Noise Technical Report for the El Camino Real Assisted Living Facility Project City of San Diego, California

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JANUARY 2023

Printed on 30% post-consumer recycled material.

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Acronyms and Abbreviations

Acronym/Abbreviation	Definition
ACC	air-cooled condenser
ADT	average daily traffic
APN	accessor parcel number
CAGN	California gnatcatcher
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
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
ips	inches per second
Ldn	day–night average noise level
Leq	equivalent noise level
Lmax	maximum sound level
Lmin	minimum sound level
LUAG	Land Use Adjacency Guidelines
MHPA	multiple habitat planning area
MSCP	Multiple Species Conservation Plan
OPR	Office of Planning and Research
PPV	peak particle velocity
proposed project	El Camino Real Assisted Living Facility
PTAC	packaged terminal air conditioner
RCNM	Roadway Construction Noise Model
SDMC	San Diego Municipal Code
SLM	Sound level meter
SPL	Sound pressure level
ST	Short-term
STC	Sound transmission class
TL	transmission loss

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1 Introduction and Background

This technical noise report evaluates the potential noise impacts during construction and operation of the proposed El Camino Real Assisted Living Facility Project (proposed project). This assessment utilizes the City of San Diego (City) significance thresholds (City of San Diego 2020) that are comparable to those relating to noise and vibration assessment in Appendix G of the California Environmental Quality Act Guidelines (14 CCR 15000 et seq.).

Project Description

The proposed El Camino Real Assisted Living Project (project) proposes to develop approximately 2.8 acres of a 3.97-acre parcel at 13860 El Camino Real (APN 304-650-37-00) in the northern section of the City of San Diego (City), California south of the San Dieguito River and north of Del Mar Heights Road (Figure 1, Project Location).

The proposed project consists of the construction of a 105,568 square-foot structure that will house an assisted living facility for the elderly with 87 assisted living units, 18 memory care units, and associated common facilities (dining room, kitchen, spa, pool, fitness center, etc.). The project will also install a parking lot, sidewalks, patios, and landscaping around the structure. The construction will occur on the western portion of a 3.97-acre parcel located at 13860 El Camino Real (APN 304-650-37-00). (Figure 2, Site Plan). The project would not encroach into the MHPA or the 100-foot wetland buffer around wetland habitat to the east of the project footprint.

Noise Characteristics

Sound is mechanical energy transmitted by pressure waves in a compressible medium, such as air. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired. The sound pressure level (SPL) has become the most common descriptor used to characterize the loudness of an ambient sound level. The unit of measurement of sound pressure is a decibel (dB). Under controlled conditions in an acoustics laboratory, the trained, healthy human ear is able to discern changes in sound levels of 1 dB when exposed to steady, single-frequency signals in the mid-frequency range. Outside such controlled conditions, the trained ear can detect changes of 2 dB in normal environmental noise. It is widely accepted that the average healthy ear, however, can barely perceive noise level changes of 3 dB. A change of 5 dB is readily perceptible, and a change of 10 dB is perceived as twice or half as loud (Caltrans 2013). A doubling of sound energy results in a 3 dB increase in sound, which means that a doubling of sound energy (e.g., doubling the number of daily trips along a given road) would result in a barely perceptible change in sound level.

Sound may be described in terms of level or amplitude (measured in dB), frequency or pitch (measured in hertz or cycles per second), and duration (measured in seconds or minutes). 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 A-weighted decibel (dBA) scale performs this compensation by discriminating against low and very high frequencies in a manner approximating the sensitivity of the human ear.

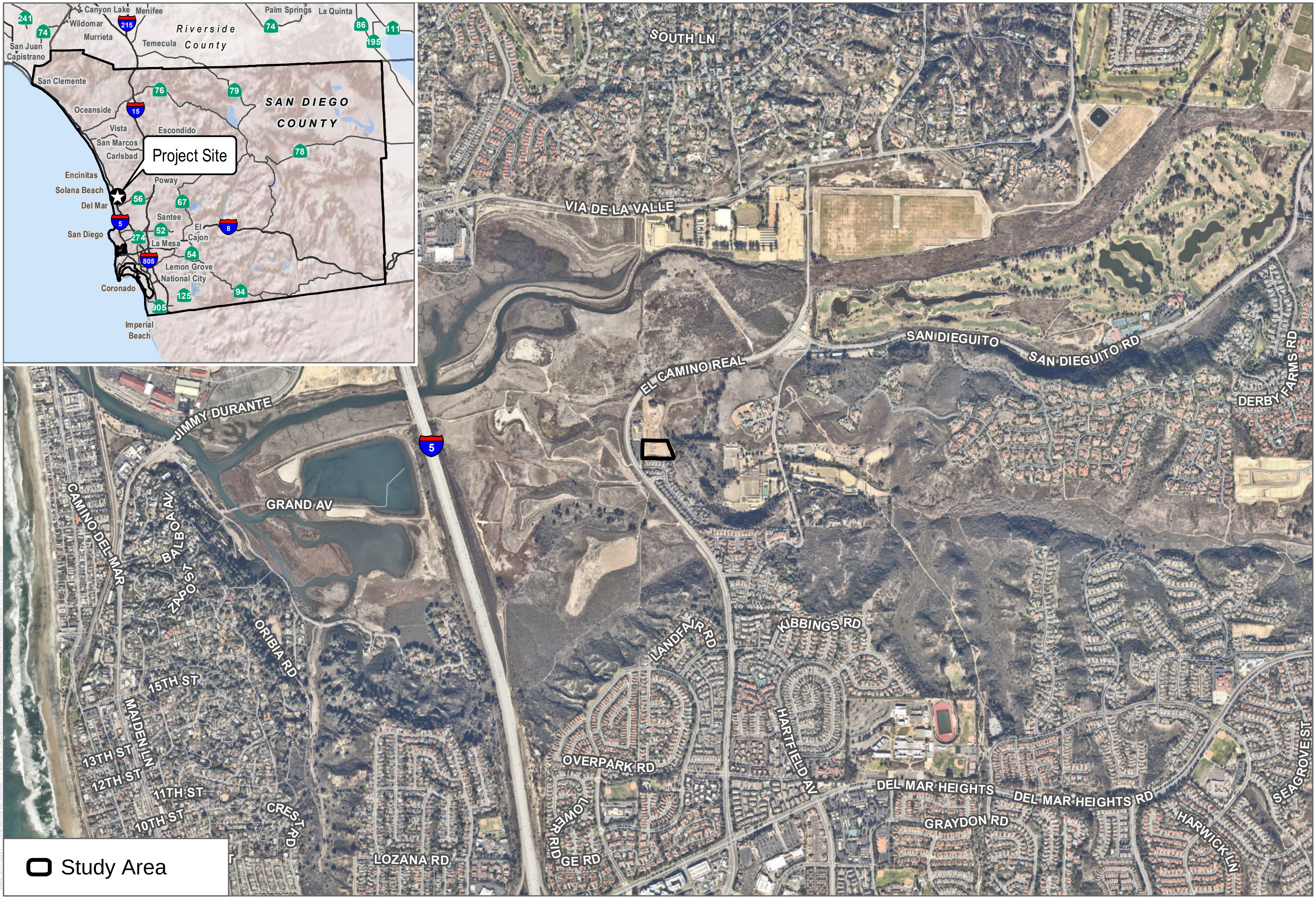
Several descriptors of noise (a.k.a., noise metrics) exist to help predict average community reactions to the adverse effects of environmental noise, including traffic-generated noise. These descriptors include the equivalent noise level over a given period (L_{eq}), the day–night average noise level (L_{dn}), and the community noise equivalent level (CNEL). Each of these descriptors uses units of dBA.

L_{eq} is a decibel quantity that represents the constant or energy-averaged value equivalent to the amount of variable sound energy received by a receptor during a time interval. For example, a 1-hour L_{eq} measurement of 60 dBA would represent the average amount of energy contained in all the noise that occurred in that hour. L_{eq} is an effective noise descriptor because of its ability to assess the total time-varying effects of noise on sensitive receptors, which can then be compared to an established L_{eq} standard or threshold of the same duration. Another descriptor is maximum sound level (L_{max}), which is the greatest sound level measured during a designated time interval or event. The minimum sound level (L_{min}) is often called the *floor* of a measurement period.

Unlike the L_{eq}, L_{max}, and L_{min} metrics, L_{dn} and CNEL descriptors always represent 24-hour periods and differ from a 24-hour L_{eq} value because they apply a time-weighted factor designed to emphasize noise events that occur during the non-daytime 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. to 7:00 p.m.) receives no penalty. Noise during the evening (7:00 p.m. to 10:00 p.m.) is penalized by adding 5 dB to the actual levels, and nighttime (10:00 p.m. to 7:00 a.m.) noise is penalized by adding 10 dB to the actual levels. L_{dn} differs from CNEL in that the daytime period is longer (defined instead as 7:00 a.m. to 10:00 p.m.), thus eliminating the dB adjustment for 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 0.5–1 dB, and are often considered or actually defined as being essentially equivalent by many jurisdictions.

Vibration Fundamentals

Vibration is oscillatory movement of mass (typically a solid) over time. It is described in terms of frequency and amplitude and, unlike sound, can be expressed as displacement, velocity, or acceleration. For environmental studies, vibration is often studied as a velocity that, akin to the discussion of sound pressure levels, can also be expressed in dB as a way to cast a large range of quantities into a more convenient scale and with respect to a reference quantity. Vibration impacts to buildings are generally discussed in terms of inches per second (ips) peak particle velocity (PPV), which will be used herein to discuss vibration levels for ease of reading and comparison with relevant standards. Vibration can also be annoying and thereby impact occupants of structures, and vibration of sufficient amplitude can disrupt sensitive equipment and processes (Caltrans 2020), such as those involving the use of electron microscopes and lithography equipment. Common sources of vibration within communities include construction activities and railroads. Groundborne vibration generated by construction projects is usually highest during pile driving, rock blasting, soil compacting, jack hammering, and demolition-related activities where sudden releases of subterranean energy or powerful impacts of tools on hard materials occur. Depending on their distances to a sensitive receptor, operation of large bulldozers, graders, loaded dump trucks, or other heavy construction equipment and vehicles on a construction site also have the potential to cause high vibration amplitudes.



SOURCE: NearMap 2020

0 1,000 2,000 Feet

FIGURE 1

Project Location

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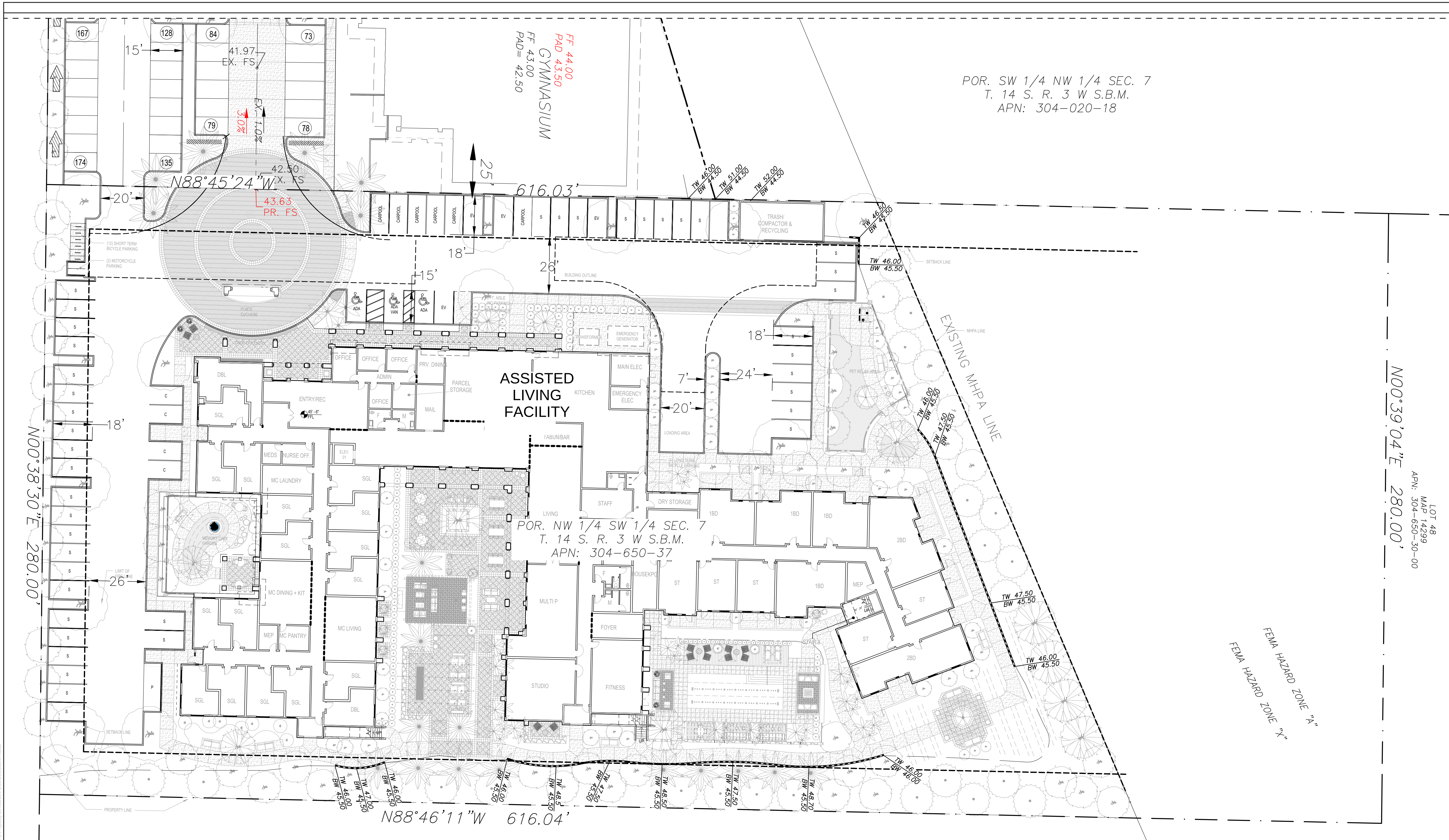

