Noise Technical Report

The Collection at Cactus Apartment Project

City of San Diego, California

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Acronyms and Abbreviations

Acronym/Abbreviation	Definition
ADT	average daily traffic
ANSI	American National Standards Institute
AUF	acoustical usage factor
Caltrans	California Department of Transportation
City	City of San Diego
CNEL	Community Noise Equivalent Level
dB	decibel
dBA	A-weighted decibel
DOT	Department of Transportation
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HVAC	heating, ventilating, and air-conditioning
Hz	Hertz (cycles per second)
ips	inches per second
ISO	International Organization of Standardization
L_{90}	90% statistical sound level
L_{eq}	equivalent noise level
$L_{eq(h)}$	hourly Leq sound level
L_{max}	maximum sound level
L_{min}	minimum sound level
LT	Long-term
MSCP	Multiple Species Conservation Program
MHPA	Multiple-habitat Planning Area
NIST	National Institute of Standards and Technology
OMCPU	Otay Mesa Community Plan Update
proposed project	The Collection at Cactus Apartment Project
PPV	Peak particle velocity
RCNM	Roadway Construction Noise Model
report	Noise Technical Report
RMS	root mean square
SANDAG	San Diego Association of Governments
SLM	Sound level meter
SPL	Sound pressure level
ST	Short-term
TFIC	Traffic Forecast Information Center

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1 Introduction

1.1 Report Purpose and Scope

The purpose of this technical report is to assess potential noise and vibration impacts associated with construction and operation of the Collection at Cactus Apartment Project (Project). This analysis uses the significance thresholds in the City of San Diego's Otay Mesa Community Plan Update (OMCPU) Program Environmental Impact Report (EIR) (City of San Diego 2014), and other applicable thresholds of significance (e.g. Caltrans).

1.2 Project Location

The Project is located east of Cactus Road, west of Continental Road, north of Airway Road, and south of State Route (SR) 905, in the City of San Diego, California. The Project area falls in Section 33, Township 18 South, Range 1 West of the Otay Mesa, CA U.S. Geological Service (USGS) 7.5-minute series topographic Quadrangle map (Figure 1). The Project is part of the Otay Mesa Central Village Specific Plan (Specific Plan), adopted by the City of San Diego (City) on April 4, 2017. Coverage for the CEQA for the Specific Plan was provided under the Central Village Specific Plan (CVSP) EIR Addendum, dated March 17, 2017 (Addendum). The Addendum was prepared in accordance with CEQA and tiered from the OMCPU Program Environmental Impact Report (PEIR), which had been updated by the City in 2014.

1.3 Project Description

The Project proposes a Vesting Tentative Map (VTM) and Neighborhood Development Permit (NDP) to develop 962 multifamily residential units, including 81 Affordable units, across Planning Areas (PA) 10, PA 11, PA 12, and PA 13 of the CVSP. Additionally, the Project would allow for the future development of a net 3.5-acre park (gross 3.62 acres) within PA 17 of the CVSP.

The Project site encompasses one Assessor's Parcel Number (APN) 646-100-77. The Project site is approximately 39.62 gross acres (29.37 net acres) within the CVSP, in the Otay Mesa area of the City of San Diego. Under existing conditions, the site is vacant and undeveloped. From a regional perspective, the Project site is located approximately one mile north of the United States/Mexico Border and is directly south of SR-905). The Project site is surrounded by industrial land uses north of SR-905, residential land uses to the east, vacant and commercial land uses to the south, and residential and commercial land uses to the west. Additionally, west of the Project are land uses planned for multi-family residential, mixed use, and open space land uses associated with the CVSP.

Approval of the VTM and NDP would allow for the development of 130 units on approximately 5.49 net acres in PA 10, 324 units on approximately 8.41 net acres in PA 11, 348 units on approximately 9.01 net acres in PA 12, and 160 units on approximately 6.46 net acres in PA 13 for a total of 962 units. Additionally, the Project proposes 17,452 square feet (s.f.) in leasing/amenity space, a public park on approximately 3.5 net acres in PA 17 (3.62 gross acres), five detention basins, and associated utilities and improvements.

The base density of each PA is 242 units for PA 10, 244 units for PA 11, 262 units for PA 12, and 285 units for PA 13. Pursuant to State Density Bonus law, in exchange for reserving 10% of the PA 11 and 12 base dwelling units

(52 units) for “Very Low” Income households, the Project is entitled to a 32.5% density bonus (166 units), two incentives, and unlimited waivers. The Project is also reserving 10% of the PA 10 and 13 dwelling units (29 units) for “Low” income households, entitling the Project to a 20% density bonus, one incentive, and unlimited waivers. The Project will not utilize its allotted density bonus for PA 10 and 13, but will utilize incentives and waivers. The very low-income and low-income units will be located in PA 11 and PA 12.

Grading would occur on approximately 38.0 acres, which includes disturbance to the Project site and grading associated with off-site roadway improvements. Grading would require 16,541 cubic yards (cy) of cut and 59,387 cy of fill. It should be noted that grading activities and ultimate development would avoid the drainage area in the northwest corner of the Project site.

Access to the Project would be provided via Airway Road, Cactus Road, Continental Road, future Street D, and future street Park Way. The Project would connect to existing utilities within Airway Road, Continental Road, and Cactus Road. The Project would include appropriate improvements to Airway Road, Cactus Road, and Continental Road as well as the construction of several roadways for internal circulation. Specifically, to accommodate internal circulation, the Project includes the construction of Street D running east to west through the central portion of the Project site and connecting with Cactus Road and Continental Road, as well as the construction of Park Way running north to south and connecting with Airway Road and proposed Street D.

Figure 1 Project Location

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Figure 2 Project Site Plan

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2 Environmental Setting

Due to the technical nature of noise and vibration impact assessment, a brief overview of basic noise principles and descriptors is provided below, as well as a summary of the existing noise environment.

2.1 Noise and Vibration Basics

2.1.1 Sound

Noise is defined as unwanted sound. Sound may be described in terms of level or amplitude (measured in decibels [dB]), frequency or pitch (measured in hertz or cycles per second), and duration (measured in seconds or minutes). The standard unit of measurement of the amplitude of sound is the decibel. Because the human ear is not equally sensitive to sound at all frequencies, a special frequency-dependent rating scale is used to relate noise to human sensitivity. The dBA scale performs this compensation by discriminating against low and very high frequencies in a manner approximating the sensitivity of the human ear. Several descriptors of noise (noise metrics) exist to help predict average community reactions to the adverse effects of environmental noise, including traffic-generated noise, on a community. These descriptors include the equivalent noise level over a given period (L_{eq}), the statistical sound level, the day–night average noise level (L_{dn}), and the Community Noise Equivalent Level (CNEL). Each of these descriptors uses units of dBA. Table 1 provides examples of A-weighted noise levels from common sounds. In general, human sound perception is such that a change in sound level of 3 dBA is barely noticeable, a change of 5 dBA is clearly noticeable, and a change of 10 dBA is perceived as doubling or halving the sound level.

