Trumble Road Open Pit Restoration Project

Noise Study

prepared for

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Table of Contents

Tables

Figures

Appendices

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1 Project Description

1.1 Introduction

This report is an analysis of the potential noise impacts of the proposed Trumble Road Open Pit Restoration Project (project) located in Menifee, California. Rincon Consultants, Inc. prepared this study under contract to the North Pacific Developments, Inc., for use by the City of Menifee, in support of the environmental documentation being prepared pursuant to the California Environmental Quality Act (CEQA). Currently, operation of the site includes mining activities and soil hauling (import and export). Under the proposed project, on-going mining activities and soil export would cease, but existing soil import would continue until the restoration is complete. Because the project would not result in a change to existing operations on site, and exclusively includes grading and restoring the existing open pit, the purpose of this study is to analyze the project's temporary construction noise impacts. Therefore, operational noise is not discussed in this study.

1.2 Project Description

The project involves a Rough Grading Permit No. 22-019 for rough grading and restoration of 7.6 acres of an open pit located at 25675 Trumble Road, in Menifee, California. Rough grading and restoration of 9 acres of the same open pit was previously approved under Grading Permit No. 17-087R (Planning Case No. 2017-361) in 2018 (there is overlap of the two project footprints). The previous Grading Permit No. 17-087R included 5,000 cubic yards (cy) of cut and 207,000 cy of fill. This revised plan now has the grading completed to the final grade level in lieu of the earlier partial filling of the pit and a further grading permit required to reach the final grade. Specifically, the project proposes the following:

- Total excavation: 31,684 cy
- Total import: 289,864 cy
- Total site disturbed: 7.6 acres
- Estimated Start: November 30, 2022
- Estimated Complete: July 1, 2023
- Hours of Operation: 7:00 a.m. to 6:00 p.m. Monday to Saturday

Construction equipment would include a Caterpillar D11T Crawler Dozer; Caterpillar 631WW Water Truck; and a Caterpillar 836 Landfill Compactor.

The import of clean soil would continue to come from unrelated projects in the area that require export of soil to a local disposal site. Therefore, there would be no increase in haul trucks as part of the project construction or operation because the procurement method to import soil would remain the same. In fact, the project would eliminate truck trips because soil would remain onsite and would no longer be exported from the site under the proposed project.

Water would be used onsite in the active grading areas to control dust and trucks would use existing haul roads on the site. Water would be applied for dust control no less than once a day prior to the daily construction activities commencing and as required throughout the day.