SOURCE: Leppert Engineering 2020

FIGURE 2

Site Plan

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2 Regulatory Setting

Regulatory Setting

Federal

Federal Transit Administration

In its Transit Noise and Vibration Impact Assessment guidance manual, the Federal Transit Administration (FTA) recommends a daytime construction noise level threshold of 80 dBA L_{eq} over an 8-hour period (FTA 2018) when detailed construction noise assessments are performed to evaluate potential impacts to community residences surrounding a project. Although this FTA guidance is not a regulation, it can serve as a quantified standard in the absence of such limits at the state and local jurisdictional levels.

State

California Code of Regulations, Title 24

Title 24 of the California Code of Regulations sets standards that new development in California must meet. According to Title 24, interior noise levels are not to exceed 45 dBA CNEL in any habitable room (International Construction Code 2019).

California Department of Health Services Guidelines

The California Department of Health Services has developed guidelines of community noise acceptability for use by local agencies (OPR 2003). Selected relevant levels are listed here:

- Below 60 dBA CNEL: normally acceptable for low-density residential use
- 50 to 70 dBA: conditionally acceptable for low-density residential use
- Below 65 dBA CNEL: normally acceptable for high-density residential use and transient lodging
- 60 to 70 dBA CNEL: conditionally acceptable for high-density residential, transient lodging, churches, educational, and medical facilities

California Department of Transportation

In its Transportation and Construction Vibration Guidance Manual (Caltrans 2020), the California Department of Transportation (Caltrans) recommends 0.5 inches per second (ips) peak particle velocity (PPV) as a threshold for the avoidance of structural damage risk 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 groundborne vibration of 0.10 ips PPV from continuous or frequently intermittent sources may find it “strongly perceptible” (Caltrans 2020) and on such basis would thus be considered a significant groundborne vibration impact for purposes of this assessment. 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.

Local

The following are summarized or reproduced portions of relevant General Plan policies and City noise regulations .

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 institutional uses and other noise-sensitive uses is 65 dBA CNEL as depicted in Table 1 below.

Table 1. 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 & Greenhouses; Animal Raising, Maintenance and Keeping; Commercial Stables					
Residential					
Single Units; Mobile Homes		45			
Multiple Dwelling Units **For uses affected by aircraft noise, refer to Policies NE-D.2. and NE-D.3.*		45	45*		
Institutional					
Hospitals; Nursing Facilities; Intermediate Care Facilities; Kindergarten through Grade 12 Educational 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 & Groceries; Pets & Pet Supplies; Sundries, Pharmaceutical & Convenience Sales; Wearing Apparel & Accessories			50	50	
Commercial Services					
Building Services; Business Support; Eating & Drinking; Financial Institutions; Maintenance & Repair; Personal Services; Assembly & Entertainment (includes public and religious assembly); Radio and Television Studios; Golf Course Support			50	50	
Visitor Accommodations		45	45	45	

Table 1. Land Use – Noise Compatibility Guidelines

Land Use Category	Exterior Noise Exposure (dBA CNEL)				
	55-60	*60-65*	*65-70*	*70-75*	*75-80*
Offices					
Business & Professional; Government; Medical, Dental & Health Practitioner; Regional & Corporate Headquarters			50	50	
Vehicle and Vehicular Equipment Sales and Services Use					
Commercial or Personal Vehicle Repair & Maintenance; Commercial or Personal Vehicle Sales & Rentals; Vehicle Equipment & Supplies Sales & Rentals; Vehicle Parking					
Wholesale, Distribution, Storage Use Category					
Equipment & Materials Storage Yards; Moving & Storage Facilities; Warehouse; Wholesale Distribution					
Industrial					
Heavy Manufacturing; Light Manufacturing; Marine Industry; Trucking & Transportation Terminals; Mining & Extractive Industries					
Research and Development				50	

	Compatible	Indoor Uses	Standard construction methods should attenuate exterior noise to an acceptable indoor noise level. Refer to Section I.
		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 (45 or 50) for occupied areas. Refer to Section I.
		Outdoor Uses	Feasible noise mitigation techniques should be analyzed and incorporated to make the outdoor activities acceptable. Refer to Section I.
	Incompatible	Indoor Uses	New construction should not be undertaken.
		Outdoor Uses	Severe noise interference makes outdoor activities unacceptable.

Source: City of San Diego 2015.

<u>MSCP Land Use Adjacency Guidelines</u>

The project site contains and is adjacent to the City of San Diego Multiple Species Conservation Plan Subarea Plan (MSCP; City of San Diego 1997) Multi-Habitat Planning Area (MHPA). These MHPA areas are intended for limited development to provide conservation of adequate habitat for the on-going survival of covered species. In order to protect the MHPA preserve, the MSCP Subarea Plan includes the Land Use Adjacency Guidelines (LUAG) that apply to properties located adjacent to the MHPA. As the site is located adjacent to the MHPA, these LUAG apply to the project site. These guidelines are in Section 1.4.3 of the City's MSCP Subarea Plan (March 1997) and include the following issues areas: 1) drainage, 2) toxics, 3) lighting, 4) noise, 5) barriers, 6) invasive species, 7) brush management and 8) grading/land development. Specifically for noise, the LUAG state:

> 4. Uses in or adjacent to the MHPA should be designed to minimize noise impacts. Berms or walls should be constructed adjacent to commercial areas, recreational areas, and any other use that may introduce

noises that could impact or interfere with wildlife utilization of the MHPA. Excessively noisy uses or activities adjacent to breeding areas must incorporate noise reduction measures and be curtailed during the breeding season of sensitive species. Adequate noise reduction measures should also be incorporated for the remainder of the year.

Due to the presence of coastal California gnatcatcher in the coastal sage scrub habitat located to the southeast of the project site within the MHPA, and consistent with note "e" from Step 2 for determining significant direct impacts under Section C (Biological Resources) of the City's Significance Determination Thresholds (City of San Diego 2020), the project must ensure noise levels do not exceed 60 dB (A) hourly average during the coastal California gnatcatcher breeding season within this MHPA area occupied by gnatcatcher.

City of San Diego Municipal Code 59.5.0401 (Noise Ordinance)

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 limit given in the 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 Average Sound Level (dB)
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 59.5.0404 (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.

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3 Existing Conditions

Sound pressure level (SPL) measurements were conducted near the proposed project site on February 2, 2020, to quantify and characterize the existing outdoor ambient sound levels. Table 3 provides the location, date, and time period at which these baseline noise level measurements were performed by an attending Dudek field investigator using a Rion-branded Model NL-52 sound level meter (SLM) equipped with a 0.5-inch, pre-polarized condenser microphone with pre-amplifier. The SLM meets the current American National Standards Institute standard for a Type 1 (Precision Grade) sound level meter. The accuracy of the SLM was verified using a field calibrator before and after the measurements, and the measurements were conducted with the microphone positioned approximately 5 feet above the ground.

Two (2) short-term (ST) noise level measurement locations (ST1 and ST2) intended to be representative of the outdoor ambient sound environment for existing noise-sensitive receivers in the vicinity of the proposed project were selected near the proposed project site. These locations are depicted as receivers ST1 and ST2 on Figure 3, Noise Measurement and Modeled Receptor Locations. The measured L_{eq} and L_{max} noise levels at these surveyed locations are provided in Table 3. The primary noise sources at the sites identified in Table 3 consisted of traffic along adjacent roadways, the sounds of leaves rustling, and birdsong. As shown in Table 3, the measured SPL ranged from 59.3 dBA L_{eq} at ST1 to 51.9 dBA L_{eq} at ST2. Beyond the summarized information presented in Table 3, detailed noise measurement data is included in Appendix A, Baseline Noise Measurement Field Data.

Table 3. Measured Baseline Outdoor Ambient Noise Levels

Site	Location/Address	Date/Time	L_{eq}	L_{max}
ST1	Western boundary of project site, on church parking lot	2021-02-02, 10:59 AM to 11:10 AM	59.3	67.3
ST2	Southeastern boundary of project site, near MHPA line.	2021-02-02, 11:14 AM to 11:24 AM	51.9	61.4

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

Generally, the measured samples of daytime L_{eq} agree with expectations: ST1 is near 59 dBA L_{eq} due largely to its proximity to El Camino Real, a major roadway and thus fairly continuous acoustical contributor to the measured outdoor ambient sound environment. ST2 is also exposed to this existing traffic noise, but due its location being three times the distance from El Camino Real as the location of ST1, along with the likely sound path occlusion due to existing rows of single-family homes on Rosecroft Way, the lower measured noise level of 52 dBA L_{eq} would be reasonably anticipated.

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SOURCE: NearMap 2020

0 50 100 Feet

FIGURE 3

Noise Measurement Locations

4 Thresholds of Significance

City of San Diego Significance Determination Thresholds

Interior and Exterior Noise Impacts from Traffic-Generated Noise

As shown in Table 4, which is reproduced from Table K-2 in the City's CEQA Significance Determination Thresholds, the noise level at exterior usable open space for assisted living facilities should not exceed 65 dBA CNEL (City of San Diego 2020). A significant permanent increase is defined as a direct project-related permanent ambient increase of 3 dBA or greater, where exterior noise levels would already exceed the City's significance thresholds (City of San Diego 2020) (e.g., 65 dBA daytime for single-family residential land uses). An increase of 3 dBA is perceived by the human ear as a barely perceptible increase.

Table 4. City of San Diego Traffic Noise Significance Thresholds (dBA CNEL)

Structure or Proposed Use that would be impacted by Traffic Noise	Interior Space	Exterior Useable Space[1]	General Indication of Potential Significance
Single-family detached	45 dB	65 dB	Structure or outdoor useable area[2] is <50 feet from the center of the closest (outside) lane on a street with existing or future ADTs >7,500
Multi-family, school, library, hospital, day care center, hotel, motel, park, convalescent home	Development Services Department ensures 45 dB pursuant to Title 24	65 dB	
Office, church, business, Professional uses	n/a	70 dB	Structure or outdoor useable area is <50 feet from the center of the closest lane on a street with existing or future ADTs >20,000
Commercial, retail, industrial, outdoor sports uses	n/a	75 dB	Structure or outdoor useable area is <50 feet from the center of the closest lane on a street with existing or future ADTs >40,000

Source: City of San Diego 2020.
Notes: ADT = average daily traffic
1 If a project is currently at or exceeds the significance thresholds for traffic noise described above, and noise levels would result in less than a 3-dB increase, then the impact is not considered significant.
2 Exterior useable areas do not include residential front yards or balconies, unless the areas such as balconies are part of the required useable open space calculation for multi-family units.

Exterior Noise Land Use Compatibility

Table K-4 from the City's CEQA Significance Determination Thresholds indicates that up to 60 dBA CNEL would be considered an exterior noise level compatible with assisted living facility use (City of San Diego 2020) as proposed by the project. This compatibility value is consistent with what appears in Table 2 for this type of land use. Above this level, the City's significance threshold (#7 under Section K) elaborates that "the transition zone between compatible and incompatible should be evaluated by the environmental planner to determine whether the use would be acceptable based on all available information and the extent to which the noise from the proposed project would affect the surrounding uses" (City of San Diego 2020). Hence, this analysis shall refer to Table 4 and apply

60 to 70 dBA CNEL as "conditionally compatible" for the assisted living facility uses and its associated onsite open spaces.

