
Appendix F

Noise and Vibration Technical Memorandum

MEMORANDUM

To: San Diego Unified Port District
From: Dana Lodico, PE, INCE Bd. Cert (Dudek); Nick Segovia, INCE (Dudek)
Subject: Tidelands Avenue Electric Truck Hub Noise and Vibration Technical Memorandum
Date: January 28, 2026
cc: Matt Valerio (Dudek); Tuesday Christopher (Dudek)
Attachments: Attachment A – Construction Noise Prediction Model Worksheets
Attachment B – Military Working Dog (MWD) Auditory Health Memorandum
Attachment C – Department of the Navy Military Working Dog Program, OPNAVINST 5585.2C

Dudek is pleased to present the San Diego Unified Port District (District) with the following noise and vibration technical memorandum for the Tidelands Avenue Electric Truck Hub (Project). This memorandum presents quantitative calculations of the exposure of offsite noise-sensitive receptors to noise emissions generated by onsite construction and post-construction operations. The nearest noise-sensitive receptors are existing residential parcels located approximately 1,250 feet to the east of the Project site's property lines. For informational purposes, the calculated Project-generated noise exposure at the United States Naval Base – San Diego dog kennels, located about 250 feet to the southwest, is also provided. The Project site and the nearest offsite noise-sensitive receptors (NSR) are in the city of National City. Construction vibration is also calculated. The contents and organization of this memorandum are as follows: Executive Summary, Assessment Framework, Project Impact Analysis, and References Cited.

1 Executive Summary

The Project's potential construction and operation-related noise and vibration impacts to the surrounding community were predicted to be in compliance with applicable National City (City) standards and Caltrans guidance. The Project's post-construction operation noise is predicted to comply with the City standards described as an A-weighted energy-averaged hourly ($L_{eq[h]}$) exterior noise level at multi-unit residential uses of 60 dBA from 7:00 a.m. to 10:00 p.m. and 50 dBA from 10:00 p.m. to 7:00 a.m. at the nearest noise-sensitive receptors (National City 2001). The Project's attributed construction noise at the nearest noise-sensitive receptor locations is predicted to be below the City's construction noise limit at Type I areas (i.e., residential properties) of 75 dBA L_{eq-1hr} for mobile equipment and 60 dBA L_{eq-1hr} for stationary equipment. Ground-borne vibration exposure levels are anticipated to be below California Department of Transportation (Caltrans) based vibration standards. For informational purposes, the Project's potential noise and vibration impacts to an existing dog kennel within the United States Naval Base – San Diego to the southwest are also analyzed.

2 Assessment Framework

2.1 Acoustical Fundamentals

The following subsections provide a summary of acoustical terminology and concepts that the subsequent analyses will use to evaluate potential noise and vibration impacts associated with the Avocado Alternative.

2.1.1 Sound, Noise, and Acoustics

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air) to a hearing organ, such as a human ear. Noise is defined as loud, unexpected, or annoying sound.

In the science of acoustics, the fundamental model consists of a sound (or noise) source, a receptor, and the propagation path between the two. The loudness of the noise source and obstructions or atmospheric factors affecting the propagation path to the receptor determine the sound level and characteristics of the noise perceived by the receptor. The field of acoustics deals primarily with the propagation and control of sound.

Frequency

Continuous sound can be described by frequency (pitch) and amplitude (loudness). A low-frequency sound is perceived as low in pitch. Frequency is expressed in terms of cycles per second, or Hertz (Hz) (e.g., a frequency of 250 cycles per second is referred to as 250 Hz). High frequencies are sometimes more conveniently expressed in kilohertz (kHz), or thousands of Hertz. The audible frequency range for humans is generally between 20 Hz and 20,000 Hz.

Sound Pressure Levels and Decibels

The amplitude of pressure waves generated by a sound source determines the loudness of that source. Sound pressure amplitude is measured in micro-Pascals (μPa). One μPa is approximately one hundred billionth (0.0000000001) of normal atmospheric pressure. Sound pressure amplitudes for different kinds of noise environments can range from less than 100 to 100,000,000 μPa . Because of this large range of values, sound is rarely expressed in terms of μPa . Instead, a logarithmic scale is used to describe sound pressure level (SPL) in terms of decibels (dB). The threshold of hearing for young people is about 0 dB, which corresponds to 20 μPa .

Addition of Decibels

Because decibels are logarithmic units, SPL cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3-dB increase. In other words, when two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dB higher than one source under the same conditions. For example, if one automobile produces an SPL of 70 dB when it passes an observer, two cars passing simultaneously would not produce 140 dB—rather, they would combine to produce 73 dB. Under the decibel scale, three sources of equal loudness together produce a sound level 5 dB louder than one source.

A-weighted Decibels

The decibel scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness or human response is determined by the characteristics of the human ear.

Human hearing is limited in the range of audible frequencies as well as in the way it perceives the SPL in that range. In general, people are most sensitive to the frequency range of 1,000–8,000 Hz and perceive sounds within that range better than sounds of the same amplitude in higher or lower frequencies. To approximate the response of the human ear, sound levels of individual frequency bands are weighted, depending on the human sensitivity to those frequencies. Then, an “A-weighted” sound level (expressed in units of dBA) can be computed based on this information.

The A-weighting network approximates the frequency response of the average young ear when listening to most ordinary sounds. When people make judgments of the relative loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels of those sounds. Other weighting networks have been devised to address high noise levels or other special problems (e.g., B-, C-, and D-scales), but these scales are rarely used in conjunction with environmental noise. Noise levels for environmental noise reports are typically reported in terms of A-weighted decibels or dBA. Table 1 describes typical A-weighted noise levels for various noise sources.

Table 1. Typical A-Weighted Noise Levels for Common Indoor and Outdoor Sources

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
Diesel truck at 50 feet at 50 mph	85	Food blender at 3 feet
	80	Garbage disposal at 3 feet
Noisy urban area, daytime	75	—
Gas lawn mower, 100 feet	70	Vacuum cleaner at 10 feet
Commercial area	65	Normal speech at 3 feet
Heavy traffic at 300 feet	60	—
	55	Large business office
Quiet urban daytime	50	Dishwasher next room
	45	—
Quiet urban nighttime	40	Theater, large conference room (background)
Quiet suburban nighttime	35	—
	30	Library
Quiet rural nighttime	25	Bedroom at night, concert hall (background)

Source: Caltrans 2013.

Human Response to Changes in Noise Levels

As discussed above, doubling sound energy results in a 3-dB increase in sound. However, given a sound level change measured with precise instrumentation, the subjective human perception of a doubling of loudness will usually be different than what is measured.

Under controlled conditions in an acoustical laboratory, a trained healthy human ear is able to discern 1-dB changes in sound levels, when exposed to steady, single-frequency (“pure-tone”) signals in the mid-frequency (1,000 Hz–8,000 Hz) range (Caltrans 2013). In typical noisy environments, changes in noise of 1 to 2 dB are generally not perceptible. However, it is widely accepted that people are able to begin to detect sound level increases of 3 dB in typical noisy environments. Further, a 5-dB increase is generally perceived as a distinctly noticeable increase, and a 10-dB increase is generally perceived as a doubling of loudness (Caltrans 2013). Therefore, a doubling of sound energy (e.g., doubling the volume of traffic on a highway) that would result in a 3-dB increase in sound, would generally be perceived as barely detectable by average healthy human hearing.

Noise Descriptors

Noise in our daily environment fluctuates over time at varying rates. Various noise descriptors have been developed to describe time-varying noise levels. The following are the noise descriptors utilized in this analysis.

- **Equivalent Sound Level (L_{eq}):** L_{eq} represents an energy average of the sound level occurring over a specified period. The 1-hour A-weighted equivalent sound level ($L_{eq[h]}$) is the energy average of A-weighted sound levels occurring during a one-hour period and is the basis for noise abatement criteria (NAC) used by Caltrans and the Federal Highway Administration (FHWA). Note that L_{eq} is not an arithmetic average of varying dB levels over a period of time, L_{eq} uses a logarithmic equation for averaging of the energy levels and therefore accounts for greater sound energy represented by higher decibel contributions.
- **Percentile-Exceeded Sound Level (L_{xx}):** L_{xx} represents the sound level exceeded for a given percentage of a specified period (e.g., L_{10} is the sound level exceeded 10% of the time, and L_{90} is the sound level exceeded 90% of the time).
- **Maximum Sound Level (L_{max}):** L_{max} is the highest instantaneous sound level measured during a specified period.
- **Day-Night Level (L_{dn}):** L_{dn} is the energy average of A-weighted sound levels occurring over a 24-hour period, with a 10-dB penalty applied to each of the A-weighted hourly sound levels ($L_{eq[h]}$) occurring during nighttime hours between 10 p.m. and 7 a.m.
- **Community Noise Equivalent Level (CNEL):** Similar to L_{dn} , CNEL is the energy average of the A-weighted sound levels occurring over a 24-hour period, with a 10-dB penalty applied to each of the A-weighted hourly sound levels ($L_{eq[h]}$) occurring during the nighttime hours between 10 p.m. and 7 a.m., and a 5-dB penalty applied to each of the A-weighted hourly sound levels ($L_{eq[h]}$) occurring during evening hours between 7 p.m. and 10 p.m.