Table 1. Typical Exterior and Interior Sound Levels in the Environment

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
—	110	Rock band
Jet flyover at 300 meters (1,000 feet)	100	—
Gas lawn mower at 1 meter (3 feet)	90	—
Diesel truck at 15 meters (50 feet), at 80 kilometers per hour (50 mph)	80	Food blender at 1 meter (3 feet)
		Garbage disposal at 1 meter (3 feet)
Noisy urban area, daytime	70	Vacuum cleaner at 3 meters (10 feet)
gas lawn mower at 30 meters (100 feet)		
Commercial area	60	Normal speech at 1 meter (3 feet)
Heavy traffic at 90 meters (300 feet)		
Quiet urban daytime	50	Large business office
		Dishwasher, next room
Quiet urban nighttime	40	Theater, large conference room (background)
Quiet suburban nighttime	30	Library
Quiet rural nighttime	20	Bedroom at night, concert hall (background)
—	10	Broadcast/recording studio
Lowest threshold of human hearing	0	Lowest threshold of human hearing

Source: Caltrans 2013.
Note: dBA = A-weighted decibel.

The L_{eq} value is a sound level energy-averaged over a specified period (typically no less than 15 minutes for environmental studies). It is a single numerical value that, if constant over time, represents the same amount of variable sound energy received by a receptor during a time interval. For example, a 1-hour L_{eq} measurement would represent the average amount of energy contained in all the noise that occurred in that hour. The L_{eq} value is thus an effective noise descriptor because of its ability to assess the total time-varying effects of noise on sensitive receptors.

Unlike the L_{eq} metric that can be defined for any duration, L_{dn} and CNEL descriptors always represent 24-hour periods, often on an annualized basis. The L_{dn} and CNEL values also differ from L_{eq} because they apply a time-weighted dB adjustment designed to emphasize noise events that occur during the evening and nighttime hours (when speech and sleep disturbance is of more concern). "Time weighted" refers to the fact that L_{dn} and CNEL penalize noise that occurs during certain sensitive periods. In the case of CNEL, noise occurring during the daytime (7:00 a.m.–7:00 p.m.) receives no penalty. Noise during the evening (7:00 p.m.–10:00 p.m.) is penalized by adding 5 dB, while nighttime (10:00 p.m.–7:00 a.m.) noise is penalized by adding 10 dB. L_{dn} differs from CNEL in that the daytime period is defined as 7:00 a.m.–10:00 p.m., thus eliminating the evening period. L_{dn} and CNEL are the predominant criteria used to measure roadway noise affecting residential receptors. These two metrics generally differ from one another by no more than 0.5 dB to 1 dB and, as such, are often treated as equivalent to one another.

2.1.2 Vibration

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Vibration can be a serious concern, causing buildings to shake and rumbling sounds to be heard. In contrast to noise, vibration is not a common environmental problem. It is unusual for vibration from sources such as buses and trucks to be perceptible, even in locations close to major roads. Some common sources of vibration are trains, buses on rough roads, and construction activities, such as blasting, pile driving, and heavy earthmoving equipment.

Several different methods are used to quantify vibration. Peak particle velocity (PPV), expressed in inches per second (ips), is defined as the maximum instantaneous peak of the vibration signal and is most frequently used to describe vibration impacts to buildings. The root mean square (RMS) amplitude is most frequently used to describe the effect of vibration on the human body and is defined as the average of the squared amplitude of the signal. Decibel notation (VdB) is commonly used to describe this RMS magnitude with respect to a reference value, which acts to compress the range of numbers required to discuss vibration in the context of impact assessment.

The calculation to determine PPV at a given distance is as follows:

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

Where:

PPV_{rcvr} = the peak particle velocity in inches per second of the equipment adjusted for distance (i.e., at the receiver)

PPV_{ref} = the reference vibration level in inches per second at 25 feet

D = the distance from the equipment to the receiver

n = an exponent, for which a value of 1.1 would be consistent with Caltrans suggestion for class III "hard soils" composed of dense compacted sand or dry consolidated clay (Caltrans 2020).

The above PPV_{rcvr} value can be converted to an RMS vibration velocity level as follows, where the crest factor (CF) is assumed to be a value of 4 per FTA guidance (FTA 2018):

$$VdB_{rcvr} = 20*LOG(PPV_{rcvr}/(CF*0.000001))$$

2.1.3 Sensitive Receptors

Noise- and vibration-sensitive land uses are typically 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 be considered noise- and vibration-sensitive and may warrant unique measures for protection from intruding noise. Existing sensitive receptors in the vicinity of the project site consist of residential multi-family uses located on the /eastern side of Continental Street approximately 85 feet to the east of the project boundary and single-family homes west of Cactus road approximately 85 feet west of the project boundary as shown in Figure 3, Noise Measurement Locations. At residentially zoned land uses, the City's construction noise standard (75 dBA L_{eq} over a 12-hour period) applies. The City's non-construction exterior noise level thresholds are the most stringent to protect people from loud noise sources where people live. Hence, these nearby residential sensitive receptors (~85 feet from the project on the eastern side of Continental Street and western side of Cactus Road) represent those studied herein and have the greatest potential to be impacted by construction and/or operation of the project.

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3 Regulatory Setting

The following subsections summarize relevant laws, ordinances, regulations, policies, standards, and guidance that establish noise and vibration impact significance assessment criteria for the proposed project.

3.1 Federal

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

The rationale for the FICON recommendations is that it is possible to consistently describe the annoyance of people exposed to transportation noise in terms of L_{dn}. This day-night sound level (L_{dn}) is comparable to the afore-described CNEL value but considers the 7:00 p.m. to 10:00 p.m. hours as daytime and thus not subject to the +5 dB "evening" penalty that the CNEL value derivation applies. The changes in noise exposure that are shown below are expected to result in equal changes in annoyance at sensitive land uses. Although the FICON recommendations were specifically developed to address aircraft noise impacts, they are used in this analysis to define a substantial increase in community noise levels related to all transportation noise sources and permanent non-transportation noise sources.

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

3.2 State

3.2.1 California Department of Transportation – Vibration

In its Transportation and Construction Vibration Guidance Manual (Caltrans 2020), the California Department of Transportation (Caltrans) recommends 0.5 ips PPV as a threshold for the avoidance of structural damage to typical newer residential buildings exposed to continuous or frequent intermittent sources of groundborne vibration. For transient vibration events, such as blasting, the damage risk threshold would be 1.0 ips PPV (Caltrans 2020) at the same type of newer residential structures. For older structures, these guidance thresholds would be more stringent: 0.3 ips PPV for continuous/intermittent vibration sources, and 0.5 ips PPV for transient vibration events. With respect to human annoyance, Caltrans guidance indicates that building occupants exposed to continuous groundborne vibration in the range of 0.1 ips PPV ("strongly perceptible") to 0.4 ips PPV ("severe") would find it "annoying" at 0.2 ips PPV and "unpleasant" at the 0.4 ips PPV value. Although these Caltrans guidance thresholds

are not regulations, they can serve as quantified standards in the absence of such limits at the local jurisdictional level.

