

MEMORANDUM

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Date: February 28, 2025

Subject: East Valley Parkway and Midway Drive Drainage Improvement Project – Noise and Vibration Assessment

PURPOSE

The purpose of this technical memorandum is to evaluate potential short- and long-term noise and groundborne vibration impacts resulting from the construction of the East Valley Parkway and Midway Drive Drainage Improvement Project (project), located in the City of Escondido (City), California.

PROJECT LOCATION

The project site is an approximately 5-mile-long corridor within public rights-of-way along existing roadways and Escondido Creek in the central portion of the City of Escondido, within San Diego County (County), California; refer to [Figure 1, *Regional Vicinity*](#), and [Figure 2, *Project Site and Vicinity*](#).

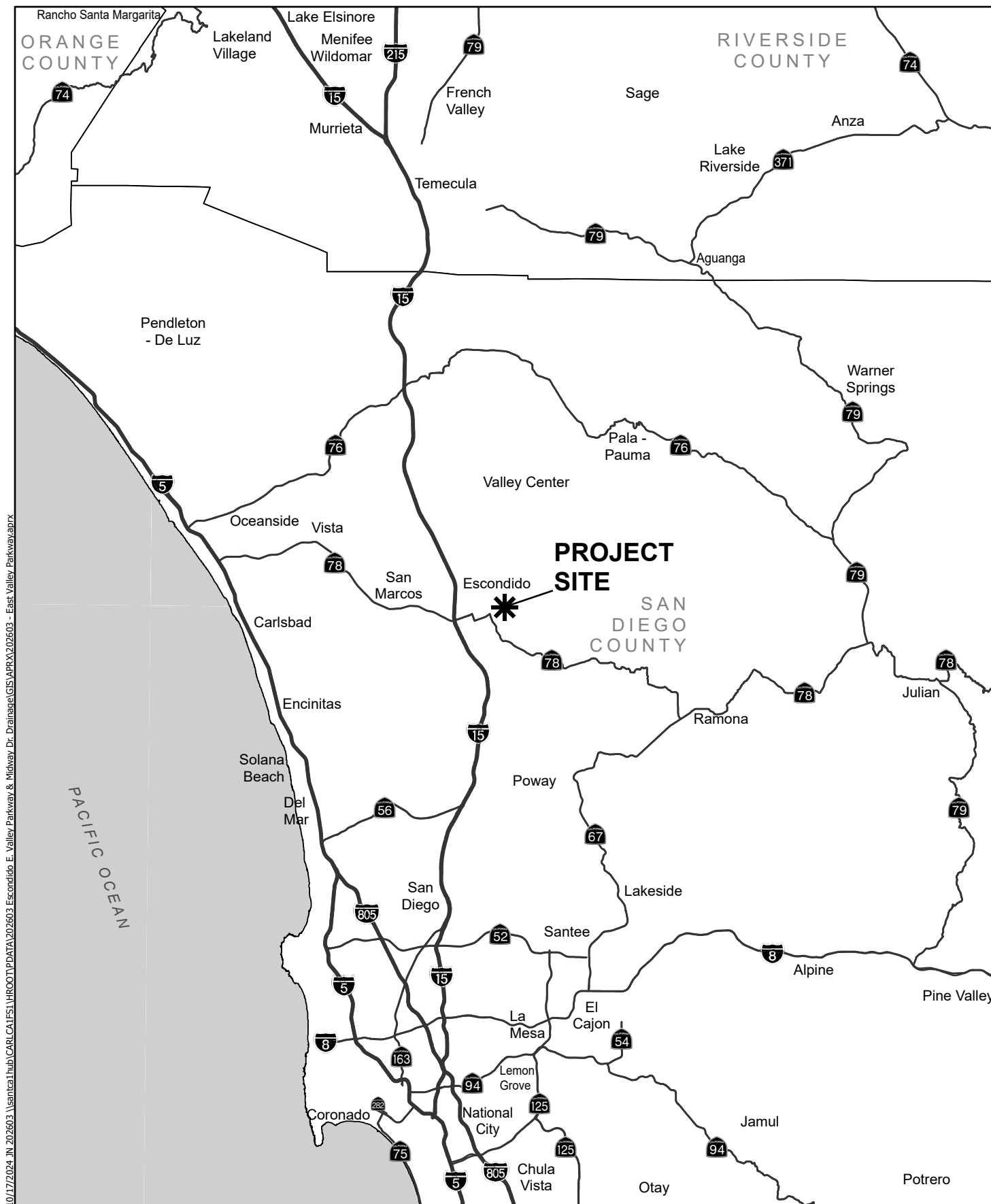
EXISTING SITE CONDITIONS

The existing storm drainage systems in the project area are undersized and unable to collect and convey anticipated flow rates, resulting in more than 1,600 properties being completely or partially within a Federal Emergency Management Agency (FEMA) 100-year floodplain. Localized flooding occurs within the project area and has triggered deployment of sandbags and road closures an average of five times per year since 2019.

