3.12 NOISE

This section describes the environmental and regulatory setting for noise and vibration. It also describes existing conditions and potential impacts related to noise that would result from implementation of the proposed project, and mitigation for potentially significant impacts, where feasible. Descriptions and analysis in this section are based on noise modeling performed by Stantec. The noise modeling output is included in this EIR as Appendix G.

3.12.1 Environmental Setting

Noise Fundamentals and Terminology

Noise is generally defined as unwanted sound that annoys or disturbs people and potentially causes an adverse psychological or physiological effect on human health. Because noise is an environmental pollutant that can interfere with human activities, evaluation of noise is necessary when considering the environmental impacts of a proposed project.

Sound is mechanical energy (vibration) transmitted by pressure waves over a medium such as air or water. Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the sound pressure level is the most common descriptor used to characterize the loudness of an ambient (existing) sound level. Although the decibel (dB) scale, a logarithmic scale, is used to quantify sound intensity, it does not accurately describe how sound intensity is perceived by human hearing. The perceived loudness of sound is dependent upon many factors, including sound pressure level and frequency content. The human ear is not equally sensitive to all frequencies in the entire spectrum, so noise measurements are weighted more heavily for frequencies to which humans are sensitive in a process called A-weighting, written as dB(A) and referred to as A-weighted decibels. There is a strong correlation between A-weighted sound levels (expressed as dB(A)) and community response to noise. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. Table 3.12-1 defines sound measurements and other terminology used in this EIR, and Table 3.12-2 summarizes typical A-weighted sound levels for different noise sources.

With respect to how humans perceive and react to changes in noise levels, a 1 dB(A) increase is imperceptible, a 3 dB(A) increase is barely perceptible, a 5 dB(A) increase is clearly noticeable, and a 10 dB(A) increase is subjectively perceived as approximately twice as loud. These subjective reactions to changes in noise levels were developed on the basis of test subjects' reactions to changes in the levels of steady-state pure tones or broadband noise and to changes in levels of a given noise source. These statistical indicators are thought to be most applicable to noise levels in the range of 50 to 70 dB(A), as this is the usual range of voice and interior noise levels. Numbers of agencies and municipalities have developed or adopted noise level standards, consistent with these and other similar studies to help prevent annoyance and to protect against the degradation of the existing noise environment.

Different types of measurements are used to characterize the time-varying nature of sound. These measurements include the equivalent sound level (Leq), the minimum and maximum sound levels (Lmin and Lmax), percentile-exceeded sound levels (such as L10, L20), the day-night sound level (Ldn), and the community noise equivalent level (CNEL). Ldn and CNEL values differ by less than 1 dB. As a matter of practice, Ldn and CNEL values are considered to be equivalent and are treated as such in this assessment.

For a point source, such as a stationary compressor or construction equipment, sound attenuates based on geometry at a rate of 6 dB per doubling of distance. For a line source, such as free-flowing traffic on a freeway, sound attenuates at a rate of 3 dB per doubling of distance.[1] Atmospheric conditions, including wind, temperature gradients, and humidity, can change how sound propagates over distance and can affect the level of sound received at a given location. The degree to which the ground surface absorbs acoustical energy also affects sound propagation. Sound that travels over an acoustically absorptive surface, such as grass, attenuates at a greater rate than sound that travels over a hard surface, such as pavement. The increased attenuation is typically in the range of 1 to 2 dB per doubling of distance. Barriers, such as buildings and topography that block the line of sight between a source and receiver, also increase the attenuation of sound over distance.

Table 3.12-1: Definition of Sound Measurement

Sound Measurements	Definition
Decibel (dB)	A unitless measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micro-pascals.
A-Weighted Decibel (dB(A))	An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
Maximum Sound Level (Lmax)	The maximum sound level measured during the measurement period.
Minimum Sound Level (Lmin)	The minimum sound level measured during the measurement period.
Equivalent Sound Level (Leq)	The equivalent steady state sound level that in a stated period of time would contain the same acoustical energy.
Percentile-Exceeded Sound Level (Lxx)	The sound level exceeded xx % of a specific time period. L10 is the sound level exceeded 10% of the time. L90 is the sound level exceeded 90% of the time. L90 is often considered to be representative of the background noise level in a given area.
Day-Night Level (Ldn)	The energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels occurring during the period from 10:00 p.m. to 7:00 a.m.
Community Noise Equivalent Level (CNEL)	The energy average of the A-weighted sound levels occurring during a 24-hour period with 5 dB added to the A-weighted sound levels occurring during the period from 7:00 p.m. to 10:00 p.m. and 10 dB added to the A-weighted sound levels occurring during the period from 10:00 p.m. to 7:00 a.m.
Peak Particle Velocity (Peak Velocity or PPV)	A measurement of ground vibration defined as the maximum speed (measured in inches per second) at which a particle in the ground is moving relative to its inactive state. PPV is usually expressed in inches/second.
Frequency: Hertz	The number of complete pressure fluctuations per second above and below atmospheric pressure.

