Acoustical Assessment
Oyster Cove Project
City of Petaluma, California

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Appendix

Appendix A: Noise Data

LIST OF ABBREVIATED TERMS

APN	Assessor's Parcel Number
ADT	average daily traffic
ASTM	American Society for Testing and Materials
dBA	A-weighted sound level
CEQA	California Environmental Quality Act
CSMA	California Subdivision Map Act
CNEL	community equivalent noise level
DNL	day-night noise level
dB	decibel
du/ac	dwelling units per acre
L_{eq}	equivalent noise level
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HVAC	heating ventilation and air conditioning
Hz	hertz
in/sec	inches per second
LUD	Land Use Designation
L_{max}	maximum noise level
µPa	micropascals
L_{min}	minimum noise level
PPV	peak particle velocity
RMS	root mean square
STC	Sound Transmission Class
sf	square feet
TNM	Traffic Noise Model
VdB	vibration velocity level

1 INTRODUCTION

This report documents the results of an Acoustical Assessment completed for the Oyster Cove Project ("proposed Project" or "Project"). The purpose of this Acoustical Assessment is to evaluate the Project's potential construction and operational noise and vibration levels associated with the Project and determine the level of impact the Project would have on the environment.

1.1 PROJECT LOCATION

The proposed Project is located at 100 and 310 East D Street in Petaluma. Figure 1: Regional Map and Figure 2: Project Vicinity Map depict the Project site in a regional and local context. The Project site is located in an urban area with a mix of surrounding uses including commercial, office, and industrial uses. The Project site is located in downtown Petaluma near Petaluma's Historic Commercial District, the Sonoma Marin Rapid Transit ("SMART") Petaluma Downtown Station, and immediately adjacent to the Steamer Landing/River Park. The site is bounded by East D Street to the west, the Petaluma River Park to the east, a T5 zoned unused rail spur to the north, the Petaluma River to the south, and by Civic Space/Trail owned by the City that surrounds the McNear Canal.

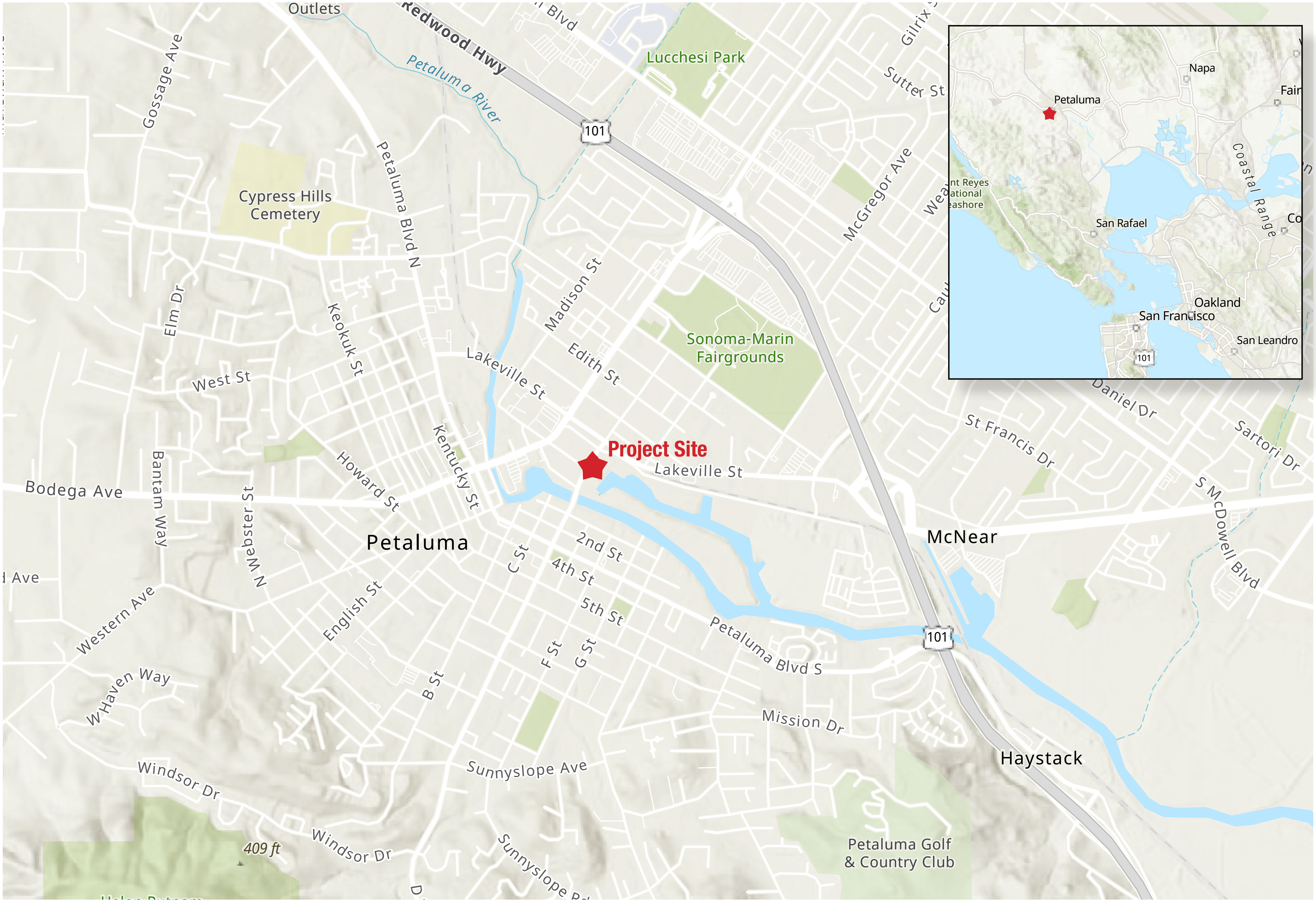
The site is partially developed with three one-story industrial buildings. The existing one-story buildings are located on the southern half of the Project site. A majority of the Project site remains undeveloped and is vegetated with pavement and gravel surrounding the existing buildings.

1.2 PROJECT DESCRIPTION

The proposed Project would demolish two of the existing industrial buildings, located in the southeastern portion of the Project site, and would renovate and adaptively reuse the existing building located in the southwestern corner of the Project site. The building-to-remain is approximately 9,000 square feet (sf) and is proposed to be a combination of commercial and boat storage. Construction of the Project is expected to commence in early 2023 and last for approximately two years. The proposed development would result in 122 three-story townhomes and 10 live/work units varying in size from approximately 1,350 sf to 2,130 sf. A new public pedestrian and bike path connecting East D Street to the Petaluma River Park is proposed. Proposed site work also includes site lighting and utility infrastructure as required to support Project operations. Figure 3: Site Plan, shows the proposed layout of the Project site.

Primary access to the Project site is from East D Street, directly across from its intersection with Copeland Street. The Project proposes a reconfiguration of current circulation patterns that would relocate vehicular traffic to the interior of the site, leaving the entire waterfront to be enjoyed by pedestrians and cyclists.

The Project site is designated as Mixed Use (MU) and River Dependent Industrial (RDI). MU allows for a combination of uses, including retail, residential, service commercial, and/or office. RDI allows for heavy industrial manufacturing, raw material processing, and related uses that require river access as an integral part of daily operations. The Project site is zoned as Urban Center (T-5) and River Dependent Industrial District (D3).



Source: USGS, 2021

Figure 1: Regional Map

Oyster Cove Project

Not to scale

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Source: Nearmap, 2022

Figure 2: Project Vicinity Map

Oyster Cove Project

Not to scale

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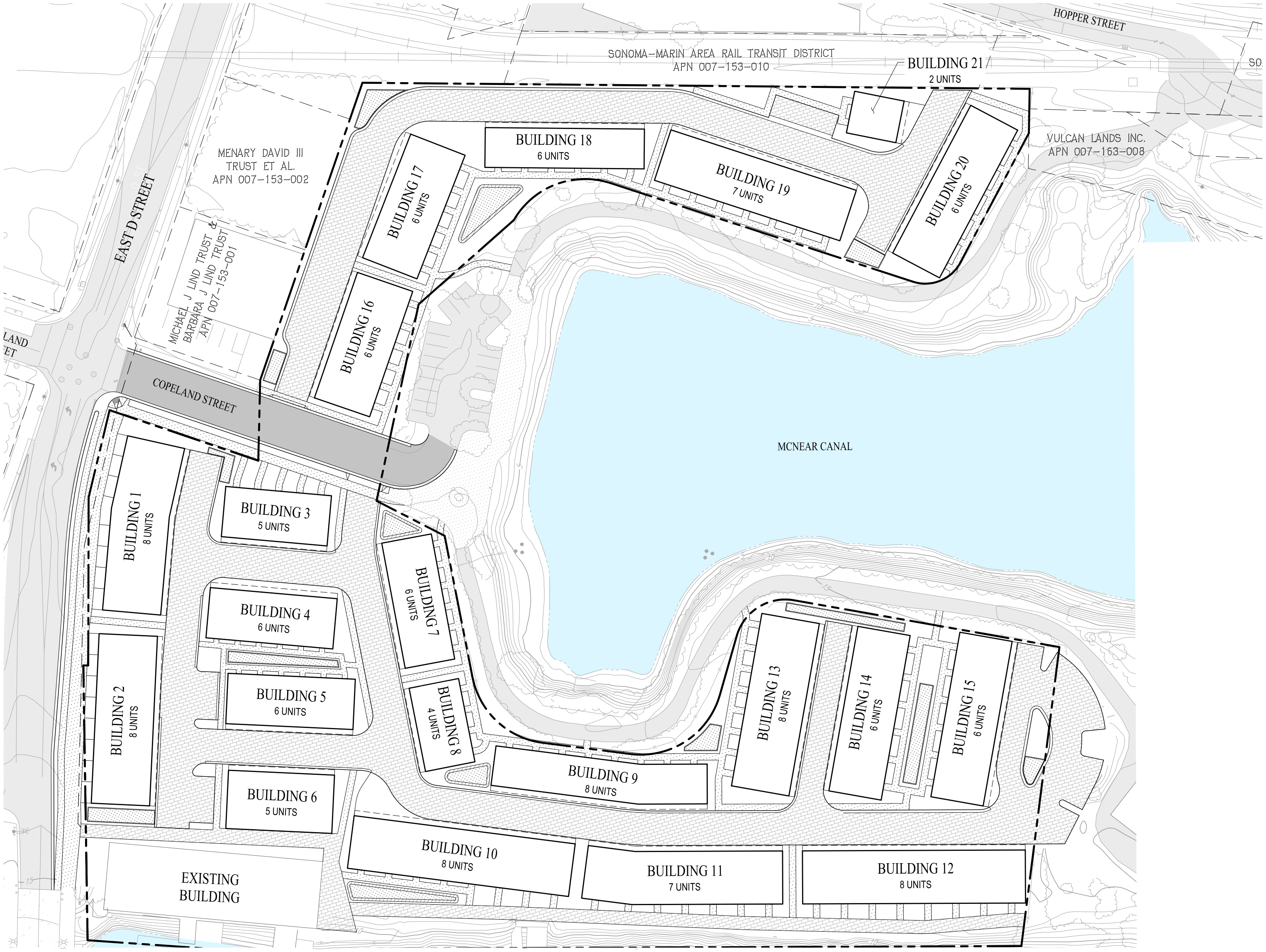

Source: CBG Civil Engineers, 2022

Figure 3: Site Plan

Oyster Cove Project

Not to scale

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2 ACOUSTIC FUNDAMENTALS

2.1 SOUND AND ENVIRONMENTAL NOISE

Acoustics is the science of sound. Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a medium (e.g. air) to human (or animal) ear. If the pressure variations occur frequently enough (at least 20 times per second), they can be heard and are called sound. The number of pressure variations per second is called the frequency of sound and is expressed as cycles per second, or hertz (Hz).

Noise is defined as loud, unexpected, or annoying sound. The fundamental acoustics model consists of a noise source, receptor, and the propagation path between the two. The loudness of the noise source, obstructions, or atmospheric factors affecting the propagation path, determine the perceived sound level and noise characteristics at the receptor. Acoustics deal primarily with the propagation and control of sound. A typical noise environment consists of ambient noise that is the sum of many distant and indistinguishable noise sources. Superimposed on this ambient noise is the sound from individual local sources. These sources can vary from an occasional aircraft or train passing by to continuous noise from traffic on a major highway. Perceptions of sound and noise are highly subjective from person to person.

Measuring sound directly in terms of pressure would require a large range of numbers. To avoid this, the decibel (dB) scale was devised. The dB scale uses the hearing threshold of 20 micropascals (µPa) as a point of reference, defined as 0 dB. Other sound pressures are then compared to this reference pressure, and the logarithm is taken to keep the numbers in a practical range. The dB scale allows a million-fold increase in pressure to be expressed as 120 dB, and changes in levels correspond closely to human perception of relative loudness. Table 1: Typical Noise Levels provides typical noise levels.

Table 1: Typical Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	– 110 –	Rock Band
Jet fly-over at 1,000 feet		
	– 100 –	
Gas lawnmower at 3 feet		
	– 90 –	
Diesel truck at 50 feet at 50 miles per hour		Food blender at 3 feet
	– 80 –	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawnmower, 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 next room
Quiet urban nighttime	– 40 –	Theater, large conference room (background)
Quiet suburban nighttime		
	– 30 –	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	– 20 –	
		Broadcast/recording studio
	– 10 –	
Lowest threshold of human hearing	– 0 –	Lowest threshold of human hearing

Source: California Department of Transportation, *Technical Noise Supplement to the Traffic Noise Analysis Protocol*, September 2013.

