HELIX
Environmental Planning

Bernardo Shores Project

Acoustical Technical Report

September 16, 2014

Prepared for:
The Bernardo Shores Project Owner, LLC
c/o Integral Communities (as its agent)
2235 Encinitas Boulevard, Suite 216
Encinitas, CA 92024

Prepared by:
HELIX Environmental Planning, Inc.
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La Mesa, CA 91942

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GLOSSARY OF TERMS AND ACRONYMS

ADT	average daily traffic
AICUZ	Air Installation Compatible Use Zone Update
ANSI	American National Standards Institute
C/MU-1	General Commercial & Mixed Use (zoning)
CAD	Computer Aided Design
CADNA	Computer Aided Noise Abatement
City	City of Imperial Beach
CMU	Concrete Masonry Unit
CNEL	Community Noise Equivalent Level
County	County of San Diego
dB	decibel
dBA	A-weighted sound pressure level
daytime	the period from 7:00 a.m. to 10:00 p.m.
DU	dwelling unit
evening	the period from 7:00 p.m. to 10:00 p.m.
FHWA	Federal Highway Administration
HNL	Hourly Noise Level
HVAC	Heating, ventilating and air conditioning
Hz	hertz
L_{DN}	Day-Night sound level
L_{EQ}	Equivalent sound level
L_{EQ} A-Weighted	A “one-hour” equivalent sound level measurement
LLG	Linscott, Law and Greenspan, Engineers
MT	medium truck
mph	miles per hour
nighttime	periods other than daytime (as defined above), including legal holidays
NOLF	Naval Outlying Landing Field in Imperial Beach
PPV	peak particle velocity
PPA	peak particle acceleration
RCNM	Roadway Construction Noise Model
rms	root mean square
RV	recreational vehicle

GLOSSARY OF TERMS AND ACRONYMS (cont.)

SF	square foot or square feet
S_{PL}	Sound Pressure Level
STC	Sound Transmission Control
S_{WL}	Sound Power Level
TNM	Traffic Noise Model

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EXECUTIVE SUMMARY

The Bernardo Shores Project (hereafter referred to as "Project" or "Proposed Project") proposes to replace an existing recreational vehicle (RV) park with a single- and multi-family residential development.

The Proposed Project consists of a residential development located on 9.31 acres (plus a contiguous 0.76-acre parcel that is 20 feet by 1,400 feet) of land. The property is located northeast of the intersection of Highway 75 (also known as Palm Avenue) and Rainbow Drive in the City of Imperial Beach (City), which is the most southwestern city in San Diego County. The Project site is approximately 0.75 mile from the Pacific Ocean.

The Proposed Project would provide 190 attached multi-family residential units (townhomes) and 3 detached single-family residential units, for a total of 193 dwelling units (DUs). Home sizes would range from approximately 1,145 to 2,250 square feet (SF). The homes would be limited to a maximum of 3 stories (no more than 40 feet in height). Additional amenities, such as a common area pool, are proposed to be constructed on site. Project construction would require the demolition of existing on-site structures (including parking areas and RV pads), mass grading of the Project site, foundation excavation, foundation pour, utilities excavation, and building construction.

The Project site is surrounded by various land use types; residential uses are located to the east and west of the Project site, commercial uses and a mobile home park are located to the south, and San Diego Bay National Wildlife Refuge (Pond 10A) is located to the north. The surrounding parcels are zoned for residential (R-1-6000 and R-3000-D), general commercial and mixed use (C/MU-1), and urban reserve (UR).

CONSTRUCTION NOISE IMPACTS

Construction noise at the surrounding property lines is anticipated to be in compliance with the County of San Diego (County) Noise Ordinance (construction) requirements, and impacts would be less than significant. Additionally, construction vibration impacts at the surrounding property lines are expected to be less than significant. Therefore, no noise attenuation measures are required for construction noise or vibration.

OPERATIONAL NOISE IMPACTS

It should be noted that this analysis is based on an older site plan that included 203 DUs. The site plan has since been revised to include only 193 units (10 units fewer than originally proposed). Therefore, this analysis is considered to be conservative; actual impacts would be less than what is presented below.

Stationary Source Noise

On-site Heating, Ventilation, and Air Conditioning Noise

The only noteworthy stationary noise source associated with the Proposed Project with the potential for noise impacts would be the heating, ventilation and air conditioning (HVAC) equipment. Typical exterior noise impacts from one residence to an adjacent residence on the Project site would be approximately 44.5 dBA. Therefore, stationary source noise impacts from on-site residence to on-site residence receptors would be less than significant.

Off-site HVAC Noise

The HVAC systems for the Proposed Project would likely be ground-mounted (worst case for noise impact), located in close proximity to the residences they would serve. Specific planning data (i.e., equipment details and locations) for the proposed HVAC systems is not available at this time. However, to estimate operational impacts from HVAC systems of the Project, the noise from a typical large residential exterior split systems condenser (Carrier 38HDR060), located in the area with the greatest potential for operational noise impacts to surrounding residences, was used for the analysis. It is important to note that a 6-foot or higher concrete masonry unit (CMU) wall currently exists between the Project property line, where the four detached units are proposed on the "panhandle" adjacent to 7th Street, and the existing off-site residential units to the north. The operational noise analysis related to HVAC system noise assumed this wall would remain in place during both construction and operation of the Proposed Project. This existing wall would provide noise attenuation that would greatly reduce potential operational noise impacts related to HVAC units, and the calculated noise impacts from the HVAC systems to the adjacent buildings were estimated to be less than 45 dBA. The property line noise level impact threshold for nighttime noise at single-family residences is 45 dBA. Therefore, stationary source noise impacts to off-site receptors would be less than significant, and no noise attenuation measures are required.

Land Use Noise and Vibration Compatibility

As the Proposed Project is exclusively a residential development, proposed residential units would not be in close proximity to commercial uses that would have the potential to cause significant on-site noise impacts. Thus, proposed residences would not be exposed to noise generated by on-site stationary noise sources other than the previously discussed HVAC systems. No mitigation would be required.

The only potential on-site to off-site vibration impact sources are the on-site HVAC systems, pool equipment (located near the center of the Project site), and on-site traffic. Given the small size and low horsepower associated with the proposed on-site equipment (related to HVAC systems and the pool), the ability of the equipment to introduce vibration energy into the ground would be limited; subsequently, none of these sources have the potential to create human-perceptible vibration beyond their immediate footprint (or the site boundary). Therefore, vibration impacts to off-site receptors would be less than significant and no mitigation would be required.

Transportation Noise

Transportation noise generated in the Project vicinity is primarily from vehicular traffic noise; other off-site noise sources have a negligible contribution to noise levels at nearby off-site or on-site residential uses. The maximum modeled change in noise levels at off-site receivers between Existing and Existing plus Project traffic as well as between Year 2040 and Year 2040 with Project conditions was less than 0.2 Community Noise Equivalent Level (CNEL). In order for a significant impact to be identified, a 3-CNEL traffic noise increase must occur at these off-site receptors as a result of a project. A project would have to double the amount of daily traffic on a roadway while maintaining full speed. Therefore, Project off-site traffic noise impacts would be less than significant.

The dominant noise source at the Project site is the vehicular traffic on Highway 75. The proposed balcony receivers (second story and higher) for the buildings located closest to Highway 75 would experience noise levels in excess of 60 CNEL. According to the County Noise Ordinance, which has commonly been utilized by the City of Imperial Beach, outdoor use space associated with the Project must not have noise levels exceeding 60 CNEL. If these balconies are included as part of the required exterior use space for the Proposed Project, noise impacts at these locations would need to be mitigated to the 60 CNEL County standard for exterior use areas. With use of noise barriers, transportation noise levels at balconies (second story and higher) would be reduced to the 60 CNEL threshold or less.

Exterior and interior traffic-related noise levels at some proposed residential units are also expected to exceed County's noise thresholds of 60 CNEL (single-family residential) for exterior locations, and 45 CNEL for interior locations. Residential receivers with a direct view of Highway 75 would be exposed to an exterior noise level greater than 60 CNEL for Year 2040 with Project conditions. Because exterior to interior planning generally assumes a minimum 15 CNEL reduction from the outside to the inside of a structure, interior noise levels may exceed the 45 CNEL threshold for interior use areas. Thus, residences along the perimeter of the site may not be compatible with the future traffic noise levels without the implementation of noise reduction measures. Project implementation would, therefore, result in a potentially significant impact to land use-noise compatibility as a result of traffic-related noise. To mitigate this significant land use-noise compatibility impact, an interior noise analysis of proposed residences (specifically, those with a direct line of sight to Highway 75) shall be completed prior to building permit issuance to determine the appropriate measures that shall be incorporated into building design to ensure residential interior noise levels would be below 45 CNEL.

