities that are expected to take place during the breeding season. Surveys will be conducted in suitable habitat within 500 feet of any future construction activities.

The significant impacts from nighttime noise levels associated with operation of construction equipment and blasting activities for pipeline tunneling operations cannot be reduced to below the San Diego County Noise Ordinance standards. There are no feasible mitigation measures available to reduce these impacts to a level considered less than significant. Therefore, the impacts of the Moosa 100K Alternative would be significant and unmitigated.

The significant impacts from increased noise levels along Betsworth Road and Old Castle Road due to construction traffic cannot be reduced by any measure other than reducing construction-related vehicle trips below the estimated traffic volumes associated with the Moosa 100K Alternative. This is not

considered practicable due to the construction process. There are no feasible mitigation measures available to reduce these impacts to less than significant. Therefore, the Moosa 100K Alternative impacts would be significant and unmitigated.

4.0 ALTERNATIVE 3: SAN VICENTE 50,000 AF + MOOSA 50,000 AF

4.1 Environmental Setting

The locations of San Vicente Reservoir and Moosa Valley are described in the previous two sections (Figure 1 and Figure 3), along with existing and surrounding uses.

4.2 Project Description

This alternative involves a reduced raise of San Vicente Dam, which would provide approximately 50,000 AF of carryover storage at San Vicente Reservoir, and construction of a new dam at Moosa Valley to create a new reservoir that would provide another 50,000 AF of carry storage capacity. The two projects taken together would provide a combined 100,000 AF of carryover storage. It is assumed that both projects would be constructed concurrently.

San Vicente Dam would be raised an additional 32 feet beyond the approved 54-foot dam raise for the ESP, increasing the overall height of the dam by 86 feet (or a total dam height of up 306 feet). The dam raise would increase the usable volume of San Vicente Reservoir by approximately 102,100 AF. The elevation of the spillway crest would be raised from 650 to 735 feet AMSL. The San Vicente Dam raise associated with Alternative 3 would be accomplished using the same methods and techniques described for the Proposed Action; namely continuous (20 to 24 hours per day) RCC placement on the downstream face of the dam. The same options for the provision of aggregate for RCC production that are under consideration for the Proposed Action are also being evaluated for this alternative. Reservoir water level lowering would be the same as described for the Proposed Action. The reduced increase in reservoir capacity and elevation, as compared to the Proposed Action, would not require the construction of saddle dams. As with the Proposed Action, additional facilities associated with this alternative would include a downstream control facility, outlet pipeline, relocated Bypass Pipeline, relocated marina facilities, and new access roads to the dam crest, relocated marina, and Diversion Structure.

In addition to an approximate 50,000-acre-foot increase in the capacity of San Vicente Reservoir, a new 300-foot high dam would be constructed at Moosa Valley to create a reservoir with 50,000 AF of carryover storage. The dam crest elevation would be 1,185 feet AMSL. A spillway would be constructed approximately 1,500 feet to the northeast of the main dam; the spillway crest elevation would be 1,170 feet AMSL. As described in Alternative 2, the main dam would be a concrete-face rockfill dam. This alternative would involve the same conveyance facilities as Alternative 2. The pipeline would follow the same alignment described in Alternative 2. Additional facilities would include a marina, new access roads, and new electrical supply to the pump station and other facilities.

A portion of the First Aqueduct located below the reservoir inundation area would require reconstruction.

4.3 Noise and Vibration Regulations

Refer to Section 2.4 for a discussion of the regulatory setting that applies to both the SV 50K and Moosa 50K components of this alternative.

4.4 Affected Environment

The SV 50K study area would be a subset of the larger SV 100K study area, and the Moosa 50K study area would be a subset of the larger Moosa 100K study area. Therefore, the following discussion refers to Section 2.5 (Proposed Action) and Section 3.4 (Moosa 100K Alternative) for information on the Affected Environment as it applies to the SV 50K/Moosa 50K Alternative.

4.5 Impact Analysis

4.5.1 Methodology

Refer to Section 2.6.1 for a discussion of the methodology employed to evaluate impacts to noise and vibration.

4.5.2 Construction Impacts

General Construction

Construction activities associated with the Proposed Action and the Moosa 100K Alternative were each determined to be less than significant, as daytime construction activities would be less than the County's 75 dBA standard for construction activities. Operation of construction equipment under the SV 50K/Moosa 50K Alternative would result in similar construction noise levels at nearby receptors as was analyzed under the Proposed Action and the Moosa 100K Alternative; therefore, as the impacts were found to be less than significant under those alternatives, the impacts from general construction during the daytime hours for the SV 50K/Moosa 50K Alternative would also be less than significant.

