



Appendix F

General Pump Yard
Noise Impact Study

MD Acoustics

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General Pump Yard Noise Impact Study City of Hesperia, CA

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1.0 Introduction

1.1 Purpose of Analysis and Study Objectives

This noise assessment was prepared to evaluate the potential noise impacts for the project study area and to recommend noise mitigation measures, if necessary, to minimize the potential noise impacts. The assessment was conducted and compared to the noise standards set forth by the Federal, State, and Local agencies. Consistent with the City's Noise Guidelines, the project must demonstrate compliance to the applicable noise criterion as outlined within the City's Noise Element and Municipal Code.

The following is provided in this report:

- A description of the study area and the proposed project
- Information regarding the fundamentals of noise
- A description of the local noise guidelines and standards
- An analysis of traffic noise impacts to and from the project site
- An analysis of construction noise impacts

1.2 Site Location and Study Area

The project site is located at the southwest corner of I Avenue and Hercules Street, in the City of Hesperia, CA (APN: 0401-071-06), as shown in Exhibit A. The site is located within the bounds of the Main Street and Freeway Corridor Specific Plan. Land use zoning designations surrounding the project site include Commercial/Industrial Business Park to the north and south, General Industrial to the west, and Agricultural (A1) to the east. The closest existing sensitive receptors (to the site area) are the church 80 feet to the north and the residential land uses located 80 feet to the east. The project is not within 2 miles of an airport.

1.3 Proposed Project Description

The proposed project consists of the development of a yard where pumps and casings will be unloaded, stored, disassembled, and fixed primarily in the 10,000 sq ft machine shop, then reassembled, tested, and delivered back to pump sites throughout the municipality. MD understands there will be a 10,000 sq ft machine shop and tear-down benches, as well as yard storage space for pumps and casings that are in queue to be worked on, yard space for the storage of chemicals, and a fuel pump. Typical work hours are 6:00 AM to 4:00 PM, Monday through Friday.

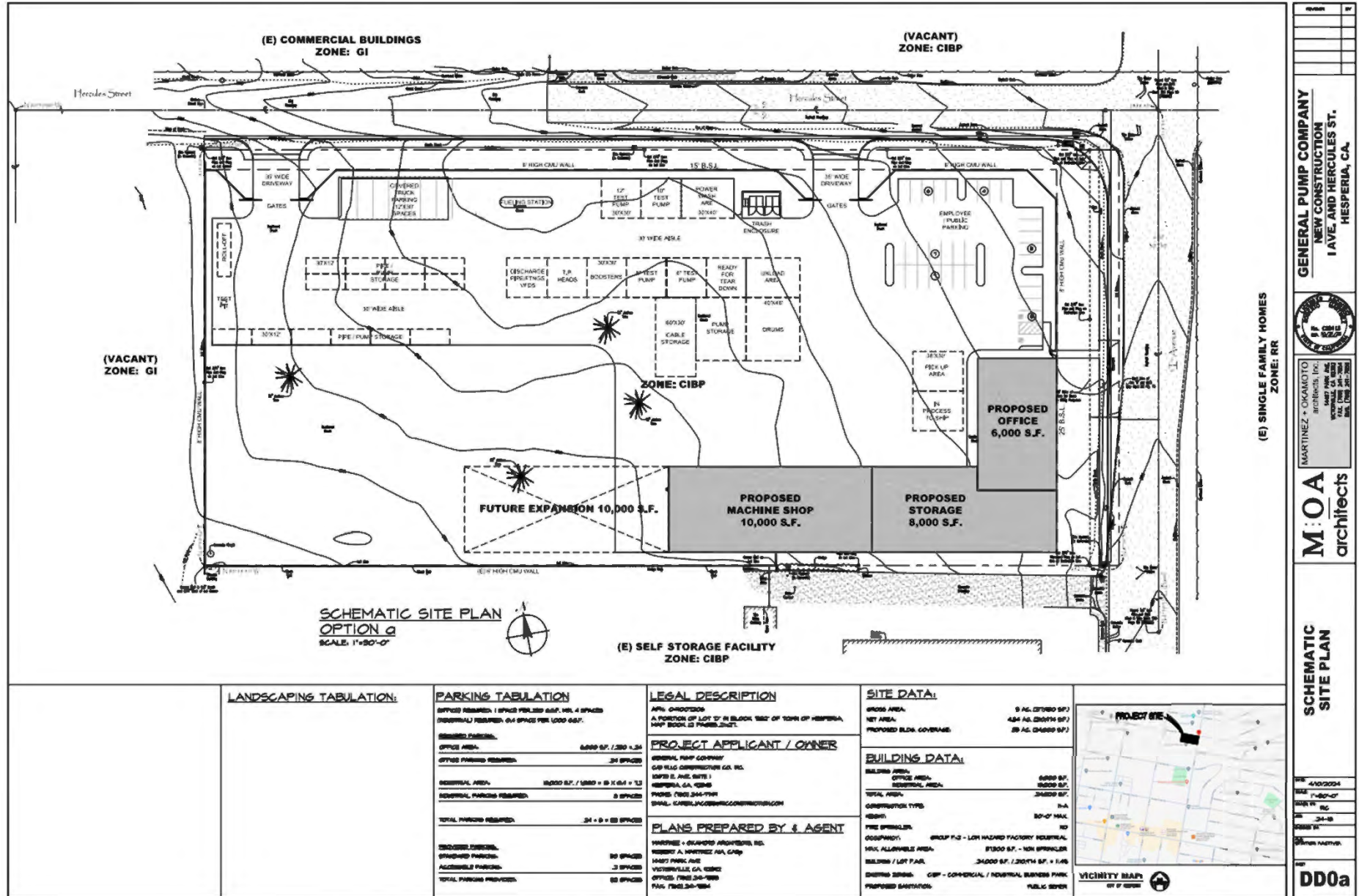
This study assesses the operational noise and traffic noise to and from the project site and compares the results to the applicable City noise standards. In addition, the study reviews noise generated by construction activities.

Construction activities within the Project area will consist of demolition, grading, building, paving, and architectural coating.

Exhibit A Location Map



Exhibit B
Site Plan



2.0 Fundamentals of Noise

This section of the report provides basic information about noise and presents some of the terms used within the report.

2.1 Sound, Noise and Acoustics

Sound is a disturbance created by a moving or vibrating source and is capable of being detected by the hearing organs. Sound may be thought of as the mechanical energy of a moving object transmitted by pressure waves through a medium to a human ear. For traffic or stationary noise, the medium of concern is air. *Noise* is defined as sound that is loud, unpleasant, unexpected, or unwanted.

2.2 Frequency and Hertz

A continuous sound is described by its *frequency* (pitch) and *amplitude* (loudness). Frequency relates to the number of pressure oscillations per second. Low-frequency sounds are low in pitch (bass sounding), and high-frequency sounds are high in pitch (squeak). These oscillations per second (cycles) are commonly referred to as Hertz (Hz). The human ear can hear from the bass pitch from 20 Hz to the high pitch of 20,000 Hz.

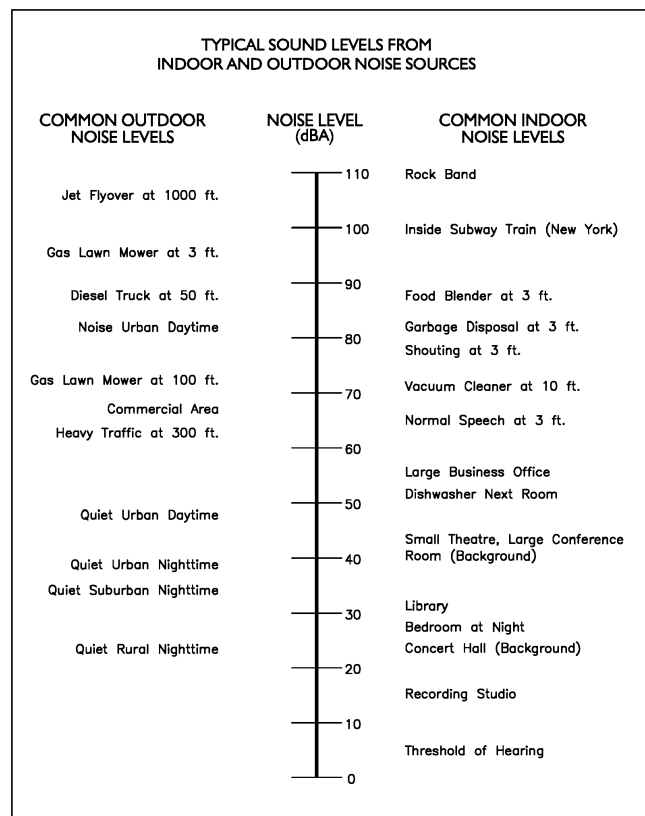
2.3 Sound Pressure Levels and Decibels

The *amplitude* of a sound determines its loudness. The loudness of sound increases or decreases as the amplitude increases or decreases. Sound pressure amplitude is measured in units of micro-Newton per square inch meter (N/m²), also called micro-Pascal (μPa). One μPa is approximately one hundred billionths (0.0000000001) of normal atmospheric pressure. Sound pressure level (SPL or L_p) is used to describe in logarithmic units the ratio of actual sound pressures to a reference pressure squared. These units are called decibels, abbreviated dB. Exhibit C illustrates reference sound levels for different noise sources.

2.4 Addition of Decibels

Because decibels are on a logarithmic scale, sound pressure levels cannot be added or subtracted by simple plus or minus addition. When two sounds or equal SPL are combined, they will produce an SPL 3 dB greater than the original single SPL. In other words, sound energy must be doubled to produce a 3 dB increase. If two sounds differ by approximately 10 dB, the higher sound level is the predominant sound.

Exhibit C: Typical A-Weighted Noise Levels



2.5 Human Response to Changes in Noise Levels

In general, the healthy human ear is most sensitive to sounds between 1,000 Hz and 5,000 Hz (A-weighted scale), and it perceives a sound within that range as being more intense than a sound with a higher or lower frequency with the same magnitude. For purposes of this report as well as with most environmental documents, the A-scale weighting is typically reported in terms of A-weighted decibel (dBA). Typically, the human ear can barely perceive the change in noise level of 3 dB. A change in 5 dB is readily perceptible, and a change in 10 dB is perceived as being twice or half as loud. As previously discussed, a doubling of sound energy results in a 3 dB increase in sound, which means that a doubling of sound energy (e.g., doubling the volume of traffic on a highway) would result in a barely perceptible change in sound level.

Changes in Intensity Level, dBA	Changes in Apparent Loudness
1	Not perceptible
3	Just perceptible
5	Clearly noticeable
10	Twice (or half) as loud

https://www.fhwa.dot.gov/environMent/noise/regulations_and_guidance/polguide/polguide02.cfm

2.6 Noise Descriptors

Noise in our daily environment fluctuates over time. Some noise levels occur in regular patterns; others are random. Some noise levels are constant, while others are sporadic. Noise descriptors were created to describe the different time-varying noise levels.

A-Weighted Sound Level: The sound pressure level in decibels as measured on a sound level meter using the A-weighted 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 response of the human ear. A numerical method of rating human judgment of loudness.

Ambient Noise Level: The composite of noise from all sources, near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

Community Noise Equivalent Level (CNEL): The average equivalent A-weighted sound level during a 24-hour day, obtained after the addition of five (5) decibels to sound levels in the evening from 7:00 to 10:00 PM and after the addition of ten (10) decibels to sound levels in the night before 7:00 AM and after 10:00 PM.

Decibel (dB): A unit for measuring the amplitude of a 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, which is 20 micro-pascals.

dB(A): A-weighted sound level (see definition above).

Equivalent Sound Level (LEQ): The sound level corresponding to a steady noise level over a given sample period with the same amount of acoustic energy as the actual time-varying noise level. The energy average noise level during the sample period.

Habitable Room: Any room meeting the requirements of the Uniform Building Code or other applicable regulations which is intended to be used for sleeping, living, cooking, or dining purposes, excluding such enclosed spaces as closets, pantries, bath or toilet rooms, service rooms, connecting corridors, laundries, unfinished attics, foyers, storage spaces, cellars, utility rooms, and similar spaces.

L(n): The A-weighted sound level exceeded during a certain percentage of the sample time. For example, L10 in the sound level exceeded 10 percent of the sample time. Similarly L50, L90 and L99, etc.

Noise: Any unwanted sound or sound which is undesirable because it interferes with speech and hearing, or is intense enough to damage hearing, or is otherwise annoying. The State Noise Control Act defines noise as "...excessive undesirable sound...".

Outdoor Living Area: Outdoor spaces that are associated with residential land uses typically used for passive recreational activities or other noise-sensitive uses. Such spaces include patio areas, barbecue areas, jacuzzi areas, etc. associated with residential uses; outdoor patient recovery or resting areas associated with hospitals, convalescent hospitals, or rest homes; outdoor areas associated with places of worship which have a significant role in services or other noise-sensitive activities; and outdoor school facilities routinely used for educational purposes which may be adversely impacted by noise. Outdoor areas usually not included in this definition are: front yard areas, driveways, greenbelts, maintenance areas and storage areas associated with residential land uses; exterior areas at hospitals that are not used for patient activities; outdoor areas associated with places of worship and principally used for short-term social gatherings; and, outdoor areas associated with school facilities that are not typically associated with educational uses prone to adverse noise impacts (for example, school play yard areas).

Percent Noise Levels: See L(n).

Sound Level (Noise Level): The weighted sound pressure level obtained by use of a sound level meter having a standard frequency-filter for attenuating part of the sound spectrum.