3.3 Local

3.3.1 City of San Diego Noise Ordinance

The following are summarized portions or reproductions of relevant City of San Diego noise regulations, policies, and guidance with respect to assessing noise impact assessment for the proposed project.

City of San Diego Municipal Code 59.5.0401 (Noise Ordinance, Sound Level Limits)

It shall be unlawful for any person to cause noise by any means to the extent that the 1-hour average sound level exceeds the applicable limits given in Table 2, Applicable Noise Limits, at any location in the City of San Diego on or beyond the boundaries of the property on which the noise is produced. The noise subject to these limits is that part of the total noise at the specified location that is due solely to the action of said person.

Table 2. Applicable Noise Limits

Land Use	Time of Day	One-Hour A-weighted Average Sound Level (dBA)
Single-family residential	7:00 a.m. to 7:00 p.m.	50
	7:00 p.m. to 10:00 p.m.	45
	10:00 p.m. to 7:00 a.m.	40
Multifamily residential (up to a maximum density of 1/2,000)	7:00 a.m. to 7:00 p.m.	55
	7:00 p.m. to 10:00 p.m.	50
	10:00 p.m. to 7:00 a.m.	45
All other residential	7:00 a.m. to 7:00 p.m.	60
	7:00 p.m. to 10:00 p.m.	55
	10:00 p.m. to 7:00 a.m.	50
Commercial	7:00 a.m. to 7:00 p.m.	65
	7:00 p.m. to 10:00 p.m.	60
	10:00 p.m. to 7:00 a.m.	60
Industrial or agricultural	Any time	75

Note: dB = decibels

City of San Diego Municipal Code 59.5.0402 (b) (Noise Ordinance, Motor Vehicles)

Section 59.5.0402 (b) of the SDMC states that nothing in the Noise Ordinance section shall apply to authorized emergency vehicles when being used in emergency situations, including the blowing of sirens and/or horns.

City of San Diego Municipal Code 59.5.0404 (Noise Ordinance, Construction Noise)

(a) It shall be unlawful for any person, between the hours of 7:00 p.m. of any day and 7:00 a.m. of the following day, or on legal holidays as specified in Section 21.04 of the San Diego Municipal Code, with exception of Columbus Day and Washington's Birthday, or on Sundays,

to erect, construct, demolish, excavate for, alter or repair any building or structure in such a manner as to create disturbing, excessive or offensive noise unless a permit has been applied for and granted beforehand by the Noise Abatement and Control Administrator. In granting such permit, the Administrator shall consider whether the construction noise in the vicinity of the proposed work site would be less objectionable at night than during the daytime because of different population densities or different neighboring activities; whether obstruction and interference with traffic particularly on streets of major importance, would be less objectionable at night than during the daytime; whether the type of work to be performed emits noises at such a low level as to not cause significant disturbances in the vicinity of the work site; the character and nature of the neighborhood of the proposed work site; whether great economic hardship would occur if the work were spread over a longer time; whether proposed night work is in the general public interest; and he shall prescribe such conditions, working times, types of construction equipment to be used, and permissible noise levels as he deems to be required in the public interest.

(b) Except as provided in subsection C. hereof, it shall be unlawful for any person, including the City of San Diego, to conduct any construction activity so as to cause, at or beyond the property lines of any property zoned residential, an average sound level greater than 75 decibels during the 12-hour period from 7:00 a.m. to 7:00 p.m.

(c) The provisions of subsection B. of this section shall not apply to construction equipment used in connection with emergency work, provided the Administrator is notified within 48 hours after commencement of work.

3.3.2 City of San Diego General Plan

The City's General Plan Noise Element identifies compatible exterior noise levels for various land use types (City of San Diego 2015). The maximum allowable noise exposure varies depending on the land use. The maximum acceptable exterior noise level for residential uses and other noise-sensitive uses (including schools, libraries, hospitals, daycare facilities, hotels, motels) is 65 dBA CNEL. Table 3 reproduces Table NE-3 from the City's General Plan Noise Element.

Table 3. City of San Diego Land Use – Noise Compatibility Guidelines

Land Use Category	Exterior Noise Exposure (dBA CNEL)				
	55–60	60–65	65–70	70–75	75–80
Parks and Recreational					
Parks, Active and Passive Recreation					
Outdoor Spectator Sports, Golf Courses; Water Recreational Facilities; Indoor Recreation Facilities					
Agricultural					
Crop Raising and Farming; Community Gardens, Aquaculture, Dairies; Horticulture Nurseries and Greenhouses; Animal Raising, Maintain and Keeping; Commercial Stables					
Residential					
Single Dwelling Units; Mobile Homes		45			
Multiple Dwelling Units*		45	45*		
Institutional					
Hospitals; Nursing Facilities; Intermediate Care Facilities; Kindergarten through Grade 12Educational Facilities; Libraries; Museums; Child Care Facilities		45			
Other Educational Facilities including Vocational/Trade Schools and Colleges and Universities		45	45		
Cemeteries					
Retail Sales					
Building Supplies/Equipment; Food, Beverages and Groceries; Pets and Pet Supplies; Sundries, Pharmaceutical, and Convenience Sales; Wearing Apparel and Accessories			50	50	
Commercial Services					
Building Services; Business Support; Eating and Drinking; Financial Institutions; Maintenance and Repair; Personal Services; Assembly and Entertainment (includes public and religious assembly); Radio and Television Studios; Golf Course Support			50	50	
Visitor Accommodations		45	45	45	
Offices					
Business and Professional; Government; Medical, Dental and Health Practitioner; Regional and Corporate Headquarters			50	50	
Vehicle and Vehicular Equipment Sales and Services Use					
Commercial or Personal Vehicle Repair and Maintenance; Commercial or Personal Vehicle Sales and Rentals; Vehicle Equipment and Supplies Sales and Rentals; Vehicle Parking					
Wholesale, Distribution, Storage Use Category					
Equipment and Materials Storage Yards; Moving and Storage Facilities; Warehouse; Wholesale Distribution					
Industrial					
Heavy Manufacturing; Light Manufacturing; Marine Industry; Trucking and Transportation Terminals; Mining and Extractive Industries					
Research and Development				50	

Table Shading Key

	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.
45, 50	Conditionally Compatible	Indoor Uses	Building structure must attenuate exterior noise to the indoor noise level indicated by the number for occupied areas.
		Outdoor Uses	Feasible noise mitigation techniques should 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.