Construction activities associated with the Proposed Action and Moosa 100K Alternative were also determined to potentially result in noise levels in excess of 60 dB within nearby habitats that are occupied by the California gnatcatcher and/or the least Bell's vireo. Construction activities that would result in noise levels in excess of 60 dB could result in impacts to the California gnatcatcher (and least Bell's vireo?). Without mitigation to reduce noise levels below 60 dB, noise levels during construction of the Moosa 100K Alternative could result in exceedance of 60 dB in the habitat area during the breeding season. This would be considered a significant impact.

Construction of both the San Vicente Dam under the Proposed Action and dam and tunnel construction for the Moosa 100K Alternative would require blasting activities. It was determined that blasting

activities at the San Vicente site and the Moosa Site would not result in exceedance of the County's noise level standard of 75 dBA L_{eq} at residential uses, due to the noise attenuation. The SV 50K/Moosa 50K Alternative would require blasting activities at both locations and would result in similar construction noise levels at nearby receptors as was analyzed under the Proposed Action and the Moosa 100K Alternative; therefore, as the impacts were found to be less than significant under those alternatives, the impacts from blasting for the SV 50K/Moosa 50K Alternative would also be less than significant.

Nighttime Construction

Construction of both the San Vicente Dam under the Proposed Action and tunneling activities for the Moosa 100K Alternative would require construction activities to operate for 24 hours a day, 7 days a week. It was determined that nighttime construction activities at the San Vicente Dam site would result in exceedance of the County's noise level standard of 45 dBA L_{eq} at residential uses during nighttime hours, due to the distance to receptors and intervening topography. Nighttime construction for tunneling activities under the Moosa 100K Alternative would potentially result in exceedance of the County standards. The SV 50K/Moosa 50K Alternative would require nighttime construction at both locations; therefore, because construction at the Moosa site would exceed the County's standards for residential uses, this would be considered a significant impact.

Blasting may occur at night for tunneling operations for pipelines under the Proposed Action and tunneling activities for the Moosa 100K Alternative and audible noise is expected from these activities. It was determined that nighttime construction activities at the San Vicente Dam site would result in exceedance of the County's noise level standard of 45 dBA L_{eq} at residential uses during nighttime hours, due to the distance to receptors and intervening topography. Nighttime construction for tunneling activities under the Moosa 100K Alternative would potentially result in exceedance of the County standards. The SV 50K/Moosa 50K Alternative would require nighttime construction at both locations; therefore, because construction at the San Vicente site and the Moosa site would exceed the County's standards for residential uses, this would be considered a significant impact.

Construction Vehicle Trips

Construction of the SV 50K/Moosa 50K Alternative would result in increased noise levels along area roadways in the San Vicente and Moosa site vicinities during the construction period. While this is considered a temporary impact, construction would be expected to last approximately 45 months at the San Vicente site and 42 months at the Moosa site.

During the peak construction months in Year 2010, the SV 50K component is estimated to generate 520 truck trips per day with an off-site trucking option, and approximately 154 truck trips per day with an on-site quarry option at the San Vicente site. This alternative would also require 292 truck trips per day at the Moosa site. In addition to truck trips, the alternative would generate about 712 and 1,264 vehicle trips per day for construction crew vehicles at the San Vicente site and Moosa site, respectively. Noise level increases during construction at selected locations are presented in **Table 15**. For the off-site trucking option at the San Vicente site, roadway noise levels would increase along the

identified roadways with a maximum noise level increase at the San Vicente site of 6.0 dBA along Vigilante Road and a maximum noise level increase of 5.7 dBA along Moreno Road during the PM peak hour. Although less than the off-site trucking option, the Year 2010 maximum noise level increase for the on-site quarry options would also exceed the 3 dB significance threshold along the two identified roadways. The SV 50K/Moosa 50K Alternative would also result in a maximum noise level increase of 7.6 dBA at the Moosa site during the PM peak hour. Using a significance criteria of 3 dB for roadway noise level increases, this Alternative would result in significant noise level increases along four of the roadway segments identified, two roadways at the San Vicente site and two roadways at the Moosa site. The noise level increases due to construction traffic would be a temporary, but would be considered a significant impact of the project as it would exceed the identified thresholds for an extended period of time.

Construction Vibration

Construction of the SV 50K/Moosa 50K Alternative would require blasting at the San Vicente site and the Moosa site. Vibration levels for the Proposed Action and the Moosa 100K Alternative were determined to be less than the 2.0 inches per second threshold at the closest resident. Therefore, blasting for this SV 50K/Moosa 50K Alternative would not result in exceedance of the damage thresholds at any nearby structures.

Similar to the Moosa 100K Alternative, the SV 50K/Moosa 50K Alternative would result in operation of construction equipment within 100 feet of a residential receptor during placement of pipelines within the Moosa Valley. Vibration levels for the Moosa 100K Alternative were determined to be less than the 0.5 inches per second threshold at the closest resident. Therefore, operation of construction equipment for this SV 50K/Moosa 50K Alternative would not result in exceedance of the vibration thresholds at any of the nearby residential receptors.