Sound Level Meter: An instrument, including a microphone, an amplifier, an output meter, and frequency weighting networks for the measurement and determination of noise and sound levels.

Single Event Noise Exposure Level (SENEL): The dB(A) level which, if it lasted for one second, would produce the same A-weighted sound energy as the actual event.

2.7 Traffic Noise Prediction

Noise levels associated with traffic depend on a variety of factors: (1) volume of traffic, (2) speed of traffic, (3) auto, medium truck (2 axle), and heavy truck percentage (3 axle and greater), and sound propagation. A greater the volume of traffic, higher speeds, and larger truck percentages equate to a

louder volume in noise. A doubling of the Average Daily Traffic (ADT) along a roadway will increase noise levels by approximately 3 dB; reasons for this are discussed in the sections above.

2.8 Sound Propagation

As sound propagates from a source, it spreads geometrically. Sound from a small, localized source (i.e., a point source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates at a rate of 6 dB per doubling of distance. The movement of vehicles down a roadway makes the source of the sound appear to propagate from a line (i.e., line source) rather than a point source. This line source results in the noise propagating from a roadway in a cylindrical spreading versus a spherical spreading that results from a point source. The sound level attenuates for a line source at a rate of 3 dB per doubling of distance.

As noise propagates from the source, it is affected by the ground and atmosphere. Noise models use hard site (reflective surfaces) and soft site (absorptive surfaces) to help calculate predicted noise levels. Hard site conditions assume no excessive ground absorption between the noise source and the receiver. Soft site conditions such as grass, soft dirt or landscaping attenuate noise at a rate of 1.5 dB per doubling of distance. When added to the geometric spreading, the excess ground attenuation results in an overall noise attenuation of 4.5 dB per doubling of distance for a line source and 7.5 dB per doubling of distance for a point source.

Research has demonstrated that atmospheric conditions can significantly affect noise levels when noise receivers are located 200 feet or more from a noise source. Wind, temperature, air humidity, and turbulence can further impact how far sound can travel.

3.0 Ground-Borne Vibration Fundamentals

3.1 Vibration Descriptors

Ground-borne vibrations consist of rapidly fluctuating motions within the ground that have an average motion of zero. The effects of ground-borne vibrations typically only cause a nuisance to people, but at extreme vibration levels, damage to buildings may occur. Although ground-borne vibration can be felt outdoors, it is typically only an annoyance to people indoors where the associated effects of the shaking of a building can be notable. Ground-borne noise is an effect of ground-borne vibration and only exists indoors, since it is produced from noise radiated from the motion of the walls and floors of a room and may also consist of the rattling of windows or dishes on shelves.

Several different methods are used to quantify vibration amplitude.

PPV – Known as the peak particle velocity (PPV) which is the maximum instantaneous peak in vibration velocity, typically given in inches per second.

RMS – Known as root mean squared (RMS) can be used to denote vibration amplitude

VdB – A commonly used abbreviation to describe the vibration level (VdB) for a vibration source.

3.2 Vibration Perception

Typically, developed areas are continuously affected by vibration velocities of 50 VdB or lower. These continuous vibrations are not noticeable to humans whose threshold of perception is around 65 VdB. Outdoor sources that may produce perceptible vibrations are usually caused by construction equipment, steel-wheeled trains, and traffic on rough roads, while smooth roads rarely produce perceptible ground-borne noise or vibration. To counter the effects of ground-borne vibration, the Federal Transit Administration (FTA) has published guidance relative to vibration impacts. According to the FTA, fragile buildings can be exposed to ground-borne vibration levels of 0.3 inches per second without experiencing structural damage.

There are three main types of vibration propagation: surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular wavefront, similar to ripples produced by throwing a rock into a pool of water. P-waves, or compression waves, are body waves that carry their energy along an expanding spherical wavefront. The particle motion in these waves is longitudinal (i.e., in a "push-pull" fashion). P-waves are analogous to airborne sound waves. S-waves, or shear waves, are body waves carrying energy along an expanding spherical wavefront. However, unlike P-waves, the particle motion is transverse, or side-to-side and perpendicular to the direction of propagation.

As vibration waves propagate from a source, the vibration energy decreases in a logarithmic nature, and the vibration levels typically decrease by 6 VdB per doubling of the distance from the vibration source. As stated above, this drop-off rate can vary greatly depending on the soil but has been shown to be effective enough for screening purposes to identify potential vibration impacts that may need to be studied through actual field tests.

4.0 Regulatory Setting

The proposed project is located in the City of Hesperia and noise regulations are addressed through the efforts of various federal, state, and local government agencies. The agencies responsible for regulating noise are discussed below.

4.1 Federal Regulations

The adverse impact of noise was officially recognized by the federal government in the Noise Control Act of 1972, which serves three purposes:

- Publicize noise emission standards for interstate commerce
- Assist state and local abatement efforts
- Promote noise education and research

The Federal Office of Noise Abatement and Control (ONAC) was originally tasked with implementing the Noise Control Act. However, it was eventually eliminated, leaving other federal agencies and committees to develop noise policies and programs. Some examples of these agencies are as follows: The Department of Transportation (DOT) assumed a significant role in noise control through its various agencies. The Federal Aviation Agency (FAA) regulates noise from aircraft and airports. The Federal Highway Administration (FHWA) regulates noise from the interstate highway system. The Occupational Safety and Health Administration (OSHA) is responsible for the prohibition of excessive noise exposure to workers.

The federal government advocates that local jurisdictions use their land use regulatory authority to arrange new development in such a way that “noise sensitive” uses are either prohibited from being constructed adjacent to a highway or that the developments are planned and constructed in such a manner that potential noise impacts are minimized.

Since the federal government has preempted the setting of standards for noise levels that can be emitted by the transportation source, the City is restricted to regulating the noise generated by the transportation system through nuisance abatement ordinances and land use planning.

4.2 State Regulations

Established in 1973, the California Department of Health Services Office of Noise Control (ONC) was instrumental in developing regulatory tools to control and abate noise for use by local agencies. One significant model is the “Land Use Compatibility for Community Noise Environments Matrix.” The matrix allows the local jurisdiction to clearly delineate compatibility of sensitive uses with various incremental levels of noise.

The State of California has established noise insulation standards as outlined in Title 24, the California Building Code, which in some cases requires acoustical analyses to outline exterior noise levels and to ensure interior noise levels do not exceed the interior threshold. The State mandates that the legislative body of each county and city adopt a noise element as part of its comprehensive general plan. The local

noise element usually recognizes the land use compatibility guidelines published by the State Department of Health Services. The guidelines rank noise land use compatibility in terms of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable, as illustrated in Exhibit D.

4.3 City of Hesperia Noise Regulations

The City of Hesperia outlines its noise regulations and standards within the Noise Element from the General Plan and the Noise Ordinance from the Municipal Code.

City of Hesperia General Plan

Applicable policies and standards governing environmental noise in the City are set forth in the General Plan’s Noise Element. Exhibit NS-1 (Exhibit D of this report) of the City’s Noise Element outlines the land use compatibility and Table NS-4 (Exhibit E of this report) outlines the City’s interior and exterior noise levels for community noise environments.

Exhibit D: Noise/Land Use Compatibility Matrix

Land Use Category	Community Noise Equivalent Level (CNEL), dB						
	55	60	65	70	75	80	85
Residential – Low Density Single Family, Duplex, Mobile Home	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable	Clearly Unacceptable	Clearly Unacceptable
Residential – Multi Family	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable	Clearly Unacceptable	Clearly Unacceptable
Transient Lodging – Motels, Hotels	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable	Clearly Unacceptable	Clearly Unacceptable
Schools, Libraries, Churches, Hospitals, Nursing Homes	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable	Clearly Unacceptable	Clearly Unacceptable
Auditoriums, Concert Halls, Amphitheaters	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable	Clearly Unacceptable	Clearly Unacceptable
Sports Arena, Outdoor Spectator Sports	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable	Clearly Unacceptable	Clearly Unacceptable
Playground, Neighborhood Parks	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable	Clearly Unacceptable	Clearly Unacceptable
Golf Courses, Riding Stables, Water Recreation, Cemeteries	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable	Clearly Unacceptable	Clearly Unacceptable
Office Buildings, Business Commercial and Professional	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable	Clearly Unacceptable	Clearly Unacceptable
Industrial, Manufacturing, Utilities, Agriculture	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable	Clearly Unacceptable	Clearly Unacceptable

<p>Normally Acceptable</p> <p>Specified land use is satisfactory, assuming buildings are of conventional construction</p>	<p>Conditionally Acceptable</p> <p>New development should be undertaken only after detailed analysis of noise reduction requirements are made.</p>	<p>Normally Unacceptable</p> <p>New development should be generally discouraged, if not, a detailed analysis of noise reduction requirements must be made.</p>	<p>Clearly Unacceptable</p> <p>New development should generally not be undertaken</p>
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Source: State of California General Plan Guidelines (2003)

Exhibit E: Interior and Exterior Noise Standards

Land Use Categories		Community Noise Equivalent Level (CNEL)	
Categories	Land Uses	Interior ¹	Exterior ²
Residential	Single Family, Duplex, Multiple Family	45 ³	65
	Mobile Homes	n/a	65 ⁴
Commercial	Hotel, Motel, Transient Lodging	45	65 ⁵
Industrial	Commercial Retail, Bank, Restaurant	55	n/a
Institutional	Office Building, Research and Development, Professional Offices, City Office Building	50	n/a
	Amphitheatre, Concert Hall, Meeting Hall	45	n/a
	Gymnasium (Multipurpose)	50	n/a
	Sports Club	55	n/a
	Manufacturing, Warehousing, Wholesale, Utilities	65	n/a
Institutional	Movie Theatres	45	n/a
	Hospitals, School Classrooms	45	65
Institutional	Church, Library	45	n/a
	Open Space	Parks	n/a

Interpretation

- Indoor environment excluding: Bathrooms, toilets, closets, corridors.
- Outdoor environment limited to:
Private yard of single family
Multi-family private patio or balcony which is served by a means of exit from inside.
Mobile home park
Hospital patio
Park picnic area
School playground
Hotel and motel recreation area
- Noise level requirement with closed windows. Mechanical ventilation system or other means of natural ventilation shall be provided per Building Code.
- Exterior noise level should be such that interior noise level will not exceed 45 dBA CNEL.
- Except those areas affected by aircraft noise.

In addition to these noise standards, the City has outlined goals and implementation policies to reduce potential noise impacts, which are presented below:

Goals and Implementation Policies

Goals and implementation policies from the noise section that would mitigate potential impacts on noise include the following.

Goal NS - 1: To achieve and maintain an environment which is free from excessive or harmful noise through identification, control and abatement.

Implementation Policies

NS - 1.1: Incorporate noise reduction features during site planning and into land use planning decisions to mitigate anticipated noise impacts on affected residential and noise-sensitive land uses.

- NS - 1.2:** Control and abate undesirable sounds through the use of the land use compatibility criteria shown in Exhibit NS-1 (Exhibit D in this report), Table NS-4 (Exhibit E in this report) and the Municipal Code Section 16.20.125(B).
- NS - 1.3:** Enforce the California Noise Insulation Standards (California Code of Regulations, Title 24). Title 24 requires that an acoustical analysis be performed for all new multifamily residences in areas where the exterior sound level exceeds 60 dBA CNEL. The analysis shall ensure that the building design limits the interior noise environment to 45 dBA CNEL or below.
- NS - 1.6.** Provide developers and builders with development noise policy guidelines. The guidelines shall provide specific design criteria, minimum standards for submittal of acoustical studies and descriptions of acceptable noise mitigation measures.
- NS - 1.7.** Ensure that residential uses and areas intended for frequent outdoor use (See Table NS-3 footnote 2) are not subjected to inappropriate noise levels resulting from transportation systems.
- NS - 1.10.** Limit the hours of construction activity in, and around, residential areas in order to reduce the intrusion of noise in the early morning and late evening hours and on weekends and holidays.
- NS - 1.13.** Ensure adequate noise control measures at construction sites by requiring that construction equipment be fitted with manufacturer-recommended mufflers and ensuring physical separation of machinery maintenance and staging areas from adjacent residential uses.

Goal NS - 2: To achieve and maintain an environment which is free from excessive vibration.

Implementation Policies

- NS - 2.1:** Control exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels as set forth in Table NS-1 and Municipal Code Section 16.20.130.

City of Hesperia Municipal Code

The City's Municipal Code outlines the City's exterior noise limits as it relates to stationary noise sources in Section 16.20.125 – Noise.

Section 16.20.125 – Noise

- A. Noise Measurement. Noise will be measured with a sound level meter, which meets the standards of the American National Standards Institute (ANSI Section S1.4-1979, Type 1 or Type2). Noise levels

shall be measured using the “A” weighted sound pressure level scale in decibels (ref. pressure = 20 micro-newtons per meter squared). The unit of measure shall be designated as dB(A). The building official shall be the noise control officer.

B. Noise Standards.

1. The following table describes the noise standard for emanations from any source, as it affects adjacent properties:

Affected Land Use (Receiving Noise)	Maximum Noise Level	Time Period
A-1, A-2, R-1, R-3 and RR Zone Districts	55 dB(A)	10:00 p.m. – 7:00 a.m.
A-1, A-2, R-1, R-3 and RR Zone Districts	60 dB(A)*	7:00 a.m. – 10:00 p.m.
C-1, C-2, C-3, C-4, C-R, AP, and P-I Zone Districts	65 dB(A)*	Anytime
I-1 and I-2 Zone Districts	70 dB(A)*	Anytime

*Due to wind noise, the maximum permissible noise level may be adjusted so that it is no greater than five dB(A) above the ambient noise level.