Noise Descriptors

The dB 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. Several rating scales have been developed to analyze the adverse effect of community noise on people. Because environmental noise fluctuates over time, these scales consider that the effect of noise on people is largely dependent on the total acoustical energy content of the noise, as well as the time of day when the noise occurs. The equivalent noise level (L_{eq}) represents the continuous sound pressure level over the measurement period, while the day-night noise level (DNL) and Community Equivalent Noise Level (CNEL) are measures of energy average during a 24-hour period, with dB weighted sound levels from 7:00 p.m. to 7:00 a.m. Most commonly, environmental sounds are described in terms of L_{eq} that has the same acoustical energy as the summation of all the time-varying events. Each is applicable to this analysis and defined Table 2: Definitions of Acoustical Terms.

Table 2: Definitions of Acoustical Terms

Term	Definitions
Decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in μPa (or 20 micronewtons per square meter), where 1 pascals is the pressure resulting from a force of 1 newton exerted over an area of 1 square meter. The sound pressure level is expressed in dB as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e.g. 20 μPa). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency (Hz)	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level (dBA)	The sound pressure level in dB as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level (L_{eq})	The average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.
Maximum Noise Level (L_{max}) Minimum Noise Level (L_{min})	The maximum and minimum dBA during the measurement period.
Exceeded Noise Levels (L_1, L_{10}, L_{50}, L_{90})	The dBA values that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day-Night Noise Level (DNL)	A 24-hour average Leq with a 10 dBA weighting added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity at nighttime. The logarithmic effect of these additions is that a 60 dBA 24-hour Leq would result in a measurement of 66.4 dBA DNL.

Term	Definitions
Community Noise Equivalent Level (CNEL)	A 24-hour average Leq with a 5 dBA weighting during the hours of 7:00 a.m. to 10:00 a.m. and a 10 dBA weighting added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the evening and nighttime, respectively. The logarithmic effect of these additions is that a 60 dBA 24-hour Leq would result in a measurement of 66.7 dBA CNEL.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends on its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

The A-weighted decibel (dBA) sound level scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be used. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about plus or minus 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends on the distance between the receptor and the noise source.

A-Weighted Decibels

The perceived loudness of sounds is dependent on many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable and can be approximated by dBA values. There is a strong correlation between dBA and the way the human ear perceives sound. For this reason, the dBA has become the standard tool of environmental noise assessment. All noise levels reported in this document are in terms of dBA, but are expressed as dB, unless otherwise noted.

Addition of Decibels

The dB scale is logarithmic, not linear, and therefore sound levels cannot be added or subtracted through ordinary arithmetic. Two sound levels 10 dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic dB is A-weighted, an increase of 10 dBA is generally perceived as a doubling in loudness. For example, a 70-dBA sound is half as loud as an 80-dBA sound and twice as loud as a 60-dBA sound. When two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dBA higher than one source under the same conditions. Under the dB scale, three sources of equal loudness together would produce an increase of approximately 5 dBA.

Sound Propagation and Attenuation

Sound spreads (propagates uniformly outward in a spherical pattern, and the sound level decreases (attenuates) at a rate of approximately 6 dB for each doubling of distance from a stationary or point source. Sound from a line source, such as a highway, propagates outward in a cylindrical pattern. Sound levels attenuate at a rate of approximately 3 dB for each doubling of distance from a line source, such as a roadway, depending on ground surface characteristics. No excess attenuation is assumed for hard surfaces like a parking lot or a body of water. Soft surfaces, such as soft dirt or grass, can absorb sound, so an excess ground-attenuation value of 1.5 dB per doubling of distance is normally assumed. For line sources, an overall attenuation rate of 3 dB per doubling of distance is assumed.

Noise levels may also be reduced by intervening structures; generally, a single row of buildings between the receptor and the noise source reduces the noise level by about 5 dBA, while a solid wall or berm reduces noise levels by 5 to 10 dBA. The way older homes in California were constructed generally provides a reduction of exterior-to-interior noise levels of about 20 to 25 dBA with closed windows. The exterior-to-interior reduction of newer residential units is generally 30 dBA or more.

Human Response to Noise

The human response to environmental noise is subjective and varies considerably from individual to individual. Noise in the community has often been cited as a health problem, not in terms of actual physiological damage, such as hearing impairment, but in terms of inhibiting general well-being and contributing to undue stress and annoyance. The health effects of noise in the community arise from interference with human activities, including sleep, speech, recreation, and tasks that demand concentration or coordination. Hearing loss can occur at the highest noise intensity levels.

Noise environments and consequences of human activities are usually well represented by median noise levels during the day or night or over a 24-hour period. Environmental noise levels are generally considered low when the CNEL is below 60 dBA, moderate in the 60 to 70 dBA range, and high above 70 dBA. Examples of low daytime levels are isolated, natural settings with noise levels as low as 20 dBA and quiet, suburban, residential streets with noise levels around 40 dBA. Noise levels above 45 dBA at night can disrupt sleep. Examples of moderate-level noise environments are urban residential or semi-commercial areas (typically 55 to 60 dBA) and commercial locations (typically 60 dBA). People may consider louder environments adverse, but most will accept the higher levels associated with noisier urban residential or residential-commercial areas (60 to 75 dBA) or dense urban or industrial areas (65 to 80 dBA). Regarding increases in dBA, the following relationships should be noted:

- Except in carefully controlled laboratory experiments, a 1-dBA change cannot be perceived by humans.
- Outside of the laboratory, a 3-dBA change is considered a just-perceivable difference.
- A minimum 5-dBA change is required before any noticeable change in community response would be expected. A 5-dBA increase is typically considered substantial.
- A 10-dBA change is subjectively heard as an approximate doubling in loudness and would almost certainly cause an adverse change in community response.

Effects of Noise on People

Hearing Loss. While physical damage to the ear from an intense noise impulse is rare, a degradation of auditory acuity can occur even within a community noise environment. Hearing loss occurs mainly due to chronic exposure to excessive noise but may be due to a single event such as an explosion. Natural hearing loss associated with aging may also be accelerated from chronic exposure to loud noise. The Occupational Safety and Health Administration has a noise exposure standard that is set at the noise threshold where hearing loss may occur from long-term exposures. The maximum allowable level is 90 dBA averaged over 8 hours. If the noise is above 90 dBA, the allowable exposure time is correspondingly shorter.

Annoyance. Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The DNL as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise. There continues to be disagreement about the relative annoyance of these different sources. A noise level of about 55 dBA DNL is the threshold at which a substantial percentage of people begin to report annoyance[1].

2.2 GROUNDBORNE VIBRATION

Sources of groundborne 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, including Vibration Decibels (VdB), peak particle velocity (PPV), and the root mean square (RMS) velocity. VdB is the vibration velocity level in the decibel scale. 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 3: Human Reaction and Damage to Buildings from Vibration, displays 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. In high noise environments, which are more prevalent where groundborne vibration approaches perceptible levels, this rattling phenomenon may also be produced by loud airborne environmental noise causing induced vibration in exterior doors and windows.

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 earth-moving which requires the use of heavy-duty earth moving 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.

[1] Federal Interagency Committee on Noise, *Federal Agency Review of Selected Airport Noise Analysis Issues*, August 1992.

Table 3: Human Reaction and Damage to Buildings from Vibration

Peak Particle Velocity (in/sec)	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, Transportation and Construction Vibration Guidance Manual, 2013.

3 REGULATORY SETTING

To limit population exposure to physically or psychologically damaging as well as intrusive noise levels, the Federal government, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise.

3.1 STATE OF CALIFORNIA

California Government Code

California Government Code Section 65302(f) mandates that the legislative body of each county and city adopt a noise element as part of its comprehensive general plan. The local noise element must recognize the land use compatibility guidelines established by the State Department of Health Services. The guidelines rank noise land use compatibility in terms of "normally acceptable", "conditionally acceptable", "normally unacceptable", and "clearly unacceptable" noise levels for various land use types. Single-family homes are "normally acceptable" in exterior noise environments up to 60 CNEL and "conditionally acceptable" up to 70 CNEL. Multiple-family residential uses are "normally acceptable" up to 65 CNEL and "conditionally acceptable" up to 70 CNEL. Schools, libraries, and churches are "normally acceptable" up to 70 CNEL, as are office buildings and business, commercial, and professional uses.

Title 24 – Building Code

The State's noise insulation standards are codified in the California Code of Regulations, Title 24: Part 1, Building Standards Administrative Code, and Part 2, California Building Code. These noise standards are applied to new construction in California for interior noise compatibility from exterior noise sources. The regulations specify that acoustical studies must be prepared when noise-sensitive structures, such as residential buildings, schools, or hospitals, are located near major transportation noise sources, and where such noise sources create an exterior noise level of 65 dBA CNEL or higher. Acoustical studies that accompany building plans must demonstrate that the structure has been designed to limit interior noise in habitable rooms to acceptable noise levels. For new multi-family residential buildings, the acceptable interior noise limit for new construction is 45 dBA CNEL.

3.2 LOCAL

City of Petaluma General Plan 2025

The Petaluma General Plan identifies goals and policies in the Health and Safety Element related to noise. The following lists applicable noise goals and targets that apply to the Project obtained from the City of Petaluma General Plan:

Policy 10-P-3: **Noise**. Protect public health and welfare by eliminating or minimizing the effects of existing noise problems, and by minimizing the increase of noise levels in the future.

A. Continue efforts to incorporate noise considerations into land use planning decisions, and guide the location and design of transportation facilities to minimize the effects of noise on adjacent land uses.

B. Discourage location of new noise-sensitive uses, primarily homes, in areas with projected noise levels greater than 65 Db CNEL. Where such uses are permitted, require incorporation of mitigation measures to ensure that interior noise levels do not exceed 45 Db CNEL.

C. Ensure that the City's Noise Ordinance and other regulations:

- Require that applicants for new noise sensitive development in areas subject to noise levels greater than 65 dB CNEL obtain the services of a professional acoustical engineer to provide a technical analysis and design of mitigation measures.
- Require placement of fixed equipment, such as air conditioning units and condensers, inside or in the walls of new buildings or on roof-tops of central units in order to reduce noise impacts on any nearby sensitive receptors.
- Establish appropriate noise-emission standards to be used in connection with the purchase, use, and maintenance of City vehicles.

D. Continue to require control of noise of mitigation measures for any noise-emitting construction equipment or activity.

The City's Noise Ordinance establishes controls on construction-related noise.

E. As part of development review, use Figure 10-2: Land Use Compatibility Standards to determine acceptable uses and installation requirements in noise-impacted areas.

F. Discourage the use of sound walls anywhere except along Highway 101 and/or along the NWPRA corridor, without findings that such walls will not be detrimental to community character. When sound walls are deemed necessary, integrate them into the streetscape.

G. In making a determination of impact under the California Environmental Quality Act (CEQA), consider an increase of four or more dBA to be "significant" if the resulting noise level would exceed that described as normally acceptable for the affected land use in Figure 10-2: Land Use Compatibility Standards.

Figure 10-2 in the Petaluma General Plan, Land Use Compatibility Standards, establishes compatibility standards that are used to determine land use compatibility with the City's noise environment for proposed projects. The guidelines for multifamily residential are summarized in Table 4: Land Use Compatibility Standards below.

Table 4: Land Use Compatibility Standards

Land-Use Category	Exterior Noise Exposure (DNL), in dBA			
	Normally Acceptable[1]	Conditionally Acceptable[2]	Normally Unacceptable[3]	Clearly Unacceptable[4]
Residential – Low Density, Single Family, Duplex, Mobile Home	Up to 60	>60 to 70	>70-75	>75
Residential – Multifamily	Up to 65	>60 to 70	>70-75	>75
Transient Lodging – Motels, Hotels	Up to 65	>60 to 75	>70-80	>80
Schools, Libraries, Churches, Hospitals, Nursing Homes	Up to 70	>60 to 75	>70-80	>80
Auditoriums, Concert Halls, Amphitheaters	-	Up to 70	-	>65
Sports Area, Outdoor Spectator Sports	-	Up to 75	-	>70
Playgrounds, Neighborhoods Parks	Up to 70	>65 to 75	-	>75
Golf Courses, Riding Stables, Water Recreation, Cemeteries	Up to 75	>75-80	>80	-
Office Buildings, Business Commercial, and Professional Offices	Up to 70	>65 to 75	>75	-
Industrial, Manufacturing Utilities, Agriculture	Up to 75	>70 to 80	>80	-

1. Normally Acceptable – Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction. There are no special noise insulation requirements.
2. Conditionally Acceptable – New construction should be undertaken only after a detailed analysis of the noise reduction requirement is conducted and needed noise insulation features included in the design.
3. Normally Unacceptable – New construction should be discouraged and may be denied as inconsistent with the General Plan and City Code. 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.
4. Clearly Unacceptable – New construction or development should generally not be undertaken.

Source: City of Petaluma General Plan, 2008.

City of Petaluma Municipal Code

The City's Municipal Code provides limitations on construction hours. The portions of the Municipal Code that are relevant for this project are as follows:

Chapter 21.040 Dangerous and Objectionable Elements.

