Noise Analysis for the Crystal Cove Apartments Project Moreno Valley, California

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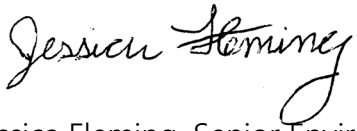
August 3, 2022



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Noise, Air Quality, and Greenhouse Gas

TABLE OF CONTENTS

FIGURES

TABLE OF CONTENTS (cont.)

FIGURES (cont.)

TABLES

ATTACHMENTS

Acronyms and Abbreviations

ADT	average daily trips
Caltrans	California Department of Transportation
City	City of Moreno Valley
CNEL	community noise equivalent level
CPU	Community Plan Update
dB	decibel
dB(A)	A-weighted decibel
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HVAC	heating, ventilation, and air conditioning
in/sec	inch per second
L_{eq}	one-hour equivalent noise level
L_{pw}	sound power level
PPV	peak particle velocity
project	Crystal Cove Apartments Project
STC	sound transmission class

Executive Summary

The Crystal Cove Apartments Project (project) is located in the central portion of the city of Moreno Valley, California, approximately 4.2 miles east of Interstate 215. The 8.00-acre project site is located on Assessor's Parcel Number 484-030-028 southwest of the intersection of Alessandro Boulevard and Lasselle Street. The project site is currently undeveloped. The project would develop a 200-unit apartment complex that would consist of nine separate buildings, providing a total of 92 one-bedroom apartments and 108 two-bedroom apartments. The project would also provide a recreation center building with an outdoor pool. Access to the project site would be provided via a new connection to Alessandro Boulevard along the northern project boundary and a new connection to Copper Cove Lane along the southern project boundary. The project would also make off-site roadway and parkway improvements within the right-of-way of Alessandro Boulevard along the northern project boundary, as well as off-site roadway improvements with the right-of-way of Copper Cove Lane along the southern project boundary. These off-site improvements would total 1.41 acre, which would increase the total project area to 9.41 acres.

This report evaluates potential noise impacts associated with construction and operation of the project. As part of this assessment, noise levels due to vehicle traffic were calculated and evaluated against City of Moreno Valley (City) noise and land use compatibility guidelines. In addition to compatibility, this report evaluates the potential for noise to impact adjacent receivers from on-site sources and construction activity. A summary of the findings is provided below.

Construction Noise

The City's 2040 General Plan Final Environmental Impact Report (EIR) mitigation framework NOS-1 addresses construction noise and requires construction noise reduction measures to be implemented for projects that exceed the noise standards contained in Sections 8.14.040(c) and 11.80.030(D)(7) of the City's Municipal Code (City of Moreno Valley 2021a). The City does not specify a numerical noise level limit applicable to construction activities; however, the Federal Transit Administrations (FTA's) Transit Noise and Vibration Impact Assessment manual indicates that 80 A-weighted decibel dB(A) one-hour equivalent noise level (L_{eq}) is reasonable criteria for assessing construction noise levels at residential uses.

As calculated in this analysis, construction noise levels are not anticipated to exceed 80 dB(A) L_{eq} at the adjacent uses. Additionally, should construction of the project occur at the same time as construction of the project located west of the adjacent church, cumulative construction noise levels are also not anticipated to exceed 80 dB(A) L_{eq}. The City regulates construction noise through Sections 8.14.040(E) and 11.80.030(D)(7) of the City's Municipal Code by limiting construction activities to 7:00 a.m. to 7:00 p.m. from Monday through Friday excluding holidays and from 8:00 a.m. to 4:00 p.m. on Saturdays. Construction activities would only occur during the hours permitted under Sections 8.14.040(E) and 11.80.030(D)(7) of the City's Municipal Code. Therefore, on-site construction activities would not generate a substantial temporary increase in ambient noise levels, and impacts would be less than significant.

Vehicle Traffic Noise

On-site Noise Compatibility

The main source of noise at the project site is vehicle traffic on Alessandro Boulevard and Lasselle Street. Multi-family residential uses are "normally acceptable" with noise levels up to 65 community noise equivalent level (CNEL), "conditionally acceptable" with noise levels from 65 to 70 CNEL, "normally unacceptable with noise levels from 70 to 75 CNEL, and "clearly unacceptable" with noise levels above 75 CNEL. The interior noise level standard is 45 CNEL. As calculated in this analysis, exterior noise levels at the exterior use area (pool, cabanas, and tot lot) would range from 47 to 51 CNEL, which would be less than the City's "normally acceptable" compatibility standard of 65 CNEL. Therefore, operational roadway noise would not generate a substantial permanent increase in ambient exterior noise levels, and impacts would be less than significant.

Standard light-frame construction would reduce exterior to interior noise levels by at least 20 decibels (dB). Therefore, interior noise levels would be reduced to 45 CNEL or less in buildings exposed to exterior noise levels of 65 CNEL or less. For buildings located where exterior noise levels exceed 65 CNEL, window components with an increased sound transmission class (STC) rating would be required. This analysis calculated the required composite STC ratings that need to be achieved in each location exceeding 65 CNEL. The provision of windows that have an STC equal to or greater than the values calculated in this analysis would be sufficient to reduce interior noise levels to 45 CNEL or less. Therefore, the project would not be exposed to noise levels in excess of standards established in the General Plan, and impacts would be less than significant.

Off-site Vehicle Traffic Noise

The project would increase traffic volumes on local roadways. However, the project would not substantially alter the vehicle classifications mix on local or regional roadways, nor would the project alter the speed on an existing roadway or create a new roadway. Thus, the primary factor affecting off-site noise levels would be increased traffic volumes. A substantial noise increase is defined as an increase of 3 dB above existing conditions.

Based on the ITE Trip Generation Manual, 11th Edition, the project would generate 6.74 weekday trips per unit for a total of 1,348 daily weekday trips (K2 Traffic Engineering, Inc. 2022). An increase of 1,348 trips on Alessandro Boulevard would result in a noise increase of 0.7 to 0.8 dB, and an increase of 1,348 trips on Lasselle Street would result in a noise increase of 0.9 to 1.2 dB. These would not be audible changes in noise levels. Therefore, operational roadway noise would not generate a substantial permanent increase in ambient noise levels for off-site noise sensitive land uses, and impacts would be less than significant.

On-site Generated Noise

The noise sources on the project site after completion of construction are anticipated to be those that would be typical of any multi-family residential neighborhood, such as vehicles arriving and

leaving, children at play, and landscape maintenance machinery. None of these noise sources associated with multi-family uses are anticipated to violate the City's Municipal Code or result in a substantial permanent increase in existing noise levels. The project would include heating, ventilation, and air conditioning (HVAC) units. Noise levels due to HVAC units were modeled to determine if they have the potential to produce noise in excess of City limits. As calculated in this analysis, HVAC noise levels are anticipated to range from 38 to 45 dB(A) L_{eq}. Noise levels would not exceed the applicable limits as specified in Section 11.80.030(C) of the City's Municipal Code. Therefore, operational HVAC noise would not generate a substantial permanent increase in ambient noise levels in excess of limits established in the Municipal Code, and impacts would be less than significant.

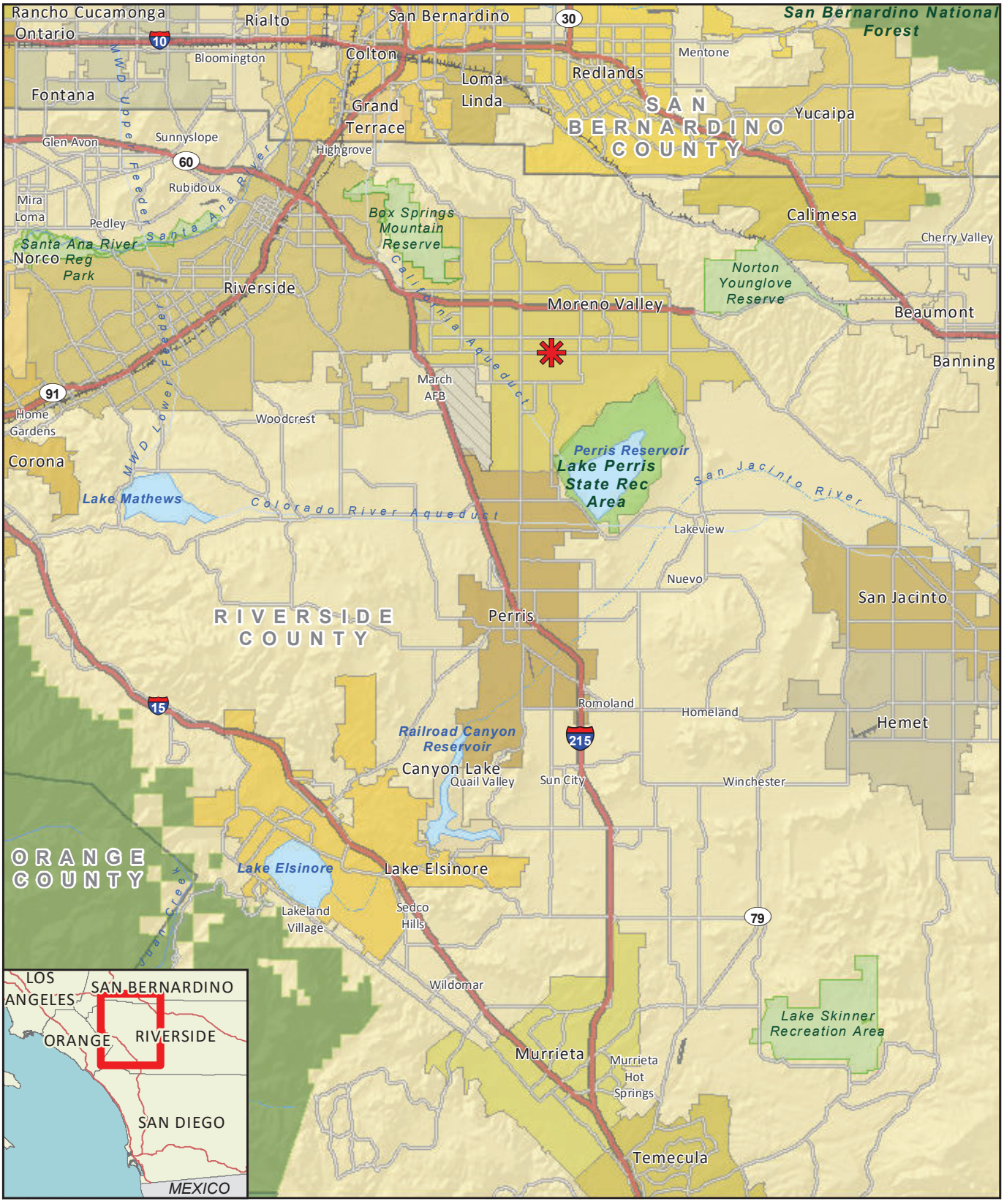
Vibration

The City's 2040 General Plan Final EIR mitigation framework NOS-2 addresses construction vibration and requires that vibration levels shall not exceed FTA architectural damage thresholds (e.g., 0.12 inches per second [in/sec] peak particle velocity [PPV] for fragile or historical resources, 0.2 in/sec PPV for non-engineered timber and masonry buildings, and 0.3 in/sec PPV for engineered concrete and masonry) (City of Moreno Valley 2021a). The nearest receptors are the residential uses located approximately 40 feet south of the southern project boundary and the church located approximately 20 feet west of the western project boundary. The largest piece of vibration-generating equipment that could be used for project construction is a large bulldozer. Vibration levels from a large bulldozer would be 0.114 in/sec PPV at the church and 0.053 in/sec PPV at the nearest residential receptor. These vibration levels would be less than the FTA thresholds. Additionally, construction equipment would move throughout the entire site and would only be located near the project boundaries for short periods of time. Thus, vibration levels at the receptors located near the project boundaries would be less than these maximum levels for a majority of the construction period. Although vibration levels may be perceptible for short periods of time, maximum vibration levels would not exceed FTA thresholds. Therefore, construction would not generate excessive ground borne vibration or ground borne noise levels, and impacts would be less than significant. Once operational, the project would not be a source of ground borne vibration or ground borne noise.

1.0 Introduction

1.1 Project Description

The Crystal Cove Apartments Project (project) is located in the central portion of the city of Moreno Valley, California, approximately 4.2 miles east of Interstate 215. The 8.00-acre project site is located on Assessor's Parcel Number 484-030-028 southwest of the intersection of Alessandro Boulevard and Lasselle Street. The project site is currently undeveloped. Figure 1 shows the regional location of the project site. Figure 2 shows an aerial photograph of the project site and vicinity.



Project Location

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FIGURE 1
Regional Location

Image Source: NearMap (flown May 2022)

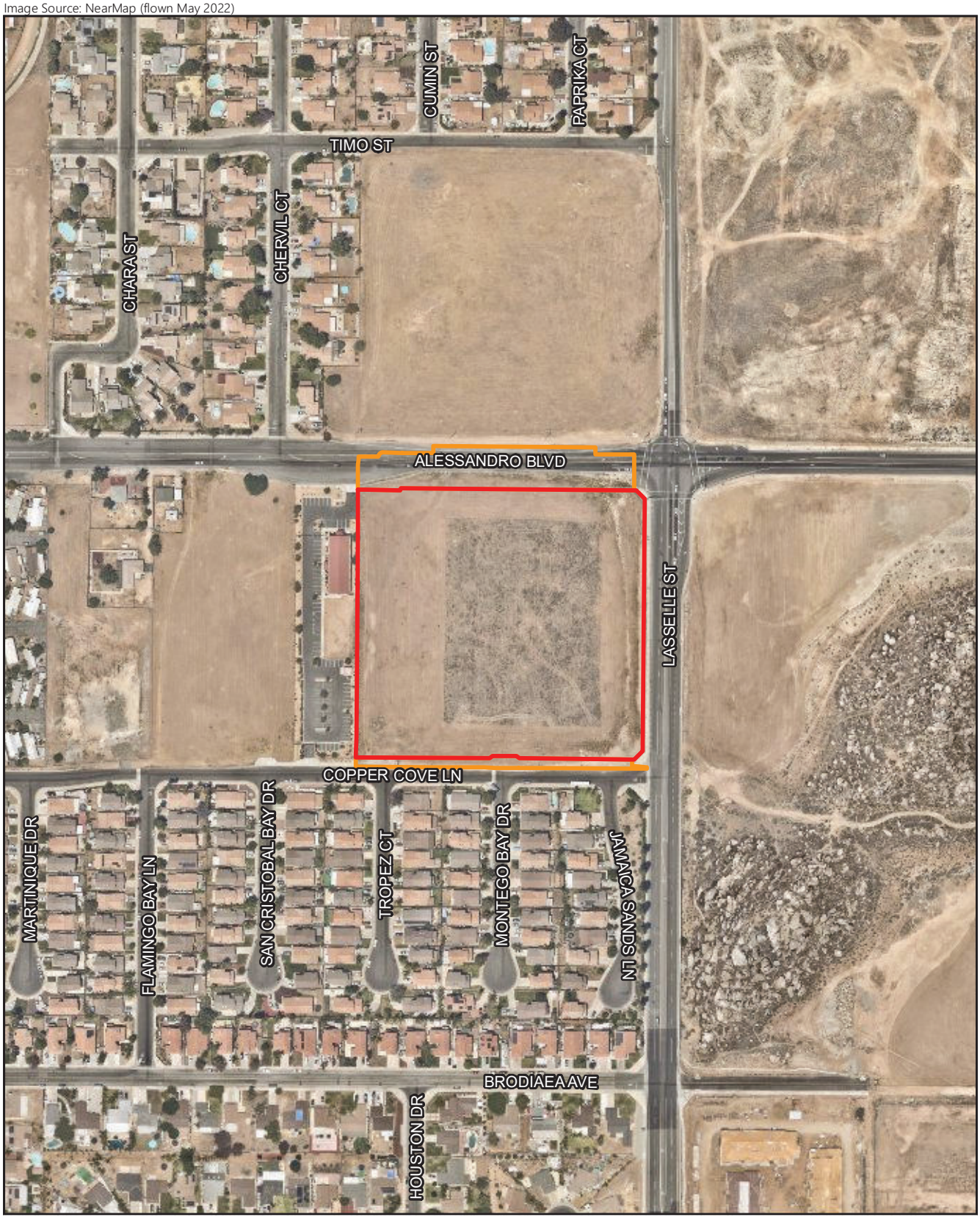

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FIGURE 2
Project Location on Aerial Photograph

The project would develop a 200-unit apartment complex that would consist of nine separate buildings, providing a total of 92 one-bedroom apartments and 108 two-bedroom apartments. The total floor area of all the units within the nine apartment buildings would equal 186,540 square feet. The project would also provide a recreation center building with an outdoor pool. The project would provide a total of 354 parking spaces consisting of 221 covered parking spaces, 133 uncovered parking spaces, 12 Americans with Disabilities Act-compliant parking spaces, and 36 electrical vehicle parking spaces wired for future installation of charging equipment. Access to the site would be provided via a new connection to Alessandro Boulevard along the northern project boundary and a new connection to Copper Cove Lane along the southern project boundary. The project would also make off-site roadway and parkway improvements within the right-of-way of Alessandro Boulevard along the northern project boundary, as well as offsite roadway improvements with the right-of-way of Copper Cove Lane along the southern project boundary. These off-site improvements would total 1.41 acres, which would increase the total project area to 9.41 acres. Figure 3 shows the proposed site plan.