2. No person shall operate or cause to be operated any source of sound at any location or allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person, which causes the noise level, when measured on any other property, either incorporated or unincorporated, to exceed:

- a. The noise standard for that receiving land use (as specified in subsection (B)(1) of this section) for a cumulative period of more than thirty (30) minutes in any hour; or
- b. The noise standard plus five dB(A) for a cumulative period of more than fifteen (15) minutes in any hour; or
- c. The noise standard plus ten dB(A) for a cumulative period of more than five minutes in any hour; or
- d. The noise standard plus fifteen (15) dB(A) for a cumulative period of more than one minute in any hour; or
- e. The noise standard plus twenty (20) dB(A) for any period of time.

C. If the measured ambient level exceeds any of the first four noise limit categories above, the allowable noise exposure standard shall be increased to reflect the ambient noise level. If the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under this category shall be increased to reflect the maximum ambient noise level.

D. If the alleged offense consists entirely of impact noise or simple tone noise, each of the noise levels in subsection (B)(1) of this section shall be reduced by five dB(A).

- E. Exempt Noises. The following sources of noise are exempt:
1. Motor vehicles not under the control of the industrial use;
 2. Emergency equipment, vehicles and devices;
 3. Temporary construction, repair, or demolition activities between seven a.m. and seven p.m. except Sundays and federal holidays.

Section 16.20.1130 – Vibration

- A. Vibration Standard. No ground vibration shall be allowed which can be felt without the aid of instruments at or beyond the lot line; nor will any vibration be permitted which produces a particle velocity greater than or equal to 0.2 inches per second measured at or beyond the lot line.
- B. Vibration Measurement. Vibration velocity shall be measured with a seismograph or other instrument capable of measuring and recording displacement and frequency, particle velocity or acceleration. Readings are to be made at points of maximum vibration along any lot line next to a residential or commercial district or a community industrial lot.
- C. Exempt Vibrations. The following sources of vibration are not regulated by this code:
1. Motor vehicles not under the control of the industrial use;
 2. Temporary construction, maintenance or demolition activities between seven a.m. and seven p.m. except Sundays and federal holidays

Main Street & Freeway Corridor Specific Plan

Loading docks, service entries, mechanical equipment and recreational play areas should be sited as far away from adjoining single-family properties as reasonably possible.

4.4 CEQA Guidelines

According to CEQA guidelines, the project would have a potential impact if it resulted 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, would the project expose people residing or working in the project area to excessive noise levels?

5.0 Study Method and Procedure

The following section describes the noise modeling procedures and assumptions used for this assessment.

5.1 Noise Measurement Procedure and Criteria

Noise measurements are taken to determine the existing noise levels. A noise receiver or receptor is any location in the noise analysis in which noise might produce an impact. The following criteria are used to select measurement locations and receptors:

- Locations expected to receive the highest noise impacts, such as the first row of houses
- Locations that are acoustically representative and equivalent of the area of concern
- Human land usage
- Sites clear of major obstruction and contamination

MD conducted the sound level measurements in accordance to the City's and Caltrans (TeNS) technical noise specifications. All measurement equipment meets American National Standards Institute (ANSI) specifications for sound level meters (S1.4-1983 identified in Chapter 19.68.020.AA). The following gives a brief description of the Caltrans Technical Noise Supplement procedures for sound level measurements:

- Microphones for sound level meters were placed 5-feet above the ground for all measurements
- Sound level meters were calibrated (Larson Davis CAL 200) before and after each measurement
- Following the calibration of equipment, a windscreen was placed over the microphone
- Frequency weighting was set on "A" and slow response
- Results of the long-term noise measurements were recorded on field data sheets
- During any short-term noise measurements, any noise contaminations such as barking dogs, local traffic, lawnmowers, or aircraft fly-overs were noted
- Temperature and sky conditions were observed and documented

5.2 Noise Measurement Locations

The noise monitoring locations were selected to obtain a baseline of the existing noise environment. Two (2) short-term 15-minute noise measurements were conducted at the Project site, and long-term data was extrapolated based on traffic patterns. Appendix A includes photos, the field sheet, and measured noise data. Exhibit F illustrates the location of the measurements.

5.3 SoundPLAN Noise Model (Operational Noise)

SoundPLAN (SP) acoustical modeling software was utilized to model future worst-case stationary noise impacts to the adjacent land uses. SP is capable of evaluating multiple stationary noise source impacts at various receiver locations. SP's software utilizes algorithms (based on the inverse square law and reference equipment noise level data) to calculate noise level projections. The software allows the user to input specific noise sources, spectral content, sound barriers, building placement, topography, and sensitive receptor locations.

The future worst-case noise level projections were modeled using referenced sound level data for the various stationary on-site sources (idling trucks, loading noise, parking spaces, a pressure washer, and pumps). The model assumes that the site has 10 idling trucks, 38 parking spaces, 5 loading trucks, a pressure washer, and four pumps all operating for 30 minutes or more during an hour.

Parking was modeled with a reference noise level of 1 vehicle per hour coming or going from the parking spots. Additionally, Idling trucks were modeled at 74 dBA Lp at 10 feet (MD, 2020). Pumps were modeled at 93 dBA Lw (Steve Rogers Acoustics, LLC 2021). Loading noise was modeled at 80 dBA Lw from SoundPLAN's library. The pressure washer was modeled at 100 dBA Lw (University of Florida's Hearing Conservation Program). The model is able to evaluate the noise-attenuating effects of the proposed property line walls. For L8 calculations, backup beepers were assumed to have a sound power of 103 dBA and placed at the closest truck. Input and output calculations are provided in Appendix B.

5.4 FHWA Roadway Construction Noise Model

The construction noise analysis utilizes the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RNCM), together with several key construction parameters. Key inputs include distance to the sensitive receiver, equipment usage, % usage factor, and baseline parameters for the project site.

The project was analyzed based on the different construction phases. The construction noise calculation output worksheet is in Appendix C. The following assumptions relevant to short-term construction noise impacts were used:

- It is estimated that construction will occur over a 13-month time period.

Exhibit F

Measurement Locations

= Short-Term
Monitoring Location



6.0 Existing Noise Environment

Two (2) 15-minute noise measurements were conducted at the project site to document the existing noise environment. The measurements include the 15-minute Leq, Lmin, Lmax, and other statistical data (e.g. L2, L8). Noise measurement field sheets are provided in Appendix A.

6.1 Short-Term Noise Measurement Results

The results of the short-term noise data are presented in Table 1.

Table 1: Short-Term Noise Measurement Data¹

Location	Start Time	Stop Time	LEQ	LMAX	LMIN	L2	L8	L25	L50	L90	Estimated CNEL
NM1	1:37 PM	1:52 PM	46.0	56.5	40.6	51.2	48.6	46.5	44.8	42.7	49.3
NM2	1:19 PM	1:34 PM	68.4	81.8	47.8	76.1	72.9	69.1	65.0	55.0	71.7
Notes: 1. Short-term noise monitoring locations are illustrated in Exhibit F.											

Noise data indicates the ambient noise level ranged from 45 to 65 dBA L50 at the project site. The measured noise levels and field notes indicate that traffic noise along I Avenue is the main source of noise impacting the project site. Additional field notes and photographs are provided in Appendix A.

7.0 Future Noise Environment Impacts and Mitigation

This assessment analyzes future noise impacts from the project and compares the results to the City's Noise Standards. The analysis details the estimated exterior noise levels associated with traffic from adjacent roadway sources and stationary noise due to the project.

7.1 Future Exterior Noise

The exterior noise level off-site of the project will be impacted by transportation-related sources and stationary sources from the site. The following outlines the impacts associated with exterior noise levels.

7.1.1 Future Off-Site Traffic Noise Impact

The main source of noise due to traffic near the project site is traffic from I Avenue. Comparatively, the noise due to traffic from the nearby collector streets is less impactful. The project trip generation provided by Integrated Engineering Group (April, 2024) estimates the project will generate 117 daily trips. It takes a change in noise level of 3 dB for the human ear to perceive a difference. It takes a doubling of traffic to increase the noise level by 3 dB. An additional 117 daily trips will not significantly increase traffic counts from I Avenue or Hercules Street and thus will not significantly increase the traffic noise level. Thus, the impact is less than significant.

7.1.2 Noise Impacts to Off-Site Receptors Due to Stationary Sources

Receptors that may be affected by project operational noise include residences 80 feet to the east, a church 80 feet to the north, and vacant industrial land to the south and west. The worst-case stationary noise was modeled using SoundPLAN acoustical modeling software. The model utilizes point sources representing idling trucks, loading noise, a power washer, 4 pumps, and 1 movement per hour for each parking space.

A total of four (4) receptors were modeled using the SoundPLAN noise model to evaluate the proposed project's operational impact. A receptor is denoted by a yellow dot. All yellow dots represent a property line. The results are in Exhibit G.

Project Operational Noise Levels

Exhibit G shows the "project-only" operational noise levels at the property lines and/or sensitive receptor area and how the noise will propagate at the site. Operational noise levels at the adjacent uses are anticipated to range between 53 and 55 dBA L50 at the adjacent industrial property lines and 47 dBA L50 at the nearest residential uses.

The "project-only" operational noise level at Receptor 2 meets the City's nighttime residential noise standard of 65 dBA L50 (adjusted to represent the ambient noise level) and the City's industrial noise standard of 70 dBA L50.

Project Plus Ambient Operational Noise Levels

A total of four (4) receptors (R1 – R4) were modeled to evaluate the proposed project’s operational impact. This study analyzes the project only operational noise level projections and the project plus ambient noise level projections. See Table 2 below.

Table 2: Worst-case Predicted Operational L50 Noise Level

Receptor ¹	Existing Ambient Noise Level (dBA, L50) ²	Project Noise Level (dBA, L50) ³	Total Combined Noise Level (dBA, L50)	Non Transp. Noise Limit (dBA, L50)	Change in Noise Level as Result of Project
1	55	53	57	70	2
2	65	47	65	65	0
3	52	53	56	70	4
4	46	55	56	70	10
Notes: ¹ Receptors 1 and 4 represent adjacent property lines. Receptor 5 represents nearby residential uses. ² See Appendix A for the ambient noise measurement. ³ See Exhibit G for the operational noise level projections at said receptors.					

As shown in Table 2, the project plus ambient noise level is projected to be 56 to 57 dBA L50 at the surrounding industrial receptors and 65 dBA L50 at the adjacent residential receptor. The project will increase the existing ambient noise level by 2 to 10 dB at the adjacent industrial property lines and 0 dB at the residential receptor.

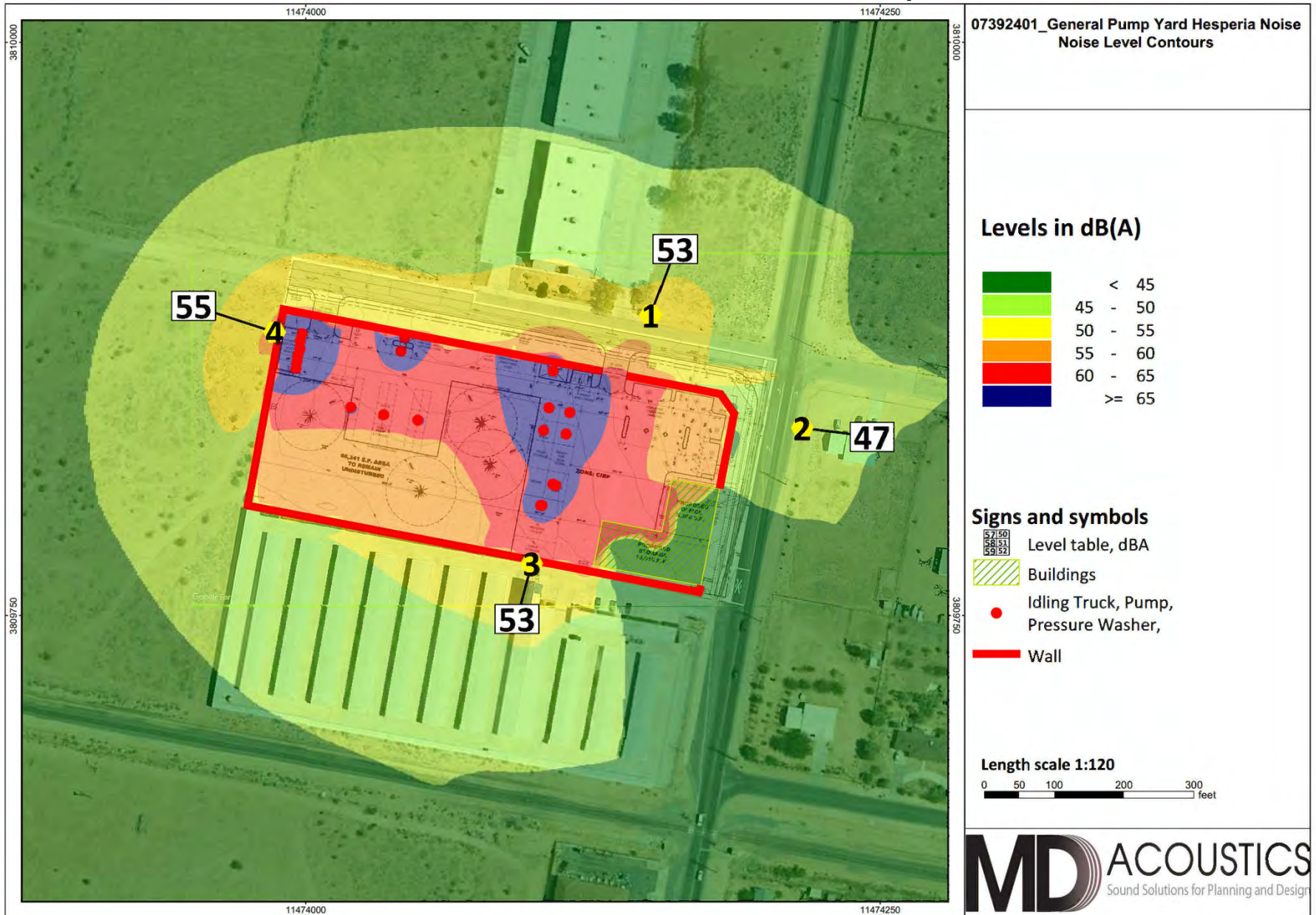
Backup beepers would represent less than 5 minutes of noise in a 60-minute period. The noise limit for a 5-minute period is 73 dBA L8 at the residential receptor (reflecting the ambient noise level) and 80 dBA L8 at the industrial receptor (70 dBA+10).