Figure 1 Regional Location

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Project Location

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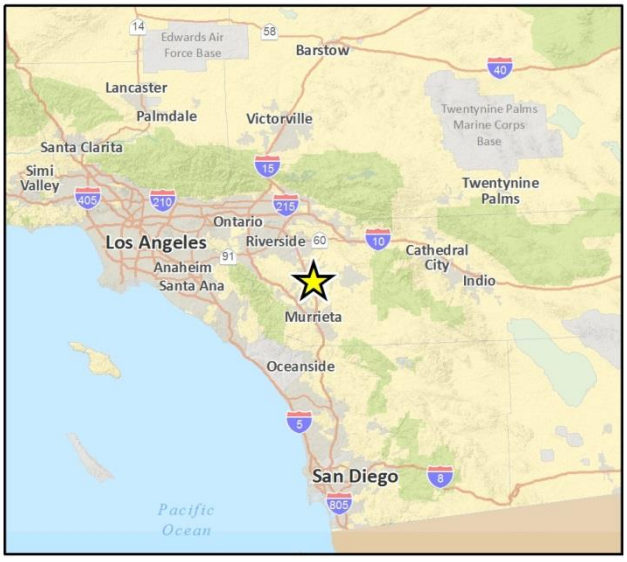
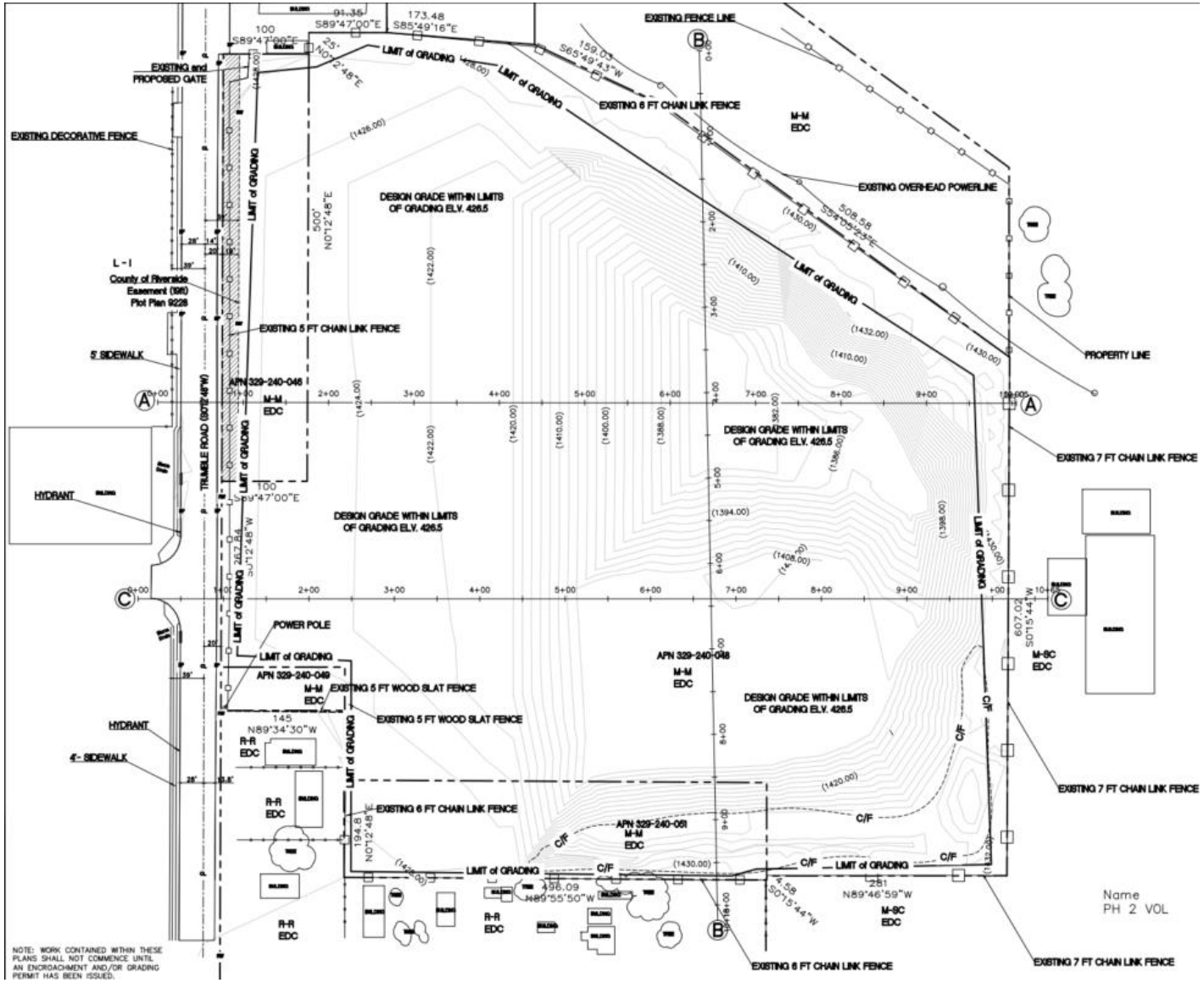


Fig 1 Regional Location

Figure 2 Project Location

Imagery provided by Esri and its licensors © 2018.

