3.9 Noise

3.9.1 Introduction

This section describes generally the existing noise environment in the project area, applicable noise regulations, and potential noise impacts from construction and operation of the project, the regulatory framework, an analysis of potential noise impacts that would result from implementation of the project, and mitigation measures where appropriate.

3.9.2 Environmental Setting

Noise Principles and Descriptors

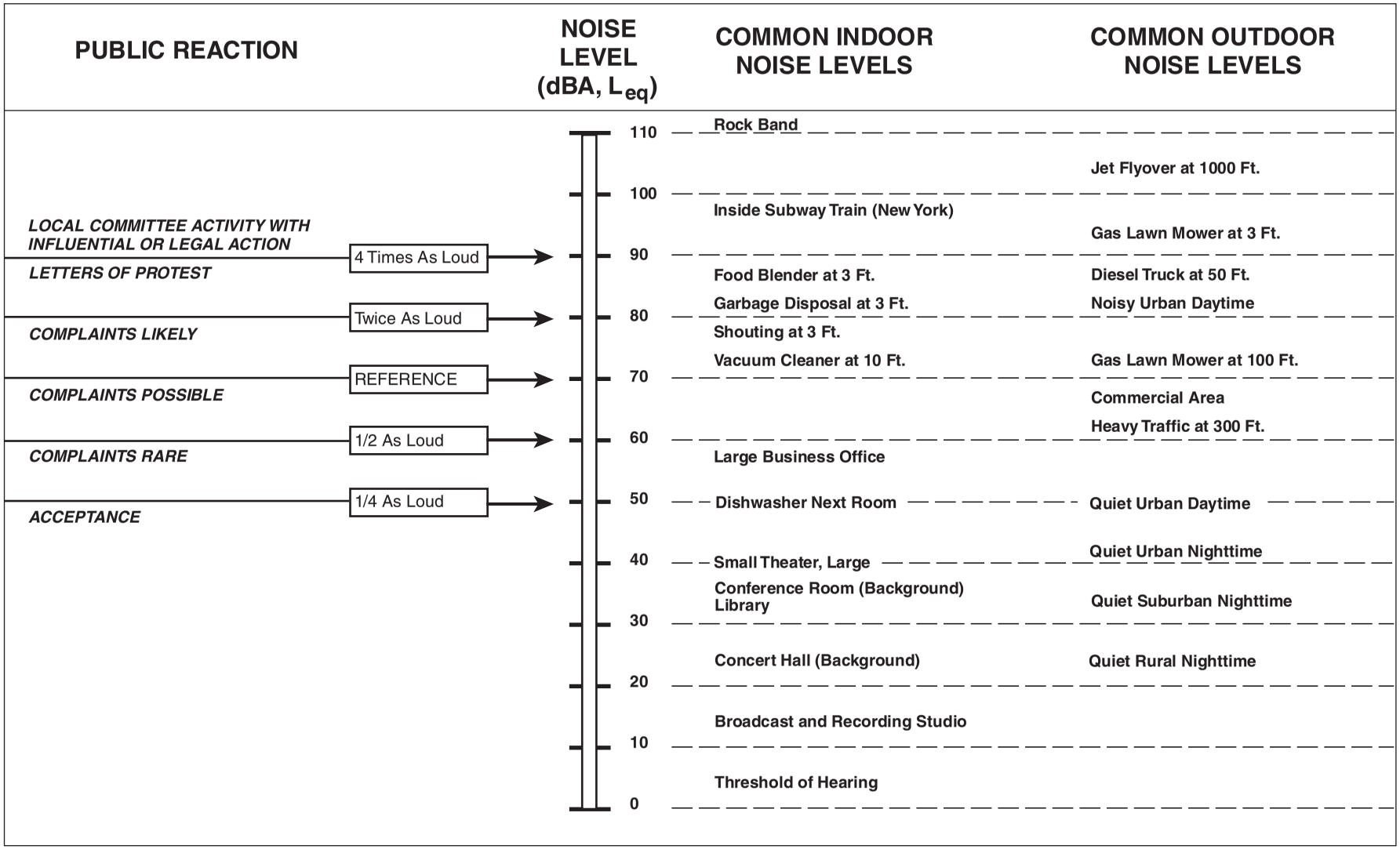
Noise is defined as unwanted sound. Sound, traveling in the form of waves from a source, exerts a sound pressure level (referred to as sound level) which is measured in decibels (dB), with zero dB corresponding roughly to the threshold of human hearing, and 120 to 140 dB corresponding to the threshold of pain. Pressure waves traveling through air exert a force registered by the human ear as sound.

Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond to the frequency of a particular sound. Typically, sound does not consist of a single frequency, but rather a broad band of frequencies varying in levels of magnitude (sound power). When all the audible frequencies of a sound are measured, a sound spectrum is plotted consisting of a range of frequency spanning 20 to 20,000 Hz. The sound pressure level, therefore, constitutes the additive force exerted by a sound corresponding to the sound frequency/sound power level spectrum.

The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. As a consequence, when assessing potential noise impacts, sound is measured using an electronic filter that de-emphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ear's decreased sensitivity to low and extremely high frequencies instead of the frequency mid-range. This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted decibels (dBA). Frequency A-weighting follows an international standard methodology of frequency de-emphasis and is typically applied to community noise measurements. Some representative noise sources and their corresponding A-weighted noise levels are shown in **Figure 3.9-1**.