4.5.3 Operational Impacts

The SV 50K/Moosa 50K Alternative would result in raising the level of an existing reservoir at San Vicente and the creation of a new reservoir in the Moosa Valley. The alternative would also require the construction of a new marina at both sites, and it would also require construction of new pump stations for operation of the Moosa reservoir.

Table 15
Calculated Roadway Noise Levels at Selected Noise-Sensitive Locations Near the San Vicente Site and the Moosa Site

Roadway Segment	Receptor	Year 2010 Without SV 50K/Moosa 50K (dBA)	Year 2010 with SV 50K/ Moosa 50K (Off-Site Quarry) (dBA)	Year 2010 with SV 50K/ Moosa 50K (On-Site Quarry) (dBA)	Maximum Increase over Year 2010 Without SV 50K/Moosa 50K (Off-Site Quarry) (dBA)	Maximum Increase over Year 2010 Without SV 50K/Moosa 50K (On-Site Quarry) (dBA)	Significance Threshold
San Vicente Site							
Vigilante Road, Moreno Avenue to SR 67	Residential	64.1	70.1	67.6	**6.0**	**3.5**	**3.0**
Moreno Avenue, South of Vigilante Road	Residential	65.6	71.3	70.1	**5.7**	**4.5**	**3.0**
SR 67, North of Vigilante Road	Residential	68.8	69.6	69.2	0.8	0.4	3.0
SR 67, South of Vigilante Road	Residential	68.8	69.1	68.9	0.3	0.1	3.0
Moosa Site							
Betsworth Road, west of Lilac Road	Residential	53.1	60.7	--	**7.6**	--	**3.0**
Lilac Road, north of Betsworth Road	Residential	61.2	63.2	--	2.0	--	3.0
Old Castle Road, west of Lilac Road	Residential	63.8	66.5	--	2.7	--	**3.0**
Old Castle Road, east of Champagne Boulevard	Residential	66.9	68.4	--	1.5	--	3.0

Source: EIP Associates, a division of PBS&J, 2006.

Notes:

1. Noise levels calculated using FWHA's TNM. Noise levels calculated for the PM peak hour at the setback of the identified receptors for San Vicente sites and 100 feet from centerline of roadway for Moosa sites. Based on traffic data from Linscott, Law, & Greenspan Engineers' *Traffic Impact Analysis San Vicente Dam Raise* November 2006.

The expected increase in recreational traffic volumes for the Proposed Action and the Moosa 100K Alternative along vicinity roadways to access the resevoirs would not generate noise levels at nearby residential receptors above the 3 dB threshold. Impacts were determined to be less than significant under the Proposed Action and the Moosa 100K Alternative. The SV 50K and the Moosa 50K components would each have a smaller surface area at the reservoirs than under the Proposed Action and the Moosa 100K Alternative, but similar marinas would be constructed under the SV 50K/Moosa 50K Alternative with similar expected traffic generation. Therefore, impacts of the SV 50K/Moosa 50K Alternative would be less than significant.

Recreational activities under the Proposed Action and the Moosa 100K Alternative would include boating and fishing opportunities. Both the Proposed Action and the Moosa 100K Alternative were determined to result in no impacts to nearby residents as there would be no residential receptor subject to the San Diego County Noise Ordinance of 50 dBA L_{eq} (daytime) and the 45 dBA L_{eq} (nighttime) noise standards for residential uses. The SV 50K/Moosa 50K Alternative would result in a smaller increase in surface area at the San Vicente Reservoir than the Proposed Action, and in a smaller reservoir at the Moosa site than analyzed above under the Moosa 100K Alternative. Therefore, there would be no noise impacts to residents under the SV 50K/Moosa 50K Alternative.

Impacts from operation of new pump stations at the Moosa site would be the same for this Alternative as with the Moosa 100K Alternative. Similar to the larger Moosa 100K Alternative, the Water Authority would ensure that all new pump stations for the Moosa 50K component would be enclosed or shielded, including the use of sound absorption materials as needed, to meet the County's standards at the nearest residential receptor. Therefore, impacts from pump station operation noise from the Moosa 50K component would be less than significant.

4.6 Mitigation

Refer to Section 2.7 and Section 3.6 for mitigation measures that would apply to both the SV 50K and Moosa 50K components of this alternative.

REFERENCES

County of San Diego General Plan. Noise Element, Amended September 2006.

County of San Diego Municipal Code. Chapter 36.4, Noise Abatement and Control, 2000.

Federal Transit Administration. Transit Noise and Vibration Impact Assessment Manual, May 2006.

Linscott, Law & Greenspan. Traffic Impact Analysis San Vicente Dam Raise. Dated November 1, 2006.

Ogden Environmental. Noise and Vibration Technical Report for Draft Environmental Impact Report/Environmental Impact Statement, November 1995.