PROJECT DESCRIPTION

The proposed project would involve increasing the capacity of the storm drain systems in the central portion of the City to collect and convey flows up to a 100-year frequency storm event downstream to Escondido Creek. Escondido Creek is a concrete-lined channel in the vicinity of the project site that has been improved to convey runoff from a 100-year storm. The proposed project would involve the construction of approximately 16,850 linear feet of reinforced concrete box culverts and approximately 4,450 linear feet of reinforced concrete pipelines beneath existing roadways and adjacent public rights-of-way (e.g., sidewalks) and four new stormwater inlets into

Escondido Creek. The culverts would range in size from a single 6-foot by 4-foot culvert (24 square feet in area) to a dual 12-foot by 10-foot culvert (240 square feet in area). The pipelines would be 36 inches in diameter (approximately 7 square feet in area) and 54 inches in diameter (approximately 16 square feet in area). The project would require relocation of some of the existing underground utility lines to accommodate the proposed storm drain culverts. After relocation of existing utilities and installation of the proposed storm drain culverts and pipes, the affected roadways/sidewalks would be resurfaced. Road resurfacing would include the provision of storm drain inlets along both sides of the roads to collect runoff. The project would also include bioretention areas to provide filtration and treatment of runoff before discharging into Escondido Creek. Construction of the proposed project is anticipated to take approximately 24 months to complete, commencing in February 2026 and concluding in February 2028. Given the linear nature of the project, the active construction area would continuously move along the project site at a rate of approximately 50 to 80 linear feet per day. Pipe installation would be completed in trenches. After pipe installation, the trenches would be backfilled and the road would be repaved. The proposed project would require 90,000 cubic yards of soil export and 31,000 cubic yards of soil import.



EAST VALLEY PARKWAY & MIDWAY DRIVE DRAINAGE IMPROVEMENTS
CITY OF ESCONDIDO

Michael Baker
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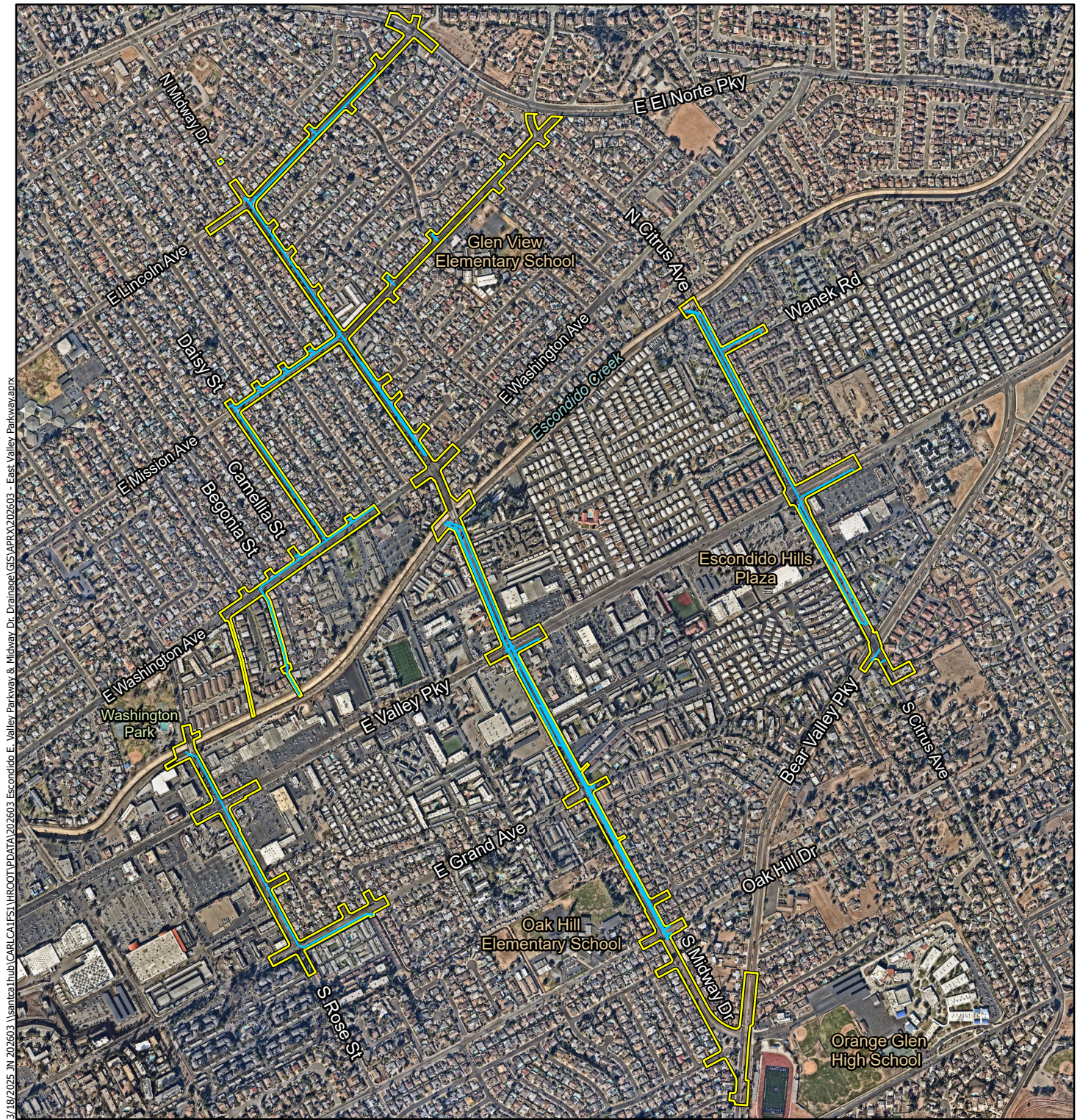


