TO 20-01 PAPÉ MACHINERY ENVIRONMENTAL NOISE ASSESSMENT

Fremont, California

January 27, 2020

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INTRODUCTION

An approximately 63,000 square foot construction equipment sales, rental, and service dealership is proposed on a vacant 7.8-acre lot located at 43510 Osgood Road in Fremont, California. Repair services, replacement parts sales, and transaction-related financial services would also be provided to customers of the proposed Papé facility. The site would be equipped with a vehicle wash station and an above-ground diesel fuel storage tank. Initially, business hours would be Monday through Friday from 7:00 a.m. to 5:00 p.m. Thirty employees are anticipated. Primary site access includes two 40-foot driveways along Osgood Road to allow for tractor-trailer and emergency vehicle access.

This report evaluates the project's potential to result in significant noise and vibration impacts with respect to applicable California Environmental Quality Act (CEQA) guidelines. The report is divided into three sections: 1) the Setting Section provides a brief description of the fundamentals of environmental noise and groundborne vibration, summarizes applicable regulatory criteria, and discusses the results of the ambient noise monitoring survey completed to document existing noise conditions; 2) the General Plan Consistency Section discusses the noise and land use compatibility of the project utilizing policies in the City's General Plan; and, 3) the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate project impacts, provides a discussion of each project impact, and presents mitigation measures, where necessary, to mitigate the identified impacts to a less-than-significant level.

SETTING

Fundamentals of Environmental Noise

Noise may be defined as unwanted sound. Noise is usually objectionable because it is disturbing or annoying. The objectionable nature of sound could be caused by its *pitch* or its *loudness*. *Pitch* is the height or depth of a tone or sound, depending on the relative rapidity (*frequency*) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. *Loudness* is intensity of sound waves combined with the reception characteristics of the ear. Intensity may be compared with the height of an ocean wave in that it is a measure of the amplitude of the sound wave.

In addition to the concepts of pitch and loudness, there are several noise measurement scales which are used to describe noise in a particular location. A *decibel (dB)* is a unit of measurement which indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10 decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. Technical terms are defined in Table 1.

There are several methods of characterizing sound. The most common in California is the *A-weighted sound level (dBA).* This scale gives greater weight to the frequencies of sound to which

the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA are shown in Table 2. 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 utilized. 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. This *energy-equivalent sound/noise descriptor* is called L_{eq}. The most common averaging period is hourly, but L_{eq} can describe any series of noise events of arbitrary duration.

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 upon the distance the receptor is from the noise source. Close to the noise source, the models are accurate to within about plus or minus 1 to 2 dBA.

Since the sensitivity to noise increases during the evening and at night -- because excessive noise interferes with the ability to sleep -- 24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The *Community Noise Equivalent Level* (*CNEL*) is a measure of the cumulative noise exposure in a community, with a 5 dB penalty added to evening (7:00 p.m. - 10:00 p.m.) and a 10 dB addition to nocturnal (10:00 p.m. - 7:00 a.m.) noise levels. The *Day/Night Average Sound Level* (L_{dn}) is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period.

Effects of Noise

Sleep and Speech Interference

The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noises of sufficient intensity (above 35 dBA) and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA L_{dn}. Typically, the highest steady traffic noise level during the daytime is about equal to the L_{dn} and nighttime levels are 10 dBA lower. The standard is designed for sleep and speech protection and most jurisdictions apply the same criterion for all residential uses. Typical structural attenuation is 12 to 17 dBA with open windows. With closed windows in good condition, the noise attenuation factor is around 20 dBA for an older structure and 25 dBA for a newer dwelling. Sleep and speech interference is therefore possible when exterior noise levels are about 57 to 62 dBA L_{dn} with open windows and 65 to 70 dBA L_{dn} if the windows are closed. Levels of 55 to 60 dBA are common along collector streets and secondary arterials, while 65 to 70 dBA is a typical value for a primary/major arterial. Levels of 75 to 80 dBA are normal noise levels at the first row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed; those facing major roadways and freeways typically need special glass windows.

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 the causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The L_{dn} 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. When measuring the percentage of the population highly annoyed, the threshold for ground vehicle noise is about 50 dBA L_{dn}. At a L_{dn} of about 60 dBA, approximately 12 percent of the population is highly annoyed. When the L_{dn} increases to 70 dBA, the percentage of the population highly annoyed increases to about 25 to 30 percent of the population. There is, therefore, an increase of about 2 percent per dBA between a L_{dn} of 60 to 70 dBA. Between a L_{dn} of 70 to 80 dBA, each decibel increase increases by about 3 percent the percentage of the population highly annoyed. People appear to respond more adversely to aircraft noise. When the L_{dn} is 60 dBA, approximately 30 to 35 percent of the population is believed to be highly annoyed. Each decibel increase to 70 dBA adds about 3 percentage points to the number of people highly annoyed. Above 70 dBA, each decibel increase results in about a 4 percent increase in the percentage of the population highly annoyed.

TABLE 1 Definition of Acoustical Terms Used in this Report

Term	Definition
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 micro Pascals.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micro Pascals (or 20 micro Newtons per square meter), where 1 Pascal 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 decibels 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 micro Pascals). 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 decibels 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 A-weighted noise level during the measurement period.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day/Night Noise Level, L_{dn} or DNL	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 p.m. and 7:00 a.m.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 p.m.to 10:00 p.m. and after addition of 10 decibels to sound levels measured in the night between 10:00 p.m. and 7:00 a.m.
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 upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Source: Handbook of Acoustical Measurements and Noise Control, Harris, 1998.

TABLE 2 Typical Noise Levels in the Environment

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110 dBA	Rock band
Jet fly-over at 1,000 feet		
	100 dBA	
Gas lawn mower at 3 feet		
	90 dBA	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	80 dBA	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, 100 feet	70 dBA	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	60 dBA	
		Large business office
Quiet urban daytime	50 dBA	Dishwasher in next room
Quiet urban nighttime	40 dBA	Theater, large conference room
Quiet suburban nighttime		
	30 dBA	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	20 dBA	
		Broadcast/recording studio
	10 dBA	
	0 dBA	

Source: Technical Noise Supplement (TeNS), California Department of Transportation, September 2013.

Fundamentals of Groundborne Vibration

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One method is the Peak Particle Velocity (PPV). The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. In this report, a PPV descriptor with units of mm/sec or in/sec is used to evaluate construction generated vibration for building damage and human complaints. Table 3 displays the reactions of people and the effects on buildings that continuous or frequent intermittent vibration levels produce. The guidelines in Table 3 represent syntheses of vibration criteria for human response and potential damage to buildings resulting from construction vibration.

Construction activities can cause vibration that varies in intensity depending on several factors. The use of pile driving and vibratory compaction equipment typically generates the highest construction related groundborne vibration levels. Because of the impulsive nature of such activities, the use of the PPV descriptor has been routinely used to measure and assess groundborne vibration and almost exclusively to assess the potential of vibration to cause damage and the degree of annoyance for humans.

The two primary concerns with construction-induced vibration, the potential to damage a structure and the potential to interfere with the enjoyment of life, are evaluated against different vibration limits. Human perception to vibration varies with the individual and is a function of physical setting and the type of vibration. Persons exposed to elevated ambient vibration levels, such as people in an urban environment, may tolerate a higher vibration level.

Structural damage can be classified as cosmetic only, such as paint flaking or minimal extension of cracks in building surfaces; minor, including limited surface cracking; or major, that may threaten the structural integrity of the building. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher. The damage criteria presented in Table 3 include several categories for ancient, fragile, and historic structures, the types of structures most at risk to damage. Most buildings are included within the categories ranging from “Historic and some old buildings” to “Modern industrial/commercial buildings”. Construction-induced vibration that can be detrimental to the building is very rare and has only been observed in instances where the structure is at a high state of disrepair and the construction activity occurs immediately adjacent to the structure.

The annoyance levels shown in Table 3 should be interpreted with care since vibration may be found to be annoying at lower levels than those shown, 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.