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1.0 INTRODUCTION

The Bernardo Shores Project (hereafter referred to as "Project" or "Proposed Project") proposes to replace an existing recreational vehicle (RV) park with a gated residential development.

The Proposed Project consists of a residential development located on 9.31 acres (plus a contiguous 0.76-acre parcel that is approximately 20 feet by 1,400 feet) of land currently designated for the development. The property is located northeast of the intersection of Highway 75 (also known as Palm Avenue) and Rainbow Drive in the City of Imperial Beach (City), which is the most southwestern city in San Diego County (County). The Project site is approximately 0.75 mile from the Pacific Ocean.

The Proposed Project would provide 190 attached multi-family residential units (townhomes) and 3 detached single-family residential units, for a total of 193 dwelling units (DUs). Home sizes would range from approximately 1,145 to 2,250 square feet (SF). The homes would be limited to a maximum of 3 stories (no more than 40 feet in height). Additional amenities, such as a common area pool, are proposed to be constructed on site. Project construction would require the demolition of existing on-site structures (including parking areas and RV pads), mass grading of the Project site, foundation excavation, foundation pour, utilities excavation, and building construction.

This report addresses the potential for noise impacts to proposed on-site uses and the surrounding community generated by the Project, as well as potential noise impacts from off-site and on-site noise sources to the Project's usable outdoor and indoor areas.

1.1 NOISE AND SOUND LEVEL DESCRIPTORS AND VIBRATION BASICS

All noise level or sound level values presented herein are expressed in terms of decibels (dB), with A-weighting to approximate the hearing sensitivity of humans. Time-averaged noise levels are expressed by the symbol L_{EQ} with a specified duration. The Community Noise Equivalent Level (CNEL) is a 24-hour average, where noise levels during the evening hours of 7:00 p.m. to 10:00 p.m. have an added 5-dB weighting, and sound levels during the nighttime hours of 10:00 p.m. to 7:00 a.m. have an added 10-dB weighting. This is similar to the Day-Night sound level (L_{DN}) which is a 24-hour average with an added 10-dB weighting on the same nighttime hours but no added weighting on the evening hours. Sound levels expressed in CNEL are always based on the A-weighted decibel. These metrics are used to express noise levels for both measurement and municipal regulations, for land use guidelines, and for enforcement of noise ordinances.

Information regarding vibration basics, as discussed in the Transportation- and Construction-Induced Vibration Guidance Manual (California Department of Transportation [Caltrans] Environmental Program 2004), is provided below.

> In describing vibration in the ground and in structures, the motion of a particle (i.e., a point in or on the ground or structure) is used. The concepts of particle displacement, velocity, and acceleration are used to describe how the ground or

structure responds to excitation. Although displacement is generally easier to understand than velocity or acceleration, it is rarely used to describe ground and structure borne vibration because most transducers used to measure vibration directly measure velocity or acceleration, not displacement. Accordingly, vibratory motion is commonly described by identifying the peak particle velocity (PPV) or peak particle acceleration (PPA). PPV is generally accepted as the most appropriate descriptor for evaluating the potential for building damage. For human response, however, an average vibration amplitude is more appropriate because it takes time for the human body to respond to the excitation (the human body responds to an average vibration amplitude, not a peak amplitude).

1.2 PROJECT LOCATION

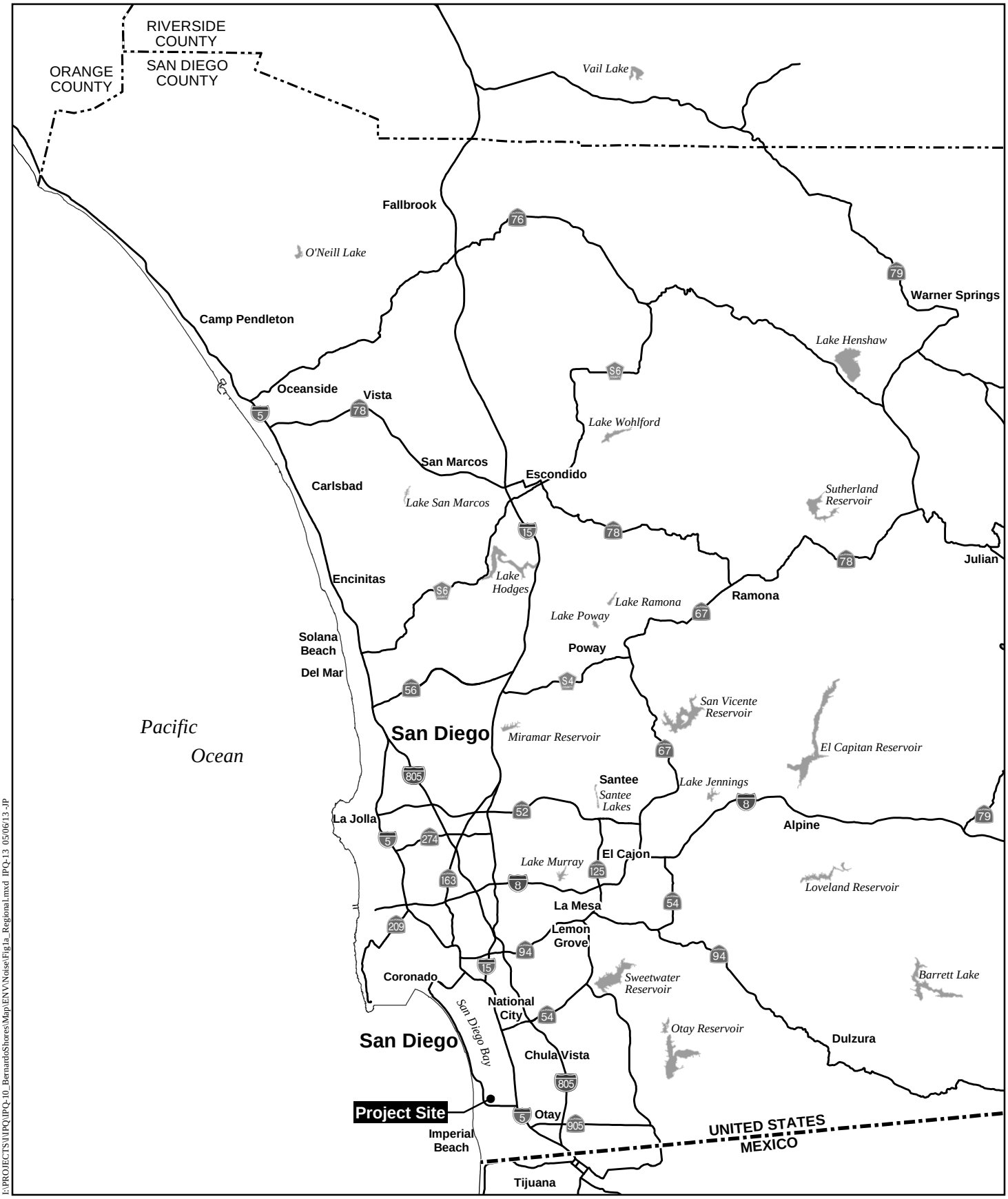
The Project site is approximately 10 acres, and is located northeast of the intersection of Highway 75 and Rainbow Drive in the City of Imperial Beach, California. The street address for the existing 124-space RV park is 500 Highway 75, Imperial Beach, California, and the site is located at the southwestern corner of San Diego Bay (Figure 1a, *Regional Location Map*, Figure 1b, *Project Location Map*, and Figure 2, *Aerial Photograph*). The Project site consists of relatively level ground at an approximate elevation of 10 feet above mean sea level. The current use consists of paved roads and concrete RV parking pads, along with amenity features of the RV park such as a community/office building, pool, and recreation area. The property is zoned C/MU-1 (General Commercial & Mixed Use). According to the City, attached multi-family residential units are permitted within C/MU-1 at a maximum density of one dwelling unit (DU) per 1,000 square feet.

The surrounding area is developed with residential uses to the east and west and commercial uses to the south. In addition, San Diego Bay National Wildlife Refuge (Pond 10A) is located to the north of the site. The surrounding parcels are zoned for residential (R-1-6000 and R-3000-D), general commercial and mixed use (C/MU-1), and urban reserve (UR).

The nearest airport to the Proposed Project site is the Naval Outlying Landing Field (NOLF) in Imperial Beach. NOLF is located approximately one mile south of the Project site. An Air Installation Compatible Use Zone Update (AICUZ) was completed in 2011, which analyzed the impact of NOLF in Imperial Beach (see attached visual in Appendix A, NOLF Imperial Beach Prospective AICUZ Footprint, 2011). The Project site is located outside of the noise contours provided for the facility.