Source: City of San Diego 2015.

* For uses affected by aircraft noise, refer to General Plan Noise Element Policies NE-D.2 and NE-D.3.

The City's General Plan Noise Element also lists the following policies with respect to noise and land use compatibility.

- **NE-A.1.** Separate excessive noise-generating uses from residential and other noise-sensitive land uses with a sufficient spatial buffer of less sensitive uses.
- **NE-A.2.** 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 5) to minimize the effects on noise-sensitive land uses.
- **NE-A.3.** Limit future residential and other noise-sensitive land uses in areas exposed to high levels of noise.
- **NE-A.4.** Require an acoustical study consistent with Acoustical Study Guidelines (Table NE-4) for proposed developments in areas where the existing or future noise level exceeds or would exceed the "compatible" noise level thresholds as indicated on the Land Use - Noise Compatibility Guidelines (Table 5), so that noise mitigation measures can be included in the project design to meet the noise guidelines.
- **NE-A.5.** Prepare noise studies to address existing and future noise levels from noise sources that are specific to a community when updating community plans.

3.3.3 Otay Mesa Community Plan Update EIR

The 2013 Otay Mesa Community Plan Update (OMCPU) PEIR provides thresholds that are referenced in this analysis. Based on the City's Significance Thresholds at the time this OMCPU PEIR was prepared, noise impacts would be significant if the CPU would:

1. Result in the exposure of people to current or future transportation noise levels that would exceed standards established in the Transportation Element of the General Plan and land use compatibility guidelines in the Brown Field Comprehensive Land Use Plan;
2. Result in exposure of future residents to excessive noise levels from airport and aircraft operations;
3. Allow collocation of residential and commercial or industrial uses where exposure of people to noise levels would exceed the City's Noise Abatement and Control Ordinance; or
4. Adversely impact sensitive species within the MHPA due to construction noise.

This assessment intends to use these criteria unless updated by current state CEQA appendix G criteria.

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4 Existing Noise Conditions

Sound level measurements were conducted on March 5th, 2024, to document the existing noise environment within the project area to establish baseline noise conditions against which to compare project noise levels. All noise measurements were performed in accordance with relevant American National Standards Institute (ANSI) and American Standards for Testing and Measurement (ASTM) guidelines, at three (3) locations in the proposed project area.

The noise measurements were performed using a Rion NL-62 model Type 1 precision grade sound level meter (SLM). Field calibrations were performed on the SLM with an acoustic calibrator before and after the measurements. All instrumentation components, including microphones, preamplifiers and field calibrators have laboratory-certified calibrations traceable to the National Institute of Standards and Technology (NIST). The SLMs used meet the current ANSI standard for Type 1 SLMs. Meteorological conditions during the monitoring periods were consistent with seasonal expectations and appropriate for collection of usable noise level data.

The primary noise source affecting the long-term noise monitoring location was vehicular traffic on the local roadway network. Additional noise sources experienced during the noise-monitoring were bird noise, distant dogs barking, and aircraft noise.

Short-term (ST) noise monitoring was conducted at three locations (as shown on Figure 3), with results presented in Table 4, to further characterize noise levels generated by the existing ambient noise environment.

Table 4. Summary of Short-Term Ambient Noise Measurements

Site	Location	Time	Average Noise Levels (dBA)			
			L_{eq}	L_{max}	L_{50}	L_{90}
ST1	East of Continental Street at Multi-family homes.	2024-03-05, 09:46 AM to 10:01 AM	53.5	57.2	53.3	51.8
ST2	Northern project boundary.	2024-03-05, 09:26 AM to 09:41 AM	68.5	72.2	68.3	64.9
ST3	Southern project boundary adjacent to Airway Rd.	2024-03-05, 09:05 AM to 09:20 AM	56.2	64.5	53.0	48.6

Source: Dudek 2024, Appendix A.
Notes: dBA = A-weighted decibels; L_{eq} = average equivalent noise level; L_{max} = maximum noise level; L_{50} = sound level exceeded 50 percent of the period; L_{90} = sound level exceeded 90% of the period.

Figure 3 Noise Measurement Locations

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5 Thresholds of Significance

The following significance criteria are based on the 2013 OMCPU PEIR and will be used to determine the significance of potential noise impacts. Impacts to noise would be significant if the proposed project would result in the following:

1. Result in the exposure of people to current or future transportation noise levels that would exceed standards established in the Transportation Element of the General Plan and land use compatibility guidelines in the Brown Field Comprehensive Land Use Plan;

2. Result in exposure of future residents to excessive noise levels from airport and aircraft operations;

3. Allow collocation of residential and commercial or industrial uses where exposure of people to noise levels would exceed the City's Noise Abatement and Control Ordinance; or

4. Adversely impact sensitive species within the MHPA due to construction noise.

In light of these above significance criteria, this analysis uses the following standards to evaluate potential noise and vibration impacts.

- Construction noise - Temporary construction noise that exceeds 75 dBA L_{eq} at a sensitive receptor would be considered significant. In particular, per SDMC 59.5.0404(c), construction noise levels measured at or beyond the property lines of any property zoned residential shall not exceed an average sound level greater than 75 dB L_{eq} during the 12-hour period from 7:00 a.m. to 7:00 p.m. In addition, construction activity is prohibited between the hours of 7:00 p.m. of any day and 7:00 a.m. of the following day, or on legal holidays as specified in SDMC Section 21.04, with the exception of Columbus Day and Washington's Birthday, or on Sundays, which would create disturbing, excessive, or offensive noise unless a permit has been applied for and granted beforehand by the Noise Abatement and Control Administrator, in conformance with SDMC Section 59.5.0404. Additionally, where temporary construction noise would substantially interfere with normal business communication, or affect sensitive receptors, such as educational facilities, a significant noise impact may be identified.
- Off-site Project-attributed transportation noise – Guidance regarding the determination of a substantial permanent increase in transportation noise levels in the Project vicinity above existing levels is provided by the 1992 findings of FICON, which assessed the annoyance effects of changes in ambient noise levels resulting from aircraft operations. The FICON recommendations are based upon studies that relate aircraft noise levels to the percentage of persons highly annoyed by the noise. Annoyance is a qualitative measure of the adverse reaction of people to noise that generates speech interference, sleep disturbance, or interference with the desire for a tranquil environment.

  The rationale for the FICON recommendations is that it is possible to consistently describe the annoyance of people exposed to transportation noise in terms of Ldn (and, by extension, CNEL).[1] The changes in noise exposure that are shown in Table 5 are expected to result in equal changes in annoyance at sensitive land uses. Although the FICON recommendations were specifically developed to address aircraft noise impacts,

[1] As discussed in Section 4.9-1, Existing Conditions, the L_{dn} and CNEL noise metrics are very similar and often used interchangeably.

they are used in this analysis to define a substantial increase in community noise levels related to all transportation noise sources.[2]

Table 5. Measures of Substantial Increase for Transportation Noise Sources

Ambient Noise Level Without Project (L_{dn}/CNEL)	Significant Impact Assumed to Occur if the Project Increases Ambient Noise Levels by:
<60 dBA	+ 5 dB or more
60–65 dBA	+ 3 dB or more
>65 dBA	+ 2 dB or more

Source: FICON 1992.
Notes: Ldn = day–night average noise level; CNEL = community noise equivalent level; dBA = A-weighted decibel; dB = decibel.