Figure 3 Project Grading Plan



2 Noise

2.1 Background

Overview of Sound Measurement

Noise level (or volume) is generally measured in decibels (dB) using the A-weighted sound pressure level (dBA). The A-weighting scale is an adjustment to the actual sound pressure levels to be consistent with that of human hearing response, which is most sensitive to frequencies around 4,000 Hertz (about the highest note on a piano) and less sensitive to low frequencies (below 100 Hertz).

Sound pressure level is measured on a logarithmic scale with the 0 dBA level based on the lowest detectable sound pressure level that people can perceive (an audible sound that is not zero sound pressure level). Based on the logarithmic scale, a doubling of sound energy is equivalent to an increase of 3 dBA, and a sound that is 10 dBA less than the ambient sound level has no effect on ambient noise. Because of the nature of the human ear, a sound must be about 10 dBA greater than the ambient noise level to be judged as twice as loud. In general, a 3 dBA change in the ambient noise level is noticeable, while 1-2 dBA changes generally are not perceived. Quiet suburban areas typically have noise levels in the range of 40-50 dBA, while areas adjacent to arterial streets are in the 50-60+ dBA range. Normal conversational levels are in the 60-65 dBA range, and ambient noise levels greater than 65 dBA can interrupt conversations.

Noise levels typically attenuate (i.e., drop off) at a rate of 6 dBA per doubling of distance from point sources (e.g., industrial machinery). Noise from lightly traveled roads typically attenuates at a rate of about 4.5 dBA per doubling of distance. Noise from heavily traveled roads typically attenuates at about 3 dBA per doubling of distance. 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 (Federal Transit Administration [FTA] 2018). The manner in which homes in California are constructed generally provides a reduction of exterior-to-interior noise levels of about 20 to 25 dBA with closed windows (FTA 2018).

In addition to the instantaneous measurement of sound levels, the duration of sound is important since sounds that occur over a long period of time are more likely to be an annoyance or cause direct physical damage or environmental stress. One of the most frequently used noise metrics that considers both duration and sound power level is the equivalent noise level (Leq). The Leq is defined as the single steady A-weighted level that is equivalent to the same amount of energy as that contained in the actual fluctuating levels over a period of time (essentially, the average noise level). Typically, Leq is summed over a one-hour period. Lmax is the highest RMS (root mean squared) sound pressure level within the measuring period, and Lmin is the lowest RMS sound pressure level within the measuring period.

The time period in which noise occurs is also important since noise that occurs at night tends to be more disturbing than that which occurs during the day. Community noise is usually measured using Day-Night Average Level (DNL), which is the 24-hour average noise level with a 10-dBA penalty for noise occurring during nighttime (10 PM to 7 AM) hours, or Community Noise Equivalent Level (CNEL), which is the 24-hour average noise level with a 5 dBA penalty for noise occurring from 7 PM

to 10 PM and a 10 dBA penalty for noise occurring from 10 PM to 7 AM. Noise levels described by DNL and CNEL usually do not differ by more than 1 dBA. In practice, CNEL and DNL are used interchangeably.

Vibration

Groundborne vibration of concern in environmental analysis consists of the oscillatory waves that move from a source through the ground to adjacent structures. The number of cycles per second of oscillation makes up the vibration frequency, described in terms of Hz. The frequency of a vibrating object describes how rapidly it oscillates. The normal frequency range of most groundborne vibration that can be felt by the human body starts from a low frequency of less than 1 Hz and goes to a high of about 200 Hz (Crocker 2007).

While people have varying sensitivities to vibrations at different frequencies, in general they are most sensitive to low-frequency vibration. Vibration in buildings, such as from nearby construction activities, may cause windows, items on shelves, and pictures on walls to rattle. Vibration of building components can also take the form of an audible low-frequency rumbling noise, referred to as groundborne noise. Groundborne noise is usually only a problem when the originating vibration spectrum is dominated by frequencies in the upper end of the range (60 to 200 Hz), or when foundations or utilities, such as sewer and water pipes, physically connect the structure and the vibration source (FTA 2018). Although groundborne vibration is sometimes noticeable in outdoor environments, it is almost never annoying to people who are outdoors. The primary concern from vibration is that it can be intrusive and annoying to building occupants and vibration-sensitive land uses.