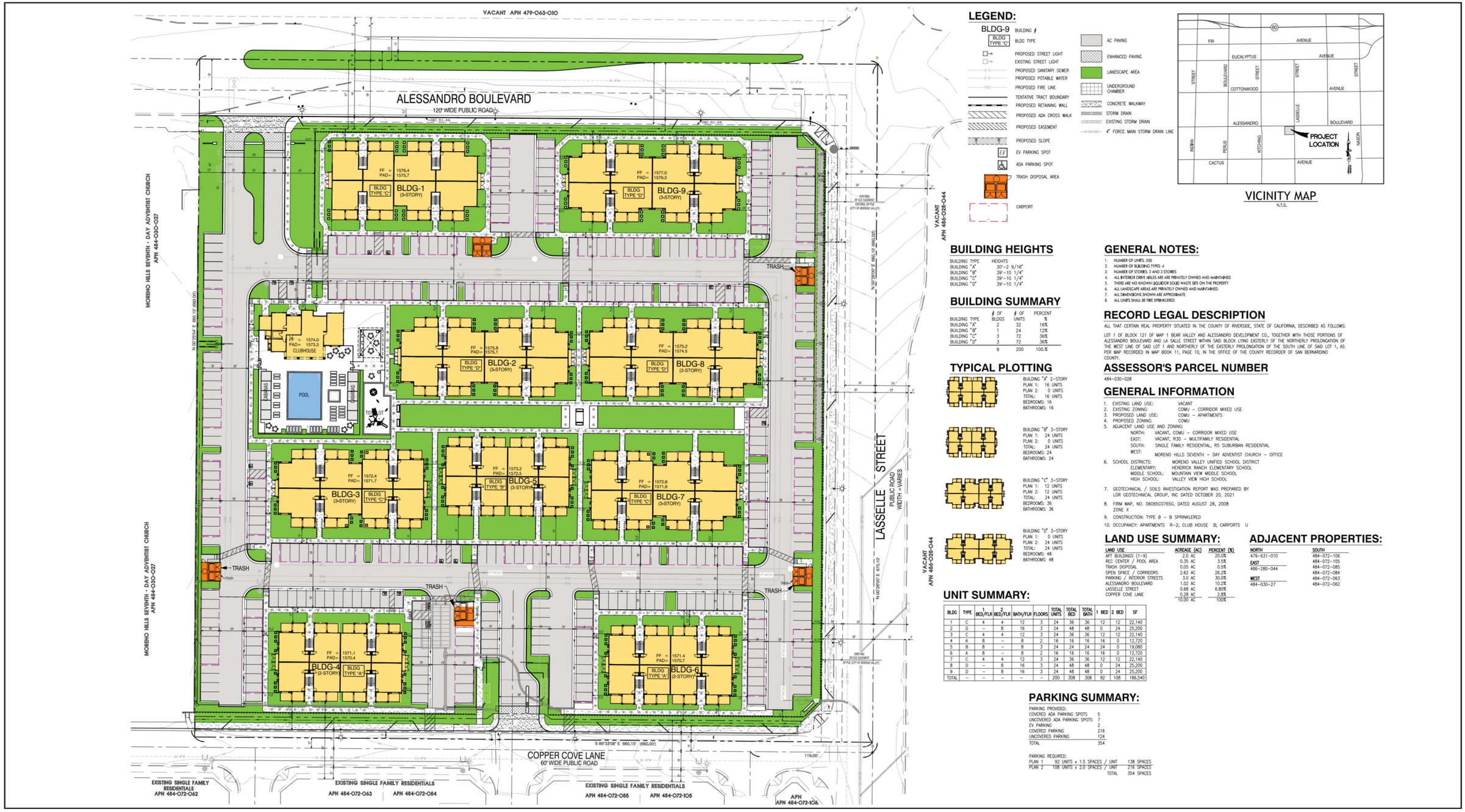
1.2 Fundamentals of Noise

Sound levels are described in units called the decibel (dB). Decibels are measured on a logarithmic scale that quantifies sound intensity in a manner similar to the Richter scale used for earthquake magnitudes. Thus, a doubling of the energy of a noise source, such as doubling of traffic volume, would increase the noise level by 3 dB; a halving of the energy would result in a 3 dB decrease.

Additionally, in technical terms, sound levels are described as either a "sound power level" or a "sound pressure level," which while commonly confused, are two distinct characteristics of sound. Both share the same unit of measure, the dB. However, sound power, expressed as L_{pw}, is the energy converted into sound by the source. The L_{pw} is used to estimate how far a noise will travel and to predict the sound levels at various distances from the source. As sound energy travels through the air, it creates a sound wave that exerts pressure on receivers such as an eardrum or microphone and is the sound pressure level. Noise measurement instruments only measure sound pressure, and noise level limits used in standards are generally sound pressure levels.

The human ear is not equally sensitive to all frequencies within the sound spectrum. To accommodate this phenomenon, the A-scale, which approximates the frequency response of the average young ear when listening to most ordinary everyday sounds, was devised. When people make relative judgments of the loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels of those sounds. Therefore, the "A-weighted" noise scale is used for measurements and standards involving the human perception of noise. Noise levels using A-weighted measurements are designated with the notation dB(A).

Map Source: MDS Consulting



LEGEND:

BLDG-9 BUILDING #
BLDG TYPE "C" BLDG TYPE
PROPOSED STREET LIGHT
EXISTING STREET LIGHT
PROPOSED SANITARY SEWER
PROPOSED POTABLE WATER
PROPOSED FIRE LINE
TENTATIVE TRACT BOUNDARY
PROPOSED RETAINING WALL
PROPOSED ADA CROSS WALK
PROPOSED EASEMENT
PROPOSED SLOPE
EV PARKING SPOT
ADA PARKING SPOT
TRASH DISPOSAL AREA
CARPORT
AC PAVING
ENHANCED PAVING
LANDSCAPE AREA
UNDERGROUND CHAMBER
CONCRETE WALKWAY
STORM DRAIN
EXISTING STORM DRAIN
4" FORCE MAIN STORM DRAIN LINE

VICINITY MAP
N.T.S.

BUILDING HEIGHTS

BUILDING TYPE	HEIGHTS
BUILDING "A"	30'-2 9/16"
BUILDING "B"	39'-10 1/4"
BUILDING "C"	39'-10 1/4"
BUILDING "D"	39'-10 1/4"

BUILDING SUMMARY

BUILDING TYPE	# OF BLDGS	# OF UNITS	PERCENT %
BUILDING "A"	2	32	16%
BUILDING "B"	1	24	12%
BUILDING "C"	3	72	36%
BUILDING "D"	3	72	36%
	9	200	100.%

TYPICAL PLOTTING

BUILDING "A" 2-STORY
PLAN 1: 16 UNITS
PLAN 2: 0 UNITS
TOTAL: 16 UNITS
BEDROOMS: 16
BATHROOMS: 16

BUILDING "B" 3-STORY
PLAN 1: 24 UNITS
PLAN 2: 0 UNITS
TOTAL: 24 UNITS
BEDROOMS: 24
BATHROOMS: 24

BUILDING "C" 3-STORY
PLAN 1: 12 UNITS
PLAN 2: 12 UNITS
TOTAL: 24 UNITS
BEDROOMS: 36
BATHROOMS: 36

BUILDING "D" 3-STORY
PLAN 1: 0 UNITS
PLAN 2: 24 UNITS
TOTAL: 24 UNITS
BEDROOMS: 48
BATHROOMS: 48

UNIT SUMMARY:

BLDG	TYPE	1 BED/FLR	2 BED/FLR	BATH/FLR	FLOORS	TOTAL UNITS	TOTAL BED	TOTAL BATH	1 BED	2 BED	SF
1	C	4	4	12	3	24	36	36	12	12	22,140
2	D	–	8	16	3	24	48	48	0	24	25,200
3	C	4	4	12	3	24	36	36	12	12	22,140
4	A	8	–	8	2	16	16	16	16	0	12,720
5	B	8	–	8	3	24	24	24	24	0	19,080
6	A	8	–	8	2	16	16	16	16	0	12,720
7	C	4	4	12	3	24	36	36	12	12	22,140
8	D	–	8	16	3	24	48	48	0	24	25,200
9	D	–	8	16	3	24	48	48	0	24	25,200
TOTAL	–	–	–	–	–	200	308	308	92	108	186,540

PARKING SUMMARY:

PARKING PROVIDED:	
COVERED ADA PARKING SPOTS	5
UNCOVERED ADA PARKING SPOTS	7
EV PARKING	2
COVERED PARKING	216
UNCOVERED PARKING	124
TOTAL	354

PARKING REQUIRED:

PLAN 1	92 UNITS x 1.5 SPACES / UNIT	138 SPACES
PLAN 2	108 UNITS x 2.0 SPACES / UNIT	216 SPACES
	TOTAL	354 SPACES

GENERAL NOTES:

1. NUMBER OF UNITS: 200
2. NUMBER OF BUILDING TYPES: 4
3. NUMBER OF STORIES: 2 AND 3 STORIES
4. ALL INTERIOR DRIVE AISLES ARE ARE PRIVATELY OWNED AND MAINTAINED
5. THERE ARE NO KNOWN LIQUIDOR SOLID WASTE SITE ON THE PROPERTY
6. ALL LANDSCAPE AREAS ARE PRIVATELY OWNED AND MAINTAINED.
7. ALL DIMENSIONS SHOWN ARE APPROXIMATE.
8. ALL UNITS SHALL BE FIRE SPRINKLERED.

RECORD LEGAL DESCRIPTION

ALL THAT CERTAIN REAL PROPERTY SITUATED IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, DESCRIBED AS FOLLOWS:

LOT 1 OF BLOCK 121 OF MAP 1 BEAR VALLEY AND ALESSANDRO DEVELOPMENT CO., TOGETHER WITH THOSE PORTIONS OF ALESSANDRO BOULEVARD AND LA SALLE STREET WITHIN SAID BLOCK LYING EASTERLY OF THE NORTHERLY PROLONGATION OF THE WEST LINE OF SAID LOT 1 AND NORTHERLY OF THE EASTERLY PROLONGATION OF THE SOUTH LINE OF SAID LOT 1, AS PER MAP RECORDED IN MAP BOOK 11, PAGE 10, IN THE OFFICE OF THE COUNTY RECORDER OF SAN BERNARDINO COUNTY.

ASSESSOR'S PARCEL NUMBER

484-030-028

GENERAL INFORMATION

1. EXISTING LAND USE: VACANT
2. EXISTING ZONING: COMU – CORRIDOR MIXED USE
3. PROPOSED LAND USE: COMU – APARTMENTS
4. PROPOSED ZONING: COMU
5. ADJACENT LAND USE AND ZONING:
   - NORTH: VACANT, COMU – CORRIDOR MIXED USE
   - EAST: VACANT, R30 – MULTIFAMILY RESIDENTIAL
   - SOUTH: SINGLE FAMILY RESIDENTIAL, R5 SUBURBAN RESIDENTIAL
   - WEST: MORENO HILLS SEVENTH – DAY ADVENTIST CHURCH – OFFICE
6. SCHOOL DISTRICTS: MORENO VALLEY UNIFIED SCHOOL DISTRICT
   - ELEMENTARY: HENDRICK RANCH ELEMENTARY SCHOOL
   - MIDDLE SCHOOL: MOUNTAIN VIEW MIDDLE SCHOOL
   - HIGH SCHOOL: VALLEY VIEW HIGH SCHOOL
7. GEOTECHNICAL / SOILS INVESTIGATION REPORT WAS PREPARED BY LOR GEOTECHNICAL GROUP, INC DATED OCTOBER 20, 2021
8. FIRM MAP, NO. 06065C0765G, DATED AUGUST 28, 2008 ZONE X
9. CONSTRUCTION: TYPE B – B SPRINKLERED
10. OCCUPANCY: APARTMENTS R-2; CLUB HOUSE B; CARPORTS U

LAND USE SUMMARY:

LAND USE	ACREAGE (AC)	PERCENT (%)
APT BUILDINGS (1-9)	2.0 AC	20.0%
REC CENTER / POOL AREA	0.35 AC	3.5%
TRASH DISPOSAL	0.05 AC	0.5%
OPEN SPACE / CORRIDORS	2.62 AC	26.2%
PARKING / INTERIOR STREETS	3.0 AC	30.0%
ALESSANDRO BOULEVARD	1.02 AC	10.2%
LASSELLE STREET	0.68 AC	6.80%
COPPER COVE LANE	0.28 AC	2.8%
	10.00 AC	100%

ADJACENT PROPERTIES:

NORTH	SOUTH
479-631-010	484-072-106
EAST	484-072-105
486-280-044	484-072-085
	484-072-084
WEST	484-072-063
484-030-27	484-072-062

0 Feet 60

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FIGURE 3
Site Plan

The impact of noise is not a function of loudness alone. The time of day when noise occurs and the duration of the noise are also important. In addition, most noise that lasts for more than a few seconds is variable in its intensity. Consequently, a variety of noise descriptors has been developed. The noise descriptors used for this study are the one-hour equivalent noise level (L_{eq}), the community noise equivalent level (CNEL), and the sound exposure level. The CNEL is a 24-hour equivalent sound level. The CNEL calculation applies an additional 5 dB(A) penalty to noise occurring during evening hours, between 7:00 p.m. and 10:00 p.m., and an additional 10 dB(A) penalty is added to noise occurring during the night, between 10:00 p.m. and 7:00 a.m. These increases for certain times are intended to account for the added sensitivity of humans to noise during the evening and night. The sound exposure level is a noise level over a stated period of time or event and normalized to one second. Sound from a small, localized source (approximating a "point" source) radiates uniformly outward as it travels away from the source in a spherical pattern, known as geometric spreading. The sound level decreases or drops off at a rate of 6 dB(A) for each doubling of the distance.

Traffic noise is not a single, stationary point source of sound. The movement of vehicles makes the source of the sound appear to emanate from a line (line source) rather than a point when viewed over some time interval. The drop-off rate for a line source is 3 dB(A) for each doubling of distance.

The propagation of noise is also affected by the intervening ground, known as ground absorption. A hard site (such as parking lots or smooth bodies of water) receives no additional ground attenuation, and the changes in noise levels with distance (drop-off rate) are simply the geometric spreading of the source. A soft site (such as soft dirt, grass, or scattered bushes and trees) receives an additional ground attenuation value of 1.5 dB(A) per doubling of distance. Thus, a point source over a soft site would attenuate at 7.5 dB(A) per doubling of distance.

Human perception of noise has no simple correlation with acoustical energy. A change in noise levels is generally perceived as follows: 3 dB(A) barely perceptible, 5 dB(A) readily perceptible, and 10 dB(A) perceived as a doubling or halving of noise (California Department of Transportation [Caltrans] 2013).

2.0 Applicable Standards

2.1 City of Moreno Valley General Plan

2.1.1 Noise Element

The Noise Element of the City's 2040 General Plan establishes policies to guard against creation of new noise/land use conflicts and to minimize the impact of existing noise sources on the community. Table 1 identifies noise level compatibility standards and interior noise standards to be used to guide land use planning decisions (City of Moreno Valley 2021b). As shown in Table 1, multi-family residential uses are "normally acceptable" with noise levels up to 65 CNEL, "conditionally acceptable" with noise levels from 65 to 70 CNEL, "normally unacceptable with noise levels from 70 to 75 CNEL, and "clearly unacceptable" with noise levels above 75 CNEL.