- Construction vibration – Guidance from Caltrans indicates that a vibration velocity level of 0.2 ips PPV received at a structure would be considered annoying by occupants within (Caltrans 2020). As for the receiving structure itself, aforementioned Caltrans guidance from Section 2 recommends that a vibration level of 0.3 ips PPV would represent the threshold for building damage risk of older residential structures exposed to continuous or frequently intermittent sources of groundborne vibration.
- Airport noise - The nearest public or public-use airport is the Brown Field Municipal Airport, located approximately 0.4 miles north of the Project. At such distance from an airport handling civilian aviation traffic, there is no potential to expose people in the Project area to excessive airport-related noise. Additionally, the City of San Diego General Plan shows that that the Project area is outside of the 60 dBA CNEL airport noise contour.

[2] Traffic noise and other transportation noise sources are similar to aircraft/airport noise in that all of these noise sources can and do operate throughout the daytime and nighttime hours. The FICON recommendations use a weighted 24-hour noise metric, in which noise occurring during nighttime hours has a penalty applied to account for the increased sensitivity of persons to noise at night. Additionally, the graduated levels of the FICON guidance for substantial increase account for the diminishing tolerance of the typical person to noise increases as ambient noise levels are increased. Such is the case whether the dominant noise source is aircraft, or some other transportation source.

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6 Impact Analysis

The following noise and vibration impact assessment for the Project is arranged in the same order of the four OMCPU PEIR significance criteria (1, 2, 3, 4) for noise as listed in Section 5.

1. ***Would the project result in the exposure of people to current or future transportation noise levels that would exceed standards established in the Transportation Element of the General Plan and land use compatibility guidelines in the Brown Field Comprehensive Land Use Plan?***

6.1 Long-Term Off-Site Traffic Noise Exposure

The proposed Project would result in the creation of additional vehicle trips on local arterial roadways (i.e., Airway Road, Cactus Road, Continental Street, and Britannia Boulevard), which could result in increased traffic noise levels at adjacent noise-sensitive land uses. Appendix C, Traffic Noise Modeling Input and Output, contains a spreadsheet with traffic volume data (average daily traffic) on Airway Road, Cactus Road, Continental Street, and Britannia Boulevard),. In particular, the proposed Project would create additional traffic along Continental Street, which according to the Traffic Impact Assessment prepared for the proposed Project (CR Associates 2024) would add 5,947 total average daily trips to the site's vicinity.

According to the Federal Interagency Committee on Noise (FICON), guidance from their 1992 findings indicates how changes in ambient noise levels from transportation sources, such as aircraft operations, affect human annoyance. The FICON recommendations are based on studies linking aircraft noise levels to the percentage of people highly annoyed by the noise, considering factors like speech interference, sleep disturbance, and the desire for a tranquil environment. This guidance uses the day-night average noise level (Ldn) and community noise equivalent level (CNEL) to quantify noise exposure and its impact on people.

The FICON thresholds for significant noise increases are as follows: If the ambient noise level is below 60 dBA Ldn/CNEL, a 5 dB increase is considered significant. For ambient noise levels between 60 and 65 dBA Ldn/CNEL, a 3 dB increase is considered significant. If the ambient noise level exceeds 65 dBA Ldn/CNEL, a 2 dB increase is considered significant.

These thresholds are used to assess whether the proposed Project would cause a substantial permanent increase in transportation noise levels in the vicinity. If the noise increase exceeds these thresholds at existing noise-sensitive land uses, where exterior noise levels already surpass the city's significance thresholds (e.g., 65 dBA during the daytime for multi-family residential areas), the impact would be considered significant.

Potential noise effects from vehicular traffic were assessed using the Federal Highway Administration's Traffic Noise Model version 2.5 (FHWA 2004). Information used in the model included the roadway geometry, Existing Year (2024), Existing plus Project, Opening Year (2027) Opening Year plus Project, Horizon Year (2062), and Horizon Year plus Project traffic volumes and posted traffic speeds. Noise levels were modeled

at representative noise-sensitive receivers ST1 through ST3, as shown in Figure 3. Additional Modeled receptor M1 was used to represent the western sensitive receptors approximately 85 feet west of the project site west of Cactus Road. These four receptors represent the nearby single-family and multi-family homes, as well as the surrounding roadways. Since the prepared traffic assessment did not include future traffic volumes for the 905 freeway, Horizon Year traffic numbers were estimated using the SANDAG Transportation Forecast Information Center. The receivers were modeled to be 5 feet above the local ground elevation. The noise model results are summarized in Table 6. Based on results of the model, implementation of the proposed Project would not result in readily perceptible increases in traffic noise.

Table 6. Roadway Traffic Noise Modeling Results

Modeled Receiver	Existing (2024) Noise Level (dBA CNEL)	Existing (2024) Plus Project Noise Level (dBA CNEL)	Opening Year (2027) without Project Noise Level (dBA CNEL)	Opening year (2027) with Project Noise Level (dBA CNEL)	Horizon Year (2062) without Project Noise Level (dBA CNEL)	Horizon Year (2062) with Project Noise Level (dBA CNEL)	Maximum Project-Related Noise Level Increase (dB)
ST1	54.5	59.4	60.0	61.9	59.9	61.6	4.9
ST2	68.2	68.2	69.0	69.0	68.1	68.1	0.0
ST3	60.3	62.2	67.4	67.8	67.6	68.0	1.9
M1	54.8	57.5	59.4	60.5	62.0	62.6	2.7

Source: Appendix C
Notes: dBA = A-weighted decibel; CNEL = Community Noise Equivalent Level; dB = decibel.

Table 6 shows that at all four listed representative receivers, the addition of Project-related traffic to the roadway network would result in a CNEL increase of less than 5 dB. Although a 5 dB increase is considered a noticeable change in noise levels, the increase is below the threshold for a substantial increase according to the 1992 findings of FICON. The FICON recommendations define a substantial increase as 5 dB or more for areas with existing noise levels below 60 dBA, 3 dB or more for areas with existing noise levels between 60-65 dBA, and 2 dB or more for areas with existing noise levels above 65 dBA. Thus, a less-than-significant impact is expected for Project-related off-site traffic noise increases affecting existing residences in the vicinity.