Vibration energy spreads out as it travels through the ground, causing the vibration level to diminish with distance away from the source. High-frequency vibrations diminish much more rapidly than low frequencies, so low frequencies tend to dominate the spectrum at large distances from the source. Discontinuities in the soil strata can also cause diffractions or channeling effects that affect the propagation of vibration over long distances (Caltrans 2020). When a building is affected by vibration, a ground-to-foundation coupling loss will usually reduce the overall vibration level. However, under rare circumstances, the ground-to-foundation coupling may actually amplify the vibration level due to structural resonances of the floors and walls.

Vibration amplitudes are usually expressed in peak particle velocity (PPV) or RMS vibration velocity. The PPV and RMS velocity are normally described in inches per second. PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is often used in monitoring of blasting vibration because it is related to the stresses that are experienced by buildings (Caltrans 2020).

Sensitive Receivers

Noise exposure thresholds for various types of land uses reflect the varying noise sensitivities associated with each land use type. The City of Menifee *Noise Element* defines noise-sensitive land uses as residences, schools, and open space/recreation areas where quiet environments are necessary for enjoyment, public health, and safety (City of Menifee 2013a). These uses are considered sensitive because the presence of excessive noise may interrupt normal activities typically associated with their use. The sensitive receivers closest to the project site are residences 25 feet to the west and south, residences 95 feet to the north, and a church 170 feet to the northwest.

Project Noise Setting

As shown in Figure 2, the project site is located on Trumble Road between Illinois Avenue and Watson Road. The northern project boundary is located 300 feet from California State Route 74 (CA-74) and the western project boundary is located 1,300 feet from Interstate 215/Escondido Freeway (I-215).

The project is located within the Economic Development Corridor (EDC) an area designated in the City of Menifee's Land Use Map (2013b). Adjacent land uses include single-family residences to the south, manufacturing facilities to the west, and automobile shops to the north, east, and southeast.

The most common source of noise in the project site vicinity is traffic on Trumble Road and CA-74. Secondary noise sources include traffic on I-215 and Sherman Road. Motor vehicle noise, primarily from cars and trucks, is of concern because it is characterized by a high number of individual events, which often create sustained noise levels. Ambient noise levels are generally highest during the daytime and rush hour unless congestion substantially slows speeds.

To determine ambient sound levels at and near the project site, two 15-minute sound level measurements were collected during the morning peak hour between 7:00 a.m. and 9:00 a.m. on December 28th, 2017 using an ANSI Type 2 integrating sound level meter. Two measurements were taken in the vicinity of the project site to capture existing ambient sound levels at the project site and at the nearest sensitive receivers (refer to Appendix A for sound level measurement data). These measurements are still applicable to describe the existing ambient noise levels as current development in the immediate area is similar to when the measurements occurred. Table 1 lists the ambient sound levels measured at both locations and Figure 4 shows the sound level measurement locations.

Table 1 Project Vicinity Sound Level Monitoring Results

Measurement Number	Measurement Location	Sample Times	dBA Leq [15][1]	dBA Lmin	dBA Lmax	Primary Noise Source	Distance to Centerline of the Noise Source (feet)
1	Southwest of project site on Trumble Road near Illinois Avenue intersection	8:43 AM- 8:58 AM	61.0	48.0	81.3	Trumble Road	25
2	Northeast of project site on Sherman Road near CA-74 intersection	7:58 AM-8:13 AM	65.8	51.7	87.3	CA-74	165

See Appendix A for noise monitoring data.

[1] Leq was measured over a 15-minute period (Leq [15]).