Table 1
Community Noise Compatibility Matrix

	Community Noise Exposure (CNEL)						
	55	60	65	70	75	80	
Residential – Low Density Single Family, Duplex, Mobile Homes	A			B	C	D	
Residential – Multiple Family	A			B	C	D	
Transient Lodging – Motels, Hotels	A			B	C		D
Schools, Libraries, Churches, Hospitals, Nursing Homes	A				C		D
Auditoriums, Concert Halls, Amphitheaters	B				C		
Sports Arena, Outdoor Spectator Sports	B					C	
Playgrounds, Neighborhood Parks	A				B	C	
Golf Courses, Riding Stables, Water Recreation, Cemeteries	A					C	D
Office Buildings, Business Commercial and Professional	A				B	C	
Industrial, Manufacturing, Utilities, Agriculture	A					B	C

Table 1 Community Noise Compatibility Matrix	
A	**Normally Acceptable:** Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
B	**Conditionally Acceptable:** New construction or development should be undertaken only after a detailed analysis of the noise reduction requirement is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.
C	**Normally Unacceptable:** New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.
D	**Clearly Unacceptable:** New construction or development should generally not be undertaken.

The Noise Element of the City's 2040 General Plan contains the following goals, policies, and actions that would be intended to address ambient noise (City of Moreno Valley 2021b).

Goal

N-1: Design for a pleasant, healthy sound environment conducive to living and working.

Policies

N.1-1: Protect occupants of existing and new buildings from exposure to excessive noise, particularly adjacent to freeways, major roadways, the railroad, and within areas of aircraft overflight.

N.1-2: Guide the location and design of transportation facilities, industrial uses, and other potential noise generators to minimize the effects of noise on adjacent land uses.

N.1-3: Apply the community noise compatibility standards (Table N-1) to all new development and major redevelopment projects outside the noise and safety compatibility zones established in the March Air Reserve Base/Inland Port Airport Land Use

Compatibility (ALUC) Plan in order to protect against the adverse effects of noise exposure. Projects within the noise and safety compatibility zones are subject to the standards contained in the ALUC Plan.

N.1-4: Require a noise study and/or mitigation measures if applicable for all projects that would expose people to noise levels greater than the "normally acceptable" standard and for any other projects that are likely to generate noise in excess of these standards.

N.1-5: Noise impacts should be controlled at the noise source where feasible, as opposed to at receptor end with measures to buffer, dampen, or actively cancel noise sources. Site design, building orientation, building design, hours of operation, and other techniques, for new developments deemed to be noise generators shall be used to control noise sources.

N.1-6: Require noise buffering, dampening, or active cancellation, on rooftop or other outdoor mechanical equipment located near residences, parks, and other noise sensitive land uses.

N.1-7: Developers shall reduce the noise impacts on new development through appropriate means (e.g., double-paned or soundproof windows, setbacks, berming, and screening). Noise attenuation methods should avoid the use of visible sound walls where possible.

Actions

N.1-A: Continue to review proposed projects for conformance with the March Air Reserve Base/Inland Port Airport Land Use Compatibility Plan, including consideration of the Compatibility Zone Factors shown in Table MA-1 and the Basic Compatibility Criteria shown in Table MA-2, as may be amended.

N.1-C: Study the feasibility of using alternative pavement materials such as rubberized asphalt pavements on roadways to reduce noise generation. Update City standards as appropriate.

Goal

N-2: Ensure that noise does not have a substantial, adverse effect on the quality of life in the community.

Policies

N.2-1: Use the development review process to proactively identify and address potential noise compatibility issues.

N.2-2: Continue to work with community members and business owners to address noise complaints and ensure voluntary resolution of issues through the enforcement of Municipal Code provisions.

N.2-3: Limit the potential noise impacts of construction activities on surrounding land uses through noise regulations in the Municipal Code that address allowed days and hours of construction, types of work, construction equipment, and sound attenuation devices.

N.2-4: Collaborate with the March Joint Powers Authority, March Inland Port Airport Authority, Riverside County Airport Land Use Commission, and other responsible agencies to formulate and apply strategies to address noise and safety compatibility protection from airport operations.

N.2-5: Encourage residential development heavily impacted by aircraft-related noise to transition to uses that are more compatible.

Actions

N.2-A: Continue to maintain performance standards in the Municipal Code to ensure that noise generated by proposed projects is compatible with surrounding land uses.

N.2-B: Update the Municipal Code to establish controls on outdoor noise in public places, such as outdoor dining terraces in commercial mixed use areas, public plazas, or parks. Controls may include limits on noise levels or hours of operation.

2.1.2 General Plan Environmental Impact Report Mitigation Framework

Noise impacts associated with the City's 2040 General Plan were evaluated in the Final EIR approved by the City in 2021 (City of Moreno Valley 2021a). The following mitigation framework applies to the project:

Construction Noise

NOS-1: The Director of Community Development or his or her designee shall require applicants to demonstrate whether the project has the potential to exceed noise standards contained in Sections 8.14.040(E) and 11.80.030(D)(7) of the Municipal Code. If a project may exceed standards or is located adjacent to sensitive receptors, the City may require the applicant to prepare a Noise Analysis that estimates construction noise and identifies noise reduction measures that would ensure compliance with Municipal Code standards. Construction plans submitted to the City shall identify applicable measures on demolition, grading, and construction plans submitted to the City. Noise reduction measures can include, but are not limited to, the following:

1. Demolition, construction, site preparation, and related activities that would generate noise perceptible at the property line of the subject property are limited to the hours between 7:00 a.m. to 7:00 p.m. from Monday through Friday excluding holidays and from 8:00 a.m. to 4:00 p.m. on Saturdays. The building inspector may issue an exception to this limitation on hours in cases of urgent necessity where the public health and safety will not be substantially impaired.

2. Idling times for noise-generating equipment used in demolition, construction, site preparation, and related activities shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes.

3. Demolition, construction, site preparation, and related activities within 70 feet from the edge of properties with existing, occupied noise-sensitive uses shall incorporate all feasible strategies to reduce noise exposure for noise-sensitive uses, including:

    a. Provide written notice to all known occupied noise-sensitive uses within 400 feet of the edge of the project site boundary at least 2 weeks prior to the start of each construction phase of the construction schedule;

    b. Ensure that construction equipment is properly maintained and equipped with noise control components, such as mufflers, in accordance with manufacturers' specifications;

    c. Re-route construction equipment away from adjacent noise-sensitive uses;

    d. Locate noisy construction equipment away from surrounding noise-sensitive uses;

    e. Use sound aprons or temporary noise enclosures around noise-generating equipment;

    f. Position storage of waste materials, earth, and other supplies in a manner that will function as a noise barrier for surrounding noise-sensitive uses;

    g. Use the quietest practical type of equipment;

    h. Use electric powered equipment instead of diesel or gasoline engine powered equipment; Use shrouding or shielding and intake and exhaust silencers/mufflers; and

    i. Other effective and feasible strategies to reduce construction noise exposure for surrounding noise-sensitive uses.

4. For construction of buildings that require the installation of piles, an alternative to installation of piles by hammering shall be used. This could include the use of augured holes for cast-in-place piles, installation through vibration or hydraulic insertion, or another low-noise technique.

Construction Vibration

NOS-2: Prior to issuance of a building permit for a project requiring pile driving during construction within 135 feet of fragile structures, such as historical resources, 100 feet of non-engineered timber and masonry buildings (e.g., most residential buildings), or within 75 feet of engineered concrete and masonry (no plaster); or a vibratory roller within 25 feet of any structure, the project applicant shall prepare a noise and

vibration analysis to assess and mitigate potential noise and vibration impacts related to these activities. This noise and vibration analysis shall be conducted by a qualified and experienced acoustical consultant or engineer. The vibration levels shall not exceed Federal Transit Administration (FTA) architectural damage thresholds (e.g., 0.12 inches per second [in/sec] peak particle velocity [PPV] for fragile or historical resources, 0.2 in/sec PPV for non-engineered timber and masonry buildings, and 0.3 in/sec PPV for engineered concrete and masonry). If vibration levels would exceed this threshold, alternative uses such as drilling piles as opposed to pile driving and static rollers as opposed to vibratory rollers shall be used. If necessary, construction vibration monitoring shall be conducted to ensure vibration thresholds are not exceeded.

2.2 City of Moreno Valley Municipal Code

2.2.1 Operational Noise

Whereas the noise standards of the Noise Element are primarily used to ensure noise/land use compatibility with transportation noise sources, the noise regulations in the Municipal Code are used to regulate noise from local on-site noise sources, such as mechanical equipment or event noise. The City regulates noise through the Municipal Code under Title 11 Peace, Morals and Safety, Chapter 11.80, Noise Regulation. Tables 2 and 3 summarize the maximum continuous and maximum impulsive noise level limits specified in Section 11.80.030(B)(1) of the Municipal Code.

Table 2
Maximum Continuous Sound Levels

Duration per Day Continuous Hours	Sound Level Limit [dB(A) L_{eq}]
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
0.25	115
dB(A) = A-weighted decibels; L_{eq} = one-hour equivalent noise level	

Table 3
Maximum Impulsive Sound Levels

Number of Repetitions per 24-Hour Period	Sound Level Limit [dB(A) L_{eq}]
1	145
10	135
100	125
dB(A) = A-weighted decibels; L_{eq} = one-hour equivalent noise level	

Section 11.80.030(C) of the Municipal Code provides noise level limits for non-impulsive noise. The section states,

> No person shall maintain, create, operate or cause to be operated on private property any source of sound in such a manner as to create any non-impulsive sound which exceeds the limits set forth for the source land use category in Table 11.80.030-2 when measured at a distance of two hundred (200) feet or more from the real property line of the source of the sound, if the sound occurs on privately owned property, or from the source of the sound, if the sound occurs on public right-of-way, public space or other publicly owned property.

The sound level limits provided in Table 11.80.030-2 of the Municipal Code are summarized in Table 4.

Table 4
Maximum Sound Levels for Source Land Uses
[dB(A) L_{eq}]

Residential		Commercial	
Daytime	Nighttime	Daytime	Nighttime
60	55	65	60

dB(A) = A-weighted decibels; L_{eq} = one-hour equivalent noise level

2.2.2 Construction Noise

The Municipal Code limits construction activities in two parts of the code: Sections 8.14.040(E) and 11.80.030(D)(7). Section 8.14.040(E) states that construction within the city shall only occur from 7:00 a.m. to 7:00 p.m. from Monday through Friday excluding holidays and from 8:00 a.m. to 4:00 p.m. on Saturdays. Section 11.80.030(D)(7) states that no person shall operate or cause the operation of any tools or equipment used in construction, drilling, repair, alteration or demolition work between the hours of 8:00 p.m. and 7:00 a.m. such that the sound creates a noise disturbance. For power tools, specifically, 11.80.030(D)(9) states that no person shall operate or permit the operation of any mechanically, electrically or gasoline motor-driven tool during nighttime hours that causes a noise disturbance across a residential property line. A noise disturbance is defined as any sound that disturbs a reasonable person of normal sensitivities, exceeds the sound level limits set forth in the Noise Ordinance, or is plainly audible (as measured at a distance of 200 feet from the property line of the source of the sound if the sound occurs on privately owned property, or public right-of-way, public space, or other publicly owned property).

2.2.3 Vibration

The Municipal Code does not establish quantified limits for vibration levels. Section 9.10.170 states, "No vibration shall be permitted which can be felt at or beyond the property line."

2.3 California Code of Regulations

Interior noise levels for habitable rooms are also regulated by Title 24 of the California Code of Regulations California Noise Insulation Standards. Title 24, Chapter 12, Section 1206.4, of the 2019 California Building Code requires that interior noise levels attributable to exterior sources not exceed 45 CNEL in any habitable room (California Code of Regulations 2019). A habitable room is a room used for living, sleeping, eating, or cooking. Bathrooms, closets, hallways, utility spaces, and similar areas are not considered habitable rooms for this regulation (24 California Code of Regulations, Chapter 12, Section 1206.4 2019).

3.0 Existing Conditions

Existing noise levels at the project site were measured on April 28, 2022, using one Larson-Davis LxT Sound Expert Sound Level Meters, serial number 3828. The following parameters were used:

Filter:	A-weighted
Response:	Slow
Time History Period:	5 seconds

The meter was calibrated before and after the measurements. The meter was set 5 feet above the ground level for each measurement.

Noise measurements were taken to obtain typical ambient noise levels at the project site and in the vicinity. The weather was warm and partly cloudy with a slight breeze. Three 15-minute measurements were taken, as described below. The measurement locations are shown on Figure 4, and detailed data is presented in Attachment 1.

Measurement 1 was located at the eastern project boundary, approximately 50 feet west of Lasselle Street. The main source of noise at this location was vehicle traffic on Lasselle Street. The secondary source of noise was vehicle traffic on Alessandro Boulevard. During the 15-minute measurement period, vehicle traffic on Lasselle Street was counted. The average measured noise level was 60.3 dB(A) L_{eq}.

Measurement 2 was located approximately 25 feet east of the western project boundary near the existing church. The main source of noise at this location was vehicle traffic on Alessandro Boulevard. During the 15-minute measurement period, vehicle traffic on Alessandro Boulevard was counted. The average measured noise level was 49.0 dB(A) L_{eq}.

Measurement 3 was located at the northern project boundary, approximately 50 feet south of Alessandro Boulevard. The main source of noise at this location was vehicle traffic on Alessandro Boulevard. During the 15-minute measurement period, vehicle traffic on Lasselle Street was counted. The average measured noise level was 60.4 dB(A) L_{eq}.

Image Source: NearMap (flown May 2022)

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FIGURE 4
Noise Measurement Locations

Noise measurements are summarized in Table 5, and vehicle traffic counts are summarized in Table 6.

Table 5 Noise Measurements				
Measurement	Location	Time	Noise Sources	L_{eq}
1	50 feet west of Lasselle Street	1:35 p.m. – 1:50 p.m.	Vehicle traffic on Lasselle Street	60.3
2	25 feet east of western project boundary	2:14 p.m. – 2:29 p.m.	Vehicle traffic on Alessandro Boulevard	49.0
3	50 feet south of Alessandro Boulevard	2:45 p.m. – 3:00 p.m.	Vehicle traffic on Alessandro Boulevard	60.4
NOTE: Noise measurement data is contained in Attachment 1.				

Table 6 15-minute Traffic Counts							
Measurement	Roadway	Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles
1	Lasselle Street	Northbound	128	2	0	0	0
		Southbound	86	2	1	0	0
2	Alessandro Boulevard	Eastbound	112	1	4	3	0
		Westbound	120	1	1	1	0
3	Alessandro Boulevard	Eastbound	149	0	0	1	0
		Westbound	131	0	4	2	0

4.0 Analysis Methodology

Noise level predictions and contour mapping were developed using noise modeling software, SoundPlan Essential, version 4.1 (Navcon Engineering 2018). SoundPLAN calculates noise propagation based on the International Organization for Standardization method (ISO 9613-2 – Acoustics, Attenuation of Sound during Propagation Outdoors). The model calculates noise levels at selected receiver locations using input parameter estimates such as total noise generated by each noise source; distances between sources, barriers, and receivers; and shielding provided by intervening terrain, barriers, and structures. The model outputs can be developed as noise level contour maps or noise levels at specific receivers. In all cases, receivers were modeled at 5 feet above ground elevation, which represents the average height of the human ear.

4.1 Construction Noise Analysis

Project construction noise would be generated by diesel engine-driven construction equipment used for site preparation and grading, building construction, loading, unloading, and placing materials and paving. Diesel engine-driven trucks also would bring materials to the site and remove the soils from excavation.

Construction equipment with a diesel engine typically generates maximum noise levels from 70 to 95 dB(A) L_{eq} at a distance of 50 feet (Federal Highway Administration [FHWA] 2006). Table 7 summarizes typical construction equipment noise levels.