Source: Federal Highway Administration 2006

[1] Federal Highway Administration 2011

Table 3.12-2:Typical A-Weighted Sound Levels

Common Outdoor Activities	Noise Level (dB(A))	Common Indoor Activities
	-110-	Rock band
Jet flyover at 1,000 Feet		
	-100-	
Gas lawnmower at 3 Feet		
	-90-	
Diesel truck at 50 Feet at 50 MPH		Food blender at 3 Feet
Noisy urban area, daytime	-80-	Garbage Disposal at 3 Feet
Gas lawnmower, 100 Feet		
Commercial area	-70-	Vacuum Cleaner at 10 Feet
Heavy traffic at 300 Feet		Normal Speech at 3 Feet
	-60-	
Quiet urban daytime		Large business office
	-50-	Dishwasher in next room
Quiet urban nighttime		
Quiet suburban nighttime	-40-	Theater, large conference room (Background)
Quiet rural nighttime	-30-	
		Library
	-20-	Bedroom at night, concert hall (Background)
	-10-	
		Broadcast/recording studio
	-0-	

Source: Egan, David M. Architectural Acoustics. J. Ross Pub., Pub 2007

Decibel Addition

Because dB are logarithmic units, sound pressure levels cannot be added or subtracted through ordinary arithmetic. On the dB scale, a doubling of sound energy corresponds to a 3 dB increase. In other words, when two identical sources are each producing sound of the same loudness, their combined sound level at a given distance would be 3 dB higher than one source under the same conditions. For example, if one source produces a sound pressure level of 70 dB(A), two identical sources would combine to produce 73 dB(A). The cumulative sound level of any number of sources can be determined using dB addition.

Vibration Standards

Vibration is like noise such that noise involves a source, a transmission path, and a receiver. While related to noise, vibration differs in that noise is generally considered to be pressure waves transmitted through air, whereas vibration usually consists of the excitation of a structure or surface. As with noise, vibration consists of an amplitude and frequency. A person's perception to vibration depends on their individual sensitivity to vibration, as well as the amplitude and frequency of the source and the response of the system that is vibrating.

Vibration can be measured in terms of acceleration, velocity, or displacement. A common practice is to monitor vibration measures in terms of PPV in inches per second. Standards pertaining to perception as well as damage to structures have been developed for vibration levels defined in terms of PPV. The County does not have specific policies pertaining to vibration levels. However, vibration levels associated with construction activities and proposed project operations are addressed as potential noise impacts associated with the proposed project implementation.

Human and structural response to different vibration levels is influenced by a number of factors, including ground type, distance between source and receptor, duration, and the number of perceived vibration events. Table 3.12-3 notes the general threshold at which human annoyance could occur is 0.1 inch per second (in/sec) at PPV. Table 3.12-4 indicates the threshold for damage to structures ranges from 0.2 to 0.6 in/sec at PPV.

Table 3.12-3: Guideline Vibration Annoyance Potential Criteria

Human Response	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Sources
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.1
Severe	2.0	0.4

Notes: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seal equipment, vibratory pile drivers, and vibratory compaction equipment.

Source: Caltrans 2013

Table 3.12-4: Guideline Vibration Damage Potential Criteria

Structure and Condition	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structure	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Source: Caltrans 2013

Operation of heavy construction equipment, particularly pile driving and other impact devices such as pavement breakers, create seismic waves that radiate along the surface of the earth and downward into the earth. These surface waves can be felt as ground vibration. Vibration from operation of this equipment can result in effects ranging from annoyance of people to damage of structures. Varying geology and distance will result in different vibration levels containing different frequencies and displacements. In all cases, vibration amplitudes will decrease with increasing distance.

Perceptible groundborne vibration is generally limited to areas within a few hundred feet of construction activities. As seismic waves travel outward from a vibration source, they excite the particles of rock and soil through which they pass and cause them to oscillate. The actual distance that these particles move is usually only a few ten-thousandths to a few thousandths of an inch. The rate or velocity (in inches per second) at which these particles move is the commonly accepted descriptor of the vibration amplitude, referred to as the PPV.

Table 3.12-5 summarizes typical vibration source levels generated by various construction equipment.

Table 3.12-5: Vibration Source Levels for Construction Equipment

Equipment	PPV at 25 Feet
Vibratory roller	0.210
Large bulldozer	0.089
Loaded trucks	0.076
Small bulldozer	0.003

Source: FTA 2018

Vibration amplitude attenuates over distance and is a complex function of how energy is imparted into the ground and the soil conditions through which the vibration is traveling. The following equation can be used to estimate the vibration level at a given distance for typical soil conditions (FTA 2018). PPVref is the reference PPV from Table 3.12-5:

PPV = PPVref x (25/Distance)^1.5

Identification of Sensitive Receptors and Existing Ambient Noise Levels

Sensitive Receptors

Some land uses are more tolerant of noise than others. For example, schools, hospitals, churches, and residences are considered to be more sensitive to noise intrusion than are commercial or industrial activities. Ambient noise levels can also affect the perceived desirability or livability of a development.

