Appendix E
Noise Impact Assessment

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Noise Impact Assessment
for the
El Centro Town Center Phase II – Single Family Residential and Industrial Project

City of El Centro, California

Prepared For:

Michael Baker International
9755 Clairemont Mesa Boulevard
San Diego, CA 92124

Prepared By:

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

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CONTENTS

LIST OF TABLES

LIST OF FIGURES

ATTACHMENTS

LIST OF ACRONYMS AND ABBREVIATIONS

CA	Conditionally Acceptable
Caltrans	California Department of Transportation
City	City of El Centro
CNEL	Community Noise Equivalent Level
CU	Clearly Unacceptable
dB	Decibel
dBA	Decibel is A-weighted
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}	Measure of ambient noise
L_{max}	The maximum A-weighted noise level during the measurement period.
L_{min}	The minimum A-weighted noise level during the measurement period.
NA	Normally Acceptable
NIOSH	National Institute for Occupational Safety and Health
NU	Normally Unacceptable
OPR	Office of Planning and Research
OSHA	Federal Occupational Safety and Health Administration
PPV	Peak particle velocity
Project	El Centro Town Center 2 Single Family Project
RCNM	Roadway Construction Noise Model
RMS	Root mean square
STC	Sound Transmission Class
VdB	Vibration Velocity Level
WEAL	Western Electro-Acoustic Laboratory, Inc.

1.0 INTRODUCTION

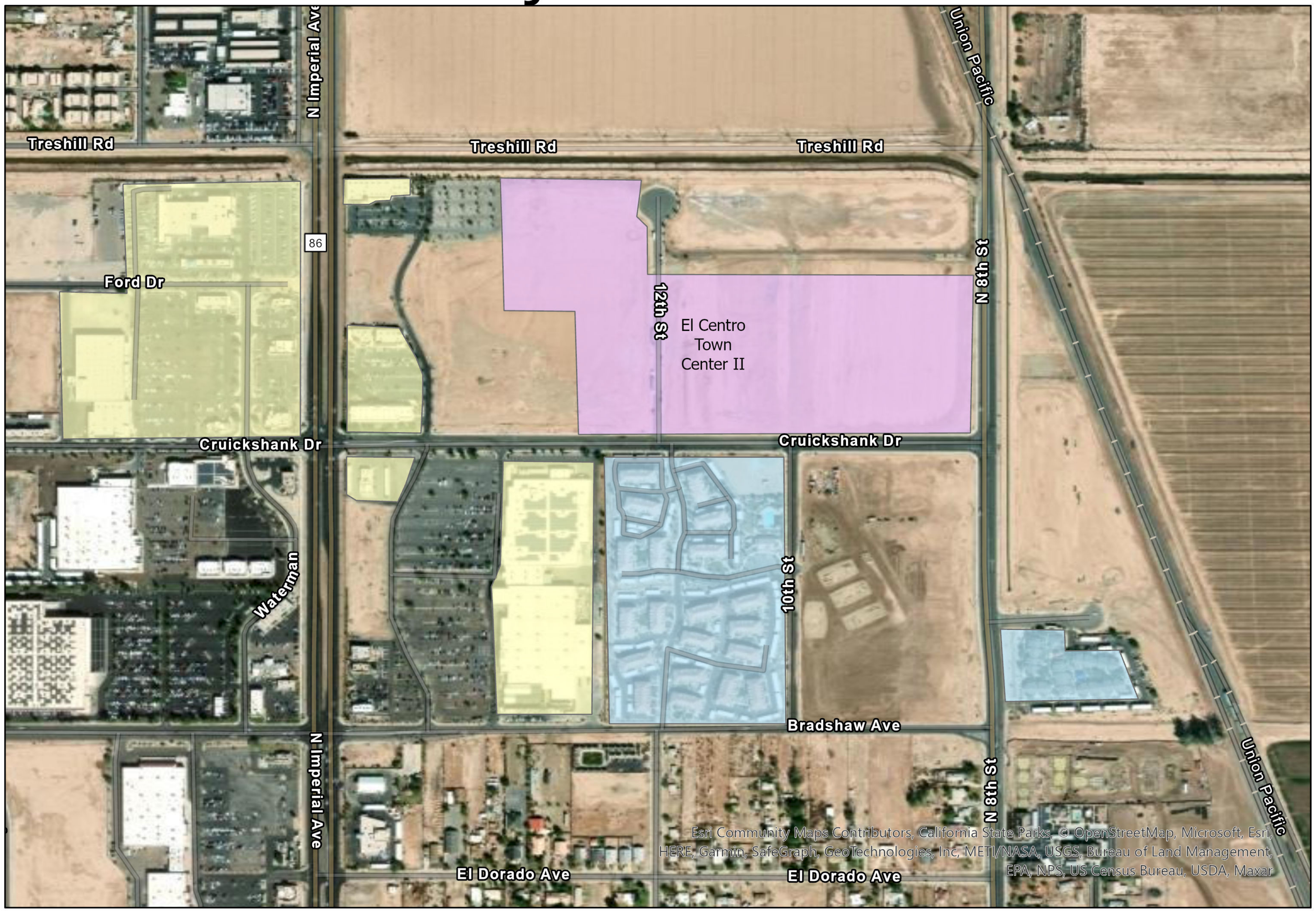
This report documents the results of a Noise Impact Assessment completed for the El Centro Town Center 2 Single Family Project (Project), which proposes the construction of a mixed-use development with 17.26-acres of warehouse space and 18.52-acres of residential units in the City of El Centro, California. This report was prepared as a comparison of predicted Project noise levels to noise standards promulgated by the City of El Centro General Plan Noise Element and Code of Ordinances. The purpose of this report is to estimate Project-generated noise and to determine the level of impact the Project would have on the environment.

1.1 Project Location and Description

The 35.78-acre Project Site is located in the Cit of El Centro (City), located in Imperial County. The Project Site is currently undeveloped and located at the Cruickshank Drive and North 8th Street intersection. The land uses surrounding the site consist mainly of commercial and agricultural (see Figure 1-1. *Project Location*).

The Project proposes the construction of a mixed-use development with warehouse buildings spanning 17.26-acres and a maximum of 104 residential units on the adjacent 18.52-acres, along with a park and various Project amenities. The Project is proposed to be constructed in two phases. Phase 1 proposes the construction of the residential units and Phase 2 proposes the construction of the warehouse space. Construction of Phase 1 would begin in January of 2024 and Phase 2 would begin in January of 2025 with both phases lasting approximately 20 months. Project construction would require the export of 9,000 cubic yards of soil and the import of 116,000 cubic yards of soil with a majority of the soil movement occurring in Phase 1.

Project Location



Legend

- Residential
- El Centro Town Center II Project Site
- Commercial

N W E S

0 0.06 0.13 0.25 Miles

Map Date: 2/3/2022
Photo (or Base) Source: *ArcGIS*

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Figure 1-1. Project Location