Table 7
Typical Construction Equipment Noise Levels

Equipment	Noise Level at 50 Feet [dB(A) L_{eq}]	Typical Duty Cycle
Auger Drill Rig	85	20%
Backhoe	80	40%
Blasting	94	1%
Chain Saw	85	20%
Clam Shovel	93	20%
Compactor (ground)	80	20%
Compressor (air)	80	40%
Concrete Mixer Truck	85	40%
Concrete Pump	82	20%
Concrete Saw	90	20%
Crane (mobile or stationary)	85	20%
Dozer	85	40%
Dump Truck	84	40%
Excavator	85	40%
Front End Loader	80	40%
Generator (25 kilovolt amps or less)	70	50%
Generator (more than 25 kilovolt amps)	82	50%
Grader	85	40%
Hydra Break Ram	90	10%
Impact Pile Driver (diesel or drop)	95	20%
Insitu Soil Sampling Rig	84	20%
Jackhammer	85	20%
Mounted Impact Hammer (hoe ram)	90	20%
Paver	85	50%
Pneumatic Tools	85	50%
Pumps	77	50%
Rock Drill	85	20%
Roller	74	40%
Scraper	85	40%
Tractor	84	40%
Vacuum Excavator (vac-truck)	85	40%
Vibratory Concrete Mixer	80	20%
Vibratory Pile Driver	95	20%
SOURCE: FHWA 2006.		

During excavation, grading, and paving operations, equipment moves to different locations and goes through varying load cycles, and there are breaks for the operators and for non-equipment tasks, such as measurement. Although maximum noise levels may be 70 to 95 dB(A) at a distance of 50 feet during most construction activities, hourly average noise levels from the grading phase of

construction would be 85 dB(A) L_{eq} at 50 feet from the center of construction activity when assessing the loudest pieces of equipment–dozer, excavator, and loader–working simultaneously.

4.2 Traffic Noise Analysis

The SoundPLAN program uses the FHWA Traffic Noise Model algorithms and reference levels to calculate traffic noise levels at selected receiver locations. The model uses various input parameters, such as projected hourly average traffic rates; vehicle mix, distribution, and speed; roadway lengths and gradients; distances between sources, barriers, and receivers; and shielding provided by intervening terrain, barriers, and structures. Receivers, roadways, and barriers were input into the model using three-dimensional coordinates.

The main source of noise at the project site is vehicle traffic on Alessandro Boulevard and Lasselle Street. Future year 2040 traffic volumes and truck mixes were obtained from the noise analysis prepared as part of the Final EIR prepared for the City's 2040 General Plan (City of Moreno Valley 2021b). Table 8 summarizes the modeled future vehicle traffic parameters.

Table 8
Modeled Vehicle Traffic Parameters

Roadway	Segment	Existing ADT	Year 2040 ADT	Vehicle Classification Mix (percent)			Speed (mph)
				Auto-mobile	Medium Truck	Heavy Truck	
Alessandro Boulevard	Kitching Street to Chara Street	6,748	25,642	95.9%	2.5%	1.6%	45
	Chara Street to Lasselle Street	6,748	22,460	95.9%	2.5%	1.6%	45
	East of Lasselle Street	7,628	26,745	95.9%	2.5%	1.6%	50
Lasselle Street	North of Alessandro Boulevard	4,378	15,233	97.7%	1.7%	0.6%	50
	South of Alessandro Boulevard	5,533	10,843	97.7%	1.7%	0.6%	50

ADT = average daily traffic; mph = miles per hour
SOURCE: City of Moreno Valley 2021b.

4.3 On-Site Generated Noise Analysis

The noise sources on the project site after completion of construction are anticipated to be those that would be typical of any multi-family residential neighborhood, such as vehicles arriving and leaving, children at play, and landscape maintenance machinery. None of these noise sources associated with multi-family uses are anticipated to violate the City's Municipal Code or result in a substantial permanent increase in existing noise levels. The project would include heating, ventilation, and air conditioning (HVAC) units. Noise levels due to HVAC units were modeled to determine if they have the potential to produce noise in excess of City limits (see Table 4).

The HVAC equipment would be located on the ground floor adjacent to the proposed buildings. It is not known at this time which manufacturer, brand, or model of unit or units would be selected for use in the project. For the purposes of this analysis, to determine what general noise levels the HVAC units would generate, it was assumed that the HVAC units would be similar to a Carrier unit with a sound power level of 75 dB(A). Noise specifications are presented in Attachment 2. All units were modeled at full capacity during the daytime and nighttime hours.

5.0 Future Acoustical Environment and Impacts

5.1 Construction Noise

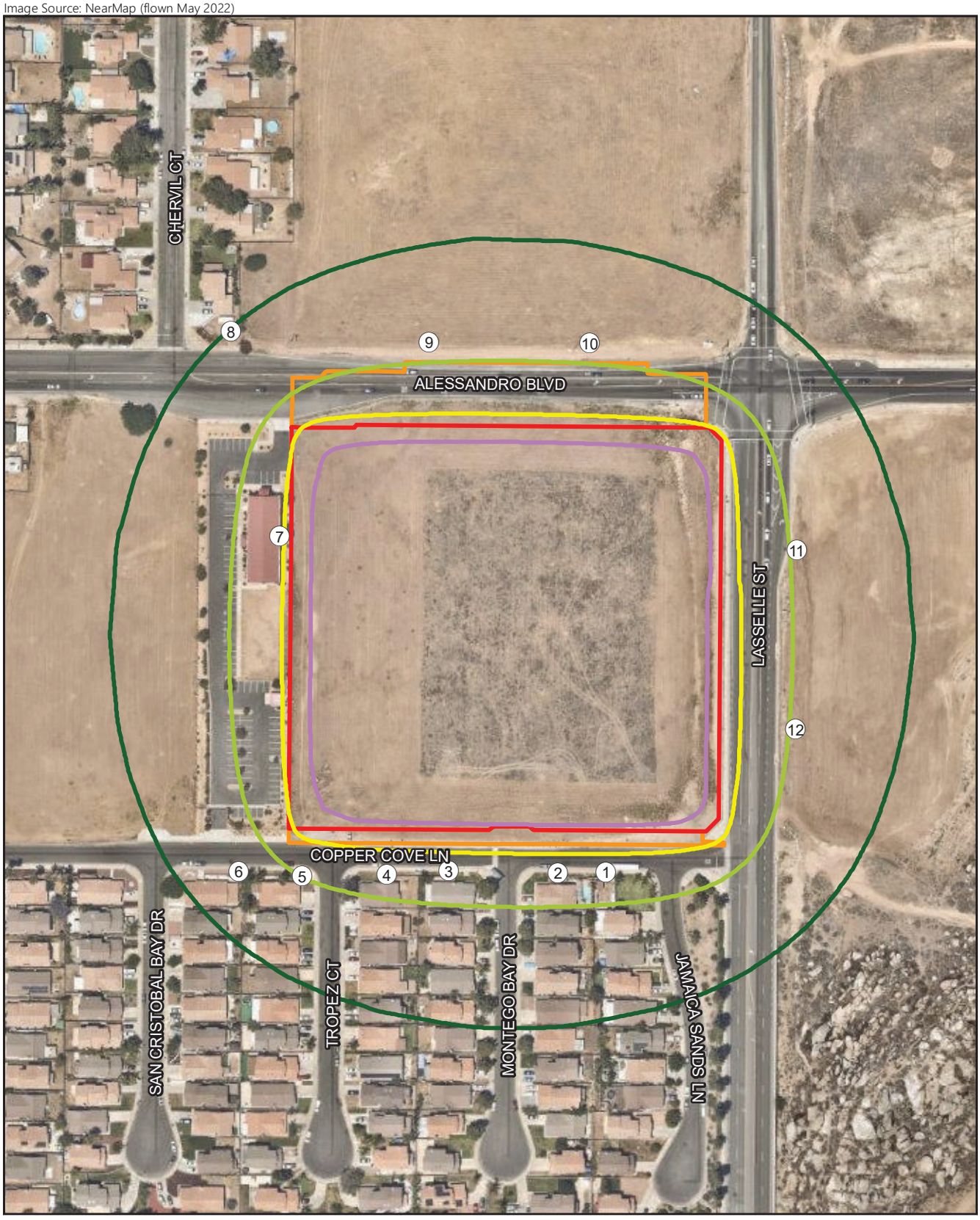
The project site is surrounded by single-family residential uses to the south, southwest, and northwest, and a church to the west. Additionally, multi-family residential uses are planned for the parcel west of the church. Undeveloped land is located to the north and east. Construction noise levels were modeled at these adjacent land uses assuming the simultaneous use of a dozer, excavator, and loader. The total combined noise level would be approximately 85 dB(A) L_{eq} at 50 feet which is equivalent to a sound power level of 116 dB(A) L_{pw}. Noise levels were modeled at a series of 12 receivers located at the adjacent uses. Construction activities are also anticipated to occur at the undeveloped lot west of the church. The exact timing of construction activities is not known at this time, however, in order to provide a worst-case cumulative analysis, noise levels due to simultaneous construction activity on both parcels were also calculated. The results are summarized in Table 9. Modeled receiver locations and construction noise contours are shown in Figure 5. SoundPLAN data is presented in Attachment 3.

Table 9
Construction Noise Levels at Off-site Receivers

Receiver	Land Use	Construction Noise Level [dB(A) L_{eq}]	
		Project Only	Cumulative
1	Residential	68	68
2	Residential	68	68
3	Residential	68	68
4	Residential	67	68
5	Residential	65	67
6	Residential	62	67
7	Church	69	71
8	Residential	60	64
9	Undeveloped	64	65
10	Undeveloped	64	64
11	Undeveloped	64	65
12	Undeveloped	64	65

dB(A) L_{eq} = A-weighted decibels equivalent noise level

Image Source: NearMap (flown May 2022)



Project Boundary

Off-site Improvement Area

Receivers

Construction Noise

60 dB(A) L_{eq}

65 dB(A) L_{eq}

70 dB(A) L_{eq}

75 dB(A) L_{eq}

0 Feet 200

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FIGURE 5

Construction Noise Contours

As shown in Table 9, noise levels generated by project-related construction activities are projected to range from 60 to 69 dB(A) L_{eq}, and noise levels due to simultaneous construction activities at the project site and the parcel to the west would range from 64 to 71 dB(A) L_{eq}. The City does not specify a numerical noise level limit applicable to construction activities, however, the FTA's Transit Noise and Vibration Impact Assessment manual indicates that 80 dB(A) L_{eq} is reasonable criteria for assessing construction noise levels at residential uses (FTA 2018). Construction noise levels are not projected to exceed 80 dB(A) L_{eq} at the adjacent residential uses. Although the adjacent residences would be exposed to construction noise levels that could be heard above ambient conditions, the exposure would be temporary.

The City regulates construction noise through Sections 8.14.040(E) and 11.80.030(D)(7) of the Municipal Code by limiting construction activities to 7:00 a.m. to 7:00 p.m. from Monday through Friday excluding holidays and from 8:00 a.m. to 4:00 p.m. on Saturdays. Construction activities would only occur during the hours permitted under Sections 8.14.040(E) and 11.80.030(D)(7) of the Municipal Code. Therefore, on-site construction activities would not generate a substantial temporary increase in ambient noise levels, and impacts would be less than significant.

5.2 Vehicle Traffic Noise

5.2.1 On-site Noise Compatibility

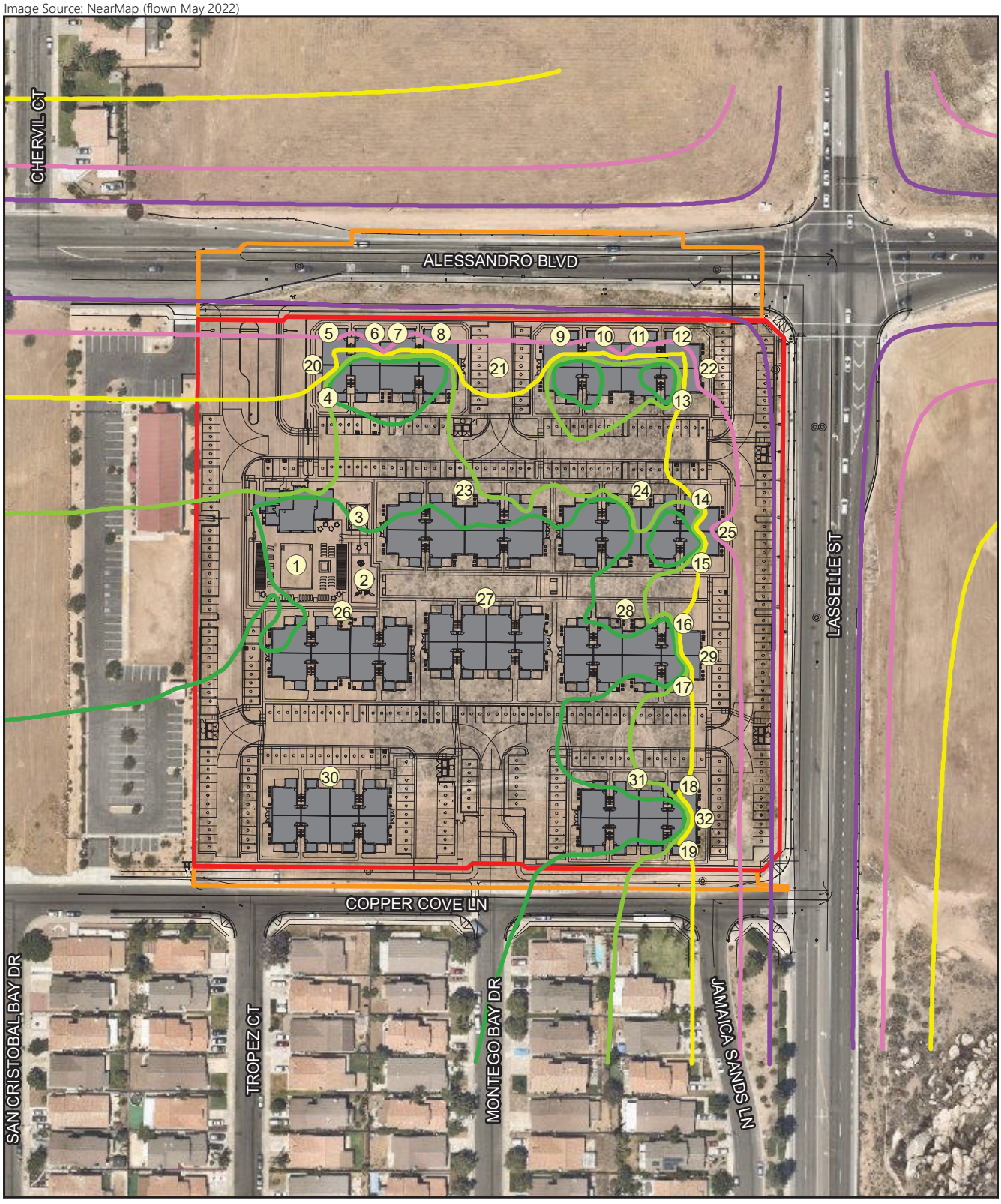
The project site is exposed to vehicle traffic noise from Alessandro Boulevard and Lasselle Street. As shown in Table 1, multi-family residential uses are "normally acceptable" with noise levels up to 65 CNEL, "conditionally acceptable" with noise levels from 65 to 70 CNEL, "normally unacceptable with noise levels from 70 to 75 CNEL, and "clearly unacceptable" with noise levels above 75 CNEL. The interior noise level standard is 45 CNEL.

Exterior Noise

Vehicle traffic noise level contours across the project site were calculated using SoundPLAN. These noise contours are shown in Figure 6. Contours take into account shielding provided by proposed buildings. As shown on Figure 6, noise levels are projected to be less than 65 CNEL across a majority of the project site. Noise levels are projected to exceed 65 CNEL at the northern and eastern project boundaries. Ground floor noise levels at all proposed buildings are not projected to exceed 70 CNEL.

Noise levels were also modeled at the exterior use area (pool, cabanas, and tot lot), at the balconies facing located closest to Alessandro Boulevard and Lasselle Street, and around the building façades. Noise levels were modeled at the exterior use area to determine exterior noise compatibility with City standards. Noise levels were modeled at balconies and building façades in order to determine the necessary noise reduction measures needed to reduce interior noise levels to 45 CNEL or less. Exterior noise levels are summarized in Table 10. SoundPLAN data is presented in Attachment 4.