Sound Propagation

When sound propagates over a distance, it changes in level and frequency content. The manner in which noise reduces with distance depends on the following factors.

- **Geometric Spreading** – Sound from a localized source (i.e., an ideal point source) propagates uniformly outward in a spherical pattern (or hemispherical when near a surface). The sound level attenuates (or decreases) at a rate of 6 dB for each doubling of distance from a point source. Roadways consist of several localized noise sources on a defined path, and hence can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source.

- **Ground Absorption** – The propagation path of noise from a sound emission source to a receptor is usually horizontal and proximate to the ground. Under these conditions, noise attenuation from ground absorption and reflective wave canceling can add to the attenuation associated with geometric spreading. For acoustically “hard” paths over which sound may traverse (i.e., sites with a reflective surface between the source and the receptor, such as a parking lot or body of water), no excess ground attenuation is assumed. For acoustically absorptive or “soft” sites (i.e., those sites with an absorptive ground surface between the source and the receptor, such as fresh-fallen snow, soft dirt, or dense vegetative ground cover), an additional ground-attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to cylindrical spreading for line source sound propagation, the excess ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance.
- **Atmospheric Effects** – Receptors located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound pressure levels can also be increased at large distances (e.g., more than 500 feet) due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also have significant effects when distances between a source and receptor are large.
- **Shielding by Natural or Human-Made Features** – A large object or barrier in the path between a noise source and a receptor can substantially attenuate noise levels at the receptor. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Natural terrain features (e.g., hills and dense woods) and human-made features (e.g., buildings and walls) can substantially reduce noise levels. Walls are often constructed between a source and a receptor specifically to reduce noise. A barrier that breaks the line of sight between a source and a receptor will typically result in at least 5 dB of noise reduction. Taller barriers provide increased noise reduction. While a line of trees may visually occlude the direct line between a source and a receptor, its actual noise-reducing effect is usually negligible because it does not create a solid barrier. Deep expanses of dense wooded areas, on the other hand, can offer noise reduction under the right conditions.

2.1.2 Vibration Characteristics

Vibration is oscillatory movement of mass (typically a solid) over time. It is described in terms of frequency and amplitude and, unlike sound, can be expressed as displacement, velocity, or acceleration. For environmental studies, vibration is often studied as a velocity that, akin to the discussion of sound pressure levels, can also be expressed in dB as a way to cast a large range of quantities into a more convenient scale. Vibration impacts to buildings are generally discussed in terms of inches per second (ips) peak particle velocity (PPV), and the potential for annoyance to occupants within those buildings is evaluated with root-mean-square (rms) vibration velocity decibels (VdB), which are calculated from PPV and application of a crest factor (CF, equal to four per FTA guidance) with the following expression (FTA 2018):

$$L_v = 20 \cdot \text{LOG}(\text{PPV}/[\text{CF} \cdot V_{\text{ref}}]) = 20 \cdot \text{LOG}(\text{PPV}/[4 \cdot 0.000001])$$

Common sources of vibration within communities include construction activities and railroad operations. Ground-borne vibration generated by construction projects is usually highest during pile driving, rock blasting, soil compacting, jack hammering, and demolition-related activities where sudden releases of subterranean energy or powerful impacts of tools on hard materials occur. Depending on their distances to a sensitive receptor, operation of large bulldozers, graders, loaded dump trucks, or other heavy construction equipment and vehicles on a construction site also have the potential to cause high vibration amplitudes.

2.2 Environmental Setting

2.2.1 Measured Outdoor Ambient Sound

The Project is located within an industrial area. The nearest noise-sensitive human locations are multi-family homes located along McKinley Avenue (near W. 18th Street) about 1,250 feet east of the site, and single-family homes situated about 2,000 feet to the east across Interstate 5 (I-5). A dog kennel is located about 250 feet southwest of the Project site and within the United States Naval Base – San Diego. CEQA does not apply to animals; however, Project generated noise level exposure of the dog kennel is provided for informational purposes.

On August 13, 2025, three (3) short-term (ST) sound pressure level (SPL) measurements were performed at locations selected within the vicinity of the Project to quantify and characterize the representative existing outdoor ambient noise environment of the area. These locations are depicted as ST1–ST3 in Exhibit A. ST1 and ST2 are acoustically representative of the exterior of noise-sensitive dog kennel southwest of the Project site and within the United States Naval Base – San Diego. Additionally, traffic counts were taken at ST3, measured 75 feet west of Tidelands Avenue, to quantify existing traffic volumes and noise levels. The measured L_{eq} , L_{min} , L_{max} , L_{10} , L_{50} , and L_{90} sound levels at the ST locations are provided in Table 2.

Table 2. Measured Baseline Outdoor Ambient Sound Pressure Levels

Site Position Tag	Date (yyyy-mm-dd), Time (hh:mm)	L_{eq} (dBA)	L_{min} (dBA)	L_{max} (dBA)	L_{10} (dBA)	L_{50} (dBA)	L_{90} (dBA)
ST1	2025-08-13, 09:40 AM to 09:55 AM	47	43	64	46	46	46
ST2	2025-08-13, 10:32 AM to 10:47 AM	51	46	65	50	50	49
ST3	2025-08-13, 11:25 AM to 11:40 AM	60	46	76	60	51	48

Notes: L_{eq} = equivalent continuous sound level (time-averaged sound level); L_{max} = maximum sound level during the measurement interval; L_{min} = minimum sound level during the measurement interval; L_{10} = sound level exceeded 10% of the time; L_{50} = sound level exceeded 50% of the time; L_{90} = sound level exceeded 90% of the time; dBA = A-weighted decibels; ST = short-term noise measurement locations.

As shown in Table 2, the measured SPL at the Naval Base dog kennel ranged from approximately 47 dBA L_{eq} at ST1 to 51 dBA L_{eq} at ST2. The primary noise sources at ST1 and ST2 consisted of traffic along adjacent roadways (i.e., Kidd Street), military aircraft noise, dog barks, and distant U.S. Navy ship building/maintenance activities. Table 3 presents the measured SPL range of these primary sound sources observed and noted by a Dudek investigator at the time of the attended measurements. These primary sources were measured intentionally at the distances indicated in Table 3 and separate from measurements ST1–ST3 in order to characterize and attribute potential noise impacts to the Naval Base dog kennel.

