APPENDIX I

Noise Impact Analysis
Ventana
City of Indio, Riverside, California

Report Date: February 18, 2021

Prepared for

GHA Companies
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Cathedral City, CA 92234

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Noise Impact Analysis
Ventana
City of Indio, Riverside County, California

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Table of Contents

List of Tables

List of Exhibits

LIST OF ACRONYMS AND ABBREVIATIONS

ADT	average daily traffic
ANSI	American National Standards Institute
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dB	decibel
dBA	A-weighted decibel
dBA/DD	A-weighted decibel per each doubling of distance
DOT	Department of Transportation
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FICON	Federal Interagency Committee on Noise
FTA	Federal Transit Administration
Hz	Hertz
L_{dn}	Day-Night Average Sound Level
L_{eq}	Equivalent Sound Level
L_V	Vibration Level
ONAC	Federal Office of Noise Abatement Control
ONC	California Department of Health Services Office of Noise Control
OSHA	Occupational Safety and Health Administration
PPV	peak particle velocity
RMS	root mean square
SEL	Single Event Level
sq ft	square feet
UMTA	Urban Mass Transit Administration
VdB	L_V at 1 microinch per second

SECTION 1: INTRODUCTION

1.1 - Purpose of Analysis and Study Objectives

This Noise Impact Study has been prepared by KW Air Quality and Noise LLC (KWAQN) to determine the offsite and onsite noise impacts associated with the proposed Ventana residential development project. The following is provided in this report:

- A description of the study area and the proposed project.
- Information regarding the fundamentals of noise.
- Information regarding the fundamentals of vibration.
- A description of the local noise guidelines and standards.
- An evaluation of the current noise environment.
- An analysis of the potential short-term construction-related noise and vibration impacts from the proposed project.
- An analysis of long-term operations-related noise and vibration impacts from the proposed project.

1.2 - Project Location and Study Area

The project site is located in the Coachella Valley portion of Riverside County. Specifically, the project site is located north of Avenue 50, between Jefferson Street and Madison Street, in the City of Indio (APNs 602-070-004-1, 602-080-001-9, and -002-0). The project site currently is currently vacant. The project is bounded to the west by residential uses, to the north and east by residential uses and vacant lots, and to the south by Avenue 60 (see Exhibit 1).

1.3 - Project Description

The project site is to be developed with 103 single-family detached residential dwelling units. If the proposed project was developed with the maximum density, it could be developed with 136 single-family detached residential dwelling units. The projected opening year and full operations are assumed to occur in 2022. The proposed site plan is shown in Exhibit 2.

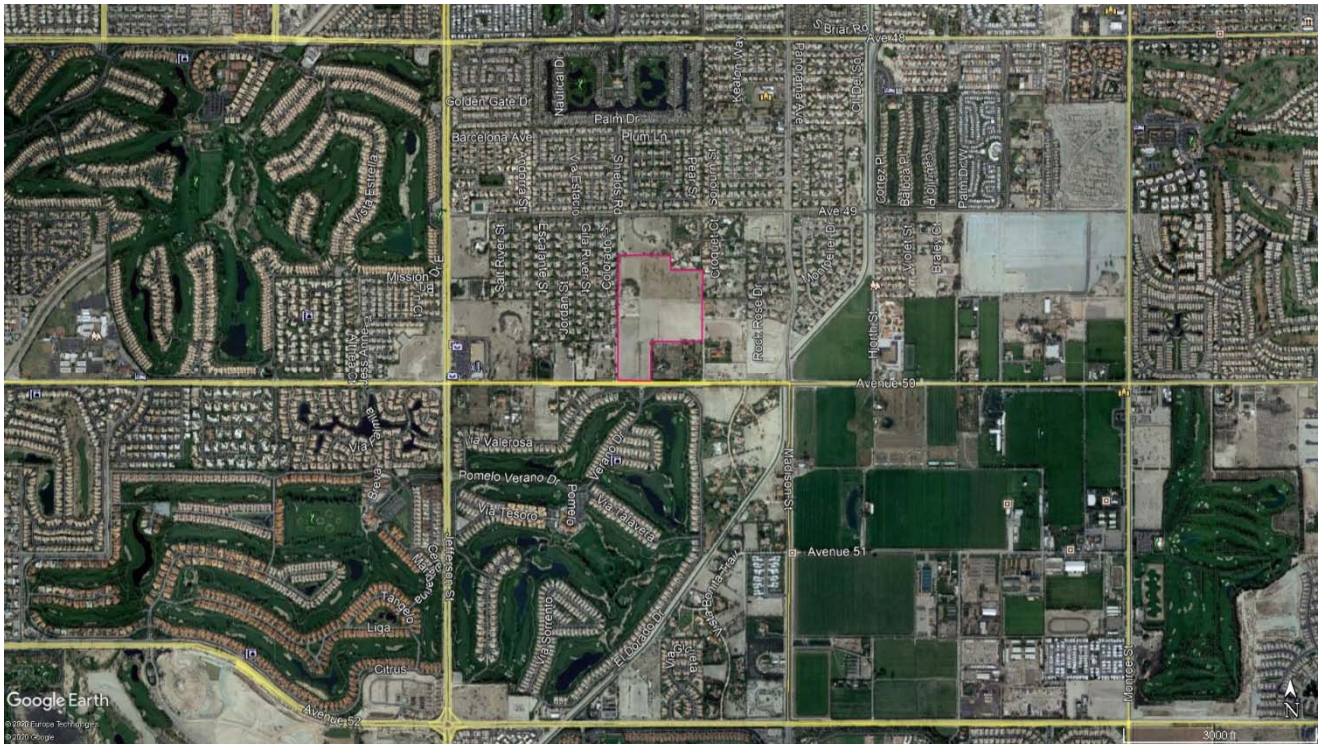


Exhibit 1
Project Location Map

Ventana
Noise Impact Analysis

Source: Google Earth, 2020

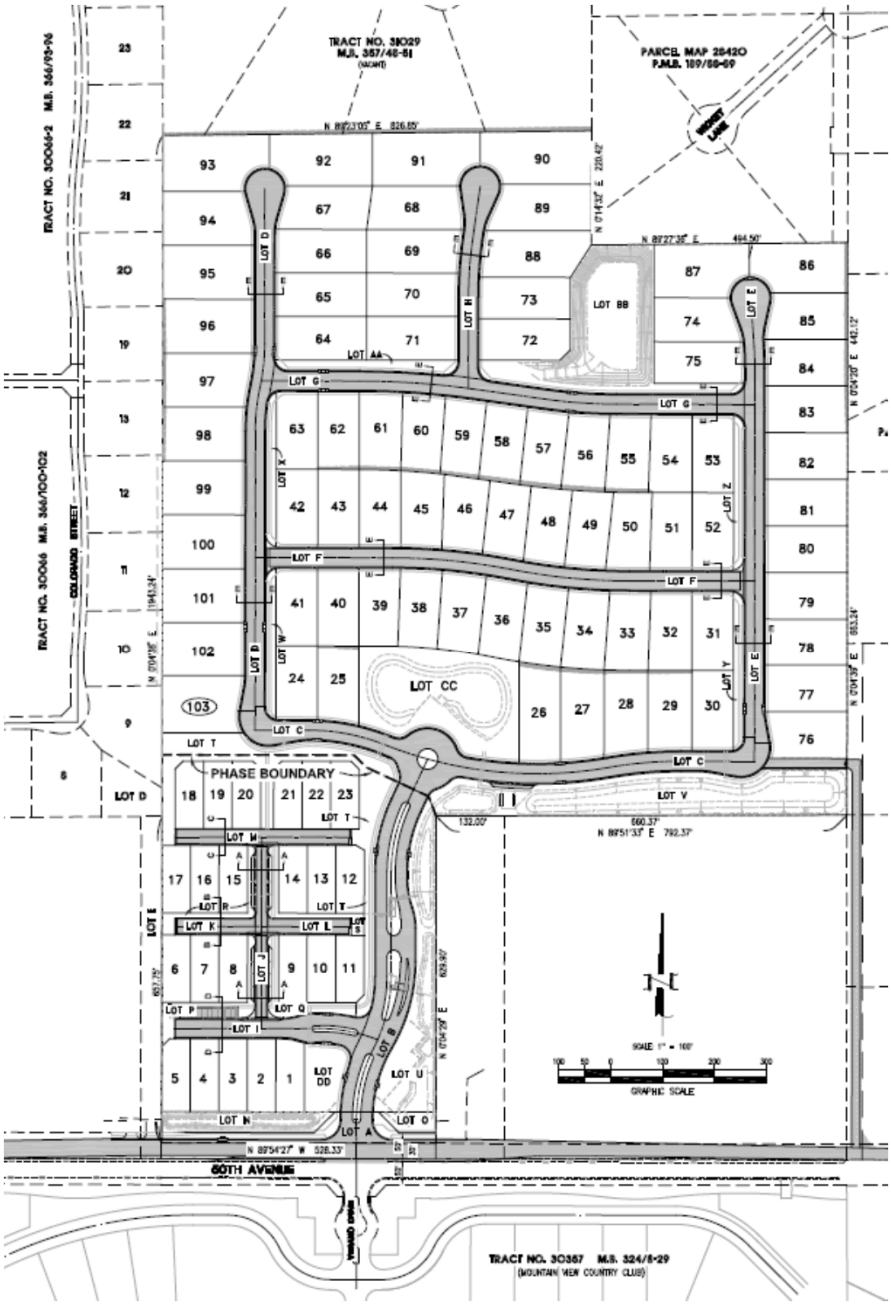


Exhibit 2
Site Plan

Ventana

Noise Impact Analysis

SECTION 2: NOISE FUNDAMENTALS

Noise is defined as unwanted sound. Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm or when it has adverse effects on health. Sound is produced by the vibration of sound pressure waves in the air. Sound pressure levels are used to measure the intensity of sound and are described in terms of decibels. The decibel (dB) is a logarithmic unit, which expresses the ratio of the sound pressure level being measured to a standard reference level. A-weighted decibels (dBA) approximate the subjective response of the human ear to a broad frequency noise source by discriminating against very low and very high frequencies of the audible spectrum. They are adjusted to reflect only those frequencies that are audible to the human ear.

2.1 - Noise Descriptors

Noise equivalent sound levels are not measured directly, but are calculated from sound pressure levels typically measured in dBA. The equivalent sound level (L_{eq}) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period. The peak traffic hour L_{eq} is the noise metric used by California Department of Transportation (Caltrans) for all traffic noise impact analyses.

The Day-Night Average Sound Level (L_{dn}) is the weighted average of the intensity of a sound, with corrections for time of day, and averaged over 24 hours. The time of day corrections require the addition of ten decibels to sound levels at night between 10 p.m. and 7 a.m. While the Community Noise Equivalent Level (CNEL) is similar to the L_{dn}, except that it has another addition of 4.77 dB to sound levels during the evening hours between 7 p.m. and 10 p.m. These additions are made to the sound levels at these times because during the evening and nighttime hours, when compared to daytime hours, there is a decrease in the ambient noise levels, which creates an increased sensitivity to sounds. For this reason the sound is perceived to be louder in the evening and nighttime hours and is weighted accordingly. Many cities rely on the CNEL noise standard to assess transportation-related impacts on noise sensitive land uses.

Another noise descriptor that is used primarily for the assessment of aircraft noise impacts is the Sound Exposure Level, which is also called the Single Event Level (SEL). The SEL descriptor represents the acoustic energy of a single event (i.e., an aircraft overflight) normalized to one-second event duration. This is useful for comparing the acoustical energy of different events involving different durations of the noise sources. The SEL is based on an integration of the noise during the period when the noise first rises within 10 dBA of its maximum value and last falls below 10 dBA of its maximum value. The SEL is often 10 dBA greater, or more, than the L_{MAX} since the SEL logarithmetically adds the L_{eq} for each second of the duration of the noise.