Image Source: NearMap (flown May 2022)



Project Boundary

Off-site Improvement Area

Receivers

Buildings

Site Plan

Vehicle Traffic Noise

50 CNEL

55 CNEL

60 CNEL

65 CNEL

70 CNEL

0 Feet 150

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FIGURE 6

Vehicle Traffic Noise Contours

Table 10 On-Site Vehicle Traffic Noise Levels				
		Exterior Noise Level (CNEL)		
Receiver	Location	1st Floor	2nd Floor	3rd Floor
1	Clubhouse Exterior Space	49	--	--
2	Clubhouse Exterior Space	47	--	--
3	Clubhouse Exterior Space	51	--	--
4	Building 1 Balcony	53	56	58
5	Building 1 Balcony	66	70	70
6	Building 1 Balcony	66	70	70
7	Building 1 Balcony	66	69	70
8	Building 1 Balcony	66	70	70
9	Building 9 Balcony	66	70	70
10	Building 9 Balcony	67	70	71
11	Building 9 Balcony	66	70	70
12	Building 9 Balcony	68	71	72
13	Building 9 Balcony	60	64	65
14	Building 8 Balcony	63	66	67
15	Building 8 Balcony	61	65	66
16	Building 7 Balcony	61	64	65
17	Building 7 Balcony	60	63	65
18	Building 6 Balcony	61	64	--
19	Building 6 Balcony	60	64	--
20	Building 1 Façade	62	65	67
21	Building 1/9 Façade	62	66	67
22	Building 9 Façade	67	70	71
23	Building 2 Façade	54	57	59
24	Building 8 Façade	57	60	62
25	Building 8 Façade	65	69	69
26	Building 3 Façade	46	49	51
27	Building 5 Façade	44	47	49
28	Building 7 Façade	53	56	58
29	Building 7 Façade	63	67	68
30	Building 4 Façade	45	48	--
31	Building 6 Façade	54	57	--
32	Building 6 Façade	63	67	--
CNEL = community noise equivalent level				

As shown in Table 10, exterior noise levels at the exterior use area (Receivers 1 through 3) would range from 47 to 51, which would be less than the City's "normally acceptable" compatibility standard of 65 CNEL. Therefore, the project would not be exposed to exterior noise levels in excess of standards established in the General Plan, and impacts would be less than significant.

Interior Noise

Interior noise levels can be reduced through standard construction techniques. When windows are closed, standard construction techniques provide various exterior-to-interior noise level reductions depending on the type of structure and window. According to the FHWA's Highway Traffic Noise Analysis and Abatement Guidance, buildings with masonry façades and double glazed windows can

be estimated to provide a noise level reduction of 35 dB, while light-frame structures with double glazed windows may provide noise level reductions of 20 to 25 dB (FHWA 2011).

The interior noise level standard for residential uses is 45 CNEL. As shown in Table 10, exterior noise levels would range from 44 to 72 CNEL. Standard light-frame construction would reduce exterior to interior noise levels by at least 20 dB. This analysis conservatively assumes that standard construction techniques would achieve 20 dB exterior to interior noise reduction. Using this assumption, interior noise levels would be reduced to 45 CNEL or less in buildings exposed to exterior noise levels of 65 CNEL or less.

The sound transmission class (STC) rating of windows, walls, and roofs is an integer value that rates how well a building component attenuates noise. The STC rating general reflects the decibel reduction that a building component can achieve. Therefore, because a noise reduction of up to 27 dB(A) is required to achieve interior noise levels of 45 CNEL or less, building components with an STC rating of up to 27 are required. Standard walls and roofs typically have STC ratings greater than 40, therefore, this analysis focuses on the minimum required window STC ratings.

Table 11 summarizes the required composite STC ratings that need to be achieved in each location exceeding 65 CNEL. The provision of windows that have an STC equal to or greater than the values shown in Table 11 would be sufficient to reduce interior noise levels to 45 CNEL or less. Therefore, the project would not be exposed to interior noise levels in excess of standards established in the General Plan, and impacts would be less than significant.

Table 11
Typical Construction Equipment Noise Levels

Building	Maximum Exterior Noise Level (CNEL)	Required Window STC Rating
Building 1	70	25
Building 2	59	--
Building 3	51	--
Building 4	48	--
Building 5	49	--
Building 6	67	22
Building 7	68	23
Building 8	69	24
Building 9	72	27

-- = Exterior noise levels are less than 65 CNEL, therefore, standard construction would reduce interior noise levels to less than 45 CNEL and windows with an increased STC rating would not be required.

5.2.2 Off-site Vehicle Traffic Noise

The project would increase traffic volumes on local roadways. However, the project would not substantially alter the vehicle classifications mix on local or regional roadways, nor would the project alter the speed on an existing roadway or create a new roadway. Thus, the primary factor affecting off-site noise levels would be increased traffic volumes. While changes in noise levels would occur along any roadway where project-related traffic occurs, for noise assessment purposes, noise level

increases are assumed to be greatest nearest the project site, as this location would represent the greatest concentration of project-related traffic. A substantial noise increase is defined as an increase of 3 dB above existing conditions.

Based on the ITE Trip Generation Manual, 11th Edition, the project would generate 6.74 weekday trips per unit for a total of 1,348 daily weekday trips (K2 Traffic Engineering, Inc. 2022). Typically, a project would have to double the traffic volume on a roadway in order to have a significant direct noise increase of 3 dB or more or to be major contributor to the cumulative traffic volumes. Based on the existing traffic volumes shown in Table 8, an increase of 1,348 trips on Alessandro Boulevard would result in a noise increase of 0.7 to 0.8 dB, and an increase of 1,348 trips on Lasselle Street would result in a noise increase of 0.9 to 1.2 dB. These would not be audible changes in noise levels. Therefore, operational roadway noise would not generate a substantial permanent increase in ambient noise levels for off-site noise sensitive land uses, and impacts would be less than significant.

5.3 On-site Generated Noise

The primary noise sources on-site would be HVAC equipment. Using the on-site noise source parameters discussed in Section 4.3, noise levels were modeled at a series of 12 receivers located at the adjacent uses. Modeled receivers and HVAC noise contours are shown in Figures 7. Modeled data is included in Attachment 5. Future projected noise levels are summarized in Table 12.

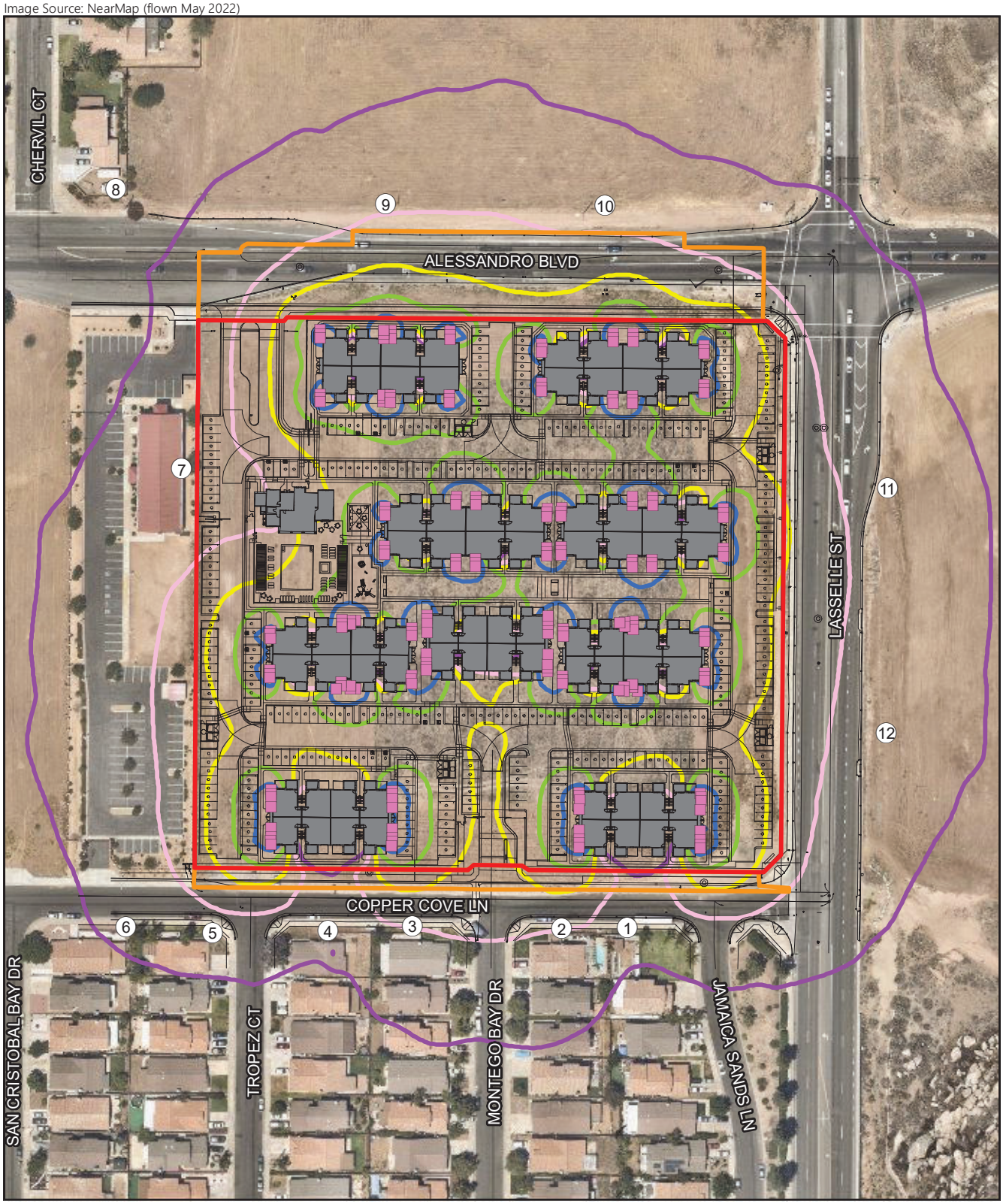
Table 12
HVAC Noise Levels at Adjacent Property Lines
[dB(A) L_{eq}]

Receiver	Land Use	Applicable Limit Daytime/Nighttime[1]	HVAC Noise Level
1	Residential	60/55	41
2	Residential	60/55	45
3	Residential	60/55	45
4	Residential	60/55	41
5	Residential	60/55	43
6	Residential	60/55	41
7	Church	65/60	43
8	Residential	60/55	38
9	Undeveloped	--	44
10	Undeveloped	--	43
11	Undeveloped	--	43
12	Undeveloped	--	43

dB(A) L_{eq} = A-weighted decibels equivalent noise level
[1]Refer to Section 2.2.1.

As shown in Table 12, HVAC noise levels are anticipated to range from 38 to 45 dB(A) L_{eq}, which would not exceed the applicable limits as specified in Section 11.80.030(C) of the City's Municipal Code. Therefore, operational HVAC noise would not generate a substantial permanent increase in ambient noise levels in excess of limits established in the Municipal Code, and impacts would be less than significant.

Image Source: NearMap (flown May 2022)



Project Boundary
Off-site Improvement Area
Receivers
HVAC Unit
Buildings
Site Plan

HVAC Noise
40 dB(A) L_{eq}
45 dB(A) L_{eq}
50 dB(A) L_{eq}
55 dB(A) L_{eq}
60 dB(A) L_{eq}

0 Feet 150

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FIGURE 7
HVAC Noise Contours

5.4 Vibration

Human reaction to vibration is dependent on the environment the receiver is in, as well as individual sensitivity. For example, vibration outdoors is rarely noticeable and generally not considered annoying. Typically, humans must be inside a structure for vibrations to become noticeable and/or annoying. Based on several federal studies, the threshold of perception is 0.035 in/sec PPV, with 0.24 in/sec PPV being a distinctly perceptible (Caltrans 2013). As specified in Mitigation Framework NOS-2 in Section 2.1.2, vibration levels shall not exceed FTA architectural damage thresholds (e.g., 0.12 in/sec PPV for fragile or historical resources, 0.2 in/sec PPV for non-engineered timber and masonry buildings, and 0.3 in/sec PPV for engineered concrete and masonry).

Construction activities produce varying degrees of ground vibration, depending on the equipment and methods employed. While ground vibrations from typical construction activities very rarely reach levels high enough to cause damage to structures, special consideration must be made when sensitive or historic land uses are near the construction site. The construction activities that typically generate the highest levels of vibration are blasting and impact pile driving and the use of a vibratory roller. However, the project would not require blasting, pile driving, or vibratory rollers. The largest piece of vibration-generating equipment that could be used for project construction is a large bulldozer. Large bulldozers generate a vibration level of 0.089 in/sec PPV at 25 feet. The nearest receptors are the residential uses located approximately 40 feet south of the southern project boundary and the church located approximately 20 feet west of the western project boundary. A vibration level of 0.089 in/sec PPV at 25 feet would be 0.114 in/sec PPV at 20 feet and 0.053 in/sec PPV at 40 feet. These vibration levels would be less than the FTA thresholds. Additionally, construction equipment would move throughout the entire site and would only be located near the project boundaries for short periods of time. Thus, vibration levels at the receptors located near the project boundaries would be less than these maximum levels for a majority of the construction period. Although vibration levels may be perceptible for short periods of time, maximum vibration levels would not exceed FTA thresholds. Therefore, project construction would not generate excessive ground borne vibration or ground borne noise levels, and impacts would be less than significant. Once operational, the project would not be a source of ground borne vibration or ground borne noise.

6.0 Conclusions

6.1 Construction Noise

The City's 2040 General Plan Final EIR mitigation framework NOS-1 addresses construction noise and requires construction noise reduction measures to be implemented for projects that exceed the noise standards contained in Sections 8.14.040(E) and 11.80.030(D)(7) of the Municipal Code (City of Moreno Valley 2021a). The City does not specify a numerical noise level limit applicable to construction activities, however, the FTA's Transit Noise and Vibration Impact Assessment manual indicates that 80 dB(A) L_{eq} is reasonable criteria for assessing construction noise levels at residential uses.

As shown in Table 9, construction noise levels are not anticipated to exceed 80 dB(A) L_{eq} at the adjacent uses. Additionally, should construction of the project occur at the same time as construction of the project located west of the adjacent church, cumulative construction noise levels are also not anticipated to exceed 80 dB(A) L_{eq}. The City regulates construction noise through Sections 8.14.040(E) and 11.80.030(D)(7) of the Municipal Code by limiting construction activities to 7:00 a.m. to 7:00 p.m. from Monday through Friday excluding holidays and from 8:00 a.m. to 4:00 p.m. on Saturdays. Construction activities would only occur during the hours permitted by the Municipal Code under Sections 8.14.040(E) and 11.80.030(D)(7) of the Municipal Code. Therefore, on-site construction activities would not generate a substantial temporary increase in ambient noise levels, and impacts would be less than significant.

6.2 Vehicle Traffic Noise

6.2.1 On-site Noise Compatibility

The project site is exposed to vehicle traffic noise from Alessandro Boulevard and Lasselle Street. Multi-family residential uses are "normally acceptable" with noise levels up to 65 CNEL, "conditionally acceptable" with noise levels from 65 to 70 CNEL, "normally unacceptable with noise levels from 70 to 75 CNEL, and "clearly unacceptable" with noise levels above 75 CNEL. The interior noise level standard is 45 CNEL. As shown in Table 10, exterior noise levels at the exterior use area (Receivers 1 through 3) would range from 47 to 51, which would be less than the City's "normally acceptable" compatibility standard of 65 CNEL. Therefore, operational roadway noise would not generate a substantial permanent increase in ambient exterior noise levels, and impacts would be less than significant.

Standard light-frame construction would reduce exterior to interior noise levels by at least 20 dB. Therefore, interior noise levels would be reduced to 45 CNEL or less in buildings exposed to exterior noise levels of 65 CNEL or less. For buildings located where exterior noise levels exceed 65 CNEL, window components with an increased STC rating would be required. Table 11 summarizes the required composite STC ratings that need to be achieved in each location exceeding 65 CNEL. The provision of windows that have an STC equal to or greater than the values shown in Table 11 would be sufficient to reduce interior noise levels to 45 CNEL or less. Therefore, the project would not be exposed to noise levels in excess of standards established in the General Plan, and impacts would be less than significant.

6.2.2 Off-site Vehicle Traffic Noise

The project would increase traffic volumes on local roadways. However, the project would not substantially alter the vehicle classifications mix on local or regional roadways, nor would the project alter the speed on an existing roadway or create a new roadway. Thus, the primary factor affecting off-site noise levels would be increased traffic volumes. A substantial noise increase is defined as an increase of 3 dB above existing conditions.