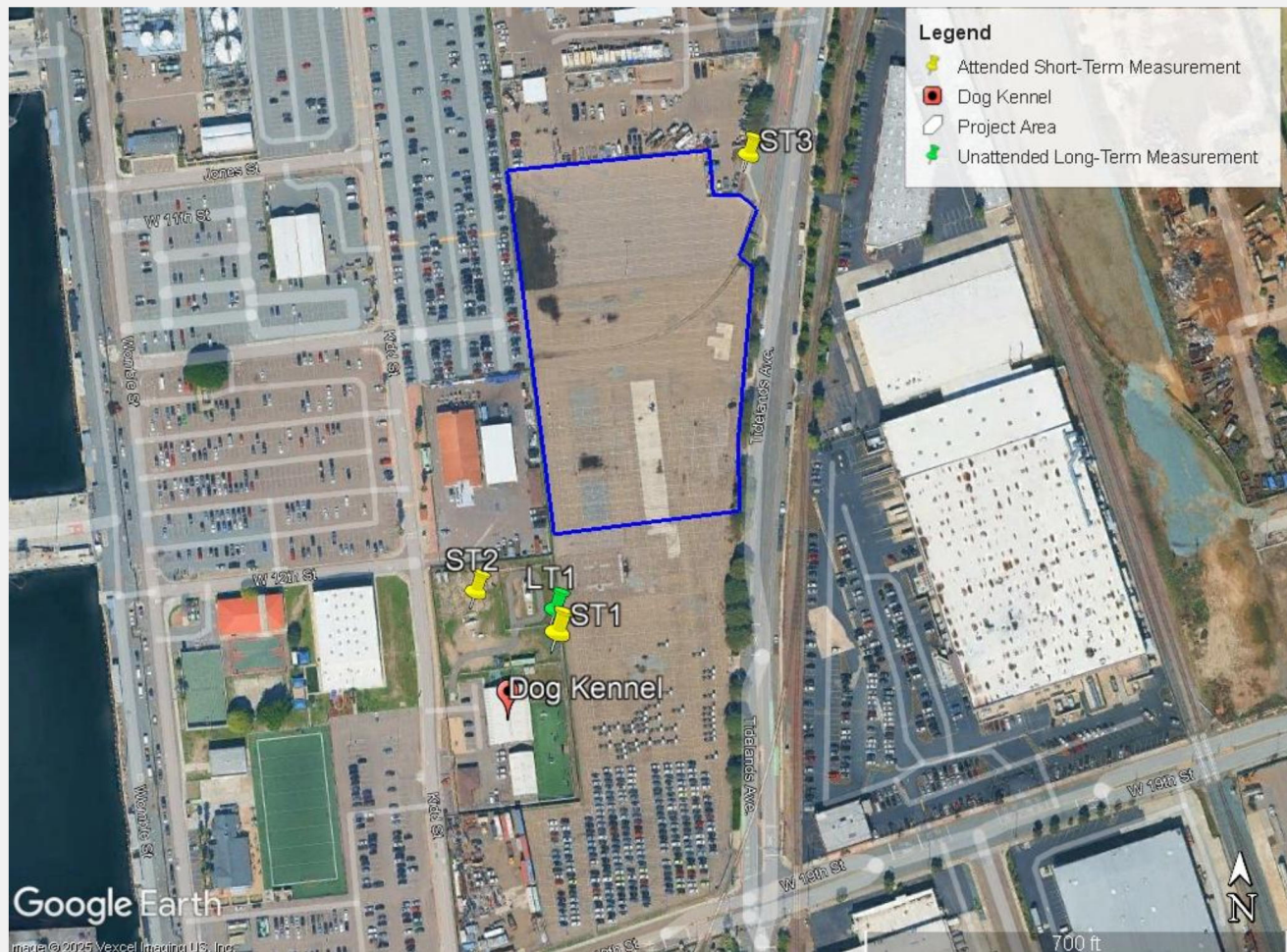
Table 3. Primary Noise Source Measured Sound Pressure Levels

Observed Noise Source	Approximate Distance (feet)	L_{eq} Range (dBA)	L_{max} (dBA)
Speaker	500	50–54	57
HVAC/fan	600	46–47	49
Backup alarms	100	50–62	62

Ship building/maintenance	>1,000	46–52	52
Dog barks	50	51–68	68
Helicopter	>1,000	53–63	63

Notes: L_{eq} = equivalent continuous sound level (time-averaged sound level); L_{max} = maximum sound level during the measurement interval; dBA = A-weighted decibels.

Exhibit A. Baseline Outdoor Ambient SPL Measurement Locations (ST = short-term; LT = long-term)



Sources: Google Earth 2025; Dudek 2025

Additionally, one (1) long-term (LT) sound level measurement location, LT1, was selected for unattended sound level monitor deployment to quantify and characterize the daytime, evening, and nighttime baseline outdoor ambient sound levels at the Naval Base dog kennel southwest of the Project site (see Exhibit A) over a full 24-hour cycle, totaling 1,440 consecutive minutes in duration. Table 4 presents the measured range of L_{eq} , L_{min} , L_{max} , L_{10} , L_{50} , and L_{90} sound levels during daytime, evening, and nighttime hours, and Exhibit B shows a plot derived from the LT1 measurement data.

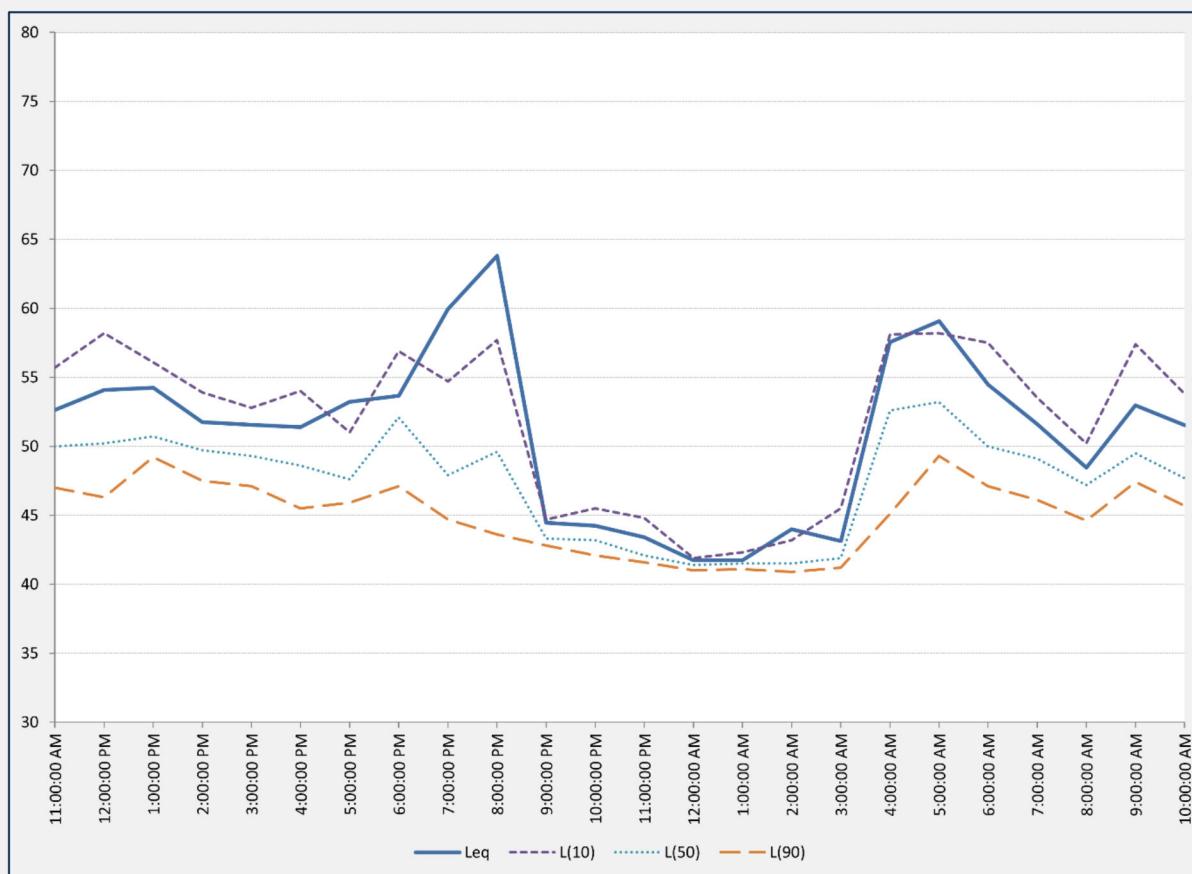
As shown in Table 4 and Exhibit B, the measured sound level range for each metric during daytime hours was consistent with the short-term measurements (ST1–ST2) presented in Table 2. The lowest hourly average (L_{eq}) value (42 dBA) was measured from 1:00 a.m. to 2:00 a.m., and the highest (64 dBA) was measured from 7:00 p.m. to 8:00 p.m. While the measured sound levels at LT1 were also influenced by the primary noise sources identified in Table 3, the measurement location was likely more sensitive to dog barking due to its proximity to the kennel, which may explain high L_{max} values during the 24-hour measurement period. Additionally, the observed “HVAC/fan” noise source approximately 600 feet away was likely active throughout the measurement period, as L_{90} values (i.e., a good indicator of background sound levels) remained above 41 dBA and were consistent over 24-hours (see Exhibit B).

Table 4. LT1 Sound Pressure Level Measurement Results

Time	Sound Level Range (dBA)					
	L_{eq}	L_{min}	L_{max}	L_{10}	L_{50}	L_{90}
Daytime (7:00 a.m. to 7:00 p.m.)	48–54	43–46	61–81	50–58	47–52	45–49
Evening (7:00 p.m. to 10:00 p.m.)	44–64	42–43	65–90	45–58	43–50	43–45
Nighttime (10:00 p.m. to 7:00 a.m.)	42–59	40–44	52–87	42–58	41–53	41–49

Notes: L_{eq} = equivalent continuous sound level (time-averaged sound level); L_{max} = maximum sound level during the measurement interval; L_{min} = minimum sound level during the measurement interval; L_{10} = sound level exceeded 10% of the time; L_{50} = sound level exceeded 50% of the time; L_{90} = sound level exceeded 90% of the time; dBA = A-weighted decibels; LT = long-term noise measurement location.