1.3 PROJECT DESCRIPTION

The Project proposes to replace an existing RV park with a gated residential development. The Project would involve the construction and use of 190 multi-family attached townhomes and 3 detached single-family houses on approximately 10 acres, with a total residential density of 21 DU per acre. The houses would be limited to 40 feet in height. Additional amenities, such as a bicycle path and a common area pool, are proposed to be constructed on the property. Existing concrete RV pads and existing on-site structures associated with the RV park would be demolished. Mass grading of the Project site, foundation excavation, foundation pour, utilities



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Regional Location Map

BERNARDO SHORES

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N 0 8 Miles

Figure 1a

Source: USGS 7.5' Quadrangle; Imperial Beach

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Project Location Map

BERNARDO SHORES

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0 2,000 Feet

Figure 1b

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Aerial Photograph

BERNARDO SHORES

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N 0 150 Feet

Figure 2

excavation, and building construction would follow the initial demolition at the site. Figure 3, *Site Plan*, shows a graphic of the Proposed Project.

1.4 SENSITIVE RECEPTORS

Off-site sensitive receptors include residential uses to the east of the Project site, as well as to the north and south of the panhandle of the proposed site (fronting 7th Street) that extends towards 7th Street. Additional residential uses are located to the west (across Highway 75) of the proposed site, and an outdoor mall and RV park are located to the south. Commercial structures to the south are not considered as sensitive receptors

The planned on-site residences and outdoor use areas are also considered sensitive receptors.

1.5 APPLICABLE NOISE AND VIBRATION REGULATIONS AND STANDARDS

City of Imperial Beach Municipal Code

The City's Municipal Code does not state daytime noise limits on construction activities; rather, the code (Chapter 9.32.020) addresses limitations on nighttime construction noise exclusively.

- The use of any tools, power machinery or equipment so as to cause noises disturbing to the comfort and repose of any person residing or working in the vicinity, or in excess of 75 decibels, [is prohibited] between the hours of 10:00 p.m. and 7:00 a.m., except when the same is necessary for emergency repairs required for the health and safety of any member of the community. (Ord. 802 §2, 1990)

However, the City has commonly utilized the County of San Diego's Noise Ordinance limit of 75 dBA during the daytime hours of 7:00 a.m. to 7:00 p.m. for other projects. Relevant information from the County of San Diego's Noise Ordinance is provided below.

San Diego County Code, Section 36.409, Sound Level Limitations on Construction Equipment

- Except for emergency work, it shall be unlawful for any person to operate construction equipment or cause construction equipment to be operated, that exceeds an average sound level of 75 decibels for an 8-hour period, between 7:00 a.m. and 7:00 p.m., when measured at the boundary line of the property where the noise source is located or on any occupied property where the noise is being received.

Construction Vibration Limits

Table 1-1 shows Caltrans' guidelines for vibration annoyance potential criteria.

Table 1-1
GUIDELINE VIBRATION ANNOYANCE POTENTIAL CRITERIA

Human Response	Maximum PPV (in/sec)	
	Transient Sources[1]	Continuous/Frequent Intermittent Sources[2]
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.1
Severe	2	0.4

Source: Transportation- and Construction-Induced Vibration Guidance Manual (Caltrans 2004).
[1] Transient sources create a single, isolated vibration event, such as blasting or drop balls.
[2] Continuous/frequent intermittent sources include impact pile drivers, pogo-stick, compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.
Notes: in/sec = inches per second; PPV = peak particle velocity

San Diego County Code, Section 36.404, General Sound Level Limits

The City does not identify specific property line noise standards for stationary noise sources; however, the City commonly utilizes the County's Noise Ordinance limits for projects within the City. Applicable information for the County's property line noise limits is provided below.

- It shall be unlawful for any person to cause or allow the creation of any noise to the extent that the one-hour average sound level at any point on or beyond the boundaries of the property will exceed the applicable limits in Table 3-1 [of the] San Diego County Code Section 36.404 Sound Level Limits (Table 1-2 below).

Source: SUMMA Architecture 2014

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Site Plan

BERNARDO SHORES

Figure 3

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Table 1-2 (Table 3-1 of the San Diego County Code) SAN DIEGO COUNTY CODE SECTION 36.404 SOUND LEVEL LIMITS		
Zone	**Time**	**One-Hour Average Sound Level Limits (dBA)**
(1) R-S, R-D, R-R, R-MH, A-70, A-72, S-80, S-81, S-87, S-90, S-92 and R-V and R-U with a density of less than 11 dwelling units per acre.	7:00 a.m. to 10:00 p.m. 10:00 p.m. to 7:00 a.m.	50 45
(2) R-RO, R-C, R-M, S-86, V5 and R-V and R-U with a density of 11 or more dwelling units per acre.	7:00 a.m. to 10:00 p.m. 10:00 p.m. to 7:00 a.m.	55 50
(3) S-94, V4 and all other commercial zones.	7:00 a.m. to 10:00 p.m. 10:00 p.m. to 7:00 a.m.	60 55
(4) V1, V2	7:00 a.m. to 7:00 p.m.	60
V1, V2	7:00 p.m. to 10:00 p.m.	55
V1	10:00 p.m. to 7:00 a.m.	55
V2	10:00 p.m. to 7:00 a.m.	50
V3	7:00 a.m. to 10:00 p.m. 10:00 p.m. to 7:00 a.m.	70 65
(5) M-50, M-52 and M-54	Anytime	70
(6) S-82, M-56 and M-58	Anytime	75
(7) S-88 (see subsection (c) below)	-	-

(a) If the measured ambient level exceeds the applicable limit noted above, the allowable one-hour average sound level shall be the ambient noise level, plus three decibels. The ambient noise level shall be measured when the alleged noise violation source is not operating.

(b) The sound level limit at a location on a boundary between two zones is the arithmetic mean of the respective limits for the two zones; provided however, that the one-hour average sound level limit applicable to extractive industries, including but not limited to borrow pits and mines, shall be 75 decibels at the property line regardless of the zone which the extractive industry is actually located.

(c) S88 zones are Specific Planning Areas which allow for different uses. The sound level limits in Table 36.404 above that apply in an S88 zone depend on the use being made of the property. The limits in Table 36.404, subsection (1) apply to property with a residential, agricultural, or civic use. The limits in subsection (3) apply to property with a commercial use. The limits in subsection (5) apply to property with an industrial use that would only be allowed in an M50, M52, or M54 zone. The limits in subsection (6) apply

to all property with an extractive use or a use that would only be allowed in an M56 or M58 zone.

(d) A fixed-location public utility distribution or transmission facility located on or adjacent to a property line shall be subject to the sound level limits of this section, measured at or beyond six feet from the boundary of the easement upon which the facility is located.

The zone for the site is C/MU-1, and the zoning for surrounding uses is predominantly residential (R-1-6000 and R-3000-D); accordingly, this analysis utilizes the more conservative maximum operational exterior noise limit for residential uses (rather than the strictly commercial limit, which is higher); the residential noise limit is 50 dBA L_{EQ} during the daytime hours of 7:00 a.m. to 10:00 p.m., and 45 dBA L_{EQ} during the nighttime hours of 10:00 p.m. to 7:00 a.m.

County of San Diego Noise Element of the General Plan and Guidelines for Determining Significance for Land Use and Transportation Noise Planning

The City also does not identify specific transportation noise thresholds; however, the City commonly utilizes the County of San Diego's planning guidelines for projects within the City. Applicable information for San Diego County's guidelines is provided below.

Noise impacts would be considered significant if Project implementation would result in the exposure of any on- or off-site, existing or reasonably foreseeable future Noise Sensitive Land Uses (NSLUs) to exterior or interior noise (including noise generated from the Project, together with noise from roads, railroads, airports, heliports, and all other noise sources) in excess of any of the following:

A. Exterior Locations:

i. 60 (CNEL) Single-Family; or 65 CNEL Multi-Family or Mixed Use; or

ii. A significant cumulative impact would occur if the project would contribute to a cumulative scenario that would result in the exposure of any on- or off-site, existing or reasonably foreseeable NSLU, to: (1) an increase of 10 CNEL over pre-existing noise levels of less than 50 CNEL resulting in a combined exterior noise level of 60 CNEL or greater, (2) an increase of 3 CNEL in existing plus project plus cumulative conditions if that total is above 60 CNEL, or (3) interior noise in excess of 45 CNEL. A "cumulatively considerable" project contribution to an identified significant cumulative noise impact would occur if the project would contribute more than a one dB increase.

In the case of single-family residential detached NSLUs, exterior noise shall be measured at an outdoor living area which adjoins and is on the same lot as the dwelling, and which contains at least the following minimum area:

(1) Net lot area up to 4,000 SF: 400 SF
(2) Net lot area 4,000 SF to 10 acres: 10 percent of net lot area
(3) Net lot area over 10 acres: 1 acre

For all other projects, exterior noise shall be measured at all exterior areas provided for group or private usable open space.