Noise from Adjacent Stationary Uses (Noise Generators)

The City's Noise Ordinance also limits property line noise levels for various land uses by time of day for noise generated by on-site sources associated with project operation (see the Table of Allowable Limits in Section 59.5.0401 of the San Diego Municipal Code [SDMC]). By way of illustration, the limit for multifamily residential land uses is 55 dBA L_{eq} from 7:00 a.m. to 7:00 p.m., 50 dBA L_{eq} from 7:00 p.m. to 10:00 p.m., and 50 dBA L_{eq} from 10:00 p.m. to 7:00 a.m. A project that would generate noise levels at the property line that exceed the City's Noise Ordinance Standards is considered potentially significant (such as potentially a carwash or projects operating generators or noisy equipment). If a nonresidential use, such as a commercial, industrial, or school use, is proposed to abut an existing residential use, the decibel level at the property line should be the arithmetic mean of the decibel levels allowed for each use as set forth in SDMC Section 59.5.0401.

Temporary Construction Noise and Sound Level Limits

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, that 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 day care facilities, a significant noise impact may be identified.

Construction Vibration Guidance

Guidance from Caltrans indicates that a vibration velocity level of 0.1 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 0.5 ips PPV would represent the threshold for building damage risk to a newer residential building experiencing continuous/frequent groundborne vibration.

MSCP Land Use Adjacency Guidelines

The MSCP Land Use Adjacency Guidelines (LUAG) set guidelines for noise requirements dependent on the biological resources present in the adjacent habitat. As detailed in the Biological Technical Report (Dudek 2022), noise-sensitive bird species are expected to nest in the nearby MHPA area. These species include coastal California gnatcatcher, for which the threshold for nesting sensitive birds is 60 dB (A) during its breeding season.

5 Impact Discussion

a) Would the project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standard of other agencies?

Short-Term Construction

Conventional Construction Activities

Construction noise associated with the proposed project is assessed with respect to the nearest pre-existing residential receptors, at which the 75 dBA 12-hour L_{eq} threshold per SDMC 59.5.0404(c) would apply.

Construction noise and vibration are temporary phenomena. Construction noise and vibration levels vary 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 5. Note that the equipment noise levels presented in Table 5 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 5. Typical Construction Equipment Maximum Noise Levels

Equipment Type	Typical Equipment (L_{max}, dBA at 50 Feet)
Backhoe	78
Compressor (air)	78
Concrete Mixer Truck	79
Crane	81
Dozer	82
Excavator	81
Generator	72
Grader	85
Man Lift	75
Paver	77
Roller	80
Welder / Torch	73

Source: DOT 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 distances to the nearest existing noise-sensitive receptor: 1) from the nearest position of the construction site boundary (or where activity is likely to concentrate, such as a building façade) and 2) from the geographic center of the construction site or area of expected activity, 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 prediction, 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. Because of this uncertainty, all the equipment for a construction phase is assumed to operate—on average—from the acoustical centroid. Table 6 summarizes these two distances to the apparent closest noise-sensitive receptor 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 will be involved in the construction activity for a limited portion of the 12-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 the equipment may be operating up to all 12 hours per day.

Table 6. Estimated Distances between Construction Activities and the Nearest

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)	30	122
Grading (excavator, grader, dozer, backhoe, scraper)	30	122
Building construction (crane, man-lift, generator, backhoe, welder/torch)	50	150
Architectural finishes (air compressor)	50	150
Paving (paver, roller, other equipment)	30	122

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 5), 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 (in this case, the allowable daytime construction hours of 7:00 a.m. to 7:00 p.m. Conservatively, no topographical or structural 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 7.

Table 7. 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)
Site preparation (dozer, backhoe)	76.1	76.9
Grading (excavator, grader, dozer, backhoe, scraper)	82.3	80
Building construction (crane, man-lift, generator, backhoe, welder/torch)	75.0	71.6
Architectural finishes (air compressor)	70.7	64.5
Paving (paver, roller, other equipment)	75.5	73.5

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

As presented in Table 7, the estimated construction noise levels are predicted to be as high as 82 dBA L_{eq} over a 12-hour period at the nearest existing residences (as close as 30 feet away) when grading activities take place near the southern project boundaries. Note that these estimated noise levels at a source-to-receiver distance of 30 feet would occur when noted pieces of heavy equipment would each operate for a cumulative period of up to two (2) 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 will be operating sporadically throughout the project site and more frequently away from the southern edge. At more typical distances closer to the center of the project site (approximately 122 feet from the nearest existing residence), construction noise levels are estimated to range from approximately 65 dBA Leq to 80 dBA Leq at the nearest existing residence. For these instances when operation of construction equipment and processes are sufficiently proximate to cause activity noise levels to exceed 75 dBA Leq, which the City of San Diego requires as a daytime threshold for construction noise exposure over a 12-hour period at a residential receptor, mitigation measure **MM-NOI-1** shall be implemented as indicated site conditions may warrant. Proper application of temporary noise barriers or comparable sound abatement due to implementation of **MM-NOI-1** has the ability to reduce noise levels by up to 10 dB, which would correspondingly reduce the predicted 82 dBA 12-hour Leq for the grading phase to 72 dBA Leq, which would make the level compliant with the 75 dBA threshold.

It is anticipated that construction activities associated with the proposed project would take place primarily within the allowable hours of construction per the City (7:00 a.m. and 7:00 p.m. Monday through Friday) as described in SDMC 59.5.0404 [see Compliance Measure (CM) CM-NOI-1, in Section 6, below). In the event that construction is required to extend beyond these times, extended hours permits would be required and would be obtained by the applicant.

In summary, construction noise during allowable daytime hours has the potential for noise to exceed the 75 dBA L_{eq} 12-hour City threshold at the nearest residential receiver on occasion. Thus, temporary construction-related noise impacts would be considered potentially significant unless mitigated. With implementation of **MM-NOI-1**, impacts would be reduced to **less than significant with mitigation.**

Construction Noise Impacts to Biological Resources

Due to the proposed development location adjacent to the MHPA, the project would be subject to the MSCP LUAG. Consistent with Significance Determination Thresholds (City of San Diego 2020), presence of coastal California gnatcatcher (CAGN) in the coastal sage scrub (CSS) habitat located to the southeast of the project site within the MHPA requires that noise from the project cannot exceed 60 dBA hourly L_{eq} (or the ambient sound level, if higher) during CAGN breeding season. A preliminary analysis of anticipated construction noise compliance during site grading activities was completed with respect to CAGN and is included as Exhibit B1 in Appendix B. If construction occurs during the breeding season, the project would be required to include noise attenuation per CM-NOI-2 (see Section 6, below). Per CM-NOI-2, the proposed project applicant or its contractor shall implement 8-foot tall to 12-foot tall sound blankets or comparable temporary solid barriers (e.g., overlapping plywood sheeting) along site boundary fencing (or within, as practical and appropriate) to occlude construction noise emission between this CSS area and the southeastern region of the construction site. Refer to Exhibit B1 in Appendix B for recommended extent of the temporary sound barriers to be implemented during the CAGN breeding season.

These implemented barriers would aim to keep construction noise exposure levels at the boundary of the CSS portion within the MHPA to 60 dBA hourly L_{eq} or less and thus compliant with the City's requirements. During the remainder of the year, no such project construction noise reduction with respect to the CSS area would be required. However, if project site grading activity occurs before, during, or after the CAGN breeding season, the southern extent of these temporary barriers implemented for CM-NOI-2 may represent part of **MM-NOI-1** application and would be installed prior to and/or remain in place after the CAGN breeding season. Lastly, indirect impacts to Least Bell's Vireo associated with noise could occur up to 500 feet from the project work areas. However, **MM-BIO-1** (outlined in Chapter 5.4, Biological Resources, of the EIR), has been incorporated to reduce impacts to less than significant. **MM-BIO-1** provides requirements for sound attenuation during the Least Bell's Vireo's nesting season. Therefore, construction noise impacts to biological resources would be **less than significant.**

Long-Term Operational

Roadway Traffic Noise

The proposed project would result in the creation of additional vehicle trips on local arterial roadways (i.e., El Camino Real), which could result in increased traffic noise levels at adjacent offsite existing noise-sensitive land uses. Appendix B, Traffic Noise Modeling Input and Output, contains a spreadsheet with traffic volume data (average daily traffic) for El Camino Real. In particular, the proposed project would add 210 average daily trips to the segment along El Camino Real.

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, posted traffic speeds, and traffic volumes for the following scenarios: existing (year 2021) and existing plus project. Noise levels were modeled at representative noise-sensitive receivers ST1 and ST2, as shown in Figure 3, and modeled to be 5 feet above the local ground elevation. The traffic noise prediction model results for the existing and existing-plus-project scenarios at these two assessment positions, and the arithmetic dB differences, are summarized in Table 8.

The City's Noise Element establishes a policy for exterior sensitive areas to be protected from high noise levels. The Noise Element sets 65 dBA CNEL for outdoor areas and 45 dBA CNEL for interior areas as the normally acceptable levels. Because measured SPL at ST1 as presented in Table 3 was less than 60 dBA L_{eq} during a daytime period sample, and on the expectation that nighttime traffic-dominated noise levels would be an estimated 10 dB less (FTA 2018), the existing CNEL at ST1 would be less than 65 dBA. But at the exterior areas of existing homes associated with the "Stallion's Crossing" community south of the proposed project that are nearest to El Camino Real may be exposed to existing noise that already exceeds this standard. In addition to this fixed noise threshold, for the purposes of this noise analysis, potential project-attributed traffic noise impacts would also be considered significant when they cause an increase of 3 dB from existing noise levels. An increase or decrease in noise level of at least 3 dB is required before any noticeable change in community response would be expected (Caltrans 2013).

Table 8. Roadway Traffic Noise Modeling Results

Modeled Receiver Tag (Location Description)	Existing (2019) Noise Level (dBA CNEL)	Existing (2019) Plus Project Noise Level (dBA CNEL)	Maximum Project-Related Noise Level Increase (dB)
ST1	62.5	62.5	< 0.1
ST2	49.4	47.6	-1.8
SC1	69.2	69.3	0.1

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

Table 8 shows that at the three listed representative receivers, the addition of proposed project traffic to the roadway network would result in a CNEL increase of less than 3 dB, which is below the discernible level of change for the average healthy human ear. Also, post-construction traffic from the proposed project is not expected to cause existing CNEL to cross the 65 dBA limit—it is already above this standard at SC1. At ST2, expected traffic noise levels are predicted to decrease due to introduction of the proposed new buildings as sound path occlusion between them and the roadway noise source. Thus, a **less-than-significant impact** is expected for proposed project–related off-site traffic noise increases affecting existing residences in the vicinity.

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. 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 8, the FHWA TNM software was also used to predict the existing-plus-project scenario traffic noise levels at multiple on-site exterior areas, as listed in Table 9. These on-site modeled receptor locations, which appear in Figure 4, include representative positions for the exteriors of multiple floors of the proposed project western and southern building facades. Predicted exterior sound levels presented in Table 9 that 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 9. On-Site Exterior Roadway Traffic Noise Modeling Results

Location	Modeled Receiver Tag	Description	Predicted Traffic Noise Exposure at Modeled Receiver (dBA CNEL)
Western Façade	M1-1	1st floor	60.6

Table 9. On-Site Exterior Roadway Traffic Noise Modeling Results

Location	Modeled Receiver Tag	Description	Predicted Traffic Noise Exposure at Modeled Receiver (dBA CNEL)
Southern Façade	M1-2	2nd floor/Balcony	62.9
	M1-3	3rd floor	63.1
	M2-1	1st floor	58.9
	M2-2	2nd floor/Balcony	61.8
	M2-3	3rd floor	61.8
	M3-1	1st floor	56.8
	M3-2	2nd floor/Balcony	59.7
	M3-3	3rd floor	59.9
Memory Care Garden	OS-1	n/a	58.6
Center Courtyard	OS-2	n/a	49.9
Pool Area	OS-3	n/a	48.3

Notes: dBA = A-weighted decibel; CNEL = Community Noise Equivalent Level.

The prediction results from Table 9 indicate that future traffic noise levels would not exceed 63 dBA CNEL. 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 18. 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.