1. *Noise Regulations Generally.*

a. The following specific acts, subject to the exemptions provided in Section 21.040(A)(5), are declared to be public nuisances and are prohibited:

   1) The operation or use of any of the following before 7:00 a.m. or after 10:00 p.m. daily (except Saturday, Sunday and State, Federal or Local Holidays, when the prohibited time shall be before 9:00 a.m. and after 10:00 p.m.):
   2) A hammer or any other device or implement used to repeatedly pound or strike an object.
   3) An impact wrench, or other tool or equipment powered by compressed air.

4) Any tool or piece of equipment powered by an internal-combustion engine such as, but not limited to, chain saw, backpack blower, and lawn mower. Except as specifically included in this Ordinance, motor vehicles, powered by an internal-combustion engine and subject to the State of California vehicle code, are excluded from this prohibition.
5) Any electrically or battery powered tool or piece of equipment used for cutting, drilling, or shaping wood, plastic, metal, or other materials or objects, such as but not limited to a saw, drill, lathe or router.
6) Any of the following: the operation and/or loading or unloading of heavy equipment (such as but not limited to bulldozer, road grader, back hoe), ground drilling and boring equipment, hydraulic crane and boom equipment, portable power generator or pump, pavement equipment (such as but not limited to pneumatic hammer, pavement breaker, tamper, compacting equipment), pile-driving equipment, vibrating roller, sand blaster, gunite machine, trencher, concrete truck, and hot kettle pump and the like.
7) Construction, demolition, excavation, erection, alteration or repair activity.
8) Operating or permitting the operation of powered model vehicles including but not limited to cars, aircraft and boats.
9) Using or operating for any purpose any loudspeaker, loudspeaker system or similar device in such a manner as to create a noise disturbance. Any permit issued pursuant to PMC Section 13.28.050 (amplified sound permit within a public park) is exempt from this section.
10) The use of truck/tractor trailer “Jake Brakes” on any public street under the jurisdiction of the City of Petaluma Police Department.

2. *Noise Measurement.* Utilizing the “A” weighting scale of a sound level meter and the “slow” meter response (use “fast” response for impulsive type sounds), the ambient noise level shall first be measured at a position or positions at any point on the receiver’s property which can include private and public property. In general, the microphone shall be located four to five feet above the ground; ten feet or more from the nearest reflective surface where possible. If possible, the ambient noise shall be measured with the alleged offending noise source inoperative. If for any reason the alleged offending noise source cannot be shut down, the ambient noise must be estimated by performing a measurement in the same general area of the source but at a sufficient distance such that the noise from the source is at least 10dB below the ambient in order that only the ambient level be measured.
   a. If the measured ambient level is greater than 60dB, the Maximum Noise Exposure standard shall be adjusted in 5dB increments for each time period as appropriate to encompass or reflect the measured ambient noise level. In no case shall the maximum allowed threshold exceed 75dB after adjustments are made.
   b. In the event the measured ambient noise level is 70dB or greater, the maximum allowable noise level shall be increased to reflect the maximum ambient noise level. In this case, adjustments for loudness and time as contained in Table I shall not be permitted.
   c. No person shall cause or allow to cause, any source of sound at any location within the incorporated City or allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person, which when measured on the property where the noise disturbance is being experienced within public or private open/outdoor spaces, exceeds the noise level of Table 5: Maximum Exterior Noise Exposure (L_{eq}, dBA).

Table 5: Maximum Exterior Noise Exposure (L_{eq}, dBA)

Compatibility	Time: 10 p.m to 7 a.m. M-F; 10 p.m. to 8 a.m. S, S and Holidays	Time: 7 a.m. to 10 p.m. M-F; 8 a.m. to 10 p.m. S, S and Holidays
General Plan Ambient	60	60
Cumulative period of 15 minutes or more in one hours	65	70
Cumulative period of 5 minutes or more in one hour	70	75
Cumulative period of 1 minute or more in one hour	75	80

1. If the measured ambient level is greater than 60dB, the Maximum Noise Exposure standard shall be adjusted in 5dB increments for each time period as appropriate to encompass or reflect the measured ambient noise level. In no case shall the maximum allowed threshold exceed 75dB after adjustments are made.
2. In the event the measured ambient noise level is 70dB or greater, the maximum allowable noise level shall be increased to reflect the maximum ambient noise level. In this case, adjustments for loudness and time as contained in Table 4 shall not be permitted.
3. No person shall cause or allow to cause, any source of sound at any location within the incorporated City or allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person, which when measured on the property where the noise disturbance is being experienced within public or private open/outdoor spaces, exceeds the noise level of Table 4.

Source: City of Petaluma Zoning Code. Chapter 21 Performance Standards. Section 21.040. Dangerous and Objectionable Elements.

Exemptions from the maximum exterior noise exposure level standards are:

a. Aerial warning devices which are required by law to protect the health, safety and welfare of the community shall be exempt from the provisions of this chapter.
b. Emergency vehicle responses and all necessary equipment utilized for the purpose of responding to a declared state of emergency are exempt from this chapter.
c. Airport, river operations that significantly contribute to commercial and industrial tonnage figures on the Petaluma River, and railroad operations.
d. The operation of garbage collection and other municipal or utility vehicles.
e. Uses established through the discretionary review process containing specific noise conditions of approval and/or mitigation measures.

In addition, the Noise Control Officer is authorized to grant exceptions from any provision of Chapter 21, subject to limitations of proximity to noise sensitive uses, noise levels, time limits and other terms and conditions as the Noise Control Officer determines are appropriate to protect the public health, safety and welfare from the noise emanating therefrom. Section 21.040 prohibits vibrations in excess of approximately 80 VdB and single impulse periodic vibrations with an average interval greater than 5 minutes of approximately 87 VdB.[2]

[2] Section 21.040 of the Zoning Code prohibits vibrations in excess of 0.002 g at 50 cycles per second and single impulse periodic vibrations with an average interval greater than 5 minutes of 0.01g at 50 cycles per second. Based on the Petaluma General Plan 2025 Draft Environmental Impact Report, 0.002 g at 50 cycles per second

4 EXISTING CONDITIONS

4.1 EXISTING NOISE SOURCES

The City of Petaluma is impacted by various noise sources. Mobile sources of noise, especially cars and trucks, are the most common and significant sources of noise in most communities. Other sources of noise are the various land uses (i.e., residential, commercial, institutional, and recreational and parks activities) throughout the City that generate stationary-source noise. Adjacent to the Project site is the existing railroad and SMART light-rail train tracks.

Noise Measurements

To determine ambient noise levels in the Project area, four short-term (10-minute) noise measurements were taken using a Larson Davis SoundExpert LxT Type I integrating sound level meter on February 2, 2022; refer to Appendix A for existing noise measurement data and Figure 4: Noise Measurement Locations.

Short-Term measurement 1 (ST-1) was taken to represent the existing noise level at the residential and industrial uses on 1st Street; ST-2 was taken to represent existing noise levels at the residential and commercial/industrial uses on Erwin Street; ST-3 was taken to represent existing noise levels at the adjacent industrial/commercial uses on Copeland Street near the bus stop; and ST-4 was taken to represent existing noise levels on Hopper Street near the Petaluma Downtown SMART Station. Existing ambient noise in the Project site is dominated by traffic and trucks idling along Copeland Street, D Street, and Lakeville Street, as well as train and SMART activity. The primary noise sources during the noise measurements were traffic along Copeland Street, D Street, Lakeville Street, SMART, and stationary noise at commercial and industrial operations nearby. Table 6: Noise Measurements, provides the ambient noise levels measured at these locations.

Table 6: Noise Measurements

Site No.	Location	L_{eq} (dBA)	L_{min} (dBA)	L_{max} (dBA)	L_{peak} (dBA)	DNL (dBA)	Time	Date
ST-1	First Street	55.6	42.9	67.9	90.2	--	10:43 a.m. to 10:53 a.m.	2/9/2022
ST-2	D Street	56.4	45.4	77.6	95.7	--	11:48 a.m. to 11:58 a.m.	2/9/2022
ST-3	Copeland Street	65.4	49.6	80.5	97.6	--	11:19 a.m. to 11:29 a.m.	2/9/2022
ST-4	Hopper Street	63.4	53.4	72.8	96.3	--	11:35 a.m. to 11:45 a.m.	2/9/2022
Source: Noise Measurements taken by Kimley-Horn on February 9, 2022.								

Source: Nearmap, 2022

Figure 4: Noise Measurement Locations

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Existing Mobile Noise

Existing highway noise levels were calculated for the roadway segments in the Project vicinity. This task was accomplished using the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA-RD-77-108) and existing traffic volumes from the Project Transportation Analysis (Kimley-Horn 2022). The noise prediction model calculates the average noise level at specific locations based on traffic volumes, average speeds, roadway geometry, and site environmental conditions. The average vehicle noise rates (also referred to as energy rates) used in the FHWA model have been modified to reflect average vehicle noise rates identified for California by Caltrans. The Caltrans data indicates that California automobile noise is 0.8 to 1.0 dBA higher than national levels and that medium and heavy truck noise is 0.3 to 3.0 dBA lower than national levels. The average daily noise levels along roadway segments in proximity to the Project site are included in Table 7: Existing Traffic Noise.

Table 7: Existing Traffic Noise

Roadway Segment	ADT	dBA L_{dn}[1]
D Street		
Lakeville St. to Copeland St.	15,010	64.8
Copeland St. to 1st St.	19,200	65.9
1st St. to Petaluma Blvd.	17,240	65.4
Lakeville Street		
D St. to Washington St.	8,350	63.4
Copeland Street		
D St. to Washington St.	4,990	60.0
Washington Street		
Lakeville St. to Copeland St.	20,790	66.3
ADT = average daily trips; dBA = A-weighted decibels; L_{dn} = day-night noise level		
1. Traffic noise levels are at 100 feet from the roadway centerline. The actual sound level at any receptor location is dependent upon such factors as the source-to-receptor distance and the presence of intervening structures, barriers, and topography.		
Source Based on data from the Transportation Analysis (Kimley-Horn, 2022). Refer to Appendix A for traffic noise modeling assumptions and results.		

The Project site is primarily surrounded by industrial and commercial uses. The existing mobile noise in the Project area are generated along U.S. Highway 101 (U.S.101), which is north and south of the Project site, and Lakeville Street which is north and east of the Project site.

Existing Stationary Noise

The primary sources of stationary noise in the Project vicinity are those associated with the operations of nearby Sonoma-Marina Area Rail Transit (SMART) railway corridor located adjacent to the northwest and east of the Project site and existing mixed-used commercial and industrial uses surrounding of the Project site. The noise associated with these sources may represent a single-event noise occurrence, short-term noise, or long-term/continuous noise.

4.2 SENSITIVE RECEPTORS

Noise exposure standards and guidelines for various types of land uses reflect the varying noise sensitivities associated with each of these uses. Residences, hospitals, schools, guest lodging, libraries, and churches are treated as the most sensitive to noise intrusion and therefore have more stringent noise exposure targets than do other uses, such as manufacturing or agricultural uses that are not subject to impacts such as sleep disturbance. As shown in Table 8: Sensitive Receptors, sensitive receptors near the Project site include a school, a church, a library, guest lodging, and multi-family residences, single-family residences. Surrounding the Project site to the north, south, east, and west, are large commercial and industrial areas. Additionally, the project site is located adjacent to Steamer Landing Pak, McNear Park, and the summer camp base of the Friends of the Petaluma River, to the east. These distances are from the Project site to the sensitive receptor property line. Figure 5: Sensitive Receptor Locations shows the sensitive receptors closest to the Project site.

Table 8: Sensitive Receptors

Receptor Description	Distance and Direction from the Project Site
1. Multi-family residential community	220 feet south
2. Single-family residential community	410 feet north
3. Hampton Inn Petaluma	500 feet northeast
4. Single-family residential community	950 feet southeast
5. Single-family residential community	1,250 feet south
6. San Antonio High School	1,500 feet northeast
7. Petaluma Historical Library and Museum	1,520 feet southwest
8. Children's Corner Preschool	1,600 feet north

Source: Nearmap, 2022

Figure 5: Sensitive Receptor Locations

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5 SIGNIFICANCE CRITERIA AND METHODOLOGY

5.1 CEQA THRESHOLDS

Appendix G of the California Environmental Quality Act (CEQA) Guidelines contains analysis guidelines related to noise impacts. These guidelines have been used by the City to develop thresholds of significance for this analysis. A project would create a significant environmental impact if it would:

NOI-1 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;

NOI-2 Generate excessive groundborne vibration or groundborne noise levels; and

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, expose people residing or working in the project area to excessive noise levels.

5.2 METHODOLOGY

Construction

Construction noise estimates are based upon noise levels on typical noise levels generated by construction equipment published by the Federal Transit Administration (FTA) and FHWA. Construction noise is assessed in dBA L_{eq}. This unit is appropriate because L_{eq} can be used to describe noise level from operation of each piece of equipment separately, and levels can be combined to represent the noise level from all equipment operating during a given period. The Federal Transit Administration's (FTA) *Transit Noise and Vibration Impact Assessment Manual* (2018) (FTA Noise and Vibration Manual) identifies a maximum 1-hour noise level standard of 90 dBA L_{eq} at residential uses and 100 dBA L_{eq} at commercial and industrial uses for short-term construction activities. The City' General establishes construction noise standards of 60 dBA $L_{eq(8\text{-}hour)}$ for low density single family residential uses , 65 dBA $L_{eq(8\text{-}hour)}$ for multifamily residential and hotel uses, and 75 $L_{eq(8\text{-}hour)}$ for commercial and industrial uses.

