4.7 Noise

The analysis in this section provides focused updates to Chapter 4.10 Noise in the 2011 Comprehensive Land Use Update (CLUU) Program Environmental Impact Report (PEIR), with an emphasis on potential noise impacts that may change as a result of the Focused General Plan Update (FGPU).

The purpose of this section is to identify and assess potential sources of noise associated with buildout of the FGPU that could result in a substantial temporary or permanent increase in ambient noise levels in excess of standards established in the General Plan or Noise Ordinance to ensure that new development does not expose people to unacceptable noise levels.

4.7.1 Noise Definitions

There are several noise measurement scales that are used to describe noise. The most basic and standard noise measurement is the decibel (dB), which measures the relative amplitude (loudness) and pitch (frequency) of sound. The human ear is not equally sensitive to sound at all frequencies. Additionally, since sound levels can vary considerably over a short period of time, a method for describing these variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This equivalent noise level descriptor is described as L_{eq}. The most common averaging period is hourly, but it can be of any duration. Statistical measures such as the maximum (L_{max}) and minimum (L_{min}) levels are also used to quantify the time-varying noise levels in the community. Sound levels in decibels are calculated on a logarithmic basis. Each 10-decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities.

There are several methods of characterizing sound. The most common in California is the A-weighted sound level, measured in A-weighted decibels (dBA). All sound levels in this report are A-weighted unless otherwise noted. This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive.

Since sensitivity to noise increases during the evening and at night—because excessive noise interferes with the ability to sleep—24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The day/night average sound level (L_{dn}) is a measure of the cumulative noise exposure in a community, with a 10 dB addition to nocturnal (10:00 p.m. to 7:00 a.m.) noise levels.

Ambient noise level refers to the composite of noise from all sources near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location and time. Table 4.7-1 provides additional descriptions of frequently used acoustic terms.

Community noise equivalent level (CNEL) describes the average noise level during a 24-hour period, with a penalty of 5 dB added to sound levels between 7 p.m. and 10 p.m., and a penalty of 10 dB added to sound levels between 10 p.m. and 7 a.m.

Table 4.7-1 Definition of Acoustic Terms

Term	Definition
Decibel, dB	A unit describing the amplitude of sound.
Frequency, hertz (Hz)	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-Weighted Sound Level, dBA	Decibel level as measured using the A-weighted filter network, which deemphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlating well with subjective reactions to noise.
Day/Night Noise Level, L_{dn}	The average A-weighted noise level during a 24-hour day obtained after addition of 10 decibels to levels measured in the night between 10:00pm and 7:00am.
L_{max}, L_{min}	The maximum and minimum A-weighted noise levels during the measurement period.
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.
Community noise equivalent level, CNEL	The 24 hour A-weighted average for sound, with corrections for evening and nighttime hours.
Intrusive	Noise that intrudes over and above the existing ambient noise at a given location. Relative intrusiveness depends on amplitude, duration, frequency, time of occurrence, and tonal or informational content as well as the prevailing ambient noise level.
Sensitive Receptor	A location where people reside or where the presence of unwanted sound could adversely affect the primary intended use of the land. Residences, churches, schools, libraries, parks, open space, hospitals, and convalescent homes are examples of sensitive receptors to noise.

Source: National City Comprehensive Land Use Update EIR , Chapter 4.10 Noise (2011), https://www.nationalcityca.gov/home/showpublisheddocument/4449/636090627169130000

In general, human sound perception in a community environment is such that a change in sound level of 3 dB is just noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as doubling or halving the sound level. Because of the logarithmic scale of the decibel unit, sound levels cannot be added or subtracted arithmetically. A simple rule of thumb is useful in dealing with sound levels: if a sound's physical intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. For example, 60 dB + 60 dB = 63 dB (doubling). However, when noise levels differ, the resulting noise level may not change substantially—for example, when 60 dB and 70 dB sources are added, the resulting noise level equals 70.4 dB.[1]

To gather an understanding dBA sound levels, see Table 4.7-2 for a comparison to typical sounds common in an urban environment and the typical human response to these noise levels.

1 National City Comprehensive Land Use Update EIR , Chapter 4.10 Noise (2011), https://www.nationalcityca.gov/home/showpublisheddocument/4449/636090627169130000

Table 4.7-2 Noise Levels of Common Activities

Common Sounds	Noise Level (dB)	Effect on Human Response
Carrier deck Jet operation Air raid siren	140	Painfully loud
Jet takeoff (200 feet) Thunderclap Discotheque	130	
Auto horn (3 feet)	120	Maximum vocal effect
Pile drivers Chain saw (2 feet)	110	
Garbage truck 767.10 Power lawn mower (4 feet)	100	
Heavy truck (50 feet) City traffic	90	Very annoying Hearing damage (8 hours)
Alarm clock (2 feet) Hair dryer Vacuum cleaner	80	Annoying
Noisy restaurant Freeway traffic Man's voice	70	Telephone use difficult
Air conditioning unit (20 feet)	60	Intrusive
Light traffic (100 feet)	50	Quiet
Living room Bedroom Quiet office	40	
Library Soft whisper (15 feet)	30	Very quiet
Broadcasting studio	20	
	10	Just audible
	0	Hearing begins

Source: National City, Municipal Code, Section 12.02.060 Criteria, Table 1 Sound Levels and Human Response, (2001), https://library.municode.com/ca/national_city/codes/code_of_ordinances?nodeId=CD_ORD_TIT12NOCO_CH12.02GEPR_12.02.060CR

4.7.2 Effects of Noise

As noted in the National City Municipal Code under Section 12.02.060, 70 dB is the point at which noise may begin to harm hearing, 60 dB is the threshold of stress response, and 45 dB disturbs sleep. To the ear, each 10 dB increase seems twice as loud.

4.7.2.1 Hearing Loss

Noise-induced hearing loss is 100 percent preventable; however, once acquired, it is permanent and irreversible. Risk of hearing loss from noise exposure is a complex issue. The U.S. Environmental Protection Agency (EPA) and the World Health Organization recommend maintaining environmental noises below 70 dBA over 24 hours (75 dBA over 8 hours) to prevent noise-induced hearing loss.[2]

4.7.2.2 Sleep and Speech Interference

Causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The thresholds for speech interference indoors are about 45 dBA if the noise is steady and about 55 dBA if the noise is fluctuating. Outdoor thresholds are about 15 dBA higher. Steady noise above 35 dBA and fluctuating noise levels above about 45 dBA have been shown to affect sleep.[3]

4.7.2.3 Annoyance

The EPA has specified limits for speech interference and annoyance at 55 dBA for outdoors activities and 45 dBA for indoor activities. These limits were chosen to protect 96 percent of the general population from developing hearing loss, as well as to protect "public health and welfare" (defined as personal comfort and well-being and absence of mental anguish and annoyance).[4]

4.7.3 Groundborne Vibration

Ground vibration consists of rapidly fluctuating motions or waves transmitted through solid material. Several methods are typically used to quantify the amplitude of vibration, including peak particle velocity (PPV) and root mean square (RMS) velocity. PPV is defined as the maximum instantaneous positive or negative peak of a vibration wave. RMS velocity is defined as the average of the squared amplitude of the signal.[5] 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).

As discussed previously, annoyance is a subjective measure, and vibrations may be found to be annoying at much lower levels than those shown, depending on the level of activity and 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.