Many of the residential units feature balconies on the 2nd and 3rd floor, for which access would likely be provided by single-panel, out-swing fiberglass French doors with hinges comparable to a Milgard Essence series model (or similar from another manufacturer). Alternately, they could be a sliding door type. For purposes of this analysis, either of these patio/balcony door design styles are assumed to feature a dual-pane glazing system similar to a standard residential window assembly (i.e., two 1/8"-thick glass panes separated by a 3/8" wide airgap) in narrow-perimeter frames compatible with modern thermal insulation (and thus energy conserving) design. 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).

This study further assumes an exterior wall assembly that includes: one layer of 5/8" gypsum wallboard (GWB) on the interior-facing side, 2"x4" wood studs, glass fiber batt insulation in the stud cavities, and a dual-layer of 5/8" GWB on the exterior-facing side. Acoustical transmission loss (TL) data is available on this representative assembly (Halliwell 1998), and is used as part of estimating the composite STC ratings reported herein. For purposes of this analysis, the dual-layer GWB on the exterior surface approximates the mass and solidity of what may be other approved material options as determined by the Project architect, such as cement fiber siding panels, brick masonry veneer, or cement plaster attached to layers of fiberglass mat sheathing and plywood sheathing.

Table 10 summarizes the calculated net STC ratings for a set of studied occupied room facades that are anticipated to be exposed to predicted exterior noise levels greater than 60 dBA CNEL. Details of these calculations that account for the façade surface area and its composite areas of exterior wall assembly and windows appear in Appendix D.

Clearly, an open window or open door to an adjoining patio or balcony greatly compromises the sound insulation performance of the façade wall assembly, as presented for the sample units appearing in Table 10. However, when such windows and doors are closed, all facades are anticipated to exhibit a predicted STC rating of at least 36, 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.

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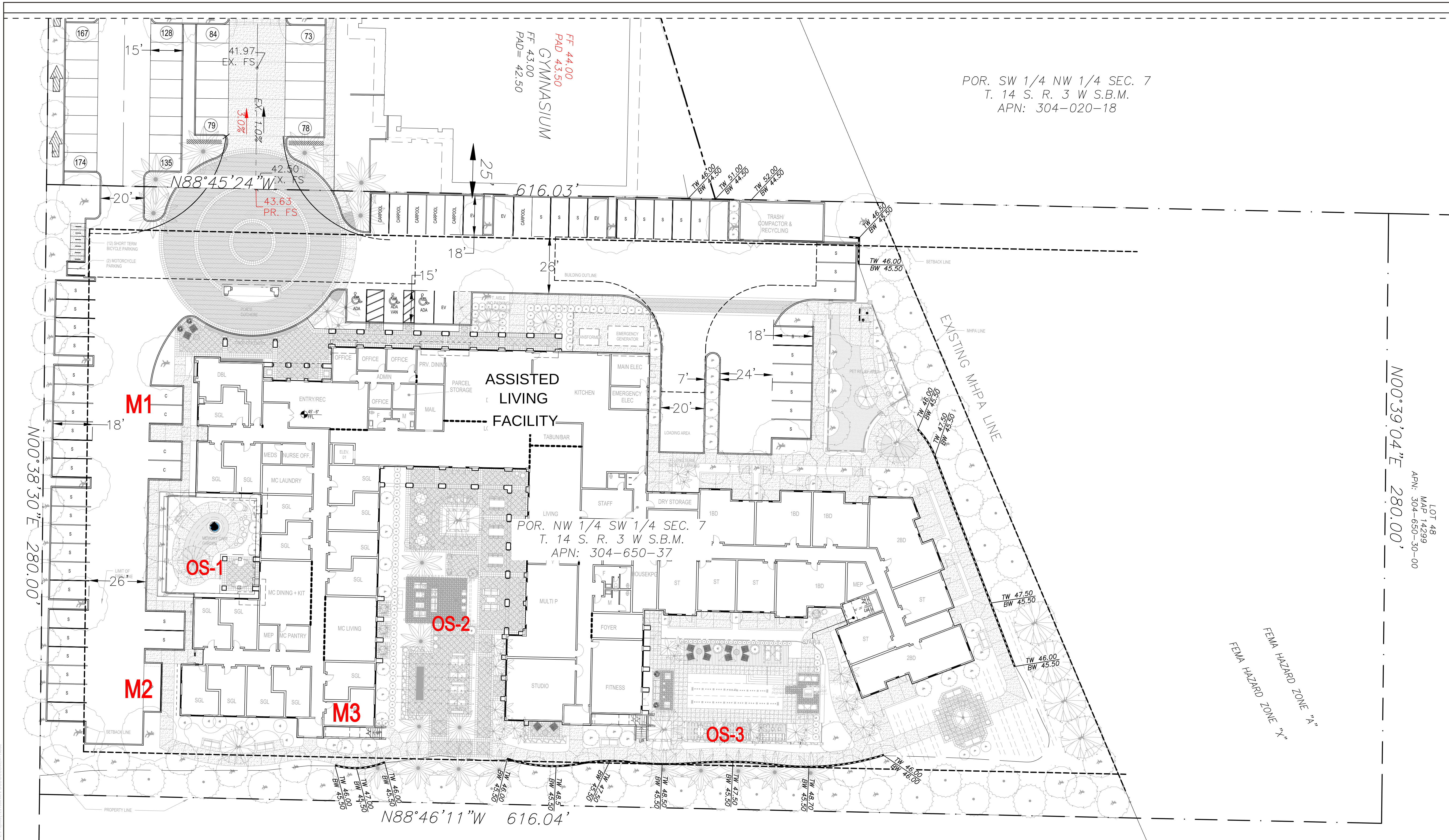

SOURCE: Leppert Engineering 2020

FIGURE 4

Noise Modeling Receptor Locations

Recall that none of the predicted exterior traffic noise levels at the studied receptor locations exceeded 63 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., 63 – 36 = 27 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 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.**

Table 10. Predicted Net Sound Transmission Class of Occupied Room Façade

Floorplan	Occupied Room Facade	Predicted Net Sound Transmission Class (STC) for Scenario	
		Closed Window(s) and Door *	Open Window(s) & Closed French Door*
Type A.2	1st floor Bedroom, western facade	37	8
Type E	2nd floor Bedroom w/ balcony, western Façade	36	11
Type F	3rd floor Bedroom, western Façade	38	11

n/a = not applicable
*Doors are only modeled for scenarios that contain the balcony door.

Stationary Operations Noise

The incorporation of new facilities attributed to development of the proposed project will add a variety of noise-producing 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.

Facility Unit Heating, Ventilation, and Air Conditioning Noise

Shared Spaces

According to its site plan, and aside from air-conditioning systems for its individual residential units, the proposed project would need to provide mechanical ventilation for approximately 13,000 square feet of accessory or shared space. Using reference data for interior occupied building spaces of similar usage and square footage, it is assumed that mechanical ventilation units should provide approximately 72 tons of refrigeration (i.e., cooling) for accessory areas such as the kitchen, gym, and dining rooms (Loren Cook Company, 2015). For purposes of this analysis, it is assumed the project will provide this anticipated interior comfort as thirteen (13) packaged air handling units (AHU) with incorporated air-cooled condensers (ACC) or comparable noise-producing equipment across the proposed project rooftop. Using the overall sound power levels estimated with available fan data (e.g., airflow volume rate and static pressure) these distinct units of rooftop HVAC equipment individually have a sound emission source power level between 79 dBA and 86 dBA (Trane 2013). The proposed project site plan suggests that the AHU units would be installed as groupings behind 5-foot tall screening walls.

The project site plan also shows a transformer located next to the backup generator near the northern façade. Expected operation noise from the transformer has been included in a predictive sound propagation model that estimates aggregate noise level from the built-out and operating project at offsite receptors.

On-site Assisted Living Facility

Each of the new 105 inhabited rooms would be expected to feature a packaged terminal air-conditioning unit (PTAC), each emitting noise under “high cool” (i.e., refrigeration compressor active to provide cooling) operation and exhibiting an SPL of up to 54.6 dBA (converted from Amana sound power level data [Goodman Company]). Based on manufacturer information (Friedrich 2014), these units would be expected to exhaust air to the outdoors from discharge ports flush with the project’s exterior building facades.

The land immediately north of the proposed project is also zoned AR-1-1 and a church is under construction on that property. This site is as close as approximately 75 horizontal feet to what would be an arrangement of up to 3 PTAC and 3 rooftop AHU’s. The predicted sound emission level from the combination of these units would be no more than 38 dBA hourly L_{eq}, and would thus be compliant with the City’s noise ordinance.

The closest noise-sensitive residential receptor to the south of the proposed project’s building would be as close as approximately 50 horizontal feet to what would be an arrangement of up to 3 PTAC units. Due to the higher relative elevation of the AHU noise sources on the roof and sound occlusion of the noise screening wall, and their horizontal distances away from the noise sensitive receivers as modeled, the predicted sound emission level from the combination of these project rooftop AHUs with the PTAC units would be no more than 37 dBA L_{eq} at this nearest southern offsite receptor and would thus be compliant with the City’s nighttime threshold of 45 dBA hourly L_{eq}. This acoustical goal represents the arithmetic mean of noise limits between adjoining zones as stated in section 59.5.0401 of the SDMC, which for this southern offsite receptor would be the average of 50 dBA hourly L_{eq} at night (“all other residential” category on Table 59.5.0401 of the City’s noise ordinance, since the zoning of the proposed project is AR-1-1) and 40 dBA hourly L_{eq} (single-family residential associated with zoning R-1-14 for the Stallion’s Crossing community). Please see Exhibit E1 within Appendix E, Facility HVAC Noise Prediction, for a graphical display of the predicted aggregate noise level from these units, superimposed on an aerial image of the expected layout of the HVAC equipment and proposed project building and the proximate neighboring residences to the south. Under such conditions, the operation of residential air-conditioning units, along with acoustical contribution from the aforementioned rooftop HVAC units and the onsite outdoor transformer, would result in **less-than-significant** noise impacts at the nearest existing residential receptors to the south of the project.

Emergency Generator

The proposed project also features a backup generator that will be installed on ground level north of the main building. While operation of such equipment during actual emergency situations is typically exempt or excused from noise standards, noise emission from regular testing of the equipment under non-emergency conditions at an expected frequency of up to one half-hour test per month during daytime hours would still need to comply with the City’s established noise limit at the property line: 50 dBA hourly L_{eq} south of project site as well as 60 dBA hourly L_{eq} at the northern property line and at the MHPA line east of the project site. For purposes of this analysis, the backup generator is expected to be comparable in operational noise emission to a Cummins 300DQHAB model with an F202 “Quiet Site II Second Stage” type sound enclosure with accompanying mounted exhaust muffler (Cummins undated), yielding an overall sound power level of 102 dBA. Additional data from the manufacturer for this generator model with a “Level II” sound-reducing enclosure generally agrees (Cummins 2008) on the basis of expected overall A-weighted sound pressure level at a distance of approximately 23 feet (7 meters). With the operating back-up generator sound source defined in this manner, the aggregate noise level from the backup generator when tested at full load in combination with the PTACs and rooftop AHUs would yield a southern property line noise level of only 37 dBA hourly L_{eq} at the nearest residences south of the project and 60 dBA hourly L_{eq} at the northern property line. Exhibit E2 from Appendix E displays these predicted results as part of color-coded annular adjoining noise level ranges. Under such conditions, operation of the backup generator would result in a **less-than-significant** noise impact.

Furthermore, the MHPA boundary northeast of the project will be exposed to up to 57 dBA hourly L_{eq} during emergency generator testing. To the southeast, in the vicinity of the aforementioned CSS region of the MHPA where CAGN are present, predicted operation noise levels are expected to be less than 40 dBA under either operating case: with or without testing of the emergency generator; hence, potential operational noise impact to CAGN during their breeding season in this portion of the MHPA would be considered **less than significant.**

b) Would the project result in generation of excessive groundborne vibration or groundborne noise levels?

Conventional Construction Activity 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 2020). Information from Caltrans indicates that continuous vibrations with a PPV of approximately 0.1 ips could be considered annoying on the basis of it being "strongly perceptible" by building occupants. 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 PPV or less at a reference distance of 25 feet (FTA 2018).

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 northern project boundary (i.e., 30 feet from the nearest occupied property) the estimated vibration velocity level would be 0.067 ips per the equation as follows (FTA 2018):

$PPV_{rcvr} = PPV_{ref} * (25/D)^{1.5} = 0.067 = 0.089 * (25/30)^{1.5}$

In the above equation, PPV_{rcvr} is the predicted vibration velocity at the receiver position, PPV_{ref} is the reference value at 25 feet from the vibration source (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 0.1 ips PPV and therefore less than significant.