Based on the ITE Trip Generation Manual, 11th Edition, the project would generate 6.74 weekday trips per unit for a total of 1,348 daily weekday trips (K2 Traffic Engineering, Inc. 2022). An increase of

1,348 trips on Alessandro Boulevard would result in a noise increase of 0.7 to 0.8 dB, and an increase of 1,348 trips on Lasselle Street would result in a noise increase of 0.9 to 1.2 dB. These would not be audible changes in noise levels. Therefore, operational roadway noise would not generate a substantial permanent increase in ambient noise levels for off-site noise sensitive land uses, and impacts would be less than significant.

6.3 On-site Generated Noise

The noise sources on the project site after completion of construction are anticipated to be those that would be typical of any multi-family residential neighborhood, such as vehicles arriving and leaving, children at play, and landscape maintenance machinery. None of these noise sources associated with multi-family uses are anticipated to violate the City's Municipal Code or result in a substantial permanent increase in existing noise levels. The project would include HVAC units. Noise levels due to HVAC units were modeled to determine if they have the potential to produce noise in excess of City limits. As shown in Table 12, HVAC noise levels are anticipated to range from 38 to 45 dB(A) L_{eq}. Noise levels would not exceed the applicable limits as specified in Section 11.80.030(C) of the City's Municipal Code. Therefore, operational HVAC noise would not generate a substantial permanent increase in ambient noise levels in excess of limits established in the Municipal Code, and impacts would be less than significant.

6.4 Vibration

The City's 2040 General Plan Final EIR mitigation framework NOS-2 addresses construction vibration and requires that vibration levels shall not exceed FTA architectural damage thresholds (e.g., 0.12 in/sec PPV for fragile or historical resources, 0.2 in/sec PPV for non-engineered timber and masonry buildings, and 0.3 in/sec PPV for engineered concrete and masonry) (City of Moreno Valley 2021a). The nearest receptors are the residential uses located approximately 40 feet south of the southern project boundary and the church located approximately 20 feet west of the western project boundary. The largest piece of vibration-generating equipment that could be used for project construction is a large bulldozer. Vibration levels from a large bulldozer would be 0.114 in/sec PPV at the church and 0.053 in/sec PPV at the nearest residential receptor. These vibration levels would be less than the FTA thresholds. Additionally, construction equipment would move throughout the entire site and would only be located near the project boundaries for short periods of time. Thus, vibration levels at the receptors located near the project boundaries would be less than these maximum levels for a majority of the construction period. Although vibration levels may be perceptible for short periods of time, maximum vibration levels would not exceed FTA thresholds. Therefore, project construction would not generate excessive ground borne vibration or ground borne noise levels, and impacts would be less than significant. Once operational, the project would not be a source of ground borne vibration or ground borne noise.

7.0 References Cited

California Code of Regulations

2019 2019 California Building Code, California Code of Regulations, Title 24, Chapter 12 Interior Environment, Section 1206, Sound Transmission, accessed at http://www.bsc.ca.gov/codes.aspx.

California Department of Transportation (Caltrans)

2013 Technical Noise Supplement. November.

Federal Highway Administration (FHWA)

2006 Roadway Construction Noise Model User's Guide. FHWA-HEP-05-054, SOT-VNTSC-FHWA-05-01. Final Report. January 2006.

2011 Highway Traffic Noise: Analysis and Abatement Guidance. FHWA-HEP-10-025. December 2011.

Federal Transit Administration (FTA)

2018 Transit Noise and Vibration Impact Assessment Manual. FTA Report No. 0123. Prepared by John A. Volpe National Transportation Systems Center. September 2018.

K2 Traffic Engineering, Inc.

2022 Crystal Cove Project Scoping Form. Prepared on April 26, 2022.

Moreno Valley, City of

2021a Final Environmental Impact Report for the MoVal 2040: Moreno Valley Comprehensive Plan Update, Housing Element Update, and Climate Action Plan. SCH #2020039022. May 20, 2021.

2021b General Plan 2040. Adopted June 15, 2021.

Navcon Engineering, Inc.

2018 SoundPLAN Essential version 4.1.

ATTACHMENTS

ATTACHMENT 1

Noise Measurement Data

Summary

File Name on Meter	LxT_Data.007.s
File Name on PC	LxTse_0003828-20220426 143127-LxT_Data.007.ldbin
Serial Number	0003828
Model	SoundExpert® LxT
Firmware Version	2.404
User	
Location	
Job Description	
Note	

Measurement

Description	
Start	2022-04-26 14:31:27
Stop	2022-04-26 14:47:00
Duration	00:15:32.9
Run Time	00:15:01.1
Pause	00:00:31.8
Pre-Calibration	2022-04-26 13:15:00
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	A Weighting
Detector	Slow
Preamplifier	PRMLxT1L
Microphone Correction	Off
Integration Method	Linear
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	A Weighting
OBA Max Spectrum	At LMax
Overload	121.5 dB

	A	C	Z
Under Range Peak	**78.1**	75.1	80.1 dB
Under Range Limit	**24.0**	24.8	30.6 dB
Noise Floor	14.8	15.6	21.5 dB

Results

L_{Aeq}	60.3	
LAE	89.9	
EA	107.917 µPa²h	
$L_{Apeak\ (max)}$	2022-04-26 14:42:34	91.9 dB
L_{ASmax}	2022-04-26 14:42:35	77.0 dB
L_{ASmin}	2022-04-26 14:38:09	41.1 dB
SEA	-99.9 dB	
LAS > 85.0 dB (Exceedance Counts / Duration)	0	0.0 s
LAS > 115.0 dB (Exceedance Counts / Duration)	0	0.0 s
L_{Apeak} > 135.0 dB (Exceedance Counts / Duration)	0	0.0 s
L_{Apeak} > 137.0 dB (Exceedance Counts / Duration)	0	0.0 s
L_{Apeak} > 140.0 dB (Exceedance Counts / Duration)	0	0.0 s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**	
	60.3	60.3	-99.9	60.3	60.3	-99.9	-99.9	dB

L_{Ceq}	70.9 dB	
L_{Aeq}	60.3 dB	
L_{Ceq} - L_{Aeq}	10.6 dB	
L_{ALeq}	61.8 dB	
L_{Aeq}	60.3 dB	
L_{ALeq} - L_{Aeq}	1.5 dB	

	A		C		Z	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
L_{eq}	60.3		70.9			
$L_{S(max)}$	77.0	2022/04/26 14:42:35				
$L_{S(min)}$	41.1	2022/04/26 14:38:09				
$L_{Peak(max)}$	91.9	2022/04/26 14:42:34				

Overload Count	0
Overload Duration	0.0 s
OBA Overload Count	0
OBA Overload Duration	0.0 s

Statistics

LA5.00	65.6 dB
LA10.00	63.0 dB
LA33.30	57.9 dB
LA50.00	55.3 dB
LA66.60	52.5 dB
LA90.00	47.4 dB

Summary

File Name on Meter	LxT_Data.008.s
File Name on PC	LxTse_0003828-20220426 151027-LxT_Data.008.ldbin
Serial Number	0003828
Model	SoundExpert® LxT
Firmware Version	2.404
User	
Location	
Job Description	
Note	

Measurement

Description	
Start	2022-04-26 15:10:27
Stop	2022-04-26 15:25:43
Duration	00:15:15.8
Run Time	00:15:00.4
Pause	00:00:15.4
Pre-Calibration	2022-04-26 13:15:00
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	A Weighting
Detector	Slow
Preamplifier	PRMLxT1L
Microphone Correction	Off
Integration Method	Linear
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	A Weighting
OBA Max Spectrum	At LMax
Overload	121.5 dB

	A	C	Z
Under Range Peak	**78.1**	75.1	80.1 dB
Under Range Limit	**24.0**	24.8	30.6 dB
Noise Floor	14.8	15.6	21.5 dB

Results

L_{Aeq}	49.0	
LAE	78.6	
EA	7.973 µPa²h	
$L_{Apeak\ (max)}$	2022-04-26 15:25:13	84.6 dB
L_{ASmax}	2022-04-26 15:10:27	67.1 dB
L_{ASmin}	2022-04-26 15:22:09	35.6 dB
SEA	-99.9 dB	
LAS > 85.0 dB (Exceedance Counts / Duration)	0	0.0 s
LAS > 115.0 dB (Exceedance Counts / Duration)	0	0.0 s
L_{Apeak} > 135.0 dB (Exceedance Counts / Duration)	0	0.0 s
L_{Apeak} > 137.0 dB (Exceedance Counts / Duration)	0	0.0 s
L_{Apeak} > 140.0 dB (Exceedance Counts / Duration)	0	0.0 s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**	
	49.0	49.0	-99.9	49.0	49.0	-99.9	-99.9	dB

L_{Ceq}	64.4 dB
L_{Aeq}	49.0 dB
L_{Ceq} - L_{Aeq}	15.4 dB
L_{ALeq}	50.8 dB
L_{Aeq}	49.0 dB
L_{ALeq} - L_{Aeq}	1.8 dB

	A		C		Z	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
L_{eq}	49.0		64.4			
$L_{S(max)}$	67.1	2022/04/26 15:10:27				
$L_{S(min)}$	35.6	2022/04/26 15:22:09				
$L_{Peak(max)}$	84.6	2022/04/26 15:25:13				

Overload Count	0
Overload Duration	0.0 s
OBA Overload Count	0
OBA Overload Duration	0.0 s

Statistics

LA5.00	54.5 dB
LA10.00	52.6 dB
LA33.30	49.0 dB
LA50.00	47.1 dB
LA66.60	44.6 dB
LA90.00	39.1 dB

Summary

File Name on Meter	LxT_Data.009.s
File Name on PC	LxTse_0003828-20220426 154127-LxT_Data.009.ldbin
Serial Number	0003828
Model	SoundExpert® LxT
Firmware Version	2.404
User	
Location	
Job Description	
Note	

Measurement

Description	
Start	2022-04-26 15:41:27
Stop	2022-04-26 15:56:43
Duration	00:15:16.5
Run Time	00:15:01.4
Pause	00:00:15.1
Pre-Calibration	2022-04-26 13:15:00
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	A Weighting
Detector	Slow
Preamplifier	PRMLxT1L
Microphone Correction	Off
Integration Method	Linear
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	A Weighting
OBA Max Spectrum	At LMax
Overload	121.5 dB

	A	C	Z
Under Range Peak	**78.1**	75.1	80.1 dB
Under Range Limit	**24.0**	24.8	30.6 dB
Noise Floor	14.8	15.6	21.5 dB

Results

L_{Aeq}	60.4	
LAE	89.9	
EA	108.565 µPa²h	
$L_{Apeak\ (max)}$	2022-04-26 15:46:17	89.4 dB
L_{ASmax}	2022-04-26 15:46:17	76.5 dB
L_{ASmin}	2022-04-26 15:43:37	42.8 dB
SEA	-99.9 dB	
LAS > 85.0 dB (Exceedance Counts / Duration)	0	0.0 s
LAS > 115.0 dB (Exceedance Counts / Duration)	0	0.0 s
L_{Apeak} > 135.0 dB (Exceedance Counts / Duration)	0	0.0 s
L_{Apeak} > 137.0 dB (Exceedance Counts / Duration)	0	0.0 s
L_{Apeak} > 140.0 dB (Exceedance Counts / Duration)	0	0.0 s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**	
	60.4	60.4	-99.9	60.4	60.4	-99.9	-99.9	dB

L_{Ceq}	72.3 dB	
L_{Aeq}	60.4 dB	
L_{Ceq} - L_{Aeq}	12.0 dB	
L_{ALeq}	61.8 dB	
L_{Aeq}	60.4 dB	
L_{ALeq} - L_{Aeq}	1.5 dB	

	A		C		Z	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
L_{eq}	60.4		72.3			
$L_{S(max)}$	76.5	2022/04/26 15:46:17				
$L_{S(min)}$	42.8	2022/04/26 15:43:37				
$L_{Peak(max)}$	89.4	2022/04/26 15:46:17				

Overload Count	0
Overload Duration	0.0 s
OBA Overload Count	0
OBA Overload Duration	0.0 s

Statistics

LA5.00	64.7 dB
LA10.00	62.7 dB
LA33.30	59.5 dB
LA50.00	58.1 dB
LA66.60	55.6 dB
LA90.00	50.6 dB

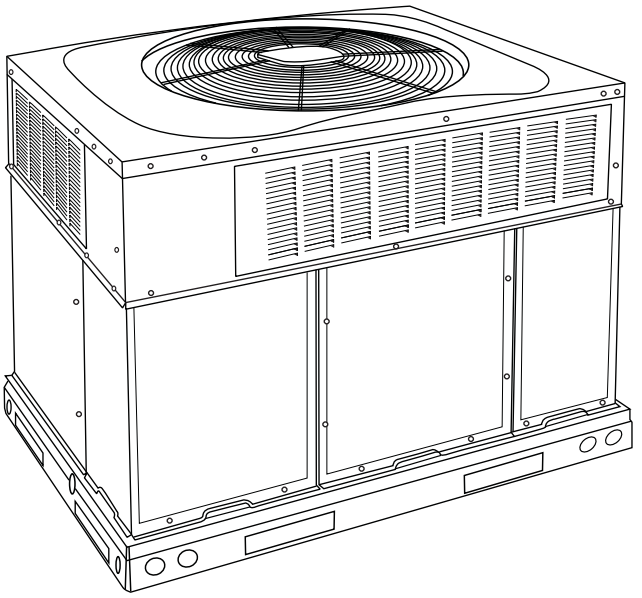
ATTACHMENT 2

HVAC Specifications

50VG–A
Performance™ 16 SEER 2–Stage Packaged Air Conditioner System with Puron® (R–410A) Refrigerant
Single and Three Phase
2 to 5 Nominal Tons (Sizes 24–60)

Carrier
turn to the experts

Product Data



A09033

Fig. 1 - Unit 50VG-A

Single-Packaged Products with Energy-Saving Features and Puron® refrigerant.

- 15.0-16.0 SEER / 12.0-12.5 EER
- Factory-Installed TXV
- Multi-speed ECM Blower Motor - Standard
- Sound levels as low as 72dBA
- Two Stages of Cooling
- Dehumidification Feature

FEATURES/BENEFITS

One-piece cooling unit with optional electric heater, low sound levels, easy installation, low maintenance, and dependable performance.

Puron Environmentally Sound Refrigerant is Carrier's unique refrigerant designed to help protect the environment. Puron is an HFC refrigerant which does not contain chlorine that can harm the ozone layer. Puron refrigerant is in service in millions of systems proving highly reliable, environmentally sound performance.

Easy Installation

Factory-assembled package is a compact, fully self-contained, electric cooling unit that is prewired, pre-piped, and pre-charged for minimum installation expense. These units are available in a variety of standard cooling sizes with voltage options to meet residential and light commercial requirements. Units are lightweight and install easily on a rooftop or at ground level. The high tech composite base eliminates rust problems associated with ground level applications.

Innovative Unit Base Design

On the inside a high-tech composite material will not rust and incorporates a sloped drain pan which improves drainage and helps inhibit mold, algae and bacterial growth. On the outside metal base rails provide added stability as well as easier handling and rigging.

Convertible duct configuration

Unit is designed for use in either downflow or horizontal applications. Each unit is converted from horizontal to downflow and includes horizontal duct covers. Downflow operation is provided in the field to allow vertical ductwork connections. The basepan seals on the bottom openings to ensure a positive seal in the vertical airflow mode.

Efficient operation High-efficiency design offers SEER (Seasonal Energy Efficiency Ratios) of up to 16.0. (See page 4.)

Durable, dependable components

Scroll Compressors have 2 stages of cooling and are designed for high efficiency. Each compressor is hermetically sealed against contamination to help promote longer life and dependable operation. Each compressor also has vibration isolation to provide quieter operation. All compressors have internal high pressure and overcurrent protection.

Multi-speed ECM Blower Motor is standard on all 50VG-A.

Direct-drive PSC (Permanent Split Capacitor) condenser-fan motors are designed to help reduce energy consumption and provide for cooing operation down to 40°F (4.4°C) outdoor temperature. Motormaster® II low ambient kit is available as a field-installed accessory.

Thermostatic Expansion Valve - A hard shutoff, balance port TXV maintains a constant superheat at the evaporator exit (cooling cycle) resulting in higher overall system efficiency.

Refrigerant system is designed to provide dependability. Liquid filter driers are used to promote clean, unrestricted operation. Each unit leaves the factory with a full refrigerant charge. Refrigerant service connections make checking operating pressures easier.