Reference noise levels are used to estimate noise levels at nearby sensitive receptors based on a standard noise attenuation rate of 6 dB per doubling of distance (line-of-sight method of sound attenuation for point sources of noise). Construction noise level estimates do not account for the presence of intervening structures or topography, which may reduce noise levels at receptor locations. Therefore, the noise levels presented herein represent a conservative, reasonable worst-case estimate of actual temporary construction noise.

Operations

The analysis of the existing and future noise environments is based on noise prediction modeling and empirical observations. Reference noise level data are used to estimate the Project operational noise impacts from stationary sources. Noise levels are collected from field noise measurements and other published sources from similar types of activities are used to estimate noise levels expected with the

Project's stationary sources. The reference noise levels are used to represent a worst-case noise environment as noise level from stationary sources can vary throughout the day.

Stationary source operational noise is evaluated based on the standards within the City's Municipal Code. The traffic noise levels in the Project vicinity were calculated using the FHWA Highway Noise Prediction Model (FHWA-RD-77-108).

Vibration

Groundborne vibration levels associated with construction-related activities for the Project were evaluated utilizing typical groundborne vibration levels associated with construction equipment, obtained from FTA published data for construction equipment. Potential groundborne vibration impacts related to structural damage and human annoyance were evaluated, considering the distance from construction activities to nearby land uses and typically applied criteria for structural damage and human annoyance.

6 POTENTIAL IMPACTS AND MITIGATION

6.1 ACOUSTICAL IMPACTS

Threshold 6.1 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?

Construction

Construction noise typically occurs intermittently and varies depending on the nature or phase of construction (e.g. land clearing, grading, excavation, paving). Noise generated by construction equipment, including earth movers, material handlers, and portable generators, can reach high levels. During construction, exterior noise levels could affect the residential neighborhoods surrounding the construction site. Project construction would occur approximately 220 feet from the nearest sensitive receptor to the south. However, construction activities would occur throughout the Project site and would not be concentrated at a single point near sensitive receptors. Noise levels typically attenuate (or drop off) at a rate of 6 dB per doubling of distance from point sources, such as industrial machinery. During construction, exterior noise levels could affect sensitive receptors near the construction site.

Construction activities associated with development of the Project would include some demolition, site preparation, grading, paving, building construction, and architectural coating. Such activities would require graders, scrapers, and tractors during site preparation; graders, dozers, and tractors during grading; cranes, forklifts, generators, tractors, and welders during building construction; pavers, rollers, mixers, tractors, and paving equipment during paving; and air compressors during architectural coating. Grading and excavation phases of Project construction tend to be the shortest in duration and create the highest construction noise levels due to the operation of heavy equipment required to complete these activities. It should be noted that only a limited amount of equipment can operate near a given location at a particular time. Equipment typically used during this stage includes heavy-duty trucks, backhoes, bulldozers, excavators, front-end loaders, and scrapers. Operating cycles for these types of construction equipment may involve one or two minutes of full-power operation followed by three to four minutes at lower power settings. Other primary sources of noise would be shorter-duration incidents, such as dropping large pieces of equipment or the hydraulic movement of machinery lifts, which would last less than one minute. According to the applicant, no pile-driving would be required during construction and as such a Project condition of approval will be included in the Project permit to reflect the Project's proposed construction.

Noise generated by construction equipment, including earth movers, material handlers, and portable generators, can reach high levels. Typical noise levels associated with individual construction equipment are listed in Table 9: Typical Construction Noise Levels.

Table 9: Typical Construction Noise Levels

Equipment	Typical Noise Level (dBA) at 50 feet from Source	Typical Noise Level (dBA) at 200 feet from Source[1]
Air Compressor	80	68
Backhoe	80	68
Compactor	82	70
Concrete Mixer	85	73
Concrete Pump	82	70
Concrete Vibrator	76	64
Crane, Derrick	88	76
Crane, Mobile	83	71
Dozer	85	73
Generator	82	70
Grader	85	73
Impact Wrench	85	73
Jack Hammer	88	76
Loader	80	68
Paver	85	73
Pump	77	89
Roller	85	83
Saw	76	73
Scraper	85	65
Shovel	82	73
Truck	84	64
1. Calculated using the inverse square law formula for sound attenuation: $dBA_2 = dBA_1 + 20Log(d_1/d_2)$ Where: $QWdBA_2$ = estimated noise level at receptor; dBA_1 = reference noise level; d_1 = reference distance; d_2 = receptor location distance.		
Source: Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, September 2018.		

The City's General Plan limits hourly average noise levels due to construction to 60 dBA for low density single family residential land uses or 65 dBA for multifamily residential land uses. Additionally, Section 21.040 of the City's Municipal Code limits construction activities between 7:00 a.m. and 10:00 p.m. Monday through Friday and between 9:00 a.m. and 10:00 p.m. on weekends and holidays.

As shown in Table 9 noise maximum levels are below 88 dBA at 50 feet. The highest anticipated construction noise level of 88 dBA at 50 feet is expected to occur during the demolition phase. Noise impacts for mobile construction equipment are typically assessed as emanating from the center of the equipment activity or construction site.[3] For the proposed Project, this center point would be approximately 350 feet from the nearest sensitive receptor property line. These sensitive uses may be exposed to elevated noise levels during Project construction. The Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) was used to calculate noise levels during construction activities; refer to Appendix A: Noise Data. RCNM is a computer program used to assess construction noise impacts and allows for user-defined construction equipment and user-defined noise limit criteria. Noise

[3] For the purposes of this analysis, the construction area is defined as the center of the project site per the methodology in the FTA Transit Noise and Vibration Impact Assessment Manual (September 2018). Although some construction activities may occur at distances closer than 350 feet from the nearest properties, construction equipment would be dispersed throughout the project site during various construction activities. Therefore, the center of the project site represents the most appropriate distance based on the sporadic nature of construction activities.

levels were calculated for each construction phase and are based on the equipment used, distance to the nearest property/receptor, and acoustical use factor for equipment.

The noise levels calculated in Table 10: Project Construction Noise Levels, show estimated exterior construction noise at the closest sensitive receptors to the south and north of the Project site, as well as the closest off-site building to the west. Based on calculations using the RCNM model, construction noise levels would range from approximately 50.2 dBA L_{eq} and 79.7 dBA L_{eq} at the nearest sensitive receptors and off-site uses; see Table 10.

Table 10: Project Construction Noise Levels

Construction Phase	Receptor Location			Modeled Exterior Noise Level (dBA L_{eq}) [2]	Noise Threshold (dBA L_{eq}) [3]	Exceeded?
	Land Use	Direction	Distance (feet) [1]			
Demolition	Multifamily Residential	South	350	67.7	65	Yes
	Single Family Residential	North	495	64.7	60	No
	Industrial	West	70	81.7	75	Yes
	Hotel	Northeast	745	61.1	65	No
Site Preparation	Multifamily Residential	South	350	65.1	65	Yes
	Single Family Residential	North	495	62.1	60	Yes
	Industrial	West	70	79.1	75	Yes
	Hotel	Northeast	745	58.6	65	No
Grading	Multifamily Residential	South	350	68.3	65	Yes
	Single Family Residential	North	495	65.3	60	Yes
	Industrial	West	70	82.3	75	Yes
	Hotel	Northeast	745	61.8	65	No
Building Construction	Multifamily Residential	South	350	65.7	65	Yes
	Single Family Residential	North	495	62.7	60	Yes
	Industrial	West	70	79.7	75	Yes
	Hotel	Northeast	745	59.1	65	No
Paving	Multifamily Residential	South	350	51.8	65	No
	Single Family Residential	North	495	56.7	60	No
	Industrial	West	70	73.7	75	No
	Hotel	Northeast	745	53.2	65	No
Architectural Coating	Multifamily Residential	South	350	56.8	65	No
	Single Family Residential	North	495	53.8	60	No
	Industrial	West	70	70.8	75	No
	Hotel	Northeast	745	50.2	65	No

Notes:
1. Distance is from the nearest receptor to the main construction activity area on the Project site. Not all equipment would operate at the closest distance to the receptor.
2. Modeled noise levels conservatively assume the simultaneous operation of all pieces of equipment.
3. The City' General establishes construction noise standards of 60 dBA $L_{eq(8\text{-}hour)}$ for low density single family residential uses , 65 dBA $L_{eq(8\text{-}hour)}$ for multifamily residential and hotel uses, and 75 $L_{eq(8\text{-}hour)}$ for commercial and industrial uses.

Source: Federal Highway Administration, *Roadway Construction Noise Model,* 2006. Refer to **Appendix A: Noise Data** for noise modeling results.

As shown in Table 10, the loudest noise levels would be 68.3 L_{eq} and 65.3 L_{eq} at the nearest sensitive receptors to the north and south, respectively. These noise levels would exceed the City's hourly threshold of 60 L_{eq} for single family residential uses and 65 L_{eq} for multifamily residential uses. Additionally, the loudest noise level would be 79.7 L_{eq} at the nearest off-site industrial structure, which would exceed the City's 75 L_{eq} for industrial uses. However, the proposed Project construction activities would be required to comply with Section 21.040 of the Zoning Code, which restricts the hours of operation to between 7:00

a.m. and 10:00 p.m. Monday through Friday and between 9:00 a.m. and 10:00 p.m. on Saturdays, Sundays, and holidays.

Although Project construction would occur during normal daytime hours, construction activities could result in a noticeable increase in ambient noise levels in the area. Therefore, the Project would implement the following Best Management Practices (BMPs) which would ensure that all construction equipment is equipped with properly operating and maintained mufflers and other state required noise attenuation devices, helping to reduce noise at the source. The FHWA indicates that muffler systems can reduce noise levels by 10 dBA or more.[4] Therefore, the noise levels in Table 10 would be below thresholds. The BMPs would be required to ensure that construction noise levels do not exceed the City's standards and that time-of-day restrictions are adhered to. Further, the proposed Project would have no pile-driving or impact equipment. With implementation of these practices, construction noise impacts to nearby receptors would be less than significant.

Best Management Practices

- Pursuant to the Municipal Code, restrict noise-generating activities at the construction site or in areas adjacent to the construction site to the hours between 7:00 a.m. and 10:00 p.m., Monday through Friday and 9:00 a.m. to 10:00 p.m. on Saturday, Sunday and State, Federal or Local Holidays.
- Equip all internal combustion engine driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.
- Locate stationary noise generating equipment (e.g., compressors) as far as possible from adjacent residential receivers.
- Acoustically shield stationary equipment located near residential receivers with temporary noise barriers.
- Utilize "quiet" air compressors and other stationary noise sources where technology exists.
- The contractor shall prepare a detailed construction plan identifying the schedule for major noise-generating construction activities. The construction plan shall identify a procedure for coordination with the owner/occupants of nearby noise sensitive residential land uses so that construction activities can be scheduled to minimize noise disturbance.
- Designate a "disturbance coordinator" responsible for responding to any complaints about construction noise. The disturbance coordinator will determine the cause of the noise complaint (e.g., bad muffler, etc.) and will require that reasonable measures be implemented to correct the problem.

Construction Traffic Noise

Construction is estimated to be approximately 2 years. Construction noise may be generated by large trucks moving materials to and from the Project site. Large trucks would be necessary to deliver building materials as well as remove dump materials. Excavation and cut and fill would be required. Soil hauling would be required as approximately 3,000 cubic yards (cy) of soil would be exported and 12,500 cy of soil would be imported. Based on the California Emissions Estimator Model (CalEEMod) default assumptions for this Project, as analyzed in Oyster Cove Project Air Quality Assessment (Kimley-Horn 2022), the Project

[4] Federal Highway Administration, *Special Report - Measurement, Prediction, and Mitigation*, Chapter 4 Mitigation, 2017.

would generate the highest number of daily trips during the demolition and grading phases. The model estimates that the Project would generate up to 15 worker trips and 17 daily hauling trips (417 hauling trips over 24 days) for demolition for a total of approximately 32 daily vehicle trips during demolition. For site preparation, the model estimates approximately 18 worker trips per day. The model estimates that the Project would generate up to 1,938 hauling trips during the grading phase which would last approximately 6 months. This would be approximately 15 daily hauling trips. Building construction would have approximately 120 daily worker trips and 24 vendor trips. Because of the logarithmic nature of noise levels, a doubling of the traffic volume (assuming that the speed and vehicle mix do not also change) would not result in a noise level increase of 3 dBA.[5] D Street from Lakeville Street to Copeland Street has an average daily trip volume of 15,010 vehicles (Table 7). Therefore, a maximum of 209 daily Project construction trips would not double the existing traffic volume per day. Construction related traffic noise would not be noticeable and would not create a significant noise impact.

California establishes noise limits for vehicles licensed to operate on public roads using a pass-by test procedure. Pass-by noise refers to the noise level produced by an individual vehicle as it travels past a fixed location. The pass-by procedure measures the total noise emissions of a moving vehicle with a microphone. When the vehicle reaches the microphone, the vehicle is at full throttle acceleration at an engine speed calculated for its displacement.

For heavy trucks, the State pass-by standard is consistent with the federal limit of 80 dB. The State pass-by standard for light trucks and passenger cars (less than 4.5 tons gross vehicle rating) is also 80 dB at 15 meters from the centerline. According to the FHWA, dump trucks typically generate noise levels of 77 dBA and flatbed trucks typically generate noise levels of 74 dBA, at a distance of 50 feet from the truck (FHWA, Roadway Construction Noise Model, 2006). Furthermore, while construction is less than 24 months and would be temporary, the Project is subject to the BMPs, shown above, to limit construction noise and impacts.