Construction vibration, at sufficiently high levels, can also present a building damage risk. However, anticipated construction vibration associated with the proposed project would yield levels of 0.067 ips, which do not surpass the guidance limit of 0.2 to 0.3 ips PPV for preventing damage to residential structures (Caltrans 2020). Because the predicted vibration level at 30 feet is less than this guidance limit, the risk of vibration damage to nearby structures is considered **less than significant.**

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?

The project site is not located within 2 miles of any airport. Therefore, the proposed project would not expose people residing or working in the project area to excessive noise levels associated with aircraft. Impacts would be **less than significant**.

6 Compliance and Mitigation Measures

The following compliance measures (CM), introduced in Section 5, Impact Discussion, would apply during construction activities.

CM-NOI-1 – Construction hours shall comply with the San Diego Municipal Code 59.5.0404 (Noise Ordinance), Construction Noise.

CM-NOI-2 – Should the grading phase of the proposed project occur during the California gnatcatcher (CAGN) breeding season (March 1 and August 15), and with respect to the Coastal Sage Scrub (CSS) portion of the Multiple Habitat Planning Area (MHPA) located southeast of the project site, the proposed project applicant or its contractor shall implement 8'-tall to 12'-tall sound blankets or comparable temporary solid barriers (e.g., overlapping plywood sheeting) along site boundary fencing (or within, as practical and appropriate) to occlude construction noise emission between this CSS area and the southeastern region of the construction site.

The following mitigation measure, introduced in Section 5, Impact Discussion, would apply during construction activities.

MM-NOI-1 - Temporary Construction Noise

The proposed project applicant or its contractor will implement one or more of the following options for onsite noise control and sound abatement means that, in aggregate, would yield a minimum of approximately 10 dBA of construction noise reduction during the grading phase of the Project.

- *Administrative controls* (e.g., reduce operating time of equipment and/or prohibit usage of equipment type[s] within certain distances to a nearest receiving occupied off-site property).
- *Engineering controls* (change equipment operating parameters [speed, capacity, etc.], or install features or elements that otherwise reduce equipment noise emission [e.g., upgrade engine exhaust mufflers]).
- *Install noise abatement* on the site boundary fencing (or within, as practical and appropriate) in the form of sound blankets or comparable temporary solid barriers to occlude construction noise emission between the site (or specific equipment operation as the situation may define) and the noise-sensitive receptor(s) of concern.

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7 Summary of Findings

This noise report was conducted to predictively quantify construction and operation noise and vibration attributed to the proposed project. The results indicate that implementing -1, and CM-2 reduce impacts and potential impacts during construction grading activities would be less than significant with mitigation MM-NOI-1 and MM-BIO-1, successfully applied. No further mitigation is required.

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Appendix A

Baseline Noise Measurement Field Data

FORMS FIELD DATA REPORT

Field Noise Measurement Data

Record: 1329	
Project Name	El camino seinor homes
Observer(s)	Connor Burke
Date	2021-02-02

Meteorological Conditions	
Temp (F)	72
Humidity % (R.H.)	64
Wind	Calm
Wind Speed (MPH)	4
Wind Direction	East
Sky	Sunny

Instrument and Calibrator Information	
Instrument Name List	(ENC) Rion NL-52
Instrument Name	(ENC) Rion NL-52
Instrument Name Lookup Key	(ENC) Rion NL-52
Manufacturer	Rion
Model	NL-52
Serial Number	553896
Calibrator Name	(ENC) LD CAL150
Calibrator Name	(ENC) LD CAL150
Calibrator Name Lookup Key	(ENC) LD CAL150
Calibrator Manufacturer	Larson Davis
Calibrator Model	LD CAL150
Calibrator Serial #	5152
Pre-Test (dBA SPL)	94
Post-Test (dBA SPL)	94
Windscreen	Yes
Weighting?	A-WTD
Slow/Fast?	Slow
ANSI?	Yes

Monitoring	
Record #	1
Site ID	ST1
Site Location Lat/Long	32.970396, -117.238801
Begin (Time)	10:59:00
End (Time)	11:10:00
Leq	59.3
Lmax	67.3
Lmin	52.5
Other Lx?	L90, L50, L10
L90	53.9
L50	57.3
L10	62.40
Other Lx (Specify Metric)	L
Primary Noise Source	Traffic
Other Noise Sources (Background)	Birds, Distant Aircraft, Distant Traffic, Rustling Leaves
Other Noise Sources Additional Description	Construction on church to the north
Is the same instrument and calibrator being used as previously noted?	Yes
Are the meteorological conditions the same as previously noted?	Yes

FORMS DUDEK FIELD DATA REPORT

Source Info and Traffic Counts

Number of Lanes	*4*
Lane Width (feet)	*10*
Roadway Width (feet)	*40*
Roadway Width (m)	*12.2*
Distance to Roadway (feet)	*100*
Distance to Roadway (m)	*30.5*
Distance Measured to Centerline or Edge of Pavement?	*Edge of Pavement*
Estimated Vehicle Speed (MPH)	*50*

Traffic Counts

Vehicle Count Summary	*A 100, MT 0, HT 0, B 0, MC 0*
Select Method for Recording Count Duration	*Enter Manually*
Counting Both Directions?	*Yes*
Count Duration (minutes)	*10*
Vehicle Count Tally	
Select Method for Vehicle Counts	*Enter Manually*
Number of Vehicles - Autos	*100*
Number of Vehicles - Medium Trucks	*0*
Number of Vehicles - Heavy Trucks	*0*
Number of Vehicles - Buses	*0*
Number of Vehicles - Motorcyles	*0*

Description / Photos

Site Photos

Photo

Comments / Description	*Facing west*

FORMS DUDEK FIELD DATA REPORT

Monitoring

Record #	*2*
Site ID	*ST2*
Site Location Lat/Long	*32.970180, -117.237288*
Begin (Time)	*11:14:00*
End (Time)	*11:24:00*
Leq	*51.9*
Lmax	*61.4*
Lmin	*48.5*
Other Lx?	*L90, L50, L10*
L90	*49.7*
L50	*51.3*
L10	*53.4*
Other Lx (Specify Metric)	*L*
Primary Noise Source	*Distant traffic*
Other Noise Sources (Background)	*Birds, Distant Dog Barking, Rustling Leaves*
Other Noise Sources Additional Description	*Church construction*
Is the same instrument and calibrator being used as previously noted?	*Yes*
Are the meteorological conditions the same as previously noted?	*Yes*

Description / Photos

Site Photos

Photo

Appendix B

Construction Noise Modeling Input and Output

To User: bordered cells are inputs, unbordered cells have formulae

noise level limit for construction phase, per County = 75

allowable hours over which Leq is to be averaged (example: 8 for County of San Diego, FTA guidance) = 12

Construction Phase	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Client Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 12-hour Leq
Site Preparation	Dozer	1	40	82		30	86.4	2	120	75
	Backhoe	1	40	78		30	82.4	2	120	71
										76.1
Grading	grader	1	40	85		30	89.4	2	120	78
	dozer	1	40	82		30	86.4	2	120	75
	excavator	1	40	81		30	85.4	2	120	74
	Backhoe	1	40	78		30	82.4	2	120	71
	Scraper	1	40	84		30	88.4	2	120	77
							Total for Grading Phase:			82.3
Building Construction	Crane	1	16	81		30	85.4	2	120	70
	Man Lift	1	20	75		30	79.4	2	120	65
	Generator	1	50	72		30	76.4	2	120	66
	Backhoe	1	40	78		30	82.4	2	120	71
	Welder / Torch	1	40	73		30	77.4	2	120	66
							Total for Building Construction Phase:			**75.0**
Architectural Coating	Compressor (air)	1	40	78		30	82.4	2	120	71
							Total for Architectural Coating Phase:			**70.7**
Paving	Paver	1	50	77		30	81.4	2	120	71
	Roller	1	20	80		30	84.4	2	120	70
	Concrete Mixer Truck	1	40	79		30	83.4	2	120	72
							Total for Paving Phase:			75.5

To User: bordered cells are inputs, unbordered cells have formulae

noise level limit for construction phase, per County = 75
allowable hours over which Leq is to be averaged (example: 8 for County of San Diego, FTA guidance) = 12

Construction Phase	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Client Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 12-hour Leq
Site Preparation	Dozer	3	40	82		122	74.3	12	720	75
	Backhoe	4	40	78		122	70.3	12	720	72
						Total for Site Preparation Phase:				76.9
Grading	grader	1	40	85		122	77.3	12	720	73
	dozer	1	40	82		122	74.3	12	720	70
	excavator	2	40	81		122	73.3	12	720	72
	Backhoe	4	40	78		122	70.3	12	720	72
	Scraper	2	40	84		122	76.3	12	720	75
							Total for Grading Phase:			80.0
Building Construction	Crane	1	16	81		150	71.5	12	720	63
	Man Lift	3	20	75		150	65.5	12	720	63
	Generator	1	50	72		150	62.5	12	720	59
	Backhoe	3	40	78		150	68.5	12	720	69
	Welder / Torch	1	40	73		150	63.5	12	720	59
						Total for Building Construction Phase:				**71.6**
Architectural Coating	Compressor (air)	1	40	78		150	68.5	12	720	64
						Total for Architectural Coating Phase:				**64.5**
Paving	Paver	2	50	77		122	69.3	12	720	69
	Roller	1	20	80		122	72.3	12	720	65
	Concrete Mixer Truck	2	40	79		122	71.3	12	720	70
							Total for Paving Phase:			**73.5**

Equipment Description	Impact Device?	Acoustical Use Factor (%)	Lesser of or available Lmax	Spec. 721 Lmax	Measured L_{max} @50ft (dBA, slow)
All Other Equipment > 5 HP	No	50	85	85	-- N/A --
Auger Drill Rig	No	20	84	85	84
Backhoe	No	40	78	80	78
Bar Bender	No	20	80	80	-- N/A --
Blasting	Yes	-- N/A --	94	94	-- N/A --
Boring Jack Power Unit	No	50	80	80	83
Chain Saw	No	20	84	85	84
Clam Shovel (dropping)	Yes	20	87	93	87
Compactor (ground)	No	20	80	80	83
Compressor (air)	No	40	78	80	78
Concrete Batch Plant	No	15	83	83	-- N/A --
Concrete Mixer Truck	No	40	79	85	79
Concrete Pump Truck	No	20	81	82	81
Concrete Saw	No	20	90	90	90
Crane	No	16	81	85	81
Dozer	No	40	82	85	82
Drill Rig Truck	No	20	79	84	79
Drum Mixer	No	50	80	80	80
Dump Truck	No	40	76	84	76
Excavator	No	40	81	85	81
Flat Bed Truck	No	40	74	84	74
Front End Loader	No	40	79	80	79
Generator	No	50	72	72	81
Generator (<25KVA, VMS signs)	No	50	70	70	73
Gradall	No	40	83	85	83
Grader	No	40	85	85	-- N/A --
Grapple (on backhoe)	No	40	85	85	87
Horizontal Boring Hydr. Jack	No	25	80	80	82
Hydra Break Ram	Yes	10	90	90	-- N/A --
Impact Pile Driver	Yes	20	95	95	101
Jackhammer	Yes	20	85	85	89
Man Lift	No	20	75	85	75
Mounted Impact Hammer (hoe ram)	Yes	20	90	90	90
Pavement Scarafier	No	20	85	85	90
Paver	No	50	77	85	77
Pickup Truck	No	40	55	55	75
Pneumatic Tools	No	50	85	85	85
Pumps	No	50	77	77	81
Refrigerator Unit	No	100	73	82	73
Rivit Buster/chipping gun	Yes	20	79	85	79

Rock Drill	No	20	81	85	81
Roller	No	20	80	85	80
Sand Blasting (Single Nozzle)	No	20	85	85	96
Scraper	No	40	84	85	84
Shears (on backhoe)	No	40	85	85	96
Slurry Plant	No	100	78	78	78
Slurry Trenching Machine	No	50	80	82	80
Soil Mix Drill Rig	No	50	80	80	-- N/A --
Tractor	No	40	84	84	-- N/A --
Vacuum Excavator (Vac-truck)	No	40	85	85	85
Vacuum Street Sweeper	No	10	80	80	82
Ventilation Fan	No	100	79	85	79
Vibrating Hopper	No	50	85	85	87
Vibratory Concrete Mixer	No	20	80	80	80
Vibratory Pile Driver	No	20	95	95	101
Warning Horn	No	5	83	85	83
Welder / Torch	No	40	73	73	74