High and Low Pressure Switches provide added reliability for the compressor.

Indoor and Outdoor coils are computer-designed for optimum heat transfer and efficiency. The indoor coil is fabricated from copper tube and aluminum fins and is located inside the unit for protection against damage. The outdoor coil is internally mounted on the top tier of the unit.

Low sound ratings ensure a quiet indoor and outdoor environment with sound ratings as low as 72dBA. (See Page 4.)

Easy to service cabinets provide easy 3 panel accessibility to serviceable components during maintenance and installation. The basepan with integrated drain pan provides easy ground level installation with a mounting pad. A nesting feature ensures a positive basepan to roof curb seal when the unit is roof mounted. A convenient 3/4-in. (19.05 mm) wide perimeter flange makes frame mounting on a rooftop easy.

AHRI* CAPACITIES

Cooling Capacities and Efficiencies

Unit Model 50VG-A	Nominal Tons	Standard CFM (High / Low Stage)	Net Cooling Capacities - Btuh (High Stage)	EER @A**	SEER†
24	2	800 / 600	23000	12.0	15.0
30	2-1/2	1000 / 750	29000	12.0	15.0
36	3	1200 / 900	35400	12.5	16.0
42	3-1/2	1400 / 1050	42000	12.5	16.0
48	4	1600 / 1200	47500	12.3	16.0
60	5	1750 / 1200	57000	12.3	16.0

LEGEND
dB–Sound Levels (decibels)
db—Dry Bulb
SEER—Seasonal Energy Efficiency Ratio
wb—Wet Bulb
COP–Coefficient of Performance
* Air Conditioning, Heating & Refrigeration Institute.
**At "A" conditions–80°F (26.7°C) indoor db/67°F (19.4°C) indoor wb & 95°F (35°C) outdoor db.
† Rated in accordance with U.S. Government DOE Department of Energy) test procedures and/or AHRI Standards 210/240.

Notes:
1. Ratings are net values, reflecting the effects of circulating fan heat. Ratings are based on:
Cooling Standard: 80°F (26.7°C) db, 67°F wb (19.4°C) indoor entering–air temperature and 95°F db (35°C) outdoor entering–air temperature.
2. Before purchasing this appliance, read important energy cost and efficiency information available from AHRIdirectory.org.

A-WEIGHTED SOUND POWER LEVEL (dBA)

Model 50VG-A	Sound Ratings (dBA)	TYPICAL OCTAVE BAND SPECTRUM (dBA without tone adjustment)						
		125	250	500	1000	2000	4000	8000
24	73	60.0	62.5	68.5	68.5	64.0	60.0	53.0
30	77	57.5	67.0	73.5	72.0	67.0	61.0	52.5
36	73	62.5	65.5	67.5	68.0	65.5	60.0	52.5
42	73	60.5	63.5	68.0	68.0	66.0	60.5	53.0
48	72	60.0	63.5	66.0	67.0	63.5	58.5	49.5
60	75	69.0	67.0	69.0	68.0	65.0	61.5	54.0

NOTE: Tested in accordance with AHRI Standard 270 (not listed in AHRI).

ATTACHMENT 3

SoundPLAN Data – Construction Noise

10113 Crystal Cove

SoundPLAN Data - Construction

		Noise Level	Corrections		
Source name	Reference	Leq1	Cwall	CI	CT
		dB(A)	dB(A)	dB(A)	dB(A)
Construction	Lw/unit	116.3	-	-	-

10113 Crystal Cove

SoundPLAN Data - Construction

No.	Coordinates X	Coordinates Y	Noise Level Crystal Cove Only	Noise Level Crystal Cove & Flamingo Bay
	(meters)		dB(A) Leq	dB(A) Leq
1	480623.20	3752798.43	67.6	67.9
2	480602.42	3752798.01	67.7	68.0
3	480555.03	3752798.43	67.7	68.2
4	480528.42	3752796.77	67.0	67.7
5	480491.84	3752795.94	64.9	66.8
6	480464.41	3752797.60	62.1	66.9
7	480481.03	3752942.68	69.3	70.9
8	480459.42	3753031.22	60.0	64.4
9	480545.05	3753027.06	63.6	64.7
10	480614.47	3753027.06	63.6	64.2
11	480704.68	3752938.10	64.3	64.6
12	480704.68	3752860.78	64.3	64.7

ATTACHMENT 4

SoundPLAN Data – Future Traffic Noise

Station	ADT	Traffic values Vehicles type	Vehicle nar	day	evening	night	Speed	Control device	Constr. Speed	Affect. veh.	Road surface	Gradient Min / Max
km	Veh/24h			Veh/h	Veh/h	Veh/h	km/h		km/h	%		%
Lasselle Street	Traffic direction:	In entry direction										
0+000	10848	Total	-	696	361	157	-	none	-	-	Average (of DGAC and PCC)	0
0+000	10848	Automobiles	-	666	345	150	80	none	-	-	Average (of DGAC and PCC)	0
0+000	10848	Medium trucks	-	12	6	3	80	none	-	-	Average (of DGAC and PCC)	0
0+000	10848	Heavy trucks	-	4	2	1	80	none	-	-	Average (of DGAC and PCC)	0
0+000	10848	Buses	-	7	4	2	80	none	-	-	Average (of DGAC and PCC)	0
0+000	10848	Motorcycles	-	7	4	2	80	none	-	-	Average (of DGAC and PCC)	0
0+000	10848	Auxiliary vehicle	-	-	-	-	-	none	-	-	Average (of DGAC and PCC)	0
0+531	15228	Total	-	977	508	220	-	none	-	-	Average (of DGAC and PCC)	0
0+531	15228	Automobiles	-	935	486	211	80	none	-	-	Average (of DGAC and PCC)	0
0+531	15228	Medium trucks	-	17	9	4	80	none	-	-	Average (of DGAC and PCC)	0
0+531	15228	Heavy trucks	-	6	3	1	80	none	-	-	Average (of DGAC and PCC)	0
0+531	15228	Buses	-	10	5	2	80	none	-	-	Average (of DGAC and PCC)	0
0+531	15228	Motorcycles	-	10	5	2	80	none	-	-	Average (of DGAC and PCC)	0
0+531	15228	Auxiliary vehicle	-	-	-	-	-	none	-	-	Average (of DGAC and PCC)	0
0+897	-	-	-	-	-	-						
Alessandro Boulevard	Traffic direction:	In entry direction										
0+000	25635	Total	-	1645	855	370	-	none	-	-	Average (of DGAC and PCC)	0
0+000	25635	Automobiles	-	1545	803	347	72	none	-	-	Average (of DGAC and PCC)	0
0+000	25635	Medium trucks	-	41	21	9	72	none	-	-	Average (of DGAC and PCC)	0
0+000	25635	Heavy trucks	-	26	14	6	72	none	-	-	Average (of DGAC and PCC)	0
0+000	25635	Buses	-	16	9	4	72	none	-	-	Average (of DGAC and PCC)	0
0+000	25635	Motorcycles	-	16	9	4	72	none	-	-	Average (of DGAC and PCC)	0
0+000	25635	Auxiliary vehicle	-	-	-	-	-	none	-	-	Average (of DGAC and PCC)	0
0+372	22455	Total	-	1441	749	324	-	none	-	-	Average (of DGAC and PCC)	0
0+372	22455	Automobiles	-	1353	703	304	72	none	-	-	Average (of DGAC and PCC)	0
0+372	22455	Medium trucks	-	36	19	8	72	none	-	-	Average (of DGAC and PCC)	0
0+372	22455	Heavy trucks	-	23	12	5	72	none	-	-	Average (of DGAC and PCC)	0
0+372	22455	Buses	-	14	7	3	72	none	-	-	Average (of DGAC and PCC)	0
0+372	22455	Motorcycles	-	14	7	3	72	none	-	-	Average (of DGAC and PCC)	0
0+372	22455	Auxiliary vehicle	-	-	-	-	-	none	-	-	Average (of DGAC and PCC)	0
0+774	26742	Total	-	1716	892	386	-	none	-	-	Average (of DGAC and PCC)	0
0+774	26742	Automobiles	-	1611	838	362	80	none	-	-	Average (of DGAC and PCC)	0
0+774	26742	Medium trucks	-	43	22	10	80	none	-	-	Average (of DGAC and PCC)	0
0+774	26742	Heavy trucks	-	27	14	6	80	none	-	-	Average (of DGAC and PCC)	0
0+774	26742	Buses	-	17	9	4	80	none	-	-	Average (of DGAC and PCC)	0
0+774	26742	Motorcycles	-	17	9	4	80	none	-	-	Average (of DGAC and PCC)	0
0+774	26742	Auxiliary vehicle	-	-	-	-	-	none	-	-	Average (of DGAC and PCC)	0
1+179	-	-	-	-	-	-						

	Coordinates			Noise Level without Balcony Barriers				Noise Level with Balcony Barriers				Difference			
No.	X	Y	Floor	Day	Evening	Night	Lden	Day	Evening	Night	Lden	Day	Evening	Night	Lden
	(meters)			dB(A)				dB(A)				dB			
1	480517.68	3752912.11	1.Fl	47.0	44.2	40.6	48.9	47.0	44.2	40.6	48.9	0	0	0	0
2	480539.30	3752907.64	1.Fl	45.2	42.3	38.7	47.1	45.2	42.3	38.7	47.1	0	0	0	0
3	480537.39	3752927.77	1.Fl	49.1	46.3	42.7	51.0	49.1	46.3	42.6	51.0	0	0	0	0
4	480527.30	3752965.35	1.Fl	51.3	48.5	44.9	53.2	51.3	48.5	44.9	53.2	0	0	0	0
4	480527.30	3752965.35	2.Fl	54.1	51.3	47.6	56.0	54.1	51.3	47.6	56.0	0	0	0	0
4	480527.30	3752965.35	3.Fl	56.0	53.2	49.6	57.9	56.0	53.2	49.6	57.9	0	0	0	0
5	480527.54	3752985.97	1.Fl	64.1	61.2	57.6	66.0	59.5	56.7	53.0	61.4	-4.6	-4.6	-4.6	-4.6
5	480527.54	3752985.97	2.Fl	67.6	64.7	61.1	69.5	60.3	57.5	53.8	62.2	-7.3	-7.3	-7.3	-7.3
5	480527.54	3752985.97	3.Fl	68	65.1	61.5	69.9	59.2	56.3	52.7	61.1	-8.8	-8.8	-8.8	-8.8
6	480542.02	3752985.97	1.Fl	64.2	61.4	57.7	66.1	59.7	56.8	53.2	61.6	-4.6	-4.6	-4.6	-4.6
6	480542.02	3752985.97	2.Fl	67.7	64.9	61.3	69.6	60.5	57.7	54	62.4	-7.2	-7.2	-7.2	-7.2
6	480542.02	3752985.97	3.Fl	68.1	65.3	61.6	70	59.3	56.5	52.8	61.2	-8.8	-8.8	-8.8	-8.8
7	480549.44	3752985.97	1.Fl	64.0	61.2	57.5	65.9	59.4	56.6	53.0	61.3	-4.6	-4.6	-4.6	-4.6
7	480549.44	3752985.97	2.Fl	67.5	64.7	61.1	69.4	60.3	57.5	53.8	62.2	-7.3	-7.3	-7.3	-7.3
7	480549.44	3752985.97	3.Fl	67.9	65.1	61.4	69.8	59.1	56.3	52.6	61	-8.8	-8.8	-8.8	-8.8
8	480563.23	3752985.97	1.Fl	64.5	61.6	58.0	66.4	60.0	57.1	53.5	61.9	-4.5	-4.5	-4.5	-4.5
8	480563.23	3752985.97	2.Fl	67.9	65.1	61.4	69.8	60.9	58	54.4	62.8	-7.1	-7.1	-7.1	-7.1
8	480563.23	3752985.97	3.Fl	68.3	65.5	61.9	70.2	59.9	57.1	53.4	61.8	-8.4	-8.4	-8.4	-8.4
9	480601.13	3752985.51	1.Fl	64.2	61.3	57.7	66.1	59.7	56.9	53.2	61.6	-4.5	-4.5	-4.5	-4.5
9	480601.13	3752985.51	2.Fl	67.7	64.9	61.2	69.6	60.6	57.7	54.1	62.5	-7.1	-7.1	-7.1	-7.1
9	480601.13	3752985.51	3.Fl	68.1	65.3	61.7	70	59.5	56.7	53.1	61.4	-8.6	-8.6	-8.6	-8.6
10	480615.04	3752985.63	1.Fl	64.8	61.9	58.3	66.7	60.2	57.3	53.7	62.1	-4.6	-4.6	-4.6	-4.6
10	480615.04	3752985.63	2.Fl	68.2	65.3	61.7	70.1	61.1	58.2	54.6	63	-7.1	-7.1	-7.1	-7.1
10	480615.04	3752985.63	3.Fl	68.7	65.8	62.2	70.6	60.1	57.3	53.7	62	-8.5	-8.5	-8.5	-8.5
11	480626.05	3752985.63	1.Fl	64.2	61.4	57.7	66.1	59.7	56.9	53.2	61.6	-4.5	-4.5	-4.5	-4.5
11	480626.05	3752985.63	2.Fl	67.7	64.9	61.2	69.6	60.6	57.8	54.1	62.5	-7.1	-7.1	-7.1	-7.1
11	480626.05	3752985.63	3.Fl	68.1	65.3	61.7	70	59.6	56.7	53.1	61.5	-8.6	-8.6	-8.6	-8.6
12	480639.72	3752985.74	1.Fl	65.9	63.0	59.4	67.8	61.1	58.3	54.6	63.0	-4.7	-4.7	-4.7	-4.7
12	480639.72	3752985.74	2.Fl	69.1	66.2	62.6	71	62.1	59.3	55.6	64	-6.9	-6.9	-6.9	-6.9
12	480639.72	3752985.74	3.Fl	69.7	66.8	63.2	71.6	61.3	58.5	54.9	63.2	-8.3	-8.3	-8.3	-8.3
13	480639.84	3752965.35	1.Fl	58.3	55.5	51.9	60.2	58.3	55.5	51.9	60.2	0	0	0	0
13	480639.84	3752965.35	2.Fl	61.6	58.7	55.1	63.5	61.6	58.8	55.1	63.5	0	0	0	0
13	480639.84	3752965.35	3.Fl	63.2	60.3	56.7	65.1	63.2	60.3	56.7	65.1	0	0	0	0
14	480646.29	3752934.12	1.Fl	60.8	57.9	54.3	62.7	56.0	53.2	49.5	57.9	-4.8	-4.8	-4.8	-4.8
14	480646.29	3752934.12	2.Fl	64	61.2	57.5	65.9	57.6	54.8	51.1	59.5	-6.4	-6.4	-6.4	-6.4
14	480646.29	3752934.12	3.Fl	65.4	62.5	58.9	67.3	57.8	54.9	51.3	59.7	-7.6	-7.6	-7.6	-7.6
15	480646.29	3752913.77	1.Fl	59.1	56.2	52.6	61.0	59.1	56.2	52.6	61.0	0	0	0	0
15	480646.29	3752913.77	2.Fl	62.7	59.8	56.2	64.6	62.7	59.8	56.2	64.6	0	0	0	0
15	480646.29	3752913.77	3.Fl	63.8	60.9	57.3	65.7	63.8	60.9	57.3	65.7	0	0	0	0
16	480640.69	3752894.51	1.Fl	58.6	55.8	52.1	60.5	58.6	55.8	52.1	60.5	0	0	0	0
16	480640.69	3752894.51	2.Fl	61.9	59.1	55.4	63.8	61.9	59.1	55.4	63.8	0	0	0	0
16	480640.69	3752894.51	3.Fl	63.3	60.5	56.9	65.2	63.3	60.5	56.9	65.2	0	0	0	0
17	480640.65	3752874.33	1.Fl	57.8	54.9	51.3	59.7	57.8	54.9	51.3	59.7	0	0	0	0
17	480640.65	3752874.33	2.Fl	61.3	58.5	54.9	63.2	61.3	58.5	54.9	63.2	0	0	0	0
17	480640.65	3752874.33	3.Fl	62.9	60.0	56.4	64.8	62.9	60.0	56.4	64.8	0	0	0	0
18	480642.96	3752843.06	1.Fl	58.9	56.1	52.5	60.8	58.9	56.1	52.5	60.8	0	0	0	0
18	480642.96	3752843.06	2.Fl	62.3	59.5	55.9	64.2	62.3	59.5	55.9	64.2	0	0	0	0
19	480642.84	3752822.33	1.Fl	58.3	55.4	51.8	60.2	58.3	55.4	51.8	60.2	0	0	0	0
19	480642.84	3752822.33	2.Fl	61.9	59.0	55.4	63.8	61.9	59.0	55.4	63.8	0	0	0	0
20	480522.54	3752975.66	1.Fl	60.2	57.3	53.7	62.1	60.2	57.4	53.7	62.1	0	0	0	0
20	480522.54	3752975.66	2.Fl	63.4	60.6	56.9	65.3	63.4	60.6	56.9	65.3	0	0	0	0
20	480522.54	3752975.66	3.Fl	64.7	61.9	58.3	66.6	64.7	61.9	58.3	66.6	0	0	0	0
21	480581.50	3752975.19	1.Fl	60.4	57.6	53.9	62.3	60.4	57.6	53.9	62.3	0	0	0	0
21	480581.50	3752975.19	2.Fl	63.6	60.8	57.2	65.5	63.7	60.8	57.2	65.6	0	0	0	0
21	480581.50	3752975.19	3.Fl	65.0	62.1	58.5	66.9	65.0	62.1	58.5	66.9	0	0	0	0
22	480648.26	3752975.59	1.Fl	64.6	61.8	58.2	66.5	64.6	61.8	58.2	66.6	0	0	0	0
22	480648.26	3752975.59	2.Fl	67.6	64.8	61.1	69.5	67.6	64.8	61.1	69.5	0	0	0	0
22	480648.26	3752975.59	3.Fl	68.6	65.8	62.1	70.5	68.6	65.8	62.1	70.5	0	0	0	0
23	480570.76	3752936.37	1.Fl	52.4	49.6	46.0	54.3	52.4	49.6	46.0	54.3	0	0	0	0
23	480570.76	3752936.37	2.Fl	55.1	52.3	48.6	57.0	55.1	52.3	48.6	57.0	0	0	0	0
23	480570.76	3752936.37	3.Fl	56.9	54.0	50.4	58.8	56.9	54.0	50.4	58.8	0	0	0	0
24	480626.98	3752936.58	1.Fl	55.4	52.6	49.0	57.3	55.5	52.6	49.0	57.4	0	0	0	0
24	480626.98	3752936.58	2.Fl	58.3	55.5	51.8	60.2	58.3	55.5	51.9	60.2	0	0	0	0
24	480626.98	3752936.58	3.Fl	60.1	57.3	53.6	62.0	60.1	57.3	53.6	62.0	0	0	0	0
25	480654.56	3752923.82	1.Fl	63.5	60.6	57.0	65.4	63.5	60.6	57.0	65.4	0	0	0	0
25	480654.56	3752923.82	2.Fl	66.6	63.7	60.1	68.5	66.6	63.7	60.1	68.5	0	0	0	0
25	480654.56	3752923.82	3.Fl	67.1	64.2	60.6	69.0	67.1	64.2	60.6	69.0	0	0	0	0
26	480532.51	3752897.58	1.Fl	44.5	41.7	38.0	46.4	44.5	41.7	38.0	46.4	0	0	0	0
26	480532.51	3752897.58	2.Fl	47.2	44.3	40.7	49.1	47.2	44.3	40.7	49.1	0	0	0	0
26	480532.51	3752897.58	3.Fl	48.8	46.0	42.4	50.7	48.8	46.0	42.4	50.7	0	0	0	0
27	480577.86	3752902.09	1.Fl	42.2	39.4	35.8	44.1	42.2	39.4	35.8	44.1	0	0	0	0
27	480577.86	3752902.09	2.Fl	45.3	42.4	38.8	47.2	45.3	42.4	38.8	47.2	0	0	0	0
27	480577.86	3752902.09	3.Fl	47.1	44.2	40.6	49.0	47.1	44.2	40.6	49.0	0	0	0	0
28	480622.17	3752898.75	1.Fl	50.8	48.0	44.4	52.7	50.8	48.0	44.4	52.7	0	0	0	0
28	480622.17	3752898.75	2.Fl	53.9	51.1	47.5	55.8	53.9	51.1	47.5	55.8	0	0	0	0
28	480622.17	3752898.75	3.Fl	56.1	53.3	49.7	58.0	56.1	53.3	49.7	58.0	0	0	0	0
29	480648.84	3752884.29	1.Fl	61.5	58.7	55.0	63.4	61.5	58.7	55.0	63.4	0	0	0	0
29	480648.84	3752884.29	2.Fl	64.9	62.1	58.4	66.8	64.9	62.1	58.4	66.8	0	0	0	0
29	480648.84	3752884.29	3.Fl	65.9	63.1	59.4	67.8	65.9	63.1	59.4	67.8	0	0	0	0
30	480528.95	3752844.97	1.Fl	43.4	40.5	36.9	45.3	43.4	40.5	36.9	45.3	0	0	0	0
30	480528.95	3752844.97	2.Fl	46.1	43.3	39.6	48.0	46.1	43.3	39.6	48.0	0	0	0	0
31	480626.56	3752844.97	1.Fl	52.3	49.5	45.8	54.2	52.3	49.5	45.8	54.2	0	0	0	0
31	480626.56	3752844.97	2.Fl	55.4	52.6	49.0	57.4	55.4	52.6	49.0	57.4	0	0	0	0
32	480647.84	3752832.76	1.Fl	61.1	58.2	54.6	63.0	61.1	58.2	54.6	63.0	0	0	0	0
32	480647.84	3752832.76	2.Fl	64.6	61.7	58.1	66.5	64.6	61.7	58.1	66.5	0	0	0	0