The proposed project is located in Cutten, California, near Arbutus Street, Cedar Street, and Fern Street, and wraps around the existing Redwood Fields Park. The project site is surrounded by the following land uses:

- North: Timber forests, gulch occupied by Ryan Creek, and residential development at the end of Manzanita Avenue

- East: Ryan Slough, PG&E powerline, the McKay Community Forest (owned by the County), and Green Diamond Industrial Timberland
- South: Timber forests and Glen Paul School
- West: Redwood Fields Park and residential homes located along Cedar Street and Fern Street

Table 3.12-6 lists the proposed project phases, the closest noise-sensitive receptor, and the shortest approximate distance between the receptors and the proposed project.

Table 3.12-6: Closest Noise-Sensitive Receptor to the North McKay Ranch Property by Phase

Proposed Project Phase	Closest Noise-Sensitive Receptor	Approximate Shortest Distance between Project and Receptor
Phase 1	Single-Family Residence along Manzanita Avenue	20’
Phase 2	Glen Paul School	62’
Phase 3	Single-Family Homes Along Redwood Street	40’
Phase 4	Single-Family Homes Along Fern Street	915’
Phase 5	Single-Family Homes Along Redwood Street	540’
Phase 6	Single-Family Homes Along Redwood Street	945’
Phase 7	Glen Paul School	470’
Phase 8	Glen Paul School	890’
Phase 9	Glen Paul School	855’

Source: April 17, 2019 Planning NOP Review Drawing Set for North McKay Ranch Subdivision

The sewer line work on Redwood and Walnut Streets will be approximately 30 feet from the single-family homes along these roads.

The proposed water storage tank location is surrounded on all sides by dense vegetation and undeveloped areas. The closest noise-sensitive receptors are single-family homes in Ridgewood Heights, located 1,531 feet away from the tank site.

The entire project site is located 2.74 miles from Highway U.S. 101 and 2.6 miles from Murray Field (KEKA) Airport.

Ambient Noise Levels

The existing noise environment in a project area is characterized by the area’s general level of development due to the high correlation between the level of development and ambient noise levels. Areas which are not urbanized are relatively quiet, while areas which are more urbanized are noisier as a result of roadway traffic, industrial activities, and other human activities.

The unincorporated community of Cutten is a relatively small area without major highways or arterial roads. The main roads through the area, including Fern Street, Arbutus Street, and Walnut Street, are two-lane roads with little traffic. Therefore, noise levels within the area are expected to be low.

Traffic noise depends primarily on traffic speed (tire noise increases with speed) and the proportion of truck traffic (trucks generate engine, exhaust, and wind noise in addition to tire noise). Changes in traffic volumes can also have an impact on overall traffic noise levels. For example, it takes 25 percent more traffic volume to produce an increase of only 1 dB(A) in the ambient noise level. A doubling of traffic volume results in a 3 dB(A) increase in noise levels.

Existing ambient noise contours in Humboldt County are listed in Table 13-B in the County General Plan (Humboldt County 2017a). Table 13-8 states the distance between U.S. Highway 101 to the 60 dB(A) CNEL contour is 1,228 feet between Loleta Drive and Indianola Cutoff. The project site, which is 2.74 miles from U.S. Highway 101, is well beyond the 60 dB(A) CNEL contour line. Therefore, ambient noise levels at the site would most likely be typical of that experienced in a quiet suburban environment, or below 60 dB(A) CNEL.

3.12.2 Regulatory Setting

State

California Building Standards Code

CCR Part 2, Title 24, California Noise Insulation Standards, establishes minimum noise insulation standards to protect persons within new hotels, motels, dormitories, long-term care facilities, apartment houses, and dwellings other than single-family residences. Under Section 1207.11 “Exterior Sound Transmission Control,” interior noise levels attributable to exterior noise sources cannot exceed 45 Ldn in any habitable room. Where such residences are located in an environment where exterior noise is 60 Ldn or greater, an acoustical analysis is required to ensure interior levels do not exceed the 45 Ldn interior standard. If the interior allowable noise levels are met by requiring that windows be kept closed, the design for the building must also specify a ventilation or air conditioning system to provide a habitable interior environment.

California Green Building Standards

The 2016 CalGreen, Section 5.507 “Environmental Comfort,” will apply to any occupied non-residential (i.e., commercial) buildings. The code states the following:

- 5.507.4.1 Exterior noise transmission. Wall and roof-ceiling assemblies exposed to the noise source making up the building or addition envelope or altered envelope shall meet a composite STC [Sound Transmission Class] rating of at least 50 or a composite Outside-Inside Transmission Class (OITC) rating of no less than 40, with exterior windows of a minimum STC of 40 or OITC of 30 in the following locations:

  1. Within the 65 CNEL noise contour of an airport

  Exceptions:

  1. Ldn or CNEL for military airports shall be determined by the facility Air Installation Compatible Land Use Zone (AICUZ) plan.