Exhibit B. LT1 SPL Measurement Results (Hourly dBA)



Notes: Measurement location LT1 represents the dog kennel southwest of the Project site.

2.3 Regulatory Setting

2.3.1 Federal Regulations and Guidance

Federal Interagency Committee on Noise Administration

Some guidance regarding the determination of a substantial permanent increase in ambient noise levels in the Project vicinity above existing levels is provided by the 1992 findings of the Federal Interagency Committee on Noise (FICON 1992), which assessed the annoyance effects of changes in ambient noise levels resulting from aircraft operations. The FICON recommendations are based upon studies that relate aircraft and traffic noise levels to the percentage of people highly annoyed by the noise. Annoyance is a qualitative measure of the adverse reaction of people to noise that generates speech interference, sleep disturbance, or interference with the desire for a tranquil environment.

The rationale for the FICON recommendations is that it is possible to consistently describe the annoyance of people exposed to transportation noise in terms of L_{dn} . The changes in noise exposure that are shown below are expected to

result in equal changes in annoyance at sensitive land uses. Although the FICON recommendations were specifically developed to address aircraft noise impacts, they are used in this analysis to define a substantial increase in community noise levels related to permanent non-transportation noise sources.

- Outdoor ambient sound level without the project is less than 60 dBA L_{dn} , then a project-attributed increase of 5 dBA or more would be considered significant;
- Outdoor ambient sound level without the project is between 60 and 65 dBA L_{dn} , project-attributed increase of 3 dBA or more would be considered significant; and
- Outdoor ambient sound level without the project is greater than 65 dBA L_{dn} , then project-attributed increase of 1.5 dBA or more would be considered significant.

2.3.2 State Guidance

California Department of Transportation

In its Transportation and Construction Vibration Guidance Manual (Caltrans 2020b), Caltrans provides guidelines to assess the potential damage from ground vibration induced by construction equipment. These thresholds are presented in Tables 5 and 6.

Table 5. Caltrans Guidelines for Vibration Damage Potential

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

Notes: PPV = Peak particle velocity; 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.

Source: Caltrans 2020b

Table 6. Caltrans Guidelines for Annoyance

Human Response	Maximum PPV, in/sec	
	Transient Sources	Continuous / Frequent Intermittent Sources
Barely Perceptible	0.04	0.01
Distinctly Perceptible	0.25	0.04
Strongly Perceptible	0.9	0.10
Severe	2.0	0.4

Notes: PPV = Peak particle velocity; 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.

Source: Caltrans 2020b

2.3.3 Local Regulations and Guidance

National City Municipal Code Section 12.06.040

Section 12.06.040 of the City's Municipal Code establishes exterior noise level limits given in Table 7 at any location in National City on or beyond the boundaries of the property on which the noise is produced. Where two or more dissimilar land uses occur on a single property, the more restrictive noise limits shall apply.

Table 7. National City Exterior Environmental Noise Limits

Receiving Land Use Category	Allowable Noise Level (dBA 1-hour L_{eq})	
	10:00 p.m. to 7:00 a.m.	7:00 a.m. to 10:00 p.m.
All residential (less than 9 dwelling units)	45	55
Multi-unit residential (Consisting of 9 dwelling units or more and Public Space)	50	60
Commercial	60	65
Light Industry (Industry east of I-5)	70	70
Heavy Industry (Industry west of I-5)	80	80

Corrections to the exterior noise level limits:

- If the noise is continuous, the L_{eq} for any hour can be represented by any lesser time period within that hour. Noise measurements of a few minutes only will thus suffice to define the noise level.
- If the noise is intermittent, the L_{eq} for any hour may be represented by a time period typical of the operating cycle. Measurement should be made of a representative number of noisy/quiet periods. A measurement period of not less than fifteen minutes is, however, strongly recommended when dealing with intermittent noise.
- In the event the alleged offensive noise contains a steady, audible sound such as a whine, screech or hum, or contains a repetitive impulsive noise such as hammering or riveting, or contains music or speech, the standard limits shall be reduced by five dB.

- D. If the measured ambient level exceeds that permissible, the allowable noise level standard shall be the ambient noise level. The ambient level shall be measured when the alleged noise violation source is not operating.

National City Municipal Code Section 12.10.160

Section 12.10.160 of the City's Municipal Code addresses construction noise restrictions. Construction activity is prohibited between the hours of 7:00 p.m. and 7:00 a.m. during weekday hours, or at any time on weekends or holidays, where the noise would create a disturbance across a residential or commercial property line. For construction lasting less than 10 days, or when "mobile" construction equipment is in use, the daytime (i.e., between 7:00 a.m. and 7:00 p.m.) limit for noise exposure at Type I areas (i.e., residential properties) affected by the construction noise is 75 dBA, or 85 dBA at Type II areas (i.e., semi-residential/commercial properties). For construction lasting longer than 10 days, or when "stationary" construction equipment is in use, the daytime limit for noise exposure at Type I areas (i.e., residential properties) affected by the construction noise is 60 dBA, or 70 dBA at Type II areas (i.e., semi-residential/commercial properties) (National City 2001).

National City Municipal Code Section 12.10.180

With respect to durable sources of groundborne vibration, Section 12.1.180 specifies that operating or permitting the operation of any device that creates vibration which is above the vibration perception threshold of any individual at or beyond the property boundary of the source if on private property, or at 150 feet (46 meters) from the source if on a public space or public right-of-way, is prohibited.

This standard would be applicable to operational sources of groundborne vibration. This City does not contain any limits on groundborne vibration relevant to construction activities.

3 Project Impact Analysis

3.1 Methodology

Construction Noise

Construction activities include temporary noise sources with emission levels varying from hour to hour and day to day, depending on the equipment in use, the operations performed, and the distance between the source and receptor. Construction noise modeling was performed using a Microsoft Excel-based noise prediction model. Input variables include the equipment type (backhoe, crane, truck, etc.), the number of pieces of equipment, the duty cycle for each piece of equipment (i.e., percentage of each hour the equipment typically works), and the distance from the sensitive receptor. Sound source information was obtained from the Noise Source Database developed under National Cooperative Highway Research Program 25-49 (NCHRP 25-49), Development of a Highway Construction Noise Prediction Model (NASEM 2022).

Table 8 provides a list of the sound levels generated by various powered equipment that could be associated with construction of the Project, measured at a distance of 50 feet using a "slow" response time constant (1 second). Usually, construction equipment operates in alternating cycles of full power and low power, producing average noise levels over time that are less than the maximum noise level. The average sound level of construction activity also depends on the amount of time that the equipment operates and the intensity of construction activities during that time.

Table 8. Sound Levels of Typical Construction Equipment

Equipment	Maximum Sound Level (dBA L_{max}) – 50 feet from Source	Equivalent Sound Level (dBA L_{eq}) – 50 feet from Source
Air Compressor	67	66
Aerial Lift (Man Lift)	73	72
Backhoe	84	76
Compactor (Plate)	75	N/A
Compactor (Roller)	83	N/A
Concrete Mixer	82	81
Concrete Saw	88	85
Crane, Mobile	76	74
Dozer	86	80
Forklift	88	N/A
Generator	68	67
Grader	79	N/A
Horizontal Bore Drill	88	87
Loader	81	72
Paving - Asphalt	83	N/A
Paving - Concrete	88	85
Pump	74	73
Scraper	92	N/A
Flatbed Truck	74	N/A
Welding Machine	72	71

Notes: dBA = A-weighted decibel; L_{max} = maximum instantaneous noise level. N/A = Equipment without average (L_{eq}) noise levels are non-stationary and best represented only by maximum instantaneous noise level (L_{max}). **Source:** NASEM 2022

Construction Vibration

Construction activity can result in varying degrees of ground vibration at local receptors, depending on the equipment and methods used, distance to the affected structures, and soil type. Caltrans has been assembling data for groundborne vibration levels generated by heavy construction equipment operation during the building of transportation projects for many years. The vibration levels from use of such equipment are representative for other types of construction efforts, not just transportation projects, and are therefore widely employed to assess vibration levels from heavy equipment use for any effort. According to Caltrans (2020), the most important equipment relative to generation of vibration, and the vibration levels produced by such equipment, is illustrated in Table 9. Pile driving, which can generate higher groundborne vibration levels than other construction equipment is not proposed as a method of construction.

Table 9. Vibration Velocities for Typical Construction Equipment

Equipment	PPV at 25 Feet (Inches Per Second)
Vibratory Roller	0.210
Large Bulldozer	0.089
Loaded Trucks	0.076
Small Bulldozer	0.003

Source: Caltrans 2020.

