APPENDIX D

Noise and Vibration Analysis

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Memorandum

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CC: Liza Debies, CSG Consultants, Inc.

From: Chris Dugan and Kasey Kitowski

Date: November 27, 2024

SUBJECT: Noise and Vibration Analysis for the Palos Verdes Estates 2021-2029 Housing Element Program 13 Rezoning Project

MIG, Inc. (MIG) has prepared this memorandum at the request of EPD Solutions, Inc. and CSG Consultants, Inc. This memorandum estimates the potential noise and vibration levels for the proposed Palos Verdes Estates 2021-2029 Housing Element Program 13 Rezoning Project (proposed project) and evaluates those noise and vibration levels against applicable standards established by the City. As described in detail in this memorandum, the proposed project would not have the potential to result in substantial temporary or permanent changes to the existing noise and vibration environment with the incorporation of mitigation measures and would not expose people visiting or working at the project site to excessive aircraft- or airport-related noise levels. Refer to Attachment 01 for background information on environmental noise and vibration, including commonly used terminology.

PROJECT DESCRIPTION

The proposed project involves rezoning three sites within the City of Palos Verdes Estates to facilitate implementation of the City's 2021-2029 Housing Element Update, which was adopted by the City Council on May 28, 2024.

- **Site 1 Malaga Cove:** Rezone Site 1 is located at 304 and 316 Tejon Place, in the northwest portion of the city. The site consists of two parcels (Assessor's Parcel Numbers [APN] 7539-016-018 and -019) that total 0.68 acres. Site 1 is currently designated and zoned Commercial (C) and is occupied by one- and two-story office buildings totaling 15,450 square feet in size. The site is bordered by city government and park uses to the north, residential uses to the south, commercial uses to the east, and park and residential uses to the west. The proposed project would add a Mixed-Use Overlay (MU-O) zoning designation that would increase the allowable floor-to-area ratio from 0.52 under existing conditions to a maximum of 1.25. The MU-O would allow existing uses to continue operating on the ground floor of any future development while potentially supporting the development of up to 20 new housing units. It is anticipated that the future redevelopment of the site would require demolition of the existing office buildings and the temporary relocation of the building's existing occupants during construction.
- **Site 2 Lunada Bay:** Rezone Site 2 is the Lunada Bay Patio Building located at 2325 Palos Verdes Drive West, in the southcentral portion of the city. The site consists of a single, 0.68-acre parcel (APN 7542-015-025) that is designated and zoned Commercial and occupied by a single building with 36,478 square feet of office, retail, and restaurant uses. Site 2 is bordered by park uses to the north, multi- and single-family residences to the south (across an alley and La Costa Way), multi-family residences to the east (across Palos Verdes Drive West), and single-family residences, offices, and retail shops to the west (across La Costa Way and Via Anacapa). The proposed project would add an MU-O

zoning designation that would allow existing uses to continue while potentially supporting up to 20 new dwelling units. It is anticipated that the future redevelopment of the site would require demolition of the existing commercial buildings and the temporary relocation of the building's existing occupants during construction.

- **Site 3 First Church of Christ, Scientist:** Rezone Site 3 is located at 4010 Palos Verdes Drive North, in the northeastern part of the city. The site consists of two parcels (APNs 7538-027-009 and -010) that total 4.63 acres. Site 3 is currently designated and zoned Residential Single-Family (R-1) but is occupied by a 12,082-square-foot church building with associated surface parking. Site 3 is bordered by single-family residential and open space uses to the north, single-family residential uses to the south, single family residential uses and Palos Verdes Drive North to the east, and single-family residential land uses to the west (across Rolling Ridge Road). The proposed project would redesignate and rezone Site 3 from R-1 to Residential Multiple Family (R-M) and add a Housing Opportunity Overlay (HO-O) zone that would allow the existing church use to continue while potentially supporting the development of up to 116 new dwelling units. Demolition of the church is not anticipated as part of the future redevelopment of the site.

The proposed MU-O and HO-O zones would provide certain incentives in exchange for providing 20% affordable housing units, including increased density and number of stories, reduced setbacks (as defined by the base zoning designation), and reduced parking ratios as outlined in the Housing Element Update.

EXISTING NOISE LEVELS

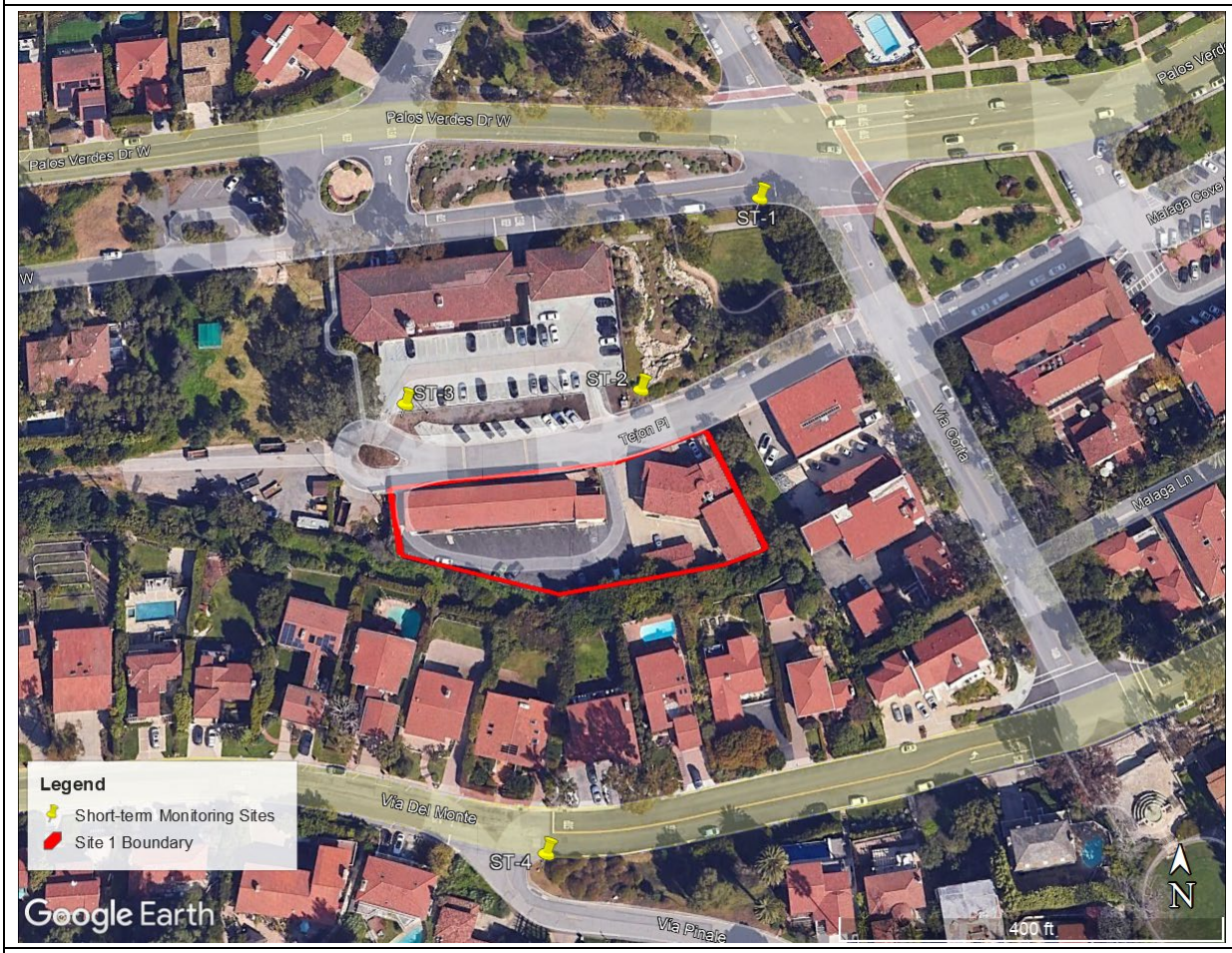
The City's General Plan Noise Element was last updated in 1973. Though dated, some of the information contained in the Noise Element remains relevant. For example, the major traffic arterials in the city continue to be Palos Verdes Drive West and Palos Verdes Drive North, and traffic volumes in the city continue to be primarily resident-commuter traffic. In addition, zoning and deed restrictions continue to limit land uses in the city to residential land uses except for neighborhood shopping areas, such as those located at Malaga Cove (Rezone Site 1) and Lunada Bay (Rezone Site 2). For these reasons, overall ambient noise levels in the city have and are expected to be primarily a function of normal residential development and use.

Short-Term Ambient Noise Levels

MIG conducted short-term ambient noise level monitoring at and near each proposed rezone site from approximately 10:20 AM to 3:00 PM on Wednesday, November 6, 2024 (see Attachment 02). The ambient noise levels were digitally measured and stored using one (1) Larson Davis SoundTrack LxT sound level meter that meets American National Standards Institute requirements for a Type 1 integrating sound level meter. Each sound meter was calibrated immediately before and after the monitoring period using a reference one kilohertz (1kH) check frequency and 114 dB sound pressure level and found to be operating within normal parameters for sensitivity. Measurements were continuously collected over the sample period in 1-minute intervals. This interval was selected to capture short-term noise events and increases in noise levels above typical background conditions. Weather conditions during the monitoring were clear and sunny, temperatures were in the low 70's, and wind speeds ranged from approximately seven to nine miles per hour.

The ambient noise monitoring locations at each site were selected to provide direct observations of existing noise sources and typical ambient noise levels at and in the vicinity of each rezone site. The ambient noise monitoring locations and results are shown below in Figure 1, Figure 2, and Figure 3. Refer to Attachment 02 for detailed ambient noise monitoring results.

Figure 1: Ambient Noise Monitoring Locations and Results for Rezone Site 1



Measured Noise Levels at Rezone Site 1

Location/Time	$L_{eq}^{(A)}$	$L_{min}^{(B)}$	$L_{90}^{(C)}$	$L_{50}^{(C)}$	$L_{8}^{(C)}$	$L_{max}^{(B)}$
ST1: 10:24 AM-11:00 AM	62.6	50.8	57.9	60.9	66.1	76.2
ST-2A[(D)]: 11:05 AM-11:15 AM	52.8	46.9	49.1	50.8	56.9	63.6
ST-2B[(D)]: 11:17 AM-11:24 AM	76.5	74.2	75.9	76.5	77.2	77.8
ST-3: 11:30 AM-11:45 AM	56.1	50.4	52.3	53.9	58.4	75.7
ST-4: 11:57 AM-12:27 PM	60.4	41.5	47.6	56.1	65.2	76.8

Source: MIG 2024 (see Attachment 02)

A) The L_{eq} value represents the equivalent steady-state noise level that would contain the same amount of acoustic energy as the time-varying noise level during the listed hour.
B) The L_{min} and L_{max} represent the lowest and highest instantaneous noise levels measured during the listed period, respectively.
C) Values represent the noise level exceeded a certain percentage of the period, e.g., L_{90} is the noise level that was exceeded 90% of the time.
D) The ambient noise monitoring at location ST-2 is split into two time periods due to a substantial change in environmental noise levels at the site. ST-2A contains the first 11 minutes of the monitoring period, during which no nearby equipment was operating. ST-2B contains the last eight (8) minutes of the monitoring, during which City equipment within 15 feet of the noise meter began operating.