2.2 - Tone Noise

A pure tone noise is a noise produced at a single frequency and laboratory tests have shown the humans are more perceptible to changes in noise levels of a pure tone (Caltrans 1998). For a noise source to contain a "pure tone," there must be a significantly higher A-weighted sound energy in a given frequency band than in the neighboring bands, thereby causing the noise source to "stand out" against other noise sources. A pure tone occurs if the sound pressure level in the one-third octave band with the tone exceeds the average of the sound pressure levels of the two contagious one-third octave bands by: 5 dB for center frequencies of 500 Hertz (Hz) and above; by 8 dB for center frequencies between 160 and 400 Hz; and by 15 dB for center frequencies of 125 Hz or less (Department of Health Services 1977).

2.3 - Noise Propagation

From the noise source to the receiver, noise changes both in level and frequency spectrum. The most obvious is the decrease in noise as the distance from the source increases. The manner in which noise reduces with distance depends on whether the source is a point or line source as well as ground absorption, atmospheric effects and refraction, and shielding by natural and manmade features. Sound from point sources, such as air conditioning condensers, radiate uniformly outward as it travels away from the source in a spherical pattern. The noise drop-off rate associated with this geometric spreading is 6 dBA per each doubling of the distance (dBA/DD). Transportation noise sources such as roadways are typically analyzed as line sources, since at any given moment the receiver may be impacted by noise from multiple vehicles at various locations along the roadway. Because of the geometry of a line source, the noise drop-off rate associated with the geometric spreading of a line source is 3 dBA/DD.

2.4 - Ground Absorption

The sound drop-off rate is highly dependent on the conditions of the land between the noise source and receiver. To account for this ground-effect attenuation (absorption), two types of site conditions are commonly used in traffic noise models: soft-site and hard-site conditions. Soft-site conditions account for the sound propagation loss over natural surfaces such as normal earth and ground vegetation. For point sources, a drop-off rate of 7.5 dBA/DD is typically observed over soft ground with landscaping, as compared with a 6.0 dBA/DD drop-off rate over hard ground such as asphalt, concrete, stone and very hard packed earth. For line sources a 4.5 dBA/DD is typically observed for soft-site conditions compared to the 3.0 dBA/DD drop-off rate for hard-site conditions. To be conservative, hard-site conditions were used in this analysis.

2.5 - Traffic Noise Prediction

The level of traffic noise depends on the three primary factors: (1) the volume of the traffic, (2) the speed of the traffic, and (3) the number of trucks in the flow of traffic. Generally, the loudness of

traffic noise is increased by heavier traffic volumes, higher speeds, and greater number of trucks. Vehicle noise is a combination of the noise produced by the engine, exhaust, and tires. Because of the logarithmic nature of traffic noise levels, a doubling of the traffic volume (assuming that the speed and truck mix do not change) results in a noise level increase of 3 dBA. Based on the FHWA community noise assessment criteria, this change is "barely perceptible," for reference a doubling of perceived noise levels would require an increase of approximately 10 dBA. However, the 1992 findings of Federal Interagency Committee on Noise (FICON), which assessed changes in ambient noise levels resulting from aircraft operations, found that noise increases as low as 1.5 dB can cause annoyance, when the existing noise levels are already greater than 65 dB. The truck mix on a given roadway also has an effect on community noise levels. As the number of heavy trucks increases and becomes a larger percentage of the vehicle mix, adjacent noise levels increase.

2.6 - Noise Barrier Attenuation

Effective noise barriers can reduce noise levels by 10 to 15 dBA, cutting the loudness of traffic noise in half. For a noise barrier to work, it must be high enough and long enough to block the view of a road. A noise barrier is most effective when placed close to the noise source or receiver. A noise barrier can achieve a 5-dBA noise level reduction when it is tall enough to break the line-of-sight. When the noise barrier is a berm instead of a wall, the noise attenuation can be increased by another 3 dBA.

SECTION 3: GROUNDBORNE VIBRATION FUNDAMENTALS

Groundborne vibrations consist of rapidly fluctuating motions within the ground that have an average motion of zero. The effects of groundborne vibrations typically only cause a nuisance to people, but at extreme vibration levels, damage to buildings may occur. Although groundborne 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. Groundborne noise is an effect of groundborne 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.

3.1 - Vibration Descriptors

Several different methods are used to quantify vibration amplitude such as the maximum instantaneous peak in the vibrations velocity, which is known as the peak particle velocity (PPV) or the root mean square (RMS) amplitude of the vibration velocity. Because of the typically small amplitudes of vibrations, vibration velocity is often expressed in decibels and is denoted as L_V and is based on the RMS velocity amplitude. A commonly used abbreviation is VdB, which in this text, is when vibration level (L_V) is based on the reference quantity of 1 microinch per second.

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. Offsite 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 groundborne noise or vibration.

3.3 - Vibration Propagation

The propagation of groundborne vibration is not as simple to model as airborne noise. This is because noise in the air travels through a relatively uniform median, while groundborne vibrations travel through the earth, which may contain significant geological differences. 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 wave front, 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 wave front. 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 also body waves that carry energy along an expanding spherical wave front. 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, in order to identify potential vibration impacts that may need to be studied through actual field tests.

3.4 - Construction-Related Vibration Level Prediction

Construction activity can result in varying degrees of ground vibration, depending on the equipment used on the site. Operation of construction equipment causes ground vibrations that spread through the ground and diminish in strength with distance. Buildings in the vicinity of the construction site respond to these vibrations with varying results ranging from no perceptible effects at the low levels to slight damage at the highest levels. Table 1 gives approximate vibration levels for particular construction activities. The data in Table 1 provides a reasonable estimate for a wide range of soil conditions.

Table 1: Vibration Source Levels for Construction Equipment

Equipment	Peak Particle Velocity (inches/second) at 25 feet	Approximate Vibration Level (L_V) at 25 feet
Pile driver (impact)	1.518 (upper range) 0.644 (typical)	112 104
Pile driver (sonic)	0.734 upper range 0.170 typical	105 93
Clam shovel drop (slurry wall)	0.202	94
Hydromill (slurry wall)	0.008 in soil 0.017 in rock	66 75
Vibratory Roller	0.210	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
Source: Transit Noise and Vibration Impact Assessment, Federal Transit Administration, Table 7-4. September 2018.		

SECTION 4: REGULATORY SETTING

The proposed project is located in the City of Indio 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:

- Promulgating noise emission standards for interstate commerce.
- Assisting state and local abatement efforts.
- Promoting noise education and research.

The Federal Office of Noise Abatement and Control (ONAC) was initially tasked with implementing the Noise Control Act. However, the ONAC has since been eliminated, leaving the development of federal noise policies and programs to other federal agencies and interagency committees. For example, the Occupational Safety and Health Administration (OSHA) agency limits noise exposure of workers to 90 dB L_{eq} or less for 8 continuous hours or 105 dB L_{eq} or less for 1 continuous hour. The Department of Transportation (DOT) assumed a significant role in noise control through its various operating agencies. The Federal Aviation Administration (FAA) regulates noise of aircraft and airports. Surface transportation system noise is regulated by a host of agencies, including the Federal Transit Administration (FTA). Transit noise is regulated by the federal Urban Mass Transit Administration (UMTA), while freeways that are part of the interstate highway system are regulated by the Federal Highway Administration (FHWA). Finally, the federal government actively 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 sited adjacent to a highway or, alternately 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 sources, 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

Though not adopted by law, the State of California General Plan Guidelines 2017, published by the California Governor's Office of Planning and Research (OPR) (OPR Guidelines), provides guidance for the compatibility of projects within areas of specific noise exposure. The OPR Guidelines identify the suitability of various types of construction relative to a range of outdoor noise levels and provide

each local community some flexibility in setting local noise standards that allow for the variability in community preferences. Findings presented in the Levels of Environmental Noise Document (EPA 1974) influenced the recommendations of the OPR Guidelines, most importantly in the choice of noise exposure metrics (i.e., Ldn or CNEL) and in the upper limits for the normally acceptable outdoor exposure of noise-sensitive uses.

The OPR Guidelines include a Noise and Land Use Compatibility Matrix which identifies acceptable and unacceptable community noise exposure limits for various land use categories. Where the "normally acceptable" range is used, it any special acoustical is defined as the highest noise level that should be considered for the construction of the buildings which do not incorporate treatment or noise mitigation. The "conditionally acceptable" or "normally unacceptable" ranges include conditions calling for detailed acoustical study prior to the construction or operation of the proposed project. The City of Indio has adopted their own version of the State Land Use Compatibility Guidelines for land use planning and to assess potential transportation noise impacts to proposed land uses (see Table 3). Title 24, Chapter 1, Article 4 of the California Administrative Code (California Noise Insulation Standards) requires noise insulation in new hotels, motels, apartment houses, and dwellings (other than single-family detached housing) that provides an annual average noise level of no more than 45 dBA CNEL. When such structures are located within a 60-dBA CNEL (or greater) noise contour, an acoustical analysis is required to ensure that interior levels do not exceed the 45-dBA CNEL annual threshold. In addition, Title 21, Chapter 6, Article 1 of the California Administrative Code requires that all habitable rooms, hospitals, convalescent homes, and places of worship shall have an interior CNEL of 45 dB or less due to aircraft noise.

Government Code Section 65302 mandates that the legislative body of each county and city in California adopt a noise element as part of its comprehensive general plan. The local noise element must recognize 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.

4.2.1 - California Environmental Quality Act

The California Environmental Quality Act Guidelines (Appendix G) establishes thresholds for noise impact analysis. This noise study includes analysis of noise and vibration impacts necessary to assess the project in light of the following Appendix G Checklist Thresholds.

Would the project result in:

a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project <u>in excess of standards</u> established in the local general plan or noise ordinance, or applicable standards of other agencies?

Substantial increases in ambient noise levels are usually associated with project construction noise (temporary) and project operational noise (permanent).

Project Construction Noise: Construction noise sources are regulated within the City of Indio Section 95C.08 which prohibits construction activities other than between the hours of:

1. Pacific Standard Time.

    a. Monday through Friday, 7:00 AM through 6:00 PM
    b. Saturday, 8:00 AM through 6:00 PM
    c. Sunday, 9:00 AM through 5:00 PM
    d. Government Holidays, 9:00 AM through 5:00 PM

2. Pacific Daylight Time.

    a. Monday through Friday, 6:00 AM through 6:00 PM
    b. Saturday, 7:00 AM through 6:00 PM
    c. Sunday, 9:00 AM through 5:00 PM
    d. Government Holidays, 9:00 AM through 5:00 PM

Although construction activity may be exempt from the noise standards in the City's Municipal Code, CEQA requires that potential noise impacts still be evaluated for significance.

The City of Indio has not adopted a numerical threshold that identifies what a substantial increase would be. For purposes of this analysis, the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment (2018) criteria will be used to establish significance thresholds. The FTA provides reasonable criteria for assessing construction noise impacts based on the potential for adverse community reaction. For residential uses, the daytime noise threshold is 80 dBA L_{eq} averaged over an 8-hour period ($L_{eq\ (8\text{-}hr)}$; and the nighttime noise threshold is 70 dBA $L_{eq\ (8\text{-}hr)}$. For commercial uses, the daytime and nighttime noise threshold is 85 dBA $L_{eq\ (8\text{-}hr)}$. In compliance with the City's Municipal Code, it is assumed that construction would not occur during the noise-sensitive nighttime hours.

Project Operational Noise (permanent): On-site operational noise is usually only evaluated for commercial and industrial projects. Quantitative analysis of on-site operational noise is typically not conducted for residential projects as they usually do not include stationary noise sources that could result in substantial increases in ambient noise levels resulting in violation of established standards. Therefore, the evaluation of project operational noise in this study is limited to the potential impacts associated with project generated vehicle traffic (off-site noise). Depending upon how many units are

proposed and the existing noise environment, project generated vehicle trips could result in substantial increases in noise levels.

For off-site project generated noise, increases in ambient noise along affected roadways due to project generated vehicle traffic is considered substantial if they result in an increase of at least 5 dBA CNEL and: (1) the existing noise levels already exceed the applicable land use compatibility standard for the affected sensitive receptors set forth in the Noise Element of the City's General Plan; or (2) the project increases noise levels by at least 5 dBA CNEL and raises the ambient noise level from below the applicable standard to above the applicable standard.

b) Generate excessive groundborne vibration or groundborne noise levels?