---

2 Chuck Kardous, MS, PE; Christa L. Themann, MA, CCC-A; Thais C. Morata, Ph.D. and W. Gregory Lotz, Ph.D. Understanding Noise Exposure Limits: Occupational vs. General Environmental Noise, NIOSH Science Blog, February 8, 2016, https://blogs.cdc.gov/niosh-science-blog/2016/02/08/noise/
3 National City Comprehensive Land Use Update EIR , Chapter 4.10 Noise (2011), https://www.nationalcityca.gov/home/showpublisheddocument/4449/636090627169130000
4 Chuck Kardous, MS, PE; Christa L. Themann, MA, CCC-A; Thais C. Morata, Ph.D. and W. Gregory Lotz, Ph.D.; Understanding Noise Exposure Limits: Occupational vs. General Environmental Noise, NIOSH Science Blog, February 8, 2016, https://blogs.cdc.gov/niosh-science-blog/2016/02/08/noise/
5 National City Comprehensive Land Use Update EIR , Chapter 4.10 Noise (2011), https://www.nationalcityca.gov/home/showpublisheddocument/4449/636090627169130000

The duration and amplitude of vibration generated by construction and maintenance equipment varies widely depending on the type of equipment and the purpose for which it is being used (see Table 4.7-3). The vibration from blasting has a high amplitude and short duration, whereas vibration from grading is lower in amplitude but longer in duration. In assessing vibration from construction and maintenance equipment, it is useful to categorize the equipment by the nature of the vibration generated. Equipment typical of high-rate repeated impact vibration includes jackhammers, hoe rams, and some types of pavement breakers.[6]

Table 4.7-3 Construction Equipment Noise

Equipment	Maximum Noise Level (dBA at 50 feet)
Scrapers	89
Bulldozers	85
Heavy Trucks	88
Backhoe	80
Pneumatic Tools	85
Concrete Pump	82
Source: Federal Transit Administration, Construction Noise Handbook, http://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook09.cfm	

The two primary concerns regarding construction-induced vibration—the potential to interfere with the enjoyment of life and the potential to damage a structure—are evaluated against different vibration limits (see Table 4.7-4 and Table 4.7-5). Studies have shown that the threshold of perception for average persons is in the range of 0.2 to 0.3 millimeters per second (0.008 to 0.012 inches per second [in/sec]) PPV. Human perception of vibration varies with the individual and is a function of physical setting and the type of vibration. Persons exposed to elevated ambient vibration levels, such as people in an urban environment, may tolerate a higher vibration level.[7]

Table 4.7-4 Reaction of People to Continuous Vibration Levels

PPV (in/sec)	Human Response
3.6 (at 2 Hz) to 0.4 (at 20 Hz)	Very disturbing
0.7 (at 2 Hz) to 0.17 (at 20 Hz)	Disturbing
0.10	Strongly perceptible
0.035	Distinctly perceptible
0.012	Slightly perceptible
Source: Caltrans, Transportation and Construction Vibration Guidance Manual, April 2020 https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tcvgm-apr2020-a11y.pdf	

6 Caltrans, Transportation and Construction Vibration Guidance Manual, April 2020, https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tcvgm-apr2020-a11y.pdf
7 National City Comprehensive Land Use Update EIR , Chapter 4.10 Noise (2011), https://www.nationalcityca.gov/home/showpublisheddocument/4449/636090627169130000

Table 4.7-5 Effect on Buildings from Continuous Vibration Levels

PPV (in/sec)	Effect on Building
0.4–0.6	Architectural damage and possible minor structural damage
0.2	Threshold at which there is a risk of architectural damage to normal dwelling houses (houses with plastered walls and ceilings)
0.1	Virtually no risk of architectural damage to normal buildings
0.08	Recommended upper limit of vibration to which ruins and ancient monuments should be subjected
0.006-0.019	Vibration unlikely to cause damage of any type

Source: Caltrans, Transportation and Construction Vibration Guidance Manual, April 2020 https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tcvgm-apr2020-a11y.pdf

Structural damage can be classified as cosmetic only, such as minor cracking of building elements, or damage that may threaten the integrity of a building. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher, and there is no general consensus as to what amount of vibration may pose a threat of structural damage to a building.

Construction-induced vibration that can be detrimental to a building is very rare and has only been observed in instances where the structure is in a high state of disrepair and the construction activity occurs immediately adjacent to the structure.

4.7.4 Existing Conditions

4.7.4.1 Noise and Vibration Generating Land Uses

Mobile Noise Sources

National City is an urbanized jurisdiction, located adjacent to industrial areas, highways, and other urbanized jurisdictions. The Interstate 5 (I-5), Interstate 805 (I-805), and State Route 54 are the most prevalent sources of traffic noise and affect distant land uses. Major arterials that also emit significant noise sources include, National City Boulevard, Highland Avenue, Euclid Avenue, Division Street, Plaza Boulevard, Civic Center Drive, 18th Street, Bay Marina/Mile of Cars Way, and 30th Street/Sweetwater Road.

Highways typically generate 70 to 80 dBA CNEL at adjacent receptors. Heavily used commuter roadways, such as arterials and major streets, also generate significant levels of noise, typically 65 to 75 dBA CNEL at adjacent receptors.

The San Diego and Imperial Valley Railroad is located in the westernmost portion of the Planning Area in a heavy commercial/industrial area. Trains are a source of intermittent, high noise levels and groundborne vibration. The highest noise levels resulting from trains occur in areas near "at-grade" rail crossings where trains are required to sound their warning whistles. Train warning whistles can generate noise levels of approximately 100 to 105 dBA at a distance of 50 feet. Groundborne vibration levels may exceed the Federal Transportation Administration's vibration impact criteria (72 to 80 vibration decibels, depending on the frequency of events) and may affect sensitive land uses within approximately 100 to 200 feet of the tracks.

Major Stationary Noise Sources

Noise sources from service commercial uses, such as automotive repair facilities, wrecking yards, tire installation centers, car washes, transfer yards, and loading docks, are found at various locations throughout National City. The noise emissions from these types of uses are dependent on many factors and are therefore difficult to quantify precisely. Noise generated by these uses contributes to the

ambient noise environment in their immediate vicinity and should be considered where either new noise-sensitive uses are proposed nearby or where similar uses are proposed in existing residential areas. Due to the nature of a developed city, a higher ambient noise level is typical in such areas .

Airport Noise
The Airport Authority serves as the Airport Land Use Commission (ALUC) for San Diego County. The ALUC is responsible for adopting Airport Land Use Compatibility Plans (ALUCPs) for 16 public use and military airports in San Diego County. ALUCPs provide guidance on appropriate land uses surrounding airports to protect the health and safety of people and property within the vicinity of an airport, as well as the public in general. An ALUCP contains policies and criteria that address compatibility between airports and future land uses that surround them by addressing noise, overflight, safety, and airspace protection concerns to minimize the public's exposure to excessive noise and safety hazards within the airport influence area (AIA) for each airport over a 20-year horizon. A 406-acre portion of National City is located within the AIA for San Diego International Airport (SDIA). This area is outside the area of primary noise concern (see Figure 4.7-1).

Military aircraft are also sources of intermittent noise over National City as the Naval Air Station North Island (NASNI) is located approximately 3 miles to the northwest on Coronado Island. Aircraft operations to and from the SDIA and the NASNI generate intermittent noise when passing over National City. Noise generated by these flights, although audible and noticeable in quiet areas above other ambient noise sources, is a minor contributor to daily average noise levels in the Planning Area. Portions of southwest National City appear to be within the NASNI AIA. Despite this, the ALUC consistency determination is that no part of the Planning Area is within noise contours. The NASNI noise contours do show a portion of the Pacific Ocean within the City's boundaries to be within the noise contours for NASNI (see Figure 4.7-1).[8]