Operations

Implementation of the Project would create new sources of noise in the Project vicinity. The major noise sources associated with the Project that would potentially impact existing and future nearby sensitive receptors include the following:

- Off-site traffic noise;
- Mechanical equipment (i.e., trash compactors, air conditioners, etc.);
- Residential activities (i.e. dogs barking, music playing, people talking, etc.);
- Activities at the loading areas (i.e., maneuvering and idling trucks, loading/unloading, and equipment noise);
- Parking areas (i.e., car door slamming, car radios, engine start-up, and car pass-by); and
- Landscape maintenance activities.

As discussed above, the closest sensitive receptors are located approximately 220 feet to the south. The Noise Ordinance, in Municipal Code Section 21.040, establishes quantitative noise limits for stationary noise sources such as machinery and commercial activities to protect the public from disturbance caused

[5] Per General Plan Policy EC-1.2.

by unnecessary or excessive noise. The basic noise limit is a level of 60 dBA L_{eq} measured on a receiving property.

Traffic Noise

Implementation of the Project would generate increased traffic volumes along study roadway segments. The Project is expected to generate approximately of 631 average daily trips, which would result in noise increases on Project area roadways. In general, a traffic noise increase of less than 3 dBA is barely perceptible to people, while a 5-dBA increase is readily noticeable.[6] Generally, traffic volumes on Project area roadways would have to approximately double for the resulting traffic noise levels to increase by 3 dBA. Therefore, permanent increases in ambient noise levels of less than 3 dBA are considered to be less than significant.

As shown in Table 11: Existing and Existing Plus Project Traffic Noise, the existing traffic-generated noise level on Project area roadways is between 60.0 dBA L_{dn} and 66.3 dBA L_{dn} at 100 feet from the centerline. As previously described, L_{dn} is 24-hour average noise level with a 10 dBA "weighting" added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the evening and nighttime, respectively.

Table 11: Existing and Existing Plus Project Traffic Noise

Roadway Segment	Existing Conditions		With Project		Change from No Project Conditions	Significant Impact?
	ADT	dBA DNL[1]	ADT	dBA DNL[1]		
D Street						
Lakeville St. to Copeland St.	15,010	64.8	15,300	64.9	0.1	**No**
Copeland St. to 1st St.	19,200	65.9	19,310	65.9	0.0	**No**
1st St. to Petaluma Blvd.	17,240	65.4	17,350	65.5	0.1	**No**
Lakeville Street						
D St. to Washington St.	8,350	63.4	8,400	63.4	0.0	**No**
Copeland Street						
D St. to Washington St.	4,990	60.0	5,230	60.2	0.2	**No**
Washington Street						
Lakeville St. to Copeland St.	20,790	66.3	20,950	66.4	0.1	**No**
ADT = average daily trips; dBA = A-weighted decibels; DNL= day-night noise levels						
1.Traffic noise levels are at 100 feet from the roadway centerline. The actual sound level at any receptor location is dependent upon such factors as the source-to-receptor distance and the presence of intervening structures, barriers, and topography.						
Source: Based on data from the Transportation Analysis (Kimley-Horn, 2022). Refer to Appendix A for traffic noise modeling assumptions and results.						

Traffic noise levels for roadways primarily affected by the Project were calculated using the FHWA's Highway Noise Prediction Model (FHWA-RD-77-108). Traffic noise modeling was conducted for conditions with and without the Project, based on traffic volumes (Kimley-Horn, 2022). As noted in Table 11, Project noise levels 100 feet from the centerline would range from 60.2 dBA to 65.9 dBA. The Project would have the highest increase of 0.2 dBA on Copeland Street between D Street and Washington Street. However,

[6] California Department of Transportation, *Technical Noise Supplement to the Traffic Noise Analysis Protocol*, 2013.

the 0.2 dBA DNL increase is under the perceptible 3.0 dBA noise level increase. Therefore, the Project would not have a significant impact on existing traffic noise levels.

Table 12: Opening Year and Opening Year Plus Project Traffic Noise, shows the opening year conditions or opening year traffic. Per the Transportation Analysis, opening year conditions include 12 approved projects that were added to the existing 2022 volumes. As shown in Table 12, opening year roadway noise levels with the Project would range from 61.9 dBA to 67.5 dBA. Project traffic would traverse and disperse over Project area roadways, where existing ambient noise levels already exist. Future development associated with the Project would result in additional traffic on adjacent roadways, thereby increasing vehicular noise near existing and proposed land uses. The Project would not result in noise level increases above 3.0 dBA. Therefore, impacts are less than significant.

Table 12: Opening Year and Opening Year Plus Project Traffic Noise

Roadway Segment	Opening Year		With Project		Change from No Project Conditions	Significant Impact?
	ADT	dBA DNL[1]	ADT	dBA DNL[1]		
D Street						
Lakeville St. to Copeland St.	16,880	65.3	17,170	66.2	0.9	**No**
Copeland St. to 1st St.	21,130	66.3	21,240	67.1	0.8	**No**
1st St. to Petaluma Blvd.	19,170	65.9	19,280	66.7	0.1	**No**
Lakeville Street						
D St. to Washington St.	9,010	63.7	9,060	64.5	0.8	**No**
Copeland Street						
D St. to Washington St.	6,110	60.9	6,350	61.9	1.0	**No**
Washington Street						
Lakeville St. to Copeland St.	22,480	66.6	22,640	67.5	0.9	**No**
ADT = average daily trips; dBA = A-weighted decibels; DNL= day-night noise levels						
1.Traffic noise levels are at 100 feet from the roadway centerline. The actual sound level at any receptor location is dependent upon such factors as the source-to-receptor distance and the presence of intervening structures, barriers, and topography.						
Source: Based on data from the Transportation Analysis (Kimley-Horn, 2022). Refer to Appendix A for traffic noise modeling assumptions and results.						

Stationary Noise Sources

Implementation of the Project would create new sources of noise in the Project vicinity from mechanical equipment, truck loading areas, residential activities, parking lot noise, and landscape maintenance. Table 13: Stationary Source Noise Levels shows the noise levels generated by various stationary noise sources and the resulting noise level at the nearest receiver. Table 13 also show the Project's compliance with Municipal Code Section 21.040, which establishes quantitative noise limits for stationary noise sources such as machinery and commercial activities of 60 dBA L_{eq} at a receiving property. Each stationary source is discussed below.

Mechanical Equipment

Regarding mechanical equipment, the Project would generate stationary-source noise associated with heating, ventilation, and air conditioning (HVAC) units. HVAC units typically generate noise levels of approximately 52 dBA at 50 feet.[7] Table 13 shows that mechanical equipment would not exceed the City's City's Municipal Code. In addition, General Plan Policy 10-P-3.C requires placement of fixed equipment, such as air conditioning units and condensers, inside or in the walls of new buildings or on roof-tops of central units in order to reduce noise impacts on any nearby sensitive receptors. Controls that would typically be incorporated to attain this outcome include locating equipment in less noise sensitive areas, when feasible; selecting quiet equipment; and providing sound attenuators on fans, acoustical screen walls, and equipment enclosures. Compliance with the Zoning Code and General Plan Policy 10-P-3.C, which is required by law and will be enforced by the City, would ensure that appropriate noise controls on HVAC equipment are applied and would ensure the compliance with the operational standards set forth in the City's Municipal Code.

Residential Activities

The Project would also result in stationary noise that is typical of residential uses/neighborhoods, including the use of landscaping equipment, dogs barking, music playing, people talking, etc. These noise sources can generate noise levels between up to 65 dBA at a distance of 50 feet.[8] However, noise events from these stationary sources are generally sporadic, short in duration, and would not last for extended periods of time. In addition, stationary noise is generated by residences to the north and south under existing conditions. Therefore, stationary noise levels from the Project would not result in a noticeable increase in ambient noise levels and would comply with City's Municipal Code as shown in Table 13.

Loading Area Noise

The Project would include commercial uses that would necessitate occasional deliveries. The primary noise associated with deliveries is the arrival and departure of trucks and vans. Operations of proposed mixed-use Project would potentially require deliveries of vans and light trucks and not heavy-duty trucks. Normal deliveries typically occur during daytime hours. During loading and unloading activities, noise would be generated by the trucks' diesel engines, exhaust systems, and brakes during low gear shifting' braking activities; backing up toward the docks/loading areas; dropping down the dock ramps; and maneuvering away from the docks. The Project is not anticipated to require a significant number of truck deliveries. The closest that the proposed Project loading area could be located to sensitive receptors would be approximately 240 feet to the south. While there would be temporary noise increases during truck maneuvering and engine idling, these impacts would be of short duration and infrequent. Typically, heavy truck operations generate a noise level of 64 dBA at a distance of 50 feet.[9] Table 13, shows that truck and loading area noise would not exceed the City's Municipal Code.

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[7] Elliott H. Berger, Rick Neitzel, and Cynthia A. Kladden, *Noise Navigator Sound Level Database with Over 1700 Measurement Values*, 2010.

[8] Elliott H. Berger, Rick Neitzel1, and Cynthia A. Kladden, *Noise Navigator Sound Level Database with Over 1700 Measurement Values*, June 26, 2015.

[9] Ibid.

Table 13: Stationary Source Noise Levels

Nearest Land Use	Distance[1] (feet)	Reference Level at 50 ft (dBA)	Municipal Code Section 21.040		
			Noise Level at Receiver	Exterior Noise Standard	Exceed Threshold
Mechanical Equipment					
Recreational	75		49 dBA		No
Industrial	75		49 dBA		No
Multifamily Residential	310	52 dBA[2]	36 dBA	60 dBA[5]	No
Single Family Residential	390		34 dBA		No
Hotel	415		33 dBA		No
Loading Area					
Multifamily Residential	240		50 dBA		No
Industrial	360		47 dBA		No
Recreational	600	64 dBA[2]	42 dBA	60 dBA[5]	
Single Family Residential	1,050		38 dBA		No
Hotel	1,200		36 dBA		No
Parking Area					
Recreational	55		60 dBA		No
Industrial	55		60 dBA		No
Multifamily Residential	285	61 dBA[3]	46 dBA	60 dBA[5]	No
Single Family Residential	350		41 dBA		No
Hotel	370		44 dBA		No
Landscape Maintenance					
Recreational	20		58 dBA		No
Industrial	20		58 dBA		No
Multifamily Residential	250	50 dBA[3]	36 dBA	60 dBA[5]	No
Single Family Residential	325		34 dBA		No
Hotel	370		33 dBA		No
Residential Activities					
Industrial	85		60 dBA		No
Recreational	130		57 dBA		No
Multifamily Residential	280	65 dBA[4]	50 dBA	60 dBA[5]	No
Single Family Residential	350		48 dBA		No
Hotel	380		47 dBA		No

1. The distance is from the location of the operational noise source to the sensitive receptor property line.
2. Elliott H. Berger, Rick Neitzel, and Cynthia A. Kladden, *Noise Navigator Sound Level Database with Over 1700 Measurement Values*, July 6, 2010.
3. Kariel, H. G., *Noise in Rural Recreational Environments*, Canadian Acoustics 19(5), 3-10, 1991.
4. U.S. EPA, *Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances*, 1971.
5. Section 21.040 18. of the City of Petaluma Municipal Code states the maximum noise level generated by the Project shall not exceed an Ldn level of 60 dBA at the receiving property.

Parking Areas

Traffic associated with parking areas is typically not of sufficient volume to exceed community noise standards, which are based on a time-averaged scale such as the CNEL scale. However, the instantaneous maximum sound levels generated by a car door slamming, engine starting up and car pass-bys range from 53 to 61 dBA [10] and may be an annoyance to adjacent noise-sensitive receptors. Parking lot noise can also be considered a "stationary" noise source. Conversations in parking areas may also be an annoyance to sensitive receptors. Sound levels of speech typically range from 33 dBA at 48 feet for normal speech to 50 dBA at 50 feet for very loud speech. [11] It should be noted that parking lot noise are instantaneous noise levels compared to noise standards in the CNEL scale, which are averaged over time. As a result, actual noise levels over time resulting from parking lot activities would be far lower Table 13, shows that parking area noise would not exceed the City's Municipal Code.

Landscape Maintenance Activities

Development and operation of the Project includes new landscaping that would require periodic maintenance. Noise generated by a gasoline-powered lawnmower is estimated to be approximately 70 dBA at a distance of 5 feet. Landscape Maintenance activities would be 58 dBA at the closest sensitive receptor approximately 220 feet away. However, the existing structures would further attenuate noise levels to below the City's standard of 65 dBA for residential uses. Maintenance activities would operate during daytime hours for brief periods of time as allowed by the City Municipal Code and would not permanently increase ambient noise levels in the Project vicinity and would be consistent with activities that currently occur at the surrounding uses. Table 13, shows that landscape maintenance noise would not exceed the City's Municipal Code. As shown in Table 13, stationary sources would not exceed the noise standards in the Section 21.040 of the Municipal Code at the nearest sensitive receptors or the nearest off-site uses. The Project would not place mechanical equipment near residential uses, and noise from this equipment would not be perceptible at the closest sensitive receptor. With adherence to the City's Municipal Code, impacts associated with the operations of the proposed Project would be less than significant.