2. Ldn or CNEL for other airports and heliports for which a land use plan that has not been developed shall be determined by the local general plan noise element.

3. Within the 65 CNEL or Ldn noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway notice source as determined by the Noise Element of the General Plan.

- 5.507.4.1.1 Noise exposure where noise contours are not readily available. Buildings exposed to a noise level of 65 dB Leq-1-hr during any hour of operation shall have building, addition or alteration exterior wall and roof-ceiling assemblies exposed to the noise source meeting a composite STC rating of at least 45 (or OITC 35), with exterior windows of a minimum STC of 40 (or OITC 30).

- 5.507.4.2 Performance method. For buildings located as defined in Section 5.507.4.1 or 5.507.4.1.1, wall and roof-ceiling assemblies exposed to the noise source making up the building or addition envelope or altered envelope shall be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an hourly equivalent noise level (Leq -1Hr) of 50 dB(A) in occupied areas during any hours of operations.

- 5.507.4.2.1 Site features. Exterior features such as sound walls or earth berms may be utilized as appropriate to the building, addition or alteration project to mitigate sound migration to the interior.

- 5.507.4.2.2 Documentation of compliance. An acoustical analysis documenting complying interior sound levels shall be prepared by personnel approved by the architect or engineer of record.

- 5.507.4.3 Interior sound transmission. Wall and floor-ceiling assemblies separating tenant spaces and tenant spaces and public places shall have an STC of at least 40.

Local

Humboldt County General Plan

Chapter 13, Noise Element, in the County General Plan (adopted October 23, 2017) identified land use compatibility noise standards and maximum interior noise levels for land uses affected by transportation and non-transportation noise sources (Humboldt County 2017a). The following noise level standards are listed in Table 13-C “Land Use / Noise Compatibility Standards”:

- Residential One-Family, Residential Multiple Family
    - Clearly Acceptable[2]: 50 dB(A) Ldn/CNEL and below
    - Normally Acceptable[3]: 51-60 dB(A) Ldn/CNEL
    - Normally Unacceptable[4]: 61-71 dB(A) Ldn/CNEL

[2] Clearly Acceptable means the noise exposure is such that the activities associated with the land use may be carried out with essentially no interference. (Residential areas both indoor and outdoor noise environments are pleasant.)

[3] Normally Acceptable means the noise exposure is great enough to of some concern, but common constructions will make the indoor environment acceptable, even for sleeping quarters. (Residential areas: the outdoor environment will be reasonably pleasant for recreation and play at the quiet end and will be tolerable at the noisy end.)

[4] Normally Unacceptable means the noise exposure is significantly more severe so that unusual and costly building constructions are necessary to ensure adequate performance of activities. (Residential areas: barriers must be erected between the site and prominent noise sources to make the outdoor environment tolerable.)

  - Clearly Unacceptable[5]: 72-91+ dB(A) Ldn/CNEL
  - Maximum Interior Noise Levels Due to Exterior Sources: 45 dB(A)
- Office Buildings, Commercial, Retail
  - Clearly Acceptable: 61 dB(A) Ldn/CNEL and below
  - Normally Acceptable: 62-71 dB(A) Ldn/CNEL
  - Normally Unacceptable: 72-80 dB(A) Ldn/CNEL
  - Clearly Unacceptable: 81-91+ dB(A) Ldn/CNEL
  - Maximum Interior Noise Levels Due to Exterior Sources: 50 dB(A)

Section 13.4, Goals and Policies, within the County General Plan also lists several relevant policies relating to noise including the following:

- **Policy N-P1:** Minimize Noise from Stationary and Mobile Sources. Minimize stationary noise sources and noise emanating from temporary activities by applying appropriate standards for average and short-term noise levels during permit review and subsequent monitoring.
- **Policy N-P2:** Guide to Land Use Planning. Evaluate current noise levels and mitigate projected noise levels when making community planning and zoning decisions to minimize the exposure of community residents to nuisance noise levels. Minimize vehicular and aircraft noise exposure by planning land uses compatible with transportation corridors and airports and applying noise attenuation designs and construction standards. Avoid zoning patterns that permit people to "move to the nuisance" unless mitigated through project conditions or recorded notice.
- **Policy N-P4:** Protection from Excessive Noise. Protect persons from existing or future excessive levels of noise which interfere with sleep, communication, relaxation, health or legally permitted use of property.