Noise Exposure and Community Noise

An individual's noise exposure is a measure of noise over a period of time. A noise level is a measure of noise at a given instant in time. The noise levels presented in Figure 3.9-1 are representative of measured noise at a given instant in time, however, they rarely persist consistently over a long period of time. Rather, community noise varies continuously over a period of time with respect to the contributing sound sources of the community noise environment. Community noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise exposure, with the individual contributors unidentifiable. The background noise



North LA/Kern County Regional Recycled Water Project . 206359

SOURCE:ESA, 2008.

Figure 3.9-1
Effects of Noise on People

level changes throughout a typical day, but does so gradually, corresponding with the addition and subtraction of distant noise sources such as traffic and atmospheric conditions. What makes community noise constantly variable throughout a day, besides the slowly changing background noise, is the addition of short duration single event noise sources (e.g., aircraft flyovers, motor vehicles, sirens), which are readily identifiable to the individual.

These successive additions of sound to the community noise environment varies the community noise level from instant to instant requiring the measurement of noise exposure over a period of time to legitimately characterize a community noise environment and evaluate cumulative noise impacts. This time-varying characteristic of environmental noise is described using statistical noise descriptors. The most frequently used noise descriptors are summarized below:

L_{eq}: the equivalent sound level is used to describe noise over a specified period of time, typically one hour, in terms of a single numerical value. The L_{eq} is the constant sound level that would contain the same acoustic energy as the varying sound level, during the same time period (i.e., the average noise exposure level for the given time period).

L_{max}: the instantaneous maximum noise level for a specified period of time.

L50: the noise level that is equaled or exceeded 50 percent of the specified time period. The L50 represents the median sound level.

L90: the noise level that is equaled or exceeded 90 percent of the specified time period. The L90 is sometimes used to represent the background sound level.

DNL: 24-hour day and night A-weighted noise exposure level, which accounts for the greater sensitivity of most people to nighttime noise by weighting noise levels at night ("penalizing" nighttime noises). Noise between 10:00 p.m. and 7:00 a.m. is weighted (penalized) by adding 10 dBA to take into account the greater annoyance of nighttime noises.

CNEL: similar to the DNL the Community Noise Equivalent Level (CNEL) adds a 5-dBA "penalty" for the evening hours between 7:00 p.m. and 10:00 p.m. in addition to a 10-dBA penalty between the hours of 10:00 p.m. and 7:00 a.m.

As a general rule, in areas where the noise environment is dominated by traffic, the L_{eq} during the peak-hour is within approximately 2 dB of the DNL at that location (Caltrans, 1998).

Effects of Noise on People

The effects of noise on people can be placed into three categories:

- subjective effects of annoyance, nuisance, dissatisfaction;
- interference with activities such as speech, sleep, learning; and
- physiological effects such as hearing loss or sudden startling.

Environmental noise typically produces effects in the first two categories. Workers in industrial plants can experience noise in the last category. There is no complete satisfactory

way to measure the subjective effects of noise, or the corresponding reactions of annoyance and dissatisfaction. A wide variation in individual thresholds of annoyance exists, and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted: the so called "ambient noise" level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships occur for a noise source:

- except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived;
- outside of the laboratory, a 3-dBA change is considered a just-perceivable difference;
- a change in level of at least 5 dBA is required before any noticeable change in human response would be expected; and
- a 10-dBA change is subjectively heard as approximately a doubling in loudness, and can cause adverse response.

These relationships occur in part because of the logarithmic nature of sound and the decibel system. The human ear perceives sound in a non-linear fashion; hence the decibel scale was developed. Because the decibel scale is based on logarithms, two noise sources do not combine in a simple additive fashion, rather logarithmically. For example, if two identical noise sources produce noise levels of 50 dBA the combined sound level would be 53 dBA, not 100 dBA.

Noise Attenuation

Stationary point sources of noise, including stationary mobile sources such as idling vehicles, attenuate (lessen) at a rate between 6 dBA for hard sites and 7.5 dBA for soft sites for each doubling of distance from the reference measurement. Hard sites are those with a reflective surface between the source and the receiver such as parking lots or smooth bodies of water. No excess ground attenuation is assumed for hard sites and the changes in noise levels with distance (drop-off rate) is simply the geometric spreading of the noise from the source. Soft sites have an absorptive ground surface such as soft dirt, grass or scattered bushes and trees. In addition to geometric spreading, an excess ground attenuation value of 1.5 dBA (per doubling distance) is normally assumed for soft sites. Line sources (such at traffic noise from vehicles traveling along a roadway) attenuate at a rate between 3 dBA for hard sites and 4.5 dBA for soft sites for each doubling of distance from the reference measurement (Caltrans, 1998).

Vibration

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. As described in the Federal Transit Administration's *Transit Noise and Vibration Impact Assessment* (FTA, 2006), ground-borne vibration can be a serious concern for nearby neighbors of a transit system route or

maintenance facility, causing buildings to shake and rumbling sounds to be heard. In contrast to airborne noise, ground-borne vibration is not a common environmental problem. It is unusual for vibration from sources such as buses and trucks to be perceptible, even in locations close to major roads. Some common sources of ground-borne vibration are trains, buses on rough roads, and construction activities such as blasting, pile driving and operating heavy earth-moving equipment.

There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. The PPV is most frequently used to describe vibration impacts to buildings. The root mean square (RMS) amplitude is most frequently used to describe the effect of vibration on the human body. The RMS amplitude is defined as the average of the squared amplitude of the signal. Decibel notation (Vdb) is commonly used to measure RMS. The decibel notation acts to compress the range of numbers required to describe vibration. Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Sensitive receptors for vibration include structures (especially older masonry structures), people (especially residents, the elderly and sick), and vibration sensitive equipment.