6.2 Traffic Noise Exposure to Future Project Occupants

Aside from exposure to aviation traffic noise, current CEQA noise-related guidelines at the state level do not require an assessment of exterior-to-interior noise intrusion, environmental noise exposure to occupants of newly-created Project residences, or environmental noise exposure to exterior non-residential uses attributed to the development of the proposed Project. Nevertheless, the City's CEQA guidelines and the California Building Code requires that interior background noise levels not exceed a CNEL of 45 dB within habitable rooms. Additionally, the OMCPU PEIR evaluated current and future roadway transportation noise exposures to people (on and offsite). Hence, the following predictive analysis of traffic noise exposure at the exteriors of occupied residences and outdoor living areas is provided below.

In addition to the prediction results presented in Table 6, the FHWA TNM software was also used to predict the Horizon + Project scenario traffic noise levels at multiple on-site exterior areas, as listed in Table 7.

Modeled receptor locations, which appear in Appendix C, include representative positions for the exteriors of multiple floors of the Northern facades. Predicted exterior sound levels presented in Table 7 are higher than 65 dBA CNEL indicate locations where an exterior-to-interior noise analysis should be performed for the proximate occupied residential unit.

Table 7. On-Site Exterior Roadway Traffic Noise Modeling Results

Modeled Receiver	Description	Predicted Traffic Noise Exposure at Modeled Receiver (dBA CNEL)
M1-1	1st floor	63
M1-2	2nd floor	66
M1-3	3rd floor	70
M1-4	4th floor	70
M2-1	1st floor	63
M2-2	2nd floor	67
M2-3	3rd floor	70
M2-4	4th floor	71
M3-1	1st floor	64
M3-2	2nd floor	71
M3-3	3rd floor	73
M3-4	4th floor	73

The prediction results from the Table 7 indicate that future traffic noise levels would range close to but not exceed 74 dBA CNEL at facades that have line of site to the nearby 905 freeway to the north of the Project. With the 45 dBA CNEL interior background sound level limit, this means the minimum composite sound transmission class (STC) rating for the exterior shell separating the habitable interior space from the outdoor sound level should be at least 29. The composite STC rating for the portion of a building shell that separates an interior space from the outdoors is calculated from the area-dependent contributions of its elements: windows, wall assemblies, and doors.

Windows are typically the weakest sound isolation element of residential buildings. The minimum performance window option in occupied rooms is assumed to be single hung operable windows with a minimum of dual-pane glazing. California's Title 24 (Title 24, Part 6 of the California Code of Regulations) stipulates energy efficiency of new residential and nonresidential buildings, with each local community adopting building codes to achieve compliance with these regulations. Based on these Title 24 requirements and the City of San Diego Code, this analysis presumes such dual-paned vinyl windows will be used for this Project. A glazing manufacturer, Viracon, reports that a dual pane assembly composed of two 1/8"-thick glass panes separated by a 3/8" wide air-gap yields an STC rating of 31 (Viracon 2019).

This analysis presumes that the exterior wall assemblies (at a minimum) comprise 7/8"-thick exterior plaster on a weather-resistant barrier attached to 2"-thick (and 4" deep) wooden studs, with fibrous batt insulation in the stud cavities, and a 5/8"-thick layer of gypsum wallboard (GWB) attached to the interior-facing surface. Assuming the mass of the exterior plaster is comparable to a double-layer of GWB, this analysis applies available acoustical transmission loss (TL) data on such a wall assembly (NRCC 1998) to help determine the composite STC rating for the façade exposed to exterior traffic noise.

Some of the proposed Project residential units feature patios or balconies, for which access is provided by single-panel, out-swing fiberglass french doors with hinges (i.e., not sliding) comparable to a Milgard Essence series model (or similar from another manufacturer). For purposes of this analysis, these doors are assumed to feature a dual-pane glazing system similar to the window assembly (i.e., two 1/8"-thick glass panes separated by a 3/8" wide air-gap) in narrow-perimeter frames. The analysis also assumes that these door products feature good seals and related hardware, so that when closed, the effective sound insulating performance is represented by the glass. Viracon data indicates that such glazing should demonstrate an STC rating of 31 (Viracon 2019).

Clearly, an open window or open door to an adjoining patio or balcony greatly compromises the sound insulation performance of the façade wall assembly. However, when such windows and doors are closed, all facades are anticipated to exhibit a predicted STC rating of at least 34, and thus would provide sufficient exterior-to-interior sound insulation from outdoor traffic noise to yield interior background sound levels that are less than 45 dBA CNEL and thus compliant with the City and state standards. Recall that none of the predicted exterior traffic noise levels at the studied receptor locations exceeded 74 dBA CNEL; thus, the STC rating value (for closed windows and doors) subtracted from these exterior noise values must result in interior noise levels of less than 45 dBA CNEL (e.g., 74 – 34 = 40 dBA CNEL, which is less than 45). This apparent requirement for closed windows and doors means that the design of these habitable rooms should feature mechanical ventilation or an air-conditioning system to provide interior comfort of the occupants. Detailed transmission loss data for a sample anticipated exterior façade is included in Appendix D, Transmission Loss Predictions. Thus, the City's threshold of 45 dB CNEL within habitable rooms would not be exceeded and considered **less than significant.**

2. ***Would the project result in the exposure of future residents to excessive noise levels from airport and aircraft operations?***

6.3 Aviation Noise

The Brown Field Municipal Airport is approximately 0.4 miles from the Project area. The Project area is outside of the 60 dB CNEL contour shown in the City of San Diego General Plan. Therefore, the Project site would not be subjected to excessive noise levels.

3. ***Would the project allow the collocation of residential and commercial or industrial uses where exposure of people to noise levels would exceed the City's Noise Abatement and Control Ordinance?***

6.4 Short-Term Construction Noise

Construction noise and vibration are temporary phenomena, with emission levels varying from hour to hour and day to day, depending on the equipment in use, the operations performed, and the distance between the source and receptor. Equipment that would be in use during construction would include, in part, graders, backhoes, rubber-tired dozers, loaders, cranes, forklifts, pavers, rollers, and air compressors. The typical maximum noise levels at a distance of 50 feet from various pieces of construction equipment and activities anticipated for use on the proposed Project site are presented in Table 8. Note that the equipment

noise levels presented in Table 8 are maximum noise levels. Usually, construction equipment operates in alternating cycles of full power and low power, producing average noise levels over time that are less than the maximum noise level. The average sound level of construction activity also depends on the amount of time that the equipment operates and the intensity of construction activities during that time.

Table 8. Typical Construction Equipment Maximum Noise Levels

Equipment Type	Typical Equipment (L_{max}, dBA at 50 Feet)
All Other Equipment > 5 HP	85
Backhoe	78
Compressor (air)	78
Crane	81
Dozer	82
Excavator	81
Flat Bed Truck	74
Front End Loader	79
Generator	72
Grader	85
Man Lift	75
Paver	77
Roller	80
Welder / Torch	73

Source: D0T 2006.
Note: L_{max} = maximum sound level; dBA = A-weighted decibels.