Table 3: Worst-case Predicted Operational L8 Noise Level

Receptor ¹	Existing Ambient Noise Level (dBA, L8) ²	Project Noise Level (dBA, L8) ³	Total Combined Noise Level (dBA, L8)	Non Transp. Noise Limit (dBA, L8)	Change in Noise Level as Result of Project
1	61	56	62	80	1
2	73	49	73	73	0
3	57	60	62	80	5
4	50	61	61	80	11
Notes: ¹ Receptors 1 and 4 represent adjacent property lines. Receptor 5 represents nearby residential uses. ² See Appendix A for the ambient noise measurement. ³ See Exhibit G for the operational noise level projections at said receptors.					

As shown in Table 3, backup beepers combined with all the operational noise result in a maximum level of 49 dBA L8 at the residential receptor and 61 dBA L8 at the industrial receptors. Ambient plus project levels are projected to be 73 dBA L8 at the residential receptor and 62 dBA L8 at the residential receptors, complying with the City's L8 code of noise occurring less than 5 minutes within an hour.

Operational Noise Level Contours



8.0 Construction Noise Impact

The degree of construction noise may vary for different areas of the project site and also vary depending on the construction activities. Noise levels associated with the construction will vary with the different phases of construction. The construction noise and vibration level projections are provided in the sections below.

8.1 Construction Noise

The Environmental Protection Agency (EPA) has compiled data regarding the noise generated characteristics of typical construction activities. The data is presented in Table 4.

Table 4: Typical Construction Noise Levels¹

Equipment Powered by Internal Combustion Engines	
Type	Noise Levels (dBA) at 50 Feet
Earth Moving	
Compactors (Rollers)	73 - 76
Front Loaders	73 - 84
Backhoes	73 - 92
Tractors	75 - 95
Scrapers, Graders	78 - 92
Pavers	85 - 87
Trucks	81 - 94
Materials Handling	
Concrete Mixers	72 - 87
Concrete Pumps	81 - 83
Cranes (Movable)	72 - 86
Cranes (Derrick)	85 - 87
Stationary	
Pumps	68 - 71
Generators	71 - 83
Compressors	75 - 86
Impact Equipment	
Type	Noise Levels (dBA) at 50 Feet
Saws	71 - 82
Vibrators	68 - 82
Notes:	
¹ Referenced Noise Levels from the Environmental Protection Agency (EPA)	

Construction noise is exempt from the noise limits per Section 16.20.125(E) of the City’s Municipal Code as long as construction occurs between 7AM to 7PM except Sundays and federal holidays. The City does not specify a not to exceed noise limit as it relates to construction noise. However, the FTA Manual provides guidelines for suggested construction noise limits and recommends a daytime noise limit of 80 dBA at residential uses.

Construction noise is considered a short-term impact and would be considered significant if construction activities are outside of the allowed times per 16.20.125(E) of the City’s Municipal Code. Construction noise will have a temporary or periodic increase in the ambient noise level above the existing within the project vicinity. The construction noise impact is considered less than significant; however, construction noise level projections are provided.

Typical operating cycles for these types of construction equipment may involve one or two minutes of full power operation followed by three to four minutes at lower power settings. Noise levels are in Table 5. A likely worst-case construction noise scenario assumes equipment operating as close as 80 feet and an average of 420 feet from the nearest sensitive receptor, the residences to the east. The Lmax levels represent maximum levels when construction occurs adjacent to the residential receptors. Leq levels represent the average construction noise level during each phase.

Table 5: Construction Noise Levels at East Residences

Phase	dBA Lmax	dBA Leq
Site Preparation	78.6	63.1
Grading	79.6	62.8
Building Construction	78.6	61.6
Paving	84.6	63.4
Architectural Coating	72.6	49.4
Notes: Const Equip from CalEEMod		

The noise due to construction at the nearest residential receptor will be 49 to 63 dBA Leq and 73 to 85 dBA Lmax. The noise due to construction will not exceed the recommended construction noise limit of 80 dBA Leq provided in the FTA Manual. It will not significantly increase the ambient noise level of 68 dBA Leq at the nearest residential properties.

8.2 Construction Vibration

Construction activities can produce vibration that may be felt by adjacent land uses. The construction of the proposed project would not require the use of equipment such as pile drivers, which are known to generate substantial construction vibration levels. The primary vibration source during construction may be from a vibratory roller. A vibratory roller has a vibration impact of 0.210 inches per second peak particle velocity (PPV) at 25 feet.

The fundamental equation used to calculate vibration propagation through average soil conditions and distance is as follows:

$$PPV_{equipment} = PPV_{ref} (100/D_{rec})^n$$

Where: PPV_{ref} = reference PPV at 100ft.

D_{rec} = distance from equipment to receiver in ft.
 $n = 1.1$ (the value related to the attenuation rate through ground)

The thresholds from the Caltrans Transportation and Construction Induced Vibration Guidance Manual in Table 6 (below) provides general thresholds and guidelines as to the vibration damage potential from vibratory impacts.

Table 6: Guideline Vibration Damage Potential Threshold Criteria

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

Source: Table 19, Transportation and Construction Vibration Guidance Manual, Caltrans, Sept. 2013.
Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Table 7 gives approximate vibration levels for particular construction activities. This data provides a reasonable estimate for a wide range of soil conditions.

Table 7: Vibration Source Levels for Construction Equipment¹

Equipment	Peak Particle Velocity (inches/second) at 25 feet	Approximate Vibration Level LV (dVB) at 25 feet
Pile driver (impact)	1.518 (upper range)	112
	0.644 (typical)	104
Pile driver (sonic)	0.734 upper range	105
	0.170 typical	93
Clam shovel drop (slurry wall)	0.202	94
Hydromill	0.008 in soil	66
(slurry wall)	0.017 in rock	75
Vibratory Roller	0.21	94
Hoe Ram	0.089	87
Large bulldozer	0.089	87
Caisson drill	0.089	87
Loaded trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

¹ Source: Transit Noise and Vibration Impact Assessment, Federal Transit Administration, May 2006.

All proposed construction is at least 80 feet from any existing structures. At a distance of 80 feet, a vibratory roller would yield a worst-case 0.058 PPV (in/sec) which may be perceptible but below any risk of damage per Table 5. The impact is less than significant, and no mitigation is required.

9.0 CEQA Analysis

The California Environmental Quality Act Guidelines establishes thresholds for noise impact analysis as presented below:

(a) Would the project 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 Code, or applicable standards of other agencies?

Transportation Noise Impacts

Transportation noise would be an impact if the increase in traffic noise level was perceptible. The project trip generation provided by Integrated Engineering Group (April, 2024) estimates the project will generate 117 daily trips. It takes a change in noise level of 3 dB for the human ear to perceive a difference. It takes a doubling of traffic to increase the noise level by 3 dB. An additional 117 daily trips will not significantly increase traffic counts from I Avenue or Hercules Street and thus will not significantly increase the traffic noise level. Thus, the impact is less than significant.

Stationary Noise Sources

Project plus ambient noise level is projected to be 56 to 57 dBA L50 at the surrounding industrial receptors and 65 dBA L50 at the adjacent residential receptor. The project will increase the existing ambient noise level by 2 to 10 dB at the adjacent industrial property lines and 0 dB at the residential receptor. This complies with the residential code of 65 dBA L50 and industrial code of 70 dBA L50.

Backup beepers combined with all the operational noise result in a maximum level of 49 dBA L8 at the residential receptor and 61 dBA L8 at the industrial receptors. Ambient plus project levels are projected to be 73 dBA L8 at the residential receptor and 62 dBA L8 at the residential receptors, complying with the City's L8 code of noise occurring less than 5 minutes within an hour. This complies with the residential code of 73 dBA L8 and industrial code of 80 dBA L8.

The impact is, therefore, less than significant.

Construction Noise and Vibration

Noise due to construction will result in short-term noise impacts associated with construction activities. Construction noise is considered a short-term impact and would be considered significant if construction activities are outside of the allowed times per 16.20.125(E) of the City's Municipal Code. The impact is therefore less than significant. However, construction noise levels are provided. The City does not specify a not to exceed noise limit as it relates to construction noise. However, the FTA Manual provides guidelines for suggested construction noise limits and recommends a daytime noise limit of 80 dBA Leq at residential uses.

The noise due to construction at the nearest residential receptor will be 49 to 63 dBA Leq and 73 to 85 dBA Lmax. The noise due to construction will not exceed the recommended construction noise limit of

80 dBA Leq provided in the FTA Manual. It will not significantly increase the ambient noise level of 68 dBA Leq at the nearest residential properties.

b) Generate excessive ground-borne vibration or ground-borne noise levels?

Construction vibration will be significant if vibration exceeds levels that would result in structural damage to existing buildings. Construction activity is not anticipated to occur within 80 feet of neighboring buildings. At a distance of 80 feet, a vibratory roller would yield a worst-case 0.058 PPV (in/sec), which may be perceptible but below any risk of damage. The impact is less than significant.

10.0 References

State of California General Plan Guidelines: 1998. Governor's Office of Planning and Research

City of Hesperia: General Plan Noise Element.

City of Hesperia: Municipal Code.

Caltrans Noise Technical Manual. 2013

Konan Vibration Criteria

Federal Highway Administration. Noise Barrier Design Handbook. June 2017.

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

Appendix A:
Photographs and Field Measurement Data

15-Minute Continuous Noise Measurement Datasheet

Project Name: General Pump Yard Noise
Project: #/Name: 0739-2024-001
Site Address/Location: I Ave & Hercules Street
Date: 03/04/2024
Field Tech/Engineer: Jason Schuyler / Rachel Edelman

Site Observations:
54F winds 0-10MPH high desert gusts up to 15 MPH. Homeless encampment on site, primary noise source
Road Noise. the site is relatively close to train tracks as well no trains were measured in these readings.

Sound Meter: XL2, NTI SN: A2A-08562-E0
Settings: A-weighted, slow, 1-sec, 15-minute interval
Site Id: NM1, NM2



15-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name: General Pump Yard Noise
Site Address/Location: I Ave & Hercules Street
Site Id: NM1, NM2

Figure 1: NM1



Figure 2: NM2



Figure 3: NM2

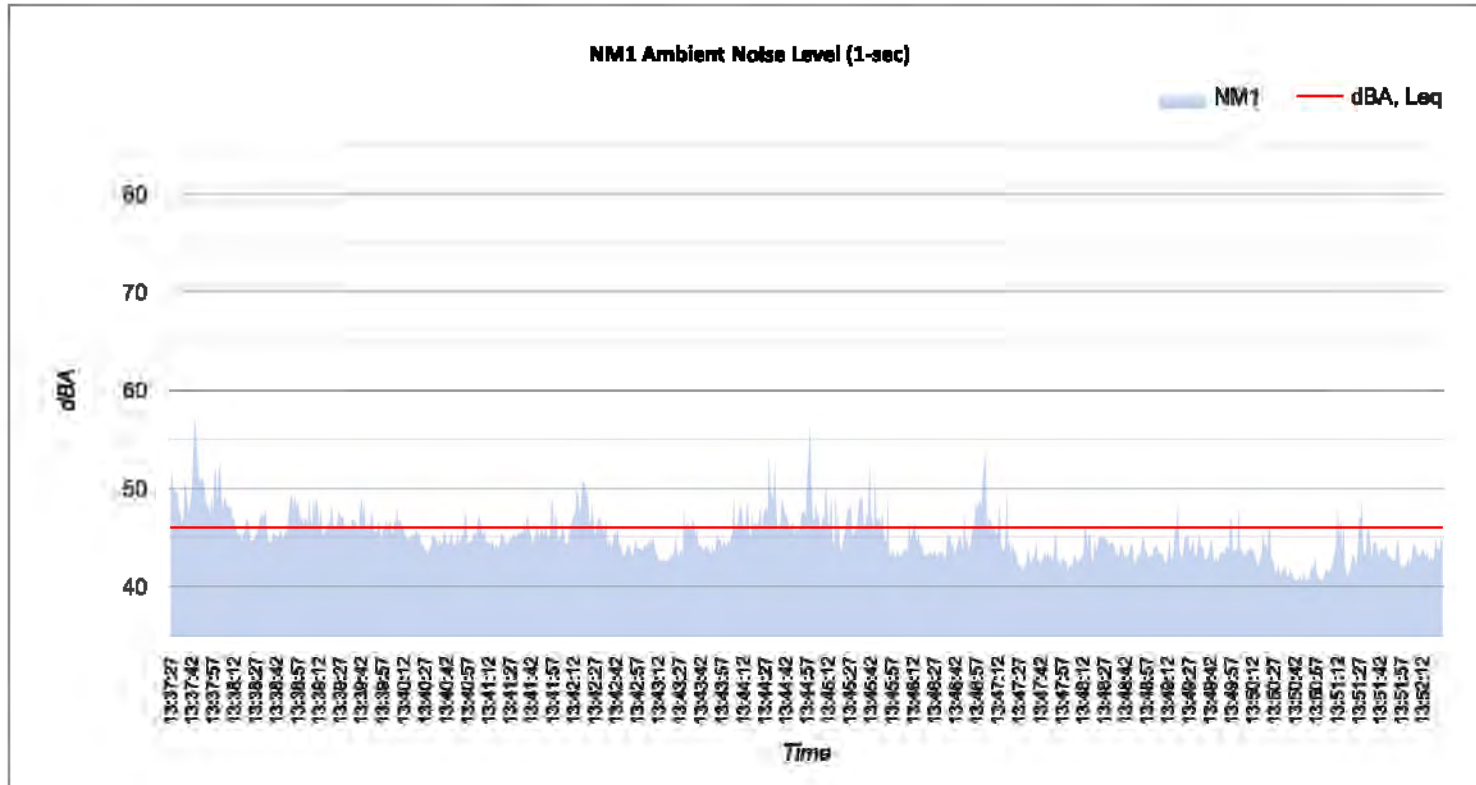


Table 1: Baseline Noise Measurement Summary

Location	Start	Stop	Leq	Lmax	Lmin	L2	L8	L25	L50	L90
NM1	1:37 PM	1:52 PM	46	56.5	40.6	51.2	48.6	45.5	44.8	42.7
NM2	1:19 PM	1:34 PM	68.4	81.8	47.8	76.1	72.9	69.1	65	55