TABLE 3 Reaction of People and Damage to Buildings from Continuous or Frequent Intermittent Vibration Levels

Velocity Level, PPV (in/sec)	Human Reaction	Effect on Buildings
0.01	Barely perceptible	No effect
0.04	Distinctly perceptible	Vibration unlikely to cause damage of any type to any structure
0.08	Distinctly perceptible to strongly perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
0.1	Strongly perceptible	Threshold at which there is a risk of damage to fragile buildings with no risk of damage to most buildings
0.25	Strongly perceptible to severe	Threshold at which there is a risk of damage to historic and some old buildings.
0.3	Strongly perceptible to severe	Threshold at which there is a risk of damage to older residential structures
0.5	Severe - Vibrations considered unpleasant	Threshold at which there is a risk of damage to new residential and modern commercial/industrial structures

Source: Transportation and Construction Vibration Guidance Manual, California Department of Transportation, September 2013.

Regulatory Background - Noise

The State of California and the City of Fremont have established regulatory criteria that are applicable in this assessment. The State CEQA Guidelines, Appendix G, the California Building Code, and the City of Fremont General Plan and Municipal Code are used to assess the potential significance of impacts. A summary of the applicable regulatory criteria is provided below.

State CEQA Guidelines. The California Environmental Quality Act (CEQA) contains guidelines to evaluate the significance of effects of environmental noise attributable to a proposed project. Under CEQA, noise impacts would be considered significant if the project would result in:

(a) 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;

(b) Generation of excessive groundborne vibration or groundborne noise levels;

(c) 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, if the project would expose people residing or working in the project area to excessive noise levels.

2016 California Building Cal Green Code. The State of California established exterior sound transmission control standards for new non-residential buildings as set forth in the 2016 California

Green Building Standards Code (Section 5.507.4.1 and 5.507.4.2). The sections that pertain to this project are as follows:

> **5.507.4.1 Exterior noise transmission, prescriptive method.** Wall and roof-ceiling assemblies exposed to the noise source making up the building envelope shall meet a composite STC rating of at least 50 or a composite OITC rating of no less than 40, with exterior windows of a minimum STC of 40 or OITC of 30 when the building falls within the 65 dBA L_{dn} noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway noise source, as determined by the local general plan noise element.
>
> **5.507.4.2 Performance method.** For buildings located, as defined by Section 5.507.4.1, wall and roof-ceiling assemblies exposed to the noise source making up the building envelope shall be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an hourly equivalent noise level ($L_{eq\ (1\text{-}hr)}$) of 50 dBA in occupied areas during any hour of operation.

The performance method, which establishes the acceptable interior noise level, is the method typically used when applying these standards.

City of Fremont General Plan 2030. The City of Fremont's General Plan Safety Element establishes goals, policies, and methods of implementation for noise and vibration sources. Applicable goals, policies, and implementation measures presented in the General Plan are as follows:

Goal 10-8: Noise & Vibration. Minimal impacts to residents and property due to noise and ground vibration sources.

- **Policy 10-8.1: Site Development Acceptable Noise Environment**

  A noise environment which meets acceptable standards as defined by the State of California Building Code and local policies contained herein.

  > **Implementation 10-8.1.A: Noise Standards**

  New development projects shall meet acceptable exterior noise level standards. The "normally acceptable" noise standards for new land uses established in Land Use Compatibility for Community Exterior Noise Environments shown in Figure 10-4 shall be used as modified by the following:

  5. Appropriate interior noise levels in commercial, industrial, and office buildings are a function of the use of space and shall be evaluated on a case-by-case basis. Interior noise levels in offices generally should be maintained at 45 L_{eq} (hourly average) or less.

  > **Implementation 10-8.1.B: Noise Studies Required**

Continue to use noise guidelines and contours to determine if additional noise studies are needed for a proposed new development. Prepare a format and guidelines for noise studies.

> **Implementation 10-8.1.D: Noise Mitigation**

Encourage the use of site design, setbacks, landscaping, earth berms, and other non-structural methods to reduce and mitigate the effects of traffic noise and other sources. Building placement should also be utilized to mitigate noise impacts on outdoor areas. In general, the use and construction of sound walls is discouraged unless no other alternative exists. If landscaping is used then appropriate controls for irrigation and maintenance shall be provided.

Table 10-4
Land Use Compatibility for Community Exterior Noise Environments

Land Use Category	Exterior Noise Exposure (Ldn)															
	<55		55		60		65		70		75		80		>80	
Single-Family and Multi-Family Residential																
Hotels, Motels and other lodging																
Outdoor Sports and Recreation, Neighborhood Parks and Playgrounds																
Schools, Libraries, Museums, Hospitals, Personal Care, Meeting Halls, Churches																
Office Buildings, Business, Commercial, and Professional																
Auditoriums, Concert Halls, Amphitheaters																

NORMALLY ACCEPTABLE:
Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special insulation requirements

CONDITIONALLY ACCEPTABLE:
Specified land use may be permitted only after detailed analysis of the noise reduction requirements and needed noise insulation features included in the design.

UNACCEPTABLE:
New construction or development should generally not be undertaken because mitigation is usually not feasible to comply with noise element policies

- **Policy 10-8.2: Acceptable Noise Environment**

  Guidelines articulated by Table 10-4 are not intended to be applied reciprocally. In other words, if an area currently is below the desired noise standards, an increase in noise up to the maximum should not necessarily be allowed. The impact of a proposed project on an existing land use should be evaluated in terms of potential for adverse community response based on a substantial increase in existing noise levels, regardless of the compatibility guidelines.

- **Policy 10-8.3: Noise Environment Protection**

  Protect existing residential neighborhoods from noise. In general, the City will require evaluation of mitigation measures for projects under the following circumstances:

  1. The project would cause the L_{dn} to increase by 5 dB(A) or more but would remain below 60 dB(A), or;

  2. The project would cause the L_{dn} to increase by 3 dB(A) or more and exceed 60 dB(A), or;

  3. The project has the potential to generate significant adverse community response due to the unusual character of the noise.

- **Policy 10-8.4: Commercial and Industrial Noise Sources**

  Control noise created by commercial or industrial sources associated with new projects or developments to not exceed noise level standards set forth in Table 10-1 as measured at any affected residential land use property line.

Table 10-1
Noise Level Standards for New Industrial and Commercial Noise Sources

Exterior Noise Level Standards, dB(A)1		
	Daytime - 7 AM – 10 PM	Nighttime - 10 PM – 7 AM
Hourly Leq	50	45
Hourly Lmax[2]	70	65

1. These standards apply on residential properties at locations where a lowered noise level would be beneficial
2. . Typical recurring maximum noise level.
Source: Illingworth & Rodkin, 2008

- **Policy 10-8.5: Construction Noise Levels**

  Control construction noise at its source to maintain existing noise levels, and in no case to exceed the acceptable noise levels.

  > **Implementation 10-8.5.B: Construction Noise Mitigation**

  > Continue to apply the construction hours ordinance to new development to limit noise exposure created by construction activity. Apply best practices to further limit noise in sensitive areas and long term projects, such as maintaining construction equipment in good condition and use of mufflers on internal combustion engines, installation of temporary noise barriers, prohibiting extended idling time of internal combustion engines, locating staging areas away from sensitive receptors and other feasible best management practices.

City of Fremont 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 18.50.040 Industrial Districts – Performance Standards. (1) Noise. At all property lines, as measured consistent with subsection (c) of this section, the maximum noise level generated by any user shall not exceed an L_{dn} level of 70 dB(A) when adjacent users are industrial, commercial, business, professional or office. When adjacent to hotels, motels and other lodging, or outdoor sports and recreation, neighborhood parks and playgrounds, the noise level at all property lines shall be limited to an L_{dn} level of 65 dB(A). When users are adjacent or contiguous to residential, institutional uses, or similar sensitive uses, the maximum noise level shall not exceed an hourly L_{eq} level of 50 dB(A) during daytime hours (7:00 a.m. – 10:00 p.m.), an hourly L_{eq} level of 45 dB(A)during nighttime hours (10:00 p.m. – 7:00 a.m.), an hourly L_{max} level of 70 dB(A)during daytime hours, and an hourly L_{max} level of 65 dB(A) during nighttime hours. Excluded from these standards are occasional sounds generated by the movement of railroad equipment, temporary construction activities or warning devices. Each of the noise level standards specified in this section shall be reduced by five db(A) for single-tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises when the site is adjacent to residential areas.