B. Interior Locations:

45 dB (CNEL) except for the following cases:

i. Rooms which are usually occupied only a part of the day (schools, libraries, or similar facilities), the interior one-hour average sound level due to noise outside should not exceed 50 dBA.

ii. Corridors, hallways, stairwells, closets, bathrooms, or any room with a volume less than 490 cubic feet.

San Diego County Guidelines for Determining the Significance of Ground-borne Vibration

Impacts associated with ground-borne vibration and noise would be significant if Project implementation would expose the uses listed in Table 4-1 of the County Guidelines (Table 1-3 in this report), Guidelines for Determining the Significance of Ground-borne Vibration and Noise Impacts, and Table 4-2 of the County Guidelines (Table 1-4 in this report), Guidelines for Determining the Significance of Ground-borne Vibration and Noise Impacts for Special Buildings, to ground-borne vibration or noise levels equal to or in excess of the levels shown below:

Table 1-3
(Table 4-1 of the San Diego County Guidelines For Determining Significance)
GUIDELINES FOR DETERMINING THE SIGNIFICANCE OF GROUND-BORNE VIBRATION AND NOISE IMPACTS

Land Use Category	Ground-borne Vibration Impact Levels (inches/sec rms)		Ground-borne Noise Impact Levels (dB re 20 micro Pascals)	
	Frequent Events[1]	Infrequent Events[2]	Frequent Events[1]	Infrequent Events[2]
Category 1: Buildings where low ambient vibration is essential for interior operations. (research and manufacturing facilities with special vibration constraints)	0.0018[3]	0.0018[3]	Not applicable[5]	Not applicable[5]
Category 2: Residences and buildings where people normally sleep. (hotels, hospitals, residences, and other sleeping facilities)[6]	0.0040	0.010	35 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use. (schools, churches, libraries, other institutions, and quiet offices)[6]	0.0056	0.014	40 dBA	48 dBA

Source: U.S. Department of Transportation, Federal Transit Administration, "Transit Noise and Vibration Impact Assessment," May 2006.

[1] "Frequent Events" is defined as more than 70 vibration events per day. Most rapid transit projects fall into this category.

[2] "Infrequent Events" is defined as fewer than 70 vibration events per day. This category includes most commuter rail systems.

[3] This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration sensitive manufacturing or research will require detailed evaluation to define acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.

[4] Vibration-sensitive equipment is not sensitive to ground-borne noise.

[5] There are some buildings, such as concert halls, TV and recording studios, and theaters that can be very sensitive to vibration and noise but do not fit into any of the three categories. Table 1-4 gives criteria for acceptable levels of ground-borne vibration and noise for these various types of special uses.

[6] For Categories 2 and 3 with occupied facilities, isolated events are significant when the PPV exceeds one inch per second. Continuous or frequent intermittent vibration sources such as impact pile drivers are significant when their PPV exceeds 0.1 inch per second. More specific criteria for structures and potential annoyance were developed by Caltrans (2004) and will be used to evaluate these continuous or transient sources in San Diego County.

Table 1-4 (Table 4-2 of the San Diego County Guidelines For Determining Significance) GUIDELINES FOR DETERMINING THE SIGNIFICANCE OF GROUND-BORNE VIBRATION AND NOISE IMPACTS FOR SPECIAL BUILDINGS				
Type of Building or Room	**Ground-borne Vibration Impact Levels (inches/sec rms)**		**Ground-borne Noise Impact Levels (dB re 20 micro Pascals)**	
	Frequent Events[1]	**Infrequent Events[2]**	**Frequent Events[1]**	**Infrequent Events[2]**
Concert Halls, TV Studios and Recording Studios	0.0018	0.0018	25 dBA	25 dBA
Auditoriums	0.0040	0.010	30 dBA	38 dBA
Theaters	0.0040	0.010	35 dBA	43 dBA

Source: U.S. Department of Transportation, Federal Transit Administration, "Transit Noise and Vibration Impact Assessment," May 2006.

[1] "Frequent Events" is defined as more than 70 vibration events per day. Most rapid transit projects fall into this category.

[2] "Occasional or Infrequent Events" are defined as fewer than 70 vibration events per day. This combined category includes most commuter rail systems.

Notes:

- If the building will rarely be occupied when the trains are operating, there is no need to consider impact.
- For historic buildings and ruins, the allowable upper limit for continuous vibration to structures is identified to be 0.056 inches/second root mean square (rms). Transient conditions (single-event) would be limited to approximately twice the continuous acceptable value.

2.0 ENVIRONMENTAL SETTING

2.1 SURROUNDING LAND USES

The Project site is surrounded by various land use types; residential uses are located to the east of the Project site, as well as to the north and south of the panhandle of the proposed site (fronting 7th Street) that extends towards 7th Street. Additional residential uses are located to the west (across Highway 75) of the proposed site, and an outdoor mall and RV park are located to the south. Commercial structures to the south are not considered as sensitive receptors (refer to Figure 2).

The parcels located across the street to the west are zoned single family residential (R-1-6000). The parcels located to the south of the Project site (both abutting the southern portion of the site, and located across the street and to the south) are zoned for general commercial and mixed use (C/MU-1). The parcels abutting the Project site to the east, as well as to the north and south of the panhandle of the proposed site (fronting 7th Street) that extends towards 7th Street, are zoned for medium density residential (R-3000-D).

2.2 SURROUNDING ROADWAY DESCRIPTIONS

The Project site is bounded by Highway 75 on the southwest; Rainbow Drive intersects Highway 75 immediately in front of the Project site, and would function as the entrance to the development. Highway 75 (also called Palm Avenue along some portions) is currently a four-lane highway with a speed limit of 40 miles per hour (mph). Along the eastern portion of Palm Avenue, before it turns into Highway 75 (east of Delaware Street), the speed limit is 35 mph. Rainbow Drive is a two-lane road with a speed limit of 30 mph. Information about the surrounding roadways is taken from the Project Traffic Impact Analysis (Linscott, Law & Greenspan, Engineers [LLG] 2014).

2.3 PROXIMITY TO AIRPORTS

The Proposed Project site is located outside of the 65 CNEL noise contour for all airports. The nearest airport to the Proposed Project site is the NOLF, which is located approximately one mile south of the Project site. An AICUZ was completed in 2011, and the Project site is located outside of the noise contours provided for that facility; as such, noise from aircraft operations at NOLF is not considered in this noise assessment.

2.4 EXISTING NOISE ENVIRONMENT

The dominant noise source in the vicinity of the Project site is associated with vehicular traffic on Highway 75.

2.5 FUTURE NOISE ENVIRONMENT

Although the area surrounding the Project site is developed, there is the potential for redevelopment to increase the density of land uses in the surrounding blocks (just as the Proposed Project increases development density). It is reasonable to assume that the area would experience some minor increases in future noise levels due to increased roadway traffic; a traffic study was conducted for this Project (LLG 2014) to analyze potential future traffic impacts in the area surrounding the Project site. The traffic data in that report were used to estimate future noise levels in the Project vicinity.

3.0 STUDY METHODS, EQUIPMENT AND PROCEDURES

This section discusses the methods and procedures followed for the noise study, including the selection of noise measurement and receiver locations, noise measurement procedures, and noise impact evaluation.

3.1 METHODOLOGY

A "one-hour" equivalent sound level measurement (L_{EQ}, A-Weighted) was recorded near the Project site (as shown on Figure 4, *Noise Measurement and Receiver Modeling Locations with Traffic Noise Contours*). During the on-site noise measurement, start and end times were

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Noise Measurement and Receiver Modeling Locations with Traffic Noise Contours

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Figure 4

recorded, vehicle counts were made for cars, medium trucks (double-tires/two axles), and heavy trucks (three or more axles) for the corresponding road segment(s).

For measurements of less than one hour in duration, the measurement time must be long enough for a representative traffic volume to occur and the noise level (L_{EQ}) to stabilize; 15 minutes is usually sufficient for this purpose. The vehicle counts are then converted to one-hour equivalent volumes by applying an appropriate factor. Other field data gathered included measuring or estimating distances, angles-of-view, slopes, elevations, roadway grades, and vehicle speeds. This information was subsequently verified using available maps and records.

3.2 EQUIPMENT

The following equipment was used to measure existing noise levels at the Project site:

- Larson Davis System LxT Integrating Sound Level Meter
- Larson Davis Model CA250 Calibrator
- Windscreen and tripod for the sound level meter
- Digital camera

The sound level meter was field-calibrated immediately prior to the noise measurements to ensure accuracy. All sound level measurements conducted and presented in this report were made with a sound level meter that conforms to the American National Standards Institute (ANSI) specifications for sound level meters (ANSI SI.4-1983 R2001). All instruments were maintained with National Bureau of Standards traceable calibration per the manufacturers' standards.