3.9.3 Regulatory Setting

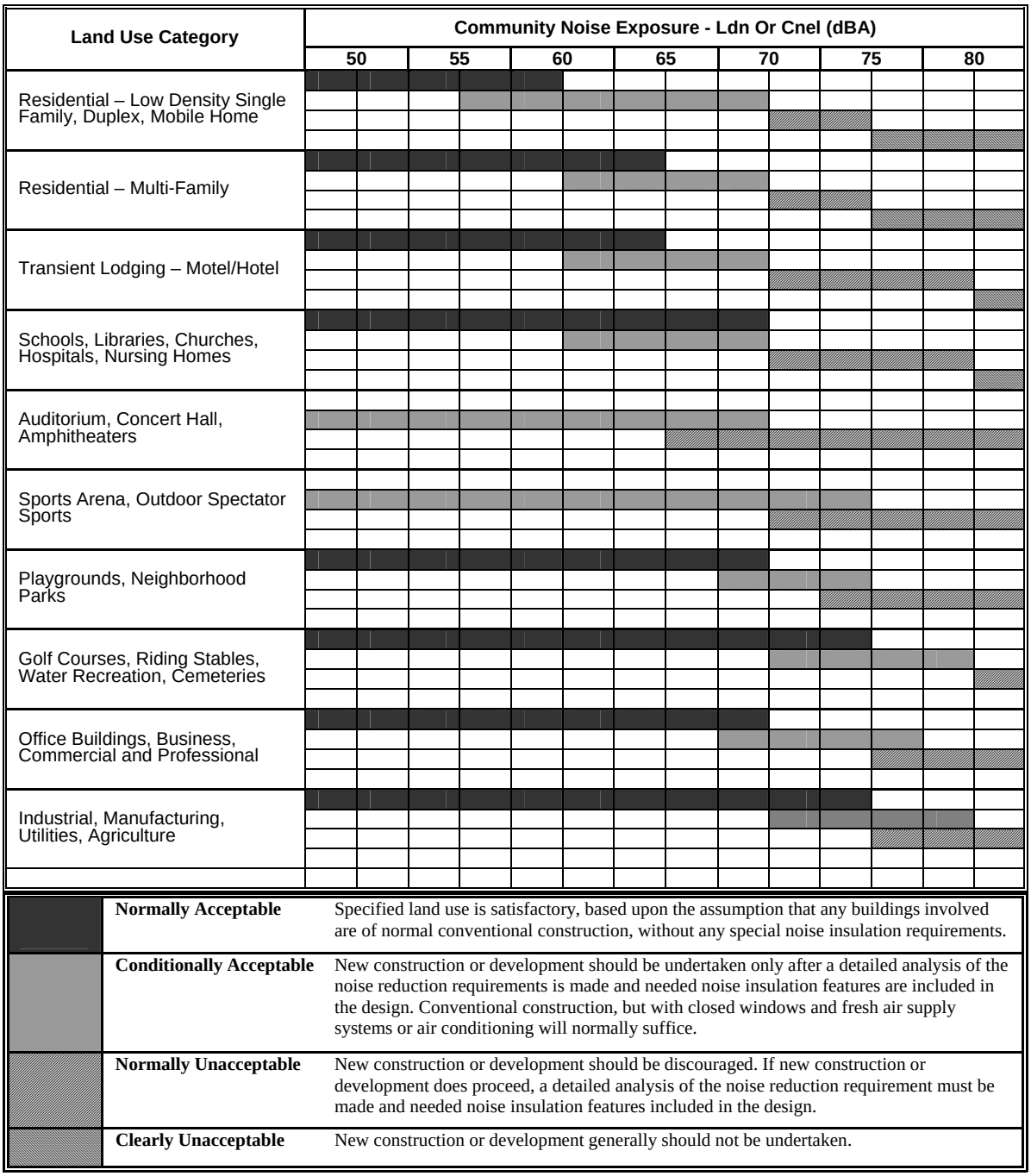
Federal

Federal regulations establish noise limits for medium and heavy trucks (more than 4.5 tons, gross vehicle weight rating) under 40 Code of Federal Regulations (CFR), Part 205, Subpart B. The federal truck pass-by noise standard is 80 dBA at 15 meters from the vehicle pathway centerline. These controls are implemented through regulatory controls on truck manufacturers.

State

California Code of Regulations has guidelines for evaluating the compatibility of various land uses as a function of community noise exposure, as shown in **Figure 3.9-2** below. The State of California also establishes noise limits for vehicles licensed to operate on public roads. For heavy trucks, the State pass-by standard is consistent with the federal limit of 80 dB. The State pass-by standard for light trucks and passenger cars (less than 4.5 tons, gross vehicle rating) is also 80 dBA at 15 meters from the centerline. These standards are implemented through controls on vehicle manufacturers and by legal sanction of vehicle operators by state and local law enforcement officials.

The State has also established noise insulation standards for new multi-family residential units, hotels, and motels that would be subject to relatively high levels of transportation-related noise. These requirements are collectively known as the California Noise Insulation Standards (Title 24, California Code of Regulations). The noise insulation standards set forth an interior standard of DNL 45 dBA in any habitable room. They require an acoustical analysis demonstrating how dwelling units have been designed to meet this interior standard where such units are proposed in areas subject to noise levels greater than DNL 60 dBA. Title 24 standards are typically enforced by local jurisdictions through the building permit application process.