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Source: Esri, ArcGIS Online, San Diego County, City of Escondido

Regional Vicinity

Figure 1



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Legend

- Proposed Storm Water Drainage Culvert/Pipeline Location
- Project Site

EAST VALLEY PARKWAY & MIDWAY DRIVE DRAINAGE IMPROVEMENTS
CITY OF ESCONDIDO

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0 500 1,000
US Feet

Source: Esri, San Diego County, City of Escondido, 2025 Nearmap Imagery

Project Site and Vicinity

Figure 2

FUNDAMENTALS OF SOUND AND ENVIRONMENTAL NOISE

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air and is characterized by both its amplitude and frequency (or pitch). The human ear does not hear all frequencies equally. In particular, the ear deemphasizes low and very high frequencies. To better approximate the sensitivity of human hearing, the A-weighted decibel scale (dBA) has been developed. Decibels are based on the logarithmic scale. The logarithmic scale compresses the wide range in sound pressure levels to a more usable range of numbers in a manner similar to the Richter scale used to measure earthquakes. In terms of human response to noise, a sound 10 dBA higher than another is perceived to be twice as loud and 20 dBA higher is perceived to be four times as loud, and so forth. Everyday sounds normally range from 30 dBA (very quiet) to 100 dBA (very loud). On this scale, the human range of hearing extends from approximately 3 dBA to around 140 dBA.

Noise is generally defined as unwanted or excessive sound, which can vary in intensity by over one million times within the range of human hearing; therefore, a logarithmic scale, known as the decibel scale (dB), is used to quantify sound intensity. Noise can be generated by several sources, including mobile sources such as automobiles, trucks, and airplanes, and stationary sources such as construction sites, machinery, and industrial operations. Noise generated by mobile sources typically attenuates (is reduced) at a rate between 3 dBA and 4.5 dBA per doubling of distance. The rate depends on the ground surface and the number or type of objects between the noise source and the receiver. Hard and flat surfaces, such as concrete or asphalt, have an attenuation rate of 3 dBA per doubling of distance. Soft surfaces, such as uneven or vegetated terrain, have an attenuation rate of about 4.5 dBA per doubling of distance. Noise generated by stationary sources typically attenuates at a rate between 6 dBA and about 7.5 dBA per doubling of distance.

There are several metrics used to characterize community noise exposure, which fluctuate constantly over time. One such metric, the equivalent sound level (L_{eq}), represents a constant sound that, over the specified period, has the same sound energy as the time-varying sound. Noise exposure over a longer period is often evaluated based on the day-night sound level (L_{dn}). This is a measure of 24-hour noise levels that incorporates a 10 dBA penalty for sounds occurring between 10:00 p.m. and 7:00 a.m. The penalty is intended to reflect the increased human sensitivity to noises occurring during nighttime hours, particularly at times when people are sleeping and there are lower ambient noise conditions. Typical L_{dn} noise levels for light- and medium-density residential areas range from 55 dBA to 65 dBA.

Similarly, community noise equivalent level (CNEL) is a measure of 24-hour noise levels that incorporates a 5 dBA penalty for sounds occurring between 7:00 p.m. and 10:00 p.m. and a 10 dBA penalty for sounds occurring between 10:00 p.m. and 7:00 a.m. to account for noise sensitivity in the evening and nighttime, respectively. Noise levels described by L_{dn} and CNEL are similar and usually do not differ by more than 1 dBA. Additionally, the L_{max} , or maximum sound level, describes the highest sound level at a single event in which the sound level changes value as time goes on. Although L_{max} is important in evaluating an interference caused by a single noise event, L_{max} could not be totaled into a one-hour or a 24-hour cumulative measure of impact.

FUNDAMENTALS OF ENVIRONMENTAL GROUND BORNE VIBRATION

Sources of earth-borne vibrations include natural phenomena (earthquakes, volcanic eruptions, sea waves, landslides, etc.) or man-made causes (explosions, machinery, traffic, trains, construction equipment, etc.). Vibration sources may be continuous (e.g., factory machinery) or transient (e.g., explosions). Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One is the peak particle velocity (PPV); another is the root mean square (RMS) velocity. The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. The RMS velocity is defined as the average of the squared amplitude of the signal. The PPV and RMS vibration velocity amplitudes are used to evaluate human response to vibration.