3.3 NOISE MODELING SOFTWARE

Modeling of the outdoor noise environment for this report was accomplished using two computer noise models: Computer Aided Noise Abatement version 3.6 (CADNA) and Traffic Noise Model (TNM) version 2.5. CADNA is a model-based computer program developed by DataKustik for predicting noise impacts in a wide variety of conditions. CADNA assists in the calculation, presentation, assessment, and mitigation of noise exposure. It allows for the input of project information, such as noise source data, barriers, structures, and topography to create a detailed CADNA model, and uses the most up-to-date calculation standards to predict outdoor noise impacts. CADNA traffic noise prediction is based on the data and methodology used in TNM. The TNM was released in February 2004 by the U.S. Department of Transportation. TNM calculates the daytime average Hourly Noise Level (HNL) from 3-dimensional model inputs and traffic data. The TNM used in this analysis was developed from Computer Aided Design (CAD) plans provided by the Project applicant. Input variables included road alignment, elevation, lane configuration, area topography, existing and planned noise control features, projected traffic volumes, estimated truck composition percentages, and vehicle speeds.

The one-hour L_{EQ} noise level is calculated utilizing peak-hour traffic; peak-hour traffic volumes can be estimated based on the assumption that 8 to 10 percent of the average daily traffic would

occur during a peak hour. The model-calculated one-hour L_{EQ} noise output is the equivalent to the CNEL.

3.4 SUMMARY OF SITE-SPECIFIC FEATURES INCLUDED IN CADNA MODEL

The CADNA model includes the existing site topography, existing nearby buildings, and planned on-site structures. The model takes into consideration the fact that some of the structures provide noise shielding to other areas of the Project site.

4.0 EXISTING NOISE ENVIRONMENT

As described in Section 2.0 of this report, the dominant noise source at the Project site is the vehicular traffic on Highway 75. An on-site inspection and traffic noise measurement were completed on the morning of April 2, 2013; a "one-hour" equivalent measurement was made. The measurement was taken across the street from the Project site, southwest of the Highway 75 and Rainbow Street intersection, on Highway 75. The microphone was placed on a tripod at approximately five feet above the existing ground level. The measurement location is shown on Figure 4.

4.1 SITE NOISE MEASUREMENTS AND COMPARISON CALCULATIONS

The traffic volumes on Highway 75 were recorded for automobiles, medium-size trucks, and heavy trucks during the measurement period. After a continuous 15-minute sound level measurement, minimal changes in the L_{EQ} were detectable and results were recorded. The measured noise level and related weather conditions are shown in Table 4-1. The traffic counts for the 15-minute measurements and the one-hour equivalent volumes are shown in Table 4-2.

Table 4-1
ON-SITE NOISE MEASUREMENT CONDITIONS AND RESULTS

Date	April 2, 2013
Time	10:45 a.m. – 11:00 a.m.
Conditions	Partly cloudy skies, winds WNW at 11 mph, temperature in the low 60s with normal humidity
Measured Noise Level	61.8 dBA L_{EQ}

Table 4-2 TRAFFIC COUNTS				
Roadway	**Traffic**	**Autos**	**MT[1]**	**HT[2]**
Highway 75/Palm Avenue	15-minute Count	200	5	1
	One-hour Equivalent	800	20	4

[1] Medium Trucks (double-tires/two axles)
[2] Heavy Trucks (three or more axles)

4.2 CALCULATED NOISE LEVEL

The calculated noise level for the measurement location, as well as the difference between the calculated and measured noise level, is shown in Table 4-3. A difference of less than 2 dB is considered sufficiently accurate and does not require an adjustment to the noise model. As shown in Table 4-3, the difference for the measured location is less than two dB; therefore, no correction factors were applied to the noise model, and the model is considered accurate to use for impact analysis.

Table 4-3 CALCULATED VERSUS MEASURED TRAFFIC NOISE LEVELS (dBA L_{EQ})				
Receiver Position	**Calculated**	**Measured**	**Difference**	**Correction Factor**
Highway 75/Palm Avenue	62.4	61.8	0.6	0.0

5.0 IMPACTS

5.1 SIGNIFICANCE THRESHOLDS

5.1.1 Construction Noise

Chapter 9.32.020 of the City of Imperial Beach Municipal Code addresses limitations on construction noise. The code states that the "use of any tools, power machinery or equipment so as to cause noises disturbing to the comfort and repose of any person residing or working in the vicinity, or in excess of 75 decibels, between the hours of 10:00 p.m. and 7:00 a.m., except when the same is necessary for emergency repairs" is prohibited. The code does not include daytime noise limits on construction activities, but the City has commonly utilized the County's Noise Ordinance limit of 75 dBA during the daytime hours of 7:00 a.m. to 7:00 p.m. for other projects.

5.1.2 Construction Vibration

Ground-borne vibration from a vibratory roller would occur only for a few passes during the construction process and would be considered significant if it exceeds the severe criteria, as set by Caltrans (Caltrans 2004), for residences of 0.4 inches/sec PPV.

5.1.3 Operational Noise

5.1.3.1 *Stationary Source Noise*

The City does not identify specific property line noise standards for stationary noise sources; however, the City commonly utilizes the County's Noise Ordinance limits for projects within the City. Thus, the maximum operational exterior noise limit for residential uses is 50 dBA L_{EQ} during the daytime hours of 7:00 a.m. to 10:00 p.m., and 45 dBA L_{EQ} during the nighttime hours of 10:00 p.m. to 7:00 a.m.

5.1.3.2 *Transportation Noise*

The City also does not identify specific transportation noise thresholds; however, the City commonly utilizes the County's Noise Ordinance limits for projects within the City. Thus, traffic noise impacts may be significant if the Project would expose housing (off or on site) to exterior traffic noise levels that exceed 60 dBA CNEL at exterior usable areas and interior traffic noise levels that exceed 45 dBA CNEL at habitable areas. Planning assumes a minimum 15 CNEL reduction from outside to inside a structure, so residential interior noise levels are assumed to be compatible with an exterior noise up to 60 CNEL.

A significant cumulative impact would occur if the Project would contribute to a cumulative scenario that would result in the exposure of any on- or off-site, existing or reasonably foreseeable NSLU, to:

(1) an increase of 10 CNEL over pre-existing noise levels of less than 50 CNEL, resulting in a combined exterior noise level of 60 CNEL or greater;

(2) an increase of 3 CNEL in existing plus project plus cumulative conditions, if that total is above 60 CNEL; or

(3) an interior noise in excess of 45 CNEL.

A "cumulatively considerable" project contribution to an identified significant cumulative noise impact would occur if the Project would contribute more than a one dB increase.[1]

5.2 CONSTRUCTION NOISE IMPACTS

5.2.1 Construction Noise Analysis Assumptions

Project construction would entail the use of equipment throughout the site for the full term of construction. Construction activities would be roughly divided into six phases. These phases may contain some overlap depending upon location and timing. The phases would include the following:

[1] County of San Diego Report Format and Content Requirements – Noise, dated 2009

1. Demolition
2. Grading
3. Foundation excavation
4. Utilities excavation
5. Foundation pour
6. Building construction

Most construction equipment does not operate at full power (maximum noise) for a full hour. The Federal Highway Administration (FHWA) guidelines analyze most equipment at an assumed 40-percent hourly operating time.

5.2.2 Construction Noise Impacts

Demolition/removal activities are often the loudest noise that occurs during a construction of a project. Project-related demolition/removal activities would involve one-story lightweight construction buildings and concrete RV pads that are easily demolished and removed with a loader and dump trucks. This would not be a significant source of noise.

Other potential noise impacts to off-site uses could occur during site preparation when a small excavator or backhoe and a loader would be utilized for Project foundation digging and utility installation.

The FHWA Roadway Construction Noise Model (RCNM) Version 1.0 (February 2, 2006) lists the noise level of an excavator as 85 dBA at 50 feet. Excavation would occur throughout much of the site. The closest residential use to the Project site is located less than 10 feet from the Project site. The area of greatest concern is the panhandle located on the eastern portion of the proposed site that extends towards 7th Street. There are four proposed detached residences in this area, and a backhoe (or potentially, a small excavator) would need to be used at this location for foundation-related digging. However, it is important to note that a 6-foot or higher concrete masonry unit (CMU) wall currently exists on the property line between the proposed development and the existing residential units. This wall would remain in place during both construction and operation of the Proposed Project and would effectively provide noise attenuation that would greatly reduce potential construction impacts.