North Los Angeles / Kern County Recycled Water Project / 206359

SOURCE: State of California, Governor's Office of Planning and Research

Figure 3.9-2

Land Use Compatibility for Community Noise Environment

Local

Local noise issues are addressed through implementation of general plan policies, including noise and land use compatibility guidelines, and through enforcement of noise ordinance standards. Noise ordinances regulate such sources as mechanical equipment and amplified sounds as well as prescribe noise limits in residential and commercial zones. For this project, noise regulations and standards of the City of Palmdale, City of Lancaster, Kern County, and Los Angeles County were considered with respect to the proposed facilities and nearby sensitive receptors.

City of Palmdale Municipal Code

The following portions of the municipal code are relevant to the project:

> **9.18.010 Noise:** It shall be unlawful for any person to willfully make or continue, or cause or permit to be made or continued, any loud, unnecessary, or unusual noise which unreasonably disturbs the peace and quiet of any neighborhood or which causes discomfort or annoyance to any reasonable person of normal sensitiveness residing in the area.
>
> **8.28 Building Construction Hours and Operation and Noise Control:** Restriction of hours of operation for construction equipment, power mowers, garbage collection, street sweeping, truck deliveries, leaf blowers, and other noise activities within the hours of 6:30 a.m. and 8:00 p.m., unless the work is made in response to an emergency or special purpose.

City of Palmdale General Plan Noise Element

The following portions of the General Plan are relevant to the project:

> **Policy N1.1.3:** When proposed stationary noise sources could exceed an exterior noise level of 65 dBA CNEL at present, or could impact future noise sensitive land uses, require preparation of an acoustical analysis and mitigation measures to reduce noise levels to no more than 65 dBA CNEL exterior and 45 dBA CNEL interior; if the noise level cannot be reduced to these thresholds through mitigation, the new noise source should not be permitted.
>
> **Policy N1.2.2:** Restrict construction hours during the evening, early morning ands Sundays.

City of Lancaster General Plan Noise Element

Relevant objectives and policies from the Noise Element are stated below;

Objective 4.3: Promote noise compatible land use relationships by implementing the noise standards identified in Table III-1 (as below in this report as **Table 3.9-1**) to be utilized for design purposes in new development, and establishing a program to attenuate existing noise problems.

> **Policy 4.3.1:** Ensure that noise-sensitive land uses and noise generators are located and designed in such a manner that City noise objectives will be achieved.

TABLE 3.9-1
NOISE COMPATIBLE LAND USE OBJECTIVES

Land Use	Maximum Exterior CNEL	Maximum Interior CNEL
Rural, Single Family, Multiple Family Residential	65 dBA	45 dBA
Schools		
Classrooms	65 dBA	45 dBA
Playgrounds	70 dBA	--
Libraries	--	50 dBA
Hospitals/Convalescent Facilities		
Living Areas	--	50 dBA
Sleeping Areas	--	40 dBA
Commercial and Industrial	70 dBA	--
Office Areas	--	50 dBA

SOURCE: City of Lancaster, 2001.

Policy 4.3.2: Wherever feasible, manage the generation of single event noise levels (SENL) from motor vehicles, trains, aircraft, commercial, industrial, construction, and other activities such that SENL levels are no greater than 15 dBA above the noise objectives included in the Plan for Public Health and Safety (Table 3.9-1 above).

Policy 4.3.3: Ensure that the provision of noise attenuation does not create significant negative visual impacts.

City of Lancaster Municipal Code

The following sections of the Lancaster Municipal Code are relevant to the proposed project:

8.24.030 Loud, unnecessary and unusual noises prohibited. Notwithstanding any other provision of this chapter, and in addition thereto, no person shall make, cause or suffer, or permit to be made upon any premises owned, occupied or controlled by him/her any unnecessary noises or sounds which are physically annoying to persons of ordinary sensitiveness which are so harsh or so prolonged or unnatural or unusual in their use, time, or place as to occasion physical discomfort to the inhabitants of any neighborhood. All animals shall be so maintained.
(Ord. 791 § 1, 2001: Ord. 693 § 1 (part), 1995: prior code § 4-1.3)

8.24.040 Loud, unnecessary and unusual noises prohibited. Construction and building. Except as otherwise provided in this chapter, a person at any time on Sunday or any day between the hours of eight p.m. and sunrise shall not perform any construction or repair work of any kind upon any building or structure or perform any earth excavating, filling or moving where any of the foregoing entails the use of any air compressor, jack hammer, power-driven drill, riveting machine, excavator, diesel-powered truck, tractor or other earth-moving equipment, hard hammers on steel or iron or any other machine tool, device or equipment which makes loud noises within five hundred (500) feet of an occupied

dwelling, apartment, hotel, mobile home or other place of residence.
(Ord. 693 § 1 (part), 1995: prior code § 4-1.4)

8.24.050 Exceptions.

A. The provisions of Section 8.24.040 do not apply to any person who performs the construction, repair, excavation or moving work pursuant to the express written permission of the city engineer to perform such work at times prohibited in Section 8.24.040. Upon receipt of an application stating the reasons for the request, the city engineer may grant such permission if he finds that:

- The work proposed to be done is effected with the public interest; or
- Hardship or injustice or unreasonable delay would result with the interruption thereof with the hours and days specified in Section 8.24.040; or
- The building or structure involved is devoted or intended to be devoted to a use immediately incident to public interest.