Note: PPV = peak particle velocity; VdB = vibration decibel.

Groundborne vibration attenuates rapidly, even over short distances. The attenuation of groundborne vibration as it propagates from source to receptor through intervening soils and rock strata can be estimated with expressions found in Caltrans guidance (Caltrans 2020). The following equation is used to calculate PPV at any distance of interest from the operating construction equipment.

$$PPV_{rcvr} = PPV_{ref} * (25/D)^{1.1}$$

In the above equation, PPV_{rcvr} is the predicted vibration velocity at the receiver position, PPV_{ref} is the reference value at 25 feet from the vibration source (as listed in Table 8), and D is the actual horizontal distance to the receiver.

3.2 Thresholds of Significance

The significance criteria used to evaluate the project's impacts to noise are based on CEQA Guidelines Appendix G. For the purposes of this project, a potentially significant impact to noise would occur if the proposed project would result in:

1. 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 in other applicable local, state, or federal standards?
2. Generation of excessive groundborne vibration or groundborne noise levels?
3. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

Impact 3 was determined to have No Impact in the Initial Study (IS) for the Project and will not be carried further in this analysis.

3.3 Project Impacts and Mitigation Measures

Threshold 1: *Would the project result in 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 in other applicable local, state, or federal standards?*

Construction Noise Impact Discussion

Construction would occur during the City’s allowable hours (7:00 a.m. to 7:00 p.m. on non-holiday weekdays). Construction activities include temporary noise sources with emission levels varying from hour to hour and day to day, depending on the equipment in use, the operations performed, and the distance between the source and receptor.

Section 12.10.160 of the City’s Municipal Code limits construction noise at Type I areas (i.e., residential) and Type II areas (i.e., semi-residential/commercial). The studied noise-sensitive residences are located approximately 1,250 feet to the east along W 18th Street, and while located in a Type II area per the City’s Land Use Map, the following analysis conservatively compares the predicted Project construction noise levels at the nearest residences against the City’s Type I area threshold (National City 2024). Construction noise exposure at Type I areas is limited to 75 dBA L_{eq-1hr} for construction less than 10 days, or when “mobile” construction equipment is in use; for construction lasting longer than 10 days, or when “stationary” construction equipment is in use, construction noise is limited 60 dBA L_{eq-1hr} .

Noise emissions from Project construction were calculated at the nearest residences, located about 1,250 feet east of the Project site’s property lines, and also for informational purposes at the dog kennels located about 250 feet southwest. As described in Section 3.1, calculations were based upon information provided by the Applicant and on the distance between the closest Project construction boundary and this use for each construction phase.

The anticipated equipment to be used for construction of the Project is shown in Table 10 for each phase of Project construction. With the construction equipment identified in Table 10, an analysis was performed with a Microsoft Excel–based noise prediction model using the reference data shown in Table 8. Input variables include the equipment type (backhoe, crane, truck, etc.), the number of pieces of equipment, the duty cycle for each piece of equipment (i.e., percentage of each hour the equipment typically works), and the distance from the sensitive receptor. Aggregate sound emissions from Project construction activities, broken down by sequential phase of construction, were predicted for the worst-case construction activity occurring along the closest construction boundary to the kennels and the residences. The results are summarized in Table 10 and detailed in Attachment A. Calculations do not take into account shielding provided by intervening structures or topography.

Table 10. Construction Noise Levels, Worst-Case L_{eq}

Construction Phase	Equipment Type	A-weighted Sound Level at Nearest Noise-Sensitive Receptor			
		Residences (1,250 feet)		Dog Kennels (250 feet)	
		Mobile Equipment	Stationary Equipment	Mobile Equipment	Stationary Equipment
Building Construction	Crane (2), Forklift (3), Generator Set (2), Loaders (2), Welders (6)	68	51	83	66

Table 10. Construction Noise Levels, Worst-Case L_{eq}

Construction Phase	Equipment Type	A-weighted Sound Level at Nearest Noise-Sensitive Receptor			
		Residences (1,250 feet)		Dog Kennels (250 feet)	
		Mobile Equipment	Stationary Equipment	Mobile Equipment	Stationary Equipment
Paving	Paving Equipment (2), Pavers (2), Rollers (2)	68	N/A	83	N/A
Architectural Coating	Air Compressor (1)	N/A	32	N/A	47
Trenching	Trencher (1), Loader (1), Roller (1)	56	N/A	71	N/A

Notes: $L_{eq\ 1hr}$ = average noise level equivalent over a 1-hour period; dBA = A-weighted decibel
Source: Dudek 2025.

As shown in Table 10, construction noise levels at the closest residences (1,250 feet from the site boundary construction) would range from 56 to 68 dBA $L_{eq\ 1hr}$ for mobile equipment and 32 to 51 dBA $L_{eq\ 1hr}$ for stationary equipment, without taking into account the substantial shielding provided by intervening structures. These construction noise levels would be below the City's construction noise limits of 75 dBA $L_{eq\ 1hr}$ for mobile equipment and 60 dBA $L_{eq\ 1hr}$ for stationary equipment. For informational purposes, worst-case construction noise levels at the dog kennels would range from 47 to 83 dBA $L_{eq\ 1hr}$.

Operational Noise Impact Discussion

The Project site is currently used primarily for parking. The Project proposes the construction of a drayage truck stop consisting of 70 electric vehicle (EV) charging positions; electrical infrastructure for the chargers; carport solar; a convenience store/restrooms; and a battery energy storage system (BESS). The Project will also include structural improvements to the existing electric, water, and sewer utility services at the Project site. As the exact Project equipment has not yet been selected, a conservative analysis assumes that some components of the Project may generate a steady, audible sound such as a whine, screech or hum; therefore the standard limits are reduced by five dB for purposes of a conservative analysis.

New major continuous-type noise generating components of the Project would include the 70 electric vehicle chargers (assumed to be 80 dBA sound power level each), located on the northern half of the site, heating, ventilation, and air conditioning (HVAC) units associated with the convenient store (59 dBA), located in the northeastern corner of the site, and the two BESS units (85 dBA each), located in the northwestern portion of the site. For a conservative analysis, all operational sound sources were assumed to be operating continuously 24 hours/day and shielding from intervening structures, buildings, or topography was not included in the calculations. At the nearest residences located 1,250 feet northeast of the site, the operational sound level would be about 38 dBA, which would be below the City's daytime (55 dBA) and nighttime (45 dBA) noise limits for multi-unit residential uses, including the 5 dB reduction (see Table 7) and would not be anticipated to be distinguishable from other background noise sources. These predicted operation noise levels are also expected to be lower than the existing outdoor ambient sound environment at such locations within 200 horizontal feet of an Interstate highway, which FTA guidance would estimate as 55 dBA at night (FTA 2018). Therefore, the anticipated increase in outdoor ambient

noise attributed to Project onsite operations would be less than a decibel and consequently compatible with the FICON criteria.

Based on the Department of the Navy Military Working Dog Program OPNAVINST 5585.2C, average sound levels at the dog kennels should not exceed 75 decibels for any 24-hour period (Attachment C). Additionally, guidance provided by a Veterinary Medical Officer at the MCAS Miramar Veterinary Treatment Facility (see Attachment B), recommended sound exposure at the kennels not to exceed a continuous noise level of 45 dBA (i.e., 45 dBA L_{eq}) and maximum noise level of a 60 dBA peak (i.e., 60 dBA L_{max}) during sleeping hours (8:00 p.m. to 4:00 a.m.), or, a continuous noise limit of 55 dBA L_{eq} and maximum noise limit of 70 dBA L_{max} for waking hours (4:00 a.m. to 8:00 p.m.). For informational purposes, the operational sound level would be about 48 dBA at the exterior of the kennels, which would be below the daytime noise limits provided by the Veterinary Medical Officer at the MCAS Miramar Veterinary Treatment Facility, below background levels at this location except during the quietest nighttime hours (hourly average (L_{eq}) value (42 dBA) was measured from 1:00 a.m. to 2:00 a.m) and below the sound levels generated by other sound sources in the area (see Table 3).

During sleeping hours, the dogs are inside within a partially enclosed area. Sound level inside this sleeping area would be anticipated to be approximately 10 dB lower than at the exterior of the kennel due to the noise reduction provided by the partially enclosed building envelope, referencing data for “open” window conditions from Table 7 of the FHWA’s *Highway Traffic Noise: Analysis and Abatement Guidance* document (FHWA 2011). Thus, the resulting project operational noise exposure to the dog kennels would be approximately 38 dBA, which would be lower than the nighttime noise limits provided by the Veterinary Medical Officer at the MCAS Miramar Veterinary Treatment Facility.