A backhoe operating at 15 feet from the residential property line with an assumed 5 dBA of noise reduction from the existing wall would have a 79 dBA L_{EQ} (hourly) impact. Assuming less than 2 hours in a single location, this would be reduced to 73 dBA L_{EQ} (eight-hour).

This noise level would be below the County's construction noise ordinance limits for residentially zoned property (75 dBA for an eight-hour average time period) which the City has generally followed and, thus, no significant impacts would occur.

5.2.3 Vibration Impacts

The Project is not expected to utilize any pile driving or heavy earthmoving equipment, such as a large dozer or scrapper. The most likely source of vibration during Project construction would be from a vibratory roller, which may be used to achieve soil compaction as part of the foundation construction (and possibly for on-site driveways at a later time).

A vibratory roller creates approximately 0.210 inches/sec rms at 25 feet. Therefore, the construction vibration impacts are not considered significant.

5.3 OPERATIONAL NOISE IMPACTS

It should be noted that the noise analysis is based on the results of the Project traffic study, which used a total count of 194 residential DUs. The unit count for the Project has since been reduced from 194 DU to 193 DU. The traffic study therefore represents a slightly conservative analysis. The minor reduction in the number of units has little to no effect on the Project trip generation and therefore would not affect the traffic noise analysis.

5.3.1 Stationary Source Impacts

5.3.1.1 *Off-site Noise Impacts from On-site Resources*

The only noteworthy stationary noise source associated with the Proposed Project, with the potential for noise impacts, would be the heating, ventilation, and air conditioning (HVAC) equipment.

The HVAC systems would likely be ground-mounted (worst case for noise impact). Specific planning data (i.e., equipment details and locations) for the proposed HVAC systems is not available at this time. However, to estimate operational impacts from HVAC systems of the Project, the noise from a typical large residential exterior split systems condenser (*Carrier* 38HDR060), located in the area with the greatest potential for operational noise impacts to surrounding residences, was used for the analysis. The Carrier exterior condenser unit noise data, supplied by the manufacturer, is shown below in Table 5-1. The potentially sensitive area that was analyzed is the eastern panhandle of the proposed site, where the new units would be located less than 10 feet away from existing residential buildings. It is important to note that a six-foot or higher CMU wall currently exists between the Project property line, where the four detached units are proposed on the "panhandle" adjacent to 7th Street, and the existing off-site residential units to the north. The operational noise analysis related to HVAC system noise assumed the aforementioned wall would remain in place during operation of the Proposed Project. This existing wall would provide noise attenuation that would greatly reduce potential operational noise impacts related to HVAC units.

Table 5-1 HVAC EQUIPMENT NOISE LEVELS							
Noise Levels in Decibels (Db)[1] Measured at Octave Frequencies in Hertz (Hz)							Overall Noise Level in A-Weighted Scale (dBA)
125 Hz	250 Hz	500 Hz	1,000 Hz	2,000 Hz	4,000 Hz	8,000 Hz	
63.0	61.5	64.0	66.5	66.0	64.5	55.5	72.0

[1] Sound Power Levels (S_{WL}).

The calculated noise impacts from the proposed HVAC systems to the closest off-site exterior buildings were estimated to be 41.8 dBA when the adjacent on-site units were all running continuously. This is less than the more stringent nighttime significance threshold of 45 dBA for residential uses. Therefore, stationary source noise impacts from HVAC systems to off-site residential receptors would be less than significant.

5.3.1.2 *On-site Vibration Impacts to Off-site Uses*

The only potential on-site to off-site vibration impact sources are the proposed on-site HVAC systems, pool equipment (located near the center of the Project site), and on-site traffic. Given the small size and low horsepower associated with the proposed on-site equipment (related to HVAC systems and the pool), the ability of the equipment to introduce vibration energy into the ground would be limited; subsequently, none of these sources has the potential to create human-perceptible vibration beyond their immediate footprint (or the site boundary). Therefore, vibration impacts to off-site receptors would be less than significant.

5.3.1.3 *On-site Noise Impacts from On-site Sources*

As the Proposed Project is an exclusively residential development, the only sources of potential on-site noise (excluding nuisance sources such as loud music) from one on-site residence to another on-site residence are the previously discussed HVAC systems. Typical HVAC-related exterior noise impacts from one residence to an adjacent residence on the Project site would be approximately 44.5 dBA. Therefore, stationary source noise impacts from on-site residences to other on-site residential receptors would be less than significant.

5.3.1.4 *Off-site Vibration Impacts to On-site Uses*

The only observed off-site to on-site vibration impacts are the off-site HVAC systems and off-site traffic. Neither source has the potential to create perceptible vibration on the Project site. Therefore, vibration impacts to on-site receptors would be less than significant.

5.3.2 <u>Transportation Noise Impacts</u>

Table 5-2 provides information about traffic volumes on street segments surrounding the Project site for various scenarios. Tables 5-3 and 5-4 provide traffic volumes, including traffic composition utilized for the traffic noise modeling for this study, for the modeled scenarios

(LLG 2014). Potential impacts from traffic noise to surrounding street segments are analyzed in Section 5.3.2.1.

Table 5-2
OFF-SITE TRAFFIC VOLUMES

Roadway Segment	Existing ADT	Project ADT	Existing + Project ADT	Year 2040 ADT	Year 2040 Project ADT	Year 2040 with Project ADT
Highway 75						
North of Rainbow/Project Driveway	16,300	266	16,566	31,339	291	31,630
Rainbow Drive/Project Driveway to 7th Street	16,600	692	17,292	25,562	757	26,319
7th Street to Delaware Street	19,700	585	20,285	33,367	640	34,007
Delaware Street to 9th Street	22,000	585	22,585	41,136	640	41,776
9th Street to Florida Street	32,500	479	32,979	46,443	524	46,967
Rainbow Drive						
Highway 75 to Palm Avenue	4,690	106	4,796	5,376	116	5,492
Palm Avenue						
Rainbow Drive to 7th Street	11,600	21	11,621	14,912	23	14,935

Note: ADT = average daily trips

Table 5-3
OFF-SITE TRAFFIC COMPOSITION

Roadway Segment	Existing Conditions					Existing + Project Conditions				
	ADT	Peak Hour ADT	Cars (97.0%)	MT (2.5%)	HT (0.5%)	ADT	Peak Hour ADT	Cars (97.0%)	MT (2.5%)	HT (0.5%)
Highway 75										
North of Rainbow Drive	**16,300**	1,630	1,581	41	8	**16,566**	1,657	1,607	41	8
Rainbow to 7th Street	**16,600**	1,660	1,610	42	8	**17,292**	1,729	1,677	43	9
7th Street to Delaware Street	**19,700**	1,970	1,911	49	10	**20,285**	2,029	1,968	51	10
Delaware Street to 9th Street	**22,000**	2,200	2,134	55	11	**22,585**	2,259	2,191	56	11
East of 9th Street	**32,500**	3,250	3,153	81	16	**32,979**	3,298	3,199	82	16
Rainbow Drive										
Palm Avenue to Highway 75	**4,690**	469	455	12	2	**4,796**	480	465	12	2
Palm Avenue										
Rainbow Drive to 7th Street	**11,600**	1,160	1,125	29	6	**11,621**	1,162	1,127	29	6

Note: ADT = average daily trips; MT = medium trucks; HT = heavy trucks

Table 5-3
OFF-SITE TRAFFIC COMPOSITION (cont.)

Roadway Segment	Year 2040 Conditions					Year 2040 with Project Conditions				
	ADT	Peak Hour ADT	Cars (97.0%)	MT (2.5%)	HT (0.5%)	ADT	Peak Hour ADT	Cars (97.0%)	MT (2.5%)	HT (0.5%)
Highway 75										
North of Rainbow Drive	**31,339**	3,134	3,040	78	16	**31,630**	3,163	3,068	79	16
Rainbow to 7th Street	**25,562**	2,556	2,480	64	13	**26,319**	2,632	2,553	66	13
7th Street to Delaware Street	**33,367**	3,337	3,237	83	17	**34,007**	3,401	3,299	85	17
Delaware Street to 9th Street	**41,136**	4,114	3,990	103	21	**41,776**	4,178	4,052	104	21
East of 9th Street	**46,443**	4,644	4,505	116	23	**46,967**	4,697	4,556	117	23
Rainbow Drive										
Palm Avenue to Highway 75	**5,376**	538	521	13	3	**5,492**	549	533	14	3
Palm Avenue										
Rainbow Drive to 7th Street	**14,912**	1,491	1,446	37	7	14,935	1,494	1,449	37	7

Note: ADT = average daily trips; MT = medium trucks; HT = heavy trucks

5.3.2.1 *Off-site Transportation Noise Impacts*

Off-site impacts were modeled for traffic noise in the Existing Conditions and Existing plus Project conditions, as shown in Table 5-4.