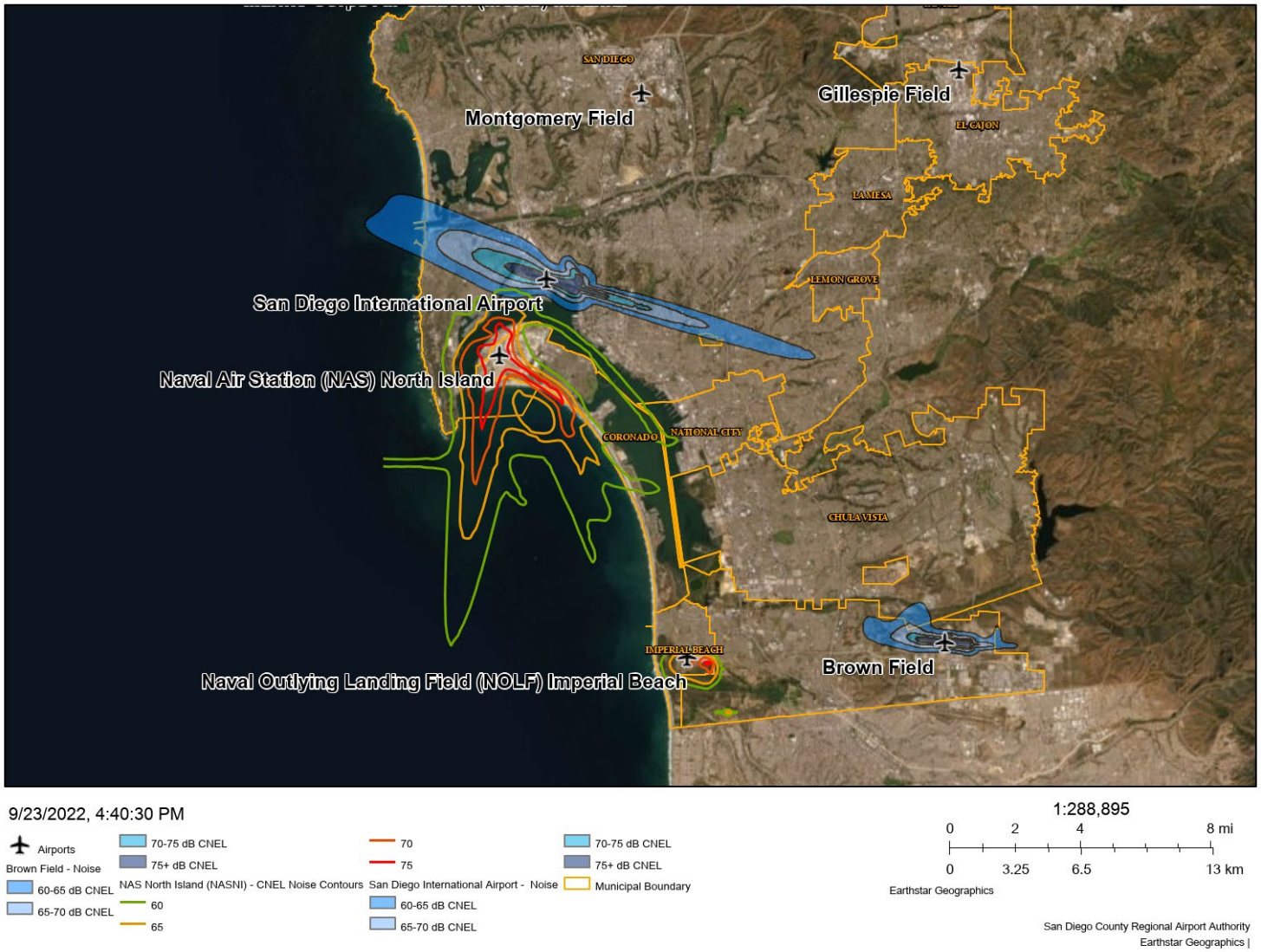
The Brown Field Municipal Airport ALUCP AIA contains an area in the southernmost extent of National City (i.e., the salt flats). This area is located outside the area of primary noise concern. As no Focus Areas are within this area, this ALUCP is excluded from further discussion in this chapter.

4.7.4.2 Sensitive Receptors

Noise-sensitive receptors are associated with land uses wherein indoor and/or outdoor human activities may be subject to stress and/or significant interference from noise. They include residential (single- and multi-family dwellings, mobile home parks, dormitories and similar uses); transient lodging (including hotels, motels and similar uses); hospitals, nursing homes, convalescent hospitals, and other facilities for long-term medical care; and public or private educational facilities, libraries, churches, and other places of public gathering. In addition to buildings, exterior use areas may also be considered noise-sensitive receptors. Exterior use areas are areas where frequent human use for prolonged periods (at least an hour) may reasonably occur. Common examples of exterior use areas include residential backyards, multi-family communal areas, patios, picnic areas, recreation areas, playgrounds, active sports areas, and parks. Noise-sensitive receptors occur throughout the City (see Figure 4.7-2).

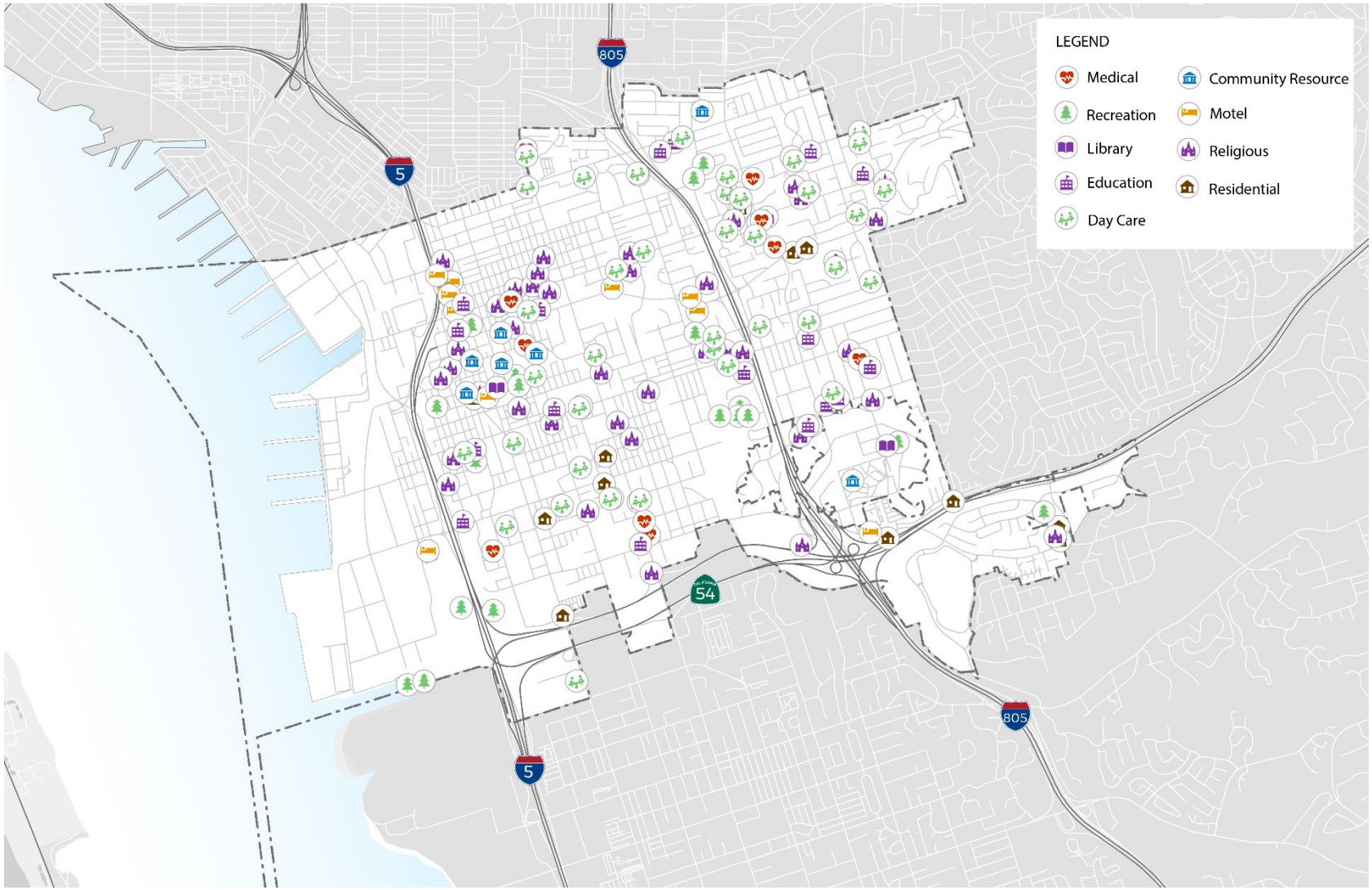
8 San Diego County Regional Airport Authority ALUCP, Naval Air Station North Island Airport Land Use Compatibility Plan, Exhibit 1 Airport Influence Area and Exhibit 4 Safety Zones and Noise Contours, October 2019, https://www.san.org/Portals/0/Documents/Airport%20Projects/Planning/2020-11-06_NASNI_ALUCP.pdf

Figure 4.7-1 Airport Noise Contours



Source: San Diego County Regional Airport Authority, ALUCP Mapping Tool, https://sdcraa-aluc.maps.arcgis.com/apps/webappviewer/index.html?id=945b3a6b12a34b158d8c9022251542e3 (Accessed September 23, 2022)

Figure 4.7-2 Noise-Sensitive Receptors



Source: SANGIS, Places, July 2018, https://sdgis-sandag.opendata.arcgis.com/datasets/SANDAG::places/explore

4.7.4.3 Ambient Noise Levels

Ambient noise levels were measured at 12 locations to characterize the variability of noise in the FGPU Planning Area. Noise measurements were taken at sites selected within the six Focus Areas with a Svantek Svan 971 Type 1 Integrating Sound Level Meter, serial number 80354. Measurement locations are shown in Figure 4.7-3. A summary of the measurements is provided in Table 4.7-6. Based on these measurements, daytime noise levels along major roadways in the FGPU Planning Area range from 64 to 67 dBA L_{eq} and are typical of an urban environment.