Table 1, *Human Reaction and Damage to Buildings for Continuous or Frequent Intermittent Vibration Levels*, describes the reactions of people and the effects on buildings produced by continuous vibration levels. The annoyance levels shown in the table should be interpreted with care since vibration may be found to be annoying at much lower levels than those listed, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage.

Ground vibration can be a concern in instances where buildings shake and substantial rumblings occur. However, it is unusual for vibration from typical urban sources such as buses and heavy trucks to be perceptible. Common sources for groundborne vibration are planes, trains, and construction activities such as pile driving and vibratory compacting activities, which require the use of heavy-duty earthmoving equipment. For the purposes of this analysis, a PPV descriptor with units of inches per second (in/sec) is used to evaluate construction-generated vibration for building damage and human complaints.

Table 1
Human Reaction and Damage to Buildings for Continuous or Frequent Intermittent Vibration Levels

Peak Particle Velocity (inches/second)	Approximate Vibration Velocity Level (VdB)	Human Reaction	Effect on Buildings
0.006–0.019	64–74	Range of threshold of perception.	Vibrations unlikely to cause damage of any type.
0.08	87	Vibrations readily perceptible.	Recommended upper level to which ruins and ancient monuments should be subjected.
0.1	92	Level at which continuous vibrations may begin to annoy people, particularly those involved in vibration sensitive activities.	Virtually no risk of architectural damage to normal buildings.
0.2	94	Vibrations may begin to annoy people in buildings.	Threshold at which there is a risk of architectural damage to normal dwellings.
0.4–0.6	98–104	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges.	Architectural damage and possibly minor structural damage.

Source: California Department of Transportation 2002.

ENVIRONMENTAL SETTING

Noise-Sensitive Receptors

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Additional land uses such as parks, historic sites, cemeteries, and recreation areas are considered to be sensitive to increases in exterior noise levels. Schools, churches, hotels, libraries, and other places where low interior noise levels are essential are also considered noise-sensitive land uses.

The project site is currently surrounded by land uses including single- and multifamily residences, commercial uses, schools, religious institutions, a self-storage center, a fire station, and a public park. The nearest sensitive receptors are residential uses (multifamily residences and single-family residences), institutional uses (New Hope Community Church), and schools (Orange Glen High School, Glen View Elementary School, Oak Hill Elementary School, Learning Jungle Escondido East, and Children's Choice Academy) located along the proposed project limits. Project construction activities would occur as close as 5 feet from the existing residential uses.

REGULATORY SETTING

State

California Noise Control Act of 1973

Sections 46000 through 46080 of the California Health and Safety Code, known as the California Noise Control Act, find that excessive noise is a serious hazard to public health and welfare and that exposure to certain levels of noise can result in physiological, psychological, and economic damage. The act also finds that there is a continuous and increasing bombardment of noise in urban, suburban, and rural areas. The California Noise Control Act declares that the State of California has a responsibility to protect the health and welfare of its citizens by the control, prevention, and abatement of noise. It is the policy of the state to provide an environment for all Californians that is free from noise that jeopardizes their health or welfare.

Local

City of Escondido General Plan

The *City of Escondido General Plan* Chapter IV, Community Protection, Section G, Noise, addresses noise mitigation regulations, strategies, and programs and delineates federal, state, and City jurisdiction relative to rail, automotive, aircraft, and nuisance noise (City of Escondido 2012). The General Plan also outlines the objectives and policies for noise control within the City. The following goal and policies are applicable to the project:

Goal 5: Protection of the community from excessive noise exposure.

Noise Policy 5.5: Require construction projects and new development to ensure acceptable vibration levels at nearby noise-sensitive uses based on Federal Transit Administrator criteria.

Noise Policy 5.7: Encourage use of site and building design, noise barriers, and construction methods as outlined in Figure VI-15 (Noise Reduction Strategies) to minimize impacts on and from new development.

Noise Policy 5.10: Require development projects that are subject to discretionary approval to assess potential construction noise impacts on nearby sensitive uses and to minimize impacts on these uses, to the extent feasible.

Municipal Code Noise Ordinance

Sec. 17-234. Construction equipment.

Except for emergency work, it shall be unlawful for any person, including the City of Escondido, to operate construction equipment as follows:

- a. It shall be unlawful for any person, including the City of Escondido, to operate construction equipment at any construction site, except on Monday through Friday during a week between the hours of seven (7) a.m. and six (6) p.m. and on Saturdays between the hours

of nine (9) a.m. and five (5) p.m., and provided that the operation of such construction equipment complies with the requirements of subsection (d) of this section.