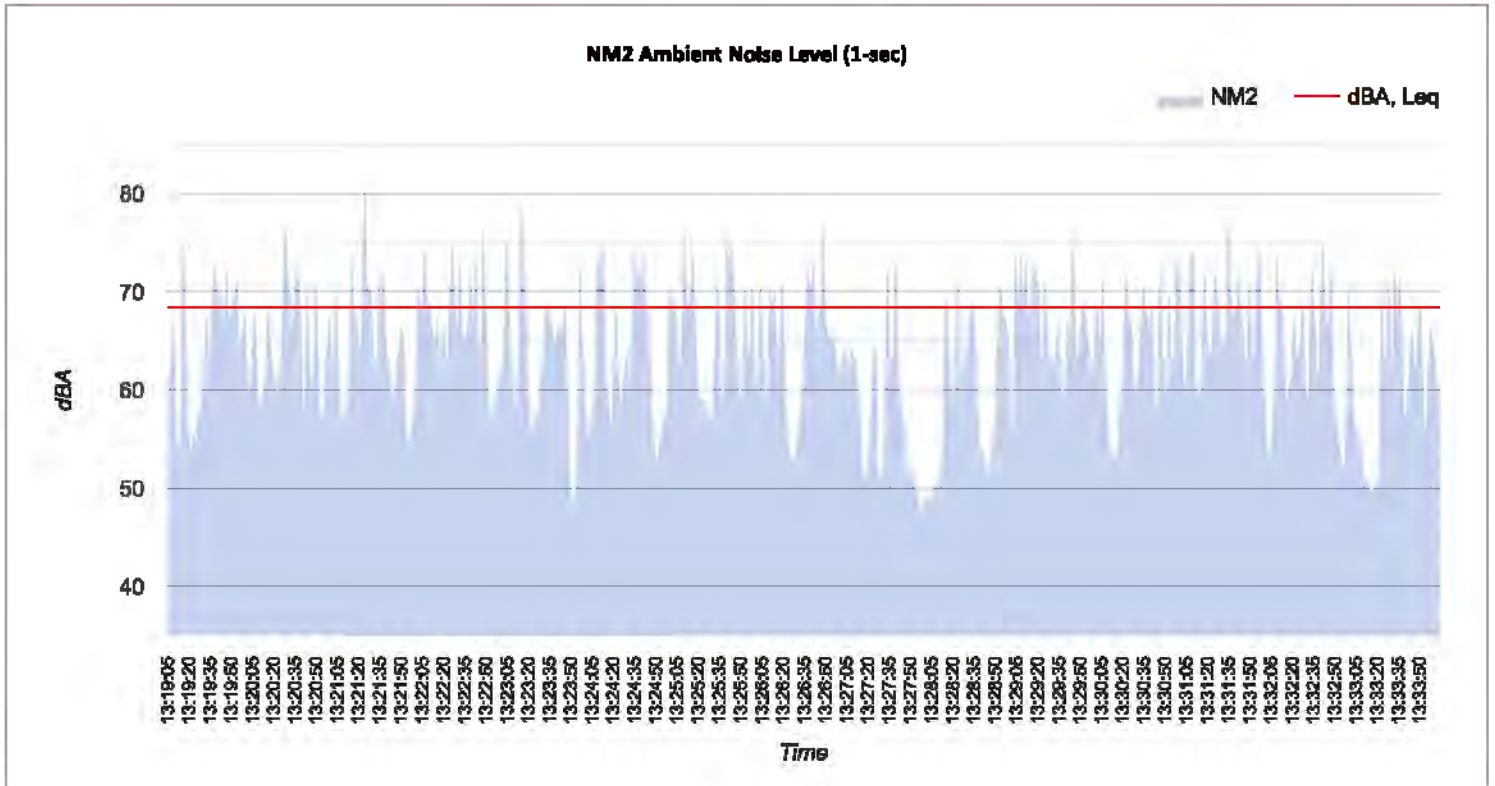
15-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name:	General Pump Yard Noise	Site Topo:	Flat desert conditions	Noise Source(s) w/ Distance:
Site Address/Location:	I Ave & Hercules Street	Meteorological Cond.:	54F wind 0-12MPH	Road and commercial noise
Site Id:	NM1	Ground Type:	loose powdery dirt with piles of rock	

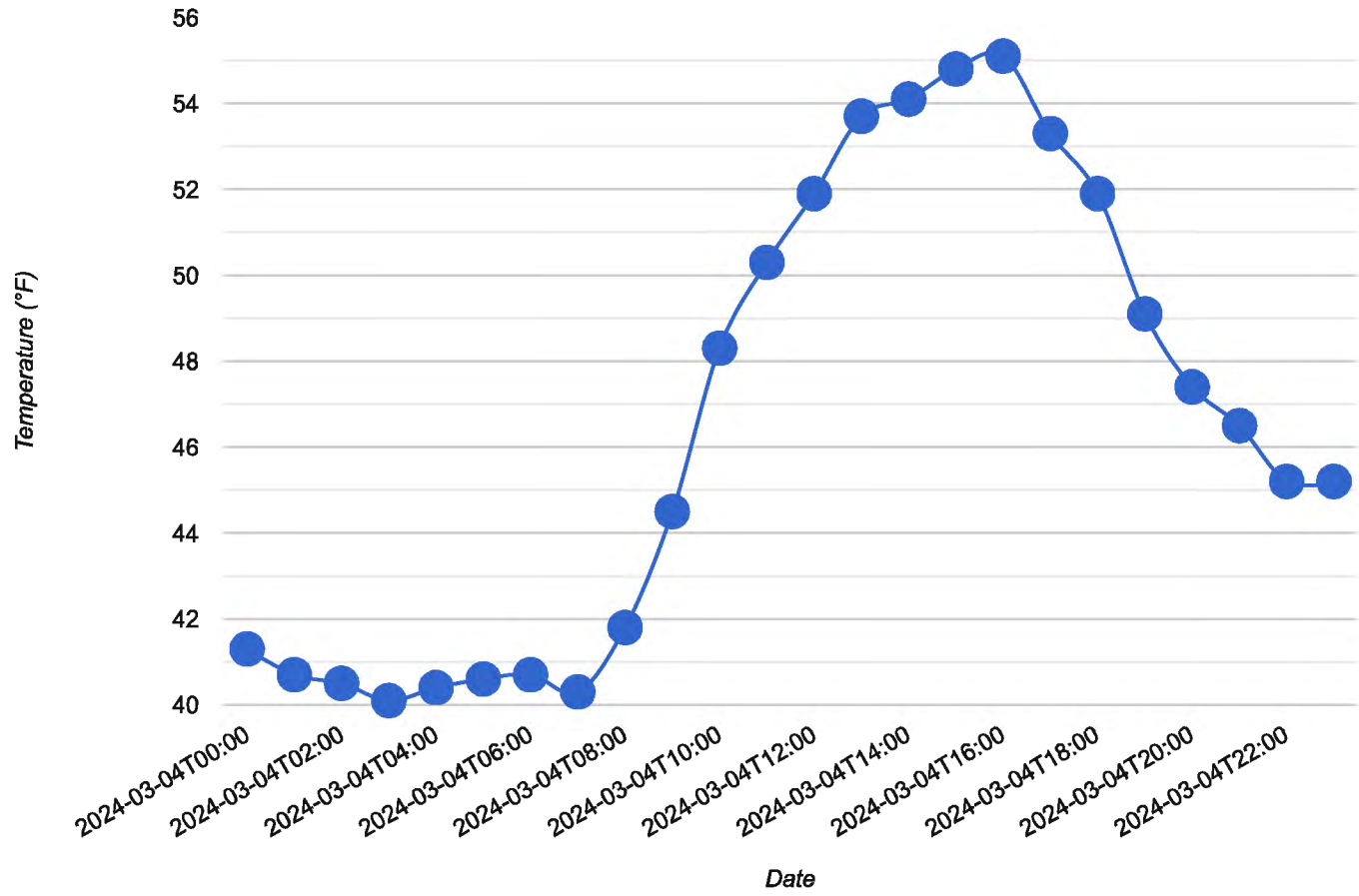


15-Minute Continuous Noise Measurement Datasheet - Cont.

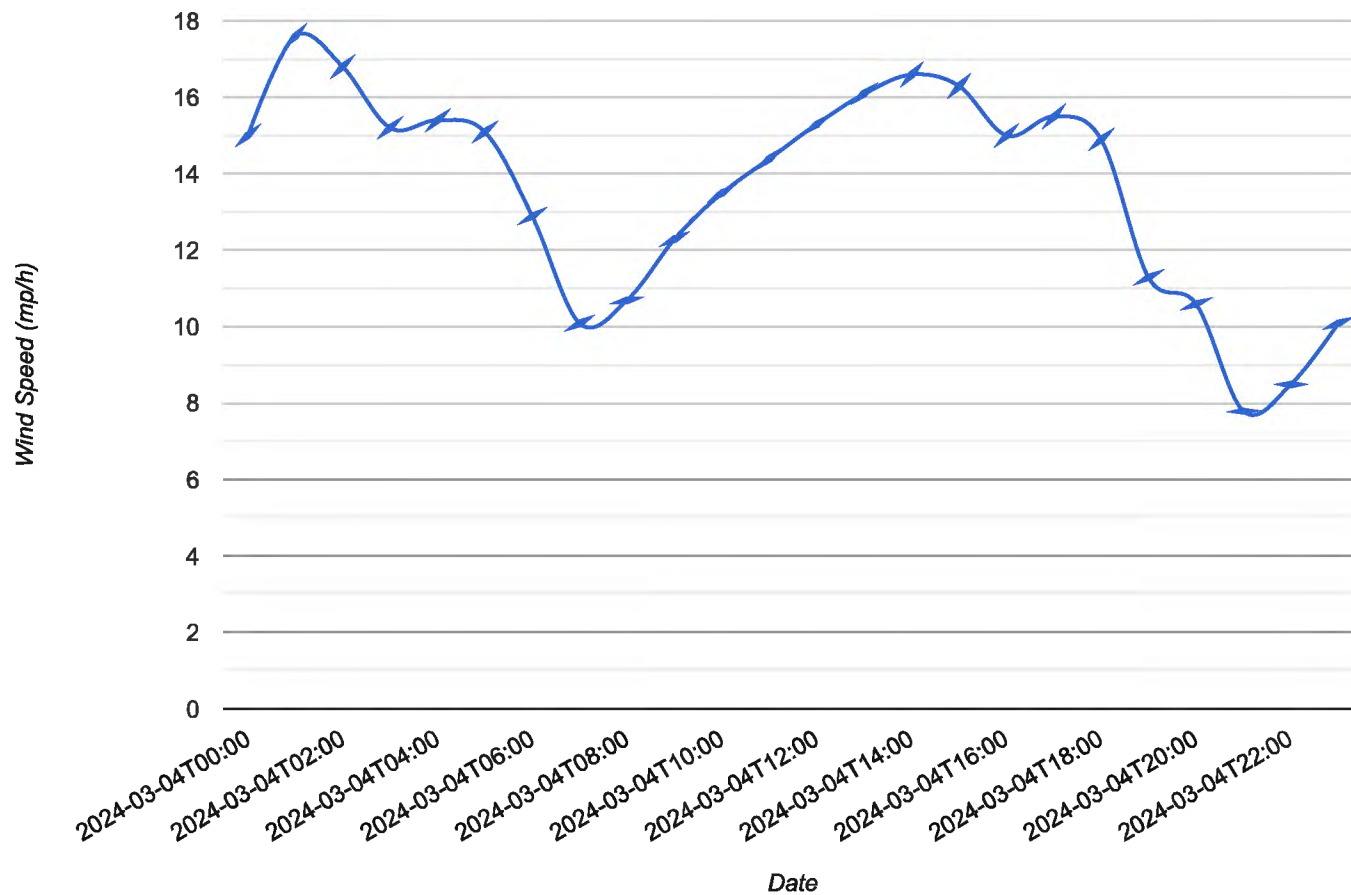
Project Name:	General Pump Yard Noise	Site Topo:	Buildings 1-2 stories tall site	Noise Source(s) w/ Distance:
Address/Location:	I Ave & Hercules Street	Meteorological Cond.:	54F wind 0-12MPH	Road and commercial noise
Id:	NM2	Ground Type:	loose powdery dirt with piles of rock	