U.S. Environmental Protection Agency. Noise from Construction Equipment and Operations, Building Equipment and Home Appliances, 1971

Weber, Joe. City of San Diego Water Department. Personal communication with PBS&J. January 12, 2007.

APPENDIX: NOISE CALCULATIONS

Roadway Construction Noise Model (RCNM),Version 1.0

Report date: 02/20/2007
Case Description: San Vicente

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Residents on Vigilante	Residential	66.9	64.9	64.9

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Blasting	Yes	1	94.0		1500.0	0.0
Backhoe	No	40		77.6	1500.0	0.0
Compactor (ground)	No	20		83.2	1500.0	0.0
Compressor (air)	No	40		77.7	1500.0	0.0
Concrete Batch Plant	No	15	83.0		1500.0	0.0
Crane	No	16		80.6	1500.0	0.0
Dozer	No	40		81.7	1500.0	0.0
Dump Truck	No	40		76.5	1500.0	0.0
Front End Loader	No	40		79.1	1500.0	0.0
Generator	No	50		80.6	1500.0	0.0
Scraper	No	40		83.6	1500.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Blasting	64.5	44.5	75.0	N/A	N/A	N/A	N/A	N/A	None	N/A	N/A	N/A
Backhoe	48.0	44.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compactor (ground)	53.7	46.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compressor (air)	48.1	44.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete Batch Plant	53.5	45.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	51.0	43.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	52.1	48.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dump Truck	46.9	42.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	49.6	45.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Generator                 51.1    48.1        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Scraper                   54.0    50.1        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
              Total       64.5    56.7        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
```

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Residents on Moreno	Residential	62.5	60.5	60.5

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Blasting	Yes	1	94.0		1500.0	0.0
Backhoe	No	40		77.6	1500.0	0.0
Compactor (ground)	No	20		83.2	1500.0	0.0
Compressor (air)	No	40		77.7	1500.0	0.0
Concrete Batch Plant	No	15	83.0		1500.0	0.0
Crane	No	16		80.6	1500.0	0.0
Dozer	No	40		81.7	1500.0	0.0
Dump Truck	No	40		76.5	1500.0	0.0
Front End Loader	No	40		79.1	1500.0	0.0
Generator	No	50		80.6	1500.0	0.0
Scraper	No	40		83.6	1500.0	0.0

Results

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                                                                    Noise Limits (dBA)
                    Noise Limit Exceedance (dBA)

----------------------------------------------
----------------------------------------------
                         Calculated (dBA)          Day           Evening
Night               Day            Evening           Night
                         ----------------   --------------   -------------
--------------    --------------  --------------  --------------
Equipment                  Lmax    Leq        Lmax    Leq     Lmax    Leq     Lmax
 Leq       Lmax    Leq     Lmax    Leq     Lmax    Leq
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------    ------  ------  ------  ------  ------  ------
Blasting                  64.5    44.5       75.0     N/A     N/A     N/A     N/A
 N/A      None     N/A     N/A     N/A     N/A     N/A
Backhoe                   48.0    44.0        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Compactor (ground)        53.7    46.7        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Compressor (air)          48.1    44.1        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Concrete Batch Plant      53.5    45.2        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Crane                     51.0    43.0        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Dozer                     52.1    48.1        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
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Dump Truck                  46.9    42.9        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Front End Loader            49.6    45.6        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Generator                   51.1    48.1        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Scraper                     54.0    50.1        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
                Total        0.0     0.0                 0.0             0.0
 0.0               0.0             0.0             0.0
```

**** Receptor #3 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Residents to east	Residential	60.0	60.0	60.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Blasting	Yes	1	94.0		2000.0	0.0
Backhoe	No	40		77.6	2000.0	0.0
Compactor (ground)	No	20		83.2	2000.0	0.0
Compressor (air)	No	40		77.7	2000.0	0.0
Concrete Batch Plant	No	15	83.0		2000.0	0.0
Crane	No	16		80.6	2000.0	0.0
Dozer	No	40		81.7	2000.0	0.0
Dump Truck	No	40		76.5	2000.0	0.0
Front End Loader	No	40		79.1	2000.0	0.0
Generator	No	50		80.6	2000.0	0.0
Scraper	No	40		83.6	2000.0	0.0

Results

```
                                                                Noise Limits (dBA)
                    Noise Limit Exceedance (dBA)

-----------------------------------------------
-----------------------------------------------
                         Calculated (dBA)          Day           Evening
Night               Day           Evening           Night
                    ----------------   --------------   -------------
--------------    --------------  --------------  --------------
Equipment                   Lmax    Leq        Lmax    Leq     Lmax    Leq     Lmax
 Leq       Lmax    Leq     Lmax    Leq     Lmax    Leq
----------------------  ------  ------     ------  ------  ------  ------  ------
------    ------  ------  ------  ------  ------  ------
Blasting                    62.0    42.0       75.0     N/A     N/A     N/A     N/A
 N/A      None     N/A     N/A     N/A     N/A     N/A
Backhoe                     45.5    41.5        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Compactor (ground)          51.2    44.2        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Compressor (air)            45.6    41.6        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Concrete Batch Plant        51.0    42.7        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Crane                       48.5    40.6        N/A     N/A     N/A     N/A     N/A
```

```
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Dozer                     49.6    45.6        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Dump Truck                44.4    40.4        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Front End Loader          47.1    43.1        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Generator                 48.6    45.6        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Scraper                   51.5    47.6        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
               Total       0.0     0.0                 0.0             0.0
 0.0               0.0             0.0             0.0
```