Figure 2: Ambient Noise Monitoring Location and Results for Rezone Site 2

Measured Noise Levels at Rezone Site 2

Location/Time	L_{eq} (A)	L_{min} (B)	L_{90} (C)	L_{50} (C)	L_{8} (C)	L_{max} (B)
ST-5: 12:45 PM-1:16 PM	61.6	42.5	50.4	56.7	66.2	81.5

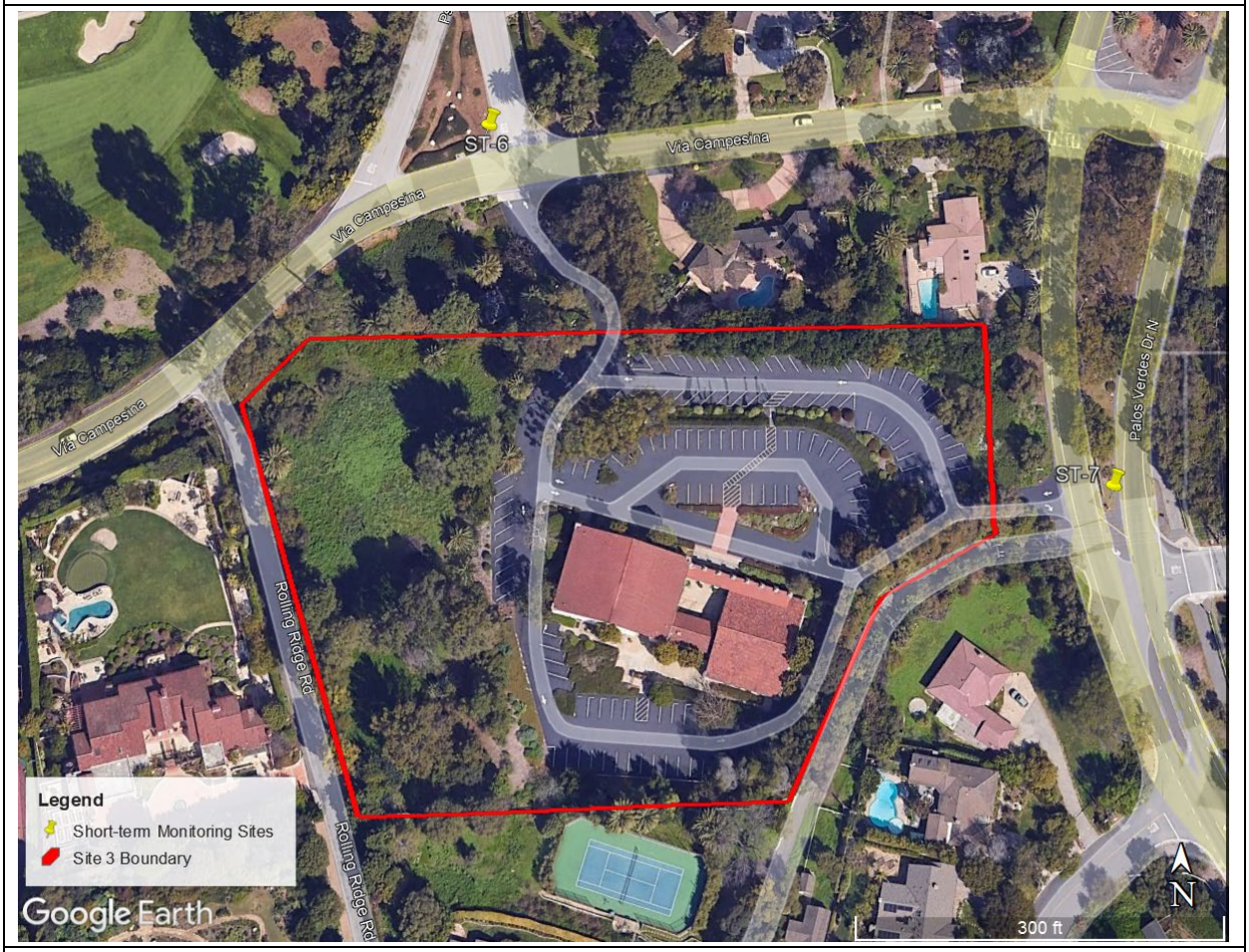
Source: MIG 2024 (see Attachment 02)

A) The L_{eq} value represents the equivalent steady-state noise level that would contain the same amount of acoustic energy as the time-varying noise level during the listed hour.

B) The L_{min} and L_{max} represent the lowest and highest instantaneous noise levels measured during the listed period, respectively.

C) Values represent the noise level exceeded a certain percentage of the period, e.g., L_{90} is the noise level that was exceeded 90% of the time.

Figure 3: Ambient Noise Monitoring Location and Results for Rezone Site 3



Measured Noise Levels at Rezone Site 3

Location/Time	$L_{eq}^{(A)}$	$L_{min}^{(B)}$	$L_{90}^{(C)}$	$L_{50}^{(C)}$	$L_{8}^{(C)}$	$L_{max}^{(B)}$
ST-6: 1:43 PM-2:14 PM	61.7	38.9	46.6	55.4	67.0	79.6
ST-7: 2:28 PM-2:58 PM	70.5	45.0	64.0	69.5	73.7	83.0

Source: MIG 2024 (see Attachment 02)

A) The L_{eq} value represents the equivalent steady-state noise level that would contain the same amount of acoustic energy as the time-varying noise level during the listed hour.
B) The L_{min} and L_{max} represent the lowest and highest instantaneous noise levels measured during the listed period, respectively.
C) Values represent the noise level exceeded a certain percentage of the period, e.g., L_{90} is the noise level that was exceeded 90% of the time.

Based on observations made during the monitoring, vehicle traffic was the predominant source of noise at all three rezone sites, with stationary source equipment and landscaping equipment also contributing to the ambient noise environment. Palos Verdes Drive West and Palos Verdes Drive North were the busiest roadways that contributed the most to traffic noise levels in the vicinity of each site.

24-Hour Noise Exposure Levels

In addition to measuring short-term noise levels, MIG modeled the 24-hour community noise exposure level (CNEL) at each rezone site using traffic data collected for the proposed project. Existing (Year 2024) traffic noise levels were computed using the U.S. Department of

Transportation Federal Highway Administration's (FHWA) Traffic Noise Model (TNM), Version 3.2. The model uses traffic volume, vehicle mix, vehicle speed, roadway geometry, and other variables to compute 24-hour traffic noise levels at user-defined receptor distances from the roadway center. The TNM modeling conducted for this memorandum generally incorporates assumptions about motor vehicle traffic and noise levels that are likely to overestimate potential traffic noise levels; specifically, calculations are based on "hard" site conditions, do not incorporate any natural or artificial shielding, and assume all vehicles travel at the posted speed limit. Roadway segments were modeled as straight-line segments without any flow controls. Modeled noise levels, therefore, represent free-flow traffic conditions.

Average daily traffic (ADT) volumes and the time-of-day traffic mix (day, evening, night) were obtained from the traffic counts conducted by EPD Solutions and vehicle fleet mixes were obtained from traffic observation counts conducted by MIG (EPD Solutions, 2024). Modeled traffic noise levels for existing year 2024 are shown in Table 1. Refer to Attachment 03 for detailed information on existing traffic noise modeling assumptions and distances to specific roadway noise contour levels.

Table 1: Existing 2024 Traffic Noise Levels

Road / Segment	Existing 2024	
	ADT[(A)]	**CNEL[(B)]**
Palos Verdes Drive West		
Site 1: Palos Verdes Drive West to Via Corta (all traffic)	14,661	52.8
Site 2: Yarmouth Road to Avenida Mirola (northbound traffic)	5,397	49.1
Site 2: Yarmouth Road to Avenida Mirola (southbound traffic)	5,084	49.8
Palos Verdes Drive North		
Site 3: South of Via Campesina (northbound traffic)	7,830	50.6
Site 3: Sof Via Campesina (southbound traffic)	5,489	48.0
Via Campesina		
Site 3: Paso Del Campo to Palos Verdes Drive North (all traffic)	2,468	44.2

Source: EPD Solutions, 2024 and MIG, 2024 (see Attachment 03)

A) ADT is total average daily traffic volume.

B) CNEL is estimated 50 feet from the modeled road center for all modeled road segments. Note that some segments are modeled for all traffic lanes (e.g., Palos Verdes Drive West to Via Corta) and some are modeled for specific northbound and southbound traffic lanes (e.g., Yarmouth Road to Avenida Mirola).

As shown in Table 1, the modeled CNEL at each rezoning is less than 55 CNEL in all cases, which may be considered a relatively quiet ambient noise environment.

Noise-Sensitive Receptors

Noise sensitive land uses and receptors are buildings or areas where unwanted sound or increases in sound may have an adverse effect on people or land uses. Land uses in the city consist primarily of single-family residential uses, with some multi-family and neighborhood commercial uses. Each of the three rezone sites are either entirely or partially bordered or otherwise surrounded by sensitive residential and/or open space land uses; Site 3 also includes a church building that could remain at the site. In addition to existing sensitive receptors near the rezone sites, the future development of each rezone site would result in new noise-sensitive residential receptors at each site.

APPLICABLE NOISE AND VIBRATION REGULATIONS

The noise and vibration regulations that are relevant to the evaluation of the proposed project's potential noise and vibration impacts are summarized below.

Federal Transit Administration

There are no federal noise and vibration regulations that directly apply to the proposed project; however, the Federal Transit Administration (FTA) has published guidance on predicting and assessing the noise and vibration impacts of proposed transit projects, including guidance for assessing noise and vibration during construction of such projects. The FTA's 2018 Transit Noise and Vibration Impact Assessment Manual provides guidance on when a construction noise assessment may be needed for a project, whether a qualitative or quantitative noise assessment may be required, and what construction-related noise impact criteria may be appropriate for a project. The FTA guidance identifies that a construction noise assessment may not be required for small projects such as small building construction that is similar in scale to surrounding development. The guidance also identifies that a qualitative assessment may be required for projects with less than one month of construction time in a noise sensitive area, while a quantitative assessment may be required for projects more than one month of construction in noise sensitive areas or if particularly noisy equipment will be used. Finally, for quantitative assessments, the FTA manual recommends construction noise impact criteria, expressed in dBA, that vary based on the type of construction noise assessment conducted for a project. While the FTA's guidance advises that construction noise criteria should consider and account for the existing noise environment, the recommended standards are considered reasonable criteria for assessment. The FTA's construction noise impact criteria are summarized in Table 2.

Table 2: FTA Construction Noise Criteria

Land Use	General Analysis Criteria[(A)]		Detailed Analysis Criteria[(B)]		
	Daytime $L_{eq(1hr)}$	Nighttime $L_{eq(1hr)}$	Daytime $L_{eq(8hr)}$	Nighttime $L_{eq(8hr)}$	30-Day Average L_{dn}
Residential	90 dBA	80 dBA	80 dBA	70 dBA	75 dBA
Commercial	100 dBA	100 dBA	85 dBA	85 dBA	80 dBA[(C)]
Industrial	100 dBA	100 dBA	90 dBA	90 dBA	85 dBA[(C)]

Source: FTA, 2018, Table 7-2 and Table 7-3

(A) Per FTA guidance, a general analysis may be warranted for projects in an early assessment stage when the equipment roster and schedule are undefined and only a rough estimate of construction noise levels is practical.

(B) Per FTA guidance, a detailed analysis may be warranted when many noise sensitive sites are adjacent to a construction project or where contractors are faced with stringent local ordinances or heightened public concerns expressed in early outreach efforts.

(C) Standard is $L_{eq(24hr)}$ instead of L_{dn}.

The FTA's ground-borne vibration annoyance criteria vary by the type of building being subjected to the vibrations, and the overall number of vibration events occurring each day. Category 1 buildings are considered buildings where vibration would interfere with operation, even at levels that are below human detection. These include buildings with sensitive equipment, such as research facilities and recording studios. Category 2 buildings include residential lands and buildings where people sleep, such as hotels and hospitals. Category 3 buildings consist of institutional land uses with primarily daytime uses. The FTA standards vary for "frequent" events (occurring more than 70 times per day, such as a rapid transit project), "occasional" events (occurring between 30 to 70 times per day), and "infrequent" events (occurring less than 30 times per day). The FTA's vibration annoyance (criteria are summarized in Table 3. It is noted that, with regards to construction vibration sources, many types of construction activities fall between the FTA's frequent, occasional, and infrequent event criteria due to the mostly intermittent and mobile nature of typical construction equipment.

Table 3: FTA Ground-Borne Vibration Impact Criteria for General Assessment

Vibration Land Use Category/Type	Frequent Events	Occasional Events	Infrequent Events
Category 1 – Buildings with sensitive equipment	65 VdB	65 VdB	65 VdB
Category 2 – Buildings where people normally sleep	72 VdB	75 VdB	80 VdB
Category 3 – Institutional land uses with primarily daytime use	75 VdB	78 VdB	83 VdB

Source: FTA, 2018

State Noise and Vibration Regulations

Assembly Bill 1307

Assembly Bill (AB) 1307 was signed into law in September 2023. The bill adds new Section 20185 to the Public Resources Code, establishing that, for the purposes of CEQA, for residential projects, "the effects of noise generated by project occupants and their guests on human beings is not a significant effect on the environment." AB 1307 defines residential or mixed-use housing projects to mean a project consisting of residential uses only or a mix of residential and non-residential uses, with at least two-thirds of the square footage of the development designated for residential uses.