2022-186

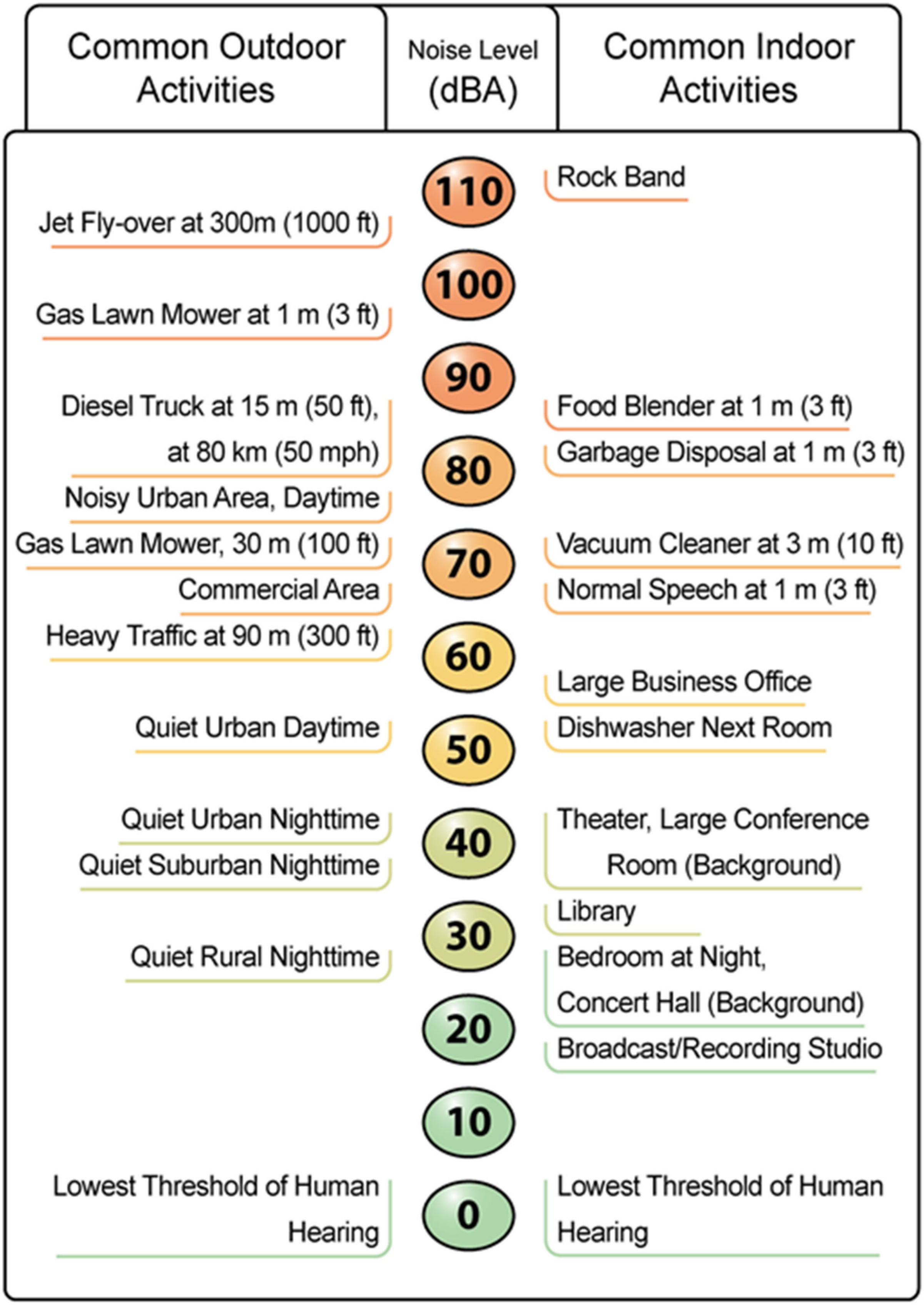
2.0 ENVIRONMENTAL NOISE AND GROUNDBORNE VIBRATION ANALYSIS

2.1 Fundamentals of Noise and Environmental Sound

2.1.1 Addition of Decibels

The decibel (dB) scale is logarithmic, not linear, and therefore sound levels cannot be added or subtracted through ordinary arithmetic. Two sound levels 10 dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic decibel is A-weighted (dBA), an increase of 10 dBA is generally perceived as a doubling in loudness. For example, a 70-dBA sound is half as loud as an 80-dBA sound and twice as loud as a 60-dBA sound. When two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be three dB higher than one source under the same conditions (Federal Transit Administration [FTA] 2018). For example, a 65-dB source of sound, such as a truck, when joined by another 65 dB source results in a sound amplitude of 68 dB, not 130 dB (i.e., doubling the source strength increases the sound pressure by three dB). Under the decibel scale, three sources of equal loudness together would produce an increase of five dB.

Typical noise levels associated with common noise sources are depicted in Figure 2-1.



Source: California Department of Transportation (Caltrans) 2020a

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Figure 2-1. Common Noise Levels

2022-186

2.1.2 Sound Propagation and Attenuation

Noise can be generated by a number of sources, including mobile sources such as automobiles, trucks and airplanes, and stationary sources such as construction sites, machinery, and industrial operations. Sound spreads (propagates) uniformly outward in a spherical pattern, and the sound level decreases (attenuates) at a rate of approximately 6 dB (dBA) for each doubling of distance from a stationary or point source (FHWA 2017). Sound from a line source, such as a highway, propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of approximately 3 dBA for each doubling of distance from a line source, such as a roadway, depending on ground surface characteristics (Federal Highway Administration [FHWA] 2017). No excess attenuation is assumed for hard surfaces like a parking lot or a body of water. Soft surfaces, such as soft dirt or grass, can absorb sound, so an excess ground-attenuation value of 1.5 dBA per doubling of distance is normally assumed. For line sources, an overall attenuation rate of three dB per doubling of distance is assumed (FHWA 2011).

Noise levels may also be reduced by intervening structures; generally, a single row of detached buildings between the receptor and the noise source reduces the noise level by about five dBA (FHWA 2006), while a solid wall or berm generally reduces noise levels by 10 to 20 dBA (FHWA 2011). However, noise barriers or enclosures specifically designed to reduce site-specific construction noise can provide a sound reduction 35 dBA or greater (Western Electro-Acoustic Laboratory, Inc. [WEAL] 2000). To achieve the most potent noise-reducing effect, a noise enclosure/barrier must physically fit in the available space, must completely break the “line of sight” between the noise source and the receptors, must be free of degrading holes or gaps, and must not be flanked by nearby reflective surfaces. Noise barriers must be sizable enough to cover the entire noise source and extend lengthwise and vertically as far as feasibly possible to be most effective. The limiting factor for a noise barrier is not the component of noise transmitted through the material, but rather the amount of noise flanking around and over the barrier. In general, barriers contribute to decreasing noise levels only when the structure breaks the "line of sight" between the source and the receiver.

The manner in which older homes in California were constructed generally provides a reduction of exterior-to-interior noise levels of about 20 to 25 dBA with closed windows (Caltrans 2002). The exterior-to-interior reduction of newer residential units is generally 30 dBA or more (Harris Miller, Miller & Hanson Inc. [HMMH] 2006). Generally, in exterior noise environments ranging from 60 dBA Community Noise Equivalent Level (CNEL) to 65 dBA CNEL, interior noise levels can typically be maintained below 45 dBA, a typical residential interior noise standard, with the incorporation of an adequate forced air mechanical ventilation system in each residential building, and standard thermal-pane residential windows/doors with a minimum rating of Sound Transmission Class (STC) 28. (STC is an integer rating of how well a building partition attenuates airborne sound. In the U.S., it is widely used to rate interior partitions, ceilings, floors, doors, windows, and exterior wall configurations). In exterior noise environments of 65 dBA CNEL or greater, a combination of forced-air mechanical ventilation and sound-rated construction methods is often required to meet the interior noise level limit. Attaining the necessary noise reduction from exterior to interior spaces is readily achievable in noise environments less than 75 dBA CNEL with proper wall construction techniques following California Building Code methods, the selections of proper windows and doors, and the incorporation of forced-air mechanical ventilation systems.

2.1.3 Noise Descriptors

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. Several rating scales have been developed to analyze the adverse effect of community noise on people. Because environmental noise fluctuates over time, these scales consider that the effect of noise on people is largely dependent on the total acoustical energy content of the noise, as well as the time of day when the noise occurs. The noise descriptors most often encountered when dealing with traffic, community, and environmental noise include the average hourly noise level (in L_{eq}) and the average daily noise levels/community noise equivalent level (in L_{dn}/CNEL). The L_{eq} is a measure of ambient noise, while the L_{dn} and CNEL are measures of community noise. Each is applicable to this analysis and defined as follows:

- **Equivalent Noise Level (L_{eq})** is the average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.
- **Day-Night Average (L_{dn})** is a 24-hour average L_{eq} with a 10-dBA "weighting" added to noise during the hours of 10:00 pm to 7:00 am to account for noise sensitivity in the nighttime. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.4 dBA L_{dn}.
- **Community Noise Equivalent Level (CNEL)** is a 24-hour average L_{eq} with a 5-dBA weighting during the hours of 7:00 pm to 10:00 pm and a 10-dBA weighting added to noise during the hours of 10:00 pm to 7:00 am to account for noise sensitivity in the evening and nighttime, respectively.

Table 2-1 provides a list of other common acoustical descriptors.

Table 2-1. Common Acoustical Descriptors	
Descriptor	**Definition**
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micropascals (or 20 micronewtons per square meter), where 1 pascal is the pressure resulting from a force of 1 newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e.g., 20 micropascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hertz (Hz)	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sounds are below 20 Hz and ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high-frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, L_{eq}	The average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day/Night Noise Level, L_{dn} or DNL	A 24-hour average L_{eq} with a 10 dBA "weighting" added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the nighttime. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.4 dBA L_{dn}.
Community Noise Equivalent Level, CNEL	A 24-hour average L_{eq} with a 5 dBA "weighting" during the hours of 7:00 p.m. to 10:00 p.m. and a 10 dBA "weighting" added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the evening and nighttime, respectively. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.7 dBA CNEL.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends on its amplitude, duration, frequency, and time of occurrence and tonal or informational content, as well as the prevailing ambient noise level.
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20.

The A-weighted decibel sound level scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about ±1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends on the distance between the receptor and the noise source. Close to the noise source, the models are accurate to within about ±1 to 2 dBA.

2.1.4 Human Response to Noise

The human response to environmental noise is subjective and varies considerably from individual to individual. Noise in the community has often been cited as a health problem, not in terms of actual physiological damage, such as hearing impairment, but in terms of inhibiting general well-being and contributing to undue stress and annoyance. The health effects of noise in the community arise from interference with human activities, including sleep, speech, recreation, and tasks that demand concentration or coordination. Hearing loss can occur at the highest noise intensity levels.

Noise environments and consequences of human activities are usually well represented by median noise levels during the day or night or over a 24-hour period. Environmental noise levels are generally considered low when the CNEL or L_{dn} is below 60 dBA, moderate in the 60 to 70 dBA range, and high above 70 dBA. Examples of low daytime levels are isolated, natural settings with noise levels as low as 20 dBA and quiet, suburban, residential streets with noise levels around 40 dBA. Noise levels above 45 dBA at night can disrupt sleep. Examples of moderate-level noise environments are urban residential or semi-commercial areas (typically 55 to 60 dBA) and commercial locations (typically 60 dBA). People may consider louder environments adverse, but most will accept the higher levels associated with noisier urban residential or residential-commercial areas (60 to 75 dBA) or dense urban or industrial areas (65 to 80 dBA). Regarding increases in A-weighted noise levels (dBA), the following relationships should be noted in understanding this analysis:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived by humans.
- Outside of the laboratory, a 3-dBA change is considered a just-perceivable difference.
- A change in level of at least 5 dBA is required before any noticeable change in community response would be expected. An increase of 5 dBA is typically considered substantial.
- A 10-dBA change is subjectively heard as an approximate doubling in loudness and would almost certainly cause an adverse change in community response.