The California Department of Transportation (Caltrans) has published one of the seminal works for the analysis of ground-borne noise and vibration relating to transportation- and construction-induced vibrations and although the project is not subject to these regulations, it serves as useful tools to evaluate vibration impacts. These guidelines recommend that a standard of 0.2 inches per section (in/sec) PPV not be exceeded for the protection of normal residential buildings (California Department of Transportation, 2013). With respect to human response within residential uses (i.e., annoyance, sleep disruption), Caltrans shows that at a continuous vibration level of 0.2 PPV (in/sec) humans will find vibration to be annoying. This is the appropriate threshold for construction related ground-borne vibration impacts. See Table 2 below for details.

Table 2, Typical Human Reaction and Effect on Buildings Due to Groundborne Vibration

Vibration Level Peak Particle Velocity (PPV)	Human Reaction	Effect on Buildings
0.006–0.019 in/sec	Threshold of perception, possibility of intrusion	Vibrations unlikely to cause damage of any type
0.08 in/sec	Vibrations readily perceptible	Recommended upper level of vibration to which ruins and ancient monuments should be subjected
0.10 in/sec	Level at which continuous vibration begins to annoy people	Virtually no risk of "architectural" (i.e., not structural) damage to normal buildings
0.20 in/sec	Vibrations annoying to people in buildings	Threshold at which there is a risk to "architectural" damage to normal dwelling – houses with plastered walls and ceilings
0.4–0.6 in/sec	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Vibrations at a greater level than normally expected from traffic, but would cause "architectural" damage and possibly minor structural damage

Notes:
Source: California Department of Transportation. Transportation and Construction Vibration Guidance Manual, Chapter 6 Tables 5 and 12, September 2013.

4.3 - Local Regulations

The City of Indio General Plan and Municipal Code establish the following applicable goals policies related to noise and vibration.

4.3.1 - City of Indio General Plan

The City of Indio General Plan was adopted September 18, 2019. The City of Indio has adopted a modified version of the State of California Noise Land Use Compatibility Matrix (see Table 3). This Matrix establishes standards for outdoor noise levels that are acceptable, conditionally acceptable, and unacceptable for a variety of land uses. For example, noise levels of up to 60 dBA CNEL are "acceptable" and levels up to 75 dBA CNEL are "conditionally acceptable" for single-family residential uses and noise levels of up to 65 dBA CNEL are "acceptable" and levels up to 75 dBA CNEL are "conditionally acceptable" for multi-family residential uses. Additional City of Indio General Plan goals and policies which apply to the proposed project are presented below.

Goal NE-1 Land Use Compatibility. A City where noise exposure is minimized for those living, working, and visiting the community.

Policy NE 1.1: Sensitive Receptors. Protect noise-sensitive uses, such as residences, schools, health care facilities, hotels, libraries, and churches, from excessive noise levels through land use capability/ adjacency, build design, and noise ordinance enforcement.

Policy NE 1.2: Noise Compatibility. Apply the Noise Compatibility Matrix, shown in Table 3, as a guide for planning and development decisions. The City will require projects involving new development or modifications to existing development to implement mitigation measures, where necessary, to reduce noise levels to at least the normally compatible range shown in the City's Noise Compatibility Matrix shown in Table 3. Mitigation measures should focus on architectural features and building design and construction, rather than site design features, such as excessive setbacks, berms, and sound walls, to maintain compatibility with adjacent and surrounding uses.

Policy NE 1.6: Limit on Hours of Operation. Limit delivery or service hours for stores and businesses with loading areas, docks, or trash bins that front, side, border, or gain access on driveways next to residential and other noise sensitive areas, such as residences, schools, hospitals, religious meeting spaces, and recreation areas.

Policy NE 1.7: Land Use and Community Design. Prioritize the building design and character policies in the Land Use and Community Character Element over those in the Noise Element to ensure that new development meets the design vision of the city. This policy will not apply when noise levels are clearly in the incompatible range as shown in the City's Noise Compatibility Matrix shown in Table 3.

Goal NE-2 Mobile Noise Sources. A City with minimal mobile source-generated noise levels.

Policy NE 2.4: Roadway Noise. Implement the policies listed under Goal 1 to reduce the impacts of roadway noise on noise-sensitive receptors where roadway noise exceeds the normally compatible range shown in the City's Noise Compatibility Matrix shown in Table 3.

Policy NE 2.5: Traffic Calming. Require the use of traffic calming measures such as reduced speed limits or roadway design features to reduce noise levels where roadway noise exceeds the normally compatible range shown in the City's Noise Compatibility Matrix shown in Table 3.

Goal NE-3 Stationary Noise Sources. A City with minimal stationary source-generated noise levels.

Policy NE 3.1: Noise Ordinance. Minimize noise conflicts between neighboring properties through enforcement of applicable regulations, such as the City's Noise Control Ordinance.

Policy NE 3.4: Construction Noise. Require development to minimize the exposure of neighboring properties to excessive noise levels from construction-related activity during all phases of construction.

4.3.2 - City of Indio Municipal Code

In addition to any measures to reduce noise levels recommended in this report, project operations will be subject to the following City ordinances.

Section 95C.03 General Prohibitions

It shall be unlawful for any person to make, continue, or cause to be made or continued, within the city limits or within 200 feet thereof, any disturbing excessive or offensive noise or vibration which causes discomfort or annoyance to any reasonable person of normal sensitivity in the area or that is plainly audible at a distance greater than 50 feet from the source point for any purpose.

Section 95C.04 Disturbing, Excessive, Offensive Noises; Declaration of Certain Acts Constituting

The following activities, among others, are declared to cause disturbing, excessive or offensive noises in violation of the noise chapter and are unlawful, namely:

F. Leaf Blowers

1. A leaf blower means any portable, hand held or back pack, engine powered device with a nozzle that creates a directable airstream which is capable of and intended for moving leaves and light materials.

2. Leaf blowers shall only be operated between the hours of 7:00 AM and 8:00 PM on any day except on Sunday when they may only be operated between the hours of 10:00 AM and 8:00 PM.

3. Leaf blowers shall be equipped with functional mufflers and an approved sound limiting device required to ensure that the leaf blower is not capable of generating a sound level exceeding any limit prescribed in this chapter.

Section 95C.08 Disturbing, Excessive, Offensive Noises or Vibration Created by Vehicles, Tools, Machinery; Declaration of Certain Acts Constituting

The following activities, among others, are declared to cause disturbing, excessive or offensive noises or vibration in violation of this section but such enumeration shall not be deemed to be exclusive, namely:

B. *Controlled hours of operation.* Notwithstanding the provisions of Chapter 151 of the City's Code it shall be unlawful for any person to operate, permit, use or cause to operate, any of the following:

2. Loading and unloading of vehicles, operating of fork lifts or cranes within 1,000 feet of a residence [exempted if distance from residential area exceeds 1,000 feet or as it may be reduced by the Planning Commission subject to design review or conditional use permit]; and

3. Construction tools and machinery.

Other than between the hours of:

3. Pacific Standard Time.

    a. Monday through Friday, 7:00 AM through 6:00 PM
    b. Saturday, 8:00 AM through 6:00 PM
    c. Sunday, 9:00 AM through 5:00 PM
    d. Government Holidays, 9:00 AM through 5:00 PM

4. Pacific Daylight Time.

    a. Monday through Friday, 6:00 AM through 6:00 PM
    b. Saturday, 7:00 AM through 6:00 PM
    c. Sunday, 9:00 AM through 5:00 PM
    d. Government Holidays, 9:00 AM through 5:00 PM

Table 3
City of Indio Noise Compatibility Guidelines[1]

Land Use Category		Exterior Noise Level (CNEL)						
		50	55	60	65	70	75	80
A	Residential – single family residences, mobile homes, senior housing, convalescent homes							
B	Residential – multi-family residences, mixed-use (commercial/residential)							
C	Transient lodging – motels, hotels, resorts							
D*	Schools, churches, hospitals, nursing homes, child care facilities							
E*	Passive recreational parks, nature preserves, contemplative spaces, cemeteries							
F*	Active parks, golf courses, athletic fields, outdoor spectator sports, water recreation							
G*	Office/professional, government, medical/dental, commercial, retail, laboratories							
H*	Industrial, manufacturing, utilities, agriculture, mining, stables, ranching, warehouse, maintenance/repair							

Acceptable:	Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal construction, without any special noise insulation requirements.
Conditionally Acceptable:	New construction or development should be undertaken only after a detailed noise analysis is conducted to determine if noise reduction measures are necessary to achieve acceptable levels for land use. Criteria for determining exterior and interior noise levels are listed in Table N-2, Noise Standards. If a project cannot mitigate noise to a level deemed Acceptable, the appropriate county decision-maker must determine that mitigation has been provided to the greatest extent practicable or that extraordinary circumstances exist.
Unacceptable:	New construction or development should generally not be undertaken.

Notes:

(1) Source: City of Indio General Plan Interim Final Draft, April 2019.

SECTION 5: EXISTING NOISE CONDITIONS

To determine the existing noise level environment, short-term noise measurements were taken in the project study area at four locations in the project vicinity. The following describes the measurement procedures, measurement locations, and the noise measurement results.

5.1 - Measurement Procedure and Criteria

To ascertain the existing noise at and adjacent to the project site, field monitoring was conducted on February 20, 2020. The field survey noted that noise within the proposed project area is generally characterized by traffic noise. The nearest airport is Bermuda Dunes Airport, which is located approximately 3.7 miles northwest of the project site. The project site falls well outside the 65 dBA noise contour, and is not considered as a source that contributes to the ambient noise levels on the project site.

5.1.1 - Noise Measurement Equipment

Noise monitoring was performed using an American National Standards Institute (ANSI Section SI4 1979, Type 1) Larson Davis model LxT sound level meter. The sound level meter was programmed in "slow" mode to record the sound pressure level at one second intervals for in A-weighted form. The sound level meter and microphone was mounted approximately five feet above the ground and equipped with a windscreen during all measurements. The sound level meter was calibrated before monitoring using Larson Davis Cal 250. The noise level measurement equipment meets American National Standards Institute (ANSI) specifications for sound level meters (S1.4-1983 identified in Chapter 19.68.020.AA).

5.1.2 - Noise Measurement Locations

The noise monitoring locations were selected in order to obtain noise measurements of the current noise sources impacting the vicinity of the project site and to provide a baseline for any potential noise impacts that may be created by development of the proposed project. The sites are shown in **Error! Reference source not found.** on the following page. Appendix A includes a photographic index of the study area and noise level measurement locations.

Exhibit 3
Noise Monitoring Locations

Ventana

Noise Impact Analysis

5.1.3 - Noise Measurement Timing and Climate

The noise measurements were recorded between 12:34 PM and 3:32 PM on February 20, 2020. At the start of the noise monitoring, the sky was relatively clear, with five to 10 percent high cloud cover and calm wind conditions (5-10 mph).

5.2 - Noise Measurement and Analysis Results

The noise measurements were taken at five (5) locations at the project site. The results of the noise level measurements are provided below in Table 4 . The dominant noise source in the area was traffic, with secondary noise from birds and the occasional overhead aircraft.

Table 4: Existing Noise Level Measurements

Site Location	Description	L_{eq}	L_{MAX}	L_{MIN}
NM 1	Adjacent to the residential receptor southeast of the project site	48.7	61.2	40.4
NM 2	Adjacent to the residential receptors southeast and east of the project site	50.5	62.9	42.3
NM 3	Adjacent to the residential receptors northeast of the project site	41.6	50.5	37.0
NM 4	Adjacent to the residential receptors west of the project site	45.9	61.5	36.9
NM 5	Adjacent to the residential receptors south of the site, south of Avenue 50.	72.1	82.3	44.8

The project is located in proximity to Festival Site for the Coachella Music and Arts and Stagecoach Country Music Festival, located south of Avenue 49, west of Monroe Street, north of Avenue 52 and east of Madison Street in the City of Indio. There were no music events taking place at the time the existing noise measurements were obtained for the Ventana residential project; however, the Addendum to the Music Festivals Plan Final EIR[1] states that the maximum noise level (recorded over a 24 hour measurement) during an event was 67.9 dBA CNEL, at the intersection of Madison Street and Avenue 50; the closest monitored intersection to the proposed residential development. As the Music Festival site is located well over 1,500 feet from the boundary of the proposed project, music events may be audible; however, the noise level from such events would not significantly impact the future residents of the proposed project.