Building Standards Code

The California Building Standards Code is contained in Title 24 of the California Code of Regulations and consists of 11 different parts that set various construction and building requirements. Part 2, California Building Code, Section 1206, Sound Transmission, establishes sound transmission standards for interior walls, partitions, and floor/ceiling assemblies between adjacent dwelling units and sleeping units and between dwelling units and sleeping units and adjacent public areas. In summary, this code section requires:

- **Airborne Sound:** Walls, partitions, and floor-ceiling assemblies separating dwelling units and sleeping units from each other or from public or service areas shall have a sound transmission class (STC) of not less than 50 if laboratory tested or have a Normalized Isolation Class (NNIC) of not less than 45 if field tested (Section 1206.2).
- **Structure-borne Sound:** Floor-ceiling assemblies between dwelling units and sleeping units or between a dwelling unit or sleeping unit and a public or service area within the structure shall have an impact insulation class rating of not less than 50 if laboratory tested or have a Normalized Impact Sound Rating of not less than 45 if field tested. Impact sound insulation is not required for floor-ceiling assemblies over nonhabitable rooms or spaces

not designed to be occupied such as garages, mechanical rooms, and storage areas (Section 1206.3).

- **Allowable Interior Noise Levels:** Interior noise levels attributable to exterior noise sources shall not exceed 45 DNL or CNEL (as set by the local General Plan) in any habitable room.[1].

The California Green Building Standards (CALGreen) Code is Part 11 to the California Building Standards Code. Chapter 5, Nonresidential Mandatory Standards, establishes acoustical control requirements for non-residential buildings.[2] In summary, this code chapter requires:

- **Prescriptive Exterior Noise Transmission Control:** Wall and roof-ceiling assemblies that are part of the building envelope within the 65 CNEL noise contour of an airport or within the 65 DNL or 65 CNEL noise contour of a freeway, expressway, railroad, industrial source, or fixed-guideway source, shall meet a composite STC rating of at least 50 (with exterior windows a minimum STC of 40) or a composite Outdoor-Indoor Sound Transmission Class (OITC) of no less than 40 (with exterior windows a minimum OITC of 30) (Section 5.507.4.1). Buildings exposed to a noise of 65 dB L_{eq} (1-hour) during any hour of operation shall have wall and roof-ceiling assemblies meeting a composite STC of at least 45 (or OITC of at least 35), with exterior windows a minimum STC of 40 (or OITC 30) (Section 5.507.4.1.1).
- **Performance Method Exterior Noise Transmission Control:** For buildings located within the 65 DNL, 65 CNEL, or 65 db L_{eq} (1-hour) areas described above, wall and roof-ceiling assemblies shall be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an L_{eq} (1-hour) of 50 dBA in occupied areas during any hour of operation (Section 5.507.4.2). This requirement shall be documented by preparing an acoustical analysis documenting interior sound levels prepared by personnel approved by the architect or engineer of record.
- **Interior Sound Transmission:** Wall and floor assemblies separating tenant spaces and tenant spaces and public spaces shall have an STC of at least 40 (Section 5.507.4.3).

California Department of Transportations (Caltrans)

The Caltrans' Transportation and Construction Vibration Guidance Manual provides a summary of vibration criteria that have been reported by researchers, organizations, and governmental agencies and provides recommended thresholds for evaluating potential vibration impacts on buildings (i.e., structural damage). These thresholds are summarized in Table 4. The thresholds vary depending on whether the vibration source is continuous or transient in nature. A transient source creates an isolated vibration event, such as blasting. Continuous sources also include sources with intermittent but frequent vibration events. While vehicle traffic is considered a continuous vibration source, many types of construction activities fall between continuous and transient in nature.

[1] Title 24, Part 2, Section 202, Definitions, defines "habitable space" to be "space for living, sleeping, eating, or cooking." Bathrooms, toilet rooms, closets, halls, storage or utility spaces and similar areas are not considered habitable spaces.

[2] Section 5.507.4 excepts buildings with few or no occupants or where occupants are not likely to be affected by exterior noise from the non-residential acoustical control requirements, as determined by the enforcement authority, such as factories, stadiums, storage, enclosed parking structures, and utilities buildings.

Table 4: Caltrans' Vibration Threshold Criteria for Building Damage		
Structural and Condition	**Peak Particle Velocity (inches/second)**	
	Transient Sources	**Continuous/Frequent Intermittent Sources**
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some older buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial and commercial structures	2.0	0.5
Source: Caltrans, 2020		

Office of Planning and Research General Plan Guidelines

The Governor's Office of Planning and Research (OPR) publishes the State of California General Plan Guidelines, which provide guidance for the acceptability of projects within specific community noise levels. OPR's recommended community noise exposure guidelines for residential, commercial, and recreational/open space uses are summarized in Table 5 (OPR, 2017).

Table 5: OPR General Plan Guidelines For Community Noise Exposure				
Land Use Category	**Community Noise Exposure Limit (CNEL or DNL, dBA)**			
	Normally Acceptable	**Conditionally Acceptable**	**Normally Unacceptable**	**Clearly Unacceptable**
Residential - Low-Density Single-Family, Duplex, Mobile Homes	60	70	75	75+
Residential - Multi-Family	65	70	75	75+
Playgrounds, Neighborhood Parks	70	70	75	75+
Golf Courses, Riding Stables, Water Recreation, Cemeteries	75	N/A	80	80+
Office Buildings, Business Commercial and Professional	70	77.5	77.5+	--
Source: OPR, 2017, Appendix D, Figure 2				

Palos Verdes Estates Municipal Code

Title 8, Health and Safety, Chapter 8.28, Noise sets forth that excessive noise is detrimental to the health and safety of individuals and is considered a public nuisance, and that the City shall prohibit unnecessary, excessive, or annoying noises from all sources. Chapter 8.28 includes the following standard:

- Section 8.28.020, Prohibited Noises, generally prohibits noise and vibrations that are so loud, prolonged, and harsh as to be annoying to reasonable persons of ordinary sensitivity and to cause or contribute to unreasonable discomfort of any persons within the vicinity. Factors to consider whether a noise, sound, or vibration is unreasonable include the volume and intensity of the noise, particularly as it is experienced within a residence or place of business, whether the noise is prolonged and continuous, how the noise contrasts with the ambient noise level, the proximity of the noise source to residential and commercial uses, the time of day; and the anticipated duration of the noise.
- Section 8.28.030, Noise from Commercial Operations, generally limits noise from commercial operations that can be heard on another premises to the hours of 7:00 AM to 7:00 PM Monday through Thursday, 7:00 AM to 5:30 PM on Friday, and 9:00 AM to 5:30 PM on Saturday.
- Section 8.28.040, Leaf Blowers, prohibits gasoline-powered leaf blowers within the R-1 and R-M zones and any electric or battery powered leaf blowers that generate a noise level above 65 dBA. Leaf blowers are restricted to the times allowed in Section 8.28.030 above, cannot be operated for more than 15 minutes in an hour on any one parcel, and must be in proper working order. Multiple leaf blowers cannot be operated on any one parcel at a time.
- Section 8.28.050, Exemptions, exempts certain activities from the City's noise standards, including alerts for emergencies and emergency work, warning devices necessary to protect public safety, outdoor activities at licensed and approved child day care facilities within residential areas and on public or private school grounds, City-approved outdoor gatherings, and public health and safety activities (e.g., street sweeping, repairing electrical service, etc.).

Title 18, Zoning Regulations, Chapter 18.04, R-1 Zone, Section 18.04.145, Mechanical Equipment Noise, establishes that mechanical equipment in the R-1 zone shall not generate noise at any property line that is more than five decibels higher than the ambient noise level at the property line at the time of measurement. This standard applies to equipment such as, but not limited to, generators, furnaces, air conditioners, pool and spa equipment, motors which run fountains or kinetic sculptures, and similar items. The installation of mechanical equipment in the R-1 zone requires a permit from the City, and equipment is not allowed to be located in any property setback.

Title 18, Zoning Regulations, Chapter 18.12, Commercial Zone, establishes the following standards related to noise:

- Section 18.12.110, Screening of Mechanical Equipment – Mechanical Equipment Noise, establishes that mechanical equipment in the Commercial zone shall be placed in the garage or basement or, when it is not practical or feasible to do so, in an outside location on the ground or rooftop provided ground equipment is not visible and rooftop equipment is screened so as not be visible from any vantage point to the extent practicable. In addition, mechanical equipment on property in the Commercial zone shall not generate noise at the property line of any property in the R-1 zone that is more than five decibels higher than the ambient noise level at the property line.
- Section 18.12.130, Noise, Smoke, and Odor Requirements, establishes that no permitted commercial uses shall generate noise that has an annoying or disruptive effect on uses located outside the immediate space occupied by the commercial use, and that continuous noise levels shall not exceed the maximum permitted levels set forth in the city's noise ordinance.

Title 18, Zoning Regulations, Chapter 18.72, Special Development Standards establishes objective design standards for multi-family and mixed-use development, including:

- Vehicular Access and Parking (Section 18.72.030.D.3): These standards require parking areas to be placed to the side or rear of buildings, and full screened from neighboring properties by building placement, landscaping, fencing, or a combination thereof.
- Common and Private Open Space (Section 18.72.030.D.5): These standards require common open space areas not to be located directly next to arterial streets, service areas, or adjacent commercial development to ensure the open space area is sheltered from noise and traffic on adjacent streets or other incompatible uses.
- Utilities and Building Equipment (Section 18.72.30.D.7: These standards require rooftop-mounted equipment to be screened from public view either in an enclosure or behind a pitched roof or parapet wall.

NOISE AND VIBRATION IMPACT ANALYSIS

In accordance with Appendix G of the State CEQA Guidelines, the proposed project could result in potentially significant impacts related to noise and vibration if it would:

(A) Generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of applicable standards;

(B) Generate excessive ground-borne vibration or ground-borne noise levels; or

(C) Expose people residing or working in the Project area to excessive airport-related noise levels.

With regard to criterion (A), the City's Municipal Code and General Plan do not establish specific construction noise thresholds. Therefore, this analysis applies the FTA's detailed daytime and nighttime construction noise criteria for residential and commercial land uses (see Table 2). The proposed project would result in a significant construction noise impact if it would:

- Generate construction noise levels at residential land uses above the FTA's daytime (80 dBA L_{eq}) or nighttime (70 dBA L_{eq}) detailed construction noise analysis criteria. This standard is conservatively applied at occupied, exterior residential use areas.
- Generate construction noise levels at commercial land uses above the FTA's detailed construction noise analysis criteria (85 dBA L_{eq}). This standard is applied at commercial buildings.

In addition, with regard to criterion (A), the proposed project would result in a significant operational noise impact if it would:

- Result in on-site noise levels that violate or conflict with City standards contained in:
  - Municipal Code Chapter 8.28 (Noise)
  - Municipal Code Section 18.04.145 (Mechanical Equipment Noise)
  - Municipal Code Section 18.12.110 (Screening of Mechanical Equipment – Mechanical Equipment Noise)
  - Municipal Code Section 18.72.020 (Objective Design Standards for Multifamily and Mixed-Use Development
- Cause or contribute to a substantial increase in traffic noise levels at off-site locations

With regard to criterion B), the City's Municipal Code and General Plan do not establish specific vibration thresholds. Therefore, this analysis applies Caltrans and FTA guidance for evaluating

ground-borne vibration levels (see Table 3 and Table 4). The proposed project would result in a significant impact if it would:

- Generate continuous, construction-related vibration levels that exceed Caltrans' guidance for potential damage to older residential structures (0.3 inches per second); or
- Generate construction-related vibration levels that exceed the FTA's guidance for adverse human response to frequent events (72 VdB for residential land uses and 75 VdB for commercial land uses).