Chapter 18.160.010 Construction Hours – Limitations. Except as modified herein, construction activity for development projects in any zoning district on any property within 500 feet of one or more residences, lodging facilities, nursing homes or inpatient hospitals shall be limited to the weekday hours of 7:00 a.m. to 7:00 p.m. and the Saturday or holiday hours of 9:00 a.m. to 6:00 p.m., while Sunday construction is not allowed. Construction activity for projects not located within 500 feet of residences, lodging facilities, nursing homes or inpatient hospitals shall be limited to the weekday hours of 6:00 a.m. to 10:00 p.m. and the weekend or holiday hours of 8:00 a.m. to 8:00 p.m.

Chapter 18.218.050 Standard Development Requirements. (d) Noise. (1) Construction Noise. To reduce the potential for noise impacts during construction, the following requirements shall be implemented:

(A) Construction equipment shall be well-maintained and used judiciously to be as quiet as practical.

(B) Construction, excavating, grading, and filling activities (including the loading and unloading of materials, truck movements, and warming of equipment motors) shall be limited as provided in Section 18.160.010.

(C) All internal combustion engine-driven equipment shall be equipped with mufflers, which are in good condition and appropriate for the equipment.

(D) The contractor shall utilize “quiet” models of air compressors and other stationary noise sources where technology exists.

(E) Loading, staging areas, stationary noise generating equipment, etc., shall be located as far as feasible from sensitive receptors.

(F) The contractor shall comply with Air Resource Board idling prohibitions of unnecessary idling of internal combustion engines.

(G) Signs shall be posted at the construction site that include permitted construction days and hours, a day and evening contact number for the job site, and a contact number for the project sponsor in the event of noise complaints. The applicant shall designate an on-site complaint and enforcement manager to track and respond to noise complaints. (Ord. 27-2016 § 37, 12-6-16; Ord. 23-2018 § 41, 10-2-18.)

Existing Noise Environment

The project site is located at 43510 Osgood Road in Fremont, California. Industrial and commercial land uses are located in the site vicinity. The nearest residential land uses would be about 400 feet to the northeast, opposite Interstate 680 (I-680). The Assembly Hall of Jehovah's Witness to the north includes a caretaker's quarters. This structure is located approximately 500 feet from the shared property line and will be treated as a sensitive receptor for this assessment. Averroes High School is also located approximately 660 feet from the property line to the north. Union Pacific Railroad (UPRR) tracks are located approximately 760 feet to the west of the project site, with commercial and industrial buildings located between. Additional single-family residences are located to the west of the UPRR tracks, approximately 890 feet from the western edge of the project site.

The noise environment at the site and in the surrounding area results primarily from vehicular traffic along I-680. Local roadways, such as Osgood Road, also contribute to the noise environment in the site vicinity. Occasional overhead aircraft associated with the Hayward Executive Airport and Oakland International Airport, and train pass-bys, are also audible at times at the project site.

A noise monitoring survey was performed at the site beginning on Tuesday, July 30, 2019 and concluding on Thursday, August 1, 2019. The monitoring survey included two long-term noise measurements (LT-1 and LT-2) and two short-term noise measurements (ST-1 and ST-2), which are shown in Figure 1.

Long-term noise measurement LT-1 was made along the western boundary of the project site, approximately 40 feet east of the centerline of Osgood Road. Hourly average noise levels at this location typically ranged from 68 to 76 dBA L_{eq} during the day, and from 57 to 72 dBA L_{eq} at night. The day-night average noise level was 74 dBA L_{dn}. The daily trend in noise levels at LT-1 is shown in Figures 2 through 4.

LT-2 was made along the eastern boundary of the site, approximately 65 feet from the centerline of the nearest through lane along I-680 southbound. The base elevation of I-680 is about 15 to 20 feet elevated above the pad elevation of the project site, and a 3-foot K-rail is located along the edge of I-680. The elevation, paired with the K-rail, provides shielding for the LT-2 measurement. Hourly average noise levels at this location typically ranged from 60 to 65 dBA L_{eq} during the day, and from 52 to 66 dBA L_{eq} at night. The day-night average noise level was 69 dBA L_{dn}. The daily trend in noise levels at LT-2 is shown in Figures 5 through 7.

The short-term noise measurements were made on Tuesday, July 30, 2019, between 11:40 a.m. and 12:10 p.m. Each noise metric for the short-term measurements are summarized in Table 4.

ST-1 was made in front of the single-family residence located at 43474 Newport Drive. ST-1 was made from the sidewalk, approximately 40 feet from the center of the Jamestown Road/Newport Drive intersection. The backyard of this residence abuts the UPRR tracks, with a property line fence providing partial shielding. During the ST-1 measurement, three trains passed by with noise levels of 52 to 70 dBA, and two jets flew overhead with noise levels of 48 to 50 dBA. A vehicle

pass-by along Jamestown Road/Newport Drive generated noise levels of 52 dBA, and two car door slams were measured to generate noise levels of 54 to 59 dBA at ST-1. The 10-minute average noise level at ST-1 was 55 dBA $L_{eq(10\text{-}min)}$.

ST-2 was made in front of 43530 Homestead Court, approximately 15 feet from the centerline of the roadway. Traffic along nearby I-680 was the predominant noise source. Noise levels generated by I-680 ranged from 53 to 56 dBA at ST-2, which was partially shielded from I-680 by an eight-foot sound wall located opposite Homestead Court from the measurement location. Two noisy heavy trucks along I-680 were observed to have noise levels or 55 to 59 dBA, while a motorcycle along I-680 generated noise levels of 57 dBA. The 10-minute average noise level at ST-2 was 55 dBA $L_{eq(10\text{-}min)}$.

FIGURE 1 Noise Measurement Locations

Source: Google Earth, 2019.

TABLE 4 Summary of Short-Term Noise Measurements (dBA)

Noise Measurement Location (Date, Time)	L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	$L_{eq(10\text{-}min)}$
ST-1: ~40 feet from the center of the Jamestown Road/Newport Drive intersection (7/30/2019, 11:40-11:50)	70	69	57	48	43	55
ST-2: ~15 feet east of the centerline of Homestead Court (7/30/2019, 12:00-12:10)	59	59	57	54	52	55