[1] https://www.indio.org/your_government/development_services/planning_division/projects/music_festival_feir_addendum.htm

5.2.1 - Traffic Noise Modeling Results

The Noise impacts related to vehicular traffic were modeled using a version of the Federal Highway Administration (FHWA) Traffic Noise Prediction Model (FHWA-RD-77-108), as modified for CNEL and the "Calveno" energy curves. Site-specific information is entered, such as roadway traffic volumes, roadway active width, source-to-receiver distances, travel speed, noise source and receiver heights, and the percentages of automobiles, medium trucks, and heavy trucks that the traffic is made up of throughout the day, amongst other variables.

The FHWA Traffic Noise Prediction Model arrives at a predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). Adjustments are then made to the REMEL to account for: total average daily traffic volumes, roadway classification, width, speed and truck mix, roadway grade and site conditions (hard or soft ground surface). All modeled roadways were assumed to have a "hard site" to predict worst-case, conservative noise levels. A hard site, such as pavement, is highly reflective and does not attenuate noise as quickly as grass or other soft sites. Any reductions in noise levels due to intervening topography and buildings were not accounted for in this analysis.

Existing, Existing Plus Project, Existing Plus Maximum Density Buildout average daily traffic (ADT) were obtained from the Project-specific Traffic Impact Analysis (TIA) (Kunzman Associates, 2021).

Roadway parameters utilized to model future traffic noise levels to the Project include location, traffic volume, speed and vehicle mix (autos, medium trucks, and heavy trucks) . The various scenarios that are described above were modeled to determine project-specific increases in noise levels at an arbitrary distance of 50 feet from roadway centerline. The uniform distance allows for direct comparisons of potential increases or decreases in noise levels based upon various traffic scenarios; however, at this distance, no specific noise standard necessarily applies. Therefore, the change in a noise level between scenarios is the focus of this portion of the analysis, rather than the resulting independent noise level for any one segment. FHWA calculation spreadsheets are included in Appendix C.

The calculated noise levels in Table 5 shows that the existing traffic noise in the area is as high as 72.2 dBA at a distance of 50 feet from the centerline.

Table 5
Project Traffic Noise Contributions to Existing Scenario

Road Segments	Existing		Existing Plus Project			Is the Increase Significant ?
	ADT	dB CNEL	ADT	Total	Project-Specific Increase	
North/South						
Jefferson Street						
n/o Avenue 48	21,300	71.0	21,400	71.0	0.0	**No**
n/o Avenue 49	28,500	72.2	28,800	72.3	0.1	**No**
s/o Avenue 49	26,600	71.9	26,900	72.0	0.1	**No**
s/o Avenue 50	17,600	70.2	17,700	70.2	0.0	**No**
Verano Drive						
s/o Avenue 50	800	56.7	800	56.7	0.0	**No**
Madison Street						
n/o Avenue 49	8,200	66.8	8,200	66.8	0.0	**No**
s/o Avenue 49	7,800	66.6	7,800	66.6	0.0	**No**
s/o Avenue 50	7,400	66.4	7,400	66.4	0.0	**No**
Hjorth Street						
s/o Avenue 49	500	54.7	500	54.7	0.0	**No**
Monroe Street						
n/o Avenue 50	11,000	68.1	11,200	68.2	0.1	**No**
s/o Avenue 50	8,900	67.2	8,900	67.2	0.0	**No**
East/West						
Avenue 48						
w/o Jefferson Street	15,800	69.7	15,900	69.7	0.0	**No**
e/o Jefferson Street	16,800	70.0	16,800	70.0	0.0	**No**
Avenue 49						
w/o Jefferson Street	900	57.2	900	57.2	0.0	**No**
e/o Jefferson Street	3,900	63.6	3,900	63.6	0.0	**No**
w/o Madison Street	3,000	62.5	3,000	62.5	0.0	**No**
e/o Madison Street	2,900	62.3	2,900	62.3	0.0	**No**
Avenue 50						
w/o Jefferson Street	8,200	66.8	8,300	66.9	0.1	**No**
e/o Jefferson Street	10,800	68.0	11,300	68.2	0.2	**No**
w/o Madison Street	10,300	67.8	10,800	68.0	0.2	**No**
e/o Madison Street	8,800	67.1	9,200	67.3	0.2	**No**
e/o Hjorth Street	9,000	67.2	9,400	67.4	0.2	**No**
e/o Monroe Street	11,600	68.3	11,700	68.4	0.1	**No**

*The uniform distance of 50 feet from centerline allows for direct comparisons of potential increases or decreases in noise levels based upon various traffic scenarios; however, at this distance, no specific noise standard necessarily applies

Table 6
Maximum Density Project Traffic Noise Contributions to Existing Scenario

Road Segments	Existing		Existing Plus Maximum Density Project			Is the Increase Significant ?
	ADT	dB CNEL	ADT	Total	Project-Specific Increase	
North/South						
Jefferson Street						
n/o Avenue 48	21,300	71.0	21,500	71.0	0.0	**No**
n/o Avenue 49	28,500	72.2	28,900	72.3	0.1	**No**
s/o Avenue 49	26,600	71.9	27,000	72.0	0.1	**No**
s/o Avenue 50	17,600	70.2	17,700	70.2	0.0	**No**
Verano Drive						
s/o Avenue 50	800	56.7	800	56.7	0.0	**No**
Madison Street						
n/o Avenue 49	8,200	66.8	8,300	66.9	0.1	**No**
s/o Avenue 49	7,800	66.6	7,900	66.7	0.1	**No**
s/o Avenue 50	7,400	66.4	7,400	66.4	0.0	**No**
Hjorth Street						
s/o Avenue 49	500	54.7	600	55.5	0.8	**No**
Monroe Street						
n/o Avenue 50	11,000	68.1	11,300	68.2	0.1	**No**
s/o Avenue 50	8,900	67.2	9,000	67.2	0.0	**No**
East/West						
Avenue 48						
w/o Jefferson Street	15,800	69.7	15,900	69.7	0.0	**No**
e/o Jefferson Street	16,800	70.0	16,900	70.0	0.0	**No**
Avenue 49						
w/o Jefferson Street	900	57.2	900	57.2	0.0	**No**
e/o Jefferson Street	3,900	63.6	3,900	63.6	0.0	**No**
w/o Madison Street	3,000	62.5	3,000	62.5	0.0	**No**
e/o Madison Street	2,900	62.3	2,900	62.3	0.0	**No**
Avenue 50						
w/o Jefferson Street	8,200	66.8	8,300	66.9	0.1	**No**
e/o Jefferson Street	10,800	68.0	11,400	68.3	0.3	**No**
w/o Madison Street	10,300	67.8	10,900	68.1	0.3	**No**
e/o Madison Street	8,800	67.1	9,400	67.4	0.3	**No**
e/o Hjorth Street	9,000	67.2	9,500	67.5	0.3	**No**
e/o Monroe Street	11,600	68.3	11,800	68.4	0.1	**No**

*The uniform distance of 50 feet from centerline allows for direct comparisons of potential increases or decreases in noise levels based upon various traffic scenarios; however, at this distance, no specific noise standard necessarily applies

SECTION 6: NOISE AND VIBRATION THRESHOLDS

Consistent with the California Environmental Quality Act (CEQA) and the CEQA Guidelines, a significant impact related to noise would occur if a proposed project is determined to result in:

- Exposure of persons to or generation of noise levels in excess of standards established in the local General Plan or noise ordinance, or applicable standards of other agencies.
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.
- Exposure of persons residing or working in the project area to excessive noise levels from aircraft.

According to the CEQA checklist, to determine whether impacts to noise resources are significant environmental effects, the following thresholds are analyzed and evaluated:

- Exceedance of noise standards for construction and operational noise
- Groundborne vibration.
- Operational noise.
- Short-term construction noise.
- Airport noise.

Each of these thresholds is analyzed below.

6.1 - Exceedance of Noise Standards

This impact discussion analyzes the potential for project construction noise to cause an exposure of persons to or generation of noise levels in excess of established City of Indio noise standards or applicable standards of other agencies. Noise levels in the project area would be influenced by construction activities.

6.1.1 - Construction Noise

Project Construction Noise: Construction noise sources are regulated within the City of Indio Section 95C.08 which prohibits construction activities other than between the hours of:

1. Pacific Standard Time.

    a. Monday through Friday, 7:00 AM through 6:00 PM
    b. Saturday, 8:00 AM through 6:00 PM

c. Sunday, 9:00 AM through 5:00 PM
d. Government Holidays, 9:00 AM through 5:00 PM

2. Pacific Daylight Time.

a. Monday through Friday, 6:00 AM through 6:00 PM
b. Saturday, 7:00 AM through 6:00 PM
c. Sunday, 9:00 AM through 5:00 PM
d. Government Holidays, 9:00 AM through 5:00 PM

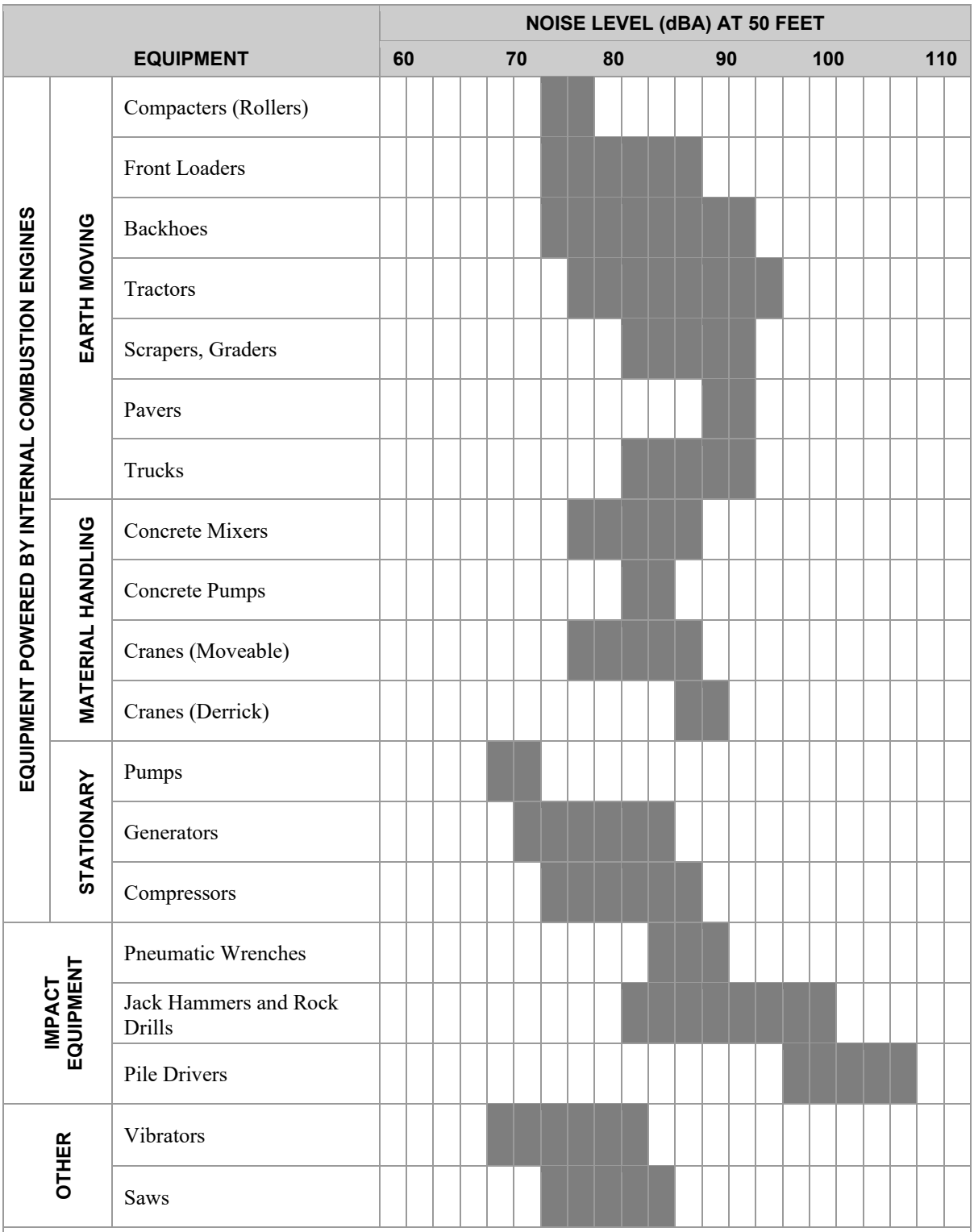
Although construction activity may be exempt from the noise standards in the City's Municipal Code, CEQA requires that potential noise impacts still be evaluated for significance.