Source: Rincon Consultants, field visit on December 28, 2017 using ANSI Type 2 Integrating sound level meter

The sound level recorded at Measurement Number 1 was 61 dBA L_{eq} and reflects existing ambient sound at the project site and the nearest sensitive receptor, residences south of the project site on Illinois Avenue. The sound level recorded at Measurement Number 2 was 65.8 dBA L_{eq} and reflects existing ambient sound at the next nearest sensitive receptor, residences to the northeast of the

project site along Jackson Avenue. The primary source of noise during both measurements was traffic on Trumble Road and CA-74, respectively.

Regulatory Setting

FTA Transit and Noise Vibration Impact Assessment Manual

The FTA provides reasonable criteria for assessing construction noise impacts based on the potential for adverse community reaction in their *Transit and Noise Vibration Impact Assessment Manual* (FTA 2018). For residential, commercial, and industrial uses, the daytime noise threshold is 80 dBA L_{eq}, 85 dBA L_{eq}, and 90 dBA L_{eq} for an 8-hour period, respectively.

City of Menifee Noise Element

The City of Menifee's General Plan *Noise Element* provides goals and policies specific to certain land uses and activities, such as motor vehicle traffic noise, trolley and train noise, aircraft noise, commercial and mixed-use activity noise, industrial activity noise, construction, refuse vehicles, parking lot sweepers, and public activity noise, as well as event noise. Applicable policies of the *Noise Element* are summarized below (City of Menifee 2013a).

N-1.2: Require new projects to comply with the noise standards of local, regional, and state building code regulations, including but not limited to the city's Municipal Code, Title 24 of the California Code of Regulations, the California Green Building Code, and subdivision and development codes.

The applicable regulations referenced in Policy N-1.2 would be Section 9.09.030 of the City's Municipal Code regarding construction noise. Other referenced regulations apply to the design and placement of new structures, which are not a component of the proposed project.

N-1.13: Require new development to minimize vibration impacts to adjacent uses during demolition and construction.

Although the proposed project does not involve new development, the proposed grading activity may generate vibration impacts to adjacent uses during demolition and construction. Therefore, this policy is applicable to the project.

City of Menifee Municipal Code

Section 9.210.060(C) of the City Municipal Code provides exemptions for construction noise from the standards in the code. Specifically, the code states the following are exempt:

- Private construction projects located one-quarter of a mile or more from an inhabited dwelling.
- Private construction projects located within one-quarter of a mile from an inhabited dwelling, shall be permitted Monday through Saturday, except nationally recognized holidays, 6:30 a.m. to 7:00 p.m., or specified in Section 8.01.010. There shall be no construction permitted on Sunday or nationally recognized holidays unless approval is obtained from the City Building Official or City Engineer.
- If construction occurs during off hours or exceeds noise thresholds, an application for a construction-related exception shall be made using the temporary use application provided by the Community Development Director in Chapter 9.105. For construction activities on Sunday or nationally recognized holidays, Section 8.01.010 of the Municipal Code shall prevail.

Figure 4 Noise Measurement Locations

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Fig 4 Noise Measurement Locations

Although construction activity is exempt from sound level standards in the Municipal Code, for purposes of this analysis, the FTA Transit Noise and Vibration Impact Assessment (FTA 2018) criteria will be used for a quantitative standard. The FTA provides reasonable criteria for assessing construction noise impacts based on the potential for adverse community reaction. For residential uses, the daytime noise threshold is 80 dBA L_{eq} for an 8-hour period.