- b. It shall be unlawful for any person, including the City of Escondido, to operate construction equipment at any construction site on Sundays and on days designated by the president, governor or city council as public holidays.
- d. No construction equipment or combination of equipment, regardless of age or date of acquisition, shall be operated so as to cause noise in excess of a one-hour average sound level limit of seventy-five (75) dB at any time, unless a variance has been obtained in advance from the city manager.
- e. Persons engaged in construction for profit or as a business shall post signs at conspicuous places on a construction site, indicating hours of work as prescribed by this article or authorized by permit and the applicable noise level limits.

Sec. 17-238. Grading.

- a. It shall be unlawful for any person, including the City of Escondido, to do any authorized grading at any construction site, except on Mondays through Fridays during a week between the hours of seven (7) a.m. and six (6) p.m. and, provided a variance has been obtained in advance from the city manager, on Saturdays from ten (10) a.m. to five (5) p.m.
- b. For the purpose of this section, “grading” shall include but not be limited to compacting, drilling, rock crushing or splitting, bulldozing, clearing, dredging, digging, filling and blasting.
- c. In addition, any equipment used for grading shall not be operated so as to cause noise in excess of a one hour sound level limit of seventy-five (75) dB at any time when measured at or within the property lines of any property which is developed and used in whole or in part for residential purposes, unless a variance has been obtained in advance from the city manager.

CALIFORNIA ENVIRONMENTAL QUALITY ACT THRESHOLDS

The environmental analysis in this memorandum is patterned after the Initial Study Checklist recommended by the *CEQA Guidelines*. The issues presented in the Initial Study Checklist have been utilized as thresholds of significance in this section. Accordingly, a project may have a significant adverse impact related to noise and vibration if it would do any of the following:

- 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 (refer to Impact NOI-1);
- Generate excessive groundborne vibration or groundborne noise levels (refer to Impact NOI-2); and/or

- 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, expose people residing or working in the project area to excessive noise levels (refer to Impact NOI-3).

SIGNIFICANCE CRITERIA AND METHODOLOGY

Construction Noise Standards

The City of Escondido has established a quantitative threshold that applies to noise levels at active construction sites. Based on the City's Municipal Code Sections 17-234 and 17-238, the maximum noise allowed during permitted construction hours at the nearest residential uses shall not exceed a one-hour average sound level limit of 75 dBA at any time. Noise levels from construction equipment and activities were modeled using the Federal Highway Administration's Roadway Construction Noise Model (2006). Construction equipment anticipated to be used for the project was provided by the project engineers; refer [Appendix A, Noise Data](#).

Operational Noise Standards

As a drainage improvement project, the project would not introduce new land uses, and operation of the proposed project would not introduce any new stationary noise-generating sources. The proposed project would not increase the roadway capacity along any of the subject roadways or represent a trip-generating land use that would result in increased mobile sources noise during project operations.

IMPACT ANALYSIS

NOI-1 Would the 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?

Level of Significance: Less Than Significant Impact.

Construction Noise Impacts

Construction noise typically occurs intermittently and varies depending on the nature or phase of construction (e.g., grading, grubbing, and excavation) that has the potential to create highest noise levels. The proposed project would be constructed over a duration of approximately 24 months and all construction activities would occur simultaneously.

Construction noise is difficult to quantify because of the many variables involved, including the specific equipment types, size of equipment used, percentage of time each piece is in operation, condition of each piece of equipment, and number of pieces that would operate on the site. Construction equipment produces maximum noise levels when equipment is operating under full power conditions (i.e., the equipment engine at maximum speed). However, equipment used on construction sites typically operates under less than full power conditions, or part power. These noise levels are typically associated with multiple pieces of equipment simultaneously operating

on part power. As previously stated, the City has established a quantitative threshold that applies to noise levels at active construction sites. Based on the City's Municipal Code Sections 17-234 and 17-238, the maximum noise allowed during permitted construction hours at the nearest residential uses shall not exceed a one-hour average sound level limit of 75 dBA at any time.

Table 2, Construction Schedule, outlines the proposed storm water drainage improvements for all roadways within the project area. Although the project construction activities would occur simultaneously, it should be noted that the project proposes drainage improvement along roadway segments of approximately 4.5 miles in total; construction equipment would be concentrated in one sub-area until specifications are met and then move to the next sub-area of the project site. As shown in Table 2, construction activities would progress linearly at a rate of 50 feet to 80 feet per day. As such, construction noise levels would intermittently occur for a day when construction equipment is operating closest to the nearest sensitive uses. Due to the site constraints (narrow construction area) and project phasing, construction activities would not occur simultaneously at one location. Therefore, the noise level of each piece of construction equipment is quantified individually. Additionally, as the construction equipment moves from one sub-area to the next, construction noise levels would decrease as the equipment operates in an area farther away from the sensitive uses.