Section 13.5, Standards, in the County General Plan also state the following:

- **Standard N-S1: Land Use/Noise Compatibility Matrix.** The Land Use/Noise Compatibility Standards (Table 13-C) shall be used as a guide to ensure compatibility of land uses. Development may occur in areas identified as "normally unacceptable" if mitigation measures can reduce indoor noise levels to "Maximum Interior Noise Levels" and outdoor noise levels to the maximum "Normally Acceptable" value for the given Land Use Category.
- **Standard N-S2: Noise Impact Combining Zones.** The 20-year projected noise contours in the Map Book Appendix and the most current Airport Land Use Compatibility Plans shall be used to identify noise impact combining zone areas to indicate where special sound insulation measures may apply.
- **Standard N-S5: Noise Standards for Habitable Rooms.** Noise reduction shall be required as necessary in new development to achieve a maximum of 45 CNEL (Community Noise Equivalent Level) interior noise levels in all habitable rooms per California building standards.

[5] Clearly Unacceptable means the noise exposure of the site is so severe that construction costs to make the indoor environment acceptable for performance of activities would be prohibitive. (Residential areas: the outdoor environment would be intolerable for normal residential use.)

- **Standard N-S6: Noise Reduction Requirements for Exterior Areas in Residential Zones.** Newly created single-family residential lots of 5,000 square feet or more, should contain a usable outdoor area at least 200 square feet in size per dwelling unit that meets the 60 CNEL (Community Noise Equivalent Level) standard.

- **Standard N-S7: Short-term Noise Performance Standards (Lmax).** The following noise standards, unless otherwise specifically indicated, shall apply to all property within their assigned noise zones and such standards shall constitute the maximum permissible noise level within the respective zones.

Short-Term Noise Standards (Lmax)		
Zoning Classification	**Day (Maximum, dB(A)) 6:00 AM to 10:00 P.M.**	**Night (Maximum, dB(A)) 10:00 P.M. to 6:00 A.M.**
MG, MC, AE, TPZ, TC, AG, FP, FR, MH	80	70
CN, MB, MI, RRA, CG, CR, C-1, C-2, C-3	75	65
RM, R-3, R-4	65	60
RS, R-1, R-2, NR	65	60

Humboldt County Code

There are several mentions of noise within the County Code; however, no reference to noise in the County Code is directly applicable to this project.

3.12.3 Methodology for Analysis

In accordance with the requirements of CEQA, the noise analysis evaluates the project's noise sources to determine the impact of the proposed project on the existing ambient noise environment. The County General Plan noise contour table was used to provide baseline noise conditions at nearby sensitive receptors and within the project site vicinity. For the purpose of this analysis, potential sensitive receptors were determined by reviewing current aerial photography.

Operational Noise and Vibration

Impacts from future project-related traffic were estimated using predicted traffic counts for the project provided in the May 9, 2018, Technical Memorandum, "Focused Traffic Study for the McKay Ranch Subdivision," by TJKM. Noise from the proposed project's mechanical and HVAC systems would operate regularly and are therefore required to comply with the maximum noise limits listed in Standard N-S7 of the County General Plan (refer to regulatory discussion above).

The proposed project would not include sources of vibration during operation. Therefore, no operational vibration assessment is required.

Construction Noise and Vibration

The Federal Highway Administration Roadway Construction Noise Model (RCNM) was used to determine noise generated from construction activities. The RCNM is used as the Federal Highway Administration's national standard for predicting noise generated from construction activities. The RCNM analysis includes the calculation of noise levels (Lmax and Leq) at incremental distances for a variety of construction equipment. The spreadsheet inputs include acoustical use factors, Lmax values, and Leq values at various distances depending on the ambient noise measurement location. Construction noise levels were calculated for each project phase, and each phase of construction is based on a specific equipment list for each phase.

Vibration from construction equipment is analyzed at the surrounding buildings and compared to the applicable Caltrans building damage criteria to determine whether construction activities would generate vibration at levels that could result in building damage.

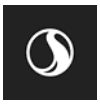
3.12.4 Thresholds of Significance

The CEQA Guidelines' Appendix G Environmental Checklist was assessed during the NOP scoping process to identify the proposed project components that have the potential to cause a significant impact. The following thresholds of significance were used to determine if further evaluation within this EIR was warranted to ascertain whether the proposed project may result in:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies
- Exposure of persons to or generation of excessive groundborne vibration or noise levels
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project
- For a project located within an airport land use plan 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 (refer to Section 7, Effects Found Not To Be Significant)
- For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels refer to Section 7, Effects Found Not To Be Significant)

USEPA Guidelines

The USEPA has established guidelines (USEPA Region 10 Environmental Impact Statement Guidelines, April 1973) for assessing the impact of an increase in noise levels. These guidelines have been used as industry standard for several years to determine the potential impact of noise increases on communities. Most people will tolerate a small increase in background noise (up to about 5 dB(A)) without complaint, especially if the increase is gradual over a period of years (such as from gradually increasing traffic



volumes). Increases greater than 5 dB(A) may cause complaints and interference with sleep. Increases above 10 dB(A) (heard as a doubling of judged loudness) are likely to cause complaints and should be considered a serious increase. Table 3.12-7 defines each of the traditional impact descriptions, their quantitative range, and the qualitative human response to changes in noise levels.