B. The provisions of Section 8.24.040 do not apply to the construction, repair or excavation during prohibited hours as may be necessary to restore property to a safe condition following a public calamity or work required to protect persons or property from imminent exposure to danger or work by private or public utility companies when restoring utility service.
(Prior code § 4-1.5)

Kern County Code

The following portions of the County Code are relevant to the project:

8.36.020 Prohibited sounds. To create noise from construction, between the hours of nine (9:00) p.m. and six (6:00) a.m. on weekdays and nine (9:00) p.m. and eight (8:00) a.m. on weekends, which is audible to a person with average hearing faculties or capacity at a distance of one hundred fifty (150) feet from the construction site, if the construction site is within one thousand (1,000) feet of an occupied residential dwelling except as provided below:

- The resource management director or his designated representative may for good cause exempt some construction work for a limited time.

Los Angeles County Code

The portions of the Los Angeles County Code presented in **Table 3.9-2** are relevant to the project:

12.12.030 Construction noise prohibited when: Except as otherwise provided in this chapter, a person, on any Sunday, or at any other time between the hours of 8:00 p.m. and 6:30 a.m. the following day, shall not perform any construction or repair work of any kind upon any building or structure, or perform any earth excavating, filling or moving, where any of the foregoing entails the use of any air compressors; jackhammers; power-driven drill; riveting machine; excavator, diesel-powered truck, tractor or other earth moving equipment; hand hammers on steel or iron, or any other machine, tool, device or equipment which makes loud noises to the disturbance of persons occupying sleeping quarters in a dwelling, apartment, hotel, mobile home, or other place of residence. (Ord. 9818 § 1, 1969: Ord. 8594 § 6, 1964.)

TABLE 3.9-2
EXTERIOR NOISE STANDARDS

Affected Land Uses (Receiving Noise)	Daytime Leq (7 am- 10 pm)	Nighttime Leq (10 pm- 7 am)
Residential	50 dBA	45 dBA
Commercial Properties	60 dBA	55 dBA
Industrial Properties	70 dBA	70 dBA

Leq = (Equivalent Energy Level). The sound level corresponding to a steady-state sound level containing the same total energy as a time varying signal over a given sample period, typically 1, 8 or 24 hours.

dB(A) = (A-weighted Sound Pressure Level). The sound pressure level, in decibels, as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound, placing greater emphasis on those frequencies within the sensitivity range of the human ear.

Ldn = (Day-Night Noise Level). The average equivalent A-weighted sound level during a 24-hour day obtained by adding 10 decibels to the hourly noise levels measured during the night (from 10 pm to 7 am). In this way Ldn takes into account the lower tolerance of people for noise during nighttime periods.

SOURCE: Los Angeles County Code (Ord. 11778 § 2 (Art. 4 § 403), 1978: Ord. 11773 § 2 (Art. 4 § 403), 1978.)

12.12.060 Exemptions--Work by public utilities—Conditions: The provisions of Section 12.12.030 do not apply to the construction, repair or excavation by a public utility which is subject to the jurisdiction of the Public Utilities Commission as may be necessary for the preservation of life or property, and where such necessity makes it necessary to construct, repair or excavate during the prohibited hours. (Ord. 8594 § 10, 1964.)

Los Angeles County General Plan Noise Element

The following portions of the General Plan are relevant to the project:

Goal N-1 An environment that is protected from unacceptable levels of noise.

Policy N 1.1: Employ effective noise abatement measures to achieve acceptable levels of noise as defined by the Los Angeles County Exterior Noise Standards.

Policy N 1.2: Ensure the compatibility of land uses throughout the County to minimize excessive noise levels.

Policy N 1.3: Ensure cumulative impacts related to noise do not exceed excessive levels by utilizing development monitoring techniques.

Sensitive Receptors

Some land uses are considered more sensitive to noise levels than others due to the amount of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities typically involved. For instance, residential areas, schools, and hospitals generally are more sensitive to noise than are commercial and industrial land uses. Many different types of land uses are located in the communities throughout the proposed project area, including noise-sensitive uses such as residences. The proposed pipeline runs near residences on 25th Street West,

Elizabeth Lake Road, 40th Street East, Avenue S, Avenue R, Gaskell Road and West Avenue K. Pump stations and reservoirs could be near sensitive receptors around Elizabeth Lake Road, 25th Street West, Avenue M, Charlone Dr, 40th Street East, Pearblossom hwy, and 42nd Street East.

3.9.4 Impacts and Mitigation Measures

Significance Criteria

According to Appendix G of the *CEQA Guidelines*, the proposed project would result in a significant noise impact if it would:

- Result in exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Result in exposure of persons to, or generation of, excessive groundborne vibration or groundborne noise levels;
- Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;
- For a project located within an airport land use plan area, or, where such a plan has not been adopted, in an area within two miles of a public airport or public use airport, expose people residing or working in the area to excessive noise levels; or
- For a project located in the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels.

While there are airports within the proposed project area and most likely within two miles of specific proposed projects, the proposed project itself does not include the development or introduction of noise sensitive land uses within the vicinity of an airport, and for this reason, would not expose persons to excessive aircraft or airport noise levels.

The proposed project would result in significant traffic noise impacts if it would increase noise levels in excess of the thresholds shown in **Table 3.9-3**.

TABLE 3.9-3
THRESHOLDS OF SIGNFICANCE FOR NOISE EXPOSURE

Ambient Noise Level Without Project (Ldn)	Significant Impact Assumed to Occur if the Project Increases Ambient Noise Levels By:
<60 dB	+ 5.0 dB or more
60-65 dB	+ 3.0 dB or more
>65 dB	+ 1.5 dB or more

SOURCE: Federal Interagency Committee on Noise (FICON), 1992.

