Eastern Municipal Water District (EMWD) Belle Terre Water Tank

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1.0 Introduction

The following assessment was prepared to evaluate the potential noise and vibration impacts of the construction of the Eastern Municipal Water District (EMWD) Belle Water Tank project. The improvements will have construction activities that will occur within 500 feet of sensitive noise sources at either end of the project limits.

For CEQA purposes, this technical noise memorandum documents the existing noise conditions in the vicinity of the proposed project site describes the criteria for determining the significance of noise impacts utilizing the County of Riverside Municipal Code and the General Plan Noise Element; and determines the likely noise & vibration impacts that would result from construction activities. Recommended mitigation measures are presented to mitigate the impacts. Further, under Appendix G of the CEQA Guidelines, this technical memorandum summarizes whether the proposed Project will result in:

- Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?
- Generation of excessive ground-borne vibration or ground-borne noise levels?
- For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project expose people residing or working in the project area to excessive noise levels?

2.0 Project Summary

2.1 Project Location

The proposed Project site is approximately 3 acres and is located north of Fields Drive and east of San Diego Canal in the community of French Valley in the unincorporated area of Riverside County. The Project site is specifically located within Planning Area 24 of the Belle Terre Specific Plan No. 382 Substantial Conformance No. 1 (SP382S1) approved by the County of Riverside Board of Supervisors in December 2019, assessor parcel number 472-170-021, and within Section 27, Township 6 South, Range 2 West of the San Bernardino Baseline Meridian Map.

2.2 Existing Conditions

The Project area is currently an undeveloped knoll covered with Riverside sage scrub and surrounded by open space and large, rural single-family residential lots to the east. A roughly graded road up the knoll slope and pad near the top of the knoll is present. MWD's San Diego Canal is located along the west side of the knoll. French Valley Channel and Fields Drive are located just south of the knoll. A new potable water reservoir (tank) and extension of associated water pipelines is needed to serve to implement projects within the boundaries of SP382S1. This facility will be owned and operated by EMWD and would extend the area of EMWD 1627 Pressure Zone. SP382S1 designates Planning Area 24 (4.7 acres) for the development of the water tank.

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Figure 1- Aerial Boundary

Belle Terre Water Storage Tank | Mitigated Negative Declaration

2.3 Project Description

As shown in Figure 2, the proposed Project includes the construction of a 1.79 million gallon (MG) potable water storage tank and associated infrastructure that will provide potable water service to the Belle Terre community as planned by SP382S1. The proposed tank will sit at an elevation of 1,590 feet above mean sea level (amsl). It will have an effective tank storage volume of 1.47 MG with a nominal tank diameter of 86-feet, a nominal height of 40-feet, and the highest point on the tank roof will be 46-feet from the ground.

An 18-inch diameter water pipeline will be constructed to connect the proposed tank to the nearest point of connection in Fields Drive for a length of approximately 1,070-feet. Other implementing projects of SP382S1 will install this point of connection. An 18-inch diameter overflow pipeline will be provided to drain overflow tank water to a proposed detention basin located at the entrance of the proposed access road. Both pipelines will be located underneath the proposed access road.

The Project also includes a detention basin. This detention basin will capture the stormwater runoff generated from the paved areas of the site, as well as overflows from the tank. The basin will have a holding capacity of approximately 3,700 cubic feet (CF). The detention basin will provide water quality treatment to the on-site runoff through the mechanisms of infiltration and evapotranspiration. The basin will be equipped with a restrictive outlet that will release flow slowly over a rip-rap apron to sheet flow over Fields Drive. An emergency concrete spillway will also be included. Any runoff beyond the capacity of the basin will sheet flow over Fields Drive into the existing natural wash south of Fields Drive, which is outside the Project area. The Project will also include a concrete-lined flat bottom ditch along the cut slope to collect runoff from the cut slope to drain to Fields Drive and flow via sheet flow to the natural wash. Fields Drive will be concrete-capped where runoff will flow.

Power from Southern California Edison will be routed to the tank site. No major site lighting is proposed. Smaller wattage lighting is proposed only for minor maintenance work at the tank site on the stairs in the block enclosure and near the access gate. The existing power pole located west of the access road will be relocated to clear EMWD access as part of other implementing projects of SP382. SCE service lines will extend the length of the access road, and separate SCE easements for SCE facilities are not anticipated. The access road, detention basin, and tank pad will all be fenced and gated to restrict access.

The PDR analysis for the Project provides conformance of the proposed water storage facility with the latest edition of EMWD's Reservoir Design and Submittal Guidelines, American Water Works Association (AWWA) Design Standards for Steel Water Storage Tanks, AWWA D100-11, and the American Society of Civil Engineers (ASCE) 7-05, Minimum Design Loads for Buildings and Other Structures. The analysis of the proposed tank includes hydrostatic, vertical (gravity), and dynamic forces exerted on the proposed tank. For the seismic analysis, the AWWA General Design curves and uniform hazard response spectra for the Probabilistic Maximum Considered Earthquake (return period of two percent in 50 years and 10 percent in 100 years). The seismic analysis of the tank included seismic overturning, hydrodynamic hoop, and compression stresses, sloshing wave, foundation, and anchorage calculations in accordance with the requirements of AWWA D-100-11 Section 13 and Section 14 for the seismic design of water storage tanks. Site-Specific analyses were performed for those parameters where site-specific analysis governs the design, such as sloshing height.

There are several existing water tanks serving EMWD's 1627 Pressure Zone. The nearest tank is Menifee Village Tank (5.0 MG) and is located 7.7 miles away from the project site. The 1627 Pressure Zone is supplied by the Pat Road Booster Station, and it is located approximately 2.5 miles away from the Project site. The proposed 1.79 MG tank is in the far southeasterly corner of EMWD 1627 Pressure Zone.

EMWD's existing potable water system without the proposed tank is designed to meet the water demands of up to 192 new homes in SP382. Any houses in excess of that number will require the proposed tank to be in operation to get water service. It is expected that the implementing Project (s) of Phase 1 will install the required water line (and other utilities) in Fields Drive so that this Project can connect at the base of the proposed access road. Fields Drive is also expected to be paved by others before the operation of the proposed tank.