The City of Indio has not adopted a numerical threshold that identifies what a substantial increase would be. For purposes of this analysis, the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment (2006) criteria will be used to establish significance thresholds. The FTA provides reasonable criteria for assessing construction noise impacts based on the potential for adverse community reaction. For residential uses, the daytime noise threshold is 80 dBA L_{eq} averaged over an 8-hour period ($L_{eq\ (8\text{-}hr)}$; and the nighttime noise threshold is 70 dBA $L_{eq\ (8\text{-}hr)}$. For commercial uses, the daytime and nighttime noise threshold is 85 dBA $L_{eq\ (8\text{-}hr)}$. In compliance with the City's Municipal Code, it is assumed that construction would not occur during the noise-sensitive nighttime hours.

The State of California defines sensitive receptors as those land uses that require serenity or are otherwise adversely affected by noise events or conditions. Schools, libraries, churches, hospitals, single and multiple-family residential, including transient lodging, motels and hotel uses make up the majority of these areas. The closest receptors to the project site include: the residential uses located to the northeast, west east and south of the project site.

Short-term noise impacts could occur during construction activities from either the noise impacts created from the transport of workers and movement of construction materials to and from the project site, or from the noise generated onsite during: ground clearing/excavation, grading, building, and paving activities.

Exhibit 4: Typical Construction Equipment Noise Levels



Source: United States Environmental Protection Agency, 1971, "Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances," NTID 300-1.

Construction noise levels will vary significantly based upon the size and topographical features of the active construction zone, duration of the work day, and types of equipment employed, as indicated in Exhibit 4. A typical construction day with an eight-hour duration will generate 84 dBA CNEL at a distance of 50 feet from the noise source, on average. 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. Although there would be a relatively high single event noise exposure potential, resulting in potential short-term intermittent annoyances, the effect in long-term ambient noise levels would be small when averaged over longer time. As shown by the ambient noise level measurements in Table 4: Existing Noise Level Measurements, the project vicinity is already exposed to a maximum noise level of 82.3 dBA.

Construction noise associated with the Project was calculated utilizing methodology presented in the FTA Transit Noise and Vibration Impact Assessment Manual (2018) together with several key construction parameters including: distance to each sensitive receiver, equipment usage, percent usage factor, and baseline parameters for the Project Site (see Appendix C for details). Distances to receptors were based on the acoustical center of the proposed construction activity. Construction noise levels were calculated for each phase. To be conservative, the noise generated by each piece of equipment was added together for each phase of construction; however, it is unlikely (and unrealistic) that every piece of equipment will be used at the same time, at the same distance from the receptor, for each phase of construction.

Construction noise levels are compared to the existing noise level in Table 4 of this report. As shown in Table 7, during grading of the project, the modeled construction noise levels could reach 65.0 dBA L_{eq} at the façade of the nearest residential receptor located close to the northeastern portion of the project site, up to 64.5 dBA L_{eq} at the façade of the nearest residential receptor the west, up to 61.8 dBA L_{eq} at the façade of the nearest residential receptor to the southeast, up to 60.8 dBA L_{eq} at the façade of the nearest residential receptors to the south and east, up to and 58.2 dBA L_{eq} at the façade of the nearest residential use to the south.

As stated previously, per FTA daytime construction noise levels should not exceed 80 dBA L_{eq} for an 8-hour period at residential uses and 85 dBA L_{eq} for an 8-hour period at commercial uses. Therefore, project construction is not anticipated to exceed the FTA thresholds for either residential or commercial uses. Furthermore, with compliance with the City's Municipal Code, it is assumed that construction would not occur during the noise-sensitive nighttime hours.

Impacts related to construction noise will be further minimized with adherence to the above Municipal Ordinances and implementation of the best management practice measures (BMPs) presented below.

In addition to adherence to the City of Indio Municipal Code which limits the construction hours of operation, the following BMPs are recommended to reduce construction noise and vibrations, emanating from the proposed project:

1. During all project site excavation and grading on-site, construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturer standards.

2. The contractor shall place all stationary construction equipment so that emitted noise is directed away from the noise sensitive receptors nearest the project site.

3. Equipment shall be shut off and not left to idle when not in use.

4. The contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise/vibration sources and sensitive receptors nearest the project site during all project construction.

5. The project proponent shall mandate that the construction contractor prohibit the use of music or sound amplification on the project site during construction.

6. The construction contractor shall limit haul truck deliveries to the same hours specified for construction equipment.

7. Limit the use of heavy equipment or vibratory rollers and soil compressors along the project boundaries to the greatest degree possible. It is acknowledged that some soil compression may be necessary along the project boundaries.

8. Jackhammers, pneumatic equipment and all other portable stationary noise sources shall be shielded and noise shall be directed away from sensitive receptors.

9. For the duration of construction activities, the construction manager shall serve as the contact person should noise levels become disruptive to local residents. A sign should be posted at the project site with the contact phone number.

With use of BMPs, such as the use of mufflers and/or temporary sound barriers that block the line-of-sight between the closest receptor and the construction activity, construction noise levels can be reduced by approximately 10 dBA at the closest receptor locations (see Table 7 for details).

Table 7
Estimated Construction Noise Levels at Sensitive Receptors With BMPs

Construction Phase	Receptor Location	Existing Ambient Noise Levels (dBA Leq)[1]	Reduction in dBA from BMPs	Construction Noise Levels at Receptor Locations (dBA Leq)[2]	Construction Noise Levels With BMPs (dBA Leq)[3]	Increase Over Ambient (dBA)
Grading	Southeast (NM1)	48.7	10.0	61.6	51.6	2.9
	Southeast and East (NM2)	50.5	10.0	60.8	50.8	0.3
	Northeast (NM3)	41.6	10.0	65.0	55.0	13.4
	West (NM4)	45.9	10.0	64.5	54.5	8.6
	South (NM5)	72.1	10.0	58.2	48.2	-23.9
Building Construction	Southeast (NM1)	48.7	10.0	56.3	46.3	-2.4
	Southeast and East (NM2)	50.5	10.0	55.4	45.4	-5.1
	Northeast (NM3)	41.6	10.0	59.6	49.6	8.0
	West (NM4)	45.9	10.0	59.2	49.2	3.3
	South (NM5)	72.1	10.0	52.8	42.8	-29.3
Paving	Southeast (NM1)	48.7	10.0	57.7	47.7	-1.0
	Southeast and East (NM2)	50.5	10.0	56.8	46.8	-3.7
	Northeast (NM3)	41.6	10.0	61.0	51.0	9.4
	West (NM4)	45.9	10.0	60.6	50.6	4.7
	South (NM5)	72.1	10.0	54.2	44.2	-27.9
Architectural Coating	Southeast (NM1)	48.7	10.0	48.3	38.3	-10.4
	Southeast and East (NM2)	50.5	10.0	47.5	37.5	-13.0
	Northeast (NM3)	41.6	10.0	51.7	41.7	0.1
	West (NM4)	45.9	10.0	51.2	41.2	-4.7
	South (NM5)	72.1	10.0	44.9	34.9	-37.2

Notes:

(1) Noise measurement locations are shown in Exhibit 3.

(2) Construction noise calculations available in Appendix C .

(3) Mitigation of 10 dBA can be achieved through use of mufflers and/or temporary sound barriers.

6.2 - Groundborne Vibration

This impact discussion analyzes the potential for the proposed project to cause an exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels. Vibration levels in the project area would be influenced by construction activities and from the ongoing operations of the proposed project.

The California Department of Transportation (Caltrans) Transportation and Construction Vibration Manual identifies various vibration damage criteria for different building classes. This evaluation uses the Caltrans architectural damage criterion for continuous vibrations at residential structures of 0.2 inch-per-second PPV. Further, as the nearest sensitive receptors to project construction are residents, per Caltrans guidance (see Table 2) the criterion for human annoyance of 0.2 PPV is utilized. The types of construction vibration impact include human annoyance and building damage. Human annoyance occurs when construction vibration rises significantly above the threshold of human perception for extended periods of time. Building damage can be cosmetic or structural.

6.2.1 - Construction Vibration

Construction activities can produce vibration that may be felt by adjacent 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 highest degree of groundborne vibration would be generated during the paving construction phase due to the operation of a vibratory roller. Based on the Federal Transit Administration (FTA) data, vibration velocities from vibratory roller operations are estimated to be approximately 0.1980 inch-per-second PPV at 26 feet from the source of activity.[2] As such, structures located greater than 26 feet from vibratory roller operations would not experience groundborne vibration above the Caltrans significance thresholds (i.e. 0.2 inch-per-second PPV for structures and 0.2 inch-per-second PPV for human annoyance). As the nearest existing structures are located approximately 50 feet from any location within the project boundary where a vibratory roller may be used (such as in preparation for paving the internal roads), the Caltrans significance thresholds would not be exceeded. Therefore, impacts would be less than significant in this regard.

6.2.2 - Operational Vibration

As the proposed project consists of a proposed residential use, the project does not include any sources of operational vibration; no impacts are anticipated.

[2] Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, September 2018.

6.3 - Operational Noise

This impact discussion analyzes the potential for a substantial permanent increase in ambient noise levels in the project vicinity associated with operation of the proposed project, including impacts related to offsite vehicular noise and exposure of neighboring land uses to onsite noise.

As stated previously, analysis of on-site operational noise is typically not conducted for residential projects as they usually do not include stationary noise sources that could result in substantial increases in ambient noise levels resulting in violation of established standards. Therefore, the evaluation of project operational noise in this study is limited to the potential impacts associated with project generated vehicle traffic (off-site noise).

Potential noise impacts associated with the operations of the proposed project are a result of project-generated vehicular traffic on the project vicinity roadways. As stated previously, the noise impacts related to vehicular traffic were modeled using a version of the Federal Highway Administration (FHWA) Traffic Noise Prediction Model (FHWA-RD-77-108), as modified for CNEL and the "Calveno" energy curves. The Opening Year (2022) without Project, Opening Year (2022) with Project and Opening Year (2022) Maximum Density average daily traffic (ADT) were obtained from the Project-specific Traffic Impact Analysis (TIA) (Kunzman Associates, 2021). FHWA calculation spreadsheets are included in Appendix C.

The calculated noise levels in Table 5 show that project-related traffic would contribute a maximum of 0.2 dBA to existing noise levels along Avenue 50. If the project was built to maximum density (with 136 SFDs instead of the proposed 103 SFDs), the calculated noise levels in Table 6 show that project-related traffic would contribute a maximum of 0.3 dBA to existing noise levels along Avenue 50. Table 8 also shows that at project buildout, in 2022, there would be a marginal increase in noise (0.2 dBA) due to the increase of project-related traffic on roadways in the project vicinity. If the project was built to maximum density, the calculated noise levels in Table 9 show that project-related traffic would contribute a maximum of 0.8 dBA above noise levels without the project along Hjorth Street. Table 10 shows that General Plan buildout, in 2040, there would be a marginal increase in noise (0.2 dBA) due to the increase of project-related traffic on roadways in the project vicinity. If the project was built to maximum density, the calculated noise levels for the Year 20240 Scenario in Table 11 show that project-related traffic would contribute a maximum of 0.5 dBA above noise levels without the project along Hjorth Street.

As the project-related increase in traffic noise do not exceed 3 dBA under any of the scenarios analyzed, the project would not contribute to a substantial permanent increase in ambient noise levels in the project vicinity.