Figure 4.7-3 Measurement Locations

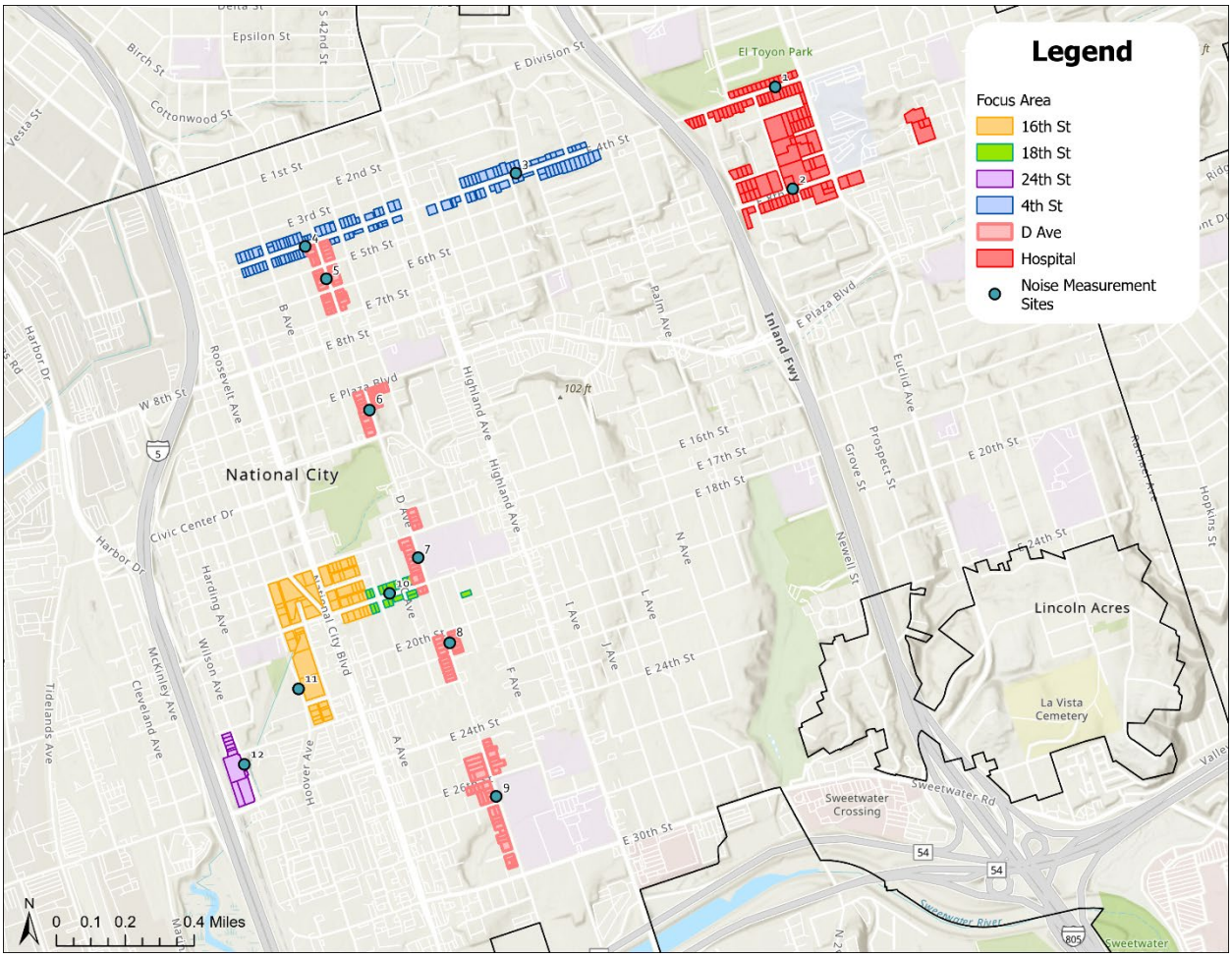


Table 4.7-6 Ambient Noise Measurements

Short-Term Measurements				
#	**Location**	**Time**	**Noise Level (dBA L_{eq})**	**Notes/ Noise Sources**
1	2213 E 4th Street	1:15 p.m. to 1:30 p.m.	64.2	
2	2303 E 8th Street	12:55 p.m. to 1:10 p.m.	67.9	
3	1139 E 4th Street	1:35 p.m. to 1:50 p.m.	59.7	
4	303 E 4th Street	12:22. p.m. to 12:37 p.m.	60.4	
5	531 D Avenue	(See note)	(See note)	Measurement not taken at this location due to barking dogs.
6	1026 D Avenue	12:00 p.m. to 12:15 p.m.	60.2	
7	1628 D Avenue	11:40 a.m. to 11:55 a.m.	59.8	
8	2035 D Avenue	10:05 a.m. to 10:20 a.m.	60.1	
9	344 E. 27th Street (along sidewalk)	9:45 a.m. to 10:00 a.m.	62.4	Local traffic on D Avenue and 27th Street
10	223 E 18th Street	11:15 a.m. to 11:25 a.m.	63.2	
11	2010 Hover Street	10:30 a.m. to 10:45 a.m.	52.8	
12	2028 E 24th Street	10:55 a.m. to 11:10 a.m.	61.3	

4.7.5 Regulatory Framework

4.7.5.1 State

California Code of Regulations (CCR), Title 24, Part 12[9]

The State of California's noise insulation standards are codified in CCR, Title 24, Building Standards Administrative Code, Part 2, California Building Code (see Section 1206). These noise standards are applied to new construction for the purpose of providing suitable interior noise environments. Title 24 requires that interior noise levels attributable to exterior sources must not exceed 45 dB in any habitable room. The regulations specify that acoustical studies must be prepared when multi-family housing is proposed near major transportation noise sources and where such noise sources create an exterior noise level of 60 dBA CNEL or higher. Acoustical studies that accompany building plans must demonstrate that hotels, motels, dormitories, apartment houses, and dwellings other than detached single-family dwellings have been designed to limit interior noise in habitable rooms to acceptable noise levels (45 dBA CNEL).

California Code of Regulations (CCR), Title 24, Part 11[10]

Noise exposure in nonresidential structures is regulated by 2022 California Green Building Standards, Chapter 5 – Nonresidential Mandatory Measures, Division 5.5 –Environmental Quality, Section 5.507 – Environmental Comfort, Subsection 5.507.4 –Acoustical Control. Pursuant to this standard, interior noise levels attributable to an airport, freeway, or expressway, railroad, industrial source, or fixed-

[9] California Building Code 2022, Chapter 12 Interior Environment https://up.codes/viewer/california/ca-building-code-2022/chapter/12/interior-environment#12
10 California Green Building Standards Code 2022, Chapter 5 Nonresidential Mandatory Measures https://up.codes0.5/viewer/california/ca-green-code-2022/chapter/5/nonresidential-mandatory-measures#5 https://up.codes/viewer/california/ca-green-code-2022/chapter/5/nonresidential-mandatory-measures#5

guideway source may not exceed 50 dBA in occupied areas during any hour of operation (24 CCR Part 6, 5.506.7.4.2).

California Department of Transportation (Caltrans) Vibration Guidance (April 2020)
There are no State plans, policies, regulations, or laws related to groundborne vibration that are directly applicable to the FGPU. However, Caltrans has adopted guidance for construction vibrations, and this guidance is used in this analysis.

Caltrans identifies maximum vibration levels for preventing damage to structures from intermittent construction or maintenance activities (see Table 4.7-7). A maximum vibration limit of 0.3 to 0.5 (in/sec) PPV is recommended for older residential structures, historic, and older buildings. A conservative vibration limit of 0.1 to 0.2 in/sec PPV has been used for buildings that are found to be structurally fragile.[11]

Table 4.7-7 Guideline Vibration Damage Potential Threshold Criteria

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

All of these limits have been used successfully, and compliance with these limits has not been known to result in appreciable structural damage. All vibration limits referred to herein apply on the ground level and take into account the response of structural elements (i.e., walls and floors) to groundborne excitation.

Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/ frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

In addition, the guidance identifies vibration levels that would be perceptible to humans, as shown in Table 4.7-8.

Table 4.7-8 Human Response to Transient Vibration

Human Response	Maximum PPV (in/sec)	
	Transient Sources	Transient Sources
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.10
Severe	2.0	0.4

11 Caltrans, Transportation and Construction Vibration Guidance Manual, April 2020, Chapter 6, Table 15 AASHTO Maximum Vibration Levels for Preventing Damage, https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tcvgm-apr2020-a11y.pdf

4.7.5.2 Local

General Plan Land Use Element

The following policy from the Land Use Element relates to noise:

- ***Policy LU 3.7:*** *Limit impacts from industrial or mixed-uses by establishing performance standards to regulate noise, glare, vibrations, odor, lighting, air pollution, and other potential disturbances.*

General Plan Noise and Nuisance Element

The City's adopted General Plan Noise and Nuisance Element addresses different sources of noise through various policies, including those requiring the use of noise barriers and reduction measures with new and existing development. It also contains the Noise Compatibility Guidelines (Table NN-5 in the Noise and Nuisance Element; see Table 4.7-9, below), which is used for evaluating land use noise compatibility when reviewing proposed land use development projects.

Table 4.7-9 Land Use Noise Compatibility Standards

Land Use Category	Exterior Noise Exposure (dBA CNEL)				
	<60	60–65	65–70	70–75	75+
Residential Land Uses					
Single-family, Mobile Homes, Senior Housing		45*	45*	45*	
Multi-Family			45*	45*	
Minor Mixed-Use, Major Mixed-Use			45*	45*	45*
Commercial					
Automotive, Service Commercial					
Office					
Shopping Center					
Visitor Accommodations			45*	45*	45*
Industrial					
Institutional					
Infrastructure (water treatment facilities, electrical substations)					
Worship facilities, educational facilities, community centers, libraries, museums and cultural centers)		45*	45*	45*	
Open Space, Parks and Recreation					
Community and Neighborhood Parks					
Golf Courses, Athletic Fields					
(*) Interior noise level					

Source: National City, General Plan, Noise and Nuisance Element, Table NN-5 Land Use – Noise Compatibility Guidelines, 2011

Key to Table 4.7-9:

	Compatible	Indoor Uses	Standard construction methods should attenuate exterior noise to an acceptable indoor noise level.
		Outdoor Uses	Activities associated with the land use may be carried out.
	Conditionally Compatible	Indoor Uses	Building structure must attenuate exterior noise to the indoor noise level. Conventional construction, but with closed windows and fresh air supply systems will normally suffice.
		Outdoor Uses	Best practices for reducing noise interference should be incorporated to make outdoor activities acceptable.
	Normally Incompatible	Indoor Uses	If new construction or development does proceed, a detailed acoustical analysis is needed to identify the noise reduction requirements and needed noise insulation features shall be included in the design.
		Outdoor Uses	Feasible noise mitigation techniques shall be analyzed and incorporated to make the outdoor activities acceptable.
	Incompatible	Indoor Uses	New construction should not be undertaken.
		Outdoor Uses	Severe noise interference makes outdoor activities unacceptable.

The Noise and Nuisance Element also addresses interior noise levels and require noise analyses and project-specific mitigation when appropriate in order to maintain consistency with the interior and exterior noise standards of the Noise and Nuisance Element. The following policies within the element are relative to noise and new development permitted under the FGPU:

- ***Policy NN-1.2:*** *Include appropriate noise reduction strategies (e.g., barriers, materials, traffic calming techniques, etc.) in the design and during implementation of new roadway projects.*
- ***Policy NN-1.3:*** *Reduce transportation noise impacts on new and existing development through the inclusion of appropriate noise reduction strategies (e.g., setbacks, noise barriers, building design, materials, etc.) in new development and redevelopment projects.*
- ***Policy NN-1.4:*** *Require the use of noise-reducing paving materials for public and private road surfacing projects.*
- ***Policy NN-2.3:*** *Enforce Title 24 required noise insulation standards in building design and construction to reduce noise generated by non-transportation sources.*
- ***Policy NN-2.5:*** *Require development to minimize the exposure of neighboring properties to excessive noise levels from construction-related activity during all phases of construction.*
- ***Policy NN-3.1:*** *Work with responsible agencies and City departments to address potential noise issues associated with land use proposals or projects.*
- ***Policy NN-3.2:*** *Require the location of sensitive land uses away from high noise areas, or require mitigation to control adverse noise impacts.*

- ***Policy NN-3.3:*** *Assure the appropriateness of proposed developments relative to existing and future noise levels by consulting the guidelines for noise-compatible land use (shown on Table NN-5) and the Noise Contour Exhibits (shown on Figures NN-1 and NN-3) to minimize the effects on noise-sensitive land uses.*
- ***Policy NN-3.4:*** *Require an acoustical study when required by Title 24 CCR (California Building Code) for proposed developments, so that noise mitigation measures can be included in the project design.*
- ***Policy NN-3.5:*** *Require that new construction and condominium conversions incorporate acoustical mitigation design in compliance with California Noise Insulation Standards (Title 24), when necessary and ensure that indoor noise levels for residential living spaces not exceed 45 dB CNEL.*
- ***Policy NN-3.6:*** *Encourage retrofitting of existing sensitive noise receptors (residences, schools, rest homes) with noise reduction materials.*

National City Municipal Code Title 12 Noise Control Ordinance
The City's Noise Control Ordinance is intended to prevent noise and vibration that may jeopardize the health or welfare of its citizens or degrade quality of life.

The key sections of the Municipal Code regulating noise control are presented below:

Chapter 12.06 Exterior Noise Limits 12.06.020 Maximum permissible sound levels by receiving land use
The noise standards presented in Table III of this chapter [renumbered as Table 4.7-10 for this Supplemental Program Environmental Impact Report] *for various categories of land uses defined in Chapter 18.10 of the city land use code, shall, unless otherwise specifically indicated, apply to each property or portion of property substantially used for a particular type of land use reasonably similar to the land use types shown in Table III. Where two or more dissimilar land uses occur on a single property, the more restrictive noise limits shall apply.*

A. *Additional land use classifications may be added by resolution of the planning commission to reflect both lower and higher existing ambient levels than those shown.*
B. *Where doubt exists when making identification of receiving land use, the planning commission may make an interpretation in the manner provided by Section 18. 134.020 of the land use code.*
C. *No person shall operate or cause to be operated any source of sound at any location within the city' or allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person, which causes the noise level to exceed the environmental noise level or nuisance noise level, or both, of the applicable limits given in Table Ill of this chapter at any point on or beyond the boundaries of the property on which the sound is produced.*
D. *Environmental noise shall be assessed by the A-weighted equivalent sound level (Leq) for any hour (Leq(h)).*

Nuisance noise shall be assessed as an A-weighted sound level not to be exceeded at any time. Nuisance noise is not subject to hourly averaging as Leq(h). The sound level of an event may be assessed by sound level meters or recording devices, or by other objective methods. However, failure or inability to conduct measurements of the sound level shall not bar enforcement or abatement.

Sound levels by receiving land. use shall be measured at the boundary of the property on which the sound is produced (generated) or at any point within the boundary of the property affected.

A. *Fixed location public utility distribution or fixed transmission facilities, located on or adjacent to a property line shall be subject to noise level limits of this section measured at or beyond six feet from the boundary of the easement upon which the equipment is located.*

Chapter 12.06 Exterior Noise Limits 12.06.040 Corrections to exterior noise level limits
See Table 4.7-10 below for referenced noise levels.

A. *If the noise is continuous as defined in Section 12.04.120, the Leq for any hour can be represented by any lesser time period within that hour. Noise measurements of a few minutes only will thus suffice to define the noise level.*

B. If the noise is intermittent as defined in Section 12.04.320, the Leq for any hour may be represented by a time period typical of the operating cycle. Measurement should be made of a representative number of noisy/quiet periods. A measurement period of not less than fifteen minutes is, however, strongly recommended when dealing with intermittent noise.