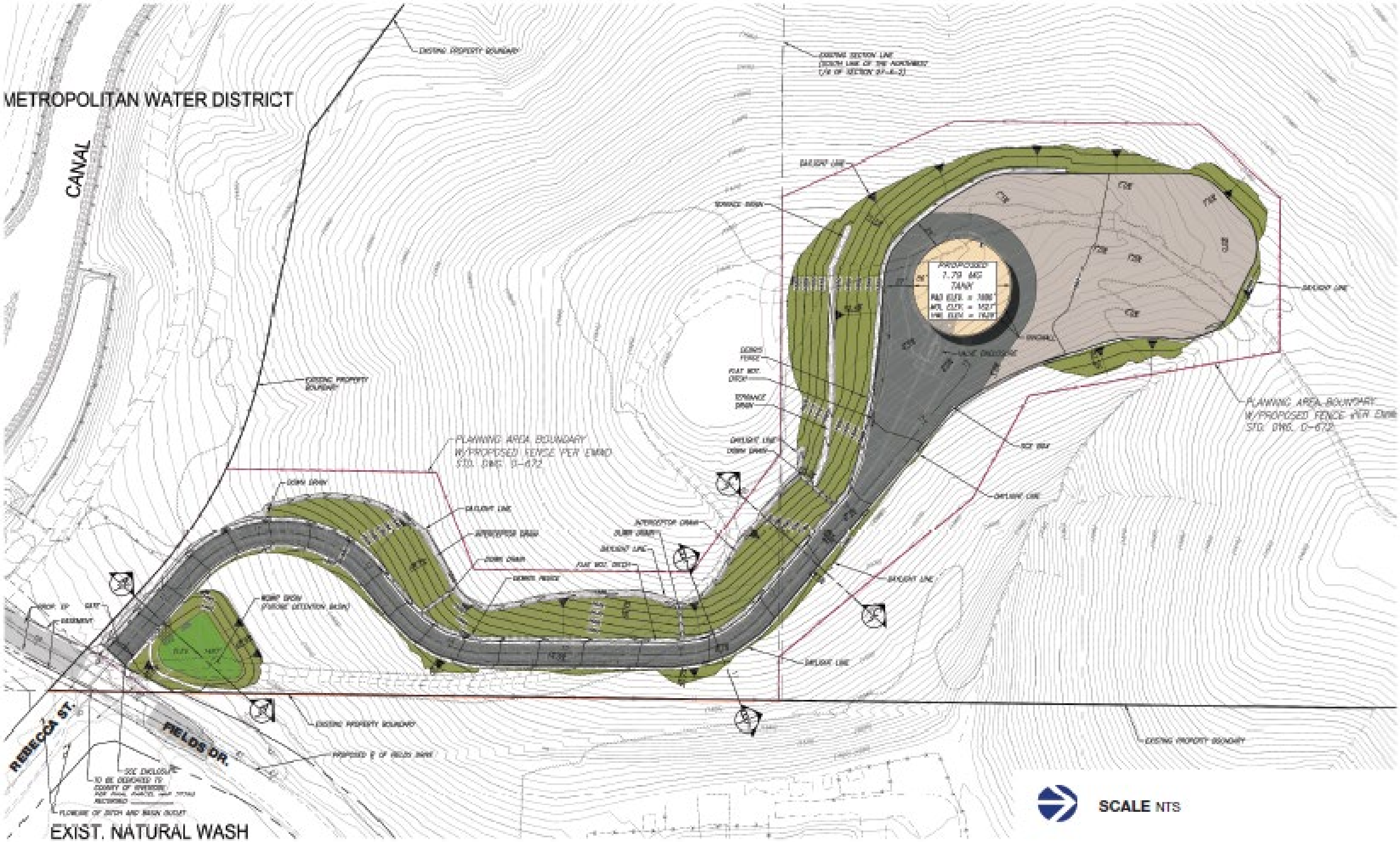

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Figure 2 - Conceptual Site Plan

Belle Terre Water Storage Tank | Mitigated Negative Declaration

2.4 Construction Activities

Although one tank is proposed herein, the tank pad will be graded large enough to hold two tanks to allow space for a future tank to be constructed when determined by EMWD. The area for the second pad will be graded and covered with gravel as part of this Project.

A 20-foot wide access road will be graded beginning from Fields Drive to the tank pad site for a length of approximately 1,350-feet. The access road will be paved with concrete curb and gutter on the downhill (east) side and a concrete drainage ditch on the up-hill (west) side. Also, the access road will surround the proposed tank for a total paved area of approximately 28,400 square feet (SF).

The total area disturbed by grading is approximately 133,000 SF, including an estimated 55,620 cubic yards (CY) of cut soil and 531 CY of fill dirt. The net volume of cut soil will be used for grading of the implementing projects of SP382S1. Cut slopes up to 40 feet in height and fill slopes of up to 15 feet in height will be required. Because of the grading required to create the access road, the exposed hillside slopes will have concrete terrace and interceptor drains along the slope top and down-drains to vertically convey runoff to the proposed concrete drainage ditch.

Construction is anticipated to take approximately one year to complete with anticipated operation commencing in November 2021. Soil export is anticipated to be approximately 3,500 CY per day. The soil will be exported a distance of approximately one mile (one-way) to Planning Areas 9 and 28, via Rebecca Road and Autumn Glen Circle to be stockpiled.

Project-related trips would include daily construction worker trips and occasional material delivery and haul truck trips. A total of up to four daily vendor trips (one-way) for material delivery and removal (excluding grading and paving phases) and two water truck trips per day are assumed during Project grading. The duration of grading activities is anticipated to take approximately 45 days. Appropriate traffic control measures would be implemented as necessary in pertinent areas to maintain access and ensure safety. Such measures would likely include standard efforts such as the use of cones, barriers, signs, and flaggers, where applicable.

2.5 Operation and Maintenance

EMWD will operate and maintain the maintenance road, detention basin, water tank, and all associated tank facilities.

3.0 Fundamentals of Noise

3.1 Sound, Noise, and Acoustics

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air) to a hearing organ, such as a human ear. Noise is defined as loud, unexpected, or annoying sound.

In the science of acoustics, the fundamental model consists of a sound (or noise) source, a receiver, and the propagation path between the two. The loudness of the noise source and the obstructions or atmospheric factors affecting the propagation path to the receiver determines the noise level and characteristics of the noise perceived by the receiver. The field of acoustics deals primarily with the propagation and control of sound.

3.2 Frequency

Continuous sound can be described by frequency (pitch) and amplitude (loudness). A low-frequency sound is perceived as low in pitch. Frequency is expressed in terms of cycles per second, or Hertz (Hz) (e.g., a frequency of 250 cycles per second is referred to as 250 Hz). High frequencies are sometimes more conveniently expressed in kilohertz (kHz), or thousands of Hertz. The audible frequency range for humans is generally between 20 Hz and 20,000 Hz.

3.3 Sound Pressure Levels and Decibels

The amplitude of pressure waves generated by a sound source determines the loudness of that source. Sound pressure amplitude is measured in micro-Pascals (μPa). One μPa is approximately one hundred billionths (0.00000000001) of normal atmospheric pressure. Sound pressure amplitudes for different kinds of noise environments can range from less than 100 to 100,000,000 μPa. Because of this huge range of values, the sound is rarely expressed in terms of μPa. Instead, a logarithmic scale is used to describe sound pressure level (SPL)) in terms of decibels (dB). The threshold of hearing for young people is about 0 dB, which corresponds to 20 μPa.

3.4 Addition of Decibels

Because decibels are logarithmic units, SPL cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3-dB increase. In other words, when two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be approximately 3 dB higher than one source under the same conditions (10log[2]). For example, if one automobile produces an SPL of 70 dB when it passes an observer, two cars passing simultaneously would not produce 140 dB – rather, they would combine to produce approximately 73 dB. Under the decibel scale, three sources of equal loudness together produce a sound level of approximately 5 dB louder than one source.

3.5 A-weighted Decibels

The decibel scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness or human response is determined by the characteristics of the human ear.

Human hearing is limited in the range of audible frequencies, as well as in the way it perceives the SPL in that range. In general, people are most sensitive to the frequency range of 1,000-8,000 Hz and perceive sounds within that range better than sounds of the same amplitude is higher or lower frequencies. To approximate the response of the human ear, sound levels of individual frequency bands are weighted, depending on the human sensitivity to those frequencies. Then, an "A-weighted" sound level (expressed in units of dBA) can be computed based on this information.

The A-weighting network approximates the frequency response of average human hearing when listening to most ordinary sounds. When we make judgments regarding the relative loudness or annoyance of a given sound, these judgments generally correlate well with A-weighted sound levels. Other weighting networks have been devised to address high noise levels or other special acoustical characteristics (e.g., B-, C-, and D-scales), but these scales are rarely used in conjunction with highway traffic noise. Noise levels for traffic noise reports are typically reported in terms of A-weighted decibels or dBA. **Table 1.** *Typical A-weighted Noise levels* describe typical A-weighted noise levels for various noise sources.