Table 8
Project Traffic Noise Contributions to Buildout (2022) Scenario

Road Segments	Opening Year (2022) without Project		Opening Year (2022) with Project			Is the Increase Significant ?
	ADT	dB CNEL	ADT	Total	Project-Specific Increase	
North/South						
Jefferson Street						
n/o Avenue 48	23,400	71.4	23,500	71.4	0.0	**No**
n/o Avenue 49	31,300	72.7	31,600	72.7	0.0	**No**
s/o Avenue 49	29,200	72.4	29,500	72.4	0.0	**No**
s/o Avenue 50	19,300	70.6	19,400	70.6	0.0	**No**
Verano Drive						
s/o Avenue 50	900	57.2	900	57.2	0.0	**No**
Madison Street						
n/o Avenue 49	9,000	67.2	9,000	67.2	0.0	**No**
s/o Avenue 49	8,600	67.0	8,600	67.0	0.0	**No**
s/o Avenue 50	8,100	66.8	8,100	66.8	0.0	**No**
Hjorth Street						
s/o Avenue 49	500	54.7	500	54.7	0.0	**No**
Monroe Street						
n/o Avenue 50	12,100	68.5	12,300	68.6	0.1	**No**
s/o Avenue 50	9,800	67.6	9,800	67.6	0.0	**No**
East/West						
Avenue 48						
w/o Jefferson Street	17,300	70.1	17,400	70.1	0.0	**No**
e/o Jefferson Street	18,400	70.3	18,400	70.3	0.0	**No**
Avenue 49						
w/o Jefferson Street	1,000	57.7	1,000	57.7	0.0	**No**
e/o Jefferson Street	4,300	64.0	4,300	64.0	0.0	**No**
w/o Madison Street	3,300	62.9	3,300	62.9	0.0	**No**
e/o Madison Street	3,200	62.8	3,200	62.8	0.0	**No**
Avenue 50						
w/o Jefferson Street	9,000	67.2	9,100	67.3	0.1	**No**
e/o Jefferson Street	11,900	68.5	12,400	68.6	0.1	**No**
w/o Madison Street	11,300	68.2	11,800	68.4	0.2	**No**
e/o Madison Street	9,700	67.6	10,100	67.7	0.1	**No**
e/o Hjorth Street	9,900	67.7	10,300	67.8	0.1	**No**
e/o Monroe Street	12,700	68.7	12,800	68.8	0.1	**No**

*The uniform distance of 50 feet from centerline allows for direct comparisons of potential increases or decreases in noise levels based upon various traffic scenarios; however, at this distance, no specific noise standard necessarily applies

Table 9
Maximum Density Project Traffic Noise Contributions to Buildout (2022) Scenario

Road Segments	Opening Year (2022) without Project		Opening Year (2022) with Maximum Density Project			Is the Increase Significant ?
	ADT	dB CNEL	ADT	Total	Project-Specific Increase	
North/South						
Jefferson Street						
n/o Avenue 48	23,400	71.4	23,600	71.4	0.0	**No**
n/o Avenue 49	31,300	72.7	31,700	72.7	0.0	**No**
s/o Avenue 49	29,200	72.4	29,600	72.4	0.0	**No**
s/o Avenue 50	19,300	70.6	19,400	70.6	0.0	**No**
Verano Drive						
s/o Avenue 50	900	57.2	900	57.2	0.0	**No**
Madison Street						
n/o Avenue 49	9,000	67.2	9,100	67.3	0.1	**No**
s/o Avenue 49	8,600	67.0	8,700	67.1	0.1	**No**
s/o Avenue 50	8,100	66.8	8,100	66.8	0.0	**No**
Hjorth Street						
s/o Avenue 49	500	54.7	600	55.5	0.8	**No**
Monroe Street						
n/o Avenue 50	12,100	68.5	12,400	68.6	0.1	**No**
s/o Avenue 50	9,800	67.6	9,900	67.7	0.1	**No**
East/West						
Avenue 48						
w/o Jefferson Street	17,300	70.1	17,400	70.1	0.0	**No**
e/o Jefferson Street	18,400	70.3	18,500	70.4	0.1	**No**
Avenue 49						
w/o Jefferson Street	1,000	57.7	1,000	57.7	0.0	**No**
e/o Jefferson Street	4,300	64.0	4,300	64.0	0.0	**No**
w/o Madison Street	3,300	62.9	3,300	62.9	0.0	**No**
e/o Madison Street	3,200	62.8	3,200	62.8	0.0	**No**
Avenue 50						
w/o Jefferson Street	9,000	67.2	9,100	67.3	0.1	**No**
e/o Jefferson Street	11,900	68.5	12,500	68.7	0.2	**No**
w/o Madison Street	11,300	68.2	11,900	68.5	0.3	**No**
e/o Madison Street	9,700	67.6	10,300	67.8	0.2	**No**
e/o Hjorth Street	9,900	67.7	10,400	67.9	0.2	**No**
e/o Monroe Street	12,700	68.7	12,900	68.8	0.1	**No**

*The uniform distance of 50 feet from centerline allows for direct comparisons of potential increases or decreases in noise levels based upon various traffic scenarios; however, at this distance, no specific noise standard necessarily applies

Table 10
Project Traffic Noise Contributions to 2040 Scenario

Road Segments	Year 2040 without Project		Year 2040 with Project			Is the Increase Significant ?
	ADT	dB CNEL	ADT	Total	Project-Specific Increase	
North/South						
Jefferson Street						
n/o Avenue 48	31,700	72.7	31,800	72.7	0.0	**No**
n/o Avenue 49	42,400	74.0	42,700	74.0	0.0	**No**
s/o Avenue 49	39,500	73.7	39,800	73.7	0.0	**No**
s/o Avenue 50	26,200	71.9	26,300	71.9	0.0	**No**
Verano Drive						
s/o Avenue 50	1,200	58.5	1,200	58.5	0.0	**No**
Madison Street						
n/o Avenue 49	12,200	68.6	12,200	68.6	0.0	**No**
s/o Avenue 49	11,600	68.3	11,600	68.3	0.0	**No**
s/o Avenue 50	11,000	68.1	11,000	68.1	0.0	**No**
Hjorth Street						
s/o Avenue 49	700	56.2	700	56.2	0.0	**No**
Monroe Street						
n/o Avenue 50	16,300	69.8	16,500	69.9	0.1	**No**
s/o Avenue 50	13,200	68.9	13,200	68.9	0.0	**No**
East/West						
Avenue 48						
w/o Jefferson Street	23,500	71.4	23,600	71.4	0.0	**No**
e/o Jefferson Street	25,000	71.7	25,000	71.7	0.0	**No**
Avenue 49						
w/o Jefferson Street	1,300	58.8	1,300	58.8	0.0	**No**
e/o Jefferson Street	5,800	65.3	5,800	65.3	0.0	**No**
w/o Madison Street	4,500	64.2	4,500	64.2	0.0	**No**
e/o Madison Street	4,300	64.0	4,300	64.0	0.0	**No**
Avenue 50						
w/o Jefferson Street	12,200	68.6	12,300	68.6	0.0	**No**
e/o Jefferson Street	16,000	69.7	16,500	69.9	0.2	**No**
w/o Madison Street	15,300	69.5	15,800	69.7	0.2	**No**
e/o Madison Street	13,100	68.9	13,500	69.0	0.1	**No**
e/o Hjorth Street	13,400	69.0	13,800	69.1	0.1	**No**
e/o Monroe Street	17,200	70.1	17,300	70.1	0.0	**No**

*The uniform distance of 50 feet from centerline allows for direct comparisons of potential increases or decreases in noise levels based upon various traffic scenarios; however, at this distance, no specific noise standard necessarily applies

Table 11
Maximum Density Project Traffic Noise Contributions to 2040 Scenario

Road Segments	Year 2040 without Project		Year 2040 with Maximum Density Project			Is the Increase Significant ?
	ADT	dB CNEL	ADT	Total	Project-Specific Increase	
North/South						
Jefferson Street						
n/o Avenue 48	31,700	72.7	31,900	72.7	0.0	**No**
n/o Avenue 49	42,400	74.0	42,800	74.0	0.0	**No**
s/o Avenue 49	39,500	73.7	39,900	73.7	0.0	**No**
s/o Avenue 50	26,200	71.9	26,300	71.9	0.0	**No**
Verano Drive						
s/o Avenue 50	1,200	58.5	1,200	58.5	0.0	**No**
Madison Street						
n/o Avenue 49	12,200	68.6	12,300	68.6	0.0	**No**
s/o Avenue 49	11,600	68.3	11,700	68.4	0.1	**No**
s/o Avenue 50	11,000	68.1	11,000	68.1	0.0	**No**
Hjorth Street						
s/o Avenue 49	700	56.2	800	56.7	0.5	**No**
Monroe Street						
n/o Avenue 50	16,300	69.8	16,600	69.9	0.1	**No**
s/o Avenue 50	13,200	68.9	13,300	68.9	0.0	**No**
East/West						
Avenue 48						
w/o Jefferson Street	23,500	71.4	23,600	71.4	0.0	**No**
e/o Jefferson Street	25,000	71.7	25,100	71.7	0.0	**No**
Avenue 49						
w/o Jefferson Street	1,300	58.8	1,300	58.8	0.0	**No**
e/o Jefferson Street	5,800	65.3	5,800	65.3	0.0	**No**
w/o Madison Street	4,500	64.2	4,500	64.2	0.0	**No**
e/o Madison Street	4,300	64.0	4,300	64.0	0.0	**No**
Avenue 50						
w/o Jefferson Street	12,200	68.6	12,300	68.6	0.0	**No**
e/o Jefferson Street	16,000	69.7	16,600	69.9	0.2	**No**
w/o Madison Street	15,300	69.5	15,900	69.7	0.2	**No**
e/o Madison Street	13,100	68.9	13,700	69.1	0.2	**No**
e/o Hjorth Street	13,400	69.0	13,900	69.1	0.1	**No**
e/o Monroe Street	17,200	70.1	17,400	70.1	0.0	**No**

*The uniform distance of 50 feet from centerline allows for direct comparisons of potential increases or decreases in noise levels based upon various traffic scenarios; however, at this distance, no specific noise standard necessarily applies

6.4 - Airport Noise

This impact discussion analyzes the potential for nearby airports or private airstrips to expose people residing or working in the project area to excessive noise levels.

The nearest airport is Bermuda Dunes, located approximately 3.7 miles northwest of the project site. The project site falls well outside the 65 dBA noise contour[3] and is not considered as a source that contributes to the ambient noise levels on the project site. Impacts are considered to be less than significant.

[3] Source: http://www.rcaluc.org/Portals/13/PDFGeneral/plan/newplan/43-%20Vol.%203%20Bermuda%20Dunes.pdf

SECTION 7: REFERENCES

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Appendix A:
Study Area Photographic Index

Noise Measurement Field Data

PHOTOS:

NM1 looking South across Avenue 50 towards Mountain View Country Club (130 yards)

NM1 looking North across site and enmpty undeveloped land beyond towards Avenue 49 (750 yards)

Noise Measurement Field Data

PHOTOS:

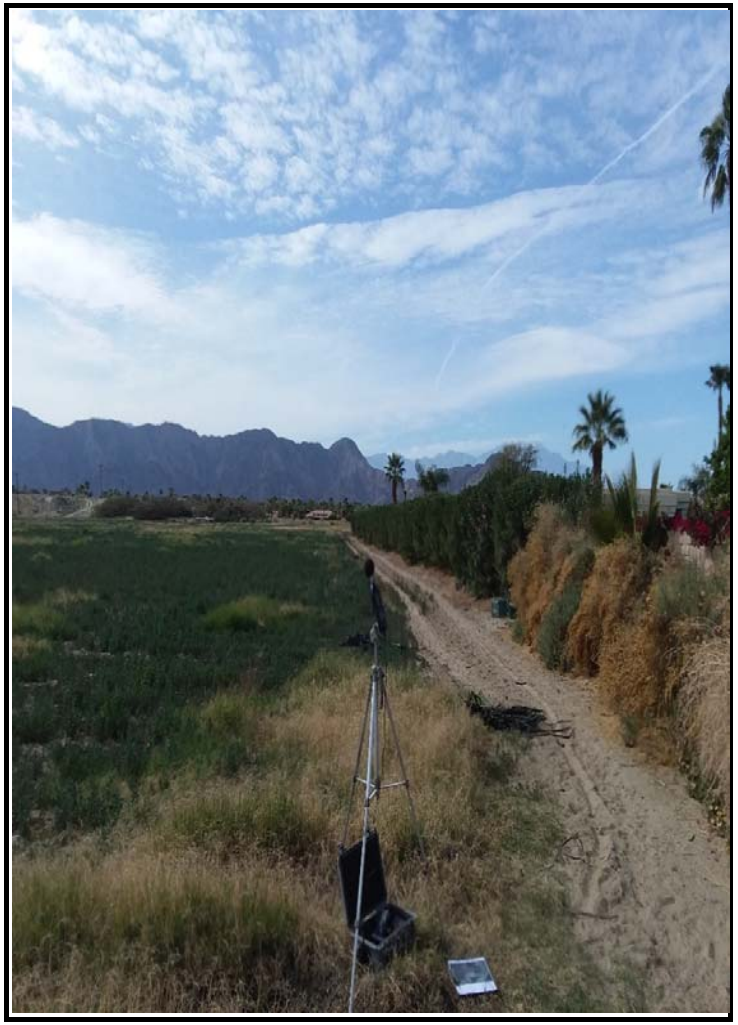
NM2 looking South down dirt road along Eastern edge of reside 80700 Avenue 50, towards Avenue 50 (230 yards).