Aggregate noise emission from proposed Project construction activities, broken down by sequential phase, was predicted at two evaluation distances to the nearest existing noise-sensitive receptor: 1) from the nearest position of the construction site boundary and 2) from the geographic center of the construction site, which serves as the time-averaged location or geographic acoustical centroid of active construction equipment for the phase under study. The intent of the former distance is to help evaluate anticipated construction noise from a limited quantity of equipment or vehicle activity expected to be at the boundary for some period of time, which would be most appropriate for phases such as site preparation, grading, and paving. The latter distance is used in a manner similar to the general assessment technique as described in the FTA guidance for construction noise assessment, when the location of individual equipment for a given construction phase is uncertain over some extent of (or the entirety of) the construction site area. In this studied scenario, because of the equipment location uncertainty, all the equipment for a construction phase is assumed to operate—on average—from the acoustical centroid position. Table 9 summarizes these two distances to the closest noise-sensitive receptor east of the eastern Project boundary for each of the five sequential construction phases. At the site boundary, this analysis assumes that up to only one piece of equipment of each listed type per phase would be involved in the construction activity for a limited portion of the 8-hour period. In other words, at such proximity, the operating equipment cannot “stack” or crowd the vicinity and still operate normally. For the acoustical centroid case, which intends to be a geographic average position for all equipment during the indicated phase, this analysis assumes that all equipment for the indicated activity will be operating in a given hour over the 8-hour assessment period.

Table 9. Estimated Distances between Construction Activities and the Nearest Noise-sensitive Receptors

Construction Phase (and Equipment Types Involved)	Distance from Nearest Noise-Sensitive Receptor to Construction Site Boundary (Feet)	Distance from Nearest Noise-Sensitive Receptor to Acoustical Centroid of Site (Feet)
Site Preparation (dozer, backhoe)	85	385
Grading (grader, scraper, dozer, excavator, backhoe)	85	385
Building construction (crane, man-lift, generator, backhoe, welder/torch)	85	385
Architectural finishes (air compressor)	85	385
Paving (paver, roller, other equipment)	85	385

Note: Proposed rock crushing activity during the Grading phase, comprising a rock crusher, hoe ram, and rock drill, is expected to be approximately 530 feet away from the nearest noise sensitive receptor, as detailed in Appendix B.

A Microsoft Excel–based noise prediction model emulating and using reference data from the Federal Highway Administration Roadway Construction Noise Model (RCNM) (FHWA 2008) was used to estimate construction noise levels at the nearest occupied noise-sensitive land use. (Although the RCNM was funded and promulgated by the Federal Highway Administration, it is often used for non-roadway projects, because the same types of construction equipment used for roadway projects are often used for other types of construction.) Input variables for the predictive modeling consist of the equipment type and number of each (e.g., two graders, a loader, a tractor), the duty cycle for each piece of equipment (e.g., percentage of time within a specific time period, such as an hour, when the equipment is expected to operate at full power or capacity and thus make noise at a level comparable to what is presented in Table 8), and the distance from the noise-sensitive receiver. The predictive model also considers how many hours that equipment may be on site and operating (or idling) within an established work shift. Conservatively, no topographical shielding was assumed in the modeling. The RCNM has default duty-cycle values for the various pieces of equipment, which were derived from an extensive study of typical construction activity patterns. Those default duty-cycle values were used for this noise analysis, which is detailed in Appendix B, Construction Noise Modeling Input and Output, and produce the predicted results displayed in Table 10.

Table 10. Predicted Construction Noise Levels per Activity Phase

Construction Phase (and Equipment Types Involved)	12-Hour L_{eq} at Nearest Noise-Sensitive Receptor to Construction Site Boundary (dBA)	12-Hour L_{eq} at Nearest Noise-Sensitive Receptor to Acoustical Centroid of Site (dBA)	Threshold Exceedance?
Site Preparation (dozer, backhoe)	71.5	60.4	No
Grading (grader, scraper, dozer, excavator, backhoe, rock drill, hoe ram, rock crusher)	74.8	64.4	No

Table 10. Predicted Construction Noise Levels per Activity Phase

Construction Phase (and Equipment Types Involved)	12-Hour L_{eq} at Nearest Noise-Sensitive Receptor to Construction Site Boundary (dBA)	12-Hour L_{eq} at Nearest Noise-Sensitive Receptor to Acoustical Centroid of Site (dBA)	Threshold Exceedance?
Building construction (crane, man-lift, generator, backhoe, welder/torch)	70.3	56.9	No
Architectural finishes (air compressor)	64.8	51.5	No
Paving (paver, roller, other equipment)	73.9	58.8	No

Notes: L_{eq} = equivalent noise level; dBA = A-weighted decibels.

As presented in Table 10, the estimated construction noise levels are predicted to be as high as 75 dBA L_{eq} over an 12-hour period at the nearest existing residences (as close as 85 feet away) when grading activities take place near the eastern property boundaries. Note that these estimated noise levels at a source-to-receiver distance of 85 feet would occur when noted pieces of heavy equipment would each operate for a cumulative period of less than four (4) hours a day, while rock crushing equipment activities onsite (i.e., a rock drill, hoe ram, and rock crusher) would operate at a source-to-receiver distance of 530 feet for eight (8) hours a day. By way of example, a grader might make multiple passes on site that are this close to a receiver; but, for the remaining time during the day, the grader is sufficiently farther away, performing work at a more distant location, or simply not operating. On an average construction workday, heavy equipment would be operating sporadically throughout the Project site and more frequently away from the property line edge (not including rock crushing equipment). At more typical distances closer to the center of the Project site (approximately 385 feet from the nearest existing residence), construction noise levels are estimated to range from approximately 52 dBA L_{eq} to 63 dBA L_{eq} at the nearest existing residence. For these instances when operation of construction equipment and processes are sufficiently proximate to potentially cause activity noise levels to exceed 75 dBA L_{eq}, which the City of San Diego uses as a threshold for construction noise exposure at a residential receptor, OMCPU PEIR mitigation measure **MM-NOI-4** shall be implemented as indicated site conditions may warrant. Proper implementation of **MM-NOI-4** has the ability to reduce noise levels by up to 5 dB, which would correspondingly reduce the estimated non-mitigated construction noise levels to 75 dBA L_{eq}, which would make the level compliant with the 75 dBA threshold.

In summary, construction noise during allowable daytime hours (between 7:00 a.m. and 7:00 p.m.) has the potential for noise to equal but not exceed the 75 dBA L_{eq} 12-hour City guidance at the nearest residential receiver on occasion. Therefore, incorporation of **MM-NOI-4** is recommended to reduce construction noise exposure levels. Thus, under such conditions, temporary construction-related noise would be considered **less than significant**.