Methodology

Noise impacts are assessed based on a comparative analysis of the noise levels resulting from the project and the noise levels under existing conditions. Analysis of temporary construction noise effects is based on typical construction phases, published or previously measured decibel levels of construction equipment and attenuation of those noise levels due to distances, presence of any barriers between the construction activity and the sensitive receptors near the sources of construction noise, and time of day and expected duration of construction activity.

Impacts Discussion

Operation of the proposed project would result in the application of recycled water for various end uses, including municipal landscape irrigation, agricultural irrigation, cooling water for power plants, and groundwater recharge. The use of recycled water would have no impact on the ambient noise conditions in the project area and is not discussed further in the following impact analysis.

Project-level Impacts

Recycled Water Pipeline

Impact 3.9-1: Construction of the proposed recycled water pipeline would intermittently and temporarily generate noise levels above existing ambient levels in the vicinity of those project elements. Significant and Unavoidable.

The proposed project would result in temporary and intermittent noise increases due to construction of project components. Construction-related noise levels throughout the proposed project area would fluctuate depending on the particular type, number, and duration of use of various pieces of construction equipment associated with individual project components. Construction-related material haul trips would raise ambient noise levels along haul routes, depending on the number of haul trips made and types of vehicles used. In addition, certain types of construction equipment generate percussive noises (such as pile driving), which can be particularly annoying. The effect of construction noise would depend upon how much noise would be generated by the equipment, the distance between construction activities and the nearest noise-sensitive uses, the existing noise levels at those uses, and the time of day in which construction activities would occur.

Table 3.9-4 shows typical noise levels during different construction stages for public works type projects. **Table 3.9-5** shows typical noise levels produced by various types of construction equipment.

Standard demolition activities, if required, employ equipment similar to that used for construction activities and would have similar, but likely shorter duration, noise impacts.

Construction of recycled water pipelines would be installed generally within the existing roadway right-of-way where feasible to minimize land acquisitions or easement requirements.

TABLE 3.9-4
TYPICAL CONSTRUCTION NOISE LEVELS

Construction Phase	Noise Level (dBA, Leq) [a]
Ground Clearing	84
Excavation	89
Foundations	78
Erection	85
Finishing	89

NOTE: Average noise levels correspond to a distance of 50 feet from the noisiest piece of equipment associated with a given phase of construction and 200 feet from the rest of the equipment associated with that phase.
SOURCE: U.S. Environmental Protection Agency, Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances, 1971. Except for blasting; rock blasting data provided by the National Park Service.

TABLE 3.9-5
TYPICAL NOISE LEVELS FROM CONSTRUCTION EQUIPMENT

Construction Equipment	Noise Level (dBA, Leq at 50 feet)
Dump Truck	88
Portable Air Compressor	81
Concrete Mixer (Truck)	85
Scraper	88
Jack Hammer	88
Dozer	87
Paver	89
Generator	76
Backhoe	85
Rock Drill	98

SOURCE: Cunniff, Environmental Noise Pollution, 1977, and Federal Transit Administration, Transit Noise and Vibration Impact Assessment, May 2006.

Additionally, in order to avoid highly sensitive areas and potential road closures, tunneling, jack and bore, or other methods would be utilized to tunnel under the potentially affected area. These methods would require staging and receiving areas, located on either side of the sensitive feature.

The new pipeline segments would extend for 70 miles, and could affect noise levels at sensitive receptor locations along the pipeline alignments for the duration of pipeline installation. The anticipated rate of pipeline installation along segments where open trench construction methods are used would be about 50 to 100 feet per day, which is typical for this type of construction in public roadway rights-of-way. At any one location along the pipeline segments, the duration of noise impacts would be relatively brief, approximately three to five days, from the commencement of trenching to the completion of backfilling and paving, if necessary.

Table 3.9-5 shows typical noise levels generated by different types of construction equipment. The types of construction equipment that would be used for pipeline installation could generally include bulldozers, backhoes, forklifts, loaders, compactors, rollers, delivery trucks, scrapers,

pavers, excavators, trenchers, rock drills, and water trucks. As shown in Table 3.9-4 the noisiest non-percussive construction phase would generate approximately 89 dBA at 50 feet, assuming no noise mitigation features. For pipeline construction occurring within 50 feet of noise-sensitive land uses, the sensitive receptors would potentially be exposed to 102 dBA Leq during excavation. Construction-related noise could exceed the construction equipment noise standards and hourly limits in at least some of the jurisdictions where construction would occur. Daytime construction noise is exempt from maximum noise thresholds identified in local noise ordinances. Therefore, daytime construction noise from pipeline construction would not violate the noise ordinance. Implementation of Mitigation Measures 3.9-1a and 3.9-1b would ensure construction activities are restricted to daytime hours and would minimize the effects of noise due to construction of the proposed project. Nonetheless, even with implementation of mitigation measures, construction noise greater than 100 dBA during the day within 50 feet of residences would be considered a significant impact of the project.

Mitigation Measures

Mitigation Measure 3.9-1a: The implementing agencies shall implement procedures to reduce noise generation from project construction activities. Typical noise control procedures include the following:

- Require construction contractors to comply with the construction hours and days limitations established in local noise ordinances. Night-time construction would require approval from local jurisdictions.
- Require all construction contractors to locate fixed construction equipment (e.g., compressors and generators) as far as possible from noise-sensitive receptors.
- Equipment used in the construction of individual project components shall be muffled and maintained in good operating condition. Internal combustion engine-driven equipment shall be fitted with intake and exhaust mufflers that are in good condition.
- If pile driving is required for facility construction, the contract specifications for those projects shall incorporate the following requirements:
  - Wherever possible, sonic or vibratory pile drivers will be used lieu of impact pile drivers.
  - Wherever feasible, pile holes will be pre-drilled to reduce potential noise and vibration impacts.
- Additional noise attenuating measures include changing the location of stationary construction equipment and/or staging areas; notifying adjacent residences and nearby sensitive receptors in advance of construction work; shutting off idling equipment; rescheduling construction activities; requiring on-going construction noise monitoring to assure adherence to City/County construction equipment standards; and/or installing temporary barriers around stationary construction noise sources.