NM2 looking North toward NM3 location (340 yards), the site o the LHS, property 80886 Avenue 50 on the RHS.

Noise Measurement Field Data

PHOTOS:

NM3 looking South towards NM2 location (340 yards) and Avenue 50 (570 yards)



NM3 looking West towards NM4 location (410 yards)

Noise Measurement Field Data

PHOTOS:

NM4 looking East back towards NM3 location (410 yards)

NM4 looking South passed sandy knoll towards Avenue 50 & NM location (610 yards)

Noise Measurement Field Data

PHOTOS:

NM5 looking East towards Mountain View Country Club Entranc
Avenue 50 & Verano Drive intersection (120 yards).

NM5 looking North across Avenue 50 passed sandy knoll towarc
NM4 location (610 yards)

Appendix B:
Field Noise Measurement Print-outs

Noise Measurement Field Data

Project Name: Indio Project, City of Indio **Date:** February 20, 2020

Project #:

Noise Measurement #: NM1 **Technician:** Ian Gallagher

Nearest Address or Cross Street: 80550 Avenue 50, Indio, California.

Site Description (Type of Existing Land Use and any other notable features): On-site: open land, sandy soil and weeds, sandy knoll on W side of site.

Adjacent: Medium to low density residential N, S, E & W, mixture of regular and gated communites. Mountain View Country Club (residential) to the immediate S.

Weather: <5% high cloud, filtered sunshine. Sunset 5:41 PM **Settings:** SLOW FAST

Temperature: 79 deg F **Wind:** 5-10 mph **Humidity:** 11% **Terrain:** Flat

Start Time: 12:34 PM **End Time:** 12:49 PM **Run Time:** (1 x 15 minutes)

Leq: 48.7 dB

Lmax 61.2 dB

L2 54.8 dB

L8 51.7 dB

L25 49.4 dB

L50 47.2 dB

Primary Noise Source: Traffic noise from vehicles travelling along Avenue 50, 179 vehicles passed by microphone during measurement. Traffic ambiance from other roads.

Secondary Noise Sources: Bird song, continuous overhead aircraft, jet, propellor and chopper, leaf rustle caused by gentle breeze.

NOISE METER:	SoundTrack LXT Class 1	**CALIBRATOR:**	Larson Davis CAL250
MAKE:	Larson Davis	**MAKE:**	Larson Davis
MODEL:	LXT1	**MODEL:**	Cal 250
SERIAL NUMBER:	3099	**SERIAL NUMBER:**	2733
FACTORY CALIBRATION DATE:	6/23/2017	**FACTORY CALIBRATION DATE:**	6/19/2017
FIELD CALIBRATION DATE:	2/20/2020		

Noise Measurement Field Data

Project Name: Indio Project, City of Indio **Date:** February 20, 2020

Project #:

Noise Measurement #: NM2 **Technician:** Ian Gallagher

Nearest Address or Cross Street: 80700 Avenue 50, Indio, California.

Site Description (Type of Existing Land Use and any other notable features): On-site: open land, sandy soil and weeds, sandy knoll on W side of site.

Adjacent: Medium to low density residential N, S, E & W, mixture of regular and gated communites. Mountain View Country Club (residential) to the immediate S.

Weather: <5% high cloud, filtered sunshine. Sunset 5:41 PM **Settings:** SLOW FAST

Temperature: 79 deg F **Wind:** 5-10 mph **Humidity:** 11% **Terrain:** Flat

Start Time: 1:03 PM **End Time:** 1:18 PM **Run Time:** (1 x 15 minutes)

Leq: 50.5 dB **Primary Noise Source:** Traffic ambiance from vehicles travelling along Avenue 50 & Madison Street.

Lmax 62.9 dB Traffic ambiance from other roads.

L2 56.0 dB **Secondary Noise Sources:** Bird song, continuous overhead aircraft, jet, propellor and chopper,

L8 52.9 dB leaf rustle caused by gentle breeze. Distant lawn mower in operation.

L25 51.0 dB

L50 49.2 dB

NOISE METER:	SoundTrack LXT Class 1	**CALIBRATOR:**	Larson Davis CAL250
MAKE:	Larson Davis	**MAKE:**	Larson Davis
MODEL:	LXT1	**MODEL:**	Cal 250
SERIAL NUMBER:	3099	**SERIAL NUMBER:**	2733
FACTORY CALIBRATION DATE:	6/23/2017	**FACTORY CALIBRATION DATE:**	6/19/2017
FIELD CALIBRATION DATE:	2/20/2020		

Noise Measurement Field Data

Project Name: Indio Project, City of Indio **Date:** February 20, 2020

Project #:

Noise Measurement #: NM3 **Technician:** Ian Gallagher

Nearest Address or Cross Street: 170 yards SSW of Croquet Ct & Kebon Dr

Site Description (Type of Existing Land Use and any other notable features): On-site: open land, sandy soil and weeds, sandy knoll on W side of site.

Adjacent: Medium to low density residential N, S, E & W, mixture of regular and gated communites. Mountain View Country Club (residential) to the immediate S.

Weather: <5% high cloud, filtered sunshine. Sunset 5:41 PM **Settings:** SLOW FAST

Temperature: 79 deg F **Wind:** 5-10 mph **Humidity:** 11% **Terrain:** Flat

Start Time: 1:37 PM **End Time:** 1:52 PM **Run Time:** (1 x 15 minutes)

Leq:	41.6	dB
Lmax	50.5	dB
L2	46.8	dB
L8	43.4	dB
L25	41.9	dB
L50	40.9	dB

Primary Noise Source: Traffic ambiance from vehicles travelling along Avenue 50 & Madison Street.

Traffic ambiance from other roads.

Secondary Noise Sources: Bird song, continuous overhead aircraft, jet, propellor and chopper,

leaf rustle caused by gentle breeze.

NOISE METER:	SoundTrack LXT Class 1	**CALIBRATOR:**	Larson Davis CAL250
MAKE:	Larson Davis	**MAKE:**	Larson Davis
MODEL:	LXT1	**MODEL:**	Cal 250
SERIAL NUMBER:	3099	**SERIAL NUMBER:**	2733
FACTORY CALIBRATION DATE:	6/23/2017	**FACTORY CALIBRATION DATE:**	6/19/2017
FIELD CALIBRATION DATE:	2/20/2020		

Noise Measurement Field Data

Project Name: Indio Project, City of Indio **Date:** February 20, 2020

Project #:

Noise Measurement #: NM4 **Technician:** Ian Gallagher

Nearest Address or Cross Street: 120 yards NNE of Colarado St & Tigris Ave

Site Description (Type of Existing Land Use and any other notable features): On-site: open land, sandy soil and weeds, sandy knoll on W side of site.

Adjacent: Medium to low density residential N, S, E & W, mixture of regular and gated communites. Mountain View Country Club (residential) to the immediate S.

Weather: 5 to 10% high cloud, filtered sunshine. Sunset 5:41 PM **Settings:** SLOW FAST

Temperature: 79 deg F **Wind:** 5-10 mph **Humidity:** 11% **Terrain:** Flat

Start Time: 2:07 PM **End Time:** 2:22 PM **Run Time:** (1 x 15 minutes)

Leq: 45.9 dB **Primary Noise Source:** Traffic ambiance from vehicles travelling along Avenue 50.

Lmax 61.5 dB Traffic ambiance from other roads. Dog barking at 2:21 PM.

L2 54.6 dB **Secondary Noise Sources:** Bird song, continuous overhead aircraft, jet, propellor and chopper,

L8 49.2 dB leaf rustle caused by gentle breeze.

L25 44.3 dB

L50 41.9 dB

NOISE METER:	SoundTrack LXT Class 1	**CALIBRATOR:**	Larson Davis CAL250
MAKE:	Larson Davis	**MAKE:**	Larson Davis
MODEL:	LXT1	**MODEL:**	Cal 250
SERIAL NUMBER:	3099	**SERIAL NUMBER:**	2733
FACTORY CALIBRATION DATE:	6/23/2017	**FACTORY CALIBRATION DATE:**	6/19/2017
FIELD CALIBRATION DATE:	2/20/2020		

Noise Measurement Field Data

Project Name: Indio Project, City of Indio **Date:** February 20, 2020

Project #:

Noise Measurement #: NM5 **Technician:** Ian Gallagher

Nearest Address or Cross Street: 120 yards West of Verano Dr & Avenue 50 intersection.

Site Description (Type of Existing Land Use and any other notable features): On-site: open land, sandy soil and weeds, sandy knoll on W side of site.

Adjacent: Medium to low density residential N, S, E & W, mixture of regular and gated communites. Mountain View Country Club (residential) to the immediate S.

Weather: 5 to 10% high cloud, filtered sunshine. Sunset 5:41 PM **Settings:** SLOW FAST

Temperature: 79 deg F **Wind:** 5-10 mph **Humidity:** 11% **Terrain:** Flat

Start Time: 3:17 PM **End Time:** 3:32 PM **Run Time:** (1 x 15 minutes)

Leq: 72.1 dB

Lmax 82.3 dB

L2 79.0 dB

L8 76.6 dB

L25 73.7 dB

L50 69.4 dB

Primary Noise Source: Traffic noise from the 289 vehicles travelling along Avenue 50 during 15 minute measuremnt. Traffic ambiance from other roads.

Secondary Noise Sources: Bird song, continuous overhead aircraft, jet, propellor and chopper, leaf rustle caused by gentle breeze.

NOISE METER:	SoundTrack LXT Class 1	**CALIBRATOR:**	Larson Davis CAL250
MAKE:	Larson Davis	**MAKE:**	Larson Davis
MODEL:	LXT1	**MODEL:**	Cal 250
SERIAL NUMBER:	3099	**SERIAL NUMBER:**	2733
FACTORY CALIBRATION DATE:	6/23/2017	**FACTORY CALIBRATION DATE:**	6/19/2017
FIELD CALIBRATION DATE:	2/20/2020		

Appendix C:
Construction Noise and FHWA Model Analysis Calculations

Table A
Construction Noise by Phase - Receptor Southeast of the Project Site (NM1)

A	B	C	D	E	F	G	H	I
Equipment Type	# of Equipment	Equipment Lmax at 50 feet, dBA[1, 2]	Distance to Receptor[3]	Equipment Usage Percent	Usage Factor	Dist. Correction dB	Usage Adj. dB	Noise Level Leq (dBA) at Receptor
Grading								
Excavators	2	81	964	40	0.80	-25.7	-1.0	54.3
Graders	1	85	964	40	0.40	-25.7	-4.0	55.3
Rubber Tired Dozers	1	82	964	40	0.40	-25.7	-4.0	52.3
Scrapers	2	84	964	40	0.80	-25.7	-1.0	57.3
Tractors/Loaders/Backhoes	2	80	964	25	0.50	-25.7	-3.0	51.3
							Log Sum	61.6
Building Construction								
Cranes	1	81	964	16	0.16	-25.7	-8.0	47.3
Forklifts	3	64	964	50	1.50	-25.7	1.8	40.1
Generator Sets	1	81	964	40	0.40	-25.7	-4.0	51.3
Welders	1	73	964	40	0.40	-25.7	-4.0	43.3
Tractors/Loaders/Backhoes	3	80	964	25	0.75	-25.7	-1.2	53.0
							Log Sum	56.3
Paving								
Pavers	2	77	964	50	1.00	-25.7	0.0	51.3
Paving Equipment	2	85	964	20	0.40	-25.7	-4.0	55.3
Rollers	2	80	964	20	0.40	-25.7	-4.0	50.3
							Log Sum	57.7
Architectural Coating								
Air Compressors	1	78	964	40	0.40	-25.7	-4.0	48.3
							Log Sum	48.3

Notes:

(1) Source: Referenced noise levels from the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (September 2018).