2.1.5 Effects of Noise on People

2.1.5.1 Hearing Loss

While physical damage to the ear from an intense noise impulse is rare, a degradation of auditory acuity can occur even within a community noise environment. Hearing loss occurs mainly due to chronic exposure to excessive noise but may be due to a single event such as an explosion. Natural hearing loss associated with aging may also be accelerated from chronic exposure to loud noise.

The Occupational Safety and Health Administration (OSHA) has a noise exposure standard that is set at the noise threshold where hearing loss may occur from long-term exposures. The maximum allowable level is 90 dBA averaged over eight hours. If the noise is above 90 dBA, the allowable exposure time is correspondingly shorter.

2.1.5.2 Annoyance

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The L_{dn} as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise. There continues to be disagreement about the relative annoyance of these different sources.

2.2 Fundamentals of Environmental Groundborne Vibration

2.2.1 Vibration Sources and Characteristics

Sources of earthborne vibrations include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or manmade causes (explosions, machinery, traffic, trains, construction equipment, etc.). Vibration sources may be continuous (e.g., factory machinery) or transient (e.g., explosions).

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One is the peak particle velocity (PPV); another is the root mean square (RMS) velocity. The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. The RMS velocity is defined as the average of the squared amplitude of the signal. The PPV and RMS vibration velocity amplitudes are used to evaluate human response to vibration.

PPV is generally accepted as the most appropriate descriptor for evaluating the potential for building damage. For human response, however, an average vibration amplitude is more appropriate because it takes time for the human body to respond to the excitation (the human body responds to an average vibration amplitude, not a peak amplitude). Because the average particle velocity over time is zero, the RMS amplitude is typically used to assess human response. The RMS value is the average of the amplitude squared over time, typically a 1- sec. period (FTA 2018).

Table 2-2 displays the reactions of people and the effects on buildings produced by continuous vibration levels. The annoyance levels shown in the table should be interpreted with care since vibration may be found to be annoying at much lower levels than those listed, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage. In high-noise environments, which are more prevalent where groundborne vibration approaches perceptible levels, this rattling phenomenon may also be produced by loud airborne environmental noise causing induced vibration in exterior doors and windows.

Ground vibration can be a concern in instances where buildings shake, and substantial rumblings occur. However, it is unusual for vibration from typical urban sources such as buses and heavy trucks to be perceptible. For instance, heavy-duty trucks generally generate groundborne vibration velocity levels of 0.006 PPV at 50 feet under typical circumstances, which as identified in Table 2-2 is considered very unlikely to cause damage to buildings of any type. Common sources for groundborne vibration are planes, trains, and construction activities such as earth-moving which requires the use of heavy-duty earth moving equipment.

Table 2-2. Human Reaction and Damage to Buildings for Continuous or Frequent Intermittent Vibration Levels			
Peak Particle Velocity (inches/second)	**Approximate Vibration Velocity Level (VdB)**	**Human Reaction**	**Effect on Buildings**
0.006–0.019	64–74	Range of threshold of perception	Vibrations unlikely to cause damage of any type
0.08	87	Vibrations readily perceptible	Threshold at which there is a risk of architectural damage to extremely fragile historic buildings, ruins, ancient monuments
0.1	92	Level at which continuous vibrations may begin to annoy people, particularly those involved in vibration sensitive activities	Threshold at which there is a risk of architectural damage to fragile buildings. Virtually no risk of architectural damage to normal buildings
0.25	94	Vibrations may begin to annoy people in buildings	Threshold at which there is a risk of architectural damage to historic and some old buildings
0.3	96	Vibrations may begin to feel severe to people in buildings	Threshold at which there is a risk of architectural damage to older residential structures
0.5	103	Vibrations considered unpleasant by people subjected to continuous vibrations	Threshold at which there is a risk of architectural damage to new residential structures and Modern industrial/commercial buildings

Source: Caltrans 2020b

3.0 EXISTING ENVIRONMENTAL NOISE SETTING

3.1 Noise Sensitive Land Uses

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Additional land uses such as hospitals, historic sites, cemeteries, and certain recreation areas are considered sensitive to increases in exterior noise levels. Schools, churches, hotels, libraries, and other places where low interior noise levels are essential are also considered noise-sensitive land uses.

The nearest existing noise-sensitive land use to the Project Site is an apartment complex, Town Center Villa Apartments, located south of the Project Site across Cruickshank Drive.

3.1.1 Existing Ambient Noise Environment

The most common and significant source of noise in the Project Area is mobile noise generated by transportation-related sources as well as aircraft noise from overflying aircraft landing at and taking off from the Imperial County Airport, located just under one mile to the northwest. Other sources of noise are the various land uses (i.e., residential, commercial and agricultural) that generate stationary-source noise. The Project Site currently consists of flat undeveloped land surrounded mainly by commercial and residential land uses. As shown in Table 3-1 below, the ambient recorded noise levels range from 40.1 dBA to 56.5 dBA L_{eq} on and in the vicinity of the Project Site. As shown in Table 3-2, the existing traffic-generated noise levels in the Project vicinity, a predominate source of noise, ranges from 43.3 to 65.1 dBA CNEL.

3.1.2 Existing Ambient Noise Measurements

In order to quantify existing ambient noise levels in the Project Area, ECORP Consulting, Inc. conducted four short-term noise measurements (15-minutes), three of which were on the Project Site (Location 1 - 3), and one located across Cruickshank Drive (Location 4), on the afternoon of September 9, 2022. These short-term noise measurements are representative of typical existing noise exposure within and immediately adjacent to the Project Site during the daytime (see Attachment A). The 15-minute measurements were taken between 1:01 p.m. and 2:35 p.m. Additionally, ECORP Consulting, Inc. conducted three short-term (30-minute) noise measurements on October 1, 2020, at additional locations south of the Project Site fronting Cruickshank Drive and North 8th Street, at what is presently the Town Center Villa Apartments. While it is acknowledged that these additional measurements were taken three years previous and before the development of the Town Center Villa Apartments, they are provided here due to the extremely close proximity to the Project Site and as additional data to supplement the more recent noise measurements. The average noise levels at each location are listed in Table 3-1.

Table 3-1. Existing (Baseline) Noise Measurements					
Location Number	Location	L_{eq} dBA	L_{min} dBA	L_{max} dBA	Time
Proposed Project (September 9, 2022)					
1	North end of Project Site adjacent to Central Drive	**42.9**	37.9	81.7	1:01 p.m. – 1:16 p.m.
2	West end of Project Site adjacent to Social Security Administration building	**40.1**	39.1	49.7	1:33 p.m. – 1:48 p.m.
3	North 12th Street and Cruickshank Drive intersection	**56.5**	54.5	76.0	1:58 p.m. – 2:13 p.m.
4	Across Cruickshank Drive from the Project Site adjacent to North 10th Street	**53.6**	39.5	72.6	2:20 p.m. – 2:35 p.m.
Additional Measurements (October 1, 2020)					
1	Corner of Bradshaw Avenue and 10th Street	**55.7**	45.7	75.6	7:27 a.m.- 7:57 a.m.
2	Residential complex on 8th Street across from Town Center IV Project Site	**61.3**	46.6	75.6	8:04 a.m. – 8:34 a.m.
3	Intersection of 10th Street and Cruickshank Drive	**52.0**	36.6	79.2	8:45 a.m. – 9:15 a.m.

Source: Measurements were taken by ECORP with an Ex Tech SDL 600 precision sound level meter, which satisfies the American National Standards Institute for general environmental noise measurement instrumentation. See Attachment A for noise measurement outputs.

Notes: L_{eq} is the average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. L_{min} is the minimum noise level during the measurement period and L_{max} is the maximum noise level during the measurement period.

As shown in Table 3-1, the ambient recorded noise levels range from 40.1 dBA to 56.5 dBA L_{eq} over the course of the four short-term noise measurements taken in the Project vicinity in September of 2022. The most common noise in the Project vicinity is produced by automotive vehicles (e.g., cars, trucks, buses, motorcycles) on area roadways.

3.1.3 Existing Roadway Noise Levels

Existing roadway noise levels were calculated for the roadway segments in the Project vicinity. This task was accomplished using the FHWA Highway Traffic Noise Prediction Model (FHWA-RD-77-108) (see Attachment B) and traffic volumes from the Project's Traffic Impact Study (Michael Baker International 2022). The model calculates the average noise level at specific locations based on traffic volumes, average speeds, roadway geometry, and site environmental conditions. The average vehicle noise rates (energy rates) used in the FHWA model have been modified to reflect average vehicle noise rates identified for California by Caltrans.

The Caltrans data shows that California automobile noise is 0.8 to 1.0 dBA higher than national levels and that medium and heavy truck noise is 0.3 to 3.0 dBA lower than national levels. The average daily noise levels along these roadway segments are presented in Table 3-2.