Weather forecast for 2024-03-04



Wind speed and directions for 2024-03-04



Source: Global Forecast System (GFS) weather forecast model

Appendix B:
SoundPLAN Inputs/Outputs



Steve Rogers Acoustics

Calleguas Municipal Water District
Lindero Pump Station Rehabilitation Project
Thousand Oaks, CA

Noise Impact Analysis & Recommendations

May 10, 2021


Revised: June 24, 2021

Prepared for:

Kennedy Jenks
2775 North Ventura Road, Suite 100
Oxnard, CA 93036

By:

Steve Rogers Acoustics, LLC



Steve Rogers
Principal



- c) We noticed a high-pitched “whine” from motor C-1, which may have been produced by a worn bearing. This resulted in elevated high-frequency noise levels (especially in the 4 kHz octave band) and overall dBA level for motor C-1.
- d) Existing pump Train B is currently non-operational and was not included in our noise measurements.
- e) Data provided by Kohler and Caterpillar (copies of data sheets attached in Appendix C) has been used to establish composite noise spectra which are attributed to the generator engine and exhaust in the noise model. We have assumed a worst-case condition of 100% load.
- f) Data provided by US Motors (copy of data sheet attached in Appendix C) has been used to represent the noise spectrum of each pump motor. For the purposes of our analysis, we have assumed that there will be no significant noise contributions from the pumps themselves, because they will be enclosed and located underground. The 3D nature of the SoundPLAN model has allowed us to accurately represent the effect of the pump canopy – with noise radiating from the open sides – rather than relying on a simple “point source” calculation. We have assumed a worst-case scenario of all three pumps operating simultaneously.
- g) In our analysis, we have focused on three receiver points around the project site, selected to represent the closest residential uses, as shown in Figure 2. In each case, we have considered a receiver 5-feet above the ground. In addition, we have used the SoundPLAN software to generate noise maps for the various noise sources scenarios, which are attached as Appendix B to this report.





MOTOR NOISE QUOTATION

MODEL NO.	CATALOG NO.	ORDER NO.	LINE NO.	PHASE	TYPE	FRAME
		1506575	100	3	HVE4	6808

OCTAVE BAND CENTER FREQUENCY (HERTZ)	SOUND PRESSURE LEVELS MEASURED IN A REVERBERANT SOUND ROOM PER IEEE 85, CORRECTED TO FREE FIELD CONDITIONS REFERENCE: .0002 DYNES/CM ² WEIGHTING NETWORK 'A'	
	295159	MPI (Ref)
	900	HP
	6	POLES
	60	HZ
31.5	---	DECIBELS
63	45.0	DECIBELS
125	57.5	DECIBELS
250	69.9	DECIBELS
500	78.2	DECIBELS
1000	81.5	DECIBELS
2000	78.4	DECIBELS
4000	73.9	DECIBELS
8000	66.1	DECIBELS
OVERALL	85.0	DECIBELS

DISTANCE FROM MAJOR MOTOR SURFACES 1 Meter

DATA IS TYPICAL UNDER NO LOAD,
IN A FREE FIELD PER ANSI S12.51 AND NEMA MG-1

DATE: 5/4/2021

Project: Nance and Arrow Warehouse
Job Number: 0551-2020-16
Site Address/Location: 170 S William Dillard Dr, Ste A105, Gilbert, AZ 85233
Date: 08/11/2020
Field Tech/Engineer: Shon Baldwin
Source/System: Idling Semi-Truck

General Location: Loading Docks - 10ft from source
Sound Meter: NTi XL2 SN: A2A-05967-E0
Settings: A-weighted, slow, 1-sec, 30-sec duration
Meteorological Cond.: 95 degrees F, no wind

Site Observations:
 SLM was placed 10-ft from idling semi-truck

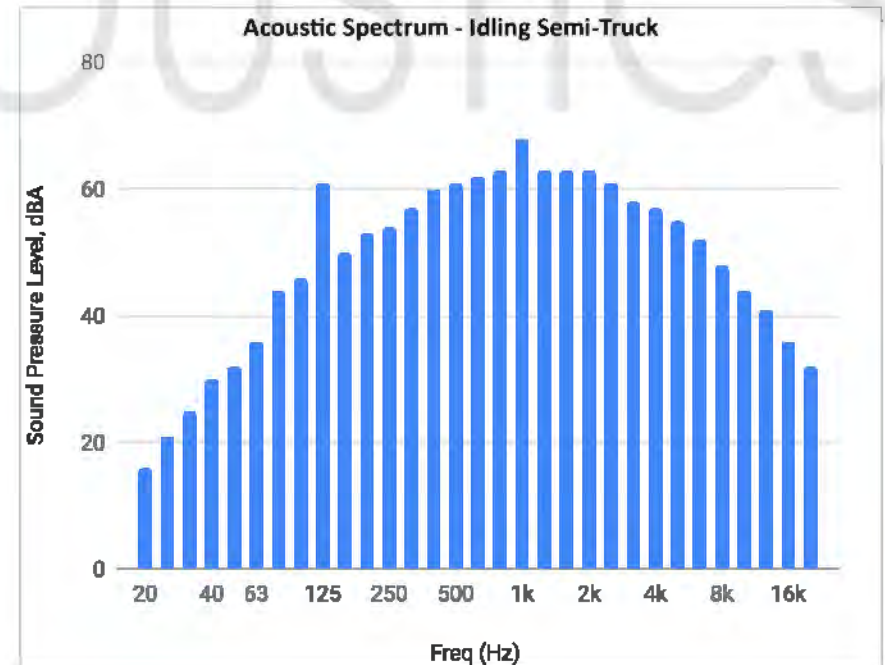
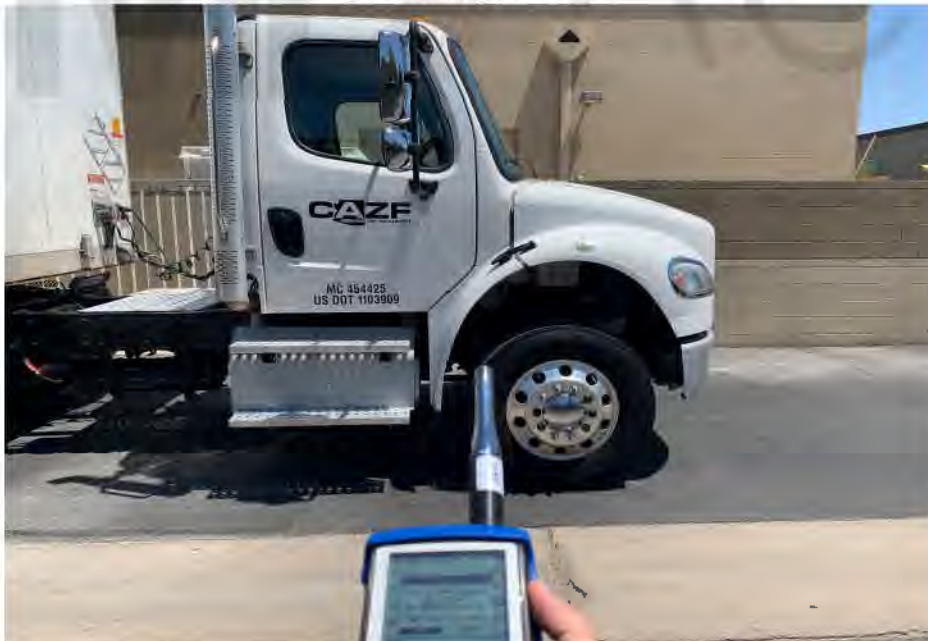
Leq	Lmin	Lmax
73.8	73.0	74.9

Ln 2	Ln 8	Ln 25	Ln 50	Ln 90	Ln 99
74.2	74.1	73.9	73.8	73.5	73.4

Table 1: Summary Measurement Data

Source/System	Overall Source	Overall dB(A)	3rd Octave Band Data (dBA)																														
			20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	12.5k	16k	20k
Idling Semi-Truck	Semi-Truck	73.8	16.0	21.0	25.0	30.0	32.0	36.0	44.0	46.0	61.0	50.0	53.0	54.0	57.0	60.0	61.0	62.0	63.0	68.0	63.0	63.0	63.0	61.0	58.0	57.0	55.0	52.0	48.0	44.0	41.0	36.0	32.0

Figure 1: Idling Semi-Truck



Noise Levels for Common Equipment

The following table can be used to determine if employees should participate in the University of Florida's Hearing Conservation Program (HCP). If an employee's use of equipment exceeds the allowable time more than two times per month, that employee needs to be included in the HCP. If an employee uses a piece of equipment that exceeds 85 decibels (dBA), regardless of duration, hearing protectors need to be used. The Noise Reduction Rating (NRR) needed for each piece of equipment is given. For equipment not listed, please contact EH&S at 392-1591 for an evaluation.

Noise Source	Sound Level	NRR Needed	Time Allowed
Airboat	108 dBA	30	2 minutes
Band Saw	104 dBA	26	6 minutes
Blender	91 dBA	13	2 hours
Blower	99 dBA	21	19 minutes
Concrete Saw	112 dBA	34	1 minute
Chain Saw	110 dBA	32	1 ½ minutes
Combine operator	95 dBA	17	48 minutes
Compressed Air	92 dBA	14	1 hr. 35 minutes
Edger	86 dBA	8	6 hrs. 20 minutes
Fire Alarms	95 dBA	17	48 minutes
Front End Loader	95 dBA	17	48 minutes
Hedge Trimmer	103 dBA	25	7 ½ minutes
Juice Extractor	86 dBA	8	6 hrs. 20 minutes
Miter Saw	109 dBA	31	2 minutes
Plant Tissue Grinder	90 dBA	12	2 hrs. 30 minutes
Pneumatic Staking	103 dBA	25	7 ½ minutes
Pressure Washer	100 dBA	22	15 minutes
Radial Arm Saw	103 dBA	25	7 ½ minutes
Riding Lawn Mower	90 dBA	12	2 hrs. 30 minutes
Sprayer, 1,000 gal.	101 dBA	23	12 minutes
Tablesaw	93 dBA	15	1 hr. 16 minutes
Tractor	92 dBA	14	1 hr 35 minutes
Vacuum	87 dBA	7	5 hours
Weedeater	96 dBA	18	38 minutes
Wet/Dry Vac	94 dBA	16	1 hour

General Pump Yard Hesperia Noise Contribution spectra - 001 - General Pump Yard Hesperia: Outdoor SP