**** Receptor #4 ****

Description	Baselines (dBA) Land Use	Daytime	Evening	Night
Residents on Vigilante for Marina option	Residential	66.9	64.9	64.9

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Blasting	Yes	1	94.0		4500.0	0.0
Backhoe	No	40		77.6	4500.0	0.0
Compactor (ground)	No	20		83.2	4500.0	0.0
Compressor (air)	No	40		77.7	4500.0	0.0
Concrete Batch Plant	No	15	83.0		4500.0	0.0
Crane	No	16		80.6	4500.0	0.0
Dozer	No	40		81.7	4500.0	0.0
Dump Truck	No	40		76.5	4500.0	0.0
Front End Loader	No	40		79.1	4500.0	0.0
Generator	No	50		80.6	4500.0	0.0
Scraper	No	40		83.6	4500.0	0.0

Results

```
                                                                    Noise Limits (dBA)
                    Noise Limit Exceedance (dBA)

-----------------------------------------------
-----------------------------------------------
                         Calculated (dBA)         Day           Evening
Night               Day           Evening          Night
                         ----------------   --------------   -------------
--------------    --------------  --------------  --------------
Equipment                   Lmax    Leq        Lmax    Leq     Lmax    Leq     Lmax
 Leq       Lmax    Leq     Lmax    Leq     Lmax    Leq
----------------------  ------  ------     ------  ------  ------  ------  ------
------    ------  ------  ------  ------  ------  ------
Blasting                  54.9    34.9       75.0     N/A     N/A     N/A     N/A
 N/A      None     N/A     N/A     N/A     N/A     N/A
Backhoe                   38.5    34.5        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Compactor (ground)        44.1    37.2        N/A     N/A     N/A     N/A     N/A
```

```
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Compressor (air)          38.6    34.6        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Concrete Batch Plant      43.9    35.7        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Crane                     41.5    33.5        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Dozer                     42.6    38.6        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Dump Truck                37.4    33.4        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Front End Loader          40.0    36.0        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Generator                 41.5    38.5        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Scraper                   44.5    40.5        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
               Total      54.9    47.1        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
```

Roadway Construction Noise Model (RCNM),Version 1.0

Report date: 02/20/2007
Case Description: Moosa

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
50 feet	Residential	66.9	64.9	64.9

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	50.0	0.0
Backhoe	No	40		77.6	50.0	0.0
Compactor (ground)	No	20		83.2	50.0	0.0
Compressor (air)	No	40		77.7	50.0	0.0
Crane	No	16		80.6	50.0	0.0
Dozer	No	40		81.7	50.0	0.0
Dump Truck	No	40		76.5	50.0	0.0
Front End Loader	No	40		79.1	50.0	0.0
Generator	No	50		80.6	50.0	0.0
Scraper	No	40		83.6	50.0	0.0
Blasting	Yes	1	94.0		50.0	0.0

Results

Calculated (dBA)							Noise Limits (dBA)						
	Day			Evening			Night			Day			Evening
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Auger Drill Rig	84.4	77.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	77.6	73.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compactor (ground)	83.2	76.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compressor (air)	77.7	73.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	80.6	72.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	81.7	77.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dump Truck	76.5	72.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	79.1	75.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	80.6	77.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Noise Limit Exceedance (dBA)

```
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Scraper                   83.6    79.6       N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Blasting                  94.0    74.0      75.0     N/A     N/A     N/A     N/A
 N/A      19.0     N/A     N/A     N/A     N/A     N/A
              Total       94.0    86.5       N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
```

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
100 feet	Residential	60.0	60.0	60.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	100.0	0.0
Backhoe	No	40		77.6	100.0	0.0
Compactor (ground)	No	20		83.2	100.0	0.0
Compressor (air)	No	40		77.7	100.0	0.0
Crane	No	16		80.6	100.0	0.0
Dozer	No	40		81.7	100.0	0.0
Dump Truck	No	40		76.5	100.0	0.0
Front End Loader	No	40		79.1	100.0	0.0
Generator	No	50		80.6	100.0	0.0
Scraper	No	40		83.6	100.0	0.0
Blasting	Yes	1	94.0		100.0	0.0