(2) Source: https://www.google.com/url?q=http://www.noisetesting.info/blog/warehouse-forklift-workplace-noise-levels/&sa=D&source=hangouts&ust=1545259247311000&usg=AFQjCNHFcKKoEKUjv5VZMOtw_KO977Em1A

(3) Distance to receptor calculated from center of site. Construction noise projected from the center of the project site to the structural façade of the nearest sensitive use.

Table B
Construction Noise by Phase - Receptors Southeast and East of the Project Site (NM2)

A	B	C	D	E	F	G	H	I
Equipment Type	# of Equipment	Equipment Lmax at 50 feet, dBA[1, 2]	Distance to Receptor[3]	Equipment Usage Percent	Usage Factor	Dist. Correction dB	Usage Adj. dB	Noise Level Leq (dBA) at Receptor
Grading								
Excavators	2	81	1060	40	0.80	-26.5	-1.0	53.5
Graders	1	85	1060	40	0.40	-26.5	-4.0	54.5
Rubber Tired Dozers	1	82	1060	40	0.40	-26.5	-4.0	51.5
Scrapers	2	84	1060	40	0.80	-26.5	-1.0	56.5
Tractors/Loaders/Backhoes	2	80	1060	25	0.50	-26.5	-3.0	50.5
							Log Sum	60.8
Building Construction								
Cranes	1	81	1060	16	0.16	-26.5	-8.0	46.5
Forklifts	3	64	1060	50	1.50	-26.5	1.8	39.2
Generator Sets	1	81	1060	40	0.40	-26.5	-4.0	50.5
Welders	1	73	1060	40	0.40	-26.5	-4.0	42.5
Tractors/Loaders/Backhoes	3	80	1060	25	0.75	-26.5	-1.2	52.2
							Log Sum	55.4
Paving								
Pavers	2	77	1060	50	1.00	-26.5	0.0	50.5
Paving Equipment	2	85	1060	20	0.40	-26.5	-4.0	54.5
Rollers	2	80	1060	20	0.40	-26.5	-4.0	49.5
							Log Sum	56.8
Architectural Coating								
Air Compressors	1	78	1060	40	0.40	-26.5	-4.0	47.5
							Log Sum	47.5

Notes:

(1) Source: Referenced noise levels from the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (September 2018).

(2) Source: https://www.google.com/url?q=http://www.noisetesting.info/blog/warehouse-forklift-workplace-noise-levels/&sa=D&source=hangouts&ust=1545259247311000&usg=AFQjCNHFcKKoEKUjv5VZMOtw_KO977Em1A

(3) Distance to receptor calculated from center of site. Construction noise projected from the center of the project site to the structural façade of the nearest sensitive use.

Table C
Construction Noise by Phase - Receptors Northeast of the Project Site (NM3)

A	B	C	D	E	F	G	H	I
Equipment Type	# of Equipment	Equipment Lmax at 50 feet, dBA[1, 2]	Distance to Receptor[3]	Equipment Usage Percent	Usage Factor	Dist. Correction dB	Usage Adj. dB	Noise Level Leq (dBA) at Receptor
Grading								
Excavators	2	81	653	40	0.80	-22.3	-1.0	57.7
Graders	1	85	653	40	0.40	-22.3	-4.0	58.7
Rubber Tired Dozers	1	82	653	40	0.40	-22.3	-4.0	55.7
Scrapers	2	84	653	40	0.80	-22.3	-1.0	60.7
Tractors/Loaders/Backhoes	2	80	653	25	0.50	-22.3	-3.0	54.7
							Log Sum	65.0
Building Construction								
Cranes	1	81	653	16	0.16	-22.3	-8.0	50.7
Forklifts	3	64	653	50	1.50	-22.3	1.8	43.4
Generator Sets	1	81	653	40	0.40	-22.3	-4.0	54.7
Welders	1	73	653	40	0.40	-22.3	-4.0	46.7
Tractors/Loaders/Backhoes	3	80	653	25	0.75	-22.3	-1.2	56.4
							Log Sum	59.6
Paving								
Pavers	2	77	653	50	1.00	-22.3	0.0	54.7
Paving Equipment	2	85	653	20	0.40	-22.3	-4.0	58.7
Rollers	2	80	653	20	0.40	-22.3	-4.0	53.7
							Log Sum	61.0
Architectural Coating								
Air Compressors	1	78	653	40	0.40	-22.3	-4.0	51.7
							Log Sum	51.7

Notes:

(1) Source: Referenced noise levels from the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (September 2018).

(2) Source: https://www.google.com/url?q=http://www.noisetesting.info/blog/warehouse-forklift-workplace-noise-levels/&sa=D&source=hangouts&ust=1545259247311000&usg=AFQjCNHFcKKoEKUjv5VZMOtw_KO977Em1A

(3) Distance to receptor calculated from center of site. Construction noise projected from the center of the project site to the structural façade of the nearest sensitive use.

Table D
Construction Noise by Phase - Receptors West of the Project Site (NM4)

A	B	C	D	E	F	G	H	I
Equipment Type	# of Equipment	Equipment Lmax at 50 feet, dBA[1, 2]	Distance to Receptor[3]	Equipment Usage Percent	Usage Factor	Dist. Correction dB	Usage Adj. dB	Noise Level Leq (dBA) at Receptor
Grading								
Excavators	2	81	690	40	0.80	-22.8	-1.0	57.2
Graders	1	85	690	40	0.40	-22.8	-4.0	58.2
Rubber Tired Dozers	1	82	690	40	0.40	-22.8	-4.0	55.2
Scrapers	2	84	690	40	0.80	-22.8	-1.0	60.2
Tractors/Loaders/Backhoes	2	80	690	25	0.50	-22.8	-3.0	54.2
							Log Sum	64.5
Building Construction								
Cranes	1	81	690	16	0.16	-22.8	-8.0	50.2
Forklifts	3	64	690	50	1.50	-22.8	1.8	43.0
Generator Sets	1	81	690	40	0.40	-22.8	-4.0	54.2
Welders	1	73	690	40	0.40	-22.8	-4.0	46.2
Tractors/Loaders/Backhoes	3	80	690	25	0.75	-22.8	-1.2	56.0
							Log Sum	59.2
Paving								
Pavers	2	77	690	50	1.00	-22.8	0.0	54.2
Paving Equipment	2	85	690	20	0.40	-22.8	-4.0	58.2
Rollers	2	80	690	20	0.40	-22.8	-4.0	53.2
							Log Sum	60.6
Architectural Coating								
Air Compressors	1	78	690	40	0.40	-22.8	-4.0	51.2
							Log Sum	51.2

Notes:

(1) Source: Referenced noise levels from the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (September 2018).

(2) Source: https://www.google.com/url?q=http://www.noisetesting.info/blog/warehouse-forklift-workplace-noise-levels/&sa=D&source=hangouts&ust=1545259247311000&usg=AFQjCNHFcKKoEKUjv5VZMOtw_KO977Em1A

(3) Distance to receptor calculated from center of site. Construction noise projected from the center of the project site to the structural façade of the nearest sensitive use.

Table E
Construction Noise by Phase - Receptors South of the Project Site (NM5)

A	B	C	D	E	F	G	H	I
Equipment Type	# of Equipment	Equipment Lmax at 50 feet, dBA[1, 2]	Distance to Receptor[3]	Equipment Usage Percent	Usage Factor	Dist. Correction dB	Usage Adj. dB	Noise Level Leq (dBA) at Receptor
Grading								
Excavators	2	81	1430	40	0.80	-29.1	-1.0	50.9
Graders	1	85	1430	40	0.40	-29.1	-4.0	51.9
Rubber Tired Dozers	1	82	1430	40	0.40	-29.1	-4.0	48.9
Scrapers	2	84	1430	40	0.80	-29.1	-1.0	53.9
Tractors/Loaders/Backhoes	2	80	1430	25	0.50	-29.1	-3.0	47.9
							Log Sum	58.2
Building Construction								
Cranes	1	81	1430	16	0.16	-29.1	-8.0	43.9
Forklifts	3	64	1430	50	1.50	-29.1	1.8	36.6
Generator Sets	1	81	1430	40	0.40	-29.1	-4.0	47.9
Welders	1	73	1430	40	0.40	-29.1	-4.0	39.9
Tractors/Loaders/Backhoes	3	80	1430	25	0.75	-29.1	-1.2	49.6
							Log Sum	52.8
Paving								
Pavers	2	77	1430	50	1.00	-29.1	0.0	47.9
Paving Equipment	2	85	1430	20	0.40	-29.1	-4.0	51.9
Rollers	2	80	1430	20	0.40	-29.1	-4.0	46.9
							Log Sum	54.2
Architectural Coating								
Air Compressors	1	78	1430	40	0.40	-29.1	-4.0	44.9
							Log Sum	44.9

Notes:

(1) Source: Referenced noise levels from the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (September 2018).

(2) Source: https://www.google.com/url?q=http://www.noisetesting.info/blog/warehouse-forklift-workplace-noise-levels/&sa=D&source=hangouts&ust=1545259247311000&usg=AFQjCNHFcKKoEKUjv5VZMOtw_KO977Em1A

(3) Distance to receptor calculated from center of site. Construction noise projected from the center of the project site to the structural façade of the nearest sensitive use.

NOISE CONTOUR WORKSHEET

(calculations based on the FHWA-RD-77-108 Highway Noise Prediction Model)

PROJECT INFORMATION

Project:	- -	**W.O. #:**	- -
City/County:	- -	**Date Entered:**	
Comments:	- -	**Entered By:**	- -

SITE INFORMATION

Planning Area(s):	- -	**Land Use(s):**	- -
Obs. Location:	(see below)	**Scenario:**	LOS 'C' Volumes

ROADWAY SEGMENT, VEHICULAR AND OBSERVER CHARACTERISTICS

Roadway:	"standard roadway"	**Roadway Class:**	- -
Segment:	- -	**Right of Way:**	- -
ADT:	10,000	**Travel Speed:**	40 MPH
Pad Elev. (opt.):	0.0 feet	**Obs. Height:**	5.0 feet
Roadway Elev.:	0.0 feet	**Roadway Grade:**	0.1%

	Required	Type	Height
Ext. Mitigation:	- -	- -	- -

	Left	Right	Total
Exposure:	90º	90º	180º

	Autos	Med Trucks	Heavy Trucks
Noise Height: (above roadway)	0.00 feet	2.30 feet	8.01 feet
Hard/Soft Site:	Hard	Hard	Hard

Veh. Distributio	Daytime	Evening	Nighttime	Daily
Automobiles	77.50%	12.90%	9.59%	97.42%
Medium Trucks	84.78%	4.89%	10.33%	1.84%
Heavy Trucks	86.49%	2.70%	10.81%	0.74%

Notes: Standard Road at 50 feet from the centerline

CALCULATED CNEL NOISE IMPACTS

Noise impact under various scenarios:

67.7
Exterior
Umitigated

Noise is a function of both speed and ADTs.
Since speed is assumed constant at 40 mph for this analysis, noise is a function of ADT only, and can be calculated by the following equation:

CNEL (dB) = 67.7 + 10 x log (ADT/10,000)