Table 1. Typical A-Weighted Noise Levels

Common Outdoor Noise	Noise Level (dBA)	Common Indoor Noise
	— 110 —	Rock band (noise to some, music to others)
Jet fly-over at 1000 feet		
	— 100 —	
Gas lawn mower at 3 feet		
	— 90 —	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	— 80 —	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, 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 daytime	**— 50 —**	Dishwasher in neighboring room
Quiet urban nighttime	**— 40 —**	Theater, large conference room (background)
Quiet suburban nighttime		
	— 30 —	Library
Quiet rural nighttime		Bedroom at night
	— 20 —	
		Broadcast/recording studio
	— 10 —	
Lowest threshold of human hearing	**— 0 —**	Lowest threshold of human hearing

Source: Caltrans, 1998.

Using the decibel scale, sound levels from two or more sources cannot be directly added together to determine the overall sound level. Rather, the combination of two sounds at the same level yields an increase of 3 dBA. The smallest recognizable change in sound levels is approximately 1 dBA. A 3-dBA increase is generally considered perceptible, whereas a 5-dBA increase is readily perceptible. Most people judge a 10-dBA increase as an approximate doubling of the sound loudness.

Two of the primary factors that reduce levels of environmental sounds are increasing the distance between the sound source to the receiver and having intervening obstacles such as walls, buildings, or terrain features between the sound source and the receiver. Factors that act to increase the loudness of environmental sounds include moving the sound source closer to the receiver, sound enhancements caused by reflections, and focusing caused by various meteorological conditions.

3.6 Human Response to Changes in Noise Levels

As discussed above, doubling sound energy results in a 3 dB increase in sound level. However, given a sound level change measured with precise instrumentation, the subjective human perception of a doubling of loudness will usually be different than what is measured. Under controlled conditions in an acoustical laboratory, trained, healthy human hearing can discern 1 dB changes in sound levels when exposed to steady, single-frequency ("pure-tone") signals in the mid-frequency (1,000 Hz–8,000 Hz) range. In typical noisy environments, changes in the noise of 1 to 2 dB are generally not perceptible. However, it is widely accepted that people can begin to detect sound level increases of 3 dB in typical noisy environments. Further, a 5-dB increase is generally perceived as a distinctly noticeable increase, and a 10-dB increase is generally perceived as a doubling of loudness. Therefore, a doubling of sound energy (e.g., doubling the volume of traffic on a highway) that would result in a 3 dB increase in sound would generally be perceived as barely detectable.

3.7 Noise Descriptors

Noise in our daily environment fluctuates over time. Some fluctuations are minor, but others are substantial. Some noise levels occur in regular patterns, but others are random. Some noise levels fluctuate rapidly, but others slowly. Some noise levels vary widely, but others are relatively constant. Various noise descriptors have been developed to describe time-varying noise levels. The following are the noise descriptors most commonly used in traffic noise analysis.

- **Equivalent Sound Level (L_{eq}):** L_{eq} represents an average of the sound energy occurring over a specified period. In effect, L_{eq} is the steady-state sound level containing the same acoustical energy as the time-varying sound that occurs during the same period. The one-hour, A-weighted equivalent sound level (L_{eq}[h]) is the energy-average of A-weighted sound levels occurring during a one-hour period and is the basis for noise abatement criteria (NAC) used by Caltrans and FHWA.

- **Percentile-Exceeded Sound Level (L_n):** L_n represents the sound level exceeded for a given percentage of a specified period (e.g., L_{10} is the sound level exceeded 10 percent of the time, and L_{90} is the sound level exceeded 90 percent of the time).

- **Maximum Sound Level (L_{max}):** L_{max} is the highest instantaneous sound level measured during a specified period.

- **Day-Night Level (L_{dn}):** L_{dn} is the energy average of A-weighted sound levels occurring over a 24-hour period, with a 10-dB penalty applied to A-weighted sound levels occurring during nighttime hours (10 p.m.-7 a.m.).

- **Community Noise Equivalent Level (CNEL):** Similar to L_{dn}, CNEL is the energy-average of the A-weighted sound levels occurring over a 24-hour period, with a 10-dB penalty applied to A-weighted sound levels occurring during the nighttime hours between (10 p.m.-7 a.m.) and a 5-dB penalty applied to the A-weighted sound levels occurring during evening hours (7 p.m.-10 p.m.).

3.8 Sound Propagation

When sound propagates over a distance, it changes in level and frequency content. The manner in which noise reduces with distance depends on the following factors.

3.9 Geometric Spreading

Sound from a localized source (i.e., a point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (or decreases) at a rate of 6 decibels for each doubling of distance from this source. Highways consist of several localized noise sources on a defined path, and hence can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of 3 decibels for each doubling of distance from a line source.

3.10 Ground Absorption

The propagation path of noise from a highway to a receiver is usually very close to the ground. Noise attenuation from ground absorption and reflective wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is usually sufficiently accurate for distances of less than 200 feet. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receiver, such as a parking lot or body of water), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receiver – such as soft dirt, grass, or scattered bushes and trees), an excess ground-attenuation value of 1.5 decibels per doubling of distance is normally assumed. When added to the cylindrical spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 decibels per doubling of distance.

3.11 Atmospheric Effects

Receivers located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have reduced noise levels. Sound levels can be increased at large distances (e.g., more than 500 feet) from the highway due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors, such as air temperature, humidity, and turbulence, can also have substantial effects.

3.12 Shielding by Natural or Man-Made Features

A large object or sound wall in the path between a noise source and a receiver can substantially attenuate noise levels at the receiver. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise. Natural terrain features (e.g., hills and dense woods) and man-made features (e.g., buildings and walls) can substantially reduce noise levels. Walls are often constructed between a source and a receiver, specifically to reduce noise. A sound wall that breaks the line of sight between a source and a receiver will typically result in at least 5 dB of noise reduction. Taller sound walls provide increased noise reduction. Vegetation between the highway and receiver is rarely effective in reducing noise unless it is sufficiently dense.

3.13 Effects of Noise on People

Noise is generally loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity that is a nuisance or disruptive. The effects of noise on people can be placed into four general categories:

- Subjective effects (e.g., dissatisfaction, annoyance)
- Interference effects (e.g., communication, sleep, and learning interference)
- Physiological effects (e.g., startle response)
- Physical effects (e.g., hearing loss)

Although exposure to high noise levels has been demonstrated to cause physical and physiological effects, the principal human responses to typical environmental noise exposure are related to subjective effects and interference with activities. Interference effects refer to interruption of daily activities and include interference with human communication activities, such as normal conversations, watching television, telephone conversations, and interference with sleep. Sleep interference effects can consist of both awakening and arousal to a lesser state of sleep. With regard to the subjective effects, the responses of individuals to similar noise events are diverse and are influenced by many factors, including the type of noise, the perceived importance of the noise, the appropriateness of the noise to the setting, the duration of the noise, the time of day and the type of activity during which the noise occurs, and individual noise sensitivity.

Overall, a wide variation of tolerance to noise exists, 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 (i.e., comparison to the ambient noise environment). In general, the more a new noise level exceeds the previously existing ambient noise level, the less acceptable the new noise level will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships generally occur:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived.
- Outside of the laboratory, a 3 dBA change in noise levels is considered to be a barely perceivable difference.
- A change in noise levels of 5 dBA is considered to be a readily perceivable difference.
- A change in noise levels of 10 dBA is subjectively heard as doubling of the perceived loudness.