FIGURE 2 Daily Trend in Noise Levels at LT-1, Tuesday July 30, 2019

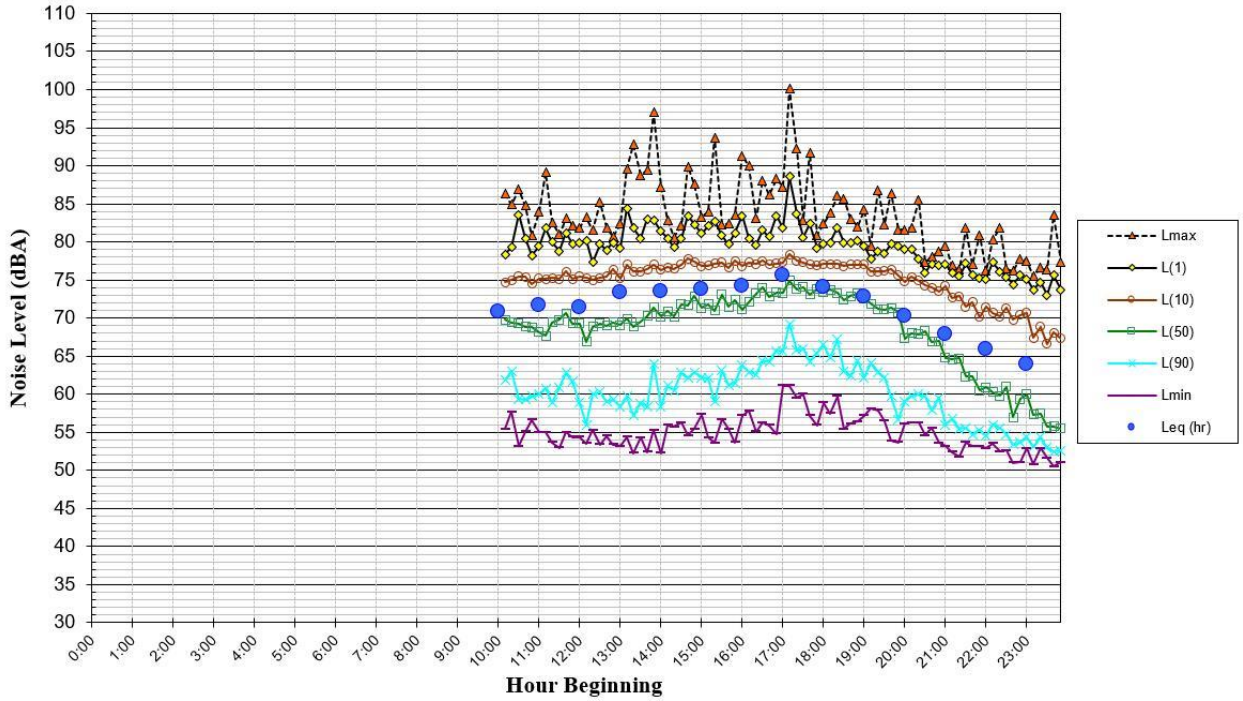


FIGURE 3 Daily Trend in Noise Levels at LT-1, Wednesday July 31, 2019

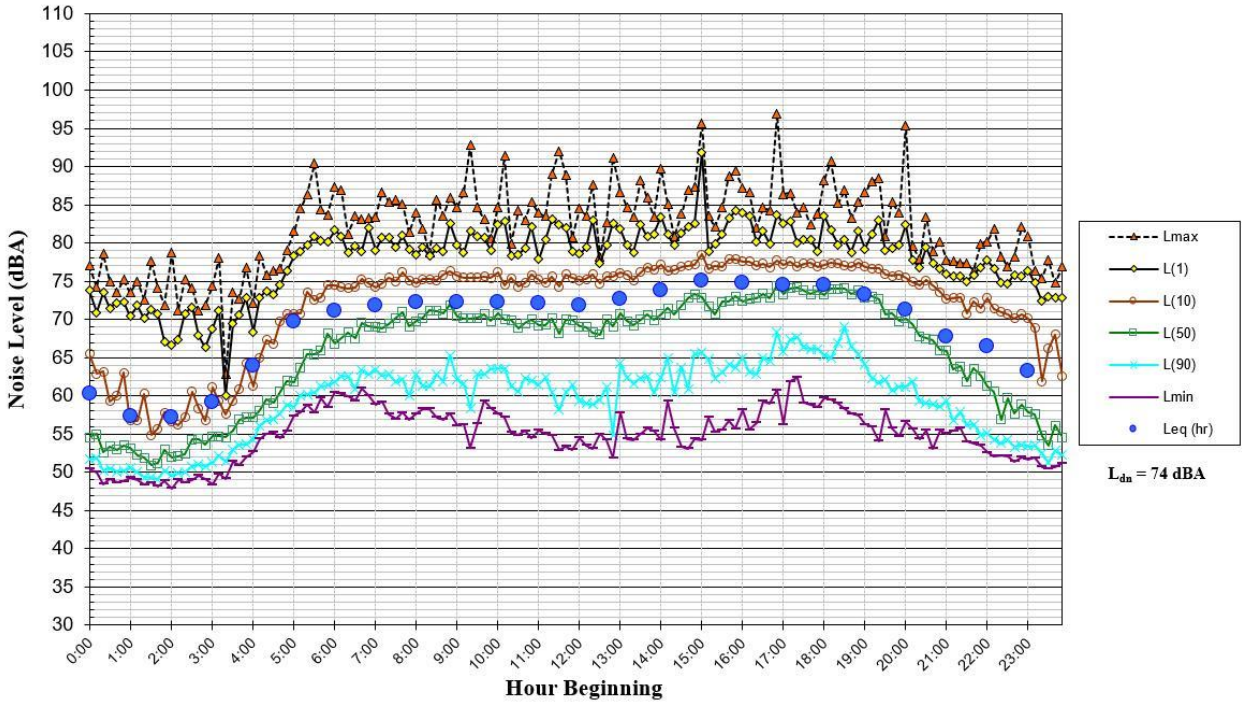


FIGURE 4 Daily Trend in Noise Levels at LT-1, Thursday August 1, 2019

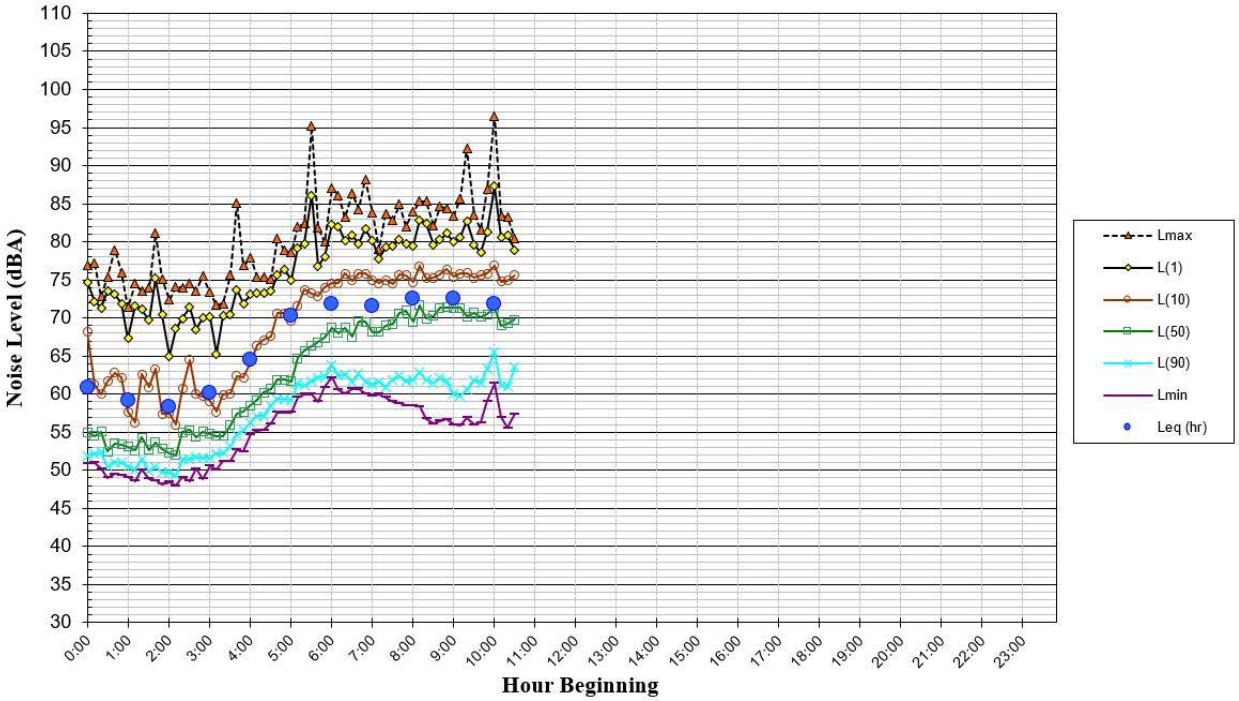


FIGURE 5 Daily Trend in Noise Levels at LT-2, Tuesday July 30, 2019

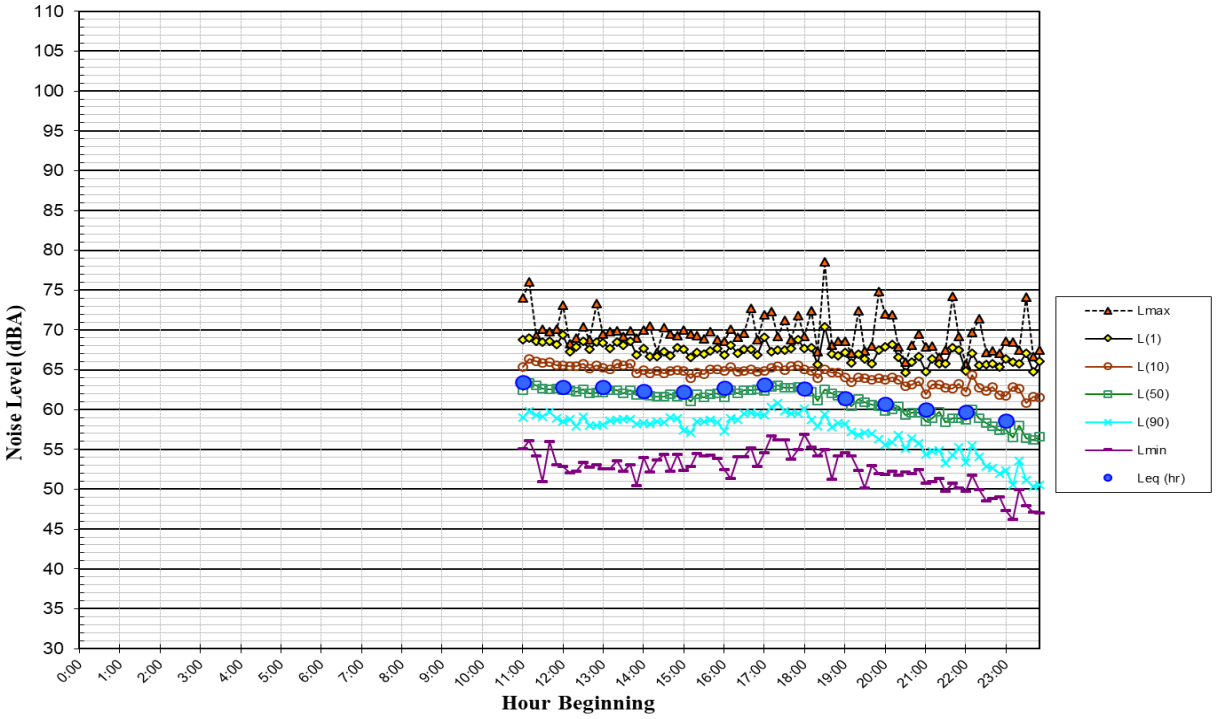


FIGURE 6 Daily Trend in Noise Levels at LT-2, Wednesday July 31, 2019

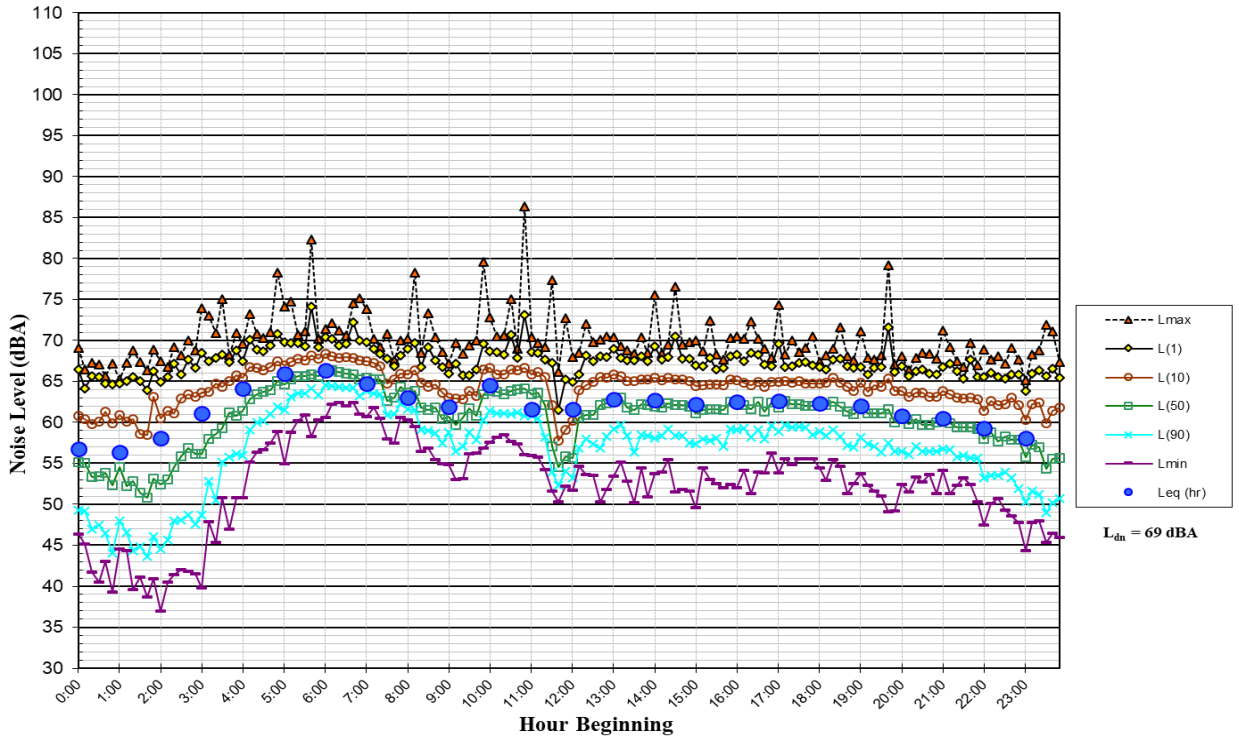
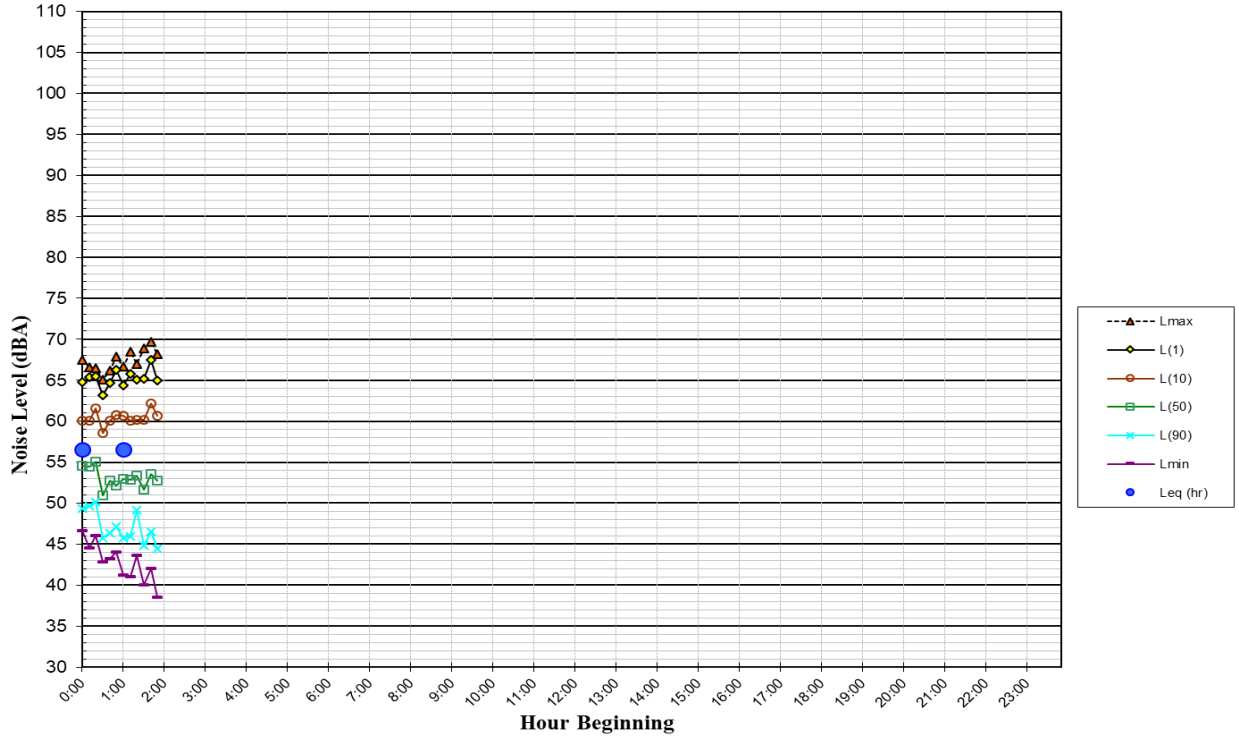


FIGURE 7 Daily Trend in Noise Levels at LT-2, Thursday August 1, 2019



PLAN CONSISTENCY ANALYSIS

Noise and Land Use Compatibility

The future noise environment at the project site would continue to be dominated by vehicular traffic along I-680 and Osgood Road. While a traffic report was not completed for the proposed project, the peak hour trips generated by the project would be 0 in the peak AM hour and 42 in the peak PM hour. Due to the existing traffic volumes along Osgood Road, these peak hour trips would result in an immeasurable noise level increase under future conditions. To estimate the noise level increase by the year 2035, the City of Fremont General Plan Update Environmental Impact Report[1] was reviewed. By the year 2035, the noise level increase along I-680 would be 2 dBA L_{dn}, and the increase along Osgood Road would be 1 dBA L_{dn}. Conservatively, these noise level increases were applied to the LT-2 and LT-1 measurements, respectively, to estimate the future noise levels at the project site.