With regard to criterion (C), the proposed project would expose people living or working in the Project area to excessive airport-related noise levels if it would conflict with an applicable ALUP or otherwise expose people to excessive airport-related noise levels from a public or private air facility

Temporary Construction Noise

The rezoning of Sites 1, 2, and 3 would not authorize or approve any specific development project. Therefore, potential temporary construction-related noise impacts can only be evaluated based on the typical construction activities associated with single- and multi-family residential and mixed-use development, which could include: staging, demolition, site preparation (e.g., land clearing), fine and mass grading (including soil import or export), utility trenching, foundation work (e.g., excavation, pouring concrete pads, potential drilling for piers or piles), material deliveries (requiring travel along city roads), building construction (e.g., framing, welding), paving, coating application, and site finishing work. In general, these activities would involve the use of worker vehicles, delivery trucks, haul trucks, and heavy-duty construction equipment such as (but not limited to) backhoes, tractors, loaders, graders, excavators, rollers, cranes, material lifts, generators, and air compressors. These types of construction activities would generate noise from the following sources:

- Heavy equipment operations at different work areas. Some heavy equipment would consist of mobile equipment such as a loader and excavator that would move around work areas; other equipment would consist of stationary equipment (e.g., cranes or material hoists/lifts) that would generally operate in a fixed location until work activities are complete. Heavy equipment generates noise from engine operation, mechanical systems and components (e.g., fans, gears, propulsion of wheels or tracks), and other sources such as backup alarms. Mobile equipment generally operates at different loads, or power outputs, and produces higher or lower noise levels depending on the operating load. Stationary equipment generally operates at a steady power output that produces a constant noise level.
- Vehicle trips, including worker, vendor, and haul truck trips. These trips are most likely to occur on key roads and travel corridors that provide access to the rezone sites, such as Palos Verdes Drive North and Palos Verdes Drive West. Worker trips usually consist of passenger cars and light- to medium-duty trucks. Vendor and haul truck trips usually consist of medium-heavy and heavy-heavy duty trucks.

Table 6 presents the noise levels associated with the typical types of construction equipment that are likely to be used during future construction activities at the rezone sites.

Table 6: Typical Construction Equipment Noise Levels (dBA)

Equipment	Reference Noise Level at 50 Feet (L_{max})[A]	Percent Usage Factor[B]	Predicted Noise Levels (L_{eq}) at Distance[C]					
			50 Feet	100 Feet	200 Feet	300 Feet	400 Feet	500 Feet
Auger Drill Rig	85	0.2	78	72	66	62	60	58
Backhoe	80	0.4	76	70	64	60	58	56
Bulldozer	85	0.4	81	75	69	65	63	61
Compact roller	80	0.2	73	67	61	57	55	53
Compressor	80	0.4	76	70	64	60	58	56
Concrete Mixer	85	0.4	81	75	69	65	63	61
Crane	85	0.16	77	71	65	61	59	57
Delivery Truck	84	0.4	80	74	68	64	62	60
Excavator	85	0.4	81	75	69	65	63	61
Front End Loader	80	0.4	76	70	64	60	58	56
Generator	82	0.5	79	73	67	63	61	59
Grader	85	0.4	81	75	69	65	63	61
Impact Pile Driver (low)	95	0.2	88	82	76	72	70	68
Impact Pile Driver (high)	101	0.2	94	88	82	78	76	74
Man Lift	85	0.2	78	72	66	62	60	58
Paver	85	0.5	82	76	70	66	64	62
Pneumatic tools	85	0.5	82	76	70	66	64	62
Pumps	77	0.5	74	68	62	58	56	54
Roller	85	0.2	78	72	66	62	60	58
Scraper	85	0.4	81	75	69	65	63	61
Tractor	84	0.4	80	74	68	64	62	60
Vacuum Truck	85	0.4	81	75	69	65	63	61

Source: Caltrans, 2020

(A) Lmax noise levels based on manufacturer's specifications.

(B) Usage factor refers to the amount of time the equipment produces noise over the time period.

(C) Estimate does not account for any atmospheric or ground attenuation factors. Calculated noise levels based on Caltrans, 2020: L_{eq} (1-hour or 8-hour) = L_{max} at 50 feet – 20log (D/50) + 10log (UF), where: L_{max} = reference L_{max} from manufacturer or other source; D = distance of interest; UF = usage fraction or fraction of time period of interest equipment is in use.

The potential for substantial temporary increases in noise levels is generally limited to construction activities that occur in areas near or immediately adjoining noise-sensitive land uses, during early morning, evening, and nighttime periods, and/or for extended periods of time. Demolition, site preparation, and grading phases typically result in the highest temporary noise levels due to the use of heavy-duty equipment such as bulldozers, excavators, graders, loaders, scrapers, and trucks. The closest that future construction activities at the rezone sites could occur to sensitive receptors would be as follows:

- Site 1 Malaga Cove: There are seven residential properties and five commercial buildings (including City Hall) within 50 feet of the Site 1 boundary. In addition, single family residential properties are the predominant land use in the vicinity of this site.
- Site 2 Lunada Bay: There is one park, one multi-family residential building, three single-family residences, and one commercial building within 50 feet of the Site 2 boundary. In addition, single and multi-family residential land uses are the predominant land uses in the vicinity of this site.
- Site 3 First Church of Christ, Scientist: There are eight residential properties within 50 feet of the Site 3 boundary, and the existing church may remain in place during potential construction activities. In addition, single family residential land uses and the Palos Verdes Golf Club are the predominant land uses in the vicinity of this site.

As shown in Table 6, the typical construction equipment used during demolition, site preparation, and grading, such as a backhoe, bulldozer, excavator, or grader, can produce noise levels between 76 dBA L_{eq} and 81 dBA L_{eq} at a distance of 50 feet from the equipment operating area. At an active construction site, it is not uncommon for two pieces of construction equipment to operate in the same general area at the same time. The concurrent operation of two or more pieces of construction equipment would result in noise levels of approximately 79 dBA L_{eq} to 84 dBA L_{eq} at a distance of 50 feet from equipment operating areas.[3] Building foundation, building construction, coating, and site finishing activities also involve heavy equipment (e.g., cranes, material lifts) and stationary noise sources (e.g., generators, welding equipment, compressors); however, this equipment usually operates at or near the building footprint and is set back from the site perimeter and farther away from adjacent noise-sensitive land uses. As shown in Table 6**,** the worst-case L_{eq} noise levels associated with building construction equipment such as a crane, generator, and man lift (e.g., a crane) is predicted to be approximately 79 dBA L_{eq}, at a distance of 50 feet. Off-site truck trips associated with debris and soil hauling, vendor deliveries, etc. would be unlikely to substantially change traffic noise levels because trips would be spread out over the course of hours and days and would not continuously impact any off-site receptor.

The project's potential temporary increases in ambient noise levels due to future on-site construction activities is summarized in Table 7.

[3] As shown in Table 6**,** a single bulldozer provides a sound level of 81 dBA L_{eq} at a distance of 50 feet; when two identical sound levels are combined, the noise level increases to 84 dBA L_{eq} and when three identical sound levels are combined, the noise level increases to 86 dBA L_{eq}. These estimates assume no shielding or other noise control measures are in place at or near the work areas. In general, maximum equipment noise levels do not occur in the same place at the same time and, therefore, maximum noise levels from two or more pieces of equipment are not combined for noise estimation purposes.

Table 7: Summary of Estimated Potential Construction Noise Level Increases			
Activity/Metric	**Site 1 Malaga Cove**	**Site 2 Lunada Bay**	**Site 3 First Church of Christ, Scientist**
Typical Range in Construction Equipment Noise Levels at 50 feet(A)	76 to 86 dBA L_{eq}	76 to 86 dBA L_{eq}	76 to 86 dBA L_{eq}
FTA daytime standard(B)	Residential: 80 dBA L_{eq} / Commercial: 85 dBA L_{eq}		
Existing daytime ambient noise level(C)	53 to 76 dBA L_{eq}	62 dBA L_{eq}	62 to 70 dBA L_{eq}
Potential temporary increase in existing daytime ambient noise level	0 to 33 dBA L_{eq}	14 to 24 dBA L_{eq}	6 to 24 dBA L_{eq}

(A) See Table 6 and footnote 3. The low end of the typical range is based on a single piece of equipment in operation and the high end of the typical range is based on three pieces of equipment in operation.
(B) See Table 2.
(C) See Figure 1, Figure 2, and Figure 3.

As shown in Table 5, typical construction activities could exceed the FTA's residential (80 dBA L_{eq}) and commercial (85 dBA L_{eq}) daytime construction noise criteria at all rezone sites. This is due to the fact that each housing site is generally either directly bordered by or adjacent to existing residential and/or commercial properties. In addition, given the predominantly residential nature of the city and its corresponding relatively quiet noise environment, construction activities could temporarily increase ambient noise levels by approximately 20 dBA l_{eq} to 33 dBA L_{eq} in some instances, which would be a substantial increase above typical ambient noise levels. It is noted that typical residential and mixed-use construction activities do not involve nighttime work; however, future construction activities could also exceed the FTA's residential (70 dBA L_{eq}) and commercial (85 dBA L_{eq}) nighttime criteria if nighttime construction were to occur.

The magnitude of each individual future project's temporary and periodic increase in ambient noise levels would depend on a number of project-specific factors that are not known at this time, including: the amount and type of equipment being used; the distance between the area where equipment is being operated and the location of the specific land use or receptor where noise levels would be perceived; the time of day construction activities are occurring; the presence or absence of any walls, buildings, or other barriers that may absorb or reflect sound waves; the total duration of the construction activities; and the existing ambient noise levels near construction areas. Neither the City's General Plan or Municipal Code limit construction activities to specific time periods or establish a specific, numerical standard for construction noise levels. As described above, the future construction activities could exceed the FTA's construction noise criteria at residential and commercial properties under certain situations and/or result in a substantial temporary increase in ambient noise that would have the potential to annoy residential receptors and/or interfere with the receptors' normal use and enjoyment of their property. This is considered a potentially significant impact. To reduce the potential for the future construction activities at Rezone Site 1, 2, and 3 to result in a substantial temporary increase in ambient noise levels in the vicinity of the project site that could exceed FTA standards, otherwise annoy residential receptors, and/or interfere with the normal use and enjoyment of residential properties, MIG recommends the City incorporate Mitigation Measure NOI-1 into the project:

Mitigation Measure NOI-1: Reduce Potential Construction Noise Levels

To reduce potential construction noise levels generated by the development of rezone sites, the City shall require future development projects to:

A. *Notify Nearby Land Uses of Planned Construction Activities.* This notice shall be provided at least two (2) weeks prior to the start of any construction activities, describe the noise control measures to be implemented by the project, and include the name and phone number of the designated developer's or contractor's representative responsible for handling construction-related noise complaints (per Mitigation Measure NOI-1, section E). This notice shall be provided to:

   1. The owner/occupants of residential dwelling units within 250 feet of construction work areas.
   2. The owner/occupants of commercial buildings within 100 feet of construction work areas.
   3. If pile driving is required for the project, notice shall be provided to the owners/occupants of all residential dwelling units and commercial buildings within 500 feet of pile driving areas.

B. *Restrict Work Hours:* Unless otherwise authorized by the City, all construction-related work activities, including material deliveries, shall be conducted only during the hours of 7 AM to 7 PM Monday to Thursday, and 7 AM to 5:30 PM on Friday, and 9:00 AM to 5:30 PM on Saturday. Construction activities shall not occur any time on Sundays and holidays. Construction sites shall post a sign at all entrances to the work site informing contractors, subcontractors, other workers, etc. of this requirement.

C. *Construction Staging and Equipment Noise Control Measures*:

   1. Construction site access and staging activities such as receipt of deliveries, equipment and material storage, etc., shall occur as far away from adjacent residential land uses as possible given site and active work constraints.
   2. All stationary noise generating equipment shall be shielded and located as far as possible from residential land uses given site and active work constraints. Shielding may consist of trailers, stored materials, or a three- or four-sided enclosure provided the structure/barrier breaks the line of sight between the equipment and the receptor, provides for proper equipment ventilation and operations, and complies with all other applicable occupational safety and health requirements.
   3. Heavy equipment shall include standard noise suppression devices such as mullers, engine covers, and engine/mechanical isolators, mounts, etc. Equipment and noise suppression devices shall be maintained in accordance with manufacturer's recommendations while on-site.
   4. Pneumatic tools shall include a suppression device on the compressed air exhaust
   5. Connect to existing electrical service to power stationary and portable equipment (e.g., pumps, generators, compressors, and welding sets). This measure shall be subject to the approval of the local electric utility..
   6. No radios or other amplified sound devices shall be audible beyond the property line of the construction site.

D. *Construction Activity Noise Control Measures:*

   1. Demolition Sequencing: Demolition/deconstruction activities shall be sequenced to take advantage of existing shielding/noise reduction provided by existing buildings,

parts of buildings, and/or topography, and shall use methods that minimize noise and vibration, such as sawing concrete blocks instead of crushing or other pulverization activities, unless there are project-specific technical and logistical constraints that require such activities.