Results

```
                                                                    Noise Limits (dBA)
                    Noise Limit Exceedance (dBA)

---------------------------------------------
---------------------------------------------
                         Calculated (dBA)          Day           Evening
Night               Day           Evening           Night
                    ----------------   --------------   -------------
--------------    --------------  --------------  --------------
Equipment                   Lmax    Leq        Lmax    Leq     Lmax    Leq     Lmax
 Leq       Lmax    Leq     Lmax    Leq     Lmax    Leq
----------------------  ------  ------     ------  ------  ------  ------  ------
------    ------  ------  ------  ------  ------  ------
Auger Drill Rig           78.3    71.3       N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Backhoe                   71.5    67.6       N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Compactor (ground)        77.2    70.2       N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Compressor (air)          71.6    67.7       N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Crane                     74.5    66.6       N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Dozer                     75.6    71.7       N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Dump Truck                70.4    66.5       N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
```

```
Front End Loader          73.1    69.1        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Generator                 74.6    71.6        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Scraper                   77.6    73.6        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Blasting                  88.0    68.0       75.0     N/A     N/A     N/A     N/A
 N/A      13.0     N/A     N/A     N/A     N/A     N/A
              Total        0.0     0.0                 0.0             0.0
 0.0               0.0             0.0             0.0
```

**** Receptor #3 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
400	Residential	60.0	60.0	60.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	400.0	0.0
Backhoe	No	40		77.6	400.0	0.0
Compactor (ground)	No	20		83.2	400.0	0.0
Compressor (air)	No	40		77.7	400.0	0.0
Crane	No	16		80.6	400.0	0.0
Dozer	No	40		81.7	400.0	0.0
Dump Truck	No	40		76.5	400.0	0.0
Front End Loader	No	40		79.1	400.0	0.0
Generator	No	50		80.6	400.0	0.0
Scraper	No	40		83.6	400.0	0.0
Blasting	Yes	1	94.0		400.0	0.0

Results

```
                                                                  Noise Limits (dBA)
                   Noise Limit Exceedance (dBA)

-----------------------------------------------
-----------------------------------------------
                        Calculated (dBA)         Day           Evening
Night              Day           Evening          Night
                   ----------------   --------------   -------------
--------------    --------------  --------------  --------------
Equipment                   Lmax    Leq        Lmax    Leq     Lmax    Leq     Lmax
 Leq       Lmax    Leq     Lmax    Leq     Lmax    Leq
----------------------  ------  ------     ------  ------  ------  ------  ------
------    ------  ------  ------  ------  ------  ------
Auger Drill Rig           66.3    59.3        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Backhoe                   59.5    55.5        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Compactor (ground)        65.2    58.2        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Compressor (air)          59.6    55.6        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Crane                     62.5    54.5        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Dozer                     63.6    59.6        N/A     N/A     N/A     N/A     N/A
```

```
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Dump Truck                58.4    54.4        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Front End Loader          61.0    57.1        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Generator                 62.6    59.6        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Scraper                   65.5    61.5        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Blasting                  75.9    55.9       75.0     N/A     N/A     N/A     N/A
 N/A       0.9     N/A     N/A     N/A     N/A     N/A
              Total        0.0     0.0                 0.0             0.0
 0.0               0.0             0.0             0.0
```

**** Receptor #4 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
1500	Residential	60.0	60.0	60.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	1500.0	0.0
Backhoe	No	40		77.6	1500.0	0.0
Compactor (ground)	No	20		83.2	1500.0	0.0
Compressor (air)	No	40		77.7	1500.0	0.0
Crane	No	16		80.6	1500.0	0.0
Dozer	No	40		81.7	1500.0	0.0
Dump Truck	No	40		76.5	1500.0	0.0
Front End Loader	No	40		79.1	1500.0	0.0
Generator	No	50		80.6	1500.0	0.0
Scraper	No	40		83.6	1500.0	0.0
Blasting	Yes	1	94.0		1500.0	0.0

Results

```
                                                                    Noise Limits (dBA)
                    Noise Limit Exceedance (dBA)

-----------------------------------------------
-----------------------------------------------
                         Calculated (dBA)         Day           Evening
Night               Day           Evening          Night
                         ----------------   --------------   -------------
--------------    --------------  --------------  --------------
Equipment                  Lmax    Leq        Lmax    Leq     Lmax    Leq     Lmax
 Leq       Lmax    Leq     Lmax    Leq     Lmax    Leq
----------------------  ------  ------     ------  ------  ------  ------  ------
------    ------  ------  ------  ------  ------  ------
Auger Drill Rig           54.8    47.8        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Backhoe                   48.0    44.0        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Compactor (ground)        53.7    46.7        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Compressor (air)          48.1    44.1        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
```

```
Crane                       51.0    43.0        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Dozer                       52.1    48.1        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Dump Truck                  46.9    42.9        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Front End Loader            49.6    45.6        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Generator                   51.1    48.1        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Scraper                     54.0    50.1        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Blasting                    64.5    44.5       75.0     N/A     N/A     N/A     N/A
 N/A      None     N/A     N/A     N/A     N/A     N/A
                Total       0.0     0.0                 0.0             0.0
 0.0               0.0             0.0             0.0
```