2.2 Impact Analysis

Significance Thresholds

The following thresholds are based on City noise standards and Appendix G of the CEQA guidelines. Noise impacts would be considered significant if:

- **Issue 1:** The project would result in the generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
  - For purposes of analyzing impacts from this project, the City has determined that using FTA construction noise thresholds would be applicable to the project. Therefore, construction noise would be significant is it exceeds a daytime threshold of 80 dBA L_{eq} for an 8-hour period: or
  - Construction occurs between the hours of 7 p.m. and 6:30 a.m., or on Sundays or national holidays.
- **Issue 2:** The project would result in the generation of excessive ground-borne vibration or ground-borne noise levels.
  - For purposes of analyzing impacts from this project, the City has determined that using Caltrans and AASHTO vibration thresholds would be applicable to the project. Therefore, a significant vibration impact would occur if the project would subject vibration-sensitive land uses to construction-related ground-borne vibration that exceeds the distinctly perceptible vibration annoyance potential criteria for human receivers of 0.24 in./sec. PPV, or the residential structural damage criteria of 0.2 PPV in./sec.

Methodology

Construction Noise

Construction noise was estimated using the FHWA Roadway Construction Noise Model (RCNM) (FHWA 2006). RCNM predicts construction noise levels for a variety of construction operations based on empirical data and the application of acoustical propagation formulas. Using RCNM, construction noise levels were estimated at sensitive receivers near the project site. RCNM provides reference noise levels for standard construction equipment, with an attenuation rate of 6 dBA per doubling of distance for stationary equipment.

Variation in power imposes additional complexity in characterizing the noise source level from construction equipment. Power variation is accounted for by describing the noise at a reference distance from the equipment operating at full power and adjusting it based on the duty cycle of the activity to determine the L_{eq} of the operation (FHWA 2006).

Construction activity would result in temporary noise in the project site vicinity, exposing surrounding nearby receivers to increased noise levels. Construction equipment would include a

Caterpillar D11T Crawler Dozer; Caterpillar 631WW Water Truck; and a Caterpillar 836 Landfill Compactor. Construction equipment would not all operate at the same time or location. In addition, construction equipment would not be in constant use during the 8-hour operating day.

Project construction would occur nearest to the single-family residences to the west and south that are located adjacent to the project site. Single family residential uses and the Church of Jesus Christ of Latter-Day Saints are located across Mojave Avenue to the north and northwest, respectively, of the project site. Over the course of a typical construction day, construction equipment would be located as close as 25 feet to the adjacent properties to the west and south and as close as 95 feet to the single-family residential uses to the north and 170 feet to the Church of Jesus Christ of Latter-Day Saints to the northwest but would typically be located at an average distance farther away due to the nature of construction and the lot size of the project. For example, during a typical construction day, the equipment may operate across the horizontal distance of the site (1,000 feet) or vertical distance (245 feet) from a nearby noise receiver. Therefore, it is assumed that over the course of a typical construction day the construction equipment would operate at an average distance of 100 feet from adjacent single-family residences to the west and south and 150 feet from single family residences to the north and 200 feet from the church to the northwest of the project site across Mojave Drive.

Construction Vibration

The greatest vibratory source during construction within the project vicinity would be the Caterpillar D11T Crawler Dozer. Neither blasting nor pile driving would be required for construction of the project. A large bulldozer would generate vibration levels of 0.089 in/sec PPV at a distance of 25 feet (Caltrans 2020). Although groundborne vibration is sometimes noticeable in outdoor environments, it is almost never annoying to people who are outdoors; therefore, the vibration level threshold is assessed at occupied structures (FTA 2018). Therefore, all vibration impacts are assessed at the structure of an affected property.

Impact Analysis

Construction Noise

Construction activity is expected to occur over a period of approximately seven months. Table 2 lists the noise levels from the type of equipment planned for use during these activities at the closest sensitive receivers. As shown in Table 2, construction noise could be as high as 75 dBA Leq at the nearest adjacent residential property. As shown in Table 2, construction noise levels would reach as high as 75 dBA L_{eq} during a typical construction day. As discussed under *Significance Thresholds*, the City does not have a quantitative threshold for construction noise. The project would be exempt from the City's noise standards if it complies with the construction hour restrictions of the City's Municipal Code, which requires that construction does not occur between 6:00 PM to 6:00 AM during the months of June through September and 6:00 PM and 7:00 AM during the months of October through May, Monday through Saturday (Municipal Code 9.09.030). Construction is prohibited all day Sunday and on nationally recognized holidays (Municipal Code 8.01.010). The project would comply with these hours. In addition, the project's construction noise level of 75 dBA Leq would not exceed the FTA's daytime noise threshold of 80 dBA L_{eq}. Therefore, impacts from construction noise would be less than significant.