Table 5-4
EXISTING PLUS PROJECT TRAFFIC NOISE LEVELS

Roadway Segment	Receptor Distance* (feet)	Existing (CNEL)	Existing + Project (CNEL)	Change Due to Project (dBA)
Highway 75 to the north of Rainbow Drive	75	66.1	66.1	0.0
Highway 75 from Rainbow Drive to 7th Street	75	66.2	66.3	0.1
Rainbow Drive from Palm Avenue to Highway 75	40	60.5	60.5	0.0
Palm Avenue from Rainbow Drive to 7th Street	50	65.1	65.2	0.1

* Roadway segments with no adjacent noise-sensitive receptors (residences) were not considered.

Off-site impacts were also modeled for traffic noise in the Year 2040 without Project Conditions and the Year 2040 with Project conditions, as shown in Table 5-5.

Table 5-5
FUTURE (2040) PLUS PROJECT TRAFFIC NOISE LEVELS

Roadway Segment	Receptor Distance* (feet)	Year 2040 (CNEL)	Year 2040 (CNEL) + Project	Change Due to Project (dBA)
Highway 75 to the north of Rainbow Drive	75	69.0	69.0	0.0
Highway 75 from Rainbow Drive to 7th Street	75	68.0	68.2	0.2
Rainbow Drive from Palm Avenue to Highway 75	40	61.2	61.3	0.1
Palm Avenue from Rainbow Drive to 7th Street	50	67.3	67.3	0.0

* Roadway segments with no adjacent noise-sensitive receptors (residences) were not considered.

In order for a significant impact to be identified, a three dBA traffic noise increase must occur at off-site receptors as a result of a project. A project would have to double the amount of daily traffic on a roadway while maintaining full speed. Project operation would not double the amount of traffic on any roadway. The maximum change in noise levels at off-site receivers between Existing and Existing plus Project conditions is approximately 0.1 CNEL. The

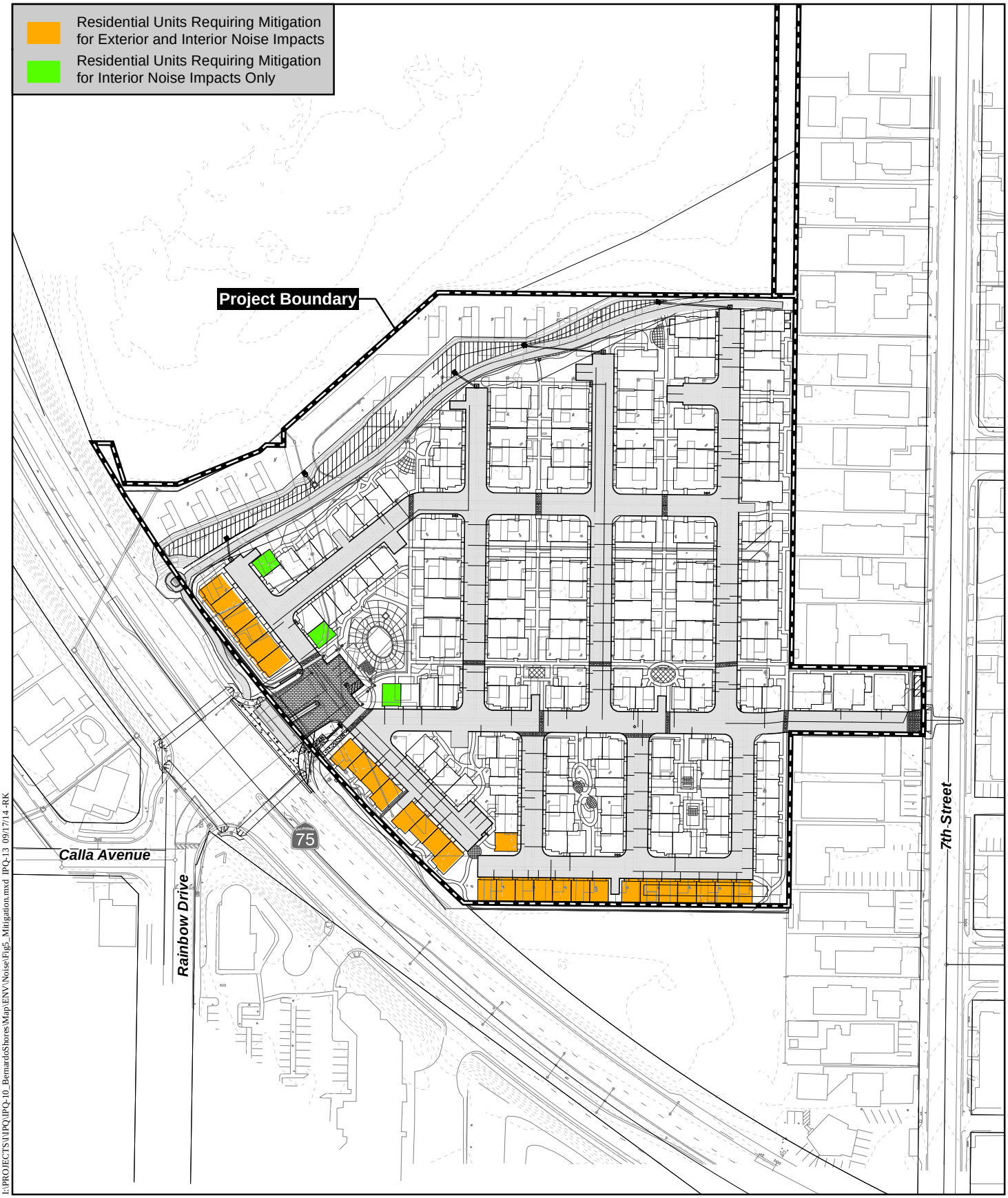
maximum change in noise levels at off-site receivers between Year 2040 without Project and Year 2040 with Project conditions is approximately 0.2 CNEL. Both of these changes are well below the three dBA change needed to cause significance noise impacts, and thus would not result in an audible difference. Therefore, Project off-site traffic noise impacts would be less than significant.

5.3.2.2 *On-site Transportation Noise Compatibility from Off-site Sources*

As previously indicated, noise generated in the Project vicinity is primarily from vehicular traffic noise; other off-site noise sources have a negligible contribution to ambient noise levels. There is a potential for the proposed residential uses to have land use-noise compatibility issues due to traffic noise along Highway 75.

To determine the land use compatibility impacts of traffic noise to the proposed units, a series of noise modeling receivers were identified on the Project site plan. The noise receiver modeling locations were placed along the edge of the proposed residential buildings with a direct line of sight to Highway 75.

The modeled receiver points, R-1 through R-17, are shown on Figure 4. Table 5-6 (below) shows the calculated future traffic noise levels at the proposed pool and residential building façades (and potential balconies) at second-story levels (the first-story level of the buildings would have similar noise exposure; however, no exterior use areas such as balconies or private yards are proposed at a first story level). Any receivers located on floors above the second-story receivers would have comparable or lower noise levels than the modeled second-story receivers. The receiver locations, as well as the noise contours associated with the traffic near the Project site, are shown on Figure 4. All modeled balcony receivers located with a line of sight view of Highway 75 would experience noise levels in excess of 60 CNEL. According to the County's Noise Ordinance, required outdoor use space associated with the Project must not have noise levels exceeding 60 CNEL. If these balconies are included as part of the required exterior use space for the Proposed Project, noise impacts at these locations would need to be mitigated in order to reduce noise levels to below thresholds. Figure 5, *Residential Units Requiring Mitigation (Year 2040 Noise Levels)*, illustrates which of the proposed residences may experience noise levels in excess of thresholds at likely balcony locations.



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Residential Units Requiring Mitigation (Year 2040 Noise Levels)

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Figure 5

Table 5-6 2040 TRAFFIC NOISE LEVELS AT ON-SITE BALCONIES	
Receiver	**CNEL**
R1	68.5
R2	68.3
R3	68.1
R4	67.9
R5	67.7
R6	66.7
R7	65.4
R8	64.8
R9	63
R10	62.3
R11	61.4
R12 (second row) [1,2]	61.1
R13 (second row) [1]	58.8
R14 (second row)[1,2]	61.5
R15 (second row)[1,2]	61
R16 (second row) [1]	60.1
R17 (Pool 1)	59.2

[1] These residences are not located along the perimeter of the site; they are located one row behind the houses along the perimeter.
[2] Balcony is not assumed to have a line of sight view to Highway 75 based on current site plan.