Table 2
Construction Schedule

Roadway	Approximate Trench Length (feet) (includes 15% contingency)	Installation Rate (feet/day)	Total Working Days (includes 25% contingency)	Calendar Months
Washington Avenue	2,105	60	44	2.1
Midway Drive (Lincoln to Escondido Creek)	3,450	60	72	3.4
Lincoln Avenue	1,817	50	45	2.2
Mission Avenue	2,565	80	40	1.9
Citrus Avenue (Escondido Creek to Bear Valley Parkway)	3,634	60	76	3.6
Citrus Avenue (Valley Parkway to Bear Valley)	2,214	80	35	1.6
Midway Drive (Escondido Creek to Valley Parkway)	1,311	50	33	1.6
Midway Drive (Valley Parkway to East Grand)	1,017	80	16	0.8
Midway Drive (East Grand to Bear Valley)	1,311	80	20	1.0
Rose Street	2,070	60	43	2.1
Grand Avenue	690	80	11	0.5

Source: Construction equipment anticipated to be used for the project was provided by the project engineers.

The estimated construction noise levels at the nearest noise-sensitive receptors are presented in Table 3, Construction Noise Levels at Adjacent Residential Receptors. Sensitive land uses surrounding the project area include single- and multifamily residences, schools, religious institutions, and a public park. Project construction activities would occur as close as 5 feet from the existing residential uses. Table 3 also shows construction noise levels at 50 and 80 feet.

Table 3
Construction Noise Levels at Adjacent Residential Receptors

Construction Equipment	Number of Equipment	Estimated Exterior Construction Noise Level at 5 feet (dBA L _{eq}) ¹	Estimated Exterior Construction Noise Level at 15 feet (dBA L _{eq}) ¹	Estimated Exterior Construction Noise Level at 50 feet (dBA L _{eq}) ¹	Estimated Exterior Construction Noise Level at 80 feet (dBA L _{eq}) ¹
Concrete/Industrial Saws	2	102.6	93.0	82.6	78.5
Excavators	3	96.7	87.2	76.7	72.6
Pavers	1	94.2	84.7	74.2	70.1
Compactors (Plate)	1	96.2	86.7	76.2	72.2
Pressure Washers	1	105.1	95.6	85.1	81.0
Pumps	2	97.9	88.4	77.9	73.8
Rollers	1	93.0	83.5	73.0	68.9
Rough Terrain Forklifts	1	91.0	81.5	71.0	66.9
Rubber Tired Loaders/Skid Teer Loaders	2	95.1	85.6	75.1	71.0
Surfacing Equipment	1	97.3	87.8	77.3	73.3
Tractors/Loaders/Backhoes	1	93.6	84.0	73.6	69.5
Welders	1	90.0	80.5	70.0	65.9

Source: Federal Highway Administration 2006 (see Appendix A).

Notes:

The noise level of each construction equipment is quantified individually due to the nature of the construction activities. Refer to Appendix A, *Noise Data*, for modeled heavy construction equipment list.

Based on Table 3, construction noise levels would be approximately 90.0 to 105.1 dBA L_{eq} at 5 feet and approximately 80.5 to 95.6 dBA L_{eq} at 15 feet. As previously stated, construction activities would progress linearly, and equipment would move at a rate of 50 to 80 feet per day. Construction noise would range from approximately 70.0 to 85.1 dBA L_{eq} at 50 feet and approximately 65.9 to 81.0 dBA L_{eq} at 80 feet, and therefore has the potential to exceed the City's one-hour average sound level limit of 75 dBA. However, noise levels from point sources such as equipment at construction sites typically attenuate at a rate of 6 dBA per doubling of distance. As the construction equipment moves linearly along the subject roadways, none of the construction equipment would operate continuously for eight hours or more near a sensitive receptor. As previously stated, construction noise would occur intermittently for a day when construction equipment is operating closest to each nearby sensitive receptor and would cease as the equipment moves farther away from the sensitive receptors.

Nevertheless, to reduce construction-related noise levels at the sensitive receptors, the project would implement several best management practices (BMPs) during construction, such as the use of construction equipment with properly operating and maintained mufflers, and locating stationary construction equipment so that emitted noise is directed away from the nearest noise-sensitive receptors. The construction hours would also be limited to be consistent with the City's Municipal Code (grading activities would be limited to 7:00 a.m. to 6:00 p.m. Monday through Friday, and construction activities would be limited to 7:00 a.m. to 6:00 p.m. Monday through Friday and 9:00 a.m. to 5:00 p.m. on Saturday; grading and construction activities are not allowed on Sundays or holidays). The noise mufflers could provide noise reduction of approximately 10 dBA and natural noise reduction would also occur. Temporary noise barriers are deemed infeasible for the project as the narrow construction area limits the available space for installing such barriers. Although construction noise would occur intermittently and would cease as the equipment moves farther away from the sensitive receptors, given that the project is anticipated

to exceed the one-hour sound level limit of 75 dB at residential property lines and temporary noise barriers are deemed infeasible, a variance would be obtained in advance from the City Manager to ensure compliance with the City's Municipal Code Sections 17-234 and 17-238.