Table 3-2. Existing Roadway Noise Levels

Roadway Segment	Surrounding Uses	CNEL at 100 feet from Centerline of Roadway
Cruickshank Drive		
West of Imperial Avenue	Commercial	57.2
Between Imperial Avenue and 10th Street	Commercial and Residential	58.0
Between 10th Street and 8th Street	Residential	55.7
Imperial Avenue		
North of Cruickshank Drive	Commercial	65.1
South of Cruickshank Drive	Commercial	63.2
10th Street		
South of Cruickshank Drive	Commercial and Residential	43.3
8th Street		
North of Cruickshank Drive	Residential	60.5
South of Cruickshank Drive	Residential	56.4

Source: Traffic noise levels were calculated by ECORP using the FHWA roadway noise prediction model in conjunction with the trip generation rate identified by Michael Baker International (2022). Refer to Attachment B for traffic noise modeling assumptions and results.

4.0 REGULATORY FRAMEWORK

4.1 Federal

4.1.1 Occupational Safety and Health Act of 1970

OSHA regulates onsite noise levels and protects workers from occupational noise exposure. To protect hearing, worker noise exposure is limited to 90 decibels with A-weighting (dBA) over an eight-hour work shift (29 Code of Regulations 1910.95). Employers are required to develop a hearing conservation program when employees are exposed to noise levels exceeding 85 dBA. These programs include provision of hearing protection devices and testing employees for hearing loss on a periodic basis.

4.1.2 National Institute of Occupational Safety and Health

A division of the US Department of Health and Human Services, the National Institute for Occupational Safety and Health (NIOSH) has established a construction-related noise level threshold as identified in the Criteria for a Recommended Standard: Occupational Noise Exposure prepared in 1998. NIOSH identifies a noise level threshold based on the duration of exposure to the source. The NIOSH construction-related noise level threshold starts at 85 dBA for more than 8 hours per day; for every 3-dBA increase, the exposure time is cut in half. This reduction results in noise level thresholds of 88 dBA for more than 4 hours per day, 92 dBA for more than 1 hour per day, 96 dBA for more than 30 minutes per day, and up to 100 dBA for more than 15 minutes per day. The intention of these thresholds is to protect people from hearing losses resulting from occupational noise exposure.

4.1.3 Federal Interagency Committee on Noise (FICON)

The FICON thresholds of significance assist in the evaluation of increased traffic noise. The 2000 FICON findings provide guidance as to the significance of changes in ambient noise levels due to transportation noise sources. FICON recommendations are based on studies that relate aircraft and traffic noise levels to the percentage of persons highly annoyed by the noise. FICON's measure of substantial increase for transportation noise exposure is as follows:

- If the existing ambient noise levels at existing and future noise-sensitive land uses (e.g. residential, etc.) are less than 60 dBA CNEL and the project creates a readily perceptible 5 dBA CNEL or greater noise level increase and the resulting noise level would exceed acceptable exterior noise standards; or
- If the existing noise levels range from 60 to 65 dBA CNEL and the project creates a barely perceptible 3 dBA CNEL or greater noise level increase and the resulting noise level would exceed acceptable exterior noise standards; or
- If the existing noise levels already exceed 65 dBA CNEL, and the project creates a community noise level increase of greater than 1.5 dBA CNEL.

4.2 State

4.2.1 State of California General Plan Guidelines

The State of California regulates vehicular and freeway noise affecting classrooms, sets standards for sound transmission and occupational noise control, and identifies noise insulation standards and airport noise/land-use compatibility criteria. The State of California General Plan Guidelines (State of California 2003), published by the Governor's Office of Planning and Research (OPR), also provides guidance for the acceptability of projects within specific CNEL/L_{dn} contours. The guidelines also present adjustment factors that may be used in order to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution.

4.2.2 State Office of Planning and Research Noise Element Guidelines

The State OPR *Noise Element Guidelines* include recommended exterior and interior noise level standards for local jurisdictions to identify and prevent the creation of incompatible land uses due to noise. The Noise Element Guidelines contain a Land Use Compatibility table that describes the compatibility of various land uses with a range of environmental noise levels in terms of the CNEL.

4.2.3 California Department of Transportation

In 2020, the California Department of Transportation (Caltrans) published the Transportation and Construction Vibration Manual (Caltrans 2020b). The manual provides general guidance on vibration issues associated with the construction and operation of projects concerning human perception and structural damage. Table 2-2 above presents recommendations for levels of vibration that could result in damage to structures exposed to continuous vibration.

4.3 Local

4.3.1 City of El Centro General Plan Noise Element

The Project Site is located in the City of El Centro and therefore would potentially affect receptors within the City from onsite and offsite sources. The City Noise Element of the General Plan is a comprehensive program for including noise management in the planning process, providing a tool for planners to use in achieving and maintaining land uses that are compatible with existing and future environmental noise levels. The Noise Policy identifies noise-sensitive land uses and noise sources and defines areas of noise impact for the purpose of developing programs to ensure that residents in El Centro, and other noise-sensitive land uses, will be protected from excessive noise intrusion.

As development proposals are submitted to the City, each is evaluated with respect to the provisions in the Noise Element to ensure that noise impacts are reduced through planning and project design. Through implementation of the policies of the Noise Element, El Centro seeks to reduce or avoid adverse noise impacts for the purposes of protecting the general health, safety, and welfare of the community.

The most basic planning strategy to minimize adverse impacts on new land uses due to noise is to avoid designating certain land uses at locations within the City that would negatively affect noise sensitive land users. Users such as schools, hospitals, childcare, senior care, congregate care, churches, and all types of residential use should be located outside of any area anticipated to exceed acceptable noise levels as defined by the Land Use Compatibility Matrix or should be protected from noise through sound attenuation measures such as site and architectural design and sound walls. The City of El Centro has adopted guidelines as a basis for planning decisions based on noise considerations. These guidelines are shown in Table 4-1. In the case that the noise levels identified at a proposed project site fall within levels considered normally acceptable, the project is considered compatible with the existing noise environment.

Table 4-1. Noise/Land Use Compatibility Matrix

Land Use	Community Noise Exposure (L_{dn} or CNEL)						
	50	55	60	65	70	75	80
Residential	NA	NA	CA	CA	NU	CU	CU
Transient Lodging- Motel, Hotel	NA	NA	CA	CA	CA	NU	CU
Schools, Libraries, Churches, Hospitals, Nursing Homes	NA	NA	CA	CA	NU	NU	CU
Auditoriums, Concert Halls, Amphitheaters	CA	CA	CA	CA	CU	CU	CU
Sports Arena, Outdoor Spectator Sports	CA	CA	CA	CA	CA	CU	CU
Playgrounds, Parks	NA	NA	NA	NA	NU	CU	CU
Gold Course, Riding Stables, Water Recreation, Cemeteries	NA	NA	NA	NA	NU	NU	CU
Office Buildings, Business Commercial, and Professional	NA	NA	NA	CA	CA	NU	NU
Industrial, Manufacturing, Utilities, Agriculture	NA	NA	NA	NA	CA	CA	NU

Source: City of El Centro 2004

Notes:

Zone A- Normally Acceptable (NA): Specific land use is satisfactory, based upon the assumption that any buildings involved meet conventional Title 24 construction standards. No special noise insulation required.

Zone B- Conditionally Acceptable (CA): New construction or development shall be undertaken only after a detailed noise analysis is made and noise reduction measures are identified and included in the project design.

Zone C- Normally Unacceptable (NU): New construction or development is discouraged. If new construction is proposed, a detailed analysis is required, noise reduction measures must be identified, and noise insulation features included in the design.

Zone D- Clearly Unacceptable (CU): New construction or development clearly should not be undertaken.

Additionally, the Noise Element contains goals and policies that must be used to guide decisions concerning land uses that are common sources of excessive noise levels. The following relevant and applicable goals from the City's Noise Element have been identified for the project:

- **Noise Goal 1**: Minimize the effect of noise through proper land use planning.

  Policy 1.1: Use noise/land use compatibility standards as a guide for future planning and development decisions.

Policy 1.2: Provide noise control measures and sound attenuating construction in areas of new construction or rehabilitation.

Policy 1.3: Promote alternative sound attenuation measures, such as berms, embankments, landscaping, setbacks, and architectural design where appropriate, rather than wall barriers.

Policy 1.4: Support changes in the Uniform Building Code that incorporate new technologies for reducing exterior noise intrusion into structures and the transmission of interior-generated noise within structures.

- **Noise Goal 2**: Minimize transportation related noise impacts to preserve the City's overall environment.

Policy 2.1: Reduce transportation related noise impacts to sensitive land uses through the use of noise control measures.

Policy 2.3: Incorporate sound-reduction design in development projects impacted by transportation related noise.

- **Noise Goal 3**: Minimize non-transportation related noise impacts to preserve the City's overall environment.

Policy 3.1: Reduce the impact of noise producing land uses and activities on noise sensitive land uses.

Policy 3.2: Incorporate sound-reduction design in new construction or rehabilitation projects impacted by non-transportation related noise.

Policy 3.3: Require mitigation measures to ensure that noise resulting from public and private construction projects is reduced to an acceptable level.

4.3.2 City of El Centro Code of Ordinances

The City's regulations with respect to noise are included in Chapter 17.1, Noise Abatement and Control, of the City's Code of Ordinances. This section provides exterior noise limits for the various land uses within the City. These standards are presented in Table 4-2.