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 straightforward additive fashion, but 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.

3.14 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 asphalt or concrete surfaces 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) are 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 as traffic noise from vehicles) 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).

4.0 Fundamentals of Vibration

Vibration is energy transmitted in waves through the ground or man-made structures. These energy waves generally dissipate with distance from the vibration source. Familiar sources of groundborne vibration are trains, buses on rough roads, and construction activities such as blasting, pile-driving, and operation of heavy earth-moving equipment. As described in the Federal Transit Administration's (FTA) Transit Noise and Vibration Impact Assessment (FTA 2018), 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.

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 commonly 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 relationship of PPV to RMS velocity is expressed in terms of the "crest factor," defined as the ratio of the PPV amplitude to the RMS amplitude. Peak particle velocity is typically a factor of 1.7 to 6 times greater than RMS vibration velocity (FTA 2018). 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.

The effects of ground-borne vibration include movement of the building floors, the rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. In extreme cases, the vibration can cause damage to buildings. Building damage is not a factor for most projects, with the occasional exception of blasting and pile-driving during construction. Annoyance from vibration often occurs when the vibration levels exceed the threshold of perception by only a small margin. A vibration level that causes an annoyance will be well below the damage threshold for normal buildings. The FTA measure of the threshold of architectural damage for conventional sensitive structures is 0.2 in/sec PPV (FTA 2018).

In residential areas, the background vibration velocity level is usually around 50 VdB (approximately 0.0013 in/sec PPV). This level is well below the vibration velocity level threshold of perception for humans, which is approximately 65 VdB. A vibration velocity level of 75 VdB is considered to be the approximate dividing line between barely perceptible and distinctly perceptible levels for many people (FTA 2018).

5.0 Regulatory Setting

Several statutes, regulations, plans, and policies have been adopted which address noise and vibration concerns. Detailed below is a discussion of the relevant regulatory setting and noise and vibration regulations, plans, and policies.

5.1 Federal

There are no federal noise standards that directly regulate environmental noise related to the construction of the proposed Project. Therefore, the FTA's guidance, 2018 Transit Noise, and Vibration Impact Assessment was used to evaluate vibration levels resulting from proposed project construction activities on human annoyance and structural damage. Based on this guidance, the vibration standards are presented in **Table 2,** *Ground-Borne Vibration Criteria: Human Annoyance,* and **Table 3***, Ground- Borne Vibration Criteria: Architectural* Damage.

Table 2. Ground-borne Vibration Criteria: Human Annoyance

Land Use Category	Max Lv (VdB)	Description
Workshop	90	Distinctly felt vibration. Appropriate to workshops and non-sensitive
Office	84	Felt vibration. Appropriate to offices and non-sensitive areas.
Residential – Daytime	78	Barely felt vibration. Adequate for computer equipment.
Residential – Nighttime	72	Vibration is not felt, but groundborne noise may be audible inside quiet rooms.

SOURCE: FTA, 2018.
NOTE:
Max Lv (VdB): Lv is the velocity level in decibels, as measured in 1/3-octave bands of frequency over the frequency ranges of 8 to 80 Hz.

Table 3. Ground-borne Vibration Criteria: Architectural Damage

Building Category	PPV (in/sec)
I. Reinforced-concrete, steel, or timber (no plaster)	0.5
II. Engineered concrete and masonry (no plaster)	0.3
III. Non-engineered timber and masonry buildings	0.2
IV. Buildings extremely susceptible to vibration damage	0.12

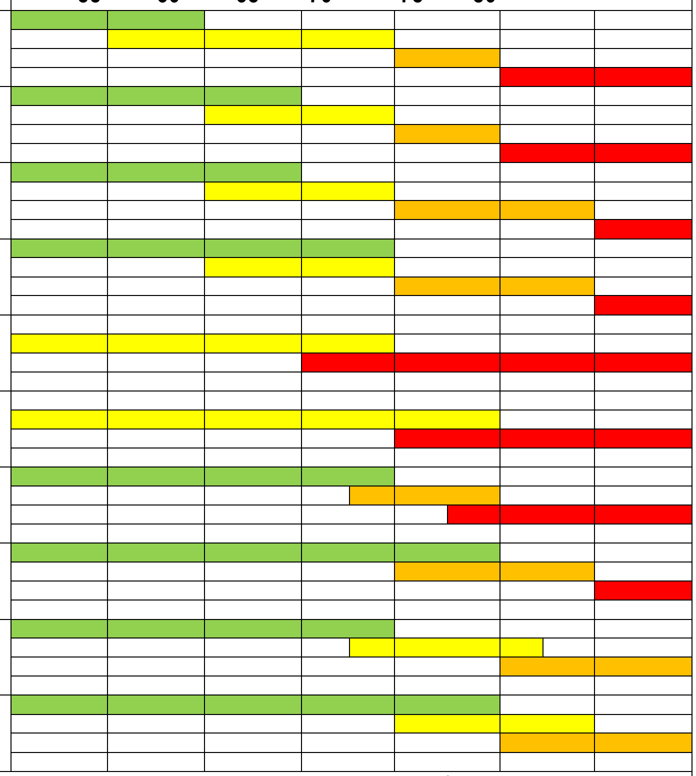
SOURCE: FTA 2018; PEIR, 2014
NOTE:
Max Lv (VdB): Lv is the velocity level in decibels, as measured in 1/3-octave bands of frequency over the frequency ranges of 8 to 80 Hz.

5.2 State

The State of California, Office of Planning and Research has published, with regard to community noise exposure, recommended guidelines for land use compatibility. These guidelines rate land use compatibility in terms of being normally acceptable, normally unacceptable, and clearly unacceptable. Each jurisdiction is required to consider these guidelines when developing a general plan noise element and when determining acceptable noise levels within its community. These guidelines are representative of various land uses that include residential, commercial/mixed-use, industrial, and public facilities. **Table 4.** *Land Use Compatibility Matrix* identifies the acceptable limit of noise exposure for various land use categories within the County. Noise exposure for single-family uses is normally acceptable when the CNEL at exterior residential locations is equal to or below 60 dBA, conditionally acceptable when the CNEL is between 55 to 70 dBA, and normally unacceptable when the CNEL exceeds 70 dBA. These guidelines apply to noise sources such as vehicular traffic, aircraft, and rail movements.

Table 4. Land Use Compatibility Matrix

Land Use Category	Community Noise Exposure (L_{dn} or CNEL, dB)
	55 60 65 70 75 80
Residential - Low-Density Single-Family, Duplex, Mobile Homes	
Residential - Multi-Family	
Transient Lodging - Motels Hotels	
Schools, Libraries, Churches, Hospitals, Nursing Homes	
Auditoriums, Concert Halls, Amphitheaters	
Sports Arena, Outdoor Spectator Sports	
Playgrounds, Neighborhood Parks	
Golf Courses, Riding Stables, Water Recreation, Cemeteries	
Office Buildings, Business Commercial and Professional	
Industrial, Manufacturing, Utilities, Agriculture	



Normally Acceptable - Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally Acceptable - New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning, will normally suffice.

Normally Unacceptable - New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

Clearly Unacceptable - New construction or development should generally not be undertaken.

SOURCE:
Adapted from: Governor's Office of Planning and Research. 2003. State of California General Plan Guidelines. Appendix C, Noise Element Guidelines, Figure 2. Sacramento, CA.