Therefore, construction activities would occur within prescribed hours and intermittently for a day when construction equipment is operating closest to each nearby sensitive use. With the implementation of BMPs and upon obtaining a variance from the City Manager, construction noise impacts would be less than significant.

Long-Term Operational Noise Impacts

Mobile Noise

The proposed project, which includes storm water drainage improvement, would not increase the roadway capacity along any of the subject roadways or represent a trip-generating land use that would result in increased mobile source noise during project operations. No impacts would occur in this regard.

Stationary Noise

As a storm water drainage improvement project, the project would not introduce new land uses, and operation of the proposed project would not introduce any new stationary noise-generating sources. No impacts would occur in this regard.

Best Management Practices

To reduce noise levels during construction activities, the construction contractors must demonstrate, to the satisfaction of the City of Escondido Public Works Department, that the project complies with the following:

- Construction contracts must specify that all construction equipment, fixed or mobile, shall be equipped with properly operating and maintained mufflers and other state-required noise attenuation devices.
- During construction, stationary construction equipment shall be placed such that emitted noise is directed away from sensitive noise receivers.

Mitigation Measures: No mitigation is required.

NOI-2 Would the project generate excessive groundborne vibration or groundborne noise levels?

Level of Significance: Less Than Significant Impact.

Construction Vibration

Project construction can generate varying degrees of groundborne vibration, depending on the construction procedure and the construction equipment used. Operation of construction equipment generates vibrations that spread through the ground and diminish in amplitude with distance from the source. The effect on buildings located in the vicinity of the construction site often varies depending on soil type, ground strata, and construction characteristics of the receiver building(s). The results from vibration can range from no perceptible effects at the lowest vibration

levels, to low rumbling sounds and perceptible vibration at moderate levels, to slight damage at the highest levels. Groundborne vibrations from construction activities rarely reach levels that damage structures.

The California Department of Transportation's *Transportation and Construction Vibration Guidance Manual* (2020) identifies various vibration damage criteria for different building classes. This evaluation uses the California Department of Transportation architectural damage criterion for continuous vibrations at residential buildings of 0.5 in/sec PPV. Groundborne vibration levels associated with representative construction equipment are summarized in Table 4, *Typical Vibration Levels for Construction Equipment*.

Table 4
Typical Vibration Levels for Construction Equipment

Equipment	Reference peak particle velocity at 25 feet (in/sec)	Approximate peak particle velocity at 15 feet (in/sec) ¹
Vibratory roller	0.210	0.368
Large bulldozer	0.089	0.156
Loaded trucks	0.076	0.133
Small bulldozer	0.003	0.005

Source: Federal Transit Administration 2018.

Notes:

Calculated using the following formula:

$$PPV_{equip} = PPV_{ref} \times (25/D)^{1.1}$$

where: PPV (equip) = the peak particle velocity in inch-per-second of the equipment adjusted for the distance

PPV (ref) = the reference vibration level in inch-per-second from Table 7-4 of the Federal Transit Administration's *Transit Noise and Vibration Impact Assessment Manual*

D = the distance from the equipment to the receiver.

Construction activities would occur linearly along the subject roadways, and due to the site constraints (narrow construction area), large construction equipment, including large bulldozers, would operate as close as 15 feet from the nearest sensitive receptor buildings. The project would also use vibratory rollers during construction. As indicated in Table 4, vibration velocities range between 0.005 in/sec and 0.368 in/sec at 15 feet, which would not cause vibration levels to exceed the 0.5 in/sec threshold at the closest sensitive receptor structures. Further, construction activities would progress linearly along the subject roadways and equipment would move at a rate of 50 to 80 feet per day. As such, vibration levels resulting from the proposed project would be temporary and intermittent in nature. Therefore, impacts from construction vibration would be less than significant.

Operational Vibration

The proposed project is a storm water drainage improvement project and operation of the project would not generate groundborne vibration that could be felt by surrounding uses. The project operation would not involve railroads or substantial heavy truck operations, and therefore, would not result in vibration impacts at surrounding uses. Thus, no impact would occur in this regard.

Mitigation Measures: No mitigation is required.

NOI-3 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?

Level of Significance: No Impact.

The proposed project is not located within an airport land use plan and there are no public or private airports or airstrips within 2 miles of the project site. The nearest public use airport to the project site is the McClellan-Palomar Airport, which is approximately 11 miles to the west. Furthermore, as a storm water drainage improvement project, the project would not include a land use that would expose people residing or working in the project area to excessive airport-related noise levels. Therefore, no impact would occur.

Mitigation Measures: No mitigation is required.

REFERENCES

California Department of Transportation. 2002. *Transportation Related Earthborne Vibrations*.

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City of Escondido. 2012. *City of Escondido General Plan*, Chapter IV, Community Protection, Section G, Noise. Accessed February 4, 2025. <https://www.escondido.gov/DocumentCenter/View/2502/Chapter-VI---Community-Protection-PDF>.