C. In the event the alleged offensive noise contains a steady, audible sound such as a whine, screech or hum, or contains a repetitive impulsive noise such as hammering or riveting, or contains music or speech, the standard limits set forth in Table III [i.e., Table 4.7-10] *shall be reduced by five dB.*

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

Table 4.7-10 Exterior Environmental Noise Limits[1,2,3]

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

Source: National City, Municipal Code Title 12 Section 12.06.040 Table III, (Ord. 2188 § 2, 2001)
1. Environmental Noise—shall be measured as Leq in any hour (Leq(h)).
2. Nuisance Noise—shall be measured as a decibel level not to be exceeded at any time.
3. Except when other hours are specified in Chapter 12.10 [of the Municipal Code].

Chapter 12.10 Prohibited Acts 12.10.160 Construction/Demolition

A. Except as provided in Section 12.10.160 B, it is unlawful to operate or to allow or cause the operation of any tools or equipment used in construction, drilling, repair, alteration, or demolition work between weekday hours of seven p.m. and seven a.m., or at any time on weekends or holidays, such that the sound therefrom creates a noise across a residential or commercial real property line that violates the provisions of section 12.06.020.

B. Subsection A shall not apply to: emergency work performed by public service utilities; work on private property that is necessary for fire and life safety; work permitted pursuant to Chapter 12.16; or, to the use of domestic power tools as allowed in Section 12.10.300.C

C. Noise from construction demolition activities shall not exceed the maximum noise levels at or within the boundaries of affected properties listed in the following schedule at all other times. [See Table 4.7-11.]

Table 4.7-11 Equipment Noise

Equipment Type		
Mobile	***Type I Areas***	***Type II Areas***
Maximum noise levels for nonscheduled, intermittent, short-term operation (less than ten days) of mobile equipment.	*Residential*	*Semi-residential/Commercial*
Daily, except Sundays and legal holidays, between seven a.m. to seven p.m.	*75 dBA*	*85 dBA*
Stationary	***Type I Areas***	***Type II Areas***
Maximum noise levels for repetitively scheduled and relatively long-term operation (periods of ten days or more) of stationary equipment:	*Residential*	*Semi-residential/Commercial*
Daily, except Sundays and legal holidays, between seven a.m. to seven p.m.	*60 dBA*	*70 dBA*
Source: National City, Municipal Code Title 12 Section 12.10.160 (Ord. 2188 § 2, 2001)		

Chapter 12.10 Prohibited Acts 12.10.180 Vibration
It is unlawful to operate or permit the operation of any device that creates a vibration which exceeds the vibration perception threshold at or beyond the property boundary of the source originates on private property, or at a distance of one hundred fifty feet or more from the source if originating from a location on a public space or public right-of-way. Vibration that occurs as an incidental result of sound generation shall not be governed by this section only, but also by the prohibitions or restrictions applicable to the source of the sound.

4.7.6 Significance Determination Thresholds

Appendix G of the 2022 CEQA Guidelines Issue XIII. Noise includes the following significance thresholds:

a) *Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?*
b) *Generation of excessive groundborne vibration or groundborne noise levels?*
c) *For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?*

4.7.7 Methodology

Threshold (c) excessive noise levels in the vicinity of an airport land use plan was determined through an initial analysis to not result in a change of significance as compared to the 2011 CLUU PEIR and therefore was excluded from the analysis in this section. Details regarding the 2011 CLUU PEIR conclusions for these issue areas are included in the Chapter 7 Comprehensive Land Use Update PEIR Subject Areas Requiring No Change in Analysis.

4.7.8 Issue Area 1: Ambient Noise

The FGPU proposes zoning changes within Focus Areas that would result in changes in land uses and in the density of future development. The intent of these changes is to facilitate housing production and promote mixed-use development, which would have the potential to affect ambient noise within the Planning Area. Additionally, the FGPU identifies an improved multimodal mobility vision that includes the improvement infrastructure throughout the Planning Area's corridors, also known as the City's community corridor classifications. This includes pedestrian and active transportation improvements through traffic signal installations, new sidewalks, curb ramps that meet the requirements of the Americans with Disabilities Act, bulb-outs, crosswalks and signing, striping enhancements, and bikeway improvements. In addition, infrastructure improvements to improve transit and vehicular mobility would include opportunities for transit hubs and stations, repair of pavement and annual pavement maintenance, and improvements to the interconnectivity of street infrastructure through Transportation System Management strategies and Transportation Demand Management strategies and policies.

For purposes of this analysis, full buildout of the FGPU is anticipated to occur in 2050. Future FGPU development would expose people living and working in the Focus Areas to changes in ambient noise from a variety of sources, including vehicular traffic, stationary sources such as certain commercial uses, and construction noise. Changes in ambient noise include noise from construction of infill projects and from noise conflicts relating to increased intensity and mixed uses in or near sensitive receptors, (e.g., new commercial uses that could have sources of noise generation—restaurant patios, entertainment, etc.).

An assessment of noise from each of these sources is provided below.

4.7.8.1 Temporary Noise Sources (Construction)

Construction noise associated with future development within the Planning Area would be generated by construction equipment used for site preparation and grading, removal of existing structures and pavement, loading, unloading, and placing materials and paving. Construction equipment noise is approximated as a point source at the center of construction activities. Based on standard distance attenuation rates (see Table 4.7-12), a noise level of 85 dBA at 50 feet would be 79 dBA at 100 feet and 73 dBA at 200 feet from the source.

Table 4.7-12 Construction Equipment Noise Emission Levels

Equipment	Typical Noise Level 50 feet from Source, dBA
Air Compressor	80
Backhoe	80
Ballast Equalizer	82
Ballast Tamper	83
Compactor	82
Concrete Mixer	85
Concrete Pump	82
Concrete Vibrator	76
Crane, Derrick	88
Crane Mobile	83
Dozer	85

Equipment	Typical Noise Level 50 feet from Source, dBA
Generator	82
Grader	85
Impact Wrench	85
Jack Hammer	88
Loader	80
Paver	85
Pile-driver (Impact)	101
Pile-driver (Sonic)	95
Pneumatic Tool	85
Pump	77
Rail Saw	90
Rock Drill	95
Roller	85
Saw	76
Scarifier	83
Scraper	85
Shovel	82
Spike Driver	77
Tie Cutter	84
Tie Handler	80
Tie Inserter	85
Truck	84

Source: FTA, Transit Noise and Vibration Impact Assessment Manual, September 2018 https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf

During excavating, grading, and paving operations, equipment moves to different locations and goes through varying load cycles, and there are breaks for the operators and for non-equipment-related tasks. Although maximum noise levels may be 85 to 90 dBA at a distance of 50 feet during most construction activities, hourly average noise levels would be 82 dBA at 50 feet from the center of construction activity when assessing the loudest pieces of equipment working simultaneously.

Construction noise occurs intermittently and varies depending on the nature or phase of construction (e.g., demolition/land clearing, grading and excavation, erection). Construction noise in any given area is typically short term and includes noise from activities such as site preparation, truck hauling of material, pouring of concrete, and use of power tools. Noise is generated by construction equipment, including earthmovers, material handlers, and portable generators, and reaches high levels for brief periods. As discussed in Section 4.7.5, above, the City Municipal Code Chapter 12 regulates exterior noise limits associated with construction equipment and activities through enforcement of noise ordinance standards (e.g., days of the week and hours of operation). The General Plan Noise and Nuisance Element includes Policy NN-2.5, which requires development to minimize the exposure of

neighboring properties to excessive noise levels from construction-related activity during all phases of construction.

Future development of the FGPU could result in a temporary ambient noise increase due to construction activities but would be subject to the applicable policies and regulations related to noise identified Section 4.7.5, above. Due to the developed nature of the Planning Area, there is a high likelihood for construction activities to take place adjacent to existing noise-sensitive receptors such as residential dwelling uses. Additionally, as future development would occur at varying times, development projects consistent with the FGPU and existing sensitive receptors may be exposed to construction noise from subsequent development projects. The City, under Municipal Code section 12.10.160 Construction/Demolition, provides maximum noise levels for construction demolition activities for mobile and stationary construction equipment in areas with residential or semi-residential/commercial uses (Table 4.7-11). Section 12.06.040 establishes allowable noise levels heard by receptors at sensitive land uses near a project site between the hours of 10 p.m. to 7 a.m. and 7 a.m. to 10 p.m. Enforcement of these maximum noise levels may reduce the potential impacts of the generation of substantial temporary noise generated by future construction but does not preclude them from occurring.