2. Noise Barrier Installation: An 8-foot-tall noise barrier shall be installed during all demolition, site preparation, grading, and structural foundation work activities (including concrete slab pours) that have a direct line of sight to an occupied dwelling unit or other on-site receptor. The barrier shall only be required along the portion of the job site / work area perimeter that lies between the active work area and the affected dwelling unit or on-site receptor. The barrier shall consist of nominal 0.5-inch plywood with a minimum material density of 1.7 pounds per square foot installed, or other commercially available acoustic panels, blankets, etc. that have a minimum sound transmission class or transmission loss value of 20 dB. The barrier shall be installed at grade or mounted to structures located at grade, such as a K-rail, and be maintained free of openings or gaps (other than weep holes). Construction ingress/egress shall not be permitted through the barrier unless there is no other viable access point due to specific project constraints or other access requirements. The noise barrier may be removed following the completion of all demolition, site preparation, grading, building foundation, and paving work (i.e., it is not necessary once framing and typical vertical building construction begins provided no other site preparation, grading, or paving work is still occurring in the area).
3. Pile Driving: Pile driving shall be prohibited unless geotechnical evaluations demonstrate pile driving activities are necessary for the project. If necessary, piles shall be pre-drilled with an auger to minimize pile driving equipment run times.

E. *Prepare a Construction Noise Complaint Plan:* Construction contractors shall prepare a Construction Noise Complaint Plan that shall:

1. Identify the name and/or title and contact information (including phone number and email) for a designated project representative responsible for addressing construction-related noise issues.
2. Include procedures describing how the designated project representative will receive, respond, and resolve construction noise complaints.
3. At a minimum, upon receipt of a noise complaint, the project representative shall identify the noise source generating the complaint, determine the cause of the complaint, and take steps to resolve the complaint such as, but not limited to, removing equipment from the site, modifying the means and methods used during construction, or installing noise control mechanisms on equipment, between work areas and receptors, etc.

The above analysis indicates that future development at the rezone sites could generate construction noise levels above the FTA's daytime residential (80 dBA L_{eq}) and commercial (85 dBA L_{eq}) construction noise criterion and have the potential to result in a substantial temporary increase in ambient noise levels that could annoy sensitive residential receptors or interfere with the normal use of residential property. This is primarily due to the proximity of existing land uses to the rezoning sites. The implementation of Mitigation Measure NOI-1 would require future housing development to provide advanced notification of construction activities, restrict work hours to daytime periods when humans are less sensitive to elevated noise levels, implement equipment noise control measures, sequence demolition activities and install temporary noise barriers, and plan for potential construction noise complaints that may result from unanticipated or unexpected issues. The use of equipment in good working order with standard noise

suppression devices and the shielding of stationary noise generating equipment per Mitigation Measure NOI-1, Section C, is estimated to result in a 2 dBA to 5 dBA reduction in modeled equipment noise levels.[4] In addition, the installation of a 8-foot-tall temporary noise barrier per Mitigation Measure NOI-1, Section D, is estimated to result in a minimum 6 dBA to 8 dBA reduction in estimated equipment noise levels, depending on the specific type of equipment used, the distance between the equipment and the barrier and the receptor and the barrier, and the elevation of the residential noise receptor. Mitigation Measure NOI-1 would, therefore, lower potential construction noise levels by 8 to 13 dBA, from approximately 76 dBA L_{eq} to 86 dBA L_{eq} down to approximately 63 dBA L_{eq} to 78 dBA L_{eq}, This mitigated construction noise levels would be less than the FTA's daytime residential (80 dBA L_{eq}) and commercial (85 dBA L_{eq}) construction criteria. In addition, by providing advanced notice of loud construction activities and implementing equipment control measures and temporary noise barriers, the potential for noise levels to surprise, annoy, or interfere with sensitive residential receptors and land uses would be substantially reduced. Thus, the implementation of Mitigation Measure NOI-1 would reduce potential temporary construction-related noise increases from future construction activities at each rezone site to a less than significant impact.

Permanent Operational Noise

The proposed project would facilitate new residential and mixed-use development at each rezone site. This new development would generate noise from on-site equipment and activities that could change ambient noise levels at adjacent land uses. The new development could also increase the city's population, add vehicle trips to the local roadway system, and potentially change off-site traffic-related noise levels in the city. These potential effects are evaluated below.

<u>On-Site Noise Levels</u>

Existing stationary and other sources of noise at and near Rezone Site 1, 2, and 3 include, but are not limited to, landscape and building maintenance activities, stationary mechanical equipment (e.g., pumps, heating, ventilation, and air conditioning, or HVAC, equipment), garbage collection activities, and other sources such as vehicle parking and people's voices. Potential new housing and mixed-use developments would involve similar noise generating sources and activities; however, the amount of mechanical equipment, the frequency of landscaping and garbage collection activities, and the intensity of parking and other activities could increase due to more intense development at these sites. Although the project could increase the amount of noise sources and noise-generating activities compared to existing conditions, it would not have the potential to generate significant on-site noise levels that could impact existing and/or future noise-sensitive land uses for the following reasons:

- In general, residential land uses, even mid- to high-density uses, are not a substantial noise-generating land use type because:
    - They do not involve substantial noise-generating activities during the nighttime.
    - Mechanical equipment associated with elevators, residential amenities such as common open space, pools, and other building systems are typically enclosed within closets, sheds, or equipment rooms.

[4] The FHWA's reference construction equipment noise levels are based, in part, on measured data from construction projects occurring in the 1990s with equipment manufactured as early as the 1970's. Newer equipment would include enhanced shields, mounts, and noise suppression controls that lower equipment noise levels below reference data.

  - HVAC equipment is typically screened from public view by landscaping, fences, or walls and, therefore, shielded from adjacent property lines.
  - As described in "Applicable Noise and Vibration Regulations", the effects of noise generated by residential occupants and their guests on human beings is not a significant effect on the environment. Accordingly, the potential noise from residential open space areas does not require evaluation.

- The potential commercial uses that would remain or be developed as part of new mixed-use development at Site 1 and Site 2 would primarily support local-serving retail, office, and neighborhood services and amenities to meet day to day needs of city residents. These mixed-uses currently do not have and would not require substantial loading or unloading facilities or large, stationary sources of equipment that could generate substantial noise levels. In addition, the existing non-residential uses at Site 1 and Site 2 may be relocated to other, existing non-residential locations. This temporary relocation would not change the noise-generating characteristics of the relocated operation, nor would it result in new noise generating equipment (e.g., HVAC equipment) because such equipment would already exist at the relocation site. Therefore, the temporary relocation of existing uses at Site 1 and/or Site 2 to another appropriate location would result in noise levels that are similar to the conditions that prevail in that location.
- The church use that may potentially remain at Site 3 would not change operations. Therefore, there would be no change in noise levels associated with this existing use.
- The City's Municipal Code establishes specific restrictions on noise from commercial operations (Section 8.28.030), leaf blowers (Section 8.28.040), and mechanical equipment (Sections 18.04.145 and 18.12.110), as well as specific design standards for multi-family and mixed-use development that places parking areas and common open space areas away from neighboring properties and noise sources. These requirements would protect existing and future residents from excessive noise levels by ensuring new development projects meet City standards. In particular, the Municipal Code limits any potential increase in noise levels from residential and commercial equipment to no more than five decibels above the ambient conditions that exist the time the equipment is installed.

As explained above, the proposed project would not have the potential to include on-site sources or activities that could generate substantial noise levels at adjacent properties. In addition, as shown in Figure 1 to Figure 3 and Table 1, the existing ambient noise levels in the city are considered less than 55 CNEL. Even with a five-decibel increase permitted by the Municipal Code, ambient noise levels in the vicinity of Site 1, Site 2, and Site 3 would not exceed 60 CNEL and would remain acceptable for residential land uses. For the reasons described above, the proposed project would not have the potential to generate noise that would exceed City standards or otherwise substantially increase existing ambient noise levels. This impact would be less than significant.

Off-site Traffic Noise Increases

The proposed project would generate vehicle trips that would be distributed onto the local roadway system and potentially increase noise levels along travel routes. As summarized in Table 1, existing traffic noise exposure levels are low, generally less than 55 CNEL, which is considered acceptable for all land use types according to OPR guidelines (see Table 5). Caltrans considers a doubling of total traffic volume to result in a three (3) dBA increase in traffic-related noise levels (Caltrans, 2013). According to the trip generation estimates prepared for the proposed project (EPD Solutions, 2024b), the future development at the rezoning sites could result in the following increases in traffic:

- Site 1 Malaga Cove: Site 1 development is estimated to generate up to 94 total daily trips. In the vicinity of Site 1, Palos Verdes Drive West has an ADT volume of 14,661 vehicles. The addition of 94 daily vehicle trips would represent less than a 1% change in ADT volumes and would not have a noticeable effect on traffic noise exposure levels in this area.
- Site 2 Lunada Bay: Site 2 development is also estimated to generate up to 94 total daily trips. In the vicinity of Site 2, Palos Verdes Drive West northbound and southbound segments have ADT volumes of 5,397 and 5,084, respectively. The addition of 94 daily vehicle trips to either directional segment would represent less than a 2% change in ADT volumes and would not have a noticeable effect on traffic noise exposure levels in this area.
- Site 3 First Church of Christ, Scientist: Site 2 development is estimated to generate up to 543 total daily trips. In the vicinity of Site 3, Palos Verdes Drive North northbound and southbound segments have ADT volumes of 7,830 and 5,489 vehicles, respectively. The addition of 543 daily trips to these segments would represent an approximate 7% (northbound) to 10% (southbound) change in ADT volumes, resulting in a maximum increase in traffic noise levels of 0.4 dBA CNEL. In addition, the addition of 543 daily vehicle trips to Via Campesina, which has an ADT of 2,468, would represent an approximately 22% increase in ADT volumes and result in an increase in traffic noise levels of approximately 0.9 dBA CNEL.

It is noted the above estimates are based on gross trip generation and do not account for any existing trips that would be replaced by future development. Thus, the above analysis is likely to overestimate potential traffic noise changes. As described above, the project could result in a 0.9 dBA change in traffic noise levels at worst-case; however, overall traffic noise exposure levels in the vicinity of the rezone sites would remain less than 55 CNEL, even with the future development. The proposed project, therefore, would not result in a substantial permanent increase in off-site, traffic-related noise levels.

Ground-borne Vibration

Construction activities have the potential to result in varying degrees of temporary ground vibration, depending on the specific construction equipment used and activities involved. Vibration generated by construction equipment spreads through the ground and diminishes with increases in distance. The effects of ground vibration may be imperceptible at the lowest levels, result in low rumbling sounds and detectable vibrations at moderate levels, and at high levels can cause sleep disturbance in places where people normally sleep or annoyance in buildings that are primarily used for daytime functions and sleeping (e.g., a hospital). Ground vibration can also potentially damage the foundations and exteriors of existing structures even if it does not result in a negative human response. Pile drivers and other pieces of high-impact construction equipment are generally the primary cause of construction-related vibration impacts. The use of such equipment is generally limited to sites where there are extensive layers of very hard materials (e.g., compacted soils, bedrock) that must be loosened or penetrated to achieve grading and foundation design requirements. The need for such methods is usually determined through site-specific geotechnical investigations that identify the subsurface materials within the grading envelope, along with foundation design recommendations and the construction methods needed to safely develop a site.

Construction equipment and activities are categorized by the nature of the vibration they produce. Equipment or activities typical of continuous vibration sources include excavation equipment, static compaction equipment, vibratory pile drivers, and pile-extraction equipment. Equipment or activities typical of transient sources (single-impact) or low-rate, repeated impact vibration include impact pile drivers and crack-and-seat equipment. Pile driving and blasting

activities produce the highest levels of ground vibration and can result in structural damage to existing buildings.

Since individual project-specific information is not available at this time, potential short-term construction-related vibration impacts can only be evaluated based on the typical construction activities associated with residential and mixed-use development (see "Temporary Construction Noise Levels" above). The need for blasting for future development facilitated by the proposed project is not anticipated. Standard construction equipment (e.g., bulldozers, trucks, jackhammers) generally does not cause vibration that could cause structural or cosmetic damage but may be felt by nearby receptors. Table 8 presents the typical vibration levels for the type of equipment that is most likely to be used in future construction at the rezone sites.