Mitigation Measure 3.9-1b: To further address the nuisance impact of project construction, construction contractors shall implement the following:

- Signs will be posted at the construction site that include permitted construction days and hours, a day and evening contact number for the job site, and a contact number for the applicable jurisdiction agency in the event of problems.
- An onsite complaint and enforcement manager shall track and respond to noise complaints.

Significance after Mitigation: Significant and unavoidable.

Impact 3.9-2: Construction of the proposed recycled water pipeline would expose persons to or generate excessive ground-borne vibration or ground-borne noise levels. Significant and Unavoidable.

As shown in **Table 3.9-6** below, use of heavy equipment during construction generates vibration levels of up to 0.089 PPV or 87 RMS (caisson drilling) at a distance of 25 feet. Construction of the proposed project would require horizontal drilling, and jack and bore drilling depending on the local geology and locations. The proposed pipeline could get as close as 15 feet from sensitive receptors and if drilling is needed at those areas, sensitive receptors would potentially be exposed to 0.19 PPV and 94 RMS. Vibration levels at these receptors would essentially be at the potential building damage threshold of 0.2 PPV and would exceed the annoyance threshold of 80 RMS. For such high vibration construction activities, Caltrans advisory documents recommend extreme care within 25 feet of any building and within 50-100 feet of a historical building or building in poor condition. Based on this information, boring or drilling within 15 feet of residences would be a potentially significant impact. Implementation of Mitigation Measure 3.9-2 would minimize construction vibration impacts by compensating for the cost of any damage that occurs to any buildings within 25 feet, and any historical buildings within 50-100 feet, of the construction site. Nonetheless, even with implementation of this mitigation measure, construction vibration levels could exceed the annoyance threshold at sensitive receptors along the pipeline route. This impact would be considered a significant impact of the project.

Mitigation Measures

> **Mitigation Measure 3.9-2:** When drilling or boring within 25 feet of any building or 50-100 feet of a historical building, a "crack survey" shall be undertaken. The crack survey must be taken before the start of construction with photo, video, or visual inventory of all existing cracks inside and outside buildings with sufficient detail for comparison after construction to determine whether actual vibration damage occurred. The implementing agencies shall be responsible for the costs of any damage caused by construction vibration.

Significance after Mitigation: Significant and unavoidable.

TABLE 3.9-6
VIBRATION VELOCITIES FOR CONSTRUCTION EQUIPMENT

Equipment Activity	PPV at 25 Feet (inches/second)[a]	RMS at 25 Feet (VDB)[b]
Large Bulldozer	0.089	87
Loaded Trucks	0.076	86
Caisson Drilling	0.089	87
Jackhammer	0.035	79

a. Buildings can be exposed to ground-borne vibration levels of 0.2 PPV without experiencing structural damage.
b. The human annoyance response level is 80 RMS.

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

Program-level Impacts

Storage Reservoirs and Pump Stations

Impact 3.9-3: Construction of the proposed storage reservoirs and pump stations would intermittently and temporarily generate noise levels above existing ambient levels in the vicinity of those project elements. Significant and Unavoidable.

Construction of new above ground storage tanks would include site preparation and clearing, excavation, grading and reservoir construction. Typical equipment includes bulldozers, excavators, scrapers, cranes, rollers, dump trucks, concrete trucks, pre-stressing equipment and construction delivery tractor-trailers. Construction would take approximately nine months. As shown in Table 3.9-4 the noisiest non-percussive construction phase would generate approximately 89 dBA at 50 feet, assuming no noise mitigation features. The exact location of the proposed storage tanks on the identified parcels has not been determined. Therefore, the potential minimum and maximum distances from each reservoir site to neighboring sensitive receptors has been calculated, and their corresponding construction noise exposure on sensitive receptors are shown in **Table 3.9-7**.

TABLE 3.9-7
STORAGE RESERVOIR CONSTRUCTION NOISE

Location	Minimum Distance/Noise Exposure	Maximum Distance/Noise Exposure
Reservoir 1	30 ft – 95 dBA	850 ft – 64 dBA
Reservoir 2	30 ft – 95 dBA	1,400 ft – 60 dBA
Reservoir 3	100 ft – 83 dBA	1,200 ft – 61 dBA

NOTE: Reservoir 4 has no noise-sensitive land uses in the immediate vicinity.

Construction of single story pump stations would involve excavation and structural foundation installation, pump house construction, pump installation, and final site restoration. Construction is estimated to take approximately eight months. As shown in Table 3.9-4 the noisiest non-percussive construction phase would generate approximately 89 dBA at 50 feet, assuming no noise mitigation features. The exact location of the proposed pump stations on the identified parcels has not been determined. Therefore, the potential minimum and maximum distances from each reservoir site to neighboring sensitive receptors has been calculated, and their corresponding construction noise exposure on sensitive receptors are shown in **Table 3.9-8**.