Level of Significance Prior to Mitigation

Project construction and operations would result in noise levels that would meet the applicable significance thresholds. Construction and operational noise impacts of the Project would therefore be **less than significant**.

Mitigation Measures

No mitigation is required.

Level of Significance after Mitigation

Impacts would be less than significant.

Threshold 2: Would the project result in generation of excessive groundborne vibration or groundborne noise levels?

Construction Vibration Impact Discussion

The City does not have vibration thresholds that would be applicable to construction of the Project. To ensure that Project construction does not result in structural damage to nearby buildings, it is appropriate to employ a numeric standard adopted by another agency. The California Department of Transportation (Caltrans 2020) establishes a construction-related damage limit of 0.25 in/sec PPV for historic and old buildings, 0.3 in/sec PPV for older residential structures, and 0.5 in/sec PPV for new residential and modern commercial/industrial structures. The applicable threshold for Project-attributed construction vibration would be 0.3 in/sec PPV at the closest residences; this threshold is also used for the dog kennel.

The closest sensitive structure is the dog kennel located about 250 feet to the southwest. Residential structures are located as close as 1,250 feet to the east and the closest industrial building is located about 40 feet to the west.

At the nearest industrial building (40 feet), construction vibration levels would be 0.13 in/sec PPV or less and well below the industrial threshold for structural damage of 0.5 in/sec PPV. At the nearest residences (1,250 feet) and at the dog kennel (250 feet), construction vibration levels would be below 0.02 in/sec PPV. These levels would be well below the residential threshold of 0.3 in/sec PPV, and below the level considered distinctly perceptible by humans of 0.04 in/sec PPV.

Level of Significance Prior to Mitigation

Project construction would result in groundborne vibration levels that would meet the applicable significance thresholds. Groundborne vibration impacts of the Project would therefore be **less than significant**.

Mitigation Measures

No mitigation is required.

Level of Significance after Mitigation

Impacts would be less than significant.

4 References Cited

- Caltrans (California Department of Transportation). 2013. *Technical Noise Supplement to the Traffic Noise Analysis Protocol*. September 2013. <https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tens-sep2013-a11y.pdf>
- Caltrans. 2020. *Transportation and Construction Vibration Guidance Manual*. Division of Environmental Analysis, Environmental Engineering, Hazardous Waste, Air, Noise, Paleontology Office. Sacramento, California.
- FHWA. December 8, 2008. Roadway Construction Noise Model (RCNM), Software Version 1.1. U.S. Department of Transportation, Research and Innovative Technology Administration, John A. Volpe National Transportation Systems Center, Environmental Measurement and Modeling Division. Washington, D.C.
- FHWA (Federal Highway Administration). 2011. *Highway Traffic Noise: Analysis and Abatement Guidance*. FHWA-HEP-10-025. December 2011.
- FICON. 1992. *Federal Agency Review of Selected Airport Noise Analysis Issues*. Federal Interagency Committee on Noise. August 1992.
- FTA (Federal Transit Administration). 2018. *Transit Noise and Vibration Impact Assessment Manual*. FTA Report No. 0123. John A. Volpe National Transportation Systems Center. September. Accessed August 4, 2025. https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf.

ISO (International Organization of Standardization). 1996. Attenuation of Sound during Propagation Outdoors, Part 2: General Method of Calculation. ISO Standard 9613-2. <https://www.iso.org/standard/20649.html>.

NASEM (National Academies of Sciences, Engineering, and Medicine). 2022. *Development of a Highway Construction Noise Prediction Model*. Prepared for National Cooperative Highway Research Program, Project 25-49 (NCHRP 25-49). https://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP25-49/nchrp_25-49RCNM2.0finalreport.pdf.

National City. 2001. *Title 12: Noise Control*. Accessed September 22, 2025. https://library.municode.com/ca/national_city/codes/code_of_ordinances?nodeId=CD_ORD_TIT12NOCO_CH12.10PRAC.

National City. 2024. *Land Use Map*. Land Use Element Update Figure L-4, Adopted 2024. Accessed September 22, 2025. <https://www.nationalcityca.gov/home/showpublisheddocument/34878/638876567209030000>

Attachment A

Construction Noise Prediction Model Inputs

Source to barrier distance

Receiver to barrier distance

Receiver height

Varies

Varies

5

magnitude of threshold (dBA) per National City MC Sec. 12.10.160 =

allowable hours over which Leq is to be averaged =

75

1

0

= temporary barrier (TB) of input height inserted between source and receptor

Construction Activity	Equipment	Total Equipment Qty	Reference Level (Leq or Lmax) @ 50 ft. from FHWA RCNM 2 Table	Air Quality/Client Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Distance-Adjusted Level	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq	Source Elevation (ft)	Receiver Elevation (ft)	Barrier Height (ft)	Source to Barr. ("A") Horiz. (ft)	Rcvr. to Barr. ("B") Horiz. (ft)	Source to Rcvr. ("C") Horiz. (ft)	"A" (ft)	"B" (ft)	"C" (ft)	Path Length Diff. "P" (ft)	Abarr (dB)	Heff (with barrier)	Heff (wout barrier)	G (with barrier)	G (without barrier)	ILbarr (dB)
Building Construction	Crane	2	74.2	Crane	1250	40.3	8.00	480	52	7.7	5	0	5	1245	1250	9.2	1245.0	1250.0	0.00	0.1	6.4	6.4	0.6	0.6	0.1
	Telescopic Handler (Forklift)	3	88.3	Forklift	1250	54.3	7.00	420	68	3.0	5	0	5	1245	1250	5.8	1245.0	1250.0	0.00	0.1	4.0	4.0	0.7	0.7	0.1
	Generator	0	67.1	Generator	1250	33.1	8.00	480	0	4.5	5	0	5	1245	1250	6.7	1245.0	1250.0	0.00	0.1	4.8	4.8	0.7	0.7	0.1
	Front End Loader (Cyclical)	2	72.4	Tractors/Loaders/Backhoes	1250	38.4	6.00	360	49	6.0	5	0	5	1245	1250	7.8	1245.0	1250.0	0.00	0.1	5.5	5.5	0.7	0.7	0.1
	Welding Machine	0	71.2	Welder	1250	37.2	8.00	480	0	2.5	5	0	5	1245	1250	5.6	1245.0	1250.0	0.00	0.1	3.8	3.8	0.7	0.7	0.1
Total for Building Construction Phase:									67.8																
Paving	Paving - Concrete (Placer + Slipform Paver)	2	87.2	Paving Eqmt	1250	53.3	8	480	65	9.0	5	0	5	1245	1250	10.3	1245.0	1250.0	0.00	0.1	7.0	7.0	0.6	0.6	0.1
	Paving - Concrete (Texturing/Curing Machine)	2	73.3	Paver	1250	39.4	8	480	51	8.0	5	0	5	1245	1250	9.4	1245.0	1250.0	0.00	0.1	6.5	6.5	0.6	0.6	0.1
	Paving - Concrete (Triple Roller Tube Paver)	2	85.1	Roller	1250	51.1	8	480	63	5.0	5	0	5	1245	1250	7.1	1245.0	1250.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total for Paving Phase:									67.5																
Architectural Coating	Compressor	0	65.6	Air Compressor	1250	31.7	1	60	0	4.3	5	0	5	1245	1250	6.6	1245.0	1250.0	0.00	0.1	4.7	4.7	0.7	0.7	0.1
Total for Architectural Coating Phase:									0.0																
Trenching	Excavator	1	75.9	Trencher	1250	41.9	4	240	48	6.2	5	0	5	1245	1250	8.0	1245.0	1250.0	0.00	0.1	5.6	5.6	0.7	0.7	0.1
	Front End Loader (Cyclical)	1	72.4	Tractors/Loaders/Backhoes	1250	38.4	4	240	44	6.0	5	0	5	1245	1250	7.8	1245.0	1250.0	0.00	0.1	5.5	5.5	0.7	0.7	0.1
	Compactor (Roller)	1	82.4	Roller	1250	48.4	4	240	54	4.4	5	0	5	1245	1250	6.7	1245.0	1250.0	0.00	0.1	4.7	4.7	0.7	0.7	0.1
Total for Trenching Phase:									55.7																