Table 8: Ground-borne Vibration from Typical Construction Equipment

Equipment	Peak Particle Velocity (in/sec)[(A)]					
	25 Feet	50 Feet	100 Feet	200 Feet	400 Feet	500 Feet
Small bulldozer	0.003	0.001	0.001	0.000	0.000	0.000
Jackhammer	0.035	0.016	0.008	0.004	0.002	0.001
Loaded truck	0.076	0.035	0.017	0.008	0.004	0.003
Auger Drill Rig	0.089	0.042	0.019	0.009	0.004	0.003
Large bulldozer	0.089	0.042	0.019	0.009	0.004	0.003
Vibratory Roller	0.210	0.098	0.046	0.021	0.010	0.008
Impact Pile Driver	0.644	0.300	0.140	0.065	0.031	0.024
Sonic Pile Driver	0.734	0.342	0.160	0.075	0.035	0.027
Equipment	**Velocity Decibels (VdB)[(B)]**					
	25 Feet	**50 Feet**	**100 Feet**	**200 Feet**	**400 Feet**	**500 Feet**
Small bulldozer	58.0	49.0	39.9	30.9	21.9	19.0
Jackhammer	79.0	70.0	60.9	51.9	42.9	40.0
Loaded truck	86.0	77.0	67.9	58.9	49.9	47.0
Auger Drill Rig	87.0	78.0	68.9	59.9	50.9	48.0
Large bulldozer	87.0	78.0	68.9	59.9	50.9	48.0
Vibratory Roller	94.0	85.0	75.9	66.9	57.9	55.0
Impact Pile Driver	104.0	95.0	85.9	76.9	67.9	65.0
Sonic Pile Driver	93.0	84.0	74.9	65.9	56.9	54.0

Sources: Caltrans, 2013 and FTA, 2018

(A) Estimated PPV calculated as: PPV(D)=PPV(ref)*(25/D)^1.3 where PPV(D)= Estimated PPV at distance; PPVref= Reference PPV at 25 ft; D= Distance from equipment to receiver; and n= ground attenuation rate (1.1 for dense compacted hard soils).

(B) Estimated Lv calculated as: Lv(D)=Lv(25 feet)-30Log(D/25) where Lv(D)= estimated velocity level in decibels at distance, Lv(25 feet)= RMS velocity amplitude at 25 feet; and D= distance from equipment to receiver.

As shown in Table 8, potential vibration levels associated with construction equipment depend on the type of equipment used. For structural damage, the use of typical equipment during construction activities (e.g., bulldozer, jack hammer, trucks, etc.) would produce PPV levels up to 0.04 in/sec at 50 feet. These PPV values are well below Caltrans' guidelines standards for potential structural damage for older residential structures (0.3 PPV for continuous vibration sources; see Table 3). Similarly, the use of specific vibration-generating equipment such as a

vibratory roller or typical pile driver would not exceed Caltrans' structural damage criteria for older residential buildings unless pile drivers were required to be used within approximately 50 feet of any building, which would be unlikely to occur at Sites 1 and Sites 2 given front, side, and rear yard setback requirements that apply to projects in the city. In addition, although unlikely, it is possible vibration generating equipment could operate within 50 feet of an existing structure at Site 3 since the existing church building may remain during future construction activities.

For human annoyance and interference responses, the use of typical equipment (e.g., bulldozer, jack hammer, trucks, etc.) during construction could produce vibration levels that exceed the FTA's adverse human response criteria for frequent events at occupied residential structures (72 VdB) within 80 feet of work areas, while the FTA's criteria for commercial land uses (75 VdB) could be exceed at occupied structures within approximately 65 feet of work areas. Thus, there is the potential for adverse human response from vibrations associated with typical construction activities at Rezone Site 1, 2, and 3, as each site currently has occupied residential buildings within approximately 80 feet of the site boundary. For specific vibration-generating equipment such as a vibratory roller or pile driver, construction could exceed the FTA's criterion for residential uses (72 VdB) at occupied structures within approximately 140 feet for a vibratory roller and 300 feet for pile driving activities, while the FTA's criterion for commercial uses (75 VdB) could be exceed at occupied structures within approximately 110 feet for a vibratory roller and 235 feet for pile driving activities. Thus, there is also the potential for adverse human response from vibrations generated by a vibratory roller or pile driving activities at Rezone Site 1, 2, and 3. These estimates represent potential vibration levels based on typical equipment operations and assume there is no change in elevation between work areas and receptor locations and no change in subsurface conditions that may affect vibration transmission through soil media and structures. In actuality, Rezone Site 1, 2, and 3 all have slight differences in elevations between work areas and adjacent receptors would limit the potential for ground-borne vibrations to affect adjacent buildings.

It is noted that potential construction-related vibrations would be intermittent (not occur every day), limited in duration (equipment would move throughout work areas and not operate in the same location for a prolonged amount of time), and occur during the daytime (when receptors would not be sleeping and, therefore, are considered less sensitive to vibration levels). As described above, the proposed project's construction activities would be unlikely to result in physical damage to any existing structures, but could exceed FTA criteria for annoyance at occupied buildings in the vicinity of Rezone Site 1, 2, and 3. The generation of ground-borne vibration levels above these criteria would be a potentially significant impact. To reduce the potential for future development at the rezone sites to generate excessive ground-borne vibration levels, MIG recommends the City incorporate Mitigation Measure NOI-2 into the project:

Mitigation Measure NOI-2: Prohibit Vibratory Equipment.

To reduce potential construction noise levels generated by the development of rezone sites, the City shall require future development projects to:

A. *Notify Nearby Land Uses of Planned Construction Activities.* See Mitigation Measure NOI-1, Section A.

B. *Restrict Work Hours.* See Mitigation Measure NOI-1, Section B.

C. *Prohibit Vibratory Equipment.* The use of vibratory rollers, vibratory/impact hammers and other potential large vibration-generating equipment (e.g., hydraulic breakers/hoe rams) shall be prohibited within 50 feet of any structure unless site- or project-specific conditions or design considerations require the use of such

equipment. Plate compactors and compactor rollers are acceptable, and deep foundation piers or caissons shall be auger drilled.

D. *Prepare Vibration Mitigation Plan.* Construction contractors shall prepare a Construction Vibration Complaint Plan that identifies:

1. The project's planned vibration-generating construction activities (e.g., demolition, grading, pile driving, vibratory compaction, etc.).
2. The potential project-specific vibration levels (given project-specific equipment and soil conditions, if known) at specific occupied building locations that may be impacted by work activities.
3. Identifies, as necessary, the vibration control measures incorporated into the project that ensure equipment and work activities would not damage buildings or result in vibrations that exceed Caltrans' criteria for structural damage (0.3 inches/second peak particle velocity for older residential buildings; however, this may be adjusted to reflect the specific type of building that may be impacted by an activity) and the FTA's human annoyance criteria for residential (72 VdB) or commercial (75 VdB) land uses for frequent events). Such measures may include, but are not limited to:
    i. The requirements of Sections A, B, and C;
    ii. The use of vibration monitoring to measure actual vibration levels;
    iii. The use of photo monitoring or other records to document building conditions prior to, during, and after construction activities; and
    iv. The use of other measures such as the use of rubber-tired equipment instead of tracked equipment, trenches, or wave barriers that limit ground-borne vibration levels at occupied receptor locations to levels below the standards identified in Mitigation Measure NOI-2, Section D.3.
4. Includes procedures describing how the construction contractor will receive, respond, and resolve to construction vibration complaints. At a minimum, upon receipt of a vibration complaint, the Contractor shall identify the vibration source generating the complaint, determine the cause of the complaint, and take steps to resolve the complaint pursuant to Mitigation Measure NOI-2, Section 3.

Mitigation measure NOI-2 requires future development projects to limit the potential for ground-borne vibration during construction activities by prohibiting the use of certain vibration generating equipment. Mitigation Measure NOI-2 requires advance notice of construction activities, limiting construction activities to daytime hours, and adherence to Caltrans and FTA standards intended to avoid potential structural damage and limited adverse human responses to ground-borne vibration levels. These measures would ensure equipment and work activities would not result in excessive vibrations that could lead to structural damage or human annoyance. This impact would be less than significant with mitigation.

Once constructed, the operation of new residential and mixed-use development projects at Rezone Site 1, 2, or 3 would not involve the use of equipment or activities that would generate excessive ground-borne vibration levels and impacts would be less than significant.

Airport-Related Noise

Torrance Municipal Airport is located approximately 2.6 miles east, 4.6 miles northeast, and 1.4 miles northeast of Sites 1, 2, and 3, respectively. All project sites (including the closest site to the airport, Site 3), are located outside of all airport noise contours (Los Angeles County Airport

Land Use Commission 2003). The proposed project, therefore, would not expose people residing or working in the project area to excessive airport-related noise levels.

OTHER NOISE AND LAND USE PLANNING ISSUES

The California Supreme Court in *California Building Industry Association v. Bay Area Air Quality Management District*, 62 Cal.4th 369 (2015) ruled that CEQA review is focused on a project's impact on the environment "and not the environment's impact on the project." Per this ruling, a Lead Agency is not required to analyze how existing conditions might impact a project's existing or future population except where specifically required by CEQA; however, a Lead Agency may elect to disclose information relevant to a project even if it is not considered an impact under CEQA.

As discussed above under "Existing Noise Levels", the City's General Plan was last updated in 1973, and it does not establish noise and land use compatibility guidelines; however, OPR's General Plan Guidelines establish 60 CNEL and 65 CNEL as the normally acceptable noise levels for single-family residential and multi-family residential land uses, respectively (see Table 5). As shown in Figure 1 to Figure 3 and Table 1, measured ambient noise levels near the rezone sites are low (generally less than 63 dBA L_{eq} during the daytime), and modeled traffic noise exposure levels at all sites are less than 55 dBA CNEL. Accordingly, none of the three rezone sites would be exposed to potentially incompatible noise levels per OPR guidelines, and the proposed project would not have the potential to substantially change these existing conditions (see "Permanent Operational Noise" above). Accordingly, future development at Rezone Site 1, 2, and 3 would not be exposed to incompatible noise levels and would not require the incorporation of specific noise attenuation features to meet residential or commercial interior noise standards established by the California Building Code (see "Building Standards Code" above).

CONCLUSION

As described in this analysis, the proposed project would not generate a substantial temporary or permanent increase in ambient noise levels with the incorporation of Mitigation Measure NOI-1, would not generate excessive ground-borne vibration with the incorporation of Mitigation Measure NOI-2, and would not expose people residing or working in the Project area to excessive aircraft noise levels. The proposed project, therefore, would not result in a substantial, adverse noise-related effect on the environment.

PREPARERS AND REFERENCES

This study was prepared by MIG under contract to EPD Solutions, Inc. This study reflects the independent, objective, professional opinion of MIG. The following individuals were involved in the preparation and review of this study:

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The following references were used to prepare this memorandum:

California Office of Planning and Research (OPR) 2017. State of California General Plan Guidelines. Sacramento, California. 2017.

California Department of Transportation (Caltrans) 2013. *Technical Noise Supplement to the Traffic Noise Analysis Protocol.* Sacramento, California. September 2013.

_____. 2020. *Transportation and Construction Vibration Guidance Manual*. Sacramento, California. April 2020.

City of Palos Verdes Estates 1973. General Plan Noise Element.

Environmental Planning Design Solutions, Inc. (EPD Solutions) 2024. "Re: Noise Count Locations for PV Estates (EPD 24-103)." Email from Simon Lin, EPD Solutions, to Chris Dugan, MIG. October 15 and 16, 2024.

Los Angeles County Airport Land Use Commission 2003. Torrance Airport. https://case.planning.lacounty.gov/assets/upl/project/aluc_airport-torrance.pdf

U.S. 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. Washington, DC. September 2018.

Attachment 01

Environmental Noise Background

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NOISE BACKGROUND

Noise may be defined as loud, unpleasant, or unwanted sound. The frequency (pitch), amplitude (intensity or loudness), and duration of noise all contribute to the effect on a listener, or receptor, and whether the receptor perceives the noise as objectionable, disturbing, or annoying.

The Decibel Scale (dB)

The decibel scale (dB) is a unit of measurement that indicates the relative amplitude of a sound. Sound levels in dB are calculated on a logarithmic basis. An increase of 10 dB represents a tenfold increase in acoustic energy, while 20 dBs is 100 times more intense, 30 dBs is 1,000 more intense, and so on. In general, there is a relationship between the subjective noisiness, or loudness of a sound, and its amplitude, or intensity, with each 10 dB increase in sound level perceived as approximately a doubling of loudness. Due to the logarithmic basis, decibels cannot be directly added or subtracted together using common arithmetic operations:

$$50\ decibels + 50\ decibels\ \neq 100\ decibels$$

Instead, the combined sound level from two or more sources must be combined logarithmically. For example, if one noise source produces a sound power level of 50 dBA, two of the same sources would combine to produce 53 dB as shown below.

$$10 * \ 10\ log\left(10^{\left(\frac{50}{10}\right)} + \ 10^{\left(\frac{50}{10}\right)}\right) = 53\ decibels$$

In general, when one source is 10 dB higher than another source, the quieter source does not add to the sound levels produced by the louder source because the louder source contains ten times more sound energy than the quieter source.