ATTACHMENT 5

SoundPLAN Data – HVAC Noise

Source name	Reference	Level	Corrections		
		Leq1	Cwall	CI	CT
		dB(A)	dB(A)	dB(A)	dB(A)
HVAC1	Lw/unit	75	-	-	-
HVAC2	Lw/unit	75	-	-	-
HVAC3	Lw/unit	75	-	-	-
HVAC4	Lw/unit	75	-	-	-
HVAC5	Lw/unit	75	-	-	-
HVAC6	Lw/unit	75	-	-	-
HVAC7	Lw/unit	75	-	-	-
HVAC8	Lw/unit	75	-	-	-
HVAC9	Lw/unit	75	-	-	-
HVAC10	Lw/unit	75	-	-	-
HVAC11	Lw/unit	75	-	-	-
HVAC12	Lw/unit	75	-	-	-
HVAC13	Lw/unit	75	-	-	-
HVAC14	Lw/unit	75	-	-	-
HVAC15	Lw/unit	75	-	-	-
HVAC16	Lw/unit	75	-	-	-
HVAC17	Lw/unit	75	-	-	-
HVAC18	Lw/unit	75	-	-	-
HVAC19	Lw/unit	75	-	-	-
HVAC20	Lw/unit	75	-	-	-
HVAC21	Lw/unit	75	-	-	-
HVAC22	Lw/unit	75	-	-	-
HVAC23	Lw/unit	75	-	-	-
HVAC24	Lw/unit	75	-	-	-
HVAC25	Lw/unit	75	-	-	-
HVAC26	Lw/unit	75	-	-	-
HVAC27	Lw/unit	75	-	-	-
HVAC28	Lw/unit	75	-	-	-
HVAC29	Lw/unit	75	-	-	-
HVAC30	Lw/unit	75	-	-	-
HVAC31	Lw/unit	75	-	-	-
HVAC32	Lw/unit	75	-	-	-
HVAC33	Lw/unit	75	-	-	-
HVAC34	Lw/unit	75	-	-	-
HVAC35	Lw/unit	75	-	-	-
HVAC36	Lw/unit	75	-	-	-
HVAC37	Lw/unit	75	-	-	-
HVAC38	Lw/unit	75	-	-	-
HVAC39	Lw/unit	75	-	-	-
HVAC40	Lw/unit	75	-	-	-
HVAC41	Lw/unit	75	-	-	-
HVAC42	Lw/unit	75	-	-	-
HVAC43	Lw/unit	75	-	-	-
HVAC44	Lw/unit	75	-	-	-
HVAC45	Lw/unit	75	-	-	-
HVAC46	Lw/unit	75	-	-	-
HVAC47	Lw/unit	75	-	-	-
HVAC48	Lw/unit	75	-	-	-
HVAC49	Lw/unit	75	-	-	-
HVAC50	Lw/unit	75	-	-	-
HVAC51	Lw/unit	75	-	-	-
HVAC52	Lw/unit	75	-	-	-
HVAC53	Lw/unit	75	-	-	-
HVAC54	Lw/unit	75	-	-	-
HVAC55	Lw/unit	75	-	-	-
HVAC56	Lw/unit	75	-	-	-
HVAC57	Lw/unit	75	-	-	-
HVAC58	Lw/unit	75	-	-	-
HVAC59	Lw/unit	75	-	-	-
HVAC60	Lw/unit	75	-	-	-
HVAC61	Lw/unit	75	-	-	-
HVAC62	Lw/unit	75	-	-	-
HVAC63	Lw/unit	75	-	-	-

HVAC64	Lw/unit	75	-	-	-
HVAC65	Lw/unit	75	-	-	-
HVAC66	Lw/unit	75	-	-	-
HVAC67	Lw/unit	75	-	-	-
HVAC68	Lw/unit	75	-	-	-
HVAC69	Lw/unit	75	-	-	-
HVAC70	Lw/unit	75	-	-	-
HVAC71	Lw/unit	75	-	-	-
HVAC72	Lw/unit	75	-	-	-
HVAC73	Lw/unit	75	-	-	-
HVAC74	Lw/unit	75	-	-	-
HVAC75	Lw/unit	75	-	-	-
HVAC76	Lw/unit	75	-	-	-
HVAC77	Lw/unit	75	-	-	-
HVAC78	Lw/unit	75	-	-	-
HVAC79	Lw/unit	75	-	-	-
HVAC80	Lw/unit	75	-	-	-
HVAC81	Lw/unit	75	-	-	-
HVAC82	Lw/unit	75	-	-	-
HVAC83	Lw/unit	75	-	-	-
HVAC84	Lw/unit	75	-	-	-
HVAC85	Lw/unit	75	-	-	-
HVAC86	Lw/unit	75	-	-	-
HVAC87	Lw/unit	75	-	-	-
HVAC88	Lw/unit	75	-	-	-
HVAC89	Lw/unit	75	-	-	-
HVAC90	Lw/unit	75	-	-	-
HVAC91	Lw/unit	75	-	-	-
HVAC92	Lw/unit	75	-	-	-
HVAC93	Lw/unit	75	-	-	-
HVAC94	Lw/unit	75	-	-	-
HVAC95	Lw/unit	75	-	-	-
HVAC96	Lw/unit	75	-	-	-
HVAC97	Lw/unit	75	-	-	-
HVAC98	Lw/unit	75	-	-	-
HVAC99	Lw/unit	75	-	-	-
HVAC100	Lw/unit	75	-	-	-
HVAC101	Lw/unit	75	-	-	-
HVAC102	Lw/unit	75	-	-	-
HVAC103	Lw/unit	75	-	-	-
HVAC104	Lw/unit	75	-	-	-
HVAC105	Lw/unit	75	-	-	-
HVAC106	Lw/unit	75	-	-	-
HVAC107	Lw/unit	75	-	-	-
HVAC108	Lw/unit	75	-	-	-
HVAC109	Lw/unit	75	-	-	-
HVAC110	Lw/unit	75	-	-	-
HVAC111	Lw/unit	75	-	-	-
HVAC112	Lw/unit	75	-	-	-
HVAC113	Lw/unit	75	-	-	-
HVAC114	Lw/unit	75	-	-	-
HVAC115	Lw/unit	75	-	-	-
HVAC116	Lw/unit	75	-	-	-
HVAC117	Lw/unit	75	-	-	-
HVAC118	Lw/unit	75	-	-	-
HVAC119	Lw/unit	75	-	-	-
HVAC120	Lw/unit	75	-	-	-
HVAC121	Lw/unit	75	-	-	-
HVAC122	Lw/unit	75	-	-	-
HVAC123	Lw/unit	75	-	-	-
HVAC124	Lw/unit	75	-	-	-
HVAC125	Lw/unit	75	-	-	-
HVAC126	Lw/unit	75	-	-	-
HVAC127	Lw/unit	75	-	-	-
HVAC128	Lw/unit	75	-	-	-
HVAC129	Lw/unit	75	-	-	-

HVAC130	Lw/unit	75	-	-	-
HVAC131	Lw/unit	75	-	-	-
HVAC132	Lw/unit	75	-	-	-
HVAC133	Lw/unit	75	-	-	-
HVAC134	Lw/unit	75	-	-	-
HVAC135	Lw/unit	75	-	-	-
HVAC136	Lw/unit	75	-	-	-
HVAC137	Lw/unit	75	-	-	-
HVAC138	Lw/unit	75	-	-	-
HVAC139	Lw/unit	75	-	-	-
HVAC140	Lw/unit	75	-	-	-
HVAC141	Lw/unit	75	-	-	-
HVAC142	Lw/unit	75	-	-	-
HVAC143	Lw/unit	75	-	-	-
HVAC144	Lw/unit	75	-	-	-
HVAC145	Lw/unit	75	-	-	-
HVAC146	Lw/unit	75	-	-	-
HVAC147	Lw/unit	75	-	-	-
HVAC148	Lw/unit	75	-	-	-
HVAC149	Lw/unit	75	-	-	-
HVAC150	Lw/unit	75	-	-	-
HVAC151	Lw/unit	75	-	-	-
HVAC152	Lw/unit	75	-	-	-
HVAC153	Lw/unit	75	-	-	-
HVAC154	Lw/unit	75	-	-	-
HVAC155	Lw/unit	75	-	-	-
HVAC156	Lw/unit	75	-	-	-
HVAC157	Lw/unit	75	-	-	-
HVAC158	Lw/unit	75	-	-	-
HVAC159	Lw/unit	75	-	-	-
HVAC160	Lw/unit	75	-	-	-
HVAC161	Lw/unit	75	-	-	-
HVAC162	Lw/unit	75	-	-	-
HVAC163	Lw/unit	75	-	-	-
HVAC164	Lw/unit	75	-	-	-
HVAC165	Lw/unit	75	-	-	-
HVAC166	Lw/unit	75	-	-	-
HVAC167	Lw/unit	75	-	-	-
HVAC168	Lw/unit	75	-	-	-
HVAC169	Lw/unit	75	-	-	-
HVAC170	Lw/unit	75	-	-	-
HVAC171	Lw/unit	75	-	-	-
HVAC172	Lw/unit	75	-	-	-
HVAC173	Lw/unit	75	-	-	-
HVAC174	Lw/unit	75	-	-	-
HVAC175	Lw/unit	75	-	-	-
HVAC176	Lw/unit	75	-	-	-
HVAC177	Lw/unit	75	-	-	-
HVAC178	Lw/unit	75	-	-	-
HVAC179	Lw/unit	75	-	-	-
HVAC180	Lw/unit	75	-	-	-
HVAC181	Lw/unit	75	-	-	-
HVAC182	Lw/unit	75	-	-	-
HVAC183	Lw/unit	75	-	-	-
HVAC184	Lw/unit	75	-	-	-
HVAC185	Lw/unit	75	-	-	-
HVAC186	Lw/unit	75	-	-	-
HVAC187	Lw/unit	75	-	-	-
HVAC188	Lw/unit	75	-	-	-
HVAC189	Lw/unit	75	-	-	-
HVAC190	Lw/unit	75	-	-	-
HVAC191	Lw/unit	75	-	-	-
HVAC192	Lw/unit	75	-	-	-

10113 Crystal Cove

SoundPLAN Data - HVAC

No.	Coordinates X	Y	Noise Level Leq1
	(meters)		dB(A)
1	480623.20	3752798.43	41.3
2	480602.42	3752798.01	45.1
3	480555.03	3752798.43	45.2
4	480528.42	3752796.77	40.8
5	480491.84	3752795.94	42.7
6	480464.41	3752797.60	40.9
7	480481.03	3752942.68	42.6
8	480459.42	3753031.22	37.6
9	480545.05	3753027.06	44.4
10	480614.47	3753027.06	43.4
11	480704.68	3752938.10	42.8
12	480704.68	3752860.78	42.7