Future Exterior Noise Environment

There are no anticipated outdoor use spaces associated with this project that would be sensitive to noise. Therefore, the future exterior noise environment was not evaluated for land use compatibility.

Future Interior Noise Environment

The State of California requires that wall and roof-ceiling assemblies exposed to the adjacent roadways have a composite Sound Transmission Class (STC)[2] rating of at least 50 or a composite Outdoor-Indoor Transmission Class (OITC) rating of no less than 40, with exterior windows of a minimum STC of 40 or OITC of 30 when the commercial property falls within the 65 dBA CNEL/L_{dn} noise contour for a freeway. According to the 2030 Traffic Noise Contours provided in the City's General Plan 2030,[3] and data from long-term noise measurements, the project site falls within the 70 dBA L_{dn} contour for I-680. The State of California also requires interior noise levels to be maintained at 50 dBA $L_{eq(1\text{-}hr)}$ or less during hours of operation at the proposed office buildings. The City of Fremont requires that interior noise levels in offices be maintained at 45 $L_{eq(1\text{-}hr)}$ or less.

The proposed office buildings would be partially shielded from I-680 by the proposed service shop and parts warehouse. However, the proposed office building would have direct line-of-sight to Osgood Road. With partial shielding and setback distances of approximately 720 feet from I-680 and 70 feet from Osgood Road, future exterior noise levels would range from approximately 66 to 73 dBA $L_{eq(1\text{-}hr)}$ during daytime hours.

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[1] Lamphier-Gregory, "Downtown Community Plan Draft Supplemental Environmental Impact Report," State Clearinghouse Number: 2010072001, February 2012.

[2] **Sound Transmission Class (STC)** A single figure rating designed to give an estimate of the sound insulation properties of a partition. Numerically, STC represents the number of decibels of speech sound reduction from one side of the partition to the other. The STC is intended for use when speech and office noise constitute the principal noise problem.

[3] City of Fremont, "City of Fremont General Plan 2030," adopted December 2011.

Standard construction materials for commercial uses would provide about 25 dBA of noise reduction in interior spaces. The inclusion of adequate forced-air mechanical ventilation systems is normally required so windows may be kept closed at the occupant's discretion and would provide an additional 5 dBA reduction. The standard construction materials in combination with forced-air mechanical ventilation would satisfy the daytime threshold of 45 dBA $L_{eq(1\text{-}hr)}$.

Spaces where lower noise levels would be desired, such as private offices and conference rooms, may benefit from additional noise control in order to meet a lower, more desirable interior noise level. Additional noise control could be accomplished by selecting higher sound-rated windows (STC 33 minimum along exterior façades).

The implementation of forced-air mechanical ventilation systems in combination with standard construction would reduce interior noise levels to 45 dBA L_{dn} or less.

NOISE IMPACTS AND MITIGATION MEASURES

This section describes the significance criteria used to evaluate project impacts under CEQA, provides a discussion of each project impact, and presents mitigation measures, where necessary, to reduce project impacts to less-than-significant levels.

Significance Criteria

The following criteria were used to evaluate the significance of environmental noise resulting from the project:

- A significant noise impact would be identified if the project would generate a substantial temporary or permanent noise level increase over ambient noise levels at existing noise-sensitive receptors surrounding the project site and that would exceed applicable noise standards presented in the General Plan or Municipal Code at existing noise-sensitive receptors surrounding the project site.

    - A significant temporary noise impact would be identified if construction-related noise would temporarily increase ambient noise levels at sensitive receptors. Hourly average noise levels exceeding 60 dBA L_{eq} at residential land uses or 70 dBA L_{eq} at commercial/industrial land uses, and the ambient by at least 5 dBA L_{eq}, for a period of more than one year would constitute a significant temporary noise increase.

    - A significant permanent noise level increase would occur if project-generated traffic would result in: a) a noise level increase of 5 dBA L_{dn} or greater, with a future noise level of less than 60 dBA L_{dn}, or b) a noise level increase of 3 dBA L_{dn} or greater, with a future noise level of 60 dBA L_{dn} or greater.

    - A significant noise impact would be identified if the project would expose persons to or generate noise levels that would exceed applicable noise standards presented in the General Plan or Municipal Code.

- A significant impact would be identified if the construction of the project would generate excessive vibration levels surrounding receptors. Groundborne vibration levels exceeding 0.2 in/sec PPV would have the potential to result in cosmetic damage to normal buildings.

- A significant noise impact would be identified if the project would expose people residing or working in the project area to excessive aircraft noise levels.

Impact 1a: **Temporary Construction Noise.** Existing noise-sensitive land uses would be exposed to a temporary increase in ambient noise levels due to project construction activities. However, project construction would not exceed the ambient environment by 5 dBA L_{eq} at any nearby land uses during daytime hours and project construction would occur within the acceptable hours as outlined in the City Municipal Code. This is a **less-than-significant temporary noise impact.**

Noise impacts resulting from construction depend upon the noise generated by various pieces of construction equipment, the timing and duration of noise-generating activities, and the distance between construction noise sources and noise-sensitive areas. Construction noise impacts primarily result when construction activities occur during noise-sensitive times of the day (e.g., early morning, evening, or nighttime hours), when the construction occurs in areas immediately adjoining noise-sensitive land uses, or when construction lasts over extended periods of time.

For project sites located within 500 feet from a residential land use, the City exempts noise due to construction activities from the established noise level standards when activities occur between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday and between 9:00 a.m. and 6:00 p.m. on Saturdays and holidays. Construction activities are prohibited on Sundays.

While noise thresholds for temporary construction are not provided in the City's General Plan or Municipal Code, the Fundamentals section of this report provides a threshold of 45 dBA for speech interference indoors. Assuming a 15 dBA exterior-to-interior reduction for standard residential construction and a 25 dBA exterior-to-interior reduction for standard commercial construction, this would correlate to an exterior threshold of 60 dBA L_{eq} at residential land uses and 70 dBA L_{eq} at commercial land uses. Additionally, temporary construction would be annoying to surrounding land uses if the ambient noise environment increased by at least 5 dBA L_{eq} for an extended period of time. Therefore, the temporary construction noise impact would be considered significant if project construction activities exceeded 60 dBA L_{eq} at nearby residences or exceeded 70 dBA L_{eq} at nearby commercial land uses and exceeded the ambient noise environment by 5 dBA L_{eq} or more for a period longer than one year.

Daytime ambient noise levels at the existing single-family residences to the west, across Osgood Road and BART rail tracks, and to the east, across I-680, are represented by ST-1 and ST-2. The ambient noise levels at these nearby residential receptors would be approximately 55 to 58 dBA L_{eq} during daytime hours. Residences across I-680 to the east are shielded by a sound wall, which would also shield temporary construction noise. Residences to the west are partially shielded by existing commercial and industrial buildings. Noise levels at these commercial and industrial buildings would be represented by LT-2. During daytime hours, these commercial buildings would have existing daytime levels of about 55 to 73 dBA L_{eq}, depending on setback from Osgood Road. The Assembly Hall of Jehovah's Witness to the north would also be represented by LT-2, with existing daytime levels of about 62 to 69 dBA L_{eq}.

The typical range of maximum instantaneous noise levels for the proposed project would be 70 to 90 dBA L_{max} at a distance of 50 feet (see Table 5). Table 6 shows the average noise level ranges, by construction phase, for various types of construction projects. Hourly average noise levels generated by the construction of a residential development are about 65 to 88 dBA L_{eq} at a distance of 50 feet from the center of a busy construction site. Construction-generated noise levels drop off at a rate of about 6 dBA per doubling of the distance between the source and receptor. Shielding by buildings or terrain often result in lower construction noise levels at distant receptors.

Construction of the proposed project is expected to last up to approximately 18 months. A detailed list of equipment expected to be used for the proposed project construction and phasing information are summarized in Table 7, along with the estimated hourly average noise levels

expected during each phase of construction when all equipment listed is operating simultaneously.. The distance at which these estimates were calculated was made from the geometrical center of the project site to the property line of the surrounding land uses. Note that the project site, as measured from the property line, is still considered to be within 500 feet of residential land uses. The noise levels summarized in Table 7 do not account for noise level reductions due to intervening buildings or existing fences or sound walls.