Table 4-2. Exterior Noise Level Limits

Zone*	Time of Day	One-Hour Average
Single-Family Residential Zones	7:00 a.m. – 10:00 p.m. 10:00 p.m. – 7:00 a.m.	55 dBA 45 dBA
Multi-Family Residential Zones	7:00 a.m. – 10:00 p.m. 10:00 p.m. – 7:00 a.m.	55 dBA 50 dBA
Commercial, Civic and Limited Use Zones	7:00 a.m. – 10:00 p.m. 10:00 p.m. – 7:00 a.m.	60 dBA 55 dBA
Manufacturing Zones	7:00 a.m. – 10:00 p.m. 10:00 p.m. – 7:00 a.m.	75 dBA 70 dBA

Source: City of El Centro 2020

*Notes: *Zones which exists on the abutting or nearby property at whose boundary the measurement is taken. The sound level limit at a location on a boundary between two zoning districts is the arithmetic mean of the respective limits for the two districts. If the measured ambient sound level exceeds the applicable limit shown in the Table, the allowable sound level shall be the ambient noise level minus 5 dB but not less than the sound level limit specified in the Table.*

Section 17.1-8, *Construction Equipment*, states that it shall be unlawful for any person to operate construction equipment at any construction site on Sundays, and days appointed by the president, governor, or the City council for a public holiday. In addition, it shall be unlawful for any person to operate construction equipment at any construction site on Mondays through Saturdays except between the hours of 6:00 a.m. and 7:00 p.m. Additionally, no such equipment, or combination of equipment regardless of age or date of acquisition, shall be operated so as to cause noise at a level in excess of 75 decibels for more than eight hours during any twenty-four hour period when measured at or within the property lines of any property which is developed and used either in part or in whole for residential purposes.

5.0 Impact Assessment

5.1 Thresholds of Significance

The impact analysis provided below is based on the following California Environmental Quality Act Guidelines Appendix G thresholds of significance. The Project would result in a significant noise-related impact if it would result in the:

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 applicable standards of other agencies.

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.

For purposes of this analysis, Project construction noise is compared to the City's construction noise standard of 75 dBA at a residential property line. The increase in transportation-related noise is compared to the FICON recommendation for evaluating the impact of increased traffic noise. Noise generated onsite is compared against the City's exterior noise standards presented in Table 4-2.

5.2 Methodology

This analysis of the existing and future noise environments is based on empirical observations and noise prediction modeling. Predicted construction noise levels were calculated utilizing the FHWA's Roadway Construction Noise Model (2006). Groundborne vibration levels associated with construction-related activities for the Project have been evaluated utilizing typical groundborne vibration levels associated with construction equipment. Potential groundborne vibration impacts related to structural damage and human annoyance were evaluated, taking into account the distance from construction activities to nearby structures and typically applied criteria for structural damage and human annoyance.

Transportation-source noise levels in the Project vicinity have been calculated using the FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with traffic counts provided by Michael Baker International (2022). Onsite stationary source noise levels associated with the Project have been calculated with the SoundPLAN 3D noise model, which predicts noise propagation from a noise source based on the location, noise level, and frequency spectra of the noise sources as well as the geometry and reflective properties of the local terrain, buildings and barriers. Baseline noise measurements were taken by ECORP Consulting, Inc. with an Ex Tech SDL 600 precision sound level meter, which satisfies the American National Standards Institute for general environmental noise measurement instrumentation. See Attachment A for noise measurement outputs.

5.3 Impact Analysis

5.3.1 Would the Project Result in Short-Term Construction-Generated Noise in Excess of City Standards?

Onsite Construction Noise

Construction noise associated with the Proposed Project would be temporary and would vary depending on the specific nature of the activities being performed. Noise generated would primarily be associated with the operation of off-road equipment for onsite construction activities as well as construction vehicle traffic on area roadways. Construction noise typically occurs intermittently and varies depending on the nature or phase of construction (e.g., site preparation, excavation, paving). Noise generated by construction equipment, including earth movers, pile drivers, and portable generators, can reach high levels. 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. Other primary sources of acoustical disturbance would be random incidents, which would last less than one minute (such as dropping large pieces of equipment or the hydraulic movement of machinery lifts). During construction, exterior noise levels could negatively affect sensitive land uses in the vicinity of the construction site.

Nearby noise-sensitive land uses consist of an apartment complex located south of the Project Site fronting Cruickshank Drive. Construction equipment and timing were provided by the Project applicant. As previously described, the Project is proposed to be constructed in two phases with the proposed residential units being constructed in Phase 1 and the proposed warehouse buildings constructed in Phase 2. The equipment necessary for the site preparation, grading, building construction and paving is the same for each phase. It is noted that no equipment was identified for the painting phase. Section 17.1-8 of the City's Code of Ordinances states that it shall be unlawful for any person to operate construction equipment at any construction site on Sundays, and days appointed by the president, governor, or the City council for a public holiday. In addition, it shall be unlawful for any person to operate construction equipment at any construction site on Mondays through Saturdays except between the hours of 6:00 a.m. and 7:00 p.m. Furthermore, no such equipment, or combination of equipment regardless of age or date of acquisition, shall be operated so as to cause noise at a level in excess of 75 decibels for more than eight hours during any 24-hour period when measured at or within the property lines of any property which is developed and used either in part or in whole for residential purposes.

It is acknowledged that the majority of construction equipment is not situated at any one location during construction activities, but rather spread throughout the Project Site and at various distances from sensitive receptors. Therefore, this analysis employs FTA guidance for calculating construction noise, which recommends measuring construction noise produced by all construction equipment simultaneously from the center of the Project Site (FTA 2018), which in this case is approximately 400 feet from the apartment complex located south of the Project Site fronting Cruickshank Drive. The anticipated short-term construction noise levels generated for the necessary equipment for each phase of construction are presented in Table 5-1.

Table 5-1. Construction Average (dBA) Noise Levels at Nearest Receptors			
Construction Phase	**Estimated Exterior Construction Noise Level @ Closest Noise Sensitive Receptor (dBA L_{eq})**	**Construction Noise Standard (dBA L_{eq})**	**Exceeds Standards?**
Phase 1			
Site Preparation	67.0	*75*	**No**
Grading	67.6	*75*	**No**
Building Construction	67.5	*75*	**No**
Paving	65.8	*75*	**No**
Phase 2			
Site Preparation	67.0	*75*	**No**
Grading	67.6	*75*	**No**
Building Construction	67.5	*75*	**No**
Paving	65.8	*75*	**No**

Source: Construction noise levels were calculated by ECORP Consulting using the FHWA Roadway Noise Construction Model (FHWA 2006). Refer to Attachment C for Model Data Outputs.

Notes: Construction equipment used during construction provided by Project applicant. Consistent with FTA recommendations for calculating construction noise, construction noise was measured from the center of the Project Site (FTA 2018), which is 400 feet from the nearest sensitive receptor. Construction timing and equipment provided by the project applicant.

L_{eq} = The equivalent energy noise level, is the average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.

As shown in Table 5-1, construction activities would not exceed the applicable noise standards. It is noted that construction noise was modeled on a worst-case basis. It is very unlikely that all pieces of construction equipment would be operating at the same time for the various phases of Project construction as well as at the point closest to residences.

Offsite Construction Worker Trips

Project construction would result in additional traffic on adjacent roadways over the period that construction occurs. According to the California Emissions Estimator Model, which is used to predict the number of construction-related automotive trips, the maximum number of Project construction trips traveling to and from the Project Site during a single construction phase would not be expected to exceed 486 daily trips in total (352 construction worker trips and 134 vendor trips). According to Caltrans Technical Noise Supplement to the Traffic Noise Analysis Protocol (2013), a doubling of traffic on a roadway is required to result in an increase of 3 dB (outside of the laboratory, a 3-dBA change is considered a just-perceivable difference). The Project Site is accessible from Cruickshank Drive via Imperial Avenue. According to the Traffic Impact Study prepared by Michael Baker International (2022) the roadway segment on Cruickshank Drive, east of Imperial Avenue, currently accommodates 4,207 average daily vehicle trips. Thus, Project construction would not result in a doubling of traffic, and therefore its contribution to existing traffic noise would not be perceptible. Additionally, it is noted that construction is temporary, and these trips would cease upon completion of the Project.

5.3.2 Would the Project Result in a Substantial Permanent Increase in Ambient Noise Levels in Excess of City Standards During Operations?

As previously described, noise-sensitive land uses are locations where people reside or where the presence of unwanted sound could adversely affect the use of the land. Residences, schools, hospitals, guest lodging, libraries, and some passive recreation areas would each be considered noise-sensitive and may warrant unique measures for protection from intruding noise. The nearest existing noise-sensitive land use to the Project Site is an apartment complex, Town Center Villa Apartments, located south of the Project Site.

Operational Offsite Traffic Noise

Future traffic noise levels throughout the vicinity of the Proposed Project were modeled based on the traffic volumes identified by Michael Baker International (2022) to determine the noise levels along Project vicinity roadways. Table 5-2 shows the calculated offsite roadway noise levels under existing traffic levels compared to future buildout of the Project. The City has not established a noise threshold for transportation related sources, as such the calculated noise levels as a result of the Project at affected land uses are compared to the FICON recommendation for evaluating the impact of increased traffic noise.