Therefore, buildout of the FGPU would result in potentially substantial temporary increases in ambient noise levels at noise-sensitive receptors (**Impact NOI-1**).

4.7.8.2 Permanent Noise Sources

Stationary (Fixed Noise) Sources

A "fixed noise source" means a stationary device that creates sounds while fixed or motionless, including, but not limited to, residential, industrial, and commercial machinery and equipment, pumps, fans, compressors, air conditioners, and refrigeration equipment.[12] The FGPU would include zoning reclassifications that would increase residential and mixed-use development opportunities throughout the Focus Areas. The common noise sources associated with new residential development would be those typical of any residential development (vehicles arriving and leaving, children at play and landscape maintenance machinery, etc.). Most of these noise sources do not have substantial potential to violate noise level standards or result in a substantial permanent increase in existing noise levels. Ground- or roof-mounted heating, ventilation, and air conditioning (HVAC) units may generate noise levels that exceed noise standards if located near sensitive adjacent uses. Common noise sources associated with mixed-use development may include outdoor speakers (e.g., drive-through speakers), parking lots, commercial-related mechanical equipment, loading docks, deliveries, trash-hauling activities, rowdy customers (commonly associated with clubs, bars, or other entertainment venues), and a variety of other noise sources.

As discussed in the City's General Plan Noise and Nuisance Element, the City establishes that noise-sensitive receptors, such as residential uses, are conditionally compatible with noise levels of 60 to 70 dBA and conditionally incompatible between 70 to 75 dBA. Where exterior noise levels would exceed 70 dBA, a detailed acoustical analysis is required to identify the noise reduction requirements, and needed noise insulation features shall be included in the design. In addition, the General Plan policies require appropriate noise reduction strategies (e.g., barriers, materials, traffic calming techniques, setbacks, noise barriers, building design, materials, etc.) in the design and during implementation of new roadway projects and new development and redevelopment projects.

Consistent with these General Plan compatibility standards, impacts would be considered significant where buildout of the FGPU would result in ambient noise levels in excess of standards established by the General Plan or Noise Ordinance, as described above. None of the noise sources described above are anticipated to violate standards of the Municipal Code or result in a substantial permanent increase in

12 National City, Municipal Code Title 12, Section 12.04.280 - Fixed Noise Source.

existing noise levels. However, ground- or roof-mounted HVAC units would have the potential to produce noise levels that exceed applicable noise limits. It is not known at this time which manufacturer, brand, or model of unit or units would be selected for use in future development projects. Buildings typically require an HVAC system capacity of less than 1 ton for every 600 square feet of air-conditioned space. A typical residential HVAC unit ranges from 1.5 to 5 tons and generates maximum noise levels of 65, 60, 55, and 50 dBA L_{eq} at distances of approximately 3, 9, 16, and 29 feet, respectively. Multi-family or commercial structures with building areas exceeding 3,000 square feet often have several residentially sized HVAC units distributed across the rooftop or a commercially sized HVAC system. In general, residentially sized HVAC units would not be expected to result in noise levels in excess of applicable noise level limits unless located closer than 30 feet from a residential property line (nighttime noise level limit of 50 dBA L_{eq}), or closer than 17 feet from a mixed-use property line (nighttime noise level limit of 55 dBA L_{eq}). HVAC units may be located within these distances.

City policies are in place to control noise and reduce on-site generated noise impacts between various land uses. As in Section 4.7.8.1, above, enforcement of compliance with maximum noise limits would reduce noise impacts from commercial uses on adjacent residential uses and enforcement of compliance at interior lease lines would reduce noise impacts from commercial uses collocated with residential uses (mixed use). Enforcement of Title 24–required noise insulation standards in building design and construction of future development under the FGPU would reduce noise generated by non-transportation sources. However, at this programmatic level of analysis for the FGPU, it cannot be verified that future developments would be capable of reducing noise levels to comply with the City's Noise Ordinance property line standards, and therefore such developments could result in substantial temporary increases in ambient noise levels at noise-sensitive receptors (**Impact NOI-2**).

Mobile Sources

Future development consistent with the FGPU would result in increases or decreases in vehicle traffic on proximate roadway segments. Ambient noise level changes would be greatest nearest the Focus Areas, where the greatest concentration of development-specific traffic would occur and would diminish at greater distances from the Focus Areas of development. Traffic noise is primarily a function of volume, vehicle mix, speed, and proximity. For purposes of this analysis, the vehicle mix and speed are assumed to remain constant for all roads except those at which the FGPU would include roadway diets. Thus, the primary factor affecting noise levels would be increased traffic volumes, which correlate directly with sound energy. As decibels are measures in a logarithmic scale, a doubling of the sound energy, such as doubling of traffic volume, would increase the noise level by 3 dBA. Existing and future traffic volumes were obtained from the Traffic Impact Analysis Report (Appendix 13.C.1).

No specific criteria have been developed for the purpose of assessing noise level increases associated with increased traffic. However, studies have shown that the average human ear can barely perceive a change in sound level of 3 dBA; a change of at least 5 dBA is considered a readily perceivable change in a normal environment; and a 10 dBA increase is subjectively heard as a doubling in loudness. As noise level increases of less than 3 dBA would be less than perceptible, these increases would be considered less than significant. Noise level increases that exceed 3 dBA would have the potential to result in significant impacts and warrant further assessment to determine significance.

Future development consistent with the FGPU would increase traffic volumes on local roadways and thereby would increase ambient noise levels. While the FGPU would also increase traffic volumes on freeways, these increases would be extremely limited as compared to the existing freeway volumes and thus would not result in measurable changes in freeway noise levels. Noise level increases that exceed 3 dBA would have potential to result in significant impacts and warrant further assessment to determine significance.

Table 4.7-13 shows estimates of the cumulative noise level increase that would occur with buildout of the FGPU, along with other regional traffic as projected for 2050, and estimates of the portion of the

cumulative increase that would result from buildout of the FGPU. Based on the modeled future conditions, noise levels associated with nearly all local roadways would be less than perceptible. No segment would be exposed to a readily perceptible noise level increase (5 dBA).

Table 4.7-13 Cumulative Noise Level Increases

Roadway	Segment		Speed (mph)	Existing L_{eq} (dBA)	Adopted General Plan L_{eq} (dBA) (2050)	FGPU L_{eq} (dBA) (2050)	Change in L_{eq} from Adopted General Plan (dBA)	Change in L_{eq} from Existing (dBA)
	From	To						
4th Street	Palm Avenue	Euclid Avenue	35	65	67	67	0	2
8th Street	I-805	Euclid Avenue	35	69	68	69	1	0
4th Street	Highland Avenue	Palm Avenue	25	61	62	61	-1	0
4th Street	National City Boulevard	Highland Avenue	25	61	63	61	-2	0
D Avenue	4th Street	8th Street	25	59	59	60	1	1
D Avenue	8th Street	16th Street	25	61	62	63	1	2
D Avenue	16th Street	18th Street	25	61	62	63	1	2
D Avenue	18th Street	24th Street	35	61	63	64	1	3
D Avenue	24th Street	30th Street	35	61	62	63	1	2
18th Street	National City Boulevard	D Avenue	30	61	60	62	2	1
Hover Avenue	22nd Street	20th Street	25	54	56	56	0	2
Wilson Avenue	24th Street	20th Street	35	62	65	65	0	3

Buildout of the FGPU would result in an increase of 3,447 average daily traffic (ADT) volume along the segment of D Avenue from 4th to 30th Street, 252 ADT volume increase along the segment of 4th Street from National City to I-5, 103 ADT volume decrease along the segment of D Avenue from I-5 to Euclid Avenue, 1,773 ADT volume increase along the segment of 18th Steet from National City Boulevard to D Avenue, 336 ADT volume increase along the segment of 8th Steet from I-805 to Euclid Avenue, and 932 ADT traffic volume decrease along the segment of Wilson Avenue from 20th to 24th Street. Traffic volume increases associated with the FGPU would contribute less than 1 dBA to the noise level increase

along D Avenue from 4th to 30th Street, approximately 1 to 2 dBA to the noise level increase along 18th Street from National City Boulevard to D Avenue and -1 to 0 dBA noise levels along 4th Street, 8th Street and Wilson Avenue. Thus, the FGPU would result in a less than perceptible contribution to traffic noise level increases.