Sound Characterization

There are several methods of characterizing sound. The most common method is the "A-weighted sound level," or dBA. This scale gives greater weight to the frequencies of sound to which the human ear is typically most sensitive. Thus, most environmental measurements are reported in dBA, meaning decibels on the A-scale.

Human hearing matches the logarithmic A-weighted scale, so that a sound of 60 dBA is perceived as twice as loud as a sound of 50 dBA. In a quiet environment, an increase of 3 dB is usually perceptible, however, in a complex noise environment such as along a busy street, a noise increase of less than 3 dB is usually not perceptible, and an increase of 5 dB is usually perceptible. Normal human speech is in the range from 50 to 65 dBA. Generally, as environmental noise exceeds 50 dBA, it becomes intrusive and above 65 dBA noise becomes excessive. Nighttime activities, including sleep, are more sensitive to noise and are considered affected over a range of 40 to 55 dBA.

Sound levels are typically not steady and can vary over a short time period. The equivalent noise level (L_{eq}) is used to represent the average character of the sound over a period of time. The L_{eq} represents the level of steady noise that would have the same acoustical energy as the sum of the time-varying noise measured over a given time period. L_{eq} is useful for evaluating shorter time periods over the course of a day. The most common L_{eq} averaging period is hourly, but L_{eq} can describe any series of noise events over a given time period.

Variable noise levels are values that are exceeded for a portion of the measured time period. Thus, L_{01} is the level exceeded one percent of the time and L90 is the level exceeded 90 percent of the time. The L_{90} value usually corresponds to the background sound level at the measurement location.

Noise exposure over the course of an entire day is described by the day/night average sound level, or DNL (also referred to as L_{dn}), and the community noise equivalent level, or CNEL. Both descriptors represent the 24-hour noise impact on a community. For DNL, the 24-hour day is divided into a 15-hour daytime period (7 AM to 10 PM) and a nine-hour nighttime period (10 PM to 7 AM) and a 10 dB "penalty" is added to measure nighttime noise levels when calculating the 24-hour average noise level. For example, a 45-dBA nighttime sound level would contribute as much to the overall day-night average as a 55-dBA daytime sound level. The CNEL descriptor is similar to DNL, except that it includes an additional 5 dBA penalty beyond the 10 dBA for sound events that occur during the evening time period (7 PM to 10 PM). The artificial penalties imposed during DNL and CNEL calculations are intended to account for a receptor's increased sensitivity to sound levels during quieter nighttime periods.

Sound Propagation

The energy contained in a sound pressure wave dissipates and is absorbed by the surrounding environment as the sound wave spreads out and travels away from the noise generating source. Theoretically, the sound level of a point source attenuates, or decreases, by 6 dB with each doubling of distance from a point source. Sound levels are also affected by certain environmental factors, such as ground cover (asphalt vs. grass or trees), atmospheric absorption, and attenuation by barriers. Outdoor noise is also attenuated by the building envelope so that sound levels inside a residence are from 10 to 20 dB less than outside, depending mainly on whether windows are open for ventilation or not.

For an ideal "point" source of sound, the energy contained in a sound pressure wave dissipates and is absorbed by the surrounding environment as the sound wave spreads out in a spherical pattern and travels away from the point source. Theoretically, the sound level attenuates, or decreases, by 6 dB with each doubling of distance from the point source. The change in noise levels between two distances can be calculated according to Equation 1 (California Department of Transportation (Caltrans), 2013a) as follows:

Equation 1

$$dBA2 = dBA1 + 20\log (D1/D2)$$

Where:

dBA1 = Known noise level, such as a reference noise level
D1 = Distance associated with dBA1
dBA2 = Noise level at distance 2
D2 = Distance associated with dBA2

For an ideal line source of sound, the energy contained in a sound pressure wave dissipates and is absorbed by the surrounding environment as the sound wave spreads out in a cylindrical pattern from the source. Theoretically, the sound level attenuates, or decreases, by 3 dB with each doubling of distance from the line source. The change in noise levels between two distances can be calculated according to Equation 2 as follows:

Equation 2

$$dBA2 = dBA1 + 10\log (D1/D2)$$

Where:

dBA1 = Known noise level, such as a reference noise level
D1 = Distance associated with dBA1
dBA2 = Noise level at distance 2
D2 = Distance associated with dBA2

For noise sources that do not operate continuously (e.g., vehicles and trucks that travel on-site, park, and then cease to generate noise),the average, hourly noise level associated with variable (i.e., non-steady) noise source can be calculated using Equation 3 as follows:

Equation 3

$$Hourly\ L_{eq} = 10 * Log\ (P_h) * 10^{(Lp/10)}$$

Where:

P_h = Percentage or fraction of hour the noise is generated

L_p = The noise level generated during the partial hour (P_h)

Finally, the total combined sound pressure level from multiple, identical sources of noise at a receiver location can be calculated using Equation 4 as follows:

Equation 4

$$SPL_{Total} = SPL_1 + 10 * Log\ (N)$$

Where:

SPL_1 = Sound pressure level of one source

N = Number of identical sources to be added

Noise Effects on Humans

Noise effects on human beings are generally categorized as:

- Subjective effects of annoyance, nuisance, and/or dissatisfaction
- Interference with activities such as speech, sleep, learning, or relaxing
- Physiological effects such as startling and hearing loss

Most environmental noise levels produce subjective or interference effects; physiological effects are usually limited to high noise environments such as industrial manufacturing facilities or airports.

Predicting the subjective and interference effects of noise is difficult due to the wide variation in individual thresholds of annoyance and past experiences with noise; however, an accepted method to determine a person's subjective reaction to a new noise source is to compare it the existing environment without the noise source, or the "ambient" noise environment. In general, the more a new noise source exceeds the ambient noise level, the more likely it is to be considered annoying and to disturb normal activities.

Under controlled conditions in an acoustical laboratory, the trained, healthy human ear is able to discern 1-dB changes in sound levels when exposed to steady, single-frequency ("pure-tone") signals in the mid-frequency (1,000–8,000 Hz) range. In typical noisy environments, changes in noise of 1 to 2 dB are generally not perceptible. However, it is widely accepted that people are able to begin to detect sound level increases of 3 dB in typical noisy environments. Further, a 5-dB increase is generally perceived as a distinctly noticeable increase, and a 10-dB increase is generally perceived as a doubling of loudness that would almost certainly cause an adverse response from community noise receptors.

When exposed to high noise levels, humans may suffer hearing damage. Sustained exposure to high noise levels (e.g., 90 dBs for hours at a time) can cause gradual hearing loss, which is usually temporary, whereas sudden exposure to a very high noise level (e.g., 130 to 140 dBs) can cause sudden and permanent hearing loss. In addition to hearing loss, noise can cause stress in humans and may contribute to stress-related diseases, such as hypertension, anxiety, and heart disease (Caltrans, 2013).

Vibration

Vibration is the movement of particles within a medium or object such as the ground or a building. Vibration may be caused by natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or humans (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources are usually characterized as continuous, such as factory machinery, or transient, such as explosions. Ground-borne vibrations consist of compression or primary waves, shear or secondary waves, and Rayleigh or surface waves. Particle motion associated with compression or primary waves is a push-pull motion parallel to the direction of the wave front, while shear or secondary waves result in particle movement that is generally perpendicular to the wave front. Rayleigh waves move in a horizontal and vertical direction that diminish rapidly with depth; however, this wave type usually results in the most disturbance along the surface of the ground because it usually contains the most energy and does not decay along the surface of the ground as quickly as compression and shear waves do.

As is the case with airborne sound, ground-borne vibrations may be described by amplitude and frequency; however, unlike airborne sound, there is no standard way of measuring and reporting amplitude. Vibration amplitudes can be expressed in terms of velocity (inches per second) or discussed in dB units in order to compress the range of numbers required to describe vibration. Vibration impacts to buildings are usually discussed in terms of peak particle velocity (PPV) in inches per second (in/sec). PPV represents the maximum instantaneous positive or negative peak of a vibration signal and is most appropriate for evaluating the potential for building damage. Vibration can impact people, structures, and sensitive equipment. The primary concern related to vibration and people is the potential to annoy those working and residing in the area. Vibration with high enough amplitudes can damage structures (such as crack plaster or destroy windows). Ground-borne vibration can also disrupt the use of sensitive medical and scientific instruments, such as electron microscopes.

Common sources of vibration within communities include construction activities and railroads. Ground-borne vibration generated by construction projects is usually highest during pile driving, rock blasting, soil compacting, jack hammering, and demolition-related activities. Next to pile driving, grading activity has the greatest potential for vibration impacts if large bulldozers, large trucks, or other heavy equipment are used.

Ground-borne noise is noise generated by vibrating building surfaces such as floors, walls, and ceilings that radiate noise inside buildings subjected to an external source of vibration. The vibration level, the acoustic radiation of the vibrating element, and the acoustical absorption of the room are all factors that affect potential ground-borne noise generation.

Attachment 02

Ambient Noise Monitoring Data

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Palos Verdes Estates 2021-2029 Housing Element Program 13 Rezoning Project
City of Palos Verdes Estates

Attachment 2: Ambient Noise Data
Prepared by: MIG, Inc.
November 2024

Attachment Contents

Sheet 1: Summary of Short-Term Ambient Noise Monitoring Data

Table 1: Summary of Short-Term Ambient Noise Measurements

Site	Date	Start Time	Duration	LASeq	LASmin	LASmax	LAS1.67	LAS8.34	LAS16.7	LAS25.0	LAS50.0	LAS90.0
ST-1	2024-11-06	10:24:00	36 minutes	62.6	50.8	76.2	69.4	66.1	64.0	62.9	60.9	57.9
ST-2A	2024-11-06	11:05:00	11 minutes	52.8	46.9	63.6	59.2	56.9	54.6	53.0	50.8	49.1
ST-2B	2024-11-06	11:17:00	8 minutes	76.5	74.2	77.8	77.4	77.2	77.0	76.8	76.5	75.9
ST-3	2024-11-06	11:30:00	15 minutes	56.1	50.4	75.7	64.6	58.4	56.0	55.3	53.9	52.3
ST-4	2024-11-06	11:57:00	30 minutes	60.4	41.5	76.8	69.3	65.2	62.5	60.6	56.1	47.6
ST-5	2024-11-06	12:45:00	31 minutes	61.6	42.5	81.5	71.2	66.2	63.3	61.4	56.7	50.4
ST-6	2024-11-06	13:44:00	30 minutes	61.7	38.9	79.6	70.7	67.0	64.3	61.9	55.4	46.6
ST-7	2024-11-06	14:28:00	30 minutes	70.5	45.0	83.0	76.7	73.7	72.5	71.7	69.5	64.0

Sheet 2: Measurement Summary

Summary

File Name on Meter	ST_PVE.001.s
File Name on PC	LxT_0005065-20241106 102000-ST_PVE.001.ldbin
Serial Number	0005065
Model	SoundTrack LxT®
Firmware Version	2.404
User	
Location	
Job Description	
Note	

Measurement

Description	L2 Palos Verdes Estates, ST, November 6, 2024	
Start	2024-11-06 10:20:00	
Stop	2024-11-06 15:02:34	
Duration	04:42:34.0	
Run Time	04:42:34.0	
Pause	00:00:00.0	
Pre-Calibration	2024-11-06 10:17:10	
Post-Calibration	2024-11-06 15:03:43	
Calibration Deviation	-0.02	dB

Overall Settings

RMS Weight	A Weighting	
Peak Weight	A Weighting	
Detector	Slow	
Preamplifier	Direct	
Microphone Correction	Off	
Integration Method	Exponential	
OBA Range	Normal	
OBA Bandwidth	1/1 and 1/3	
OBA Frequency Weighting	A Weighting	
OBA Max Spectrum	Bin Max	
Overload	122.6	dB