Appendix C

Traffic Noise Modeling Input and Output

Dudek 22 February 2021
CB TNM 2.5

INPUT: ROADWAYS
PROJECT/CONTRACT: El Camino Senior Homes
RUN: Existing

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway Name	Width	Points Name	No.	Coordinates (pavement) X	Y	Z	Flow Control Control Device	Speed Constraint	Percent Vehicles Affected	Segment Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
El Camino North	35.0	point1	1	1,567,268.4	11,968,135.0	0.00				Average	
		point2	2	1,567,197.5	11,968,216.0	0.00				Average	
		point3	3	1,567,148.4	11,968,284.0	0.00				Average	
		point4	4	1,567,103.0	11,968,349.0	0.00				Average	
		point5	5	1,567,048.8	11,968,447.0	0.00				Average	
		point6	6	1,567,006.2	11,968,544.0	0.00				Average	
		point7	7	1,566,976.9	11,968,645.0	0.00				Average	
		point8	8	1,566,958.9	11,968,739.0	0.00				Average	
		point9	9	1,566,948.6	11,968,843.0	0.00				Average	
		point10	10	1,566,945.8	11,968,928.0	0.00				Average	
		point11	11	1,566,950.2	11,968,993.0	0.00				Average	
		point12	12	1,566,960.9	11,969,062.0	0.00				Average	
		point13	13	1,566,981.1	11,969,162.0	0.00				Average	
		point14	14	1,567,010.1	11,969,253.0	0.00				Average	
		point15	15	1,567,045.1	11,969,339.0	0.00					
El Camino South	35.0	point16	16	1,567,084.4	11,969,330.0	0.00				Average	
		point17	17	1,567,045.4	11,969,236.0	0.00				Average	
		point18	18	1,567,022.8	11,969,171.0	0.00				Average	
		point19	19	1,567,000.1	11,969,068.0	0.00				Average	
		point20	20	1,566,991.5	11,968,997.0	0.00				Average	
		point21	21	1,566,985.8	11,968,935.0	0.00				Average	
		point22	22	1,566,985.8	11,968,844.0	0.00				Average	
		point23	23	1,566,996.8	11,968,754.0	0.00				Average	
		point24	24	1,567,016.2	11,968,644.0	0.00				Average	
		point25	25	1,567,033.9	11,968,590.0	0.00				Average	

			point26	26	1,567,067.2	11,968,507.0	0.00				Average	
			point27	27	1,567,099.8	11,968,431.0	0.00				Average	
			point28	28	1,567,138.0	11,968,367.0	0.00				Average	
			point29	29	1,567,194.2	11,968,289.0	0.00				Average	
			point30	30	1,567,298.8	11,968,165.0	0.00					

Dudek **22 February 2021**
CB **TNM 2.5**

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: **El Camino Senior Homes**
RUN: **Existing**

Roadway	Points												
Name	Name	No.	Segment										
			Autos		MTrucks		HTrucks		Buses		Motorcycles		
			V	S	V	S	V	S	V	S	V	S	
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	
El Camino North	point1	1	803	50	16	50	8	50	0	0	0	0	
	point2	2	803	50	16	50	8	50	0	0	0	0	
	point3	3	803	50	16	50	8	50	0	0	0	0	
	point4	4	803	50	16	50	8	50	0	0	0	0	
	point5	5	803	50	16	50	8	50	0	0	0	0	
	point6	6	803	50	16	50	8	50	0	0	0	0	
	point7	7	803	50	16	50	8	50	0	0	0	0	
	point8	8	803	50	16	50	8	50	0	0	0	0	
	point9	9	803	50	16	50	8	50	0	0	0	0	
	point10	10	803	50	16	50	8	50	0	0	0	0	
	point11	11	803	50	16	50	8	50	0	0	0	0	
	point12	12	803	50	16	50	8	50	0	0	0	0	
	point13	13	803	50	16	50	8	50	0	0	0	0	
	point14	14	803	50	16	50	8	50	0	0	0	0	
	point15	15											
El Camino South	point16	16	803	50	16	50	8	50	0	0	0	0	
	point17	17	803	50	16	50	8	50	0	0	0	0	
	point18	18	803	50	16	50	8	50	0	0	0	0	
	point19	19	803	50	16	50	8	50	0	0	0	0	
	point20	20	803	50	16	50	8	50	0	0	0	0	
	point21	21	803	50	16	50	8	50	0	0	0	0	
	point22	22	803	50	16	50	8	50	0	0	0	0	
	point23	23	803	50	16	50	8	50	0	0	0	0	

		point24	24	803	50	16	50	8	50	0	0	0	0
		point25	25	803	50	16	50	8	50	0	0	0	0
		point26	26	803	50	16	50	8	50	0	0	0	0
		point27	27	803	50	16	50	8	50	0	0	0	0
		point28	28	803	50	16	50	8	50	0	0	0	0
		point29	29	803	50	16	50	8	50	0	0	0	0
		point30	30										

Dudek **22 February 2021**
CB **TNM 2.5**

INPUT: RECEIVERS
PROJECT/CONTRACT: **El Camino Senior Homes**
RUN: **Existing**

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria Existing LAeq1h	Impact Criteria LAeq1h	Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
ST1	1	1	1,567,201.4	11,968,628.0	0.00	4.92	59.30	66	10.0	8.0	Y
ST2	2	1	1,567,722.4	11,968,516.0	0.00	4.92	51.90	66	10.0	8.0	Y
SC1	4	1	1,567,279.6	11,968,257.0	0.00	4.92	0.00	66	10.0	8.0	Y

Dudek **22 February 2021**
CB **TNM 2.5**

INPUT: BARRIERS
PROJECT/CONTRACT: **El Camino Senior Homes**
RUN: **Existing**

Barrier Name	Type	Height Min	Height Max	If Wall $ per Unit Area	If Berm $ per Unit Vol.	Top Width	Run:Rise	Add'tnl $ per Unit Length	Points Name	No.	Coordinates (bottom) X	Y	Z	Height at Point	Segment Seg Ht Perturbs Incre-ment	#Up	#Dn	On Struct?	Important Reflec-tions?
		ft	ft	$/sq ft	$/cu yd	ft	ft:ft	$/ft			ft	ft	ft	ft	ft				
Barrier1	W	0.00	99.99	0.00				0.00	point1	1	1,567,282.0	11,968,539.0	0.00	0.00	0.00	0	0		
									point2	2	1,567,335.0	11,968,540.0	0.00	0.00	0.00	0	0		
									point3	3	1,567,335.5	11,968,530.0	0.00	0.00	0.00	0	0		
									point4	4	1,567,374.8	11,968,531.0	0.00	0.00	0.00	0	0		
									point5	5	1,567,373.0	11,968,678.0	0.00	0.00	0.00	0	0		
									point6	6	1,567,440.6	11,968,678.0	0.00	0.00	0.00	0	0		
									point7	7	1,567,440.2	11,968,577.0	0.00	0.00	0.00	0	0		
									point8	8	1,567,433.4	11,968,577.0	0.00	0.00	0.00	0	0		
									point9	9	1,567,433.2	11,968,540.0	0.00	0.00	0.00	0	0		
									point10	10	1,567,499.1	11,968,539.0	0.00	0.00	0.00	0	0		
									point11	11	1,567,499.6	11,968,599.0	0.00	0.00	0.00	0	0		
									point12	12	1,567,582.2	11,968,600.0	0.00	0.00	0.00	0	0		
									point13	13	1,567,582.8	11,968,606.0	0.00	0.00	0.00	0	0		
									point14	14	1,567,588.0	11,968,609.0	0.00	0.00	0.00	0	0		
									point15	15	1,567,593.1	11,968,598.0	0.00	0.00	0.00	0	0		
									point16	16	1,567,584.9	11,968,594.0	0.00	0.00	0.00	0	0		
									point17	17	1,567,599.9	11,968,557.0	0.00	0.00	0.00	0	0		
									point18	18	1,567,619.0	11,968,566.0	0.00	0.00	0.00	0	0		
									point19	19	1,567,623.0	11,968,559.0	0.00	0.00	0.00	0	0		
									point20	20	1,567,652.2	11,968,576.0	0.00	0.00	0.00	0	0		
									point21	21	1,567,618.9	11,968,671.0	0.00	0.00	0.00	0	0		
									point22	22	1,567,498.5	11,968,671.0	0.00	0.00	0.00	0	0		
									point23	23	1,567,496.5	11,968,742.0	0.00	0.00	0.00	0	0		
									point24	24	1,567,454.2	11,968,743.0	0.00	0.00	0.00	0	0		
									point25	25	1,567,453.1	11,968,748.0	0.00	0.00	0.00	0	0		
									point26	26	1,567,347.6	11,968,749.0	0.00	0.00	0.00	0	0		
									point27	27	1,567,347.5	11,968,737.0	0.00	0.00	0.00	0	0		
									point28	28	1,567,284.2	11,968,738.0	0.00	0.00	0.00	0	0		
									point29	29	1,567,286.1	11,968,662.0	0.00	0.00	0.00	0	0		
									point30	30	1,567,311.4	11,968,662.0	0.00	0.00	0.00	0	0		
									point31	31	1,567,311.9	11,968,608.0	0.00	0.00	0.00	0	0		
									point32	32	1,567,285.6	11,968,607.0	0.00	0.00	0.00	0	0		
									point33	33	1,567,285.1	11,968,578.0	0.00	0.00	0.00	0	0		
									point34	34	1,567,290.9	11,968,577.0	0.00	0.00	0.00	0	0		
									point35	35	1,567,289.2	11,968,568.0	0.00	0.00	0.00	0	0		

									point36	36	1,567,279.2	11,968,567.0	0.00	0.00	0.00	0	0		
									point37	37	1,567,279.4	11,968,541.0	0.00	0.00					

Dudek 22 February 2021
CB TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS

PROJECT/CONTRACT: El Camino Senior Homes
RUN: Existing
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	No Barrier LAeq1h Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
ST1	1	1	59.3	62.5	66	3.2	10	----	62.5	0.0	8	-8.0
ST2	2	1	51.9	49.4	66	-2.5	10	----	49.4	0.0	8	-8.0
SC1	4	1	0.0	69.2	66	69.2	10	Snd Lvl	69.2	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	3	0.0	0.0	0.0
All Impacted	1	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Dudek **22 February 2021**
CB **TNM 2.5**

INPUT: ROADWAYS
PROJECT/CONTRACT: **El Camino Senior Homes**
RUN: **Existing + Projec**

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway		Points					Flow Control			Segment	
Name	Width	Name	No.	Coordinates (pavement) X	Y	Z	Control Device	Speed Constraint	Percent Vehicles Affected	Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
El Camino North	35.0	point1	1	1,567,268.4	11,968,135.0	0.00				Average	
		point2	2	1,567,197.5	11,968,216.0	0.00				Average	
		point3	3	1,567,148.4	11,968,284.0	0.00				Average	
		point4	4	1,567,103.0	11,968,349.0	0.00				Average	
		point5	5	1,567,048.8	11,968,447.0	0.00				Average	
		point6	6	1,567,006.2	11,968,544.0	0.00				Average	
		point7	7	1,566,976.9	11,968,645.0	0.00				Average	
		point8	8	1,566,958.9	11,968,739.0	0.00				Average	
		point9	9	1,566,948.6	11,968,843.0	0.00				Average	
		point10	10	1,566,945.8	11,968,928.0	0.00				Average	
		point11	11	1,566,950.2	11,968,993.0	0.00				Average	
		point12	12	1,566,960.9	11,969,062.0	0.00				Average	
		point13	13	1,566,981.1	11,969,162.0	0.00				Average	
		point14	14	1,567,010.1	11,969,253.0	0.00				Average	
		point15	15	1,567,045.1	11,969,339.0	0.00					
El Camino South	35.0	point16	16	1,567,084.4	11,969,330.0	0.00				Average	
		point17	17	1,567,045.4	11,969,236.0	0.00				Average	
		point18	18	1,567,022.8	11,969,171.0	0.00				Average	
		point19	19	1,567,000.1	11,969,068.0	0.00				Average	
		point20	20	1,566,991.5	11,968,997.0	0.00				Average	
		point21	21	1,566,985.8	11,968,935.0	0.00				Average	
		point22	22	1,566,985.8	11,968,844.0	0.00				Average	
		point23	23	1,566,996.8	11,968,754.0	0.00				Average	
		point24	24	1,567,016.2	11,968,644.0	0.00				Average	
		point25	25	1,567,033.9	11,968,590.0	0.00				Average	

		point26	26	1,567,067.2	11,968,507.0	0.00				Average	
		point27	27	1,567,099.8	11,968,431.0	0.00				Average	
		point28	28	1,567,138.0	11,968,367.0	0.00				Average	
		point29	29	1,567,194.2	11,968,289.0	0.00				Average	
		point30	30	1,567,298.8	11,968,165.0	0.00					

Dudek **22 February 2021**
CB **TNM 2.5**

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: **El Camino Senior Homes**
RUN: **Existing + Projec**