FICON's measure of substantial increase for transportation noise exposure is as follows:

- If the existing ambient noise levels at existing and future noise-sensitive land uses (e.g. residential, etc.) are less than 60 dBA CNEL and the project creates a readily perceptible 5 dBA CNEL or greater noise level increase AND the resulting noise level would exceed acceptable exterior noise standards; or
- If the existing noise levels range from 60 to 65 dBA CNEL and the project creates a barely perceptible 3 dBA CNEL or greater noise level increase and the resulting noise level would exceed acceptable exterior noise standards; or
- If the existing noise levels already exceed 65 dBA CNEL and the project creates a community noise level increase of greater than 1.5 dBA CNEL.

Table 5-2. Proposed Project Predicted Traffic Noise Levels					
Roadway Segment	Surrounding Uses	CNEL at 100 feet from Centerline of Roadway		Noise Standard (dBA CNEL)	Exceed Standard
		Existing Conditions	Existing + Project Conditions		
Cruickshank Drive					
West of Imperial Avenue	Commercial	57.2	59.1	*>5*	**No**
Between Imperial Avenue and 10th Street	Commercial and Residential	58.0	59.2	*>5*	**No**
Between 10th Street and 8th Street	Residential	55.7	55.9	*>5*	**No**
Imperial Avenue					
North of Cruickshank Drive	Commercial	65.1	65.2	*>1.5*	**No**
South of Cruickshank Drive	Commercial	63.2	63.3	*>3*	**No**
10th Street					
South of Cruickshank Drive	Commercial and Residential	43.3	44.7	*>5*	**No**
8th Street					
North of Cruickshank Drive	Residential	60.5	60.5	*>3*	**No**
South of Cruickshank Drive	Residential	56.4	56.4	*>5*	**No**

Source: Traffic noise levels were calculated by ECORP using the FHWA roadway noise prediction model in conjunction with the trip generation rate identified by Michael Baker International (2022). Refer to Attachment B for traffic noise modeling assumptions and results.

As shown, no roadway segment would generate an increase of noise beyond the FICON significance standards.

Operational Onsite Noise

The Project is proposing the construction of a mixed-use development consisting of warehouse space and a maximum of 104 residential units. On-site noise associated with the Proposed Project has been calculated using the SoundPLAN 3D noise model. The modeling scenario accounts for residential noise activity calculated as area sources, input to encompass the proposed residential land use area. Additionally, internal truck movement occurring at the proposed warehouses has been modeled as line sources traversing the main roadways within the site based on Project Site plans.

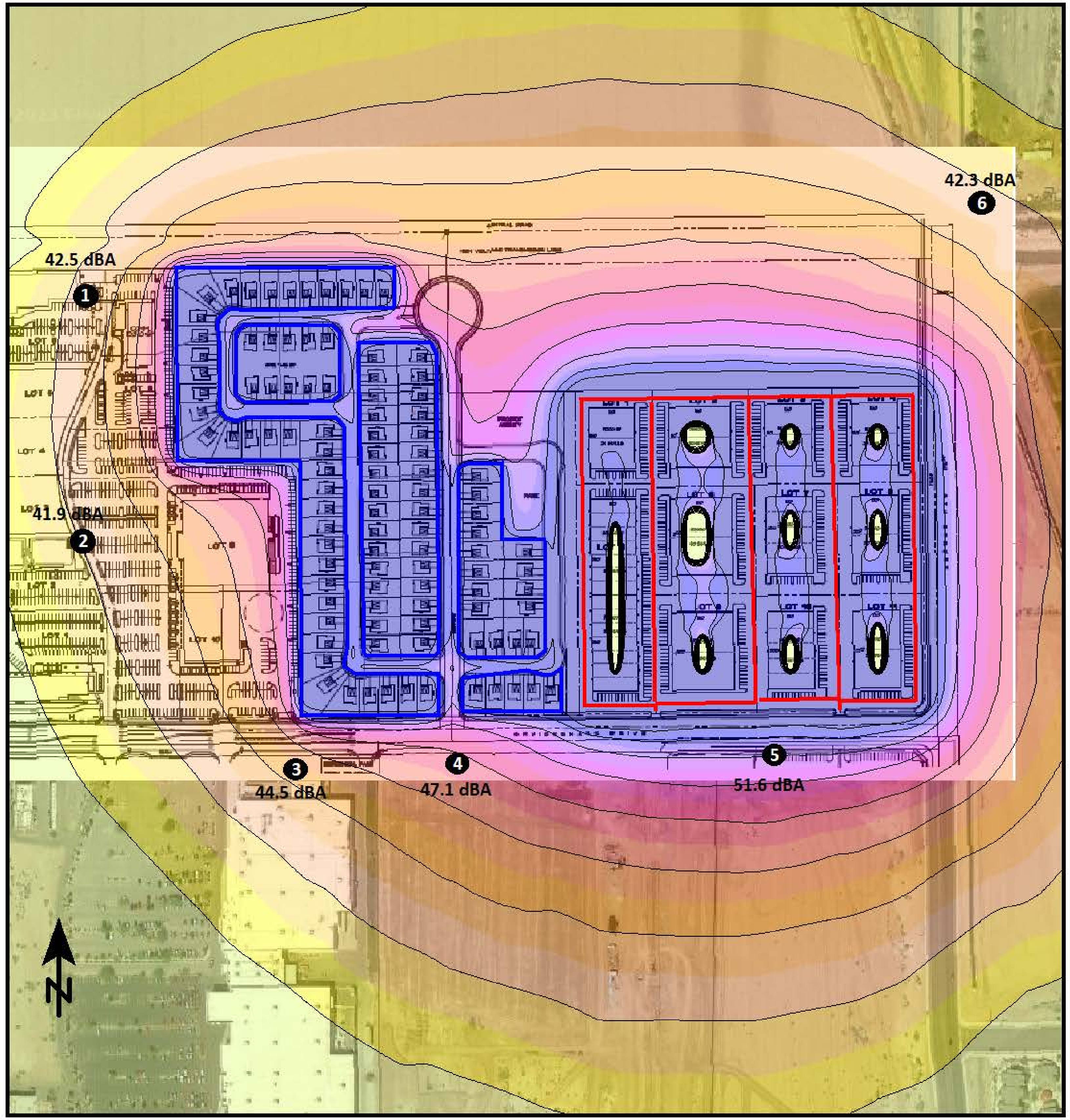
Table 5-3 shows the predicted Project noise levels at two noise-sensitive locations in the Project vicinity (nearby residences) as well as four commercial uses, as predicted by SoundPLAN. Additionally, a noise contour graphic for each scenario (see Figure 5-1) has been prepared to provide a visual depiction of the predicted noise levels in the Project vicinity from Project operations.

Table 5-3. Modeled Operational Noise Levels

Location	Modeled Operational Noise Attributed to the Project (dBA L_{eq})	Daytime/ Nighttime Noise Standards (dBA L_{eq})	Exceed Daytime/ Nighttime Exterior Standard?
#1 Commercial Use West of Project Site	42.5	*60 / 55*	**No / No**
#2 Commercial Use West of Project Site	41.9	*60 / 55*	**No / No**
#3 Commercial Use South of Project Site	44.5	*60 / 55*	**No / No**
#4 Town Center Villa Apartments South of Project Site	47.1	*55 / 50*	**No / No**
#5 Commercial Use South of Project Site	51.6	*60 / 55*	**No / No**
#6 Residence Northeast of Project Site	42.3	*55 / 45*	**No / No**

Source: SounPLAN v 8.2. Refer to Attachment D for Model Data Outputs.

As shown in Table 5-3, Project operational noise would not exceed the daytime or nighttime exterior noise standards at any location.



El Centro Town Center 2 Single Family Project

Project Noise
in dB(A)

	>= 56
	54 - 56
	52 - 54
	50 - 52
	48 - 50
	46 - 48
	44 - 46
	42 - 44
	40 - 42
	< 40

Legend
Residential Noise Activity
Internal Truck Movement

Map Date: 2/3/2022
Photo (or Base) Source: *SoundPLAN*

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 5-1. Modeled Operational Noise Levels

2022-186

Project Land Use Compatibility

The City uses the land use compatibility standards presented in the General Plan that provides the City with a tool to gauge the compatibility of new land users relative to existing noise levels. This table, presented as Table 4-1, identifies acceptable noise levels for various land uses, including noise sensitive residential land uses, such as those proposed by the Project. In the case that the noise levels identified at the Proposed Project site fall within levels presented in the General Plan, the Project is considered compatible with the existing noise environment. As previously stated, the Project is proposing a maximum of 104 residential units. It is noted that the Project is also proposing warehouse space; however, land use compatibility for that use will not be discussed as it is not considered a sensitive land use and the normally acceptable noise standard is greater than that of residential land uses. As shown in Table 4-1, a normally acceptable noise standard for residential land uses is 59 dBA CNEL or less. In order to quantify existing ambient noise levels in the Project Area, ECORP conducted four short-term noise measurements on September 9, 2022. The noise measurement sites were representative of typical existing noise exposure within and immediately adjacent to the Project Site and are considered representative of the noise levels throughout the day. As shown in Table 3-1, the ambient noise levels recorded on the Project Site (Location 1 - 3) range from 40.1 dBA to 56.5 dBA.

Additionally, the roadway segment on Cruickshank Drive between Imperial Avenue and 10th Street as well as the roadway segment on Cruickshank Drive between 10th Street and 8th Street, which traverse adjacent to the Project Site, have a calculated existing roadway noise level of 58.0 dBA CNEL and 55.7 dBA CNEL, respectively, at 100 feet from the centerline of the road, which extends onto the site. These modeled noise levels are reported in the noise metric, CNEL, which is the same noise metric promulgated by City noise compatibility guidelines contained in Table 4-1. As these noise levels fall below the noise standard, the Project Site is considered an appropriate noise environment to locate the proposed residential land use.