Table 3.12-7: USEPA Impact Guidelines

Increase over Existing or Baseline Sound Levels	Impact Per EPA Region Guidelines	Qualitative Human Perception of Difference in Sound Levels
0 dB to 5 dB	Minimum Impact	Imperceivable or Slight Difference
6 dB to 10 dB	Significant Impact	Significant Noticeable Difference – Complaints Possible
Over 10 dB	Serious Impact	Loudness Changes by a Factor of Two or Greater. Clearly Audible Difference – Complaints Likely

Source: USEPA 1973

3.12.5 Project Impact Analysis and Mitigation Measures

This section analyzes the proposed project's potential to result in significant impacts to noise and vibration. When a potential impact was determined to be potentially significant, feasible mitigation measures were identified to reduce or avoid that impact.

Substantial Increase in Ambient Noise

Impact NOI-1:	**The proposed project would not 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.**

Impact Analysis

Exterior Traffic Noise Level Impacts

To describe future noise levels due to traffic added from the project, A.M. and P.M. peak hour traffic counts (with and without the project), are shown in Figures 4 and 7, respectively, in the May 9, 2018, traffic study provided by TJKM. These traffic counts were used to determine the percentage increase of traffic on the roads adjacent to the project sites and adjacent sensitive receivers.

Table 3.12-8 shows the peak hour counts associated with traffic on the local roadway network under the baseline and baseline plus project traffic conditions. The last columns in the table show the overall percentage change and the estimated difference in peak hour noise level.

Table 3.12-8: Traffic Peak Hour Counts and Estimated Noise Increase

Roadway	Baseline Peak Hour Traffic Count	Peak Hour Traffic Count with Project	Percentage Change	Estimated dB Change
Redwood Street and Walnut Street Intersection	1,288 (1,201)	1,451 (1,416)	13% (18%)	0.5 (0.7)
Fern Street and Walnut Street Intersection	1,164 (1,055)	1,259 (1,176)	8% (11%)	0.3 (0.5)
Arbutus Street and Walnut Street Intersection	1,080 (824)	1,123 (878)	4% (7%)	0.2 (0.3)

Note: Numbers in parenthesis are P.M. peak hour traffic volumes.

The project is expected to increase traffic on the local roadways close to the project site between 4 percent and 18 percent. Noise levels in the vicinity due to increased traffic levels are only expected to raise a maximum of 0.7 dB(A) over the ambient levels. According to the USEPA Impact Guidelines in Table 3.12-6, an increase of noise levels of 0 to 5 dB(A) over the ambient conditions is not perceivable and represents a minimal impact.

Therefore, the project should not cause increased traffic noise levels over the baseline conditions at the neighboring sensitive receivers, and this would be a less than significant impact relative to this topic.

Interior Traffic Noise Level Impacts – Residential Buildings

The California Building Standards Code and the County General Plan state the interior noise levels attributable to exterior sources shall not exceed 45 dB(A) in any habitable room within single-family and multi-family residential homes. The needed sound isolation requirements of a building's exterior façade system will be dependent on the following conditions:

- The dimension of the rooms with exterior windows;
- The finishes within the rooms;
- The ratio of clear glass to solid wall in the exterior wall assembly; and
- The exterior solid wall construction.

Modern construction with punch windows typically provides a 25 dB(A) exterior-to-interior noise level reduction with windows closed. Therefore, sensitive receptors exposed to exterior noise of 70 dB(A) Ldn or less will typically comply with the code-required interior noise level standard. Modern construction utilizing window walls, curtainwalls, or a high ratio of exterior clear glass will provide less reduction with the windows closed. Building using a high amount of glass will typically comply with the code-required interior noise level standard if exposed to exterior noise levels of 67 dB(A) Ldn or less.

Based on the ambient noise level information provided in the County General Plan, noise levels at the project site are expected to be at or below 60 dB(A) Ldn. With a maximum exterior noise level of 60 dB(A) Ldn, interior noise levels within the residential homes would comply with code requirements with standard façade construction and interior noise from traffic would have a less than significant impact.

Interior Traffic Noise Level Impacts – Commercial Buildings

CalGreen and the County General Plan requires the exterior façade of commercial buildings to incorporate features to reduce noise inside the spaces to a maximum of 50 dB(A). If we assume an exterior noise level of 60 dB(A) Ldn and assuming a worst-case condition of a common space, such as a reception lobby area, with a hard-surfaced floor, gypsum board ceiling and a full-glass exterior wall, windows with a minimum rating of OITC 12 would be required to help achieve the code-dictated maximum 50 dB(A) noise level. A typical 1-inch thick insulating glass unit constructed of ¼-inch glass to ½-inch airspace to ¼-inch glass has an expected rating of OITC 26. Therefore, standard construction should be acceptable for the commercial buildings to achieve the CalGreen and County General Plan requirements to reduce interior noise levels, and, as such, interior noise from traffic would have a less than significant impact.