**** Receptor #5 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
200	Residential	60.0	60.0	60.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	200.0	0.0
Backhoe	No	40		77.6	200.0	0.0
Compactor (ground)	No	20		83.2	200.0	0.0
Compressor (air)	No	40		77.7	200.0	0.0
Crane	No	16		80.6	200.0	0.0
Dozer	No	40		81.7	200.0	0.0
Dump Truck	No	40		76.5	200.0	0.0
Front End Loader	No	40		79.1	200.0	0.0
Generator	No	50		80.6	200.0	0.0
Scraper	No	40		83.6	200.0	0.0
Blasting	Yes	1	94.0		200.0	0.0

Results

```
                                                                    Noise Limits (dBA)
                    Noise Limit Exceedance (dBA)

-----------------------------------------------
-----------------------------------------------
                         Calculated (dBA)         Day           Evening
Night               Day           Evening          Night
                         ----------------   --------------   -------------
--------------    --------------  --------------  --------------
Equipment                   Lmax    Leq        Lmax    Leq     Lmax    Leq     Lmax
 Leq       Lmax    Leq     Lmax    Leq     Lmax    Leq
----------------------  ------  ------     ------  ------  ------  ------  ------
------    ------  ------  ------  ------  ------  ------
Auger Drill Rig             72.3    65.3        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Backhoe                     65.5    61.5        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A     N/A     N/A     N/A     N/A
Compactor (ground)          71.2    64.2        N/A     N/A     N/A     N/A     N/A
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 N/A       N/A     N/A      N/A     N/A     N/A     N/A
Compressor (air)           65.6    61.6        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A      N/A     N/A     N/A     N/A
Crane                      68.5    60.6        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A      N/A     N/A     N/A     N/A
Dozer                      69.6    65.6        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A      N/A     N/A     N/A     N/A
Dump Truck                 64.4    60.4        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A      N/A     N/A     N/A     N/A
Front End Loader           67.1    63.1        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A      N/A     N/A     N/A     N/A
Generator                  68.6    65.6        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A      N/A     N/A     N/A     N/A
Scraper                    71.5    67.6        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A      N/A     N/A     N/A     N/A
Blasting                   82.0    62.0       75.0     N/A     N/A     N/A     N/A
 N/A       7.0     N/A      N/A     N/A     N/A     N/A
               Total       82.0    74.4        N/A     N/A     N/A     N/A     N/A
 N/A       N/A     N/A      N/A     N/A     N/A     N/A
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EIP Associates 20 February 2007
NI TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: San Vicente
RUN: Existing Conditions
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
12417 Vigilante Road	1	1	66.9	63.9	0	-3.0	0	Snd Lvl	63.9	0.0	0	0.0
12345 Moreno Avenue	2	1	62.5	65.3	0	2.8	0	Both	65.3	0.0	0	0.0
Deer Hill Estates	3	1	65.8	68.5	0	2.7	0	Both	68.5	0.0	0	0.0
Byron Road	4	1	69.2	68.7	0	-0.5	0	Snd Lvl	68.7	0.0	0	0.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	4	0.0	0.0	0.0
All Impacted	4	0.0	0.0	0.0
All that meet NR Goal	4	0.0	0.0	0.0

EIP Associates 20 February 2007
NI TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: San Vicente
RUN: Year 2010 without Proposed Action
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
12417 Vigilante Road	1	1	63.9	64.1	0	0.2	3	Snd Lvl	64.1	0.0	0	0.0
12345 Moreno Avenue	2	1	65.3	65.6	0	0.3	3	Snd Lvl	65.6	0.0	0	0.0
Deer Hill Estates	3	1	69.5	68.8	0	-0.7	3	Snd Lvl	68.8	0.0	0	0.0
Byron Road	4	1	68.7	68.8	0	0.1	3	Snd Lvl	68.8	0.0	0	0.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	4	0.0	0.0	0.0
All Impacted	4	0.0	0.0	0.0
All that meet NR Goal	4	0.0	0.0	0.0

EIP Associates 20 February 2007