5.3.3 Would the Project Expose Structures to Substantial Groundborne Vibration During Construction?

Excessive groundborne vibration impacts result from continuously occurring vibration levels. Increases in groundborne vibration levels attributable to the Project would be primarily associated with short-term construction-related activities. Construction on the Project Site would have the potential to result in varying degrees of temporary groundborne vibration, depending on the specific construction equipment used and the operations involved. Ground vibration generated by construction equipment spreads through the ground and diminishes in magnitude with increases in distance.

Construction-related ground vibration is normally associated with impact equipment such as pile drivers, jackhammers, and the operation of some heavy-duty construction equipment, such as dozers and trucks. It is not anticipated that pile drivers would be necessary during Project construction. Vibration decreases rapidly with distance, and it is acknowledged that construction activities would occur throughout the Project Site and would not be concentrated at the point closest to sensitive receptors. Groundborne vibration levels associated with construction equipment are summarized in Table 5-4.

Table 5-4. Representative Vibration Source Levels for Construction Equipment	
Equipment Type	**Peak Particle Velocity at 25 Feet (inches per second)**
Large Bulldozer	0.089
Pile Driver	0.170
Loaded Trucks	0.076
Hoe Ram	0.089
Jackhammer	0.035
Small Bulldozer/Tractor	0.003
Vibratory Roller	0.210

Source: FTA 2018; Caltrans 2020b

The City of El Centro does not regulate or have a numeric threshold associated with construction vibrations. However, a discussion of construction vibration is included for full disclosure purposes. For comparison purposes, the Caltrans (2020b) recommended standard of 0.3 inches per second PPV with respect to the prevention of structural damage for older residential buildings is used as a threshold. This is also the level at which vibrations may begin to annoy people in buildings. Consistent with FTA recommendations for calculating construction vibration, construction vibration was measured from the center of the Project Site (FTA 2018). The nearest structure of concern to the construction site, with regard to groundborne vibrations, is a commercial building fronting Imperial Avenue, located west of the Project Site approximately 300 feet from the western Project Site boundary.

Based on the representative vibration levels presented for various construction equipment types in Table 5-3 and the construction vibration assessment methodology published by the FTA (2018), it is possible to estimate the potential project construction vibration levels. The FTA provides the following equation:

$$[PPVequip = PPVref \times (25/D)^{1.5}]$$

Table 5-5 presents the expected Project related vibration levels at a distance of 300 feet.

Table 5-5 Construction Vibration Levels at 300 Feet							
Receiver PPV Levels (in/sec)[1]					Peak Vibration	Threshold	Exceed Threshold?
Large Bulldozer, Caisson Drilling, & Hoe Ram	Loaded Trucks	Jackhammer	Pile Driver	Vibratory Roller			
0.0021	0.0018	0.0008	0.0040	0.0050	**0.0050**	*0.3*	**No**

Notes: [1]Based on the Vibration Source Levels of Construction Equipment included on Table 5-4 (FTA 2018). Distance to the nearest structure of concern is approximately 300 feet measured from Project Site center.

As shown in Table 5-5, vibration as a result of onsite construction activities on the Project Site would not exceed 0.3 PPV at the nearest structure. Thus, onsite Project construction would not exceed the recommended threshold.

5.3.4 Would the Project Expose Structures to Substantial Groundborne Vibration During Operations?

Project operations would not include the use of any stationary equipment that would result in excessive vibration levels. While the Project may accommodate heavy-duty trucks due to the warehouse space, these vehicles can only generate groundborne vibration velocity levels of 0.006 PPV at 50 feet under typical circumstances. Therefore, the Project would result in negligible groundborne vibration impacts during operations.

5.3.5 Would the Project Expose People Residing or Working in the Project area to Excessive Airport Noise?

The Project Site is located approximately one mile southeast of the Imperial County Airport. According to the City of El Centro General Plan Update Program Environmental Impact Report (2021), the Imperial County Airport Land Use Commission has established a set of land use compatibility criteria for lands surrounding the County's airports and portions of the City are within the Imperial County Land Use Compatibility Plan Area. A small portion of northern El Centro, which includes the Project Site, falls within the 55 dBA CNEL noise contour of the Imperial County Airport Noise Impact Area (El Centro 2021). According to the General Plan Update Program Environmental Impact Report (2021), there is no portion of El Centro located within an airport noise contour that would exceed the City's noise compatibility standard for the most sensitive land uses (60 dBA CNEL). Thus, the Project would not expose those residing or working on the Project Site to excessive airport noise.

6.0 REFERENCES

Caltrans. 2021. Traffic Census Program. https://dot.ca.gov/programs/traffic-operations/census

_____. 2020a. IS/EA Annotated Outline. http://www.dot.ca.gov/ser/vol1/sec4/ch31ea/chap31ea.htm.

_____. 2020b. Transportation and Construction Vibration Guidance Manual.

_____. 2018. Traffic Census Program: 2017 Traffic Volumes. https://dot.ca.gov/programs/traffic-operations/census

_____. 2002. California Airport Land Use Planning Handbook

El Centro, City of. 2022. City of El Centro Code of Ordinances.

_____. 2021. City of El Centro General Plan Update Program Environmental Impact Report.

_____. 2004. City of El Centro General Plan.

Federal Highway Administration. 2017. Construction Noise Handbook. https://www.fhwa.dot.gov/Environment/noise/construction_noise/handbook/handbook02.cfm.

_____. 2011. Effective Noise Control During Nighttime Construction. Available online at: http://ops.fhwa.dot.gov/wz/workshops/accessible/schexnayder_paper.htm.

_____. 2006. Roadway Construction Noise Model.

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

Harris Miller, Miller & Hanson Inc. 2006. Transit Noise and Vibration Impact Assessment, Final Report.

Imperial, County of. 1996. Imperial County Airports Land Use Compatibility Plan.

Michael Baker International. 2022. Traffic Impact Study.

Office of Planning and Research. 2003. State of California General Plan Guidelines.

Western Electro-Acoustic Laboratory, Inc. 2000. Sound Transmission Sound Test Laboratory Report No. TL 96-186.

LIST OF ATTACHMENTS

ATTACHMENT A

Baseline (Existing) Noise Measurements – Project Site and Vicinity

Site Number: 1
Recorded By: Amber Williams
Job Number: 2022-186
Date: 9/7/2022
Time: 1:01 p.m. – 1:16 p.m.
Location: North end of Project Site adjacent to Central Drive
Source of Peak Noise: Vehicles on adjacent roadways and buzzing power lines

Noise Data		
Leq (dB)	**Lmin (dB)**	**Lmax (dB)**
42.9	37.9	81.7

Weather Data			
Est.	**Duration:** 15 minutes		**Sky:** Patchy clouds
	Note: dBA Offset = 0.01		**Sensor Height (ft):** 4.5
	Wind Ave Speed (mph)	**Temperature (degrees Fahrenheit)**	**Barometer Pressure (hPa)**
	0	102	29.94

Photo of Measurement Location

Site Number: 2		
Recorded By: Amber Williams		
Job Number: 2022-186		
Date: 9/7/2022		
Time: 1:33 p.m. – 1:48 p.m.		
Location: West end of Project Site adjacent to Social Security Administration building		
Source of Peak Noise: Vehicles on adjacent roadways		
Noise Data		
Leq (dB)	**Lmin (dB)**	**Lmax (dB)**
40.1	39.1	49.7

Weather Data			
Est.	**Duration:** 15 minutes		**Sky:** Patchy clouds
	Note: dBA Offset = 0.01		**Sensor Height (ft):** 4.5
	Wind Ave Speed (mph)	**Temperature (degrees Fahrenheit)**	**Barometer Pressure (hPa)**
	0	102	29.94

Photo of Measurement Location

Site Number: 3	
Recorded By: Amber Williams	
Job Number: 2022-186	
Date: 9/7/2022	
Time: 1:58 p.m. – 2:13 p.m.	
Location: North 12th Street and Cruickshank Drive intersection	
Source of Peak Noise: Vehicles on adjacent roadways	

Noise Data		
Leq (dB)	**Lmin (dB)**	**Lmax (dB)**
56.5	54.5	76.0

Weather Data			
Est.	**Duration:** 15 minutes		**Sky:** Patchy clouds
	Note: dBA Offset = 0.01		**Sensor Height (ft):** 4.5
	Wind Ave Speed (mph)	**Temperature (degrees Fahrenheit)**	**Barometer Pressure (hPa)**
	0	102	29.94

Photo of Measurement Location

Site Number: 4
Recorded By: Amber Williams
Job Number: 2022-186
Date: 9/7/2022
Time: 2:20 p.m. – 2:35 p.m.
Location: Across Cruickshank Drive from the Project Site adjacent to North 10th Street
Source of Peak Noise: Vehicles on adjacent roadways and nearby construction

Noise Data		
Leq (dB)	**Lmin (dB)**	**Lmax (dB)**
53.6	39.5	72.6

Weather Data				
Est.	**Duration:** 15 minutes		**Sky:** Patchy clouds	
	Note: dBA Offset = 0.01		**Sensor Height (ft):** 4.5	
	Wind Ave Speed (mph)	**Temperature (degrees Fahrenheit)**	**Barometer Pressure (hPa)**	
	0	102	29.94	