As shown in Table 4.7-13, the cumulative noise level increases that would occur between the existing condition (2020) and the project planning horizon (2050) would include barely perceptible noise level increases along D Avenue between 4th Street and 18th Street, D Avenue between 24th and 30th Street, and 4th Street between National City Boulevard and Euclid Avenue. Implementation of the FGPU would not result in a perceptible contribution to the cumulative noise level increases along these segments.

Segments that would be subject to a barely perceptible cumulative noise level increase (3 dBA) would occur between D Avenue between 18th Street and 24th Street and along Wilson Avenue between 20th and 24th Street. As the overall contribution of the FGPU to ambient noise levels would be less than perceptible, impacts would be less than significant and not cumulatively considerable.

4.7.9 Issue Area 2: Vibration

Vibration generated by construction activity has the potential to damage structures. This damage could be structural, such as cracking of floor slabs, foundations, columns, beams, or wells, or cosmetic architectural, such as cracked plaster, stucco, or tile.

A quantitative assessment of potential vibration impacts from construction activities, such as pile driving, vibratory compaction, demolition, drilling, or excavation, may be conducted using the following equations:

$$PPV_{equip} = PPV_{ref} \times (\frac{25}{D})^{1.5}$$

where:

PPV_{equip} = the peak particle velocity of the equipment adjusted for distance, in/sec
PPV_{ref} = the source reference vibration level at 25 ft, in/sec
D = distance from the equipment to the receiver, ft

Representative vibration source levels were obtained from the Federal Transit Administration and were evaluated in the context of the FGPU. Vibration perception would occur at structures, as people do not perceive vibrations without vibrating structures. The ground vibration levels associated with various types of construction equipment are summarized in Table 4.7-14.

Groundborne noise and vibration from common construction equipment such as large bulldozers, loaded trucks, and jackhammers would be distinctly perceptible at 52, 45, and 22 feet, respectively. Thus, construction activities within these distances of an occupied structure may result in potential annoyance to occupants. Construction activities associated with development consistent with the FGPU may occur within these distances; however, due to other considerations such as noise, exhaust, and safety, construction equipment is not typically operated within these distances of vibration-sensitive uses for prolonged periods. Additionally, as required by Municipal Code Section 12.06.040, construction activities would be limited to daylight hours and thus would have low potential to disturb sleep. Therefore, there is low potential for typical construction activities to expose people to nuisance groundborne vibration or noise levels.

Table 4.7-14 Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 feet (in/sec)	Approximate Level* at 25 feet
Pile Drive (impact)	upper range	1.518	112
	typical	0.644	104
Pile Drive (sonic)	upper range	0.734	105
	typical	0.17	93
Clam shovel drop (slurry wall)		0.202	94
Hydromill (slurry wall)	in soil	0.008	66
	in rock	0.017	75
Vibratory Roller		0.21	94
Hoe Ram		0.089	87
Large bulldozer		0.089	87
Caisson drilling		0.089	87
Loaded trucks		0.076	86
Jack hammer		0.035	79
Small bulldozer		0.003	58

*RMS velocity in decibels, VdB re 1 micro-in/sec

Source: FTA, Transit Noise and Vibration Impact Assessment Manual, September 2018 https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf

Although it is possible for vibrations from construction projects to cause building damage, the vibrations from standard construction activities are almost never of sufficient amplitude to cause more than minor cosmetic damage to buildings.[13] Potential structural damage to historic or older structures would occur if vibration levels were to exceed 0.08 PPV. Groundborne noise and vibration from common construction equipment such as large bulldozers, loaded trucks, and jackhammers would attenuate to below these levels at 10, 8, and 4 feet, respectively. Thus, there is low potential for common construction equipment to result in structural damage to historic or older buildings on adjacent properties.

Less common construction activities with substantial potential to result in groundborne noise and vibration impacts include pile driving. Both of these sources generate variable groundborne noise and vibration levels depending on the scope of the activity.

Groundborne noise and vibration generated by these sources are often several times greater than those generated by common construction activities. For example, impact pile driving can generate groundborne noise and vibration levels that are distinctly perceptible at distances of up to 682 feet and groundborne noise and vibration levels that may result in structural damage to historic or old structures within 129 feet. As project-level details are not available at this time, potential vibration impacts cannot be determined. Future development consistent with the FGPU may require pile driving that would expose people to excessive groundborne vibration or noise levels (**Impact NOI-3**).

No operational sources of vibration would result from development under the FGPU.

13 Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf

4.7.10 Mitigation, Monitoring, and Reporting

Temporary Noise Sources (Construction)

MM-NOI-1: Prior to the issuance of a permit to construct land uses associated with noise-sensitive receptors consistent with the Focused General Plan Update within 112 feet of a noise-sensitive receptors, including, but not limited to, residential dwelling units, transient lodging, hospitals, nursing homes, facilities for long-term medical care, educational facilities, libraries, or churches, a Construction Noise Control Plan shall be submitted to the City of National City's Community Development Department for review and approval. The plan shall demonstrate that all construction activity will not expose noise-sensitive land uses such as residences to noise levels that exceed 75 dBA L_{eq}. The construction noise control plan can include, but is not limited to, the following:

- Ensure that construction equipment is properly muffled according to industry standards and is in good working condition.
- Place noise-generating stationary equipment and construction staging areas away from sensitive uses, where feasible.
- Implement noise attenuation measures to the extent feasible, which may include, but are not limited to, temporary noise barriers or noise blankets around stationary construction noise sources.
- Use electric air compressors and similar power tools rather than diesel-powered equipment, where feasible.
- Construction-related equipment, including heavy-duty equipment, motor vehicles, and portable equipment, shall be turned off when not in use for more than 5 minutes.
- Project developers shall require by contract specifications that heavily loaded trucks used during construction be routed away from residential streets to the extent feasible. Contract specifications shall be included in construction documents, which shall be reviewed by the City prior to issuance of a grading permit.
- Prior to commencement of construction activities, at least one sign shall be installed near the project site entrance stating the allowable construction hours and workdays, as well as the phone number of the job superintendent. The sign shall be clearly conspicuous and legible from the public right-of-way and shall remain in place throughout construction. If the City or the job superintendent receives a complaint, the superintendent shall investigate, take appropriate corrective action, and report the action taken to the reporting party.

Permanent Stationary Noise Sources

The following mitigation measure would address project impacts related to noise level limits established in Municipal Code Section 12.06.020 Maximum permissible sound levels by receiving land use and 12.10.160 Construction/Demolition.

MM-NOI-2: Prior to the issuance of a permit to construct developments consistent with the Focused General Plan Update that would include outdoor mechanical equipment, the Planning Department shall require appropriate noise attenuation measures for heating, ventilation, and air conditioning (HVAC) equipment, including, but not limited to, (1) set back at least 30 feet from the nearest property line, (2) surrounded by walls or parapet walls that obstruct the line-of-sight to adjacent land uses, or (3) placed within a mechanical equipment room. Where it may be demonstrated that other measures would reduce HVAC noise to levels below the limits specified in the Municipal Code, such measures may be substituted.

Vibration
The following mitigation measures would address potential exposure of people to excessive groundborne noise or vibration from construction activities associated with implementation of buildout under the FGPU.

> **MM-NOI-3**: Prior to the issuance of a permit to construct projects that are in the Planning Area and would include pile driving, the Planning Department shall require that a Noise and Vibration Impact Analysis be prepared. The Noise and Vibration Impact Analysis shall be prepared by a qualified professional. Wherein a potential impact-related groundborne noise or vibration is identified, the Planning Department shall require that the reduction measures be incorporated into project design.

4.7.11 Significance After Mitigation

Implementation of **MM-NOI-1** and **MM-NOI-2** would reduce the potential for violation of the Municipal Code maximum noise level limits. Impacts related to applicable noise standards (**Impact NOI-1 and Impact NOI-2**) would be reduced to *less than significant.*

Implementation of **MM-NOI-3** would require future projects that may generate substantial vibration or be exposed to substantial vibration to implement project-specific noise reduction measures into project design. After mitigation, **Impact NOI-3** would be *less than significant*.