Roadway	Points												
Name	Name	No.	Segment										
			Autos		MTrucks		HTrucks		Buses		Motorcycles		
			V	S	V	S	V	S	V	S	V	S	
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	
El Camino North	point1	1	819	50	16	50	8	50	0	0	0	0	
	point2	2	819	50	16	50	8	50	0	0	0	0	
	point3	3	819	50	16	50	8	50	0	0	0	0	
	point4	4	819	50	16	50	8	50	0	0	0	0	
	point5	5	819	50	16	50	8	50	0	0	0	0	
	point6	6	819	50	16	50	8	50	0	0	0	0	
	point7	7	819	50	16	50	8	50	0	0	0	0	
	point8	8	819	50	16	50	8	50	0	0	0	0	
	point9	9	819	50	16	50	8	50	0	0	0	0	
	point10	10	819	50	16	50	8	50	0	0	0	0	
	point11	11	819	50	16	50	8	50	0	0	0	0	
	point12	12	819	50	16	50	8	50	0	0	0	0	
	point13	13	819	50	16	50	8	50	0	0	0	0	
	point14	14	819	50	16	50	8	50	0	0	0	0	
	point15	15											
El Camino South	point16	16	819	50	16	50	8	50	0	0	0	0	
	point17	17	819	50	16	50	8	50	0	0	0	0	
	point18	18	819	50	16	50	8	50	0	0	0	0	
	point19	19	819	50	16	50	8	50	0	0	0	0	
	point20	20	819	50	16	50	8	50	0	0	0	0	
	point21	21	819	50	16	50	8	50	0	0	0	0	
	point22	22	819	50	16	50	8	50	0	0	0	0	
	point23	23	819	50	16	50	8	50	0	0	0	0	

	point24	24	819	50	16	50	8	50	0	0	0	0
	point25	25	819	50	16	50	8	50	0	0	0	0
	point26	26	819	50	16	50	8	50	0	0	0	0
	point27	27	819	50	16	50	8	50	0	0	0	0
	point28	28	819	50	16	50	8	50	0	0	0	0
	point29	29	819	50	16	50	8	50	0	0	0	0
	point30	30										

Dudek 22 February 2021
CB TNM 2.5

INPUT: RECEIVERS
PROJECT/CONTRACT: El Camino Senior Homes
RUN: Existing + Projec

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria Existing LAeq1h	Impact Criteria LAeq1h	Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
ST1	1	1	1,567,201.4	11,968,628.0	0.00	4.92	59.30	66	10.0	8.0	Y
ST2	2	1	1,567,722.4	11,968,516.0	0.00	4.92	51.90	66	10.0	8.0	Y
M1-1	4	1	1,567,278.0	11,968,552.0	0.00	4.92	0.00	66	10.0	8.0	Y
M1-2	5	1	1,567,278.0	11,968,552.0	0.00	14.92	0.00	66	10.0	8.0	Y
M1-3	6	1	1,567,278.0	11,968,552.0	0.00	24.92	0.00	66	10.0	8.0	Y
M3-1	7	1	1,567,359.0	11,968,529.0	0.00	4.92	0.00	66	10.0	8.0	Y
M3-2	8	1	1,567,359.0	11,968,529.0	0.00	14.92	0.00	66	10.0	8.0	Y
M3-3	9	1	1,567,359.0	11,968,529.0	0.00	24.92	0.00	66	10.0	8.0	Y
M2-1	10	1	1,567,277.2	11,968,730.0	0.00	4.92	0.00	66	10.0	8.0	Y
M2-2	11	1	1,567,277.2	11,968,730.0	0.00	14.92	0.00	66	10.0	8.0	Y
M2-3	12	1	1,567,277.2	11,968,730.0	0.00	24.92	0.00	66	10.0	8.0	Y
OS-1	14	1	1,567,297.0	11,968,634.0	0.00	4.92	0.00	66	10.0	8.0	Y
OS-2	15	1	1,567,400.8	11,968,561.0	0.00	4.92	0.00	66	10.0	8.0	Y
OS-3	16	1	1,567,542.1	11,968,566.0	0.00	4.92	0.00	66	10.0	8.0	Y
SC1	18	1	1,567,279.6	11,968,257.0	0.00	4.92	0.00	66	10.0	8.0	Y

Dudek **22 February 2021**
CB **TNM 2.5**

INPUT: BARRIERS
PROJECT/CONTRACT: **El Camino Senior Homes**
RUN: **Existing + Projec**

Barrier Name	Type	Height Min	Height Max	If Wall $ per Unit Area	If Berm $ per Unit Vol.	If Berm Top Width	If Berm Run:Rise	Add'tnl $ per Unit Length	Points Name	No.	Coordinates (bottom) X	Coordinates (bottom) Y	Coordinates (bottom) Z	Height at Point	Segment Seg Ht Perturbs Incre-ment	Segment #Up	Segment #Dn	On Struct?	Important Reflec-tions?
		ft	ft	$/sq ft	$/cu yd	ft	ft:ft	$/ft			ft	ft	ft	ft	ft				
Barrier1	W	0.00	99.99	0.00				0.00	point1	1	1,567,280.2	11,968,538.0	0.00	35.00	50.00	0	0		
									point2	2	1,567,335.0	11,968,540.0	0.00	35.00	50.00	0	0		
									point3	3	1,567,335.5	11,968,530.0	0.00	35.00	50.00	0	0		
									point4	4	1,567,374.8	11,968,531.0	0.00	35.00	0.00	0	0		
									point5	5	1,567,373.0	11,968,678.0	0.00	35.00	0.00	0	0		
									point6	6	1,567,440.6	11,968,678.0	0.00	35.00	0.00	0	0		
									point7	7	1,567,440.2	11,968,577.0	0.00	35.00	0.00	0	0		
									point8	8	1,567,433.4	11,968,577.0	0.00	35.00	0.00	0	0		
									point9	9	1,567,433.2	11,968,540.0	0.00	35.00	0.00	0	0		
									point10	10	1,567,499.1	11,968,539.0	0.00	35.00	0.00	0	0		
									point11	11	1,567,499.6	11,968,599.0	0.00	35.00	0.00	0	0		
									point12	12	1,567,582.2	11,968,600.0	0.00	35.00	0.00	0	0		
									point13	13	1,567,582.8	11,968,606.0	0.00	35.00	0.00	0	0		
									point14	14	1,567,588.0	11,968,609.0	0.00	35.00	0.00	0	0		
									point15	15	1,567,593.1	11,968,598.0	0.00	35.00	0.00	0	0		
									point16	16	1,567,584.9	11,968,594.0	0.00	35.00	0.00	0	0		
									point17	17	1,567,599.9	11,968,557.0	0.00	35.00	0.00	0	0		
									point18	18	1,567,619.0	11,968,566.0	0.00	35.00	0.00	0	0		
									point19	19	1,567,623.0	11,968,559.0	0.00	35.00	0.00	0	0		
									point20	20	1,567,652.2	11,968,576.0	0.00	35.00	0.00	0	0		
									point21	21	1,567,618.9	11,968,671.0	0.00	35.00	0.00	0	0		
									point22	22	1,567,498.5	11,968,671.0	0.00	35.00	0.00	0	0		
									point23	23	1,567,496.5	11,968,742.0	0.00	35.00	0.00	0	0		
									point24	24	1,567,454.2	11,968,743.0	0.00	35.00	0.00	0	0		
									point25	25	1,567,453.1	11,968,748.0	0.00	35.00	0.00	0	0		
									point26	26	1,567,347.6	11,968,749.0	0.00	35.00	0.00	0	0		
									point27	27	1,567,347.5	11,968,737.0	0.00	35.00	0.00	0	0		
									point28	28	1,567,284.2	11,968,738.0	0.00	35.00	0.00	0	0		
									point29	29	1,567,286.1	11,968,662.0	0.00	35.00	0.00	0	0		
									point30	30	1,567,311.4	11,968,662.0	0.00	35.00	0.00	0	0		
									point31	31	1,567,311.9	11,968,608.0	0.00	35.00	0.00	0	0		
									point32	32	1,567,285.6	11,968,607.0	0.00	35.00	0.00	0	0		
									point33	33	1,567,285.1	11,968,578.0	0.00	35.00	0.00	0	0		
									point34	34	1,567,290.9	11,968,577.0	0.00	35.00	0.00	0	0		
									point35	35	1,567,289.2	11,968,568.0	0.00	35.00	0.00	0	0		

									point36	36	1,567,279.5	11,968,568.0	0.00	35.00	0.00	0	0		
									point37	37	1,567,280.2	11,968,538.0	0.00	35.00					

Dudek		**22 February 2021**
CB		**TNM 2.5**
		Calculated with TNM 2.5
RESULTS: SOUND LEVELS		
PROJECT/CONTRACT:	**El Camino Senior Homes**	
RUN:	**Existing + Projec**	
BARRIER DESIGN:	**INPUT HEIGHTS**	**Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.**
ATMOSPHERICS:	**68 deg F, 50% RH**	

Receiver Name	**No.**	**#DUs**	**Existing LAeq1h**	**No Barrier LAeq1h Calculated**	**No Barrier LAeq1h Crit'n**	**Increase over existing Calculated**	**Increase over existing Crit'n Sub'l Inc**	**Type Impact**	**With Barrier Calculated LAeq1h**	**Noise Reduction Calculated**	**Noise Reduction Goal**	**Calculated minus Goal**
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
ST1	1	1	59.3	62.5	66	3.2	10	----	62.5	0.0	8	-8.0
ST2	2	1	51.9	47.6	66	-4.3	10	----	47.6	0.0	8	-8.0
M1-1	4	1	0.0	60.6	66	60.6	10	----	60.6	0.0	8	-8.0
M1-2	5	1	0.0	62.9	66	62.9	10	----	62.9	0.0	8	-8.0
M1-3	6	1	0.0	63.1	66	63.1	10	----	63.1	0.0	8	-8.0
M3-1	7	1	0.0	56.8	66	56.8	10	----	56.6	0.2	8	-7.8
M3-2	8	1	0.0	59.7	66	59.7	10	----	59.5	0.2	8	-7.8
M3-3	9	1	0.0	59.9	66	59.9	10	----	59.6	0.3	8	-7.7
M2-1	10	1	0.0	58.9	66	58.9	10	----	58.9	0.0	8	-8.0
M2-2	11	1	0.0	61.8	66	61.8	10	----	61.8	0.0	8	-8.0
M2-3	12	1	0.0	61.8	66	61.8	10	----	61.8	0.0	8	-8.0
OS-1	14	1	0.0	58.6	66	58.6	10	----	58.6	0.0	8	-8.0
OS-2	15	1	0.0	49.9	66	49.9	10	----	49.9	0.0	8	-8.0
OS-3	16	1	0.0	48.3	66	48.3	10	----	48.3	0.0	8	-8.0
SC1	18	1	0.0	69.3	66	69.3	10	Snd Lvl	69.3	0.0	8	-8.0

Dwelling Units	**# DUs**	**Noise Reduction Min**	**Noise Reduction Avg**	**Noise Reduction Max**
		dB	**dB**	**dB**
All Selected	15	0.0	0.0	0.3
All Impacted	1	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Appendix D

Transmission Loss Prediction

Type A.2, bedroom with ***Closed Windows***

37 = approx. STC

	qty	width	height	Square feet	
material or element #1				105	Exterior Wall
material or element #2	2	3	5	30	vinyl window (dual pane)
material or element #3				0	
material or element #4	0	0	0	0	
material or element #5				0	opening
total surface		15	9	135	arbitrary total surface area

Octave Band Center Frequency (OBCF, Hz)

TL Data Source		125	250	500	1000	2000	4000
NRC-CNRC IC-IR-761 (p. 25: G16_WS90(406)_MFB90_2G16)	Exterior Wall	16	40	41	48	43	52
2 x 5/8" GWB, 2"x4" wood, 24" o.c., fiber batt fill, 1 x 5/8" GWB	material #1 τ	0.02512	0.0001	7.94328E-05	1.6E-05	5E-05	6.3E-06
available TL data for comparable assembly:	vinyl window (dual pane)	23	23	27	35	47	36
Viracon 5/8" overall - 1/8" glass + 3/8" airspace + 1/8" glass	material #2 τ	0.00501	0.00501	0.001995262	0.00032	2E-05	0.00025
available TL data for comparable assembly:	0	23	23	27	35	47	36
Viracon 5/8" overall - 1/8" glass + 3/8" airspace + 1/8" glass	material #3 τ	0.00501	0.00501	0.001995262	0.00032	2E-05	0.00025
available TL data for comparable assembly:	0	17	21	26	29	31	34
Bies & Hansen (1996), Table 8.1, "solid hardwood…", 43mm thick	material #4 τ	0.01995	0.00794	0.002511886	0.00126	0.00079	0.0004
	opening	0	0	0	0	0	0
	material #5 τ	1	1	1	1	1	1
	composite TL	17	29	33	41	44	42
enter desired STC value 37	prospective STC curve	21	30	37	40	41	41
sum of negative differentials -9	differentials	-4	-1	-4	1	3	1