Project Fixed-Source Noise

Typical residential and commercial building construction will typically involve new rooftop mechanical equipment, such as air handling units, condensing units, make-up air units, and exhaust fans. This equipment would generate noise that would radiate to neighboring properties. The noise from this equipment would be required to comply with the maximum noise limits listed in Standard N-S7 in the County General Plan. Thus, the on-site equipment would be designed to incorporate measures, such as shielding and/or appropriate attenuators, to reduce noise levels that may affect nearby properties. In addition, nighttime noise limits would be applicable to any equipment required to operate between the hours of 10:00 P.M. and 7:00 A.M. With implementation of MM NOI-1, the impact of fixed-source noise to the neighboring properties would be less than significant.

Short-Term Construction Noise Impacts

Two types of short-term noise impacts could occur during construction of the proposed project. First, construction crew commuters and the transport of construction equipment and materials to the project site would incrementally increase noise levels on access roads leading to the project site. This increased traffic would consist of vehicles, medium trucks, and heavy trucks.

The associated short-term noise from construction vehicles along the local roadways (Walnut Street, Arbutus Street, Redwood Street) would be perceptible; however, such a noise increase would be instantaneous and short-term on a daily basis. The Federal Transit Administration (FTA) offers construction mitigation measures listed in Section 12.1.3 “Mitigation of Construction Noise” in the Transit Noise and Vibration Impact Assessment document (FTA-VA-90-1003-06 May 2006). This document recommends re-routing truck traffic away from residential streets, if possible. Select streets with fewest homes, if no alternatives are available. MM NOI-2 follows the FTA recommendations to limit noise to the closest noise-sensitive receivers. With MM NOI-2, the impact of construction traffic noise to the neighboring properties would be less than significant.

The second type of short-term noise impact is related to noise generated during construction. Construction activities would include excavation activities and grading, foundation work, building construction, and paving. Each construction stage has its own mix of equipment and, consequently, its own noise characteristics. These various construction operations would change the character of the noise generated at the project site and, therefore, the ambient noise level as construction progresses. The loudest phases of construction include excavation, building construction, and grading phases, as the noisiest construction equipment is earthmoving and grading equipment. Table 3.12-9 below lists types of

construction equipment that may be used throughout construction and the maximum and average operational noise level as measured at 40 feet from the operating equipment. The 40-foot distance represents the approximate distance between the Phase 3 project and the closest single-family residences along Redwood Street.

Table 3.12-9: Summary of Federal Highway Administration Roadway Construction Noise Model

Construction Equipment Source	Distance to Nearest Sensitive Receptor	Sound Level at Residence		
		Usage Factor	Lmax, dB(A)	Leq, dB(A)
Backhoe	40 feet	40%	79.5	75.5
Crane	40 feet	16%	82.5	74.5
Concrete Mixer Truck	40 feet	40%	80.7	76.8
Concrete / Industrial Saw	40 feet	20%	91.5	84.5
Compressor (air)	40 feet	40%	79.6	75.6
Bulldozer	40 feet	40%	83.6	79.6
Excavator	40 feet	40%	82.6	78.7
Front End Loader (Forklift[6])	40 feet	40%	81.0	77.1
Generator	40 feet	50%	82.6	79.6
Grader	40 feet	40%	86.9	83.0
Paver / Paving Equipment	40 feet	50%	79.2	76.1
Roller	40 feet	20%	81.9	74.9
Scraper	40 feet	40%	85.5	81.5
Welder / Torch	40 feet	40%	75.9	72.0
Tractor	40 feet	40%	85.9	82.0

Source: Stantec 2020; Federal Highway Administration 2006

The construction of the entire project will be conducted in nine phases, in addition to the water tank construction and the sewer line work:

- Phase 1 – 3 residential units at Manzanita Avenue
- Phase 2 – 69 multi-family residential units at Arbutus Street
- Phase 3 – 56 single-family and multi-family residential units, and 2 commercial units at the corner of Arbutus Street and Redwood Street

[6] The RCNM program does not contain noise levels for a forklift. Therefore, the noise levels from a front loader were used for the forklifts in the construction noise analysis.

- Construct walled enclosures around especially noisy activities, or clusters of noisy equipment. For example, shields can be used around pavement breakers, loaded vinyl curtains can be draped under elevated structures.

Sequence of Operations:

- Combine noisy operations to occur in the same time period. The total noise level produced will not be significantly greater than the level produced if the operations were performed separately.
- Avoid nighttime activities. Sensitivity to noise increases during the nighttime hours in residential neighborhoods.

Alternative Construction Methods:

- Use specially quieted equipment, such as quieted and enclosed air compressors, mufflers, on all engines.