Table 2 Construction Noise Levels

Construction Phase	Equipment	Sensitive Receiver	Distance to Sensitive Receivers (feet)	Noise Level (dBA L_{eq})
Grading	Dozer, Compactor, Water Truck	Single-family residences to the west and south	100	75
		Single-family residences to the north	150	71
		Church to the northwest	200	69

All numbers rounded to the nearest whole number. See Appendix B for RCNM data sheets.

Construction Vibration

Construction activities known to generate excessive ground-borne vibration, such as pile driving, would not be conducted by the project. The greatest anticipated source of vibration during general project construction activities would be from a dozer, which may be used within 25 feet of the nearest off-site residential structures to the south and west when accounting for setbacks. A dozer would create approximately 0.089 in/sec PPV at a distance of 25 feet (Caltrans 2020). This would be lower than what is considered a distinctly perceptible impact for humans of 0.24 in/sec PPV and the structural damage impact to residential structures of 0.2 in/sec PPV. Therefore, although a dozer may be perceptible to nearby human receivers, temporary impacts associated with the dozer (and other potential equipment) would be less than significant.

2.3 Conclusions

The project would comply with the allowed construction hours in the City's Municipal Code, and project construction noise levels would not exceed the FTA thresholds. In addition, vibration levels from project construction would not exceed Caltrans thresholds. Impacts from project construction noise and vibration would be less than significant.

3 References

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Appendix A

Noise Measurement Data

Appendix B

FHWA Roadway Construction Noise Model (RCNM) Equipment List and Modeling Data

Report date: 8/1/2022
Case Description: Trumble Road Open Pit

		Baselines (dBA)		---- Receptor #1 ----
Description	Land Use	Daytime	Evening	Night
Residential	Residential	80	80	80

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	100	0
Dump Truck	No	40		76.5	100	0
Compactor (ground)	No	20		83.2	100	0

Results

		Calculated (dBA)	
Equipment		*Lmax	Leq
Dozer		75.6	71.7
Dump Truck		70.4	66.5
Compactor (ground)		77.2	70.2
	Total	77.2	74.7

*Calculated Lmax is the Loudest value.

Report date: 8/1/2022
Case Description: Trumble Road Open Pit

		Baselines (dBA)		---- Receptor #1 ----
Description	Land Use	Daytime	Evening	Night
Residential	Residential	80	80	80

			Equipment			
	Impact		Spec Lmax	Actual Lmax	Receptor Distance	Estimated Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Dozer	No	40		81.7	150	0
Dump Truck	No	40		76.5	150	0
Compactor (ground)	No	20		83.2	150	0

		Results	
		Calculated (dBA)	
Equipment		*Lmax	Leq
Dozer		72.1	68.1
Dump Truck		66.9	62.9
Compactor (ground)		73.7	66.7
	Total	73.7	71.2

*Calculated Lmax is the Loudest value.

Report date: 8/1/2022
Case Description: Trumble Road Open Pit

		Baselines (dBA)		---- Receptor #1 ----
Description	Land Use	Daytime	Evening	Night
Residential	Residential	80	80	80

			Equipment			
	Impact		Spec Lmax	Actual Lmax	Receptor Distance	Estimated Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Dozer	No	40		81.7	200	0
Dump Truck	No	40		76.5	200	0
Compactor (ground)	No	20		83.2	200	0

Results

Calculated (dBA)

Equipment	*Lmax	Leq
Dozer	69.6	65.6
Dump Truck	64.4	60.4
Compactor (ground)	71.2	64.2
Total	71.2	68.7

*Calculated Lmax is the Loudest value.