Note that for three of the modeled second row receivers (R12, R14 and R15), it was not clear on which side of the property a potential balcony would be located. Based on current site plans and the orientation of these residences on the proposed Project lots, it appears that a direct line of sight from the balconies associated with R12, R14 and R15 would not exist; if the balconies associated with the second row houses do not have a clear line of sight to this roadway, exterior noise levels would not be in excess of thresholds. It is therefore assumed that these three residences will not require balcony mitigation. Interior noise levels for these residences, however, may still be in excess of thresholds for these residences, as described in Section 5.3.2.2 below.

Exterior noise impacts to balconies associated with R1 through R11, R13 and R16 are assessed as potentially significant.

The pool area (R17), which experiences some shielding from the associated facilities building located to the west of the pool, was modeled to have noise levels below the 60 CNEL threshold; exterior noise impacts to this outdoor use space would be less than significant.

5.3.2.3 *On-site Transportation Noise Compatibility*

Exterior-to-interior analysis assumes a minimum 15 CNEL reduction from the outside to the inside of a structure, assuming standard building construction methods. Therefore, interior noise levels (which are required to be less than 45 CNEL) for residential are assumed to be compatible with an exterior noise level up to 60 CNEL.

As shown above in Table 5-6, all modeled residential receivers with a direct view of Highway 75 would be located in areas exposed to an exterior noise level greater than 60 CNEL. Thus, residences along the western and southern perimeter of the site, near Highway 75, may not be compatible with the future traffic noise levels without the implementation of noise reduction measures. Project implementation would result in a potentially significant impact to land use-noise compatibility related to interior noise levels as a result of traffic-related noise. Refer to Figure 5 to see the proposed residences that would require mitigation for interior noise levels. It is important to note that the same residential units that require balcony mitigation would also require mitigation for interior noise levels; however, depending upon the location of the specific residential balcony in relation to Highway 75, not every residence that requires mitigation for interior noise levels would require balcony mitigation.

The pool area and associated outdoor use space was modeled to have a noise level of 59.2 CNEL, taking into consideration natural shielding offered by the proposed residential buildings and the pool facilities building (see Table 5-6 above). This does not exceed the maximum threshold of 60 CNEL, and therefore no mitigation would be required for this outdoor use space.

5.4 IMPACT SUMMARY

The following is a summary of Project noise impacts:

5.4.1 <u>Less Than Significant Impacts</u>

The following impacts would be less than significant, and are therefore not further discussed in this report:

1. Construction noise at the surrounding property lines is anticipated to be in compliance with the County Noise Ordinance (construction) requirements, and impacts would be less than significant.

2. Construction vibration impacts at the surrounding property lines are expected to be less than significant.

3. The Project's stationary noise impacts to off-site properties would be in compliance with the County Noise Ordinance, and impacts would be less than significant.

4. The Project's contribution to off-site transportation noise impacts would be less than significant.

5. The Project's vibration impacts to off-site properties would be less than significant

6. Impacts from off-site vibration sources to on-site uses would be less than significant.

5.4.2 Potential Significant Impacts

The following impacts would be potentially significant. Noise attenuation measures are discussed in Chapter 6, below.

1. On-site noise from off-site traffic would exceed the 60 CNEL exterior use noise levels (for some residential balconies) allowed under the County Noise Ordinance for residential developments.

2. On-site noise from off-site traffic would exceed 60 CNEL at residential façades (for some residential units), which could result in residential interior noise levels greater than 45 CNEL.

6.0 MITIGATION

6.1 EXTERIOR USE AREAS

Balconies associated with units noted in Figure 5 which are counted as part of the required exterior use area shall be constructed with a 5.5-foot or higher noise barrier to attenuate exterior noise levels to below 60 CNEL.

As illustrated in Table 6-1, barriers of 5.5 feet in height would attenuate noise at all second- (as well as third- and fourth-) story residential exterior use areas to equal to or less than 60 CNEL.

Table 6-1
BUILDOUT (YEAR 2040) NOISE CONDITIONS WITH 5.5 FEET NOISE BARRIERS AT ON-SITE BALCONIES

Receiver	CNEL
R1	55.8
R2	57.5
R3	57.2
R4	57.0
R5	56.8
R6	55
R7	59.6
R8	59
R9	57.8
R10	57.2

Table 6-1 (cont.) BUILDOUT (YEAR 2040) NOISE CONDITIONS WITH 5.5 FEET NOISE BARRIERS AT ON-SITE BALCONIES	
Receiver	**CNEL**
R11	56.2
R13 (second row)	58.8
R16 (second row)	55.2

[1] Balcony is not assumed to have a line of sight view to Highway 75 based on current site plan.

Note: R12, R14, R15 and R17 do not require noise walls.

The following specifications shall be included on the building plans for the impacted balconies, and incorporated into the building design prior to issuance of the building permit:

> Sound attenuation barriers should be a single, solid sound wall and should have a height based on the finished grade of the noise source. The sound attenuation barrier should be solid and constructed of masonry, wood, plastic, fiberglass, steel, or a combination of those materials, with no cracks or gaps through or below the wall. Any seams or cracks must be filled or caulked. If wood is used, it can be tongue and groove and must be at least one-inch thick or have a surface density of at least 3.5 pounds per SF. Where architectural or aesthetic factors allow, glass or clear plastic may be used on the upper portion, if it is desirable to preserve a view. Sheet metal of 18-gauge (minimum) may be used, if it meets the other criteria and is properly supported and stiffened so that it does not rattle or create noise itself from vibration or wind. Any doors or gates must be designed with overlapping closures on the bottom and sides and meet the minimum specifications of the wall materials described above. Any gate(s) must be of 0.75-inch or thicker wood, solid-sheet metal of at least 18-gauge metal, or an exterior-grade solid-core steel door with prefabricated door jambs.

6.2 Interior Habitable Areas

To mitigate the significant land use-noise compatibility impact for all residential receivers with a direct view of Highway 75 (residences along the western and southern perimeter of the site) exposed to an exterior noise level greater than 60 CNEL and to ensure residential interior noise levels would be below 45 CNEL, an interior noise analysis of proposed residences shall be completed; the results of this analysis would help determine appropriate measures that shall be incorporated into building design prior to building permit issuance. These land use-noise compatibility measures shall include:

> Where exterior residential noise levels are expected to exceed 60 CNEL, additional noise analysis per the San Diego County standards should be conducted. The information in the noise analysis shall include wall heights and lengths, room volumes, window and door tables typical for a building plan, as well as information on any other openings in the building shell. With this specific

building plan information, the analysis shall determine the predicted interior noise levels at the planned on-site buildings. If predicted noise levels are found to be in excess of 45 CNEL for residential buildings, the report shall identify architectural materials or techniques which could be included to reduce noise levels to 45 CNEL. Glazing with Sound Transmission Control (STC) ratings from a STC 22 to STC 60 should be considered. In addition, walls with appropriate STC ratings (34 to 60) should be considered.

Appropriate means of air circulation and provision of fresh air must be present to allow windows to remain closed for extended intervals of time so that acceptable levels of noise can be maintained on the interior. The mechanical ventilation system shall meet the criteria of the International Building Code (Chapter 12, Section 1203.3 of the 2001 California Building Code).

7.0 CONCLUSIONS

Noise mitigation for off-site transportation noise sources to on-site exterior use areas is required. With the implementation of noise barriers at balconies for residential units along Highway 75 and the southern perimeter of the site, exterior transportation noise levels on balconies would be reduced to 60 CNEL threshold established by the County's General Plan or less.

An exterior-to-interior study will be required to identify the appropriate architectural materials and techniques required to reduce interior noise levels in habitable rooms to less than the 45 CNEL threshold established by the County's General Plan.

8.0 CERTIFICATION

The findings and recommendations of this acoustical analysis report are based on the available information, and are a true and factual analysis of the potential acoustical issues associated with the Bernardo Shores Project located in the City of Imperial Beach, California. This report was prepared by Charles Terry with assistance from Elizabeth Scott.

Charles Terry, Senior Acoustical Specialist	Elizabeth Scott, Environmental Planner

9.0 REFERENCES

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Appendix A

NOLF IMPERIAL BEACH PROSPECTIVE AICUZ FOOTPRINT

CNEL
APZ I
Clear Zone
Primary Surface
Installation Boundary
AICUZ Footprint Outline

TRUE NORTH
MAGNETIC NORTH
Magnetic Declination
12° 35' E

0 1,000 2,000
Feet

Source: Final AICUZ Study Update for NAS North Island and NOLF Imperial Beach

NOLF Imperial Beach Prospective AICUZ Footprint

BERNARDO SHORES

HELIX
Environmental Planning

Appendix A

I:\PROJECTS\1\IPQ\IPQ-10_BernardoShores\Map\ENV\Noise\AppendixA_NOLF_Footprint.indd IPQ-13 05/06/13 -JP