The California Noise Insulation Standards require that interior noise levels from exterior sources are 45 dBA or less in any habitable room of a multi residential-use facility (e.g., hotels, motels, dormitories, long-term care facilities, and apartment houses, except detached single-family dwellings) with doors and windows closed. Measurements are based on CNEL or Ldn (the day-night average), whichever is consistent with the noise element of the local general plan. Where exterior noise levels exceed 60 dBA CNEL, an acoustical analysis for new development may be required to show that the proposed construction will reduce interior noise levels to 45 dBA CNEL. If the interior 45 dBA CNEL limit can be achieved only with the windows closed, the residence must include mechanical ventilation that meets applicable Uniform Building Code (UBC) requirements.

5.3 Local

Local noise issues are addressed through the implementation of general plan policies, including noise and land use compatibility guidelines, and through enforcement of noise ordinance standards. A city or county's noise ordinance will typically include regulations that restrict the amount and duration of noise from various noise sources occurring within its jurisdiction as well as prescribe noise limits for different land-use types. For the proposed Project, noise regulations and standards of the County of Riverside is considered with respect to evaluating the proposed Project's noise impacts on the surrounding environment. As a public agency, EMWD is not subject to other local jurisdictional agencies' noise ordinances, nor is EMWD required to obtain variances from local agencies. However, for purposes of evaluation, local agency noise ordinances are utilized as thresholds to analyze noise levels from the construction of the proposed EMWD facility and potential impacts to sensitive receptors. They are also used as a guideline to develop mitigation measures that would typically be used to minimize noise impacts to sensitive receptors.

5.3.1 County of Riverside Noise Element

The California Government Code Section 65302(g) requires that a noise element be included in the General Plan of each county and city in the State. The Noise Element of the County of Riverside General Plan is intended to provide a systematic approach to identifying and appraising noise problems in the community, quantifying existing and projected noise levels, addressing excessive noise exposure, and community planning for the regulation of noise.

The County's primary goal with regard to community noise is to ensure that noise-producing land uses would be compatible with adjacent land uses. To this end, the Noise Element establishes noise/land use compatibility guidelines based on cumulative noise criteria for outdoor noise. These guidelines are based, in part, on the community noise compatibility guidelines established by the Office of Planning Research in assessing the compatibility of various land-use types with a range of noise levels, as previously shown in Table 4.

The County of Riverside's General Plan Noise Element has developed the following temporary construction policies to reduce noise from construction activities near sensitive areas.

Temporary Construction Policies:

N 13.1 Minimize the impacts of construction noise on adjacent uses within acceptable practices.

N 13.2 Ensure that construction activities are regulated to establish hours of operation to prevent and/or mitigate the generation of excessive or adverse noise impacts on surrounding areas.

N 13.3 Condition subdivision approval adjacent to developed/occupied noise-sensitive land uses by requiring the developer to submit a construction-related noise mitigation plan to the County for review and approval prior to issuance of a grading permit. The plan must depict the location of construction equipment and how the noise from this equipment will be mitigated during the construction of this Project, through the use of such methods as:
a. Temporary noise attenuation fences;
b. Preferential location of equipment; and
c. Use of current noise suppression technology and equipment.

N 13.4 Require that all construction equipment utilizes noise reduction features (e.g., mufflers and engine shrouds) that are no less effective than those originally installed by the manufacturer.

County of Riverside Municipal Code

With respect to residential and recreational open space uses, Section 9.52.040 (General Sound Level Standards) of the County of Riverside Municipal Code identifies the following general sound level standards, as shown in **Table 5.** *County of Riverside Sound Level Standard*. These sound level standards apply to sound emanating from all noise sources.

Table 5. County of Riverside Sound Level Standard

Land Use	Maximum Decibel Level (dB Lmax)
Community Development Residential 10:00 p.m. to 7:00 a.m.	45
7:00 a.m. to 10:00 p.m.	55
Open Space Recreation 10:00 p.m. to 7:00 a.m.	45
7:00 a.m. to 10:00 p.m.	45

SOURCE: County of Riverside Ordinance 847 Adopted 2006.

For construction noise levels, Section 9.52.020 (Exemptions) of the County of Riverside Municipal Code states that private construction projects located within one-quarter of a mile from an inhabited dwelling are exempt from the County's noise standards if 1) Construction does not occur between the hours of 6:00 p.m. and 6:00 a.m. during the months of June through September, and 2) Construction does not occur between the hours of 6:00 p.m. and 7:00 a.m. during the months of October through May.

In addition, Section 9.52.060 (Special Sound Sources Standards) of the County of Riverside Municipal Code also prohibits the operation of any power tools or equipment between the hours of 10:00 p.m. and 8:00 a.m. such that the power tools or equipment are audible to the human ear inside an inhabited dwelling other than a dwelling in which the power tools or equipment may be located. Furthermore, the operation of any power tools or equipment is prohibited at any other time such that the power tools or equipment are audible to the human ear at a distance greater than 100 feet from the power tools or equipment. However, exceptions to the standards set forth in Section 9.52.040 and 9.52.060 of the County of Riverside Municipal Code may be requested for construction-related events, which would be considered by the County's Director of Building and Safety.

5.3.2 County of Riverside Groundborne Vibration Regulation

The County of Riverside has not adopted any criteria or regulations for groundborne vibration impacts. While the Noise Element of the Riverside County General Plan contains policies that stipulate restricting the placement of sensitive land uses in proximity to vibration-producing lands and prohibiting exposure of residential dwellings to perceptible ground vibration from passing trains, these policies do not apply to the proposed Project.

6.0 Thresholds of Significance

According to Appendix G of the State CEQA Guidelines, the proposed Project could have a potentially significant impact with respect to noise if it would:

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

7.0 Existing Noise

The existing noise environment was characterized by collecting one (1) long-term 24-hour field noise measurement at the project property line. The noise measurement was performed on September 2, 2020. Appendix A includes the field monitoring data, and **Figure 3** shows the monitoring locations.

The Long-term noise measurement was taken using a Larson Davis Type 1 precision sound level meter. The noise meter was programmed in a "slow" mode to record noise levels in the "A" weighted form. The sound level microphone was mounted on a tripod, five feet above the ground, and equipped with a windscreen during all measurements. The sound level meter was calibrated before the monitoring using a CAL200 calibrator. All noise level measurement equipment meets American National Standards Institute (ANSI) specifications for sound level meters (S1.4-1983 identified in Chapter 19.68.020.AA).

Table 6 shows the measured noise levels at the project site. The current noise level for the project area is 48.5 CNEL. This noise level falls well below the Normally Acceptable land us compatibility category for residential uses.

Table 6. Existing (Ambient) Long-Term (24-hour) Noise Level Measurements[1]

Noise Monitoring Location ID[2,3]	Description	Hourly Noise Levels (1hr-L_{eq})				24-hour Noise Levels (CNEL)
		Daytime Minimum	Daytime Maximum	Nighttime Minimum	Nighttime Maximum	
LT-1	Property Boundary	45.3	52.8	31.1	44.8	48.5

1 Noise measurement was taken on September 2, 2020
2 See Figure 3 for the location of the monitoring site, and Appendix A for Field Monitoring Data.
3 Taken with Larson Davis 824 Type 1 noise meter

8.0 METHODOLOGY

8.1 Ambient Noise Measurements.

One (1) long term measurement was performed to document the existing noise environment. Noise measurements were taken with a Larson Davis Type 1 meter. This meter satisfies the American National Standards Institute standard for general environmental noise measurement instrumentation. Random incidence microphones with windscreens were used, given the outdoor (i.e., free field) conditions of monitoring. The sound level averages were measured as A-weighted, slow-time weighted (1-minute period) sound pressure level variables, commonly used for measuring environmental sounds. Sound levels presented in this report are in terms of dBA. The location of the long-term noise measurement is shown in **Figure 3**. *Noise Monitoring Location*.