Source to barrier distance

Receiver to barrier distance

Receiver height

Varies

Varies

5

magnitude of threshold (dBA) per National City MC Sec. 12.10.160 =

allowable hours over which Leq is to be averaged =

60

1

0

= temporary barrier (TB) of input height inserted between source and receptor

Construction Activity	Equipment	Total Equipment Qty	Reference Level (Leq or Lmax) @ 50 ft. from FHWA RCNM 2 Table	Air Quality/Client Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Distance-Adjusted Level	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq	Source Elevation (ft)	Receiver Elevation (ft)	Barrier Height (ft)	Source to Barr. ("A") Horiz. (ft)	Rcvr. to Barr. ("B") Horiz. (ft)	Source to Rcvr. ("C") Horiz. (ft)	"A" (ft)	"B" (ft)	"C" (ft)	Path Length Diff. "P" (ft)	Abarr (dB)	Heff (with barrier)	Heff (wout barrier)	G (with barrier)	G (without barrier)	ILbarr (dB)
Building Construction	Crane	0	74.2	Crane	1250	40.3	8.00	480	0	7.7	5	0	5	1245	1250	9.2	1245.0	1250.0	0.00	0.1	6.4	6.4	0.6	0.6	0.1
	Telescopic Handler (Forklift)	0	88.3	Forklift	1250	54.3	7.00	420	0	3.0	5	0	5	1245	1250	5.8	1245.0	1250.0	0.00	0.1	4.0	4.0	0.7	0.7	0.1
	Generator	2	67.1	Generator	1250	33.1	8.00	480	45	4.5	5	0	5	1245	1250	6.7	1245.0	1250.0	0.00	0.1	4.8	4.8	0.7	0.7	0.1
	Front End Loader (Cyclical)	0	72.4	Tractors/Loaders/Backhoes	1250	38.4	6.00	360	0	6.0	5	0	5	1245	1250	7.8	1245.0	1250.0	0.00	0.1	5.5	5.5	0.7	0.7	0.1
	Welding Machine	2	71.2	Welder	1250	37.2	8.00	480	49	2.5	5	0	5	1245	1250	5.6	1245.0	1250.0	0.00	0.1	3.8	3.8	0.7	0.7	0.1
Total for Building Construction Phase:										50.7															
Paving	Paving - Concrete (Placer + Slipform Paver)	0	87.2	Paving Eqmt	1250	53.3	8	480	0	9.0	5	0	5	1245	1250	10.3	1245.0	1250.0	0.00	0.1	7.0	7.0	0.6	0.6	0.1
	Paving - Concrete (Texturing/Curing Machine)	0	73.3	Paver	1250	39.4	8	480	0	8.0	5	0	5	1245	1250	9.4	1245.0	1250.0	0.00	0.1	6.5	6.5	0.6	0.6	0.1
	Paving - Concrete (Triple Roller Tube Paver)	0	85.1	Roller	1250	51.1	8	480	0	5.0	5	0	5	1245	1250	7.1	1245.0	1250.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total for Paving Phase:										0.0															
Architectural Coating	Compressor	1	65.6	Air Compressor	1250	31.7	1	60	32	4.3	5	0	5	1245	1250	6.6	1245.0	1250.0	0.00	0.1	4.7	4.7	0.7	0.7	0.1
Total for Architectural Coating Phase:										31.7															
Trenching	Excavator	0	75.9	Trencher	1250	41.9	4	240	0	6.2	5	0	5	1245	1250	8.0	1245.0	1250.0	0.00	0.1	5.6	5.6	0.7	0.7	0.1
	Front End Loader (Cyclical)	0	72.4	Tractors/Loaders/Backhoes	1250	38.4	4	240	0	6.0	5	0	5	1245	1250	7.8	1245.0	1250.0	0.00	0.1	5.5	5.5	0.7	0.7	0.1
	Compactor (Roller)	0	82.4	Roller	1250	48.4	4	240	0	4.4	5	0	5	1245	1250	6.7	1245.0	1250.0	0.00	0.1	4.7	4.7	0.7	0.7	0.1
Total for Trenching Phase:										0.0															

Source to barrier distance

Receiver to barrier distance

Receiver height

Varies

Varies

5

magnitude of threshold (dBA) =

allowable hours over which Leq is to be averaged =

N/A

1

0

= temporary barrier (TB) of input height inserted between source and receptor

Construction Activity	Equipment	Total Equipment Qty	Reference Level (Leq or Lmax) @ 50 ft. from FHWA RCNM 2 Table	Air Quality/Client Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Distance-Adjusted Level	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq	Source Elevation (ft)	Receiver Elevation (ft)	Barrier Height (ft)	Source to Barr. ("A") Horiz. (ft)	Rcvr. to Barr. ("B") Horiz. (ft)	Source to Rcvr. ("C") Horiz. (ft)	"A" (ft)	"B" (ft)	"C" (ft)	Path Length Diff. "P" (ft)	Abarr (dB)	Heff (with barrier)	Heff (wout barrier)	G (with barrier)	G (without barrier)	ILbarr (dB)
Building Construction	Crane	2	74.2	Crane	250	56.2	8.00	480	68	7.7	5	0	5	245	250	9.2	245.1	250.0	0.00	0.1	6.4	6.4	0.6	0.6	0.1
	Telescopic Handler (Forklift)	3	88.3	Forklift	250	69.9	7.00	420	83	3.0	5	0	5	245	250	5.8	245.1	250.0	0.00	0.1	4.0	4.0	0.7	0.7	0.1
	Generator	0	67.1	Generator	250	48.8	8.00	480	0	4.5	5	0	5	245	250	6.7	245.1	250.0	0.00	0.1	4.8	4.8	0.7	0.7	0.1
	Front End Loader (Cyclical)	2	72.4	Tractors/Loaders/Backhoes	250	54.2	6.00	360	65	6.0	5	0	5	245	250	7.8	245.1	250.0	0.00	0.1	5.5	5.5	0.7	0.7	0.1
	Welding Machine	0	71.2	Welder	250	52.7	8.00	480	0	2.5	5	0	5	245	250	5.6	245.1	250.0	0.00	0.1	3.8	3.8	0.7	0.7	0.1
Total for Building Construction Phase:									83.3																
Paving	Paving - Concrete (Placer + Slipform Paver)	2	87.2	Paving Eqmt	250	69.2	8	480	81	9.0	5	0	5	245	250	10.3	245.1	250.0	0.00	0.1	7.0	7.0	0.6	0.6	0.1
	Paving - Concrete (Texturing/Curing Machine)	2	73.3	Paver	250	55.3	8	480	67	8.0	5	0	5	245	250	9.4	245.1	250.0	0.00	0.1	6.5	6.5	0.6	0.6	0.1
	Paving - Concrete (Triple Roller Tube Paver)	2	85.1	Roller	250	66.8	8	480	79	5.0	5	0	5	245	250	7.1	245.1	250.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total for Paving Phase:									83.4																
Architectural Coating	Compressor	0	65.6	Air Compressor	250	47.3	1	60	0	4.3	5	0	5	245	250	6.6	245.1	250.0	0.00	0.1	4.7	4.7	0.7	0.7	0.1
Total for Architectural Coating Phase:									0.0																
Trenching	Excavator	1	75.9	Trencher	250	57.7	4	240	64	6.2	5	0	5	245	250	8.0	245.1	250.0	0.00	0.1	5.6	5.6	0.7	0.7	0.1
	Front End Loader (Cyclical)	1	72.4	Tractors/Loaders/Backhoes	250	54.2	4	240	60	6.0	5	0	5	245	250	7.8	245.1	250.0	0.00	0.1	5.5	5.5	0.7	0.7	0.1
	Compactor (Roller)	1	82.4	Roller	250	64.1	4	240	70	4.4	5	0	5	245	250	6.7	245.1	250.0	0.00	0.1	4.7	4.7	0.7	0.7	0.1
Total for Trenching Phase:									71.3																