TABLE 5 Construction Equipment, 50-foot Noise Emission Limits

Equipment Category	L_{max} Level (dBA)[1,2]	Impact/Continuous
Arc Welder	73	Continuous
Auger Drill Rig	85	Continuous
Backhoe	80	Continuous
Bar Bender	80	Continuous
Boring Jack Power Unit	80	Continuous
Chain Saw	85	Continuous
Compressor[3]	70	Continuous
Compressor (other)	80	Continuous
Concrete Mixer	85	Continuous
Concrete Pump	82	Continuous
Concrete Saw	90	Continuous
Concrete Vibrator	80	Continuous
Crane	85	Continuous
Dozer	85	Continuous
Excavator	85	Continuous
Front End Loader	80	Continuous
Generator	82	Continuous
Generator (25 KVA or less)	70	Continuous
Gradall	85	Continuous
Grader	85	Continuous
Grinder Saw	85	Continuous
Horizontal Boring Hydro Jack	80	Continuous
Hydra Break Ram	90	Impact
Impact Pile Driver	105	Impact
Insitu Soil Sampling Rig	84	Continuous
Jackhammer	85	Impact
Mounted Impact Hammer (hoe ram)	90	Impact
Paver	85	Continuous
Pneumatic Tools	85	Continuous
Pumps	77	Continuous
Rock Drill	85	Continuous
Scraper	85	Continuous
Slurry Trenching Machine	82	Continuous
Soil Mix Drill Rig	80	Continuous
Street Sweeper	80	Continuous
Tractor	84	Continuous
Truck (dump, delivery)	84	Continuous
Vacuum Excavator Truck (vac-truck)	85	Continuous
Vibratory Compactor	80	Continuous
Vibratory Pile Driver	95	Continuous
All other equipment with engines larger than 5 HP	85	Continuous

Notes: [1] Measured at 50 feet from the construction equipment, with a "slow" (1 sec.) time constant.
[2] Noise limits apply to total noise emitted from equipment and associated components operating at full power while engaged in its intended operation.
[3]Portable Air Compressor rated at 75 cfm or greater and that operates at greater than 50 psi.

TABLE 6 Typical Ranges of Construction Noise Levels at 50 Feet, L_{eq} (dBA)

	Domestic Housing		Office Building, Hotel, Hospital, School, Public Works		Industrial Parking Garage, Religious Amusement & Recreations, Store, Service Station		Public Works Roads & Highways, Sewers, and Trenches	
	I	II	I	II	I	II	I	II
Ground Clearing	83	83	84	84	84	83	84	84
Excavation	88	75	89	79	89	71	88	78
Foundations	81	81	78	78	77	77	88	88
Erection	81	65	87	75	84	72	79	78
Finishing	88	72	89	75	89	74	84	84

I - All pertinent equipment present at site.
II - Minimum required equipment present at site.

Source: U.S.E.P.A., Legal Compilation on Noise, Vol. 1, p. 2-104, 1973.

TABLE 7 Estimated Construction Noise Levels at Nearby Land Uses

Phase	Construction Equipment (Quantity)	Calculated Hourly Average L_{eq} from Center of Project Site to Nearest Land Use Property Line, dBA			
		Church to North (475 ft)	Com./Ind. to West (520 ft)	Res. to East (800 ft)	Res. To West (1,300 ft)
Demolition	Concrete/Industrial Saw (1) Excavator (3) Rubber-Tired Dozer (2)	67	66	62	58
Site Preparation	Rubber Tired Dozer (3) Tractor/Loader/Backhoe (4)	65	64	60	56
Grading/ Excavation	Excavator (1) Grader (1) Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (3)	65	64	61	57
Trenching	Tractor/Loader/Backhoe (1) Excavator (1)	63	62	58	54
Building-Exterior	Crane (1) Forklift (3) Generator Set (1) Tractor/Loader/Backhoe (3) Welder (1)	63	62	58	54
Building-Interior/ Architectural Coating	Air Compressor (1) Aerial Lift (1)	55	54	51	46
Paving	Paver (2) Paving Equipment (2) Roller (2)	62	61	58	53

As shown in Table 7, noise levels could periodically exceed 60 dBA L_{eq} at the nearest residences and commercial uses to the west. However, project construction would not exceed the ambient environment by 5 dBA L_{eq} at any nearby land uses during daytime hours, and incorporation of the controls outlined below would reduce construction noise levels at the nearest land uses. Therefore, temporary construction for the proposed project would be considered a less-than-significant impact.

Construction activities will be conducted in accordance with the provisions of the City's General Plan and the Municipal Code, which limits temporary construction work within 500 feet of residential land uses to between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday and between the hours of 9:00 a.m. to 6:00 p.m. on Saturdays and holidays. The City does not allow construction activities on Sundays for sites located within 500 feet of one or more residences. Further, the City shall require the construction crew to adhere to the Section 18.218.050 in the Municipal Code as shown below:

To reduce the potential for noise impacts during construction, the following requirements shall be implemented:

(A) Construction equipment shall be well-maintained and used judiciously to be as quiet as practical.

(B) Construction, excavating, grading, and filling activities (including the loading and unloading of materials, truck movements, and warming of equipment motors) shall be limited as provided in Section 18.160.010.

(C) All internal combustion engine-driven equipment shall be equipped with mufflers, which are in good condition and appropriate for the equipment.

(D) The contractor shall utilize "quiet" models of air compressors and other stationary noise sources where technology exists.

(E) Loading, staging areas, stationary noise generating equipment, etc., shall be located as far as feasible from sensitive receptors.

(F) The contractor shall comply with Air Resource Board idling prohibitions of unnecessary idling of internal combustion engines.

(G) Signs shall be posted at the construction site that include permitted construction days and hours, a day and evening contact number for the job site, and a contact number for the project sponsor in the event of noise complaints. The applicant shall designate an on-site complaint and enforcement manager to track and respond to noise complaints. (Ord. 27-2016 § 37, 12-6-16; Ord. 23-2018 § 41, 10-2-18.)

To further reduce noise levels and annoyance to surrounding land uses during construction

Construction Best Management Practices

Develop a construction noise control plan, including, but not limited to, the following construction best management controls:

- Impact tools (e.g., jackhammers, pavement breakers, and rock drills) used for construction shall be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools; and

- Control noise from construction workers' radios to a point where they are not audible at existing residences bordering the project site.

- Where feasible, temporary power service from local utility companies should be used instead of portable generators.

- During final grading, substitute graders for bulldozers, where feasible. Wheeled heavy equipment are quieter than track equipment and should be used where feasible.

- Substitute nail guns for manual hammering, where feasible.

- Avoid the use of circular saws, miter/chop saws, and radial arm saws near the adjoining noise-sensitive receptors. Where feasible, shield saws with a solid screen with material having a minimum surface density of 2 lbs/ft^2 (e.g., such as ¾" plywood).

- Maintain smooth vehicle pathways for trucks and equipment accessing the site, and avoid local residential neighborhoods as much as possible.

- The contractor shall prepare a detailed construction schedule for major noise-generating construction activities. The construction plan shall identify a procedure for coordination with adjacent residential land uses so that construction activities can be scheduled to minimize noise disturbance.

- Designate a "disturbance coordinator" who would be 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. Conspicuously post a telephone number for the disturbance coordinator at the construction site and include in it the notice sent to neighbors regarding the construction schedule.

Mitigation Measure: **No mitigation required.**

Impact 1b: **Permanent Noise Level Increase.** The proposed project would not result in a permanent noise level increase due to project-generated traffic at the existing noise-sensitive land uses in the project vicinity. This is a **less-than-significant impact.**

A significant impact would occur if the permanent noise level increase due to project-generated traffic is 3 dBA L_{dn} or greater for future levels exceeding 60 dBA L_{dn} or 5 dBA L_{dn} or greater for future levels at or below 60 dBA L_{dn} at existing noise-sensitive receptors. The Assembly Hall of

Jehovah's Witness and Averroes High School to the north would have ambient levels above 60 dBA L_{dn}, as measured by LT-1. Residences to the northeast would also have ambient levels above 60 dBA L_{dn}, as measured by LT-2 and ST-2. A significant impact at these land uses would occur if existing levels would increase by 3 dBA L_{dn} due to project traffic. The existing single-family residences to the west would have ambient levels below 60 dBA L_{dn}, as measured at ST-1. Therefore, a significant impact at these land uses would occur if existing levels would increase by 5 dBA L_{dn} due to project traffic. For reference, a 3 dBA L_{dn} noise increase would be expected if the project would double existing traffic volumes along a roadway.