NI TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: San Vicente
RUN: Year 2010 + Proposed Action (Off-site)
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
12417 Vigilante Road	1	1	64.1	70.3	0	6.2	3	Both	70.3	0.0	0	0.0
12345 Moreno Avenue	2	1	65.6	71.5	0	5.9	3	Both	71.5	0.0	0	0.0
Deer Hill Estates	3	1	68.8	69.6	0	0.8	3	Snd Lvl	69.6	0.0	0	0.0
Byron Road	4	1	68.8	69.2	0	0.4	3	Snd Lvl	69.2	0.0	0	0.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	4	0.0	0.0	0.0
All Impacted	4	0.0	0.0	0.0
All that meet NR Goal	4	0.0	0.0	0.0

EIP Associates 20 February 2007
NI TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: San Vicente
RUN: Year 2010 + Proposed Action (On-site)
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
12417 Vigilante Road	1	1	64.1	67.8	0	3.7	3	Both	67.8	0.0	0	0.0
12345 Moreno Avenue	2	1	65.6	68.9	0	3.3	3	Both	68.9	0.0	0	0.0
Deer Hill Estates	3	1	68.8	69.2	0	0.4	3	Snd Lvl	69.2	0.0	0	0.0
Byron Road	4	1	68.8	69.0	0	0.2	3	Snd Lvl	69.0	0.0	0	0.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	4	0.0	0.0	0.0
All Impacted	4	0.0	0.0	0.0
All that meet NR Goal	4	0.0	0.0	0.0

EIP Associates 20 February 2007
NI TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: San Vicente Noise Report
RUN: Moosa - Existing Conditions
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Old Castle west	1	1	0.0	66.6	0	66.6	3	Snd Lvl	66.6	0.0	8	-8.0
Old Castle east	2	1	0.0	63.5	0	63.5	3	Snd Lvl	63.5	0.0	8	-8.0
Lilac	3	1	0.0	61.0	0	61.0	3	Snd Lvl	61.0	0.0	8	-8.0
Betsworth	4	1	0.0	52.6	0	52.6	3	Snd Lvl	52.6	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	4	0.0	0.0	0.0
All Impacted	4	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

EIP Associates 20 February 2007
NI TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: San Vicente Noise Report
RUN: Moosa - 2010 without Moosa 100K
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver												
Name	No.	#DUs	Existing	No Barrier					With Barrier			
			LAeq1h	LAeq1h		Increase over existing		Type	Calculated	Noise Reduction		
				Calculated	Crit'n	Calculated	Crit'n Sub'l Inc	Impact	LAeq1h	Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Old Castle west	1	1	66.6	66.9	0	0.3	3	Snd Lvl	66.9	0.0	0	0.0
Old Castle east	2	1	63.5	63.8	0	0.3	3	Snd Lvl	63.8	0.0	0	0.0
Lilac	3	1	61.6	61.2	0	-0.4	3	Snd Lvl	61.2	0.0	0	0.0
Betsworth	4	1	52.6	53.1	0	0.5	3	Snd Lvl	53.1	0.0	0	0.0

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max
		dB	dB	dB
All Selected	4	0.0	0.0	0.0
All Impacted	4	0.0	0.0	0.0
All that meet NR Goal	4	0.0	0.0	0.0

EIP Associates 20 February 2007
NI TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: San Vicente Noise Report
RUN: Moosa 50K- 2010 with Alternative
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Old Castle west	1	1	66.6	68.4	0	1.8	3	Snd Lvl	68.4	0.0	0	0.0
Old Castle east	2	1	63.5	66.5	0	3.0	3	Both	66.5	0.0	0	0.0
Lilac	3	1	61.6	63.2	0	1.6	3	Snd Lvl	63.2	0.0	0	0.0
Betsworth	4	1	52.6	60.7	0	8.1	3	Both	60.7	0.0	0	0.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	4	0.0	0.0	0.0
All Impacted	4	0.0	0.0	0.0
All that meet NR Goal	4	0.0	0.0	0.0

EIP Associates 20 February 2007
NI TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: San Vicente
RUN: SV 2010 with SV 50K (Off-site)
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
12417 Vigilante Road	1	1	64.1	70.1	0	6.0	3	Both	70.1	0.0	0	0.0
12345 Moreno Avenue	2	1	65.6	71.3	0	5.7	3	Both	71.3	0.0	0	0.0
Deer Hill Estates	3	1	68.8	69.6	0	0.8	3	Snd Lvl	69.6	0.0	0	0.0
Byron Road	4	1	68.8	69.1	0	0.3	3	Snd Lvl	69.1	0.0	0	0.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	4	0.0	0.0	0.0
All Impacted	4	0.0	0.0	0.0
All that meet NR Goal	4	0.0	0.0	0.0

EIP Associates 20 February 2007
NI TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: San Vicente
RUN: SV 2010 with SV50K (On-site)
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
12417 Vigilante Road	1	1	64.1	67.6	0	3.5	3	Both	67.6	0.0	0	0.0
12345 Moreno Avenue	2	1	65.6	70.1	0	4.5	3	Both	70.1	0.0	0	0.0
Deer Hill Estates	3	1	68.8	69.2	0	0.4	3	Snd Lvl	69.2	0.0	0	0.0
Byron Road	4	1	68.8	68.9	0	0.1	3	Snd Lvl	68.9	0.0	0	0.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	4	0.0	0.0	0.0
All Impacted	4	0.0	0.0	0.0
All that meet NR Goal	4	0.0	0.0	0.0