Source to barrier distance

Receiver to barrier distance

Receiver height

Varies

Varies

5

magnitude of threshold (dBA) =

allowable hours over which Leq is to be averaged =

N/A

1

0 = temporary barrier (TB) of input height inserted between source and receptor

Construction Activity	Equipment	Total Equipment Qty	Reference Level (Leq or Lmax) @ 50 ft. from FHWA RCNM 2 Table	Air Quality/Client Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Distance-Adjusted Level	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq	Source Elevation (ft)	Receiver Elevation (ft)	Barrier Height (ft)	Source to Barr. ("A") Horiz. (ft)	Rcvr. to Barr. ("B") Horiz. (ft)	Source to Rcvr. ("C") Horiz. (ft)	"A" (ft)	"B" (ft)	"C" (ft)	Path Length Diff. "P" (ft)	Abarr (dB)	Heff (with barrier)	Heff (wout barrier)	G (with barrier)	G (without barrier)	ILbarr (dB)
Building Construction	Crane	0	74.2	Crane	250	56.2	8.00	480	0	7.7	5	0	5	245	250	9.2	245.1	250.0	0.00	0.1	6.4	6.4	0.6	0.6	0.1
	Telescopic Handler (Forklift)	0	88.3	Forklift	250	69.9	7.00	420	0	3.0	5	0	5	245	250	5.8	245.1	250.0	0.00	0.1	4.0	4.0	0.7	0.7	0.1
	Generator	2	67.1	Generator	250	48.8	8.00	480	61	4.5	5	0	5	245	250	6.7	245.1	250.0	0.00	0.1	4.8	4.8	0.7	0.7	0.1
	Front End Loader (Cyclical)	0	72.4	Tractors/Loaders/Backhoes	250	54.2	6.00	360	0	6.0	5	0	5	245	250	7.8	245.1	250.0	0.00	0.1	5.5	5.5	0.7	0.7	0.1
	Welding Machine	2	71.2	Welder	250	52.7	8.00	480	65	2.5	5	0	5	245	250	5.6	245.1	250.0	0.00	0.1	3.8	3.8	0.7	0.7	0.1
Total for Building Construction Phase:									66.2																
Paving	Paving - Concrete (Placer + Slipform Paver)	0	87.2	Paving Eqmt	250	69.2	8	480	0	9.0	5	0	5	245	250	10.3	245.1	250.0	0.00	0.1	7.0	7.0	0.6	0.6	0.1
	Paving - Concrete (Texturing/Curing Machine)	0	73.3	Paver	250	55.3	8	480	0	8.0	5	0	5	245	250	9.4	245.1	250.0	0.00	0.1	6.5	6.5	0.6	0.6	0.1
	Paving - Concrete (Triple Roller Tube Paver)	0	85.1	Roller	250	66.8	8	480	0	5.0	5	0	5	245	250	7.1	245.1	250.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total for Paving Phase:									0.0																
Architectural Coating	Compressor	1	65.6	Air Compressor	250	47.3	1	60	47	4.3	5	0	5	245	250	6.6	245.1	250.0	0.00	0.1	4.7	4.7	0.7	0.7	0.1
Total for Architectural Coating Phase:									47.3																
Trenching	Excavator	0	75.9	Trencher	250	57.7	4	240	0	6.2	5	0	5	245	250	8.0	245.1	250.0	0.00	0.1	5.6	5.6	0.7	0.7	0.1
	Front End Loader (Cyclical)	0	72.4	Tractors/Loaders/Backhoes	250	54.2	4	240	0	6.0	5	0	5	245	250	7.8	245.1	250.0	0.00	0.1	5.5	5.5	0.7	0.7	0.1
	Compactor (Roller)	0	82.4	Roller	250	64.1	4	240	0	4.4	5	0	5	245	250	6.7	245.1	250.0	0.00	0.1	4.7	4.7	0.7	0.7	0.1
Total for Trenching Phase:									0.0																

Attachment B

Military Working Dog (MWD) Auditory Health Memorandum



DEPARTMENT OF THE ARMY
VETERINARY READINESS ACTIVITY-SAN DIEGO
401 WEST 8TH STREET, BUILDING 3155
NATIONAL CITY, CALIFORNIA 91950

MCHB-RP-S

10 July 2025

MEMORANDUM FOR Commander, Navy Region Southwest, Naval Base San Diego, Military Working Dog Section, San Diego, California

SUBJECT: Request for Information – Military Working Dog (MWD) Auditory Health

1. BACKGROUND:

a. On 10 JUL 2025, a collaborative discussion occurred regarding a Port of San Diego project 250 feet from the NBSD MWD Kennel. Representatives in attendance included the Port, NBSD Community Planning, NBSD MWD Kennel, San Diego Section Army Veterinary Services, and NMCS Industrial Health.

b. The proposed plan involves building an electric truck charging facility with seventy charge ports. Operations and vehicle movement would occur overnight, raising concerns about potential impacts on sleeping MWDs.

c. The meeting was called to discuss potential impacts and mitigation strategies, primarily related to noise, but also light and vibration. It is well established that chronic stressors on animals can lead to adverse behavioral and physiological consequences.

2. REFERENCES:

a. World Health Organization. *Guidelines for Community Noise*. Geneva: World Health Organization, 1999.

b. Sales, G., R. Hubrecht, A. Peyvandi, S. Milligan, and B. Shield. "Noise in Dog Kennelling: Is Barking a Welfare Problem for Dogs?" *Animal Welfare* 6 no. 4 (1997): 337-349.

c. Coppola, C. L., Temple Grandin, and R. M. Enns. "Noise in the Animal Shelter Environment: Building Design and the Effects of Daily Noise Exposure." *Journal of Applied Animal Welfare Science* 9, no. 1 (2006): 1-7.

d. Peterson, L., and C. L. Coppola. "Fear and Stress in Animal Shelters: Environmental and Behavioral Insights." *Purdue Extension* VA-18-W, 2006. <https://extension.purdue.edu/extmedial/VA/VA-18-W.pdf>.

e. United States Environmental Protection Agency. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*. Washington, DC: EPA Office of Noise Abatement and Control, 1974.

f. National Research Council. *Guidelines for the Care and Use of Laboratory Animals*. Washington, DC: National Academies Press, 2011.

3. PURPOSE: To establish acceptable environmental noise parameters for areas near MWD kennels, with the goal of minimizing noise-related impacts to dogs housed nearby. Both chronic and sudden exposure to elevated noise can lead to behavioral changes, health complications, and diminished well-being in dogs.

4. ACTION:

a. Recommended noise thresholds for the charging facility, measured at the MWD kennel during canine sleeping hours (2000-0400), are a maximum continuous noise level of 45 dB(A) and maximum impulse noise level of a 60 dB(A) peak. For waking hours (0400-2000), a continuous noise limit of 55 dB(A) and impulse noise limit of 70 dB(A) are recommended.

b. These values are based on a combination of industry standards, animal welfare research, and environmental noise guidelines. While some of these references are human-focused, they are often used as a starting point for animal policies. The thresholds are conservative to reflect dogs' heightened noise sensitivity when compared to humans.

c. Temporary exceedances may be permitted for isolated events (e.g., installation, utility repair), but must be reported to the MWD kennel in advance whenever possible.

d. Mitigation strategies include positioning noise generating equipment at the furthest distance possible from the site, as already planned, and enclosing it with acoustic fencing or barriers. Light, vibration, and ultrasonic sound frequencies were not determined to be a concern requiring additional mitigation.

5. The point of contact for this memorandum is the undersigned at (858) 307-6553 or e-mail Katherine.s.lopez7.civ@health.mil.

KATHERINE S. LOPEZ, DVM
Veterinary Medical Officer
MCAS Miramar Veterinary Treatment Facility

Attachment C

Department of the Navy Military Working Dog
Program, OPNAVINST 5585.2C

CHAPTER 2

KENNEL FACILITIES AND EQUIPMENT

1. Kenneling Requirements. Before MWDs are assigned to a command, suitable kennel facilities must be provided. Various factors such as the health and comfort of MWDs must be considered in the construction of kennels and runs as well as management and safety factors. Authorization for the use of civilian kennels in emergencies must be approved by the MWD program manager. Commanding officers (CO) shall ensure MWDs are afforded commensurate security and safety while being housed at civilian kennels. MWDs will not be kenneled at the handler's quarters except in cases of extreme emergency and only with approval of the MWD program manager.

2. Kennel Construction and Approval. After the MWD program manager has approved the request to establish an MWD program at a command, plans and detailed cost estimates will be forwarded for approval, via the chain of command, to the appropriate fleet kennel master. Modifying an existing facility or building should be considered as a first alternative. The kennel master and veterinarian must be included in all planning and design phases to ensure the kennel is both functional and practical. Kennel designs for various climates are available from the 341st TRS, Lackland AFB. Kennel facilities will be constructed with the following criteria:

a. Kennel Placement. Location of kennel facilities must be carefully considered. Areas of concern are: shade, temperature control, ventilation, drainage, ease of cleaning, separation of MWDs, and safety. Adequate security lighting is essential. The following are additional considerations when selecting a suitable location:

(1) Odors and Noise. Do not locate kennel facilities in an area that may be harmful to the MWDs' senses. Avoid areas near aircraft runways or taxiways, engine test cells, small arms ranges, or other areas where the average sound level for any 24-hour period exceeds 75 decibels. In addition, MWDs that are continually disturbed by pedestrian or vehicular traffic, industrial activity, and other distractions cannot be expected to function properly. Where feasible, the kennel should be located so that natural barriers such as hills, trees, and large shrubs separate these areas from the kennel facility.