At the time of this analysis, traffic data for the proposed project was not available. Trip generation estimates[4] indicate that the project is anticipated to generate fewer than 100 new peak hour trips. Based on existing traffic conditions along Osgood Road and I-680, noise levels due to project-generated traffic are not anticipated to increase. This is a less-than-significant impact.

Mitigation Measure: No mitigation required.

Impact 1c: Noise Levels in Excess of Standards. The operation of the proposed project could generate noise levels in excess of the noise standards established in the City's General Plan or Municipal Code at the nearby sensitive receptors. This is a **potentially significant impact.**

Mechanical Equipment Noise

The proposed project would include mechanical equipment, such as heating, ventilation, and air conditioning systems (HVAC). Policy 10-8.4 of the General Plan limits stationary equipment noise to 50 dBA L_{eq} and 70 dBA L_{max} between the hours of 7:00 a.m. and 10:00 p.m. and to 45 dBA L_{eq} and 65 dBA L_{max} between the hours of 10:00 p.m. and 7:00 a.m.

The building would include HVAC equipment on the rooftop and an electrical room on the first floor. The roof will be lined by a combination of mechanical screens and metal siding that rises 8 feet above the roof level and the electrical room will be entirely enclosed within a combination of concrete masonry and metal paneling. Site plans also indicate a transformer pad outside of the northwest corner of the building.

Conservative estimates for stationary equipment noise were computed at distances of the nearest receptors. With the inclusion of the mechanical screens and metal siding on the roof, HVAC equipment is not anticipated to generate noise levels that exceed established noise standards. While the transformer is located closer to the shared property line to the north, it is not anticipated to generate noise levels that exceed established standards at the nearest property line to the north. However, without knowing specific information regarding the mechanical equipment at the proposed project site, the impacts of mechanical equipment noise on the adjacent land uses should be assessed during the final project design stage. Design planning should take into account the noise criteria associated with such equipment and utilize site planning to locate equipment in less noise-sensitive areas, such as the rooftop away from the edge of the buildings nearest to residential land uses. Other controls could include, but shall not be limited to, fan silencers, enclosures, and

[4] Institute of Transportation Engineers Handbook, 9th Edition. ITE #810 Construction Equipment Rental Store.

screen walls. Due to the potential proximity of noise-generating equipment to neighboring land uses, this is conservatively considered a potentially significant impact.

Service Dealership Noise

The proposed project would include a service dealership that operates between the hours of Monday through Friday from 7:00 a.m. to 5:00 p.m. Based on measurements from the Papé facility in Rohnert Park, typical noise levels associated with the service dealership would be from hand tools and exhaust fans. Table 8 shows noise sources and typical noise levels recorded at the service facility in Rohnert Park. At the shared property line to the north, noise levels associated with the service dealership operations could reach up to approximately 60 dBA L_{max} during the hours of 7:00 a.m. to 5:00 p.m. on Monday through Friday. Noise levels at all other property lines in the vicinity would be less than 60 dBA L_{max}. During hours of operation, ambient noise levels at the property lines of the nearest receptors would range from 60 to 75 dBA L_{eq}. Since the noise levels associated with the service operations would not exceed ambient levels at property lines of the nearest receptors, this is a less-than-significant impact.

TABLE 8 Measured Operational Noise Levels at Papé Service Center in Rohnert Park

Noise Source	Distance (feet)	Measured L_{max}	L_{max} at 50 feet
Truck driving on gravel surface	50	61	61
Drilling	45	60	59
Welding	60	57	59
Hammering	55	66	67
Exhaust fan	15	68	58

Loading and Unloading Noise

The proposed dealership and service components of the project would include truck deliveries. It is expected that there will be approximately 7 trucks per day during business hours and there will occasionally be freight truck deliveries overnight. Site plans show the loading pad on the eastern side of the building with the delivery route along the southern end of the building. Based on the ambient levels along Osgood Road and I-680, truck deliveries would not measurably increase noise levels in the project vicinity.

Site plans indicate the trash staging area would be located to the north of the building, approximately 50 feet from the shared property line to the north. Due to the anticipated infrequency of noise associated with the trash staging area, noise levels will not exceed the City's thresholds at the shared property line.

Mitigation Measure: No mitigation required.

Impact 2: Generation of Excessive Groundborne Vibration. Construction-related vibration levels are not expected to exceed applicable vibration thresholds at nearby sensitive land uses. This is a **less-than-significant impact.**

The construction of the project may generate perceptible vibration when heavy equipment or impact tools (e.g. jackhammers, hoe rams) are used. Construction activities would include demolition, site preparation work, foundation work, and new building framing and finishing. While a list of construction equipment was not available for the proposed project, pile driving equipment, which can cause excessive vibration, is not expected to be required for the proposed project.

For structural damage, the California Department of Transportation recommends a vibration limit of 0.5 in/sec PPV for buildings structurally sound and designed to modern engineering standards, which typically consist of buildings constructed since the 1990s. A conservative vibration limit of 0.2 in/sec PPV has been used for buildings that are found to be structurally sound but where structural damage is a major concern. For historical buildings or buildings that are documented to be structurally weakened, a conservative limit of 0.08 in/sec PPV is often used to provide the highest level of protection. No historical buildings or buildings that are documented to be structurally weakened adjoin the project site. For the purposes of this study, therefore, groundborne vibration levels exceeding the conservative 0.2 in/sec PPV limit would have the potential to result in a significant vibration impact.

Table 9 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet as well as worst-case scenario vibration levels at the nearest structures. Project construction activities, such as drilling, the use of jackhammers, rock drills and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles, compactors, etc.) may generate substantial vibration in the immediate vicinity. Jackhammers typically generate vibration levels of 0.035 in/sec PPV, and drilling typically generates vibration levels of 0.09 in/sec PPV at a distance of 25 feet. Vibration levels would vary depending on soil conditions, construction methods, and equipment used.

The Assembly Hall of Jehovah's Witness property includes a church and an industrial building that are located approximately 160 feet and 50 feet, respectively, from the shared property line to the north of the project site. Industrial and commercial buildings are located as close as 100 feet from the shared property line to the west and south of the project site. There may be times when excavation or other construction work may generate vibration levels up to 0.10 in/sec PPV at the industrial building to the north and 0.03 in/sec PPV at the church. Vibration levels of up to 0.05 in/sec PPV could be generated at the commercial buildings to the south and west. Additional structures are located further away and would experience lower vibration levels. While vibration levels may be perceptible, this would not be considered significant, given the intermittent and short duration of the phases that have the highest potential of producing vibration (use of jackhammers and other high-power tools).

TABLE 9 Vibration Source Levels for Construction Equipment

Equipment		Reference PPV at 25 ft. (in/sec)	PPV at Industrial Building to North (in/sec)	PPV at Church to North (in/sec)	PPV at Buildings to West and South (in/sec)
Clam shovel drop		0.202	0.094	0.026	0.044
Hydromill (slurry wall)	In soil	0.008	0.004	0.001	0.002
	In rock	0.017	0.008	0.002	0.004
Vibratory Roller		0.210	0.098	0.027	0.046
Hoe Ram		0.089	0.042	0.012	0.019
Large bulldozer		0.089	0.042	0.012	0.019
Caisson drilling		0.089	0.042	0.012	0.019
Loaded trucks		0.076	0.035	0.010	0.017
Jackhammer		0.035	0.016	0.005	0.008
Small bulldozer		0.003	0.001	0.000	0.001

Source: Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration, September 2018 as modified by Illingworth & Rodkin, Inc., December 2019.

Mitigation Measure: No mitigation required.

Impact 3: Exposure to Excessive Aircraft Noise. The project site is located more than two miles from a public airport or public use airport and would not expose people residing or working in the project area to excessive aircraft noise levels. This is a **less-than-significant impact.**

The City does not have a commercial, military, or general aviation airport. Moffett Federal Airfield is a joint civil-military airport located about 8 miles southwest of the project site. Oakland International Airport and Mineta San José International Airport, which are both public-use airports, are located approximately 20 miles northwest and 10 miles south of the project site, respectively. The project site lies outside the area of influence for each of these airports. 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 Measure: No mitigation required.