The outcome of the King & Gardiner Farms versus Kern County judge's decision established a requirement for construction noise analyses to disclose the relative increase of construction noise over ambient noise levels. Construction noise levels would cause a temporary increase of 0 to 7 dBA L_{eq} over existing ambient noise levels; ranging from an imperceptible difference in the sound magnitude to a several-decibel difference that would be clearly perceived by average healthy hearing.

6.5 Construction Vibration

Construction activities may expose persons to excessive groundborne vibration or groundborne noise, causing a potentially significant impact. Caltrans has collected groundborne vibration information related to construction activities (Caltrans 2013). Information from Caltrans indicates that continuous vibrations with a PPV of approximately 0.2 ips is considered annoying. For context, heavier pieces of construction equipment, such as a bulldozer that may be expected on the Project site, have peak particle velocities of approximately 0.089 ips or less at a reference distance of 25 feet (DOT 2006).

Groundborne vibration attenuates rapidly, even over short distances. The attenuation of groundborne vibration as it propagates from source to receptor through intervening soils and rock strata can be estimated with expressions found in FTA and Caltrans guidance. By way of example, for a bulldozer operating on site and as close as the eastern Project boundary (i.e., 85 feet from the nearest receiving sensitive land use) the estimated vibration velocity level would be 0.023 ips per the equation as follows (FTA 2018) but applying the Caltrans recommended exponent of 1.1:

$$PPV_{rcvr} = PPV_{ref} * (25/D)^{1.1} = 0.023 = 0.089 * (25/85)^{1.1};$$

where PPV_{rcvr} is the predicted vibration velocity at the receiver position, PPV_{ref} is the reference value at 25 feet from the vibration source (the bulldozer), and D is the actual horizontal distance to the receiver. Therefore, at this predicted PPV, the impact of vibration-induced annoyance to occupants of nearby existing homes would be **less than significant**.

Construction vibration, at sufficiently high levels, can also present a building damage risk. However, the predicted 0.023 ips PPV at the nearest residential receiver 85 feet away from onsite operation of the bulldozer during grading would not surpass the guidance limit of 0.3 to 0.5 ips PPV for preventing damage to residential structures (Caltrans 2013). Because the predicted vibration level at 85 feet is less than both the annoyance and building damage risk thresholds, vibration from Project conventional construction activities is considered less than significant.

Once operational, the proposed Project would not be expected to feature major onsite producers of groundborne vibration. Anticipated mechanical systems like pumps are designed and manufactured to feature rotating components (e.g., impellers) that are well-balanced with isolated vibration within or external to the equipment casings. On this basis, potential vibration impacts due to proposed Project operation would be less than significant.

6.6 Long-Term Operational Noise Exposure

Stationary Noise Sources

The incorporation of new multi-family homes and a mix of open space uses attributed to development of the proposed Project would add a variety of noise-producing electro-mechanical equipment that include those presented and discussed in the following paragraphs. Most of these noise-producing equipment or sound sources would be considered stationary or limited in mobility to a defined area. Using a Microsoft Excel–based outdoor sound propagation prediction model that applies appropriate ISO 9613-2 outdoor

sound propagation algorithms (ISO 1996), Project-attributed operational noise at nearby community receptors was predicted using several assumptions: 1) Treatment of exposed roof-mounted air-cooled condensing units as point-type sound emission sources; and 2) Point-source sound propagation (i.e., 6 dB per doubling of distance) that conservatively ignores acoustical absorption from atmospheric and ground surface effects. See Appendix E for quantitative details of the inputs and outputs that form the basis of the following assessment presentations.

Residential Unit Heating, Ventilation, and Air Conditioning Noise

For purposes of this analysis, each of the new occupied residential units would be expected to feature a split-system type air-conditioning unit, with an air-cooled refrigeration (2-ton capacity) condenser unit. Assuming each condenser unit has a sound pressure level (SPL) of 68 dBA at 3 feet based on available data from a likely manufacturer (Carrier 2012), and the units would generally be installed on the roof and behind parapets or at grade level. Therefore, the closest existing noise-sensitive residential receptor to the east of the proposed Project's eastern unit would be as close as 100 horizontal feet to the nearest of these condenser units at the nearby mult-family homes to the east of the project and single-family homes to the west of project. The predicted sound emission level from the combination of all operating condenser units as received by this off-site single-family home would be 45 dBA L_{eq} and thus be compliant with the City's nighttime threshold of 45 dBA hourly L_{eq}. Under such conditions, daytime and nighttime operation of residential air-conditioning units would result in a **less-than-significant** impact.

4. ***Would the project adversely impact sensitive species within the MHPA due to construction noise?***

6.7 MHPA Construction Noise Exposure

The proposed Project is not located within or adjacent to the City's Multiple Species Conservation Program (MSCP) Multi-habitat Planning Area (MHPA), and the nearest MHPA land is approximately 500 feet to the west in Spring Canyon (Alden Environmental, Inc 2024). On this basis, Project construction noise would not adversely impact sensitive species within the MHPA and would result in a **less-than-significant** impact.

7 Mitigation Measures

The following mitigation measure, introduced in Section 6, Impact Analysis, would apply during construction activities. Based on the OMCPU PEIR mitigation framework, this measure shall be updated, expanded, and refined when applied to specific future projects based on project-specific design and changes in existing conditions, and local, state, and federal laws

MM-NOI-4 For projects that exceed daily construction noise thresholds established by the City of San Diego, best construction management practices shall be used to reduce construction noise levels to comply with standards established by the Municipal Code in Chapter 5, Article 9.5, Noise Abatement and Control.

The project applicant shall prepare and implement a Construction Noise Management Plan. Appropriate management practices shall be determined on a project-by-project basis, and are specific to the location. Control measures shall include:

A. Minimizing simultaneous operation of multiple construction equipment units.

B. Locating stationary equipment as far as reasonable from sensitive receptors.

C. Requiring all internal combustion-engine-driven equipment to be equipped with mufflers that are in good operating condition and appropriate for the equipment.

D. Construction of temporary noise barriers around construction sites that block the line-of-sight to surrounding receptors.

Appendix B includes a construction noise prediction worksheet that illustrates a sample scenario of what the anticipated and quantifiable noise reduction effect would be of adding a temporary noise barrier to reduce construction noise exposure at the nearest sensitive receptor.

8 Conclusions

This technical report was conducted to predictively quantify construction and operation noise and vibration attributed to the proposed Project. The results indicate that potential impacts during construction grading activities would be less than significant with the incorporation of OMCPU **MM-NOI-4**. No additional mitigation is required.

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Appendix A

Baseline Field Measurement Photos and Collected Data

Appendix B
Construction Noise Prediction Model Worksheets

Appendix C
Traffic Noise Modeling Input and Output

Appendix D

Transmission Loss Predictions

Appendix E

Stationary Operation Calculation Worksheets