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Source	Sum	25Hz	31.5Hz	40Hz	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz	4kHz	5kHz	6.3kHz	8kHz	10kHz	12.5kHz	16kHz	
	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	
Receiver R1 FIG Lr,lim dB(A) Leq,d 52.7 dB(A)																															
Parking	16.8					3.6			12.7			4.1			8.2			8.8			8.9			3.9			-9.9			-38.4	
Idling Truck	32.0	-17.6	-12.8	-8.6	-7.1	-2.1	3.2	3.1	18.0	8.2	8.7	9.4	12.4	17.0	18.4	19.0	21.8	25.8	23.1	23.2	22.4	19.6	16.4	12.8	8.4	0.7	-9.6	-22.6	-39.8	-61.5	
Idling Truck	32.0	-17.6	-12.8	-8.7	-7.1	-2.2	3.2	3.1	18.0	8.2	8.6	9.4	12.3	17.0	18.4	19.0	21.8	25.8	23.1	23.1	22.4	19.6	16.4	12.9	8.4	0.8	-9.5	-22.6	-39.7	-61.5	
Idling Truck	32.0	-17.7	-12.9	-8.7	-7.1	-2.2	3.1	3.1	17.9	8.1	8.6	9.3	12.3	16.9	18.3	18.9	21.7	25.7	23.1	23.1	22.4	19.6	16.4	12.8	8.4	0.9	-9.6	-22.8	-40.0	-61.9	
Idling Truck	31.9	-17.7	-13.0	-8.8	-7.2	-2.3	3.0	3.0	17.9	8.0	8.5	9.2	12.2	16.8	18.2	18.8	21.6	25.7	23.0	23.0	22.3	19.5	16.3	12.7	8.2	0.9	-9.8	-23.1	-40.5	-62.5	
Idling Truck	31.9	-17.7	-12.9	-8.7	-7.2	-2.2	3.1	3.0	17.9	8.1	8.5	9.3	12.2	16.9	18.3	18.9	21.7	25.7	23.0	23.1	22.3	19.5	16.4	12.8	8.3	0.9	-9.7	-22.9	-40.2	-62.2	
Idling Truck	33.0	-15.4	-10.7	-6.5	-4.9	0.0	5.3	5.9	20.7	10.9	11.8	12.6	15.6	19.5	20.8	21.3	23.7	27.6	22.6	22.4	21.5	18.6	15.4	11.9	7.9	1.4	-7.8	-18.8	-32.7	-50.1	
Idling Truck	30.5	-15.4	-10.7	-6.6	-5.1	-0.2	5.0	5.5	20.3	10.3	12.0	12.7	15.3	18.1	19.1	19.2	21.3	24.8	19.4	18.8	17.5	14.2	10.7	6.9	2.6	-3.5	-13.0	-24.4	-38.4	-55.8	
Idling Truck	39.7	-9.8	-5.1	-0.9	0.7	5.6	10.9	11.9	26.8	16.9	13.2	14.0	16.9	22.3	23.7	24.3	30.5	34.6	29.9	29.9	29.4	28.2	25.5	22.5	19.1	13.0	4.9	-4.5	-16.6	-31.8	
Idling Truck	32.0	-17.5	-12.8	-8.6	-7.0	-2.1	3.2	3.2	18.1	8.3	8.7	9.5	12.4	17.1	18.4	19.0	21.8	25.8	23.1	23.1	22.4	19.5	16.3	12.7	8.3	0.5	-9.8	-22.9	-40.0	-61.8	
Idling Truck	40.7	-9.0	-4.2	0.0	1.6	6.5	11.8	12.9	27.8	18.0	14.5	15.3	18.2	23.5	24.9	25.5	31.5	35.6	30.9	31.0	30.5	28.1	25.7	23.0	19.9	14.2	6.8	-1.9	-13.0	-26.9	
Loading	20.1					-7.5			-1.0			4.0			11.2			14.8			15.5			13.0			-1.5				
Loading	20.7					-6.8			-0.2			4.9			12.1			15.5			16.2			12.9			0.0				
Loading	29.3					0.4			7.8			8.7			16.8			23.7			24.8			23.5			13.9				
Loading	28.3					-0.4			6.8			7.5			15.6			22.7			23.8			22.6			12.0				
Loading	21.6					-6.1			0.7			6.0			13.0			16.3			17.0			13.8			1.9				
Pressure Washer	46.0					20.2			27.6			33.5			38.6			41.0			40.4			37.1			28.5				
Pump	46.9					10.2			20.2			27.6			37.6			44.2			41.2			35.5			23.0				
Pump	41.0					6.7			16.2			26.6			34.6			38.0			34.0			26.6			12.0				
Pump	45.6					8.9			18.9			25.9			36.0			42.9			39.9			34.0			20.8				
Pump	41.6					6.4			16.2			25.0			34.5			38.8			34.8			27.3			12.0				
Receiver R2 FIG Lr,lim dB(A) Leq,d 47.4 dB(A)																															
Parking	16.4					2.8			12.0			3.9			8.5			8.6			8.4			3.1			-9.8			-38.5	
Idling Truck	28.7	-20.3	-15.5	-11.3	-9.7	-4.8	0.5	-0.3	14.6	4.8	5.3	6.1	9.0	13.7	15.1	15.6	18.6	22.6	20.0	19.9	19.0	15.9	12.3	7.9	2.4	-7.1	-19.3	-36.3	-59.0	-88.3	
Idling Truck	28.7	-20.2	-15.5	-11.3	-9.7	-4.8	0.5	-0.2	14.6	4.8	5.3	6.1	9.0	13.7	15.1	15.7	18.6	22.6	20.0	19.9	19.0	15.9	12.3	7.9	2.4	-5.2	-18.2	-34.9	-57.4	-86.3	
Idling Truck	28.7	-20.3	-15.5	-11.3	-9.7	-4.8	0.5	-0.3	14.6	4.8	5.3	6.1	9.0	13.7	15.1	15.6	18.6	22.6	20.0	19.9	19.0	15.9	12.3	7.9	2.4	-4.6	-17.7	-34.6	-57.2	-86.3	
Idling Truck	28.7	-20.3	-15.5	-11.3	-9.7	-4.8	0.5	-0.3	14.6	4.8	5.3	6.1	9.0	13.7	15.1	15.6	18.6	22.6	19.9	19.9	19.0	15.9	12.2	7.9	4.1	-4.6	-17.6	-34.6	-57.3	-86.4	
Idling Truck	28.7	-20.3	-15.5	-11.3	-9.7	-4.8	0.5	-0.3	14.6	4.8	5.3	6.1	9.0	13.7	15.1	15.6	18.6	22.6	20.0	19.9	19.0	15.9	12.3	7.9	4.1	-4.6	-17.6	-34.6	-57.2	-86.3	
Idling Truck	29.9	-18.6	-13.9	-9.7	-8.1	-3.2	2.1	1.8	16.7	6.9	7.3	8.1	11.0	15.7	17.1	17.6	20.6	24.6	19.8	20.0	19.2	16.3	13.0	9.2	4.5	-3.6	-14.8	-28.8	-47.5	-71.5	
Idling Truck	29.9	-18.6	-13.9	-9.7	-8.1	-3.2	2.1	1.8	16.7	6.9	7.3	8.1	11.0	15.7	17.1	17.7	20.6	24.6	19.8	19.8	19.0	16.2	12.9	11.7	7.0	-1.1	-12.2	-26.2	-44.8	-68.8	
Idling Truck	33.4	-15.9	-11.1	-7.0	-5.4	-0.4	4.9	5.3	20.2	10.4	11.1	11.9	14.8	19.3	20.7	21.3	23.9	28.0	23.3	23.3	22.7	20.1	17.3	14.2	10.5	3.9	-4.9	-15.5	-29.4	-47.1	
Idling Truck	28.7	-20.3	-15.5	-11.3	-9.7	-4.8	0.5	-0.3	14.6	4.8	5.3	6.1	9.0	13.7	15.1	15.6	18.6	22.6	20.0	19.9	19.0	15.9	12.3	7.9	2.4	-5.2	-17.7	-34.5	-57.1	-86.1	
Idling Truck	34.1	-15.4	-10.7	-6.5	-4.9	0.0	5.3	6.0	20.8	11.0	11.8	12.6	15.5	19.9	21.4	21.9	24.6	28.6	23.9	23.9	23.4	20.8	18.0	15.0	11.4	5.1	-3.4	-13.6	-26.8	-43.6	
Loading	16.8					-10.0			-4.2			0.6			8.1			11.8			12.3			8.8			-10.3				
Loading	17.4					-9.4			-3.5			1.3			8.7			12.5			13.1			8.9			-8.5				

General Pump Yard Hesperia Noise Contribution spectra - 001 - General Pump Yard Hesperia: Outdoor SP

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Source	Sum	25Hz	31.5Hz	40Hz	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz	4kHz	5kHz	6.3kHz	8kHz	10kHz	12.5kHz	16kHz	
	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	
Loading	22.1					-6.1			0.8			6.0			13.1			16.6			17.6			15.0			3.4				
Loading	21.6					-6.5			0.3			5.4			12.6			16.2			17.1			14.3			2.2				
Loading	18.3					-8.8			-2.7			2.1			9.5			13.2			13.9			10.0			-5.3				
Pressure Washer	43.9					13.9			20.8			26.0			33.1			38.3			39.2			38.3			26.5				
Pump	37.1					0.4			10.0			20.7			30.1			34.0			30.8			24.8			7.7				
Pump	36.4					-0.1			9.3			19.9			29.3			33.3			30.1			22.9			5.6				
Pump	37.0					0.3			9.9			20.6			30.0			33.9			30.7			24.6			7.4				
Pump	36.3					-0.2			9.2			19.7			29.2			33.2			30.0			23.8			5.8				
Receiver R3 FIG Lr,lim dB(A) Leq,d 52.5 dB(A)																															
Parking	12.4					-1.0			7.8			-0.8			4.0			4.6			5.0			-0.2			-15.7			-50.5	
Idling Truck	34.3	-17.0	-12.2	-8.1	-6.5	-1.6	3.8	3.9	18.8	8.9	9.5	10.3	13.2	17.7	19.0	19.6	24.0	28.0	25.3	25.3	25.5	23.5	20.4	16.6	12.0	4.0	-6.7	-19.8	-36.7	-57.9	
Idling Truck	34.2	-16.9	-12.1	-7.9	-6.4	-1.4	3.9	4.0	18.9	9.1	9.7	10.4	13.4	17.8	19.2	19.7	24.1	28.1	25.4	25.4	24.6	22.6	20.2	16.7	12.0	4.1	-6.5	-19.5	-36.3	-57.2	
Idling Truck	34.2	-16.8	-12.1	-7.9	-6.3	-1.4	3.9	4.1	19.0	9.2	9.7	10.5	13.4	17.9	19.3	19.8	24.2	28.2	25.5	25.5	24.7	21.8	19.9	16.7	12.1	4.2	-6.4	-19.3	-35.9	-56.7	
Idling Truck	34.4	-16.7	-11.9	-7.7	-6.1	-1.2	4.1	4.3	19.2	9.4	10.0	10.7	13.7	18.1	19.5	20.0	24.4	28.4	25.7	25.7	24.9	22.0	19.6	16.6	12.2	4.4	-6.1	-18.8	-35.1	-55.4	
Idling Truck	34.3	-16.7	-12.0	-7.8	-6.2	-1.3	4.0	4.2	19.1	9.3	9.8	10.6	13.5	18.0	19.4	19.9	24.3	28.3	25.6	25.6	24.8	21.9	20.0	16.8	12.2	4.3	-6.3	-19.1	-35.6	-56.1	
Idling Truck	35.6	-15.4	-10.6	-6.4	-4.8	0.1	5.4	6.0	20.9	11.0	11.9	12.7	15.7	19.8	21.1	21.6	25.8	29.7	26.4	27.0	26.2	23.4	20.2	16.7	13.1	5.8	-3.8	-15.1	-29.4	-47.1	
Idling Truck	36.9	-15.6	-10.8	-6.7	-5.1	-0.2	5.1	5.7	20.5	10.7	11.6	12.3	17.7	21.9	23.2	23.7	28.0	32.1	27.2	27.1	26.2	23.4	20.2	16.7	12.9	5.7	-4.0	-15.4	-29.9	-47.9	
Idling Truck	46.5	-3.3	1.5	5.6	7.2	12.1	17.4	18.9	33.7	23.9	25.5	26.2	29.1	32.2	34.1	34.6	37.2	41.1	36.2	35.8	35.1	32.5	29.9	27.3	24.6	19.8	13.9	7.8	0.6	-7.8	
Idling Truck	34.5	-17.1	-12.3	-8.1	-6.6	-1.6	3.7	3.8	18.7	8.8	9.4	10.2	13.1	17.6	18.9	19.5	23.9	27.9	25.2	26.2	26.4	23.7	20.4	16.6	11.9	3.9	-6.8	-20.0	-37.0	-58.4	
Idling Truck	44.1	-6.2	-1.4	2.7	4.3	9.2	14.5	15.9	30.8	20.9	22.7	23.4	26.3	30.4	31.8	32.2	34.8	38.7	33.8	33.5	32.8	30.2	27.5	24.9	22.0	16.9	10.5	3.8	-4.3	-13.9	
Loading	23.6					-5.7			1.3			6.6			13.5			18.3			18.9			17.2			3.8				
Loading	24.4					-5.0			2.3			7.9			14.6			19.2			19.8			17.4			5.5				
Loading	32.1					3.1			10.8			16.8			23.6			26.7			27.0			24.9			17.5				
Loading	34.6					6.0			13.7			19.7			26.0			29.2			29.4			27.4			20.9				
Loading	25.4					-3.8			3.6			9.5			15.7			20.2			20.8			18.4			7.3				
Pressure Washer	45.3					15.7			23.0			28.8			37.3			40.3			40.6			37.2			26.0				
Pump	39.9					3.5			13.4			25.1			33.1			36.5			33.8			26.2			10.3				
Pump	39.8					3.5			13.4			25.1			33.0			36.5			33.8			26.1			10.2				
Pump	40.9					4.8			14.8			26.4			34.4			37.8			33.9			27.3			12.2				
Pump	40.9					4.9			14.8			26.5			34.4			37.9			34.0			27.3			12.3				
Receiver R4 FIG Lr,lim dB(A) Leq,d 55.4 dB(A)																															
Parking	3.1					-6.7			0.3			-8.8			-5.9			-6.9			-8.2			-17.0			-39.0			-97.4	
Idling Truck	48.4	3.0	7.7	11.8	13.2	17.9	23.0	24.5	39.1	28.9	30.0	30.3	32.8	35.4	36.2	36.1	39.4	42.8	37.5	36.4	35.3	32.3	29.3	26.5	23.8	19.1	13.5	8.8	3.4	-2.8	
Idling Truck	47.7	2.1	6.7	10.8	12.2	17.0	22.1	23.5	38.2	28.0	29.1	29.5	32.0	34.6	35.4	35.4	38.7	42.1	36.7	35.7	34.6	31.6	28.6	25.8	23.1	18.3	12.6	7.5	2.0	-4.3	
Idling Truck	47.1	1.4	6.1	10.2	11.6	16.4	21.5	23.0	37.6	27.5	28.6	29.0	31.5	34.1	35.0	35.0	37.2	41.7	36.3	35.4	34.2	31.3	28.3	25.4	22.7	17.9	12.2	6.7	1.1	-5.4	
Idling Truck	45.6	-0.7	4.0	8.1	9.6	14.4	19.5	21.0	35.6	25.6	26.8	27.3	29.8	32.5	33.4	33.4	35.7	40.3	35.0	34.1	33.0	30.0	27.0	24.3	21.4	16.5	10.6	4.7	-2.0	-9.0	

General Pump Yard Hesperia Noise Contribution spectra - 001 - General Pump Yard Hesperia: Outdoor SP