Summary

Overall, through adherence to Municipal Code requirements, noise impacts associated with traffic, mechanical equipment, loading/unloading activities, residential activated, parking lot noise, and landscape equipment would be reduced to a less than significant level.

Mitigation Measures: No mitigation is required.

Level of Significance: Less than significant impact.

10 Kariel, H. G., *Noise in Rural Recreational Environments*, Canadian Acoustics 19(5), 3-10, 1991.

11 Elliott H. Berger, Rick Neitzel, and Cynthia A. Kladden, *Noise Navigator Sound Level Database with Over 1700 Measurement Values*, 2010.

Threshold 6.2 Would the Project generate excessive groundborne vibration or groundborne noise levels?

Construction

Increases in groundborne vibration levels attributable to the Project would be primarily associated with construction-related activities. Construction on the Project site would have the potential to result in varying degrees of temporary groundborne vibration, depending on the specific construction equipment used and the operations involved. Ground vibration generated by construction equipment spreads through the ground and diminishes in magnitude with increases in distance. 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 FTA has published standard vibration velocities for construction equipment operations. In general, depending on the building category of the nearest buildings adjacent to the potential pile driving area, the potential construction vibration damage criteria vary. For example, for a building constructed with reinforced concrete with no plaster, the FTA guidelines show that a vibration level of up to 0.50 inch per second (in/sec) peak particle velocity (PPV) is considered safe and would not result in any construction vibration damage. In general, the FTA architectural damage criterion for continuous vibrations (i.e. 0.2 in/sec) appears to be conservative. The types of construction vibration impacts include human annoyance and building damage. Human annoyance occurs when construction vibration rises significantly above the threshold of human perception for extended periods of time. Building damage can be cosmetic or structural. Ordinary buildings that are not particularly fragile would not experience cosmetic damage (e.g. plaster cracks) at distances beyond 30 feet. This distance can vary substantially depending on soil composition and underground geological layer between vibration source and receiver.

Table 14: Typical Construction Equipment Vibration Levels, lists vibration levels at 25 feet, 35 feet, and 50 feet for typical construction equipment. Groundborne vibration generated by construction equipment spreads through the ground and diminishes in magnitude with increases in distance. As indicated in Table 14, based on FTA data, vibration velocities from typical heavy construction equipment operations that would be used during Project construction range from 0.0018 to 0.1268 in/sec PPV at 35 feet from the source of activity. The nearest sensitive receptor is approximately 220 feet from the active construction zone and would not experience perceptible vibration levels.

As shown in Table 14, the highest vibration levels are achieved with the large bulldozer operations. This construction activity is expected to take place during grading. Project construction would be approximately 25 feet from the closest structure. However, construction equipment vibration velocities would not exceed the FTA's 0.20 PPV threshold. In general, other construction activities would occur throughout the Project site and would not be concentrated at the point closest to the nearest structure. Therefore, vibration impacts associated with the Project would be less than significant.

Table 14: Typical Construction Equipment Vibration Levels

Equipment	Peak Particle Velocity At 25 feet (in/sec)	Peak Particle Velocity At 35 feet (in/sec)	Peak Particle Velocity At 50 feet (in/sec)
Vibratory Roller	0.210	0.1268	0.0742
Large Bulldozer	0.089	0.0537	0.0315
Loaded Trucks	0.076	0.0459	0.0269
Rock Breaker	0.059	0.0356	0.0209
Jackhammer	0.035	0.0211	0.0124
Small Bulldozer/Tractors	0.003	0.0018	0.0011
1. Calculated using the following formula: PPVequip = PPVref x (25/D)1.5, where: PPVequip = the peak particle velocity in in/sec of the equipment adjusted for the distance; PPVref = the reference vibration level in in/sec from Table 7-4 of the Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, 2018; D = the distance from the equipment to the receiver.			
Source: Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, September 2018.			

Operations

The Project would not generate groundborne vibration that could be felt at surrounding uses. Project operations would not involve railroads or substantial heavy truck operations, and therefore would not result in vibration impacts at surrounding uses. As a result, impacts from vibration associated with Project operation would be less than significant.

Mitigation Measures: No mitigation is required.

Level of Significance: Less than significant impact.

Threshold 6.3 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?

The Project site is located 2.10 miles southwest of the Petaluma Municipal Airport. Therefore, the Project site is not located near a private airstrip, within an airport land use plan, or within two miles of a public airport and would not expose people residing or working in the Project area to excessive noise levels. Additionally, the Project site is not located within the Community Noise Equivalency Level (CNEL) noise contours from the Petaluma Municipal Airport. Noise from aircraft would not substantially increase ambient noise levels at the Project site, and interior noise levels resulting from aircraft would be compatible with the proposed Project.

Mitigation Measures: No mitigation is required.

Level of Significance: Less than significant impact.

6.2 CUMULATIVE NOISE IMPACTS

Noise by definition is a localized phenomenon, and drastically reduces as distance from the source increases. Cumulative noise impacts involve development of the Project in combination with ambient growth and other related development projects. As noise levels decrease as distance from the source increases, only projects in the nearby area could combine with the Project to potentially result in cumulative noise impacts.

Cumulative Construction Noise

The Project's construction activities, when properly mitigated, would not result in a substantial temporary increase in ambient noise levels. The City permits construction hours between the hours of 7:00 a.m. and 10:00 p.m. Monday through Friday and between 9:00 a.m. and 10:00 p.m. on weekends and holidays, unless otherwise allowed in a Development Permit or other planning approval. The Project would contribute to other proximate construction noise impacts if construction activities were conducted concurrently. However, based on the noise analysis above, the Project's construction-related noise impacts would be less than significant following compliance with local regulations and BMPs outlined in this study.

Construction activities at other planned and approved projects would be required to take place during daytime hours, and the City and Project applicants would be required to evaluate construction noise impacts and implement mitigation, if necessary, to minimize noise impacts. Each project would be required to comply with the applicable City of Petaluma Municipal Code limitations on allowable hours of construction. Therefore, Project construction would not contribute to cumulative impacts and impacts in this regard are not cumulatively considerable.

Cumulative Operational Noise

Cumulative noise impacts describe how much noise levels are projected to increase over existing conditions with the development of the Project and other foreseeable projects. Cumulative noise impacts would occur primarily as a result of increased traffic on local roadways due to buildout of the Project and other projects in the vicinity. However, noise from generators and other stationary sources could also generate cumulative noise levels.

<u>Stationary Noise</u>
As discussed above, impacts from the Project's operations would be less than significant. Due to site distance, intervening land uses, and the fact that noise dissipates as it travels away from its source, noise impacts from on-site activities and other stationary sources would be limited to the Project site and vicinity. No known past, present, or reasonably foreseeable projects would compound or increase the operational noise levels generated by the Project. Thus, cumulative operational noise impacts from related projects, in conjunction with project-specific noise impacts, would not be cumulatively significant.

<u>Traffic Noise</u>
A project's contribution to a cumulative traffic noise increase would be considered significant when the combined effect exceeds perception level (i.e., auditory level increase) threshold. Cumulative increases in traffic noise levels were estimated by comparing the Existing Plus Project and Cumulative scenarios to existing conditions.

The following criteria is used to evaluate the combined effect of the cumulative noise increase.

- Combined Effect. The cumulative with Project noise level ("Cumulative With Project") would cause a significant cumulative impact if a 3.0 dB increase over "Existing" conditions occurs and the resulting noise level exceeds the applicable exterior standard at a sensitive use. Although there may be a significant noise increase due to the Project in combination with other related projects (combined effects), it must also be demonstrated that the

Project has an incremental effect. In other words, a significant portion of the noise increase must be due to the Project.

The following criteria have been used to evaluate the incremental effect of the cumulative noise increase.

- Incremental Effects. The "Cumulative With Project" causes a 1.0 dBA increase in noise over the "Cumulative Without Project" noise level.

A significant impact would result only if both the combined and incremental effects criteria have been exceeded. Noise by definition is a localized phenomenon and reduces as distance from the source increases. Consequently, only the Project and growth due to occur in the general area would contribute to cumulative noise impacts. Table 15: Cumulative Plus Project Conditions Predicted Traffic Noise Levels, identifies the traffic noise effects along roadway segments in the vicinity of the Project site for "Existing," "Cumulative Without Project," and "Cumulative With Project," conditions, including incremental and net cumulative impacts.

Table 15: Cumulative Plus Project Conditions Predicted Traffic Noise Levels

Roadway Segment	Existing[1]	Cumulative Without Project[1]	Cumulative With Project[1]	Combined Effects	Incremental Effects	Cumulatively Significant Impact?
				dBA Difference: Existing and Cumulative With Project	dBA Difference: Cumulative Without and With Project	
D Street						
Lakeville St. to Copeland St.	64.8	66.3	66.4	1.4	0.1	**No**
Copeland St. to 1st St.	65.9	67.1	67.1	1.2	0.0	**No**
1st St. to Petaluma Blvd.	65.4	66.7	66.8	1.4	0.1	**No**
Lakeville Street						
D St. to Washington St.	63.4	65.3	65.3	1.9	0.0	**No**
Copeland Street						
D St. to Washington St.	60.0	62.7	62.9	2.9	0.2	**No**
Washington Street						
Lakeville St. to Copeland St.	66.3	68.0	68.1	1.7	0.1	**No**
ADT = average daily trips; dBA = A-weighted decibels; DNL= day-night noise levels						
1. Traffic noise levels are at 100 feet from the roadway centerline. The actual sound level at any receptor location is dependent upon such factors as the source-to-receptor distance and the presence of intervening structures, barriers, and topography.						
Source: Based on data from the Transportation Analysis (Kimley-Horn, 2022). Refer to Appendix A for traffic noise modeling assumptions and results.						

As indicated in Table 15, none of the roadway segments would exceed the combined effects criterion or the Incremental Effects criteron. A significant impact would result only if both the combined and incremental effects criteria have been exceeded. Therefore, the Project's cumulative noise contribution would be less than significant. Based on the significance criteria set forth in this Report, no roadway segments would result in significant impacts because they would not exceed the City's threshold for noise at nearby sensitive receptors. The Project would not result in long-term mobile noise impacts based on Project-generated traffic as well as cumulative and incremental noise levels. Therefore, the Project, in combination with cumulative background traffic noise levels, would result in a less than significant cumulative impact. The Project's contribution to noise levels would not be cumulatively considerable.

7 REFERENCES

1. California Department of Transportation, *California Vehicle Noise Emission Levels*, 1987.
2. California Department of Transportation, *Traffic Noise Analysis Protocol*, 2011.
3. California Department of Transportation, *Technical Noise Supplement to the Traffic Noise Analysis Protocol*, 2013.
4. California Department of Transportation, *Transportation and Construction Vibration Guidance Manual*, 2013.
5. City of Petaluma, *General Plan,* 2008.
6. City of Petaluma, *Municipal Code*, 2020.
7. Cyril M. Harris, *Handbook of Noise Control*, Second Edition, 1979.
8. Cyril M. Harris, *Noise Control in Buildings – A Practical Guide for Architects and Engineers*, 1994.
9. Elliott H. Berger, Rick Neitzel, and Cynthia A. Kladden. *Noise Navigator Sound Level Database with Over 1700 Measurement Values*, July 6, 2010.
10. Federal Highway Administration, *Roadway Construction Noise Model*, 2006.
11. Federal Highway Administration, Roadway *Construction Noise Model User's Guide Final Report*, 2006.
12. Federal Interagency Committee on Noise, *Federal Agency Review of Selected Airport Noise Analysis Issues*, 1992.
13. Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, September 2018.
14. Kariel, H. G., *Noise in Rural Recreational Environments*, Canadian Acoustics 19(5), 3-10, 1991.
15. Kimley-Horn & Associates, *Oyster Cove Transportation Impact Assessment*, March 2022.
16. United States Environmental Protection Agency, *Protective Noise Levels (EPA 550/9-79-100)*, 1979.