Type A.2 bedRoom with ***Open Windows***

8 = approx. STC

	qty	width	height	Square feet	
material or element #1				60	Exterior Wall
material or element #2	1	3	5	15	vinyl window (dual pane)
material or element #3				0	
material or element #4	0	0	0	0	
material or element #5	1	3	5	15	opening
total surface		10	9	90	arbitrary total surface area

Octave Band Center Frequency (OBCF, Hz)

TL Data Source		125	250	500	1000	2000	4000
NRC-CNRC IC-IR-761 (p. 25: G16_WS90(406)_MFB90_2G16)	Exterior Wall	16	40	41	48	43	52
2 x 5/8" GWB, 2"x4" wood, 24" o.c., fiber batt fill, 1 x 5/8" GWB	material #1 τ	0.02512	0.0001	7.94328E-05	1.6E-05	5E-05	6.3E-06
available TL data for comparable assembly:	vinyl window (dual pane)	23	23	27	35	47	36
Viracon 5/8" overall - 1/8" glass + 3/8" airspace + 1/8" glass	material #2 τ	0.00501	0.00501	0.001995262	0.00032	2E-05	0.00025
available TL data for comparable assembly:	0	23	23	27	35	47	36
Viracon 5/8" overall - 1/8" glass + 3/8" airspace + 1/8" glass	material #3 τ	0.00501	0.00501	0.001995262	0.00032	2E-05	0.00025
available TL data for comparable assembly:	0	17	21	26	29	31	34
Bies & Hansen (1996), Table 8.1, "solid hardwood…", 43mm thick	material #4 τ	0.01995	0.00794	0.002511886	0.00126	0.00079	0.0004
	opening	0	0	0	0	0	0
	material #5 τ	1	1	1	1	1	1
	composite TL	7	8	8	8	8	8
enter desired STC value 8	prospective STC curve	-8	1	8	11	12	12
sum of negative differentials -12	differentials	15	7	0	-3	-4	-4

*Tpye E Bedroom with **Closed Windows** and optional deck door*

36 = approx. STC

	qty	width	height	Square feet	
material or element #1				51	Exterior Wall
material or element #2	1	3	5	15	vinyl window (dual pane)
material or element #3				0	
material or element #4	1	3	8	24	French Door Glazing (dual pane)
material or element #5				0	opening
total surface		10	9	90	arbitrary total surface area

Octave Band Center Frequency (OBCF, Hz)

TL Data Source		125	250	500	1000	2000	4000
NRC-CNRC IC-IR-761 (p. 25: G16_WS90(406)_MFB90_2G16)	Exterior Wall	16	40	41	48	43	52
2 x 5/8" GWB, 2"x4" wood, 24" o.c., fiber batt fill, 1 x 5/8" GWB	material #1 τ	0.02512	0.0001	7.94328E-05	1.6E-05	5E-05	6.3E-06
available TL data for comparable assembly:	vinyl window (dual pane)	23	23	27	35	47	36
Viracon 5/8" overall - 1/8" glass + 3/8" airspace + 1/8" glass	material #2 τ	0.00501	0.00501	0.001995262	0.00032	2E-05	0.00025
available TL data for comparable assembly:	0	23	23	27	35	47	36
Viracon 5/8" overall - 1/8" glass + 3/8" airspace + 1/8" glass	material #3 τ	0.00501	0.00501	0.001995262	0.00032	2E-05	0.00025
	French Door Glazing (dual pane)	23	23	27	35	47	36
	material #4 τ	0.00501	0.00501	0.001995262	0.00032	2E-05	0.00025
	opening	0	0	0	0	0	0
	material #5 τ	1	1	1	1	1	1
	composite TL	18	27	30	38	44	39
enter desired STC value 36	prospective STC curve	20	29	36	39	40	40
sum of negative differentials -11	differentials	-2	-2	-6	-1	4	-1

Type E Bedroom with Open Windows and closed optional deck door

11 = approx. STC

	qty	width	height	Square feet	
material or element #1				51	Exterior Wall
material or element #2	1	1.5	5	7.5	vinyl window (dual pane)
material or element #3				0	
material or element #4	1	3	8	24	French Door Glazing (dual pane)
material or element #5	1	1.5	5	7.5	opening
total surface		10	9	90	arbitrary total surface area

Octave Band Center Frequency (OBCF, Hz)

TL Data Source		125	250	500	1000	2000	4000
NRC-CNRC IC-IR-761 (p. 25: G16_WS90(406)_MFB90_2G16)	Exterior Wall	16	40	41	48	43	52
2 x 5/8" GWB, 2"x4" wood, 24" o.c., fiber batt fill, 1 x 5/8" GWB	material #1 τ	0.02512	0.0001	7.94328E-05	1.6E-05	5E-05	6.3E-06
available TL data for comparable assembly:	vinyl window (dual pane)	23	23	27	35	47	36
Viracon 5/8" overall - 1/8" glass + 3/8" airspace + 1/8" glass	material #2 τ	0.00501	0.00501	0.001995262	0.00032	2E-05	0.00025
available TL data for comparable assembly:	0	23	23	27	35	47	36
Viracon 5/8" overall - 1/8" glass + 3/8" airspace + 1/8" glass	material #3 τ	0.00501	0.00501	0.001995262	0.00032	2E-05	0.00025
	French Door Glazing (dual pane)	23	23	27	35	47	36
	material #4 τ	0.00501	0.00501	0.001995262	0.00032	2E-05	0.00025
	opening	0	0	0	0	0	0
	material #5 τ	1	1	1	1	1	1
	composite TL	10	11	11	11	11	11
enter desired STC value: 11	prospective STC curve	-5	4	11	14	15	15
sum of negative differentials: -12	differentials	15	7	0	-3	-4	-4

*Type F Bedroom with **Closed Windows***

38 = approx. STC

	qty	width	height	Square feet	
material or element #1				75	Exterior Wall
material or element #2	1	3	5	15	vinyl window (dual pane)
material or element #3	0	0	0	0	
material or element #4	0	0	0	0	
material or element #5				0	opening
total surface		10	9	90	arbitrary total surface area

Octave Band Center Frequency (OBCF, Hz)

TL Data Source		125	250	500	1000	2000	4000
NRC-CNRC IC-IR-761 (p. 25: G16_WS90(406)_MFB90_2G16)	Exterior Wall	16	40	41	48	43	52
2 x 5/8" GWB, 2"x4" wood, 24" o.c., fiber batt fill, 1 x 5/8" GWB	material #1 τ	0.02512	0.0001	7.94328E-05	1.6E-05	5E-05	6.3E-06
available TL data for comparable assembly:	vinyl window (dual pane)	23	23	27	35	47	36
Viracon 5/8" overall - 1/8" glass + 3/8" airspace + 1/8" glass	material #2 τ	0.00501	0.00501	0.001995262	0.00032	2E-05	0.00025
available TL data for comparable assembly:	0	23	23	27	35	47	36
Viracon 5/8" overall - 1/8" glass + 3/8" airspace + 1/8" glass	material #3 τ	0.00501	0.00501	0.001995262	0.00032	2E-05	0.00025
	0						
	material #4 τ	1	1	1	1	1	1
	opening	0	0	0	0	0	0
	material #5 τ	1	1	1	1	1	1
	composite TL	17	30	34	42	43	43
enter desired STC value 38	prospective STC curve	22	31	38	41	42	42
sum of negative differentials -10	differentials	-5	-1	-4	1	1	1

Type F Bedroom with Open Windows

11 = approx. STC

	qty	width	height	Square feet	
material or element #1				75	Exterior Wall
material or element #2	1	1.5	5	7.5	vinyl window (dual pane)
material or element #3				0	
material or element #4				0	
material or element #5	1	1.5	5	7.5	opening
total surface		10	9	90	arbitrary total surface area

Octave Band Center Frequency (OBCF, Hz)

TL Data Source		125	250	500	1000	2000	4000
NRC-CNRC IC-IR-761 (p. 25: G16_WS90(406)_MFB90_2G16)	Exterior Wall	16	40	41	48	43	52
2 x 5/8" GWB, 2"x4" wood, 24" o.c., fiber batt fill, 1 x 5/8" GWB	material #1 τ	0.02512	0.0001	7.94328E-05	1.6E-05	5E-05	6.3E-06
available TL data for comparable assembly:	vinyl window (dual pane)	23	23	27	35	47	36
Viracon 5/8" overall - 1/8" glass + 3/8" airspace + 1/8" glass	material #2 τ	0.00501	0.00501	0.001995262	0.00032	2E-05	0.00025
available TL data for comparable assembly:	0	23	23	27	35	47	36
Viracon 5/8" overall - 1/8" glass + 3/8" airspace + 1/8" glass	material #3 τ	0.00501	0.00501	0.001995262	0.00032	2E-05	0.00025
	0						
	material #4 τ	1	1	1	1	1	1
	opening	0	0	0	0	0	0
	material #5 τ	1	1	1	1	1	1
	composite TL	10	11	11	11	11	11
enter desired STC value 11	prospective STC curve	-5	4	11	14	15	15
sum of negative differentials -12	differentials	15	7	0	-3	-4	-4

Appendix E

Facility HVAC Noise Prediction

Appendix E: CadnaA Input and Output

Scenario: No Generator

Name	M.	ID	Level Lr		Limit. Value		Land Use			Height		Coordinates		
			Day	Night	Day	Night	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
M1			35.1	35.1	0.0	0.0		x	Total	5.00	r	6256488.77	1934193.46	5.00
M2			36.5	36.5	0.0	0.0		x	Total	5.00	r	6256552.16	1934190.70	5.00
M3			36.4	36.4	0.0	0.0		x	Total	5.00	r	6256791.95	1934189.32	5.00

Scenario: W/ Generator

Name	M.	ID	Level Lr		Limit. Value		Land Use			Height		Coordinates		
			Day	Night	Day	Night	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
M1			35.4	35.4	0.0	0.0		x	Total	5.00	r	6256488.77	1934193.46	5.00
M2			36.9	36.9	0.0	0.0		x	Total	5.00	r	6256552.16	1934190.70	5.00
M3			36.8	36.8	0.0	0.0		x	Total	5.00	r	6256791.95	1934189.32	5.00
M4			60.0	60.0	0.0	0.0		x	Total	5.00	r	6256690.75	1934491.99	5.00

Source Library:

Name	ID	Type	Oktave Spectrum (dB)												Source
			Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	
5 ton	TS60	Lw	A	66.2	66.2	66.7	70.1	73.2	74.1	70.6	68.0	60.2	79.5	105.8	
6 ton	TSC72	Lw	A	65.9	65.9	69.9	73.5	76.4	77.3	73.7	70.7	62.1	82.4	105.6	
7 ton	TSC90	Lw	A	65.9	65.9	69.9	73.5	74.6	77.3	73.7	70.7	62.0	82.0	105.6	
13 ton	TKD175	Lw	A	61.9	61.9	66.0	72.9	78.5	81.1	77.6	71.5	60.2	84.8	101.7	
19 ton	TKD250	Lw	A	73.2	73.2	72.3	77.0	80.7	81.5	78.4	71.3	55.4	86.5	112.8	
genset casing radiated unhoused	GCRU	Lw	A	76.6	83.6	100.3	104.8	109.9	113.1	111.7	109.7	103.1	117.8	122.5	from Cummins MSP-1054 PWL
F183 genset (CR and Exh)	F183	Lw	A	90.0	96.0	104.3	113.9	110.1	111.0	108.7	106.3	100.5	118.0	131.4	Cummins MSP-1054
F201 Quiet Site II first stage (CR and Exh)	F201	Lw	A	97.9	103.9	110.2	103.1	105.2	107.7	105.3	102.5	95.4	114.8	138.4	Cummins MSP-1054
F2 Quiet Site II Second Stage	F202	Lw	A	76.9	82.9	92.2	92.1	95.2	95.7	95.3	93.5	85.4	102.2	117.8	Cummins MSP-1054
genset exhaust unmuffled	GEXU	Lw	A	93.0	99.0	109.0	114.0	119.0	115.0	116.0	117.0	110.0	123.9	134.6	based on Cummins MSP-1054 SPL at 1m 100% load