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Source	Sum	25Hz	31.5Hz	40Hz	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz	4kHz	5kHz	6.3kHz	8kHz	10kHz	12.5kHz	16kHz
	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
Idling Truck	46.4	0.5	5.2	-9.2	10.7	15.5	20.6	22.1	36.7	26.6	27.8	28.2	30.7	33.4	34.3	34.3	36.5	41.0	35.7	34.8	33.7	30.7	27.7	24.8	22.1	17.2	11.4	5.7	-0.3	-7.0
Idling Truck	34.6	-10.4	-5.7	-1.6	-0.2	4.6	9.7	10.7	25.4	15.2	16.8	17.2	19.6	22.3	23.1	23.0	24.9	28.3	22.9	22.1	23.2	20.1	16.8	13.5	10.2	4.5	-3.0	-10.9	-19.7	-30.6
Idling Truck	35.6	-10.5	-5.9	-1.8	-0.3	4.4	9.6	10.6	25.2	15.1	16.7	17.0	19.5	22.1	23.0	22.9	24.8	30.7	25.2	24.4	23.2	20.0	16.7	13.4	10.4	4.4	-3.1	-11.0	-19.8	-30.7
Idling Truck	27.6	-17.2	-12.5	-8.4	-6.9	-2.1	3.0	3.0	17.7	7.6	9.3	9.7	12.2	14.8	15.7	15.7	17.8	22.2	16.7	16.0	14.4	10.8	6.9	4.3	-0.4	-8.9	-19.8	-33.0	-49.7	-69.8
Idling Truck	48.4	2.9	7.6	11.6	13.1	17.8	22.9	24.3	38.9	28.8	29.9	30.2	32.6	35.2	36.0	36.0	39.5	42.9	37.5	36.4	35.3	32.3	29.3	26.5	23.8	19.1	13.5	8.8	3.4	-2.9
Idling Truck	28.0	-17.2	-12.5	-8.5	-7.0	-2.2	3.0	2.9	17.6	7.5	9.1	9.5	12.0	14.7	15.6	15.5	18.8	22.9	17.3	16.6	15.0	13.1	9.1	4.7	0.5	-7.7	-18.7	-32.0	-48.8	-69.1
Loading	24.4					0.1			7.2			12.5			16.9			18.5			19.3			16.3						6.6
Loading	22.1					-2.0			4.9			10.3			14.7			16.2			17.2			13.6						3.1
Loading	15.2					-8.2			-2.3			3.1			7.5			11.0			9.3			4.9						-11.5
Loading	14.7					-8.2			-2.3			3.1			7.6			10.3			8.7			4.4						-12.9
Loading	20.2					-3.8			3.0			8.5			12.9			14.3			15.4			11.6						-0.1
Pressure Washer	34.9					12.5			18.6			24.0			28.4			29.9			28.5			25.5						10.6
Pump	29.0					-2.0			6.4			17.1			23.8			25.8			20.1			12.4						-9.2
Pump	29.6					-1.6			7.0			17.8			24.4			26.3			20.8			13.2						-7.6
Pump	29.0					-2.1			6.3			17.1			23.8			25.7			20.1			12.3						-9.3
Pump	29.6					-1.6			7.0			17.7			24.4			26.3			20.8			13.2						-7.7

**General Pump Yard Hesperia Noise
Assessed contribution level - 001 - General Pump Yard**

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Source				Source type	Leq,d dB(A)	
Receiver R1	FIG	Lr,lim dB(A)	Leq,d 52.7 dB(A)	+3 for backup beeper		
			Pump	Point	46.9	
			Pressure Washer	Point	46.0	
			Pump	Point	45.6	
			Pump	Point	41.6	
			Pump	Point	41.0	
			Idling Truck	Point	40.7	
			Idling Truck	Point	39.7	
			Idling Truck	Point	33.0	
			Idling Truck	Point	32.0	
			Idling Truck	Point	32.0	
			Idling Truck	Point	32.0	
			Idling Truck	Point	32.0	
			Idling Truck	Point	31.9	
			Idling Truck	Point	31.9	
			Idling Truck	Point	30.5	
			Loading	Point	29.3	
			Loading	Point	28.3	
			Loading	Point	21.6	
			Loading	Point	20.7	
			Loading	Point	20.1	
			Parking	PLot	16.8	
Receiver R2	FIG	Lr,lim dB(A)	Leq,d 47.4 dB(A)	+2 for backup beeper		
			Pressure Washer	Point	43.9	
			Pump	Point	37.1	
			Pump	Point	37.0	
			Pump	Point	36.4	
			Pump	Point	36.3	
			Idling Truck	Point	34.1	
			Idling Truck	Point	33.4	
			Idling Truck	Point	29.9	
			Idling Truck	Point	29.9	
			Idling Truck	Point	28.7	
			Idling Truck	Point	28.7	
			Idling Truck	Point	28.7	
			Idling Truck	Point	28.7	
			Idling Truck	Point	28.7	
			Loading	Point	22.1	
			Loading	Point	21.6	
			Loading	Point	18.3	
			Loading	Point	17.4	
			Loading	Point	16.8	
			Parking	PLot	16.4	

**General Pump Yard Hesperia Noise
Assessed contribution level - 001 - General Pump Yard**

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Source	Source type	Leq,d dB(A)	
Receiver R3	FIG	Lr,lim dB(A)	Leq,d 52.5 dB(A) +7 for backup beeper
	Idling Truck	Point	46.5
	Pressure Washer	Point	45.3
	Idling Truck	Point	44.1
	Pump	Point	40.9
	Pump	Point	40.9
	Pump	Point	39.9
	Pump	Point	39.8
	Idling Truck	Point	36.9
	Idling Truck	Point	35.6
	Loading	Point	34.6
	Idling Truck	Point	34.5
	Idling Truck	Point	34.4
	Idling Truck	Point	34.3
	Idling Truck	Point	34.3
	Idling Truck	Point	34.2
	Idling Truck	Point	34.2
	Loading	Point	32.1
	Loading	Point	25.4
	Loading	Point	24.4
	Loading	Point	23.6
	Parking	PLot	12.4
Receiver R4	FIG	Lr,lim dB(A)	Leq,d 55.4 dB(A) +6 for backup beeper
	Idling Truck	Point	48.4
	Idling Truck	Point	48.4
	Idling Truck	Point	47.7
	Idling Truck	Point	47.1
	Idling Truck	Point	46.4
	Idling Truck	Point	45.6
	Idling Truck	Point	35.6
	Pressure Washer	Point	34.9
	Idling Truck	Point	34.6
	Pump	Point	29.6
	Pump	Point	29.6
	Pump	Point	29.0
	Pump	Point	29.0
	Idling Truck	Point	28.0
	Idling Truck	Point	27.6
	Loading	Point	24.4
	Loading	Point	22.1
	Loading	Point	20.2
	Loading	Point	15.2
	Loading	Point	14.7
	Parking	PLot	3.1

General Pump Yard Hesperia Noise

Octave spectra of the sources in dB(A) - 001 - General Pump Yard Hesperia: Outdoor SP

3

Name	Source type	I or A	Lw	Lw	KI	KT	Emission spectrum	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	16kHz	
			m,m ²	dB(A)	dB(A)	dB	dB	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	
Parking	PLot		1432.56	35.4	67.0	0.0	0.0	Typical spectrum	50.3	61.9	54.4	58.9	59.0	59.4	56.7	50.5	37.7
Idling Truck	Point			90.7	90.7	0.0	0.0	Idling Semi Truck 10' - Calibrated	58.2	77.5	76.2	82.8	87.4	84.1	79.0	70.6	57.9
Idling Truck	Point			90.7	90.7	0.0	0.0	Idling Semi Truck 10' - Calibrated	58.2	77.5	76.2	82.8	87.4	84.1	79.0	70.6	57.9
Idling Truck	Point			90.7	90.7	0.0	0.0	Idling Semi Truck 10' - Calibrated	58.2	77.5	76.2	82.8	87.4	84.1	79.0	70.6	57.9
Idling Truck	Point			90.7	90.7	0.0	0.0	Idling Semi Truck 10' - Calibrated	58.2	77.5	76.2	82.8	87.4	84.1	79.0	70.6	57.9
Idling Truck	Point			90.7	90.7	0.0	0.0	Idling Semi Truck 10' - Calibrated	58.2	77.5	76.2	82.8	87.4	84.1	79.0	70.6	57.9
Idling Truck	Point			90.7	90.7	0.0	0.0	Idling Semi Truck 10' - Calibrated	58.2	77.5	76.2	82.8	87.4	84.1	79.0	70.6	57.9
Idling Truck	Point			90.7	90.7	0.0	0.0	Idling Semi Truck 10' - Calibrated	58.2	77.5	76.2	82.8	87.4	84.1	79.0	70.6	57.9
Idling Truck	Point			90.7	90.7	0.0	0.0	Idling Semi Truck 10' - Calibrated	58.2	77.5	76.2	82.8	87.4	84.1	79.0	70.6	57.9
Idling Truck	Point			90.7	90.7	0.0	0.0	Idling Semi Truck 10' - Calibrated	58.2	77.5	76.2	82.8	87.4	84.1	79.0	70.6	57.9
Idling Truck	Point			90.7	90.7	0.0	0.0	Idling Semi Truck 10' - Calibrated	58.2	77.5	76.2	82.8	87.4	84.1	79.0	70.6	57.9
Idling Truck	Point			90.7	90.7	0.0	0.0	Idling Semi Truck 10' - Calibrated	58.2	77.5	76.2	82.8	87.4	84.1	79.0	70.6	57.9
Loading	Point			80.0	80.0	0.0	0.0	Truck: loading general cargo	47.0	57.0	64.1	70.1	73.0	74.0	74.1	72.0	
Loading	Point			80.0	80.0	0.0	0.0	Truck: loading general cargo	47.0	57.0	64.1	70.1	73.0	74.0	74.1	72.0	
Loading	Point			80.0	80.0	0.0	0.0	Truck: loading general cargo	47.0	57.0	64.1	70.1	73.0	74.0	74.1	72.0	
Loading	Point			80.0	80.0	0.0	0.0	Truck: loading general cargo	47.0	57.0	64.1	70.1	73.0	74.0	74.1	72.0	
Pressure Washer	Point			100.0	100.0	0.0	0.0	Pink Noise	67.0	77.0	84.1	90.1	93.0	94.0	94.1	92.0	
Pump	Point			93.0	93.0	0.0	0.0	1000 HP Vertical Turbine Pump	53.0	65.5	77.9	86.2	89.5	86.4	81.9	74.1	
Pump	Point			93.0	93.0	0.0	0.0	1000 HP Vertical Turbine Pump	53.0	65.5	77.9	86.2	89.5	86.4	81.9	74.1	
Pump	Point			93.0	93.0	0.0	0.0	1000 HP Vertical Turbine Pump	53.0	65.5	77.9	86.2	89.5	86.4	81.9	74.1	
Pump	Point			93.0	93.0	0.0	0.0	1000 HP Vertical Turbine Pump	53.0	65.5	77.9	86.2	89.5	86.4	81.9	74.1	

Appendix C:
Construction Noise Modeling Output

VIBRATION LEVEL IMPACT

Project: General Pump Yard

Date: 8/30/24

Source: Roller

Scenario: Unmitigated

Location: Church to the North

Address: I Ave & Hercules, Hesperia, CA

PPV = $PPV_{ref}(25/D)^n$ (in/sec)

DATA INPUT

Equipment = **1** Vibratory Roller INPUT SECTION IN BLUE
Type

PPVref = 0.21 Reference PPV (in/sec) at 25 ft.

D = **80.00** Distance from Equipment to Receiver (ft)

n = **1.10** Vibration attenuation rate through the ground

Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2006, pgs 38-43.

DATA OUT RESULTS

PPV = **0.058** IN/SEC OUTPUT IN RED

Receptor - Residences to the East

Construction Phase Equipment Item	# of Items	Item Lmax at 50 feet, dBA ¹	Edge of Site to Receptor, feet	Center of Site to Receptor, feet	Item Usage Percent ¹	Ground Factor ²	Usage Factor	Receptor Item Lmax, dBA	Receptor Item Leq, dBA
SITE PREP									
Tractor	4	84	80	420	40	0.66	0.40	78.6	55.4
Dozer	3	82	80	420	40	0.66	0.40	76.6	53.4
							Log Sum	78.6	63.1
GRADE									
Excavator	1	81	80	420	40	0.66	0.40	75.6	52.4
Grader	1	85	80	420	40	0.66	0.40	79.6	56.4
Dozer	1	82	80	420	40	0.66	0.40	76.6	53.4
Tractor	3	84	80	420	40	0.66	0.40	78.6	55.4
								79.6	62.8
BUILD									
Crane	1	81	80	420	16	0.66	0.16	75.6	48.5
Man lift	3	75	80	420	20	0.66	0.20	69.6	43.4
Generator	1	81	80	420	50	0.66	0.50	75.6	53.4
Tractor	3	84	80	420	40	0.66	0.40	78.6	55.4
Welder/Torch	1	74	80	420	40	0.66	0.40	68.6	45.4
								78.6	61.6
PAVE									
Concrete Mixer Truck	2	79	80	420	40	0.66	0.40	73.6	50.4
Paver	1	77	80	420	50	0.66	0.50	71.6	49.4
Pavement Scarifier	2	90	80	420	20	0.66	0.20	84.6	58.4
Roller	2	80	80	420	20	0.66	0.20	74.6	48.4
Tractor	1	84	80	420	40	0.66	0.40	78.6	55.4
								84.6	63.4
ARCH COAT									
Compressor (air)	1	78	80	420	40	0.66	0.40	72.6	49.4
								72.6	49.4

¹FHWA Construction Noise Handbook: Table 9.1 RCNM Default Noise Emission Reference Levels and Usage Factors