	A	**C**	**Z**	
Under Range Peak	**78.8**	75.8	80.8	dB
Under Range Limit	**14.7**	13.2	17.5	dB
Noise Floor	5.6	4.1	8.4	dB

	First	**Second**	**Third**
Instrument Identification	L02	MIG INC	6-3802

Results

LA_{Seq}	66.3	dB
LASE	108.6	dB
EAS	8.036	mPa^2h

EAS8		13.651	mPa²h
EAS40		68.253	mPa²h
LApk (max)	2024-11-06 11:00:21	118.6	dB
LASmax	2024-11-06 11:46:29	86.1	dB
LASmin	2024-11-06 14:21:28	26.6	dB
SEA		-99.9	dB

	Exceedance Counts	Duration	
LAS > 70.0 dB	315	2262.4	s
LAS > 80.0 dB	14	24.6	s
LApk > 115.0 dB	5	3.1	s
LApk > 135.0 dB	0	0.0	s
LApk > 140.0 dB	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
	66.3	66.3	-99.9	66.3	66.3	-99.9	-99.9

LCSeq	82.5	dB
LASeq	66.3	dB
LCSeq - LASeq	16.2	dB
LAIeq	70.5	dB
LAeq	66.3	dB
LAIeq - LAeq	4.2	dB

	A		C		Z	
	dB	Time Stamp	dB	Time	dB	Time Stamp
Leq	66.3					
LS(max)	86.1	2024/11/06 11:46:29				
LS(min)	26.6	2024/11/06 14:21:28				
Lpk(max)	118.6	2024/11/06 11:00:21				

Overload Count	12	
Overload Duration	24.9	s
OBA Overload Count	12	
OBA Overload Duration	24.9	s

Dose Settings

Dose Name	OSHA-1	OSHA-2	
Exchange Rate	5	5	dB
Threshold	90	80	dB
Criterion Level	90	90	dB

Criterion Duration	8	8	h

Results			
Dose	-99.94	0.02	%
Projected Dose	-99.94	0.03	%
TWA (Projected)	-99.9	31.3	dB
TWA (t)	-99.9	27.5	dB
Lep (t)	64.0	64.0	dB

Ln Percentiles		
LAS 1.67	76.7	dB
LAS 8.34	70.9	dB
LAS 16.70	67.8	dB
LAS 25.00	64.8	dB
LAS 50.00	58.8	dB
LAS 90.00	48.8	dB

Calibration History

Preamp	Date	dB re 1V/Pa	mV/Pa
Direct	2024-05-28 09:39:19	-28.79	36.34
Direct	2024-05-28 07:08:36	-28.72	36.66
Direct	2020-01-28 06:05:01	-28.49	37.62
PRMLxT1L	2024-11-06 15:03:41	-28.76	36.47
PRMLxT1L	2024-11-06 10:17:08	-28.73	36.61
PRMLxT1L	2024-10-09 10:16:29	-28.82	36.23
PRMLxT1L	2024-10-08 09:34:37	-28.67	36.86
PRMLxT1L	2024-09-12 12:37:20	-28.82	36.21
PRMLxT1L	2024-09-11 10:21:31	-28.69	36.79
PRMLxT1L	2024-09-10 03:02:16	-28.76	36.46
PRMLxT1L	2024-09-10 00:42:48	-28.70	36.74
PRMLxT1L	2024-07-30 12:46:13	-28.61	37.11
PRMLxT1L	2024-07-29 12:20:24	-28.70	36.73
PRMLxT1L	2024-07-16 10:07:23	-28.67	36.85
Unknown	2023-06-23 21:02:21	-28.58	37.25
Unknown	2023-06-23 20:20:04	-28.64	36.98
Unknown	2023-01-29 10:41:50	-28.69	36.78
Unknown	2022-11-22 12:05:40	-28.57	37.26
Unknown	2022-11-21 11:46:47	-28.65	36.96
Unknown	2022-11-21 11:45:41	-28.63	37.01
Unknown	2022-11-21 11:44:13	-28.62	37.08
Unknown	2022-03-29 14:00:31	-28.57	37.27
Unknown	2022-03-29 09:47:56	-28.50	37.58
Unknown	2018-11-13 08:29:15	-28.30	38.47
Unknown	2018-11-05 14:21:01	-28.27	38.59

Note: Detailed calibration records available upon request.

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Attachment 03

Traffic Noise Modeling Data

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Palos Verdes Estates 2021-2029 Housing Element Program 13 Rezoning Project
City of Palos Verdes Estates

Attachment 3: Traffic Noise Data
Prepared by: MIG Inc.
November 2024

Traffic Noise Modeling Data

Sheet	Information
1	ADT AND CNEL SUMMARY
2	TRAFFIC NOISE MODEL (TNM) ROADWAY GEOMETRY INPUTS
3	2024 EXISTING TRAFFIC NOISE CONTOURS
4	EXISTING CONDITIONS TNM TRAFFIC VOLUME PERCENTAGES
5	EXISTING CONDITIONS MODELED TRAFFIC VOLUMES

SHEET 1: ADT AND CNEL SUMMARY

Road/Segment	2024 Existing	
	ADT	CNEL
Site 1		
Palos Verdes Dr W EB AND WB (between PV Estates W Dr and Via Corta)	14,661	52.8
PV Estates W Dr EB AND WB (between Palos Verdes Dr W and Via Corte)	195	47.1
Site 2		
Palos Verdes Drive West NB (between Yarmouth Rd and Avenida Mirola)	5,397	49.1
Palos Verdes Drive West SB (between Yarmouth Rd and Avenida Mirola)	5,084	49.8
Site 3		
Via Campesina (between Pso Del Campo and Palos Verdes Dr N)	2,468	44.2
Palos Verdes Drive North SB (South of Via Campesina)	5,489	48.0
Palos Verdes Drive North NB (South of Via Campesina)	7,830	50.6

Notes

A. ADT is average daily traffic volume. ADT is bi-directional for all road segments except Site 2 segments and Palos Verdes Drive North segments. Traffic volumes obtained from the travel demand modeling conducted for the Project.

B. CNEL is estimated at 50 feet from the road center for all road segments.

SHEET 2: TRAFFIC NOISE MODEL (TNM) ROADWAY GEOMETRY INPUTS

Road/Segment	Max Daily Volume (Vehicles)	Travel Lanes		Road Width (Feet)		Vehicle Speed (MPH)
		Each Direction	Total	Each Direction	Paved Area	
Site 1						
Palos Verdes Dr W EB AND WB (between PV Estates W Dr and Via Corta)	14,661	1	2	17	34	25
PV Estates W Dr EB AND WB (between Palos Verdes Dr W and Via Corte)	195	1	2	15	30	25
Site 2						
Palos Verdes Drive West NB (between Yarmouth Rd and Avenida Mirola)	5,397	N/A	2	34	34	35
Palos Verdes Drive West SB (between Yarmouth Rd and Avenida Mirola)	5,084	N/A	2	34	34	35
Site 3						
Via Campesina (between Pso Del Campo and Palos Verdes Dr N)	2,468	1	2	15	30	30
Palos Verdes Drive North SB (South of Via Campesina)	5,489	N/A	1	32	32	35
Palos Verdes Drive North NB (South of Via Campesina)	7,830	N/A	1	32	32	35

Notes
A. Maximum traffic volume based on EPD Solutions traffic study.

SHEET 3: 2024 EXISTING TRAFFIC NOISE CONTOURS

Road/Segment	Modeled Average Daily Traffic (ADT) Volume	Modeled CNEL 50 Feet from Road Centerline	Distance from Modeled Road Center to Noise Contour Level			
			60 CNEL	65 CNEL	70 CNEL	75 CNEL
Site 1						
Palos Verdes Dr W EB AND WB (between PV Estates W Dr and Via Corta)	14,661	52.8	10	3	1	0
PV Estates W Dr EB AND WB (between Palos Verdes Dr W and Via Corte)	195	47.1	3	1	0	0
Site 2						
Palos Verdes Drive West NB (between Yarmouth Rd and Avenida Mirola)	5,397	49.1	4	1	0	0
Palos Verdes Drive West SB (between Yarmouth Rd and Avenida Mirola)	5,084	49.8	5	2	0	0
Site 3						
Via Campesina (between Pso Del Campo and Palos Verdes Dr N)	2,468	44.2	1	0	0	0
Palos Verdes Drive North SB (South of Via Campesina)	5,489	48.0	3	1	0	0
Palos Verdes Drive North NB (South of Via Campesina)	7,830	50.6	6	2	1	0

Note

A. ADT is average daily traffic volume. ADT is bi-directional for all road segments except Site 2 segments and Palos Verdes Drive North segments. Traffic volumes obtained from the travel demand modeling conducted for the Project.

B. CNEL is estimated at 50 feet from the road center for all road segments.

SHEET 4: EXISTING CONDITIONS TNM TRAFFIC VOLUME PERCENTAGES

Road/Segment	ADT	Time of Day Split (A)			Daytime, Evening, Nighttime Fleet Mix (A)				
		Day (7 AM to 7 PM	Evening (7 PM to 10 PM)	Night (10 PM to 7 AM)	Auto	MHDT	HHDT	Motorcycle	Bus
Site 1									
Palos Verdes Drive W (North)	14,661	84.9%	9.4%	5.7%	96.1%	1.5%	1.5%	1.0%	0.0%
PV Estates W Dr WB (South)	195	92.1%	6.1%	1.8%	96.1%	1.5%	1.5%	1.0%	0.0%
Site 2									
Palos Verdes Drive West NB (between Yarmouth Rd and Avenida Mirola)	5,397	87.5%	6.9%	5.7%	99.6%	0.0%	0.0%	0.2%	0.2%
Palos Verdes Drive West SB (between Yarmouth Rd and Avenida Mirola)	5,084	84.7%	11.4%	3.9%	99.6%	0.0%	0.0%	0.2%	0.2%
Site 3									
Via Campesina EB (between Pso Del Campo and Palos Verdes Dr N.)	1,325	89.9%	7.5%	2.6%	100.0%	0.0%	0.0%	0.0%	0.0%
Via Campesina WB (between Pso Del Campo and Palos Verdes Dr N.)	1,143	85.6%	6.2%	8.2%	100.0%	0.0%	0.0%	0.0%	0.0%
Via Campesina WB and EB Combined	2,468	87.7%	6.9%	5.4%	100.0%	0.0%	0.0%	0.0%	0.0%
Palos Verdes Drive North SB (South of Via Campesina) (B)	5,489	87.7%	6.9%	5.4%	98.6%	1.1%	0.0%	0.0%	0.4%
Palos Verdes Drive North NB (South of Via Campesina) (B)	7,830	87.7%	6.9%	5.4%	98.6%	1.1%	0.0%	0.0%	0.4%

Notes
observation counts.
B. ADT data for Paslos Verdes Drive North was derived from intersection turning movement counts for the 4PM hour

SHEET 5: EXISTING CONDITIONS MODELED TRAFFIC VOLUMES

Road/Segment	ADT	Day (7 AM to 7 PM)						Evening (7 PM to 10 PM)						Nighttime (10 PM to 7 AM)					
		Auto	MHDT	HHDT	MCY	Bus	Total	Auto	MHDT	HHDT	MCY	Bus	Total	Auto	MHDT	HHDT	MCY	Bus	Total
Site 1																			
Palos Verdes Drive W (North)	14,661	11,966	181	181	121	0	12,449	1,324	20	20	13	0	1,377	803	12	12	8	0	835
PV Estates W Dr WB (South)	195	177	3	3	2	0	184	8	0	0	0	0	8	3	0	0	0	0	3
Site 2																			
Palos Verdes Drive West NB (between	5,397	4,705	0	0	9	9	4,722	368.6	0.0	0.0	0.7	0.7	370	305	0.0	0.0	0.6	0.6	305
Palos Verdes Drive West SB (between Yarmouth Rd and Avenida Mirola)	5,084	4,290	0	0	8	8	4,306	575.9	0.0	0.0	1.1	1.1	578	305	0.0	0.0	0.6	0.6	200
Site 3																			
Via Campesina EB and WB	2,468	2,169	0	0	0	0	2,169	171	0	0	0	0	171	128	0	0	0	0	128
Palos Verdes Drive North SB (South of Via Campesina)	5,489	4,746	52	0	0	17	4,815	372	4	0	0	1	378	292	3	0	0	1	296
Palos Verdes Drive North NB (South of Via Campesina)	7,830	6,770	74	0	0	25	6,869	531	6	0	0	2	539	416	5	0	0	2	422