Federal Highway Administration. 2006. *Roadway Construction Noise Model (FHWA-HEP-05-054)*, version 1.1.

Federal Transit Administration. 2018. *Transit Noise and Vibration Impact Assessment Manual*.

Appendix A

Noise Data

Report date 10/9/2024
Case Descr Escondido Storm Water

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
All Construc	Residential	75	75	75

Equipment	Results													
	Calculated (dBA)			Noise Limits (dBA)					Noise Limit Exceedance (dBA)					
	*Lmax	Leq	Day	Leq	Evening	Leq	Lmax	Leq	Day	Leq	Evening	Leq	Lmax	Leq
Concrete Saw	109.6	102.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	100.7	96.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paver	97.2	94.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compactor (ground)	103.2	96.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Water Jet deleading	112.1	105.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pumps	100.9	97.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	100	93	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	95	91	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	99.1	95.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slurry Trenching Machin	100.4	97.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	97.6	93.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Welder / Torch	94	90	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	112.1	109.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
*Calculated Lmax is the Loudest value.														

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
All Construc	Residential	75	75	75

[illegible]

Excavator	91.2	87.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paver	87.7	84.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compactor (ground)	93.7	86.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Water Jet deleading	102.6	95.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pumps	91.4	88.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	90.5	83.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	85.5	81.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	89.6	85.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slurry Trenching Machir	90.8	87.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	88	84	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Welder / Torch	84.5	80.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	102.6	99.7	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.

Report date 10/2/2024
Case Descr Escondido Storm Water

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
All Construc	Residential	75	75	75

Equipment	Results													
	Calculated (dBA)			Noise Limits (dBA)					Noise Limit Exceedance (dBA)					
	*Lmax	Leq	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
			Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Concrete Saw	100	93	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	91.2	87.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paver	87.7	84.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compactor (ground)	93.7	86.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Water Jet deleading	102.6	95.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pumps	91.4	88.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	90.5	83.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	85.5	81.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	89.6	85.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slurry Trenching Machin	90.8	87.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	88	84	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Welder / Torch	84.5	80.5	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	102.6	99.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
*Calculated Lmax is the Loudest value.														

Description	Land Use	Baselines (dBA)		
		Daytime	Evening	Night
All Construc	Residential	75	75	75

[illegible]

Excavator	80.7	76.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paver	77.2	74.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compactor (ground)	83.2	76.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Water Jet deleading	92.1	85.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pumps	80.9	77.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	80	73	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	75	71	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	79.1	75.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slurry Trenching Machir	80.4	77.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	77.6	73.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Welder / Torch	74	70	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	92.1	89.2	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.

---- Receptor #3 ----

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
All Constr	Residential	75	75	75

Description	Impact Device	Usage(%)	Equipment			
			Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	60	0
Excavator	No	40		80.7	60	0
Paver	No	50		77.2	60	0
Compactor (ground)	No	20		83.2	60	0
Water Jet deleading	No	20		92.1	60	0
Pumps	No	50		80.9	60	0
Roller	No	20		80	60	0
Pickup Truck	No	40		75	60	0
Front End Loader	No	40		79.1	60	0
Slurry Trenching Machir	No	50		80.4	60	0
Backhoe	No	40		77.6	60	0
Welder / Torch	No	40		74	60	0

Results

Equipment	Calculated (dBA)			Noise Limits (dBA)				Noise Limit Exceedance (dBA)						
	*Lmax	Leq	Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq	Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq
Concrete Saw	88		81	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	79.1		75.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paver	75.6		72.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compactor (ground)	81.6		74.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Water Jet deleading	90.5		83.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pumps	79.4		76.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	78.4		71.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	73.4		69.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	77.5		73.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slurry Trenching Machir	78.8		75.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	76		72	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Welder / Torch	72.4		68.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	90.5		87.6	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.

---- Receptor #4 ----

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
All Constr	Residential	75	75	75

Description	Impact Device	Usage(%)	Equipment			
			Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	80	0
Excavator	No	40		80.7	80	0
Paver	No	50		77.2	80	0
Compactor (ground)	No	20		83.2	80	0
Water Jet deleading	No	20		92.1	80	0
Pumps	No	50		80.9	80	0
Roller	No	20		80	80	0
Pickup Truck	No	40		75	80	0
Front End Loader	No	40		79.1	80	0

Slurry Trenching Machir No		50	80.4	80	0
Backhoe	No	40	77.6	80	0
Welder / Torch	No	40	74	80	0

Results														
Equipment	Calculated (dBA)			Noise Limits (dBA)					Noise Limit Exceedance (dBA)					
			Day	Evening		Night			Day	Evening		Night		
	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Concrete Saw	85.5		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	76.6		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Paver	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
Compactor (ground)	79.1		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Water Jet deleading	88		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pumps	76.9		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller	75.9		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	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
Front End Loader	75		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slurry Trenching Machir	76.3		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	73.5		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Welder / Torch	69.9		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	88		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.