Construction Mitigation Noise Plan

- Describe and commit to a mitigation plan that will be developed later when the information is available to make final decisions (not often available during the project development phase) on all specific mitigation measures. This may be the case for large, complex projects. The objective of the plan shall be to minimize construction noise using all reasonable (e.g., cost vs. benefit) and feasible (e.g., possible to construct) means available. Components of a mitigation plan may include some or all of the following provisions, including equipment noise emission limits, lot-line construction noise limits, operational or equipment restrictions, and a public information and complaint response procedure, including a construction site notice that includes the following information: job site address, permit number, name and phone number of the contractor and owner or owner's agent, hours of construction allowed by code or any discretionary approval for the Site, and County telephone numbers where violations can be reported. The notice shall be posted and maintained at the construction site prior to the start of construction and displayed in a location that is readily visible to the public and approved by the County.
- Construction activities shall be restricted to hours between 7:00 a.m. and 6:00 p.m. Monday through Friday and 9:00 a.m. and 4:00 p.m. on Saturday. All proposed uses must comply with the noise standards identified in Figure 3-2 of the General Plan.

Level of Significance After Mitigation

- Exterior Traffic Noise Levels – Less than Significant Impact.
- Interior Traffic Noise Levels – Residential Buildings: Less than Significant Impact.
- Interior Traffic Noise Levels – Commercial Buildings: Less than Significant Impact.
- Project Fixed-Source Noise – Less Than Significant with Mitigation Incorporated.
- Construction Traffic – Less Than Significant with Mitigation Incorporated.
- Construction Activity – Less Than Significant with Mitigation Incorporated.

Generation of Excessive Vibration

Impact NOI-2: The proposed project would not generate excessive groundborne vibration or groundborne noise levels.

Impact Analysis
During construction of the proposed project, equipment such as bulldozers, loaded trucks, and rollers may be used as close as 20 feet from the nearest sensitive receptor along Manzanita Avenue. Construction equipment that would be used during project construction would generate vibration levels between 0.29 and 0.004 PPV at 20 feet, as shown below in Table 3.12-12. The groundborne vibration levels for the large bulldozer, loaded trucks, and vibratory roller are expected to be at or above the FTA vibration threshold at which human annoyance could occur of 0.10 PPV for Phase 1 of the project only. According to Table 3.12-3, the vibration levels from this equipment would be strongly perceptible. Nevertheless, when referencing Table 3.12-12, construction vibration levels would not cause damage to existing buildings.

Table 3.12-12: Vibration Source Levels for Construction Equipment

Type of Equipment	PPV at 20 Feet	PPV at 30 Feet	PPV at 100 Feet	Threshold at which Human Annoyance Could Occur	Potential for Proposed Project to Exceed Threshold
Large Bulldozer	0.124	0.068	0.011	0.10	Potential for Phase 1 of the Project
Loaded Trucks	0.106	0.058	0.010	0.10	Potential for Phase 1 of the Project
Small Bulldozer	0.004	0.002	0.000	0.10	None
Vibratory Roller	0.29	0.16	0.026	0.10	Potential for Phase 1 of the Project and during the Sewer Work

Source: FTA 2018

While the overall project construction duration will be over 10 to 20 years, construction activities would be intermittent and would occur during normal daytime working hours. The FTA offers construction vibration mitigation measures listed in Section 7.2, Construction Vibration Assessment, in the Transit Noise and Vibration Impact Assessment Manual document (FTA Report No. 0123 September 2018). The applicable measures in the FTA document are included in MM NOI-4.

Implementation of MM NOI-4 would follow the recommendations provided by the FTA; therefore, impacts would be less than significant with mitigation incorporated.

Level of Significance Before Mitigation
Potentially Significant Impact.

Mitigation Measures

MM NOI-4: **Construction Vibration**. Follow the Federal Transit Administration (FTA) construction mitigation measures listed in Section 7.2, Construction Vibration Assessment, in the Transit Noise and Vibration Impact Assessment Manual document (FTA Report No. 0123 September 2018) for Phase 1 and the Sewer Work Phase of the project only.

Design Considerations and Project Layout

- Route heavily loaded trucks away from residential streets. Select streets with the fewest homes if no alternatives are available.
- Operate earth-moving equipment on the construction lot as far away from vibration-sensitive sites as possible.

Sequence of Operations

- Phase demolition, earth-moving, and ground-impacting operations so as not to occur in the same time period. Unlike noise, the total vibration level produced could be substantially less when each vibration source operates separately.
- Avoid nighttime activities. Sensitivity to vibration increases during the nighttime hours in residential neighborhoods.

Alternate Construction Methods

- Avoid vibratory rollers and packers near sensitive areas.

Vibration Mitigation Plan

- Describe and commit to a mitigation plan that shall be developed and implemented during the engineering and construction phase when the information available during the project development phase will not be sufficient to define specific construction vibration mitigation measures. The objective of the plan shall be to minimize construction vibration damage using all reasonable and feasible means available. The plan shall include the following components:
    - A procedure for establishing threshold and limiting vibration values for potentially affected structures, based on an assessment of each structure's ability to withstand the loads and displacements due to construction vibrations.
    - A commitment to develop a vibration monitoring plan during the engineering phase and to implement a compliance monitoring program during construction.

Level of Significance After Mitigation

Less Than Significant Impact with Mitigation Incorporated.

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