Appendix A

Noise Data

Noise Measurement Field Data

Project:	Oyster Cove	**Job Number:**	197529001
Site No.:	1	**Date:**	2/9/2022
Analyst:	Sophie LaHerran	**Time:**	10:43 AM
Location:	1st Street		
Noise Sources:	Construction, traffic on 1st St and D St		
Comments:	People walking by and talking		

Results (dBA):

	Leq:	Lmin:	Lmax:	Peak:
Measurement 1:	55.6	42.9	67.9	90.2

Equipment	
Sound Level Meter:	LD SoundExpert LxT
Calibrator:	CAL200
Response Time:	Slow
Weighting:	A
Microphone Height:	5 feet

Weather	
Temp. (degrees F):	58°
Wind (mph):	4 mph
Sky:	Clear
Bar. Pressure:	30.20"
Humidity:	

Photo:

Kimley»Horn

Measurement Report

Report Summary

Meter's File Name	LxT_Data.109.s	Computer's File Name	LxTse_0006073-20220209 104251-LxT_Data.109.ldbin
Meter	LxT SE 0006073		
Firmware	2.404		
User		Location	
Job Description			
Note			

Start Time	2022-02-09 10:42:51	Duration	0:10:06.5		
End Time	2022-02-09 10:53:01	Run Time	0:10:06.5	Pause Time	0:00:00.0

Results

Overall Metrics

LA_{eq}	55.6 dB		
LAE	83.5 dB	SEA	--- dB
EA	24.7 µPa²h		
LA_{peak}	90.2 dB	2022-02-09 10:43:00	
LAS_{max}	67.9 dB	2022-02-09 10:52:20	
LAS_{min}	42.9 dB	2022-02-09 10:49:01	
LA_{eq}	55.6 dB		
LC_{eq}	66.9 dB	LC_{eq} - LA_{eq}	11.2 dB
LAI_{eq}	60.1 dB	LAI_{eq} - LA_{eq}	4.5 dB

Exceedances

Exceedances	Count	Duration
LAS > 85.0 dB	0	0:00:00.0
LAS > 115.0 dB	0	0:00:00.0
LApeak > 135.0 dB	0	0:00:00.0
LApeak > 137.0 dB	0	0:00:00.0
LApeak > 140.0 dB	0	0:00:00.0

Community Noise

LDN	LDay	LNight	
55.6 dB	55.6 dB	0.0 dB	
LDEN	**LDay**	**LEve**	**LNight**
55.6 dB	55.6 dB	--- dB	--- dB

Any Data

	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	55.6 dB		66.9 dB		--- dB	
$Ls_{(max)}$	67.9 dB	2022-02-09 10:52:20	--- dB		--- dB	
$LS_{(min)}$	42.9 dB	2022-02-09 10:49:01	--- dB		--- dB	
$L_{Peak(max)}$	90.2 dB	2022-02-09 10:43:00	--- dB		--- dB	

Overloads

Count	Duration	OBA Count	OBA Duration
0	0:00:00.0	0	0:00:00.0

Statistics

LAS 5.0	61.5 dB
LAS 10.0	59.9 dB
LAS 33.3	54.0 dB
LAS 50.0	51.2 dB
LAS 66.6	49.1 dB
LAS 90.0	45.6 dB

Noise Measurement Field Data

Project:	Oyster Cove	**Job Number:**	197529001
Site No.:	2	**Date:**	2/9/2022
Analyst:	Sophie LaHerran	**Time:**	11:48 AM
Location:	Erwin Street		
Noise Sources:	Cars passing by on D Street		
Comments:			

Results (dBA):

	Leq:	Lmin:	Lmax:	Peak:
Measurement 1:	56.4	45.5	77.6	95.7

Equipment	
Sound Level Meter:	LD SoundExpert LxT
Calibrator:	CAL200
Response Time:	Slow
Weighting:	A
Microphone Height:	5 feet

Weather	
Temp. (degrees F):	58°
Wind (mph):	4 mph
Sky:	Clear
Bar. Pressure:	30.20"
Humidity:	

Photo:

Kimley»Horn

Measurement Report

Report Summary

Meter's File Name	LxT_Data.111.s	Computer's File Name	LxTse_0006073-20220209 111944-LxT_Data.111.ldbin
Meter	LxT SE 0006073		
Firmware	2.404		
User		Location	
Job Description			
Note			

Start Time	2022-02-09 11:19:44	Duration	0:10:00.0		
End Time	2022-02-09 11:29:44	Run Time	0:10:00.0	Pause Time	0:00:00.0

Results

Overall Metrics

LA_{eq}	65.4 dB		
LAE	93.2 dB	SEA	--- dB
EA	231.5 µPa²h		
LA_{peak}	97.9 dB	2022-02-09 11:21:31	
LAS_{max}	80.6 dB	2022-02-09 11:21:32	
LAS_{min}	49.6 dB	2022-02-09 11:29:32	
LA_{eq}	65.4 dB		
LC_{eq}	74.1 dB	LC_{eq} - LA_{eq}	8.7 dB
LAI_{eq}	68.0 dB	LAI_{eq} - LA_{eq}	2.6 dB

Exceedances	Count	Duration
LAS > 85.0 dB	0	0:00:00.0
LAS > 115.0 dB	0	0:00:00.0
LApeak > 135.0 dB	0	0:00:00.0
LApeak > 137.0 dB	0	0:00:00.0
LApeak > 140.0 dB	0	0:00:00.0

Community Noise	LDN	LDay	LNight	
	65.4 dB	65.4 dB	0.0 dB	
	LDEN	LDay	LEve	LNight
	65.4 dB	65.4 dB	--- dB	--- dB

Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	65.4 dB		74.1 dB		--- dB	
$Ls_{(max)}$	80.6 dB	2022-02-09 11:21:32	--- dB		--- dB	
$LS_{(min)}$	49.6 dB	2022-02-09 11:29:32	--- dB		--- dB	
$L_{Peak(max)}$	97.9 dB	2022-02-09 11:21:31	--- dB		--- dB	

Overloads	Count	Duration	OBA Count	OBA Duration
	0	0:00:00.0	0	0:00:00.0

Statistics

LAS 5.0	71.5 dB
LAS 10.0	68.8 dB
LAS 33.3	61.7 dB
LAS 50.0	58.2 dB
LAS 66.6	56.5 dB
LAS 90.0	53.4 dB

Noise Measurement Field Data

Project:	Oyster Cove	**Job Number:**	197529001
Site No.:	3	**Date:**	2/9/2022
Analyst:	Sophie LaHerran	**Time:**	11:19 AM
Location:	Copeland Street		
Noise Sources:	Trucks idling, traffic on Copeland and D Street		
Comments:	Near bus stop		

Results (dBA):

	Leq:	Lmin:	Lmax:	Peak:
Measurement 1:	65.4	49.6	80.6	97.6

Equipment	
Sound Level Meter:	LD SoundExpert LxT
Calibrator:	CAL200
Response Time:	Slow
Weighting:	A
Microphone Height:	5 feet

Weather	
Temp. (degrees F):	58°
Wind (mph):	4 mph
Sky:	Clear
Bar. Pressure:	30.20"
Humidity:	

Photo:

Kimley»Horn

Measurement Report

Report Summary

Meter's File Name	LxT_Data.113.s	Computer's File Name	LxTse_0006073-20220209 114831-LxT_Data.113.ldbin
Meter	LxT SE 0006073		
Firmware	2.404		
User		Location	
Job Description			
Note			

Start Time	2022-02-09 11:48:31	Duration	0:10:00.0		
End Time	2022-02-09 11:58:31	Run Time	0:10:00.0	Pause Time	0:00:00.0

Results

Overall Metrics

LA_{eq}	56.4 dB		
LAE	84.2 dB	SEA	--- dB
EA	29.1 µPa²h		
LA_{peak}	95.7 dB	2022-02-09 11:57:03	
LAS_{max}	77.6 dB	2022-02-09 11:57:03	
LAS_{min}	45.5 dB	2022-02-09 11:49:22	
LA_{eq}	56.4 dB		
LC_{eq}	67.5 dB	LC_{eq} - LA_{eq}	11.1 dB
LAI_{eq}	62.7 dB	LAI_{eq} - LA_{eq}	6.3 dB

Exceedances

Exceedances	Count	Duration
LAS > 85.0 dB	0	0:00:00.0
LAS > 115.0 dB	0	0:00:00.0
LApeak > 135.0 dB	0	0:00:00.0
LApeak > 137.0 dB	0	0:00:00.0
LApeak > 140.0 dB	0	0:00:00.0

Community Noise

LDN	LDay	LNight	
56.4 dB	56.4 dB	0.0 dB	
LDEN	**LDay**	**LEve**	**LNight**
56.4 dB	56.4 dB	--- dB	--- dB

Any Data

	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	56.4 dB		67.5 dB		--- dB	
$Ls_{(max)}$	77.6 dB	2022-02-09 11:57:03	--- dB		--- dB	
$LS_{(min)}$	45.5 dB	2022-02-09 11:49:22	--- dB		--- dB	
$L_{Peak(max)}$	95.7 dB	2022-02-09 11:57:03	--- dB		--- dB	

Overloads

Count	Duration	OBA Count	OBA Duration
0	0:00:00.0	0	0:00:00.0

Statistics

LAS 5.0	59.3 dB
LAS 10.0	57.7 dB
LAS 33.3	54.5 dB
LAS 50.0	52.9 dB
LAS 66.6	51.5 dB
LAS 90.0	49.4 dB

Noise Measurement Field Data

Project:	Oyster Cove	**Job Number:**	197529001
Site No.:	4	**Date:**	2/9/2022
Analyst:	Sophie LaHerran	**Time:**	11:35 AM
Location:	Hopper Street		
Noise Sources:	Traffic on Lakeville Street		
Comments:	Next to train station		

Results (dBA):

	Leq:	Lmin:	Lmax:	Peak:
Measurement 1:	63.4	53.4	72.8	96.3

Equipment	
Sound Level Meter:	LD SoundExpert LxT
Calibrator:	CAL200
Response Time:	Slow
Weighting:	A
Microphone Height:	5 feet

Weather	
Temp. (degrees F):	58°
Wind (mph):	4 mph
Sky:	Clear
Bar. Pressure:	30.20"
Humidity:	

Photo:

Kimley»Horn

Measurement Report

Report Summary

Meter's File Name	LxT_Data.112.s	Computer's File Name	LxTse_0006073-20220209 113433-LxT_Data.112.ldbin
Meter	LxT SE 0006073		
Firmware	2.404		
User		Location	
Job Description			
Note			

Start Time	2022-02-09 11:34:33	Duration	0:10:00.0		
End Time	2022-02-09 11:44:33	Run Time	0:10:00.0	Pause Time	0:00:00.0

Results

Overall Metrics

LA_{eq}	63.4 dB		
LAE	91.1 dB	SEA	--- dB
EA	144.4 µPa²h		
LA_{peak}	96.3 dB	2022-02-09 11:36:52	
LAS_{max}	72.8 dB	2022-02-09 11:36:52	
LAS_{min}	53.4 dB	2022-02-09 11:38:35	
LA_{eq}	63.4 dB		
LC_{eq}	74.3 dB	LC_{eq} - LA_{eq}	11.0 dB
LAI_{eq}	65.6 dB	LAI_{eq} - LA_{eq}	2.2 dB

Exceedances	Count	Duration
LAS > 85.0 dB	0	0:00:00.0
LAS > 115.0 dB	0	0:00:00.0
LApeak > 135.0 dB	0	0:00:00.0
LApeak > 137.0 dB	0	0:00:00.0
LApeak > 140.0 dB	0	0:00:00.0

Community Noise	LDN	LDay	LNight	
	63.4 dB	63.4 dB	0.0 dB	
	LDEN	LDay	LEve	LNight
	63.4 dB	63.4 dB	--- dB	--- dB

Any Data	A		C		Z	
	Level	Time Stamp	Level	Time Stamp	Level	Time Stamp
L_{eq}	63.4 dB		74.3 dB		--- dB	
$Ls_{(max)}$	72.8 dB	2022-02-09 11:36:52	--- dB		--- dB	
$LS_{(min)}$	53.4 dB	2022-02-09 11:38:35	--- dB		--- dB	
$L_{Peak(max)}$	96.3 dB	2022-02-09 11:36:52	--- dB		--- dB	

Overloads	Count	Duration	OBA Count	OBA Duration
	0	0:00:00.0	0	0:00:00.0

Statistics

LAS 5.0	67.6 dB
LAS 10.0	66.0 dB
LAS 33.3	63.7 dB
LAS 50.0	62.4 dB
LAS 66.6	60.8 dB
LAS 90.0	58.3 dB

FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels

Project Name: Oyster Cove
Project Number:
Scenario: Existing
Ldn/CNEL: CNEL

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

								Vehicle Mix			Distance from Centerline of Roadway			
				Median	ADT	Speed	Alpha	Medium	Heavy	CNEL at	Distance to Contour			
#	Roadway	Segment	Lanes	Width	Volume	(mph)	Factor	Trucks	Trucks	100 Feet	70 CNEL	65 CNEL	60 CNEL	55 CNEL
1	D Street	D St from Lakeville St to Copeland St	2	2	15,010	25	0	5.7%	4.4%	64.8	-	96	303	958
2	D Street	D St from Copeland St to 1st St	2	2	19,200	25	0	5.7%	4.4%	65.9	39	123	388	1,226
3	D Street	D St from 1st St to Petaluma Blvd	2	10	17,240	25	0	5.7%	4.4%	65.4	-	110	349	1,105
4	Lakevlle St	Lakeville St from D St to Washington St	2	13	8,350	30	0	5.7%	4.4%	63.4	-	69	217	686
5	Copeland St	Copeland St from D St to Washington St	2	2	4,990	25	0	5.7%	4.4%	60.0	-	-	101	319
6	Washington St	Washington St from Lakeville St to Copeland St	4	10	20,790	25	0	5.7%	4.4%	66.3	-	136	430	1,360

[1] Distance is from the centerline of the roadway segment to the receptor location.
"-" = contour is located within the roadway right-of-way.

FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels

Project Name: Oyster Cove
Project Number:
Scenario: Existing Plus Project
Ldn/CNEL: CNEL

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

								Vehicle Mix		Distance from Centerline of Roadway				
				Median	ADT	Speed	Alpha	Medium	Heavy	CNEL at	Distance to Contour			
#	Roadway	Segment	Lanes	Width	Volume	(mph)	Factor	Trucks	Trucks	100 Feet	70 CNEL	65 CNEL	60 CNEL	55 CNEL
1	D Street	D St from Lakeville St to Copeland St	2	2	15,300	25	0	5.7%	4.4%	64.9	-	98	309	977
2	D Street	D St from Copeland St to 1st St	2	2	19,310	25	0	5.7%	4.4%	65.9	39	123	390	1,233
3	D Street	D St from 1st St to Petaluma Blvd	2	10	17,350	25	0	5.7%	4.4%	65.5	-	111	352	1,112
4	Lakevlle St	Lakeville St from D St to Washington St	2	13	8,400	30	0	5.7%	4.4%	63.4	-	69	218	690
5	Copeland St	Copeland St from D St to Washington St	2	2	5,230	25	0	5.7%	4.4%	60.2	-	33	106	334
6	Washington St	Washington St from Lakeville St to Copeland St	4	10	20,950	25	0	5.7%	4.4%	66.4	-	137	434	1,371

[1] Distance is from the centerline of the roadway segment to the receptor location.
"-" = contour is located within the roadway right-of-way.

FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels

Project Name: Oyster Cove
Project Number:
Scenario: Opening Year
Ldn/CNEL: CNEL

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

								Vehicle Mix		Distance from Centerline of Roadway				
				Median	ADT	Speed	Alpha	Medium	Heavy	CNEL at	Distance to Contour			
#	Roadway	Segment	Lanes	Width	Volume	(mph)	Factor	Trucks	Trucks	100 Feet	70 CNEL	65 CNEL	60 CNEL	55 CNEL
1	D Street	D St from Lakeville St to Copeland St	2	2	16,880	25	0	5.7%	4.4%	65.3	34	107	338	1,069
2	D Street	D St from Copeland St to 1st St	2	2	21,130	25	0	5.7%	4.4%	66.3	42	134	423	1,339
3	D Street	D St from 1st St to Petaluma Blvd	2	10	19,170	25	0	5.7%	4.4%	65.9	39	122	385	1,219
4	Lakevlle St	Lakeville St from D St to Washington St	2	13	9,010	30	0	5.7%	4.4%	63.7	-	73	232	735
5	Copeland St	Copeland St from D St to Washington St	2	2	6,110	25	0	5.7%	4.4%	60.9	-	39	122	387
6	Washington St	Washington St from Lakeville St to Copeland St	4	10	22,480	25	0	5.7%	4.4%	66.6	-	146	462	1,460

[1] Distance is from the centerline of the roadway segment to the receptor location.
"-" = contour is located within the roadway right-of-way.

FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels

Project Name: Oyster Cove
Project Number:
Scenario: Opening Year Plus Project
Ldn/CNEL: CNEL

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

#	Roadway	Segment	Lanes	Median Width	ADT Volume	Speed (mph)	Alpha Factor	Vehicle Mix Medium Trucks	Vehicle Mix Heavy Trucks	CNEL at 100 Feet	Distance from Centerline of Roadway – Distance to Contour 70 CNEL	65 CNEL	60 CNEL	55 CNEL
1	D Street	D St from Lakeville St to Copeland St	2	2	17,170	25	0	6.1%	5.7%	66.2	42	132	419	1,324
2	D Street	D St from Copeland St to 1st St	2	2	21,240	25	0	6.1%	5.7%	67.1	52	164	518	1,638
3	D Street	D St from 1st St to Petaluma Blvd	2	10	19,280	25	0	6.1%	5.7%	66.7	47	149	472	1,493
4	Lakevlle St	Lakeville St from D St to Washington St	2	13	9,060	30	0	6.1%	5.7%	64.5	-	89	281	888
5	Copeland St	Copeland St from D St to Washington St	2	2	6,350	25	0	6.1%	5.7%	61.9	-	49	155	490
6	Washington St	Washington St from Lakeville St to Copeland St	4	10	22,640	25	0	6.1%	5.7%	67.5	57	179	566	1,790

[1] Distance is from the centerline of the roadway segment to the receptor location.
"-" = contour is located within the roadway right-of-way.

FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels

Project Name: Oyster Cove
Project Number:
Scenario: Cumulative
Ldn/CNEL: CNEL

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

								Vehicle Mix		Distance from Centerline of Roadway				
				Median	ADT	Speed	Alpha	Medium	Heavy	CNEL at	Distance to Contour			
#	Roadway	Segment	Lanes	Width	Volume	(mph)	Factor	Trucks	Trucks	100 Feet	70 CNEL	65 CNEL	60 CNEL	55 CNEL
1	D Street	D St from Lakeville St to Copeland St	2	2	17,410	25	0	6.1%	5.7%	66.3	42	134	425	1,343
2	D Street	D St from Copeland St to 1st St	2	2	21,000	25	0	6.1%	5.7%	67.1	51	162	512	1,620
3	D Street	D St from 1st St to Petaluma Blvd	2	10	19,300	25	0	6.1%	5.7%	66.7	47	149	472	1,494
4	Lakevlle St	Lakeville St from D St to Washington St	2	13	10,810	30	0	6.1%	5.7%	65.3	-	106	335	1,060
5	Copeland St	Copeland St from D St to Washington St	2	2	7,700	25	0	6.1%	5.7%	62.7	-	59	188	594
6	Washington St	Washington St from Lakeville St to Copeland St	4	10	25,380	25	0	6.1%	5.7%	68.0	63	201	635	2,007

[1] Distance is from the centerline of the roadway segment to the receptor location.
"-" = contour is located within the roadway right-of-way.

FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels

Project Name: Oyster Cove
Project Number:
Scenario: Cumulative Plus Project
Ldn/CNEL: CNEL

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

								Vehicle Mix		Distance from Centerline of Roadway				
				Median	ADT	Speed	Alpha	Medium	Heavy	CNEL at	Distance to Contour			
#	Roadway	Segment	Lanes	Width	Volume	(mph)	Factor	Trucks	Trucks	100 Feet	70 CNEL	65 CNEL	60 CNEL	55 CNEL
1	D Street	D St from Lakeville St to Copeland St	2	2	17,700	25	0	6.1%	5.7%	66.4	43	137	432	1,365
2	D Street	D St from Copeland St to 1st St	2	2	21,110	25	0	6.1%	5.7%	67.1	51	163	515	1,628
3	D Street	D St from 1st St to Petaluma Blvd	2	10	19,410	25	0	6.1%	5.7%	66.8	48	150	475	1,503
4	Lakevlle St	Lakeville St from D St to Washington St	2	13	10,860	30	0	6.1%	5.7%	65.3	-	106	337	1,065
5	Copeland St	Copeland St from D St to Washington St	2	2	7,940	25	0	6.1%	5.7%	62.9	-	61	194	612
6	Washington St	Washington St from Lakeville St to Copeland St	4	10	25,540	25	0	6.1%	5.7%	68.1	64	202	639	2,019

[1] Distance is from the centerline of the roadway segment to the receptor location.
"-" = contour is located within the roadway right-of-way.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/17/2022
Case Description: Arch Coating

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Multifamily	Residential	55.5	55.6	55.6

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	350	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
Compressor (air)		60.8	56.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	60.8	56.8	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 #2 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Single Family	Residential	56.4	56.4	56.4

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	495	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
Compressor (air)		57.8	53.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	57.8	53.8	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 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Industrial	Residential	65.4	65.4	65.4

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	70	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
Compressor (air)		74.7	70.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	74.7	70.8	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 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Hotel	Industrial	63.4	63.4	63.4

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	745	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
Compressor (air)		54.2	50.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	54.2	50.2	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.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/17/2022
Case Description: Building

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Multifamily	Residential	55.5	55.6	55.6

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	350	0
Man Lift	No	20		74.7	350	0
Generator	No	50		80.6	350	0
Tractor	No	40	84		350	0

Results

Equipment		Calculated (dBA) *Lmax	Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Crane		63.6	55.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift		57.8	50.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator		63.7	60.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor		67.1	63.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	67.1	65.7	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.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Single Family	Residential	56.4	56.4	56.4

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	495	0
Man Lift	No	20		74.7	495	0
Generator	No	50		80.6	495	0
Tractor	No	40	84		495	0

Results

Equipment		Calculated (dBA) *Lmax	Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Crane		60.6	52.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift		54.8	47.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator		60.7	57.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor		64.1	60.1	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	64.1	62.7	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.

---- Receptor #3 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Industrial	Residential	65.4	65.4	65.4

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	70	0
Man Lift	No	20		74.7	70	0
Generator	No	50		80.6	70	0
Tractor	No	40	84		70	0

Results

Equipment		Calculated (dBA) *Lmax	Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Crane		77.6	69.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift		71.8	64.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator		77.7	74.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor		81.1	77.1	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	81.1	79.7	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.

---- Receptor #4 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Hotel	Industrial	63.4	63.4	63.4

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	745	0
Man Lift	No	20		74.7	745	0
Generator	No	50		80.6	745	0
Tractor	No	40	84		745	0

Results

Equipment		Calculated (dBA) *Lmax	Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Crane		57.1	49.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Man Lift		51.2	44.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator		57.2	54.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor		60.5	56.6	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	60.5	59.1	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: 3/17/2022
Case Description: Demo

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Multifamily	Residential	55.5	55.6	55.6

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	350	0
Excavator	No	40		80.7	350	0
Dozer	No	40		81.7	350	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
Concrete Saw		72.7	65.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator		63.8	59.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		64.8	60.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	72.7	67.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Single Family	Residential	56.4	56.4	56.4

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	495	0
Excavator	No	40		80.7	495	0
Dozer	No	40		81.7	495	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
Concrete Saw		69.7	62.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator		60.8	56.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		61.8	57.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	69.7	64.7	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.

---- Receptor #3 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Industrial	Residential	65.4	65.4	65.4

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	70	0
Excavator	No	40		80.7	70	0
Dozer	No	40		81.7	70	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
Concrete Saw		86.7	79.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator		77.8	73.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		78.7	74.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	86.7	81.7	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.

---- Receptor #4 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Hotel	Industrial	63.4	63.4	63.4

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	745	0
Excavator	No	40		80.7	745	0
Dozer	No	40		81.7	745	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
Concrete Saw		66.1	59.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator		57.2	53.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		58.2	54.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	66.1	61.1	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: 3/17/2022
Case Description: Grading

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Multifamily	Residential	55.5	55.6	55.6

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	350	0
Grader	No	40	85		350	0
Dozer	No	40		81.7	350	0
Tractor	No	40	84		350	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
Excavator		63.8	59.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grader		68.1	64.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		64.8	60.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor		67.1	63.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	68.1	68.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Single Family	Residential	56.4	56.4	56.4

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	495	0
Grader	No	40	85		495	0
Dozer	No	40		81.7	495	0
Tractor	No	40	84		495	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
Excavator		60.8	56.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grader		65.1	61.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		61.8	57.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor		64.1	60.1	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	65.1	65.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Industrial	Residential	65.4	65.4	65.4

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	70	0
Grader	No	40	85		70	0
Dozer	No	40		81.7	70	0
Tractor	No	40	84		70	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
Excavator		77.8	73.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grader		82.1	78.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		78.7	74.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor		81.1	77.1	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	82.1	82.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #4 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Hotel	Industrial	63.4	63.4	63.4

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	745	0
Grader	No	40	85		745	0
Dozer	No	40		81.7	745	0
Tractor	No	40	84		745	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
Excavator		57.2	53.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Grader		61.5	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
Dozer		58.2	54.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor		60.5	56.6	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	61.5	61.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/17/2022
Case Description: Paving

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Multifamily	Residential	55.5	55.6	55.6

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	350	0
Roller	No	20		80	350	0

Results

Equipment		Calculated (dBA) *Lmax	Leq	Noise Limits (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq	Noise Limit Exceedance (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq
Paver		60.3	57.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller		63.1	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	63.1	59.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Single Family	Residential	56.4	56.4	56.4

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	495	0
Roller	No	20		80	495	0

Results

Equipment		Calculated (dBA) *Lmax	Leq	Noise Limits (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq	Noise Limit Exceedance (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq
Paver		57.3	54.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller		60.1	53.1	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	60.1	56.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #3 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Industrial	Residential	65.4	65.4	65.4

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	70	0
Roller	No	20		80	70	0

Results

Equipment		Calculated (dBA) *Lmax	Leq	Noise Limits (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq	Noise Limit Exceedance (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq
Paver		74.3	71.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller		77.1	70.1	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	77.1	73.7	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.

---- Receptor #4 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Hotel	Industrial	63.4	63.4	63.4

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Paver	No	50		77.2	745	0
Roller	No	20		80	745	0

Results

Equipment		Calculated (dBA) *Lmax	Leq	Noise Limits (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq	Noise Limit Exceedance (dBA) Day Lmax	Leq	Evening Lmax	Leq	Night Lmax	Leq
Paver		53.8	50.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roller		56.5	49.5	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	56.5	53.2	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.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/17/2022
Case Description: Site Prep

---- Receptor #1 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Multifamily	Residential	55.5	55.6	55.6

Description		Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor		No	40	84		350	0
Dozer		No	40		81.7	350	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
Tractor		67.1	63.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		64.8	60.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	67.1	65.1	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.

---- Receptor #2 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Single Family	Residential	56.4	56.4	56.4

Description		Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor		No	40	84		495	0
Dozer		No	40		81.7	495	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
Tractor		64.1	60.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		61.8	57.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	64.1	62.1	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.

---- Receptor #3 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Industrial	Residential	65.4	65.4	65.4

Description		Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor		No	40	84		70	0
Dozer		No	40		81.7	70	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
Tractor		81.1	77.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		78.7	74.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	81.1	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

*Calculated Lmax is the Loudest value.

---- Receptor #4 ----

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Hotel	Industrial	63.4	63.4	63.4

Description		Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor		No	40	84		745	0
Dozer		No	40		81.7	745	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
Tractor		60.5	56.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer		58.2	54.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total	60.5	58.6	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.