8.2 Construction Noise Analysis Methodology

Construction activities typically generate noise from the operation of equipment required for the construction of various facilities. Noise impacts from on-site construction were evaluated by determining the noise levels caused by different types of construction activity, calculating the construction-related noise level at nearby noise-sensitive receptor locations, and comparing these construction-related noise levels to existing ambient noise levels (i.e., noise levels without Project-related construction noise). The actual noise level would vary, depending upon the equipment type, model, the type of work activity being performed, and the condition of the equipment. Construction noise was assessed using the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM), which calculates noise levels for a variety of construction operations based on a compilation of empirical data and the application of acoustical propagation formulas.

The following section outlines the analysis methods utilized to predict future noise and vibration levels from the construction and operation of the proposed Project.

The assessment of the construction noise impacts must be relatively general at this phase of the Project because many of the decisions affecting noise will be at the discretion of the contractor. However, an assessment based on the type of equipment expected to be used by the contractor can provide a reasonable estimate of potential noise impacts and the need for noise mitigation. A worst-case construction noise scenario was developed to estimate the loudest activities that would be occurring at the project site. Pile driving and blasting activities are not anticipated; therefore, the noisiest construction activities are centered around the movement of heavy construction equipment during excavation, grading operations, and tank construction. Noise levels were estimated based on a worst-case scenario, which assumed all pieces of equipment would be operating simultaneously during each construction phase. The calculated noise level was then compared to the respective local noise regulation to determine if construction would cause a short-term noise impact at nearby residential land uses. Receiver distance to the construction activity along with the construction equipment operating at the maximum load will have the greatest influence on construction noise levels experienced at residential land uses.

Construction noise levels will be predicted using reference noise levels for standard construction equipment, the distance to the noise-sensitive uses, and noise attenuation standards. The FHWA Roadway Construction Noise Model (RCNM) will be utilized to predict noise levels using this methodology. The RCNM is a Windows-based noise prediction model that enables the prediction of construction noise levels for a variety of construction operations based on a compilation of empirical data and the application of acoustical propagation formulas. Outputs from the RCNM will determine the combined noise levels from equipment that will be operated simultaneously. Projected noise levels without construction equipment will be subtracted from the projected noise level during construction activities to determine the change in noise level on the existing environment. The difference in noise level, the number of days various noise levels are projected, will be compared to significance thresholds to determine whether construction activities would cause significant increases.

ALBERT A. WEBB ASSOCIATES

Figure 3- Noise Monitoring Location

Belle Terre Water Storage Tank | Mitigated Negative Declaration

● LT-1 Long-Term Measurement Site

8.3 Construction Vibration Analysis Methodology

Groundborne vibration levels resulting from construction activities within the project area were estimated using the data published by the FTA in its Transit Noise and Vibration Impact Assessment Manual (FTA, 2018). Potential vibration levels resulting from construction activities of the proposed Project are identified at the nearest off-site sensitive receptor location and compared to the FTA damage criteria, as shown previously in Table 3.

9.0 Construction Analysis & Results

Construction noise represents a temporary impact on ambient noise levels. Construction noise is primarily caused by diesel engines (trucks, dozers, backhoes), impacts (jackhammers, pile drivers, hoe rams), and backup alarms. Construction equipment can be stationary or mobile. Stationary equipment operates in one location for hours or days in a constant mode (generators, compressors) or generates variable noise operation (pile drivers, jackhammers), producing constant noise for a period of time. Mobile equipment moves around the site and is characterized by variations in power and location, resulting in significant variations in noise levels over time. Grading activities and rock blasting typically generate the most significant noise impacts during construction. This section assesses the potential noise impacts to the existing sensitive residential land uses during construction.

9.1 Construction Equipment

A worst-case construction scenario was developed utilizing the loudest pieces of equipment for each construction phase. **Table 7** presents the off-road equipment anticipated to be in operation for each construction phase.

Table 7. Construction equipment by phase

Construction Activity	Off-Road Equipment	L_{max} Noise Level	Unit Amount	Load Usage Factor
Water Basin Construction	Dump Truck	84	1	40%
	Excavator	85	1	40%
	Backhoes	77.6	2	40%
Tank Construction	Tractor	85	1	40%
	Loader	85	1	40%
	Backhoe	80	1	40%
Road Construction	Backhoe	77.6	1	8%
	Grader	85	1	8%
	Dozer	81.7	1	8%

9.2 Construction Noise Levels

The RCNM model was used to determine which phase of activity for the proposed Project would generate the greatest construction noise level. **Table 8** presents the hourly noise levels in L_{eq} for each construction phase. The highest noise level that would be experienced by the closest sensitive residential receivers adjacent to the project site is 73.1 dBA L_{eq}. This noise level occurs during the road construction phase of the proposed Project. This noise level would be a noticeable increase of 20 dBA over existing maximum daytime levels of 52.8 dBA L_{eq}. In addition, the geotechnical report identified that blasting may be required depending on the excavation depth, location, equipment used, and desired rate of production. If blasting is required, it is not anticipated to occur more than one day of construction. The maximum noise level for blasting at the nearest residential location is 63.9 dBA $L_{eq.}$

The County of Riverside does not establish a construction noise level and exempts private construction projects from general noise standards, as long as the construction occurs during allowable hours. The County of Riverside Municipal Code exempts private construction projects located within one-quarter of a mile from an inhabited dwelling from the County's noise standards if 1) Construction does not occur between the hours of 6:00 p.m. and 6:00 a.m. during the months of June through September, and 2) Construction does not occur between the hours of 6:00 p.m. and 7:00 a.m. during the months of October through May.

Although the proposed EMWD Project is considered a capital improvement project of a government agency, if construction occurs outside of the above restricted hours, construction noise levels would not be considered an impact. Further, the maximum predicted noise level of 73.1 dBA L_{eq} is below the FTA residential construction noise standards of 90 dBA Leq (1-hr) for daytime noise levels and 80 dBA (1-hr) for nighttime noise levels.

Table 8. Construction Noise Levels by Construction Phase	
Proposed Project Phase	**Construction Hourly dBA, L_{eq}**
WQMP Basin	63.0
Road (closest point)	73.1
Tank Site	66.0
Blasting	63.9

Because construction activities are typically limited to weekdays, during daylight hours, this noise level is considered a nuisance or annoying, rather than a significant impact

9.4 Construction Vibration

Ground-borne vibration levels resulting from construction activities occurring within the Project site were estimated by data published by the FTA. Construction activities that would occur within the Project site include excavation, grading, tank construction, and paving. These activities have the potential to generate low levels of ground-borne vibration.

Using the vibration source level for a large bulldozer and the construction vibration assessment methodology published by the FTA, it is possible to estimate the Project vibration impacts. **Table 9** presents the expected Project-related vibration levels at 160 feet to the nearest residential property.

Table 9. Construction Equipment Vibration Levels				
Noise Receiver	Distance to Property Line	Large Bulldozer Reference Vibration Level PPV (in/sec) at 25ft	Peak Vibration PPV (in/sec) at 160ft	Significant Impact
Closest Residence to Project site	160 feet	0.089	0.0055	No

Based on the reference vibration levels provided by the FTA, a large bulldozer represents the peak source of vibration with a reference level of 0.089 (in/sec) at a distance of 25 feet. At 160 feet, construction vibration levels are expected to approach 0.0055 (in/sec). This is below the construction vibration assessment annoyance criteria provided by the FTA of 0.2 in/sec.