Photo of Measurement Location

Site Number: 1		
Recorded By: Jessie Beckman		
Job Number: 2020-159		
Date: 10/1/2020		
Time: 7:27 a.m.- 7:57 a.m.		
Location: Corner of Bradshaw Avenue and N. 10th Street		
Source of Peak Noise: Vehicles on adjacent roadways		
Noise Data		
Leq (dB)	**Lmin (dB)**	**Lmax (dB)**
55.7	45.7	75.6

Weather Data			
Est.	**Duration:** 30 minutes		**Sky:** Clear
	Note: dBA Offset = 0.01		**Sensor Height (ft):** 3.5 ft
	Wind Ave Speed (mph)	**Temperature (degrees Fahrenheit)**	**Barometer Pressure (hPa)**
	0-3	77	29.97

Photo of Measurement Location

Site Number: 2
Recorded By: Jessie Beckman
Job Number: 2020-159
Date: 10/1/2020
Time: 8:04 a.m. – 8:34 a.m.
Location: Residential complex on N. 8th Street across from Project Site
Source of Peak Noise: Vehicles on adjacent roadways

Noise Data		
Leq (dB)	**Lmin (dB)**	**Lmax (dB)**
61.3	46.6	75.6

Weather Data			
Est.	**Duration:** 30 minutes		**Sky:** Clear
	Note: dBA Offset = 0.01		**Sensor Height (ft):** 3.5 ft
	Wind Ave Speed (mph)	**Temperature (degrees Fahrenheit)**	**Barometer Pressure (hPa)**
	0-3	77	29.97

Photo of Measurement Location

Site Number: 3		
Recorded By: Jessie Beckman		
Job Number: 2020-159		
Date: 10/1/2020		
Time: 8:45 a.m. – 9:15 a.m.		
Location: Intersection of N. 10th Street and Cruickshank Drive		
Source of Peak Noise: Vehicles on adjacent roadways		
Noise Data		
Leq (dB)	**Lmin (dB)**	**Lmax (dB)**
52.0	36.6	79.2

Weather Data			
Est.	**Duration:** 30 minutes		**Sky:** Clear
	Note: dBA Offset = 0.01		**Sensor Height (ft):** 3.5 ft
	Wind Ave Speed (mph)	**Temperature (degrees Fahrenheit)**	**Barometer Pressure (hPa)**
	0-3	77	29.97

Photo of Measurement Location

ATTACHMENT B

Federal Highway Administration Highway Noise Prediction Model (FHWA-RD-77-108) Outputs – Project Traffic Noise

TRAFFIC NOISE LEVELS

Project Number: 2022-186
Project Name: El Centro Town Center 2

Background Information

Model Description:	FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.			
Analysis Scenario(s):	Existing			
Source of Traffic Volumes:	Michael Baker International (2022)			
Community Noise Descriptor:	L_{dn}:		CNEL:	X

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

Traffic Noise Levels

Analysis Condition Roadway Segment	Land Use	Lanes	Median Width	Peak Hour Volume	ADT Volume	Design Speed (mph)	Dist. from Center to Receptor	Alpha Factor	Barrier Attn. dB(A)	Vehicle Mix Medium Trucks	Vehicle Mix Heavy Trucks	Peak Hour dB(A) L_{eq}	24-Hour dB(A) CNEL
Cruickshank Drive													
West of Imperial Avenue	Commercial	2	0		3,483	35	100	0	0	1.8%	0.7%	0.0	57.2
Between Imperial Avenue and 10the Street	Commercial and Residential	2	0		4,207	35	100	0	0	1.8%	0.7%	0.0	58.0
Between 10th Street and 8th Street	Residential	2	0		2,511	35	100	0	0	1.8%	0.7%	0.0	55.7
Imperial Avenue													
North of Cruickshank Drive	Commercial	4	0		11,385	45	100	0	0	1.8%	0.7%	0.0	65.1
South of Cruickshank Drive	Commercial	4	0		7,281	45	100	0	0	1.8%	0.7%	0.0	63.2
10th Street													
South of Cruickshank Drive	Commercial and Residential	2	0		288	25	100	0	0	1.8%	0.7%	0.0	43.3
8th Street													
North of Cruickshank Drive	Residential	4	0		3,906	45	100	0	0	1.8%	0.7%	0.0	60.5
South of Cruickshank Drive	Residential	4	0		2,907	35	100	0	0	1.8%	0.7%	0.0	56.4

TRAFFIC NOISE LEVELS

Project Number: 2022-186
Project Name: El Centro Town Center 2

Background Information

Model Description:	FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.			
Analysis Scenario(s):	Existing + Project			
Source of Traffic Volumes:	Michael Baker International (2022)			
Community Noise Descriptor:	L_{dn}:		CNEL:	X

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

Traffic Noise Levels

Analysis Condition Roadway Segment	Land Use	Lanes	Median Width	Peak Hour Volume	ADT Volume	Design Speed (mph)	Dist. from Center to Receptor	Alpha Factor	Barrier Attn. dB(A)	Vehicle Mix Medium Trucks	Vehicle Mix Heavy Trucks	Peak Hour dB(A) L_{eq}	24-Hour dB(A) CNEL
Cruickshank Drive													
West of Imperial Avenue	Commercial	2	0		5,491	35	100	0	0	1.8%	0.7%	0.0	59.1
Between Imperial Avenue and 10the Street	Commercial and Residential	2	0		5,613	35	100	0	0	1.8%	0.7%	0.0	59.2
Between 10th Street and 8th Street	Residential	2	0		2,638	35	100	0	0	1.8%	0.7%	0.0	55.9
Imperial Avenue													
North of Cruickshank Drive	Commercial	4	0		11,574	45	100	0	0	1.8%	0.7%	0.0	65.2
South of Cruickshank Drive	Commercial	4	0		7,542	45	100	0	0	1.8%	0.7%	0.0	63.3
10th Street													
South of Cruickshank Drive	Commercial and Residential	2	0		395	25	100	0	0	1.8%	0.7%	0.0	44.7
8th Street													
North of Cruickshank Drive	Residential	4	0		3,906	45	100	0	0	1.8%	0.7%	0.0	60.5
South of Cruickshank Drive	Residential	4	0		2,907	35	100	0	0	1.8%	0.7%	0.0	56.4

ATTACHMENT C

Federal Highway Administration Roadway Construction Noise Outputs

Roadway Construction Noise Model (RCNM),Version 1.1

Report date:	2/7/2023
Case Description:	Site Preparation

Description	**Affected Land Use**
Site Preparation	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**
Grader	No	40	85		400
Scraper	No	40		83.6	400
Tractor	No	40	84		400

Calculated (dBA)

Equipment		***Lmax**	**Leq**
Grader		66.9	63
Scraper		65.5	61.5
Tractor		65.9	62
	Total	**66.9**	**67**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 2/7/2023
Case Description: Grading

Description	**Affected Land Use**
Grading	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**
Excavator	No	40		80.7	400
Grader	No	40	85		400
Dozer	No	40		81.7	400
Front End Loader	No	40		79.1	400
Tractor	No	40	84		400

Calculated (dBA)

Equipment		***Lmax**	**Leq**
Excavator		62.6	58.7
Grader		66.9	63
Dozer		63.6	59.6
Front End Loader		61	57.1
Tractor		65.9	62
	Total	**66.9**	**67.6**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 2/7/2023
Case Description: Building Construction

Description	**Affected Land Use**
Building Construction	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**
Gradall	No	40		83.4	400
Gradall	No	40		83.4	400
Front End Loader	No	40		79.1	400
Tractor	No	40	84		400
Slurry Trenching Machine	No	50		80.4	400

Calculated (dBA)

Equipment		***Lmax**	**Leq**
Gradall		65.3	61.4
Gradall		65.3	61.4
Front End Loader		61	57.1
Tractor		65.9	62
Slurry Trenching Machine		62.3	59.3
	Total	**65.9**	**67.5**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 2/7/2023
Case Description: Paving

Description	**Affected Land Use**
Paving	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**
Paver	No	50		77.2	400
Pavement Scarafier	No	20		89.5	400
Roller	No	20		80	400
Roller	No	20		80	400

Calculated (dBA)

Equipment		***Lmax**	**Leq**
Paver		59.2	56.1
Pavement Scarafier		71.4	64.4
Roller		61.9	54.9
Roller		61.9	54.9
	Total	**71.4**	**65.8**

*Calculated Lmax is the Loudest value.

ATTACHMENT D

SoundPLAN Onsite Noise Generation

SoundPLAN
Output Source Information

Number	Reciever Name	Floor	Level at Receiver
1	Commercial Use West of Project Site	Ground Floor	42.5 dBA
2	Commercial Use West of Project Site	Ground Floor	41.9 dBA
3	Commercial Use South of Project Site	Ground Floor	44.5 dBA
4	Town Center Villa Apartments South of Project Site	Ground Floor	47.1 dBA
5	Commercial Use South of Project Site	Ground Floor	51.6 dbA
6	Residence Northeast of Project Site	Ground Floor	42.3 dBA

Number	Noise Source Information	Citation	Level at Source
1	Internal Truck Circulation	City of San Jose 2014 Midpoint at 237 Loading Dock Noise Study	74.0 dBA
2	Residential Noise Activity	ECORP Noise Measurements	53.4 dBA