TABLE 3.9-8
PUMP STATION CONSTRUCTION NOISE

LOCATION	MINIMUM DISTANCE TO NEAREST SENSITIVE RECEPTOR	MAXIMUM DISTANCE TO NEAREST SENSITIVE RECEPTOR
Distribution Pump Station 1	850 ft – 64 dBA	3,200 ft – 53 dBA
Booster Pump Station 2	15 ft – 102 dBA	300 ft – 73 dBA

NOTE: Distribution Pump Stations 1A and 2, and Booster Pump Station 1 have no noise-sensitive land uses in the immediate vicinity.

Daytime construction noise is exempt from maximum noise thresholds identified in local noise ordinances. Therefore, daytime construction noise from pump station construction would not violate noise ordinances. Implementation of Mitigation Measures 3.9-1a and 3.9-1b would ensure construction activities are restricted to daytime hours and would further minimize the effects of noise due to construction of the proposed project. Even with implementation of mitigation measures, construction noise greater than 100 dBA during the day within 50 feet of residences would be considered a significant impact of the project. Construction of Booster Pump Station 2 could generate construction noise of 102 dBA at sensitive receptors within 15 feet of the project site. Construction of Booster Pump Station 2 would result in significant and unavoidable noise impacts.

Mitigation Measures

Implementation of Mitigation Measures 3.9-1a and 3.9-1b.

Significance after Mitigation: Significant and unavoidable.

Impact 3.9-4: Operation of the proposed storage reservoirs and pump stations could result in substantial noise increases in the vicinity of project facilities. Less than Significant with Mitigation.

Operation of the proposed projects would result in long-term noise increases, as implementation of the project would result in the addition of mechanical and electrical equipment at some of the project facilities. The degree of impact would vary with each project component, and would depend on the number, size, and type of equipment, proximity to sensitive receptors, topography and intervening structures, and extent in which noise attenuating features are incorporated into the

project design. Potential operational-related noise impacts associated with the proposed storage reservoirs and pump stations are discussed below. All pipelines would be located below grade and would not generate significant noise.

Storage Reservoirs

Reservoir operations, which are limited to water storage, would not be anticipated to generate substantial noise. Routine inspections would also not generate appreciable noise on-site or at off-site sensitive receptor locations. The reservoir could require periodic maintenance operations that would involve heavy equipment, during these periods noise would be generated at the site, but would be temporary and occur infrequently.

Pump Stations

Potential operational noise impacts associated with pump stations would primarily be from the operation of fixed stationary equipment. The impacts associated with the operation of these facilities are discussed at a program level here, since the specific location, equipment, processes and overall characteristics of these facilities are unknown.

The level of noise generated by pumps and other stationary equipment depends on four major variables:

- Characteristics of the noise source (e.g., the technology type, rated horsepower, revolutions per minute (rpm), presence or absence of pure tones, directional characteristics of the noise source, presence or absence of pure tones, directional characteristics of the noise source, presence or absence of acoustical design features);
- Number of noise sources clustered together;
- Type and effectiveness of building enclosure; and
- Operational characteristics (e.g., continuous 24-hour operation, intermittent operation, variable settings at different times).

Noise associated with pump operation could result in a potentially significant operational noise impact. For example, as a general category, pumps are rated at a noise level of 76 dBA at a distance of 50 feet without controls or enclosures [1]. Simultaneous operation of multiple pumps would incrementally and logarithmically add to this noise level. A doubling of pumps would increase the noise level by 3 dBA. For example, the operation of two pumps operating at 76 dBA would generate a composite noise level of 79 dBA. The type of building enclosures and noise attenuation effectiveness of the enclosure are unknown. Any pumps that would be located below grade would be relatively easy to shield and should not affect nearby sensitive receptors.

Since back-up generators would operate infrequently for routine testing and maintenance or during an actual interruption in power from the utility grid, they would not contribute substantially to the overall average noise exposure outside the project property boundary. Depending on the location of these facilities, pump station operation could cause noise levels at

[1] U.S. Environmental Protection Agency (EPA), Noise from Construction Equipment and Building Operations, Building Equipment, and Home Appliances, December 1971.

sensitive receptor locations to increase by 3 dBA CNEL or more in areas where noise levels already exceed the normally acceptable range, 5 dBA CNEL where the noise level from project operations would exceed the normally acceptable range for a given land use, or 10 dBA CNEL where the project would be within the normally acceptable range. Therefore, potential noise impacts from pump station related noise increases could be mitigated through provision of adequate building setbacks, effective building enclosures, and consideration of the appropriate vent locations.

Mitigation Measures

Mitigation Measure 3.9-4: The implementing agencies shall comply with local noise ordinances. In areas where pump and/or stationary equipment operation would cause noise levels to exceed the normally acceptable range for a given land use, the operation of such equipment shall not cause noise levels to increase by 5 dBA CNEL or more. In areas where noise levels already exceed the normally acceptable range for a given land use, the operation of such equipment shall not cause noise levels to increase by 3 dBA CNEL or more. To accomplish these performance standards, the implementing agency shall consider the following:

- Maximize the buffer area or setback distance between pump facilities and noise-sensitive land uses;
- Design stationary equipment and pump enclosures such that building exhaust fans and louvers are oriented away from noise-sensitive uses. To the extent feasible, configure the facility layout such that noise-generating equipment is setback from noise-sensitive land uses;
- Incorporate equipment enclosures, fan silencers, mufflers, acoustical treatments at vent openings, acoustical panels, etc.
- Construct a perimeter wall at the site such that the line of site between the building openings (exhaust fans and louvers) at the pump facilities and nearby sensitive receptors is effectively blocked. Effective shielding can significantly reduce noise.

Significance after Mitigation: Less than significant.