If blasting activities are required for a duration of one day, blasting will generate the greatest source of vibration. Based on the reference vibration levels provided by the FTA, for blasting peak source reference level is 1.518 (in/sec) at a distance of 25 feet. **Table 10** shows the blasting vibration level at 160 feet is expected to approach 0.103 (in/sec). This is below the construction vibration assessment annoyance criteria provided by the FTA of 0.2 in/sec.

Table 10. Construction Equipment Vibration Levels				
Noise Receiver	Distance to Property Line	Blasting Reference Vibration Level PPV (in/sec) at 25ft	Peak Vibration PPV (in/sec) at 160ft	Significant Impact
Closest Residence to Project site	160 feet	1.518	0.094	No

Further, impacts at the site of the closest sensitive receptor are unlikely to be sustained during the entire construction period but will occur rather only during the times that heavy construction equipment is operating in proximity to the Project site perimeter. Moreover, construction at the Project site will be restricted to daytime hours, thereby eliminating potential vibration impact during the sensitive nighttime hours. On this basis, the potential for the proposed Project to result in the exposure of persons to or generation of excessive ground-borne vibration is determined to be less than significant.

9.5 Construction Mitigation Measures

Construction noise is of short-term duration and will not present any long-term impacts on the project site or the surrounding area. Although the proposed Project is exempt from Riverside County construction hours limitations, it is recommended that the following mitigation measures discussed below are employed as applicable and will serve to reduce the construction noise impacts to the nearby residential areas.

During all Project site excavation and grading on-site, the construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with the manufacturers' standards. The construction contractors shall place all stationary construction equipment so that emitted noise is directed away from the noise-sensitive receptors (residences) nearest the Project site.

The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise-sensitive receptors nearest the Project site during all project construction.

The construction contractor shall limit all construction-related activities that would result in high noise levels according to the construction hours provided in the County of Riverside noise ordinance for construction.

The construction contractor shall limit haul truck deliveries to the same hours specified for construction equipment. To the extent feasible, haul routes shall not pass sensitive land uses or residential dwellings.

9.6 Construction Vibration Impacts

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods used, distance to the affected structures, and soil type. It is expected that ground-borne vibration from project construction activities would cause only intermittent, localized intrusion. The proposed Project's construction activities most likely to cause vibration impacts are:

• Heavy Construction Equipment: Although all heavy mobile construction equipment has the potential of causing at least some perceptible vibration while operating close to a building, the vibration is usually short-term and is not of sufficient magnitude to cause building damage. It is not expected that heavy equipment such as large bulldozers would operate close enough to any residences to cause a vibration impact.

• Trucks: Trucks hauling building materials to construction sites can be sources of vibration intrusion if the haul routes pass through residential neighborhoods on streets with bumps or potholes. Repairing the bumps and potholes generally eliminates the problem.

10.0 Conclusion

Would the proposed Project generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

As a public agency, EMWD is not subject to other local jurisdictional agencies' noise ordinances, nor is EMWD required to obtain variances from local agencies. However, for purposes of evaluation, local agency noise ordinances are utilized as thresholds to analyze noise levels from the construction of the proposed EMWD facility and potential impacts to sensitive receptors for CEQA purposes. They are also used as a guideline to develop mitigation measures that would typically be used to minimize noise impacts to sensitive receptors.

Based on a worst-case construction scenario of utilizing the loudest pieces of equipment for each construction phase and evaluated at the nearest residential receiver, the highest noise level that would be experienced at the closest sensitive residential receivers is 73.1 dBA L_{eq}. This noise level would be a noticeable increase of 20 dBA over existing maximum daytime levels of 52.8 dBA L_{eq}.

However, the County of Riverside does not establish a construction noise level and exempts private construction projects from general noise standards, as long as the construction occurs during allowable hours. The County of Riverside Municipal Code exempt private construction projects located within one-quarter of a mile from an inhabited dwelling from the County's noise standards if 1) Construction does not occur between the hours of 6:00 p.m. and 6:00 a.m. during the months of June through September, and 2) Construction does not occur between the hours of 6:00 p.m. and 7:00 a.m. during the months of October through May.

Although the proposed EMWD Project is considered a capital improvement project of a government agency, if construction occurs outside of the above restricted hours, construction noise levels would not be considered an impact. Further, the maximum predicted noise level of 73.1 dBA L_{eq} is below the FTA residential construction noise standards of 90 dBA Leq (1-hr) for daytime noise levels and 80 dBA (1-hr) for nighttime noise levels.

Recommend Mitigation Measures: The following mitigation measures are recommended to be implemented during the construction of the proposed Project.

- During all Project site excavation and grading on-site, the construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with the manufacturers' standards. The construction contractors shall place all stationary construction equipment so that emitted noise is directed away from the noise-sensitive receptors (residences) nearest the Project site.

- The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise-sensitive receptors nearest the Project site during all project construction.

- The construction contractor shall limit all construction-related activities that would result in high noise levels according to the construction hours provided in the County of Riverside noise ordinance for construction.
- The construction contractor shall limit haul truck deliveries to the same hours specified for construction equipment. To the extent feasible, haul routes shall not pass sensitive land uses or residential dwellings.

Generation of excessive ground-borne vibration or ground-borne noise levels?

For general construction activities during grading and excavation, construction vibration levels are expected to approach 0.0055 (in/sec) at the nearest residential receiver. If blasting activities are required for a duration of one day, blasting vibration levels are expected to approach 0.103 (in/sec). Both vibration levels are below the construction vibration assessment annoyance criteria provided by the FTA of 0.2 in/sec.

Further, impacts at the site of the closest sensitive receptor are unlikely to be sustained during the entire construction period but will occur rather only during the times that heavy construction equipment is operating in proximity to the Project site perimeter. Moreover, construction at the Project site will be restricted to daytime hours, thereby eliminating potential vibration impact during the sensitive nighttime hours. On this basis, the potential for the proposed Project to result in the exposure of persons to or generation of excessive ground-borne vibration is determined to be less than significant.

Recommend Mitigation Measures:

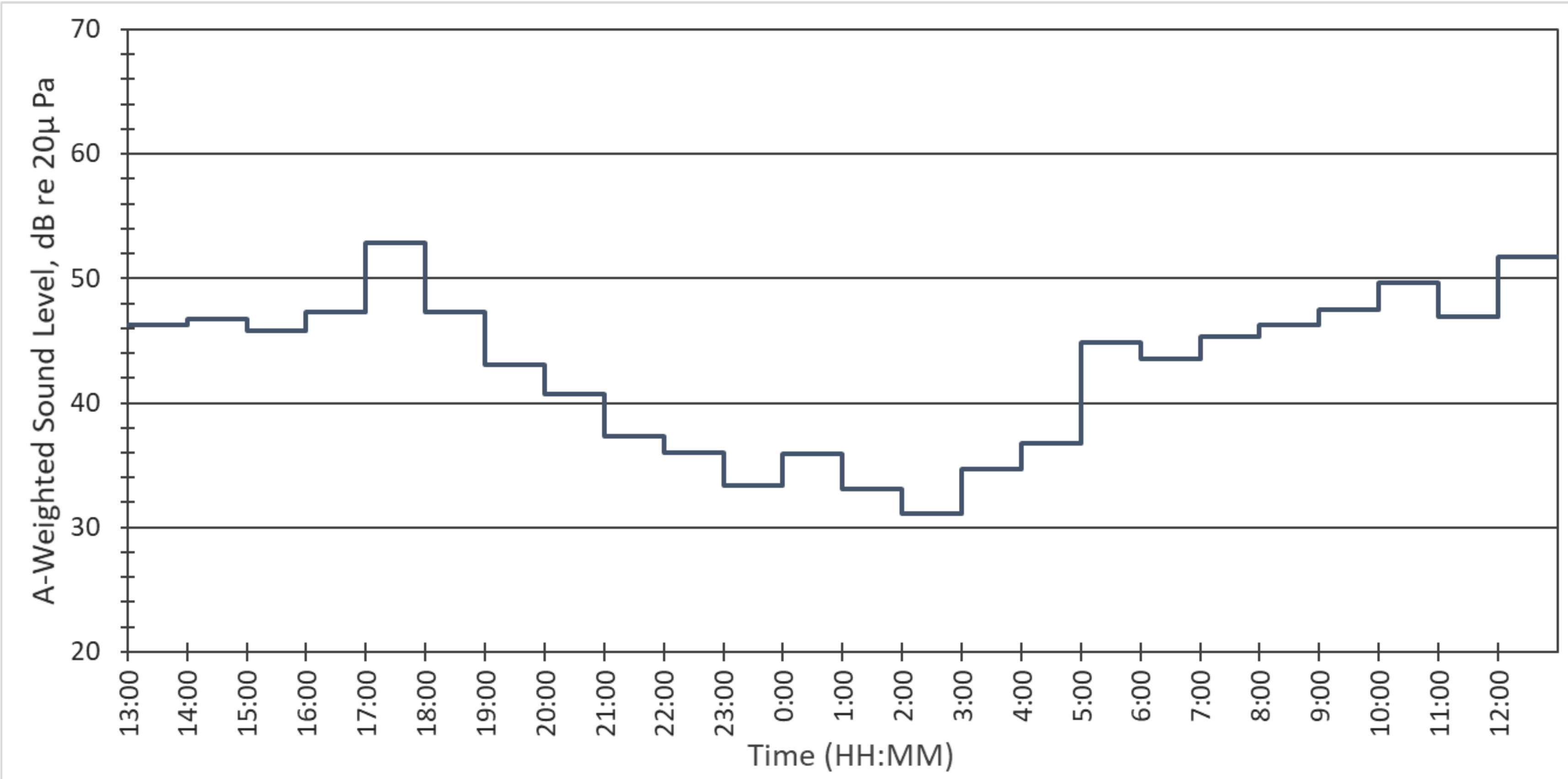
Operating large bulldozers away from residential land uses.

For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project expose people residing or working in the project area to excessive noise levels?

The proposed Project will not generate operational noise levels that would increase the noise within the existing environment. Therefore, the proposed project area would not exposure people working in the project area to excessive noise levels associated with aircraft.

Appendix A-24-hr Long Term Monitoring Data

Time	Leq (1-hr)	Ldn	CNEL
13:00	46.2	46.2	46.2
14:00	46.8	46.8	46.8
15:00	45.8	45.8	45.8
16:00	47.3	47.3	47.3
17:00	52.8	52.8	52.8
18:00	47.3	47.3	47.3
19:00	43.1	43.1	48.1
20:00	40.7	40.7	45.7
21:00	37.4	37.4	42.4
22:00	36.0	46.0	46.0
23:00	33.4	43.4	43.4
0:00	35.9	45.9	45.9
1:00	33.1	43.1	43.1
2:00	31.1	41.1	41.1
3:00	34.7	44.7	44.7
4:00	36.8	46.8	46.8
5:00	44.8	54.8	54.8
6:00	43.5	53.5	53.5
7:00	45.3	45.3	45.3
8:00	46.3	46.3	46.3
9:00	47.4	47.4	47.4
10:00	49.6	49.6	49.6
11:00	46.9	46.9	46.9
12:00	51.7	51.7	51.7
		CNEL	48.5



70
60
50
40
30
20
A-Weighted Sound Level, dB re 20µ Pa
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
Time (HH:MM)

Appendix B- Roadway Construction Noise Model Runs

			Roadway Construction Noise Model (RCNM),Version 1.1												
Report date:	9/11/2020														
Case Description:	Tank Construction														
				---- Receptor #1 ----											
		Baselines (dBA)													
Description	Land Use	Daytime	Evening	Night											
Home/Yard	Residential	47.7	41	39.1											
				Equipment											
				Spec	Actual	Receptor	Estimated								
		Impact		Lmax	Lmax	Distance	Shielding								
Description		Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)								
Backhoe		No	40		77.6	360	0								
Grader		No	40	85		360	0								
Dozer		No	40		81.7	360	0								
				Results											
		Calculated (dBA)			Noise Limits (dBA)						Noise Limit Exceedance (dBA)				
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Backhoe		60.4	56.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grader		67.9	63.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		64.5	60.5	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	67.9	66	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		*Calculated Lmax is the Loudest value.													

			Roadway Construction Noise Model (RCNM),Version 1.1												
Report date:	9/11/2020														
Case Description:	Water Basin Construction														
				---- Receptor #1 ----											
		Baselines (dBA)													
Description	Land Use	Daytime	Evening	Night											
Home/Yard	Residential	47.7	41	39.1											
				Equipment											
				Spec	Actual	Receptor	Estimated								
		Impact		Lmax	Lmax	Distance	Shielding								
Description		Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)								
Backhoe		No	40		77.6	330	0								
Excavator		No	40		80.7	330	0								
Dump Truck		No	40		76.5	330	0								
				Results											
		Calculated (dBA)			Noise Limits (dBA)						Noise Limit Exceedance (dBA)				
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Backhoe		61.2	57.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator		64.3	60.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dump Truck		60.1	56.1	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	64.3	63	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		*Calculated Lmax is the Loudest value.													

			Roadway Construction Noise Model (RCNM),Version 1.1												
Report date:	9/11/2020														
Case Description:	Road Construction														
				---- Receptor #1 ----											
		Baselines (dBA)													
Description	Land Use	Daytime	Evening	Night											
Home/Yard	Residential	47.7	41	39.1											
				Equipment											
				Spec	Actual	Receptor	Estimated								
		Impact		Lmax	Lmax	Distance	Shielding								
Description		Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)								
Backhoe		No	40		77.6	160	0								
Grader		No	40	85		160	0								
Dozer		No	40		81.7	160	0								
				Results											
		Calculated (dBA)			Noise Limits (dBA)						Noise Limit Exceedance (dBA)				
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Backhoe		67.5	63.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grader		74.9	70.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		71.6	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
	Total	74.9	73.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		*Calculated Lmax is the Loudest value.													

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 11/16/2020
Case Description:

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Home/Yard	Residential	47.7	41	39.1

Equipment

Description	Impact Device	Usage(%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Blasting	Yes	1	94		160	0

Results

		Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Blasting		83.9	63.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	83.9	63.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 11/16/2020
Case Description:

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Home/Yard	Residential	47.7	41	39.1

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Blasting	Yes	1	94		330	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	77.6	57.6	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	77.6	57.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 11/16/2020
Case Description:

---- Receptor #1 ----

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Home/Yard	Residential	47.7	41	39.1

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Blasting	Yes	1	94		360	0

Results

		Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
				Day		Evening		Night		Day		Evening		Night	
Equipment		*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Blasting		76.9	56.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	76.9	56.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.