Appendix NOISE

LINCOLN LANDING PROJECT

NOISE IMPACT REPORT

PREPARED BY

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1.0 Introduction

This report includes a description of existing noise conditions, a summary of applicable regulations, and an analysis of potential noise impacts associated with the proposed Lincoln Landing Project, located at 22301 Foothill Boulevard and 1155 Hazel Avenue in Hayward, California. Data used to prepare this section was taken from the transportation impact study prepared by TJKM Transportation Consultants (2016) and information obtained by modeling existing and future traffic noise levels in the project area and in the surrounding area **(Appendix A).**

1.1 PROJECT LOCATION

The 11.33-acre project site is located immediately west of Foothill Boulevard, south of Hazel Avenue, east of San Lorenzo Creek, and north of City Center Drive (**Figure 1**) on Assessor's Parcel Numbers (APN) 428-0026-068-01 and 428-0026-067-03. The site contains a 336,000-square-foot structure at 22301 Foothill Boulevard most recently occupied by Mervyn's, an associated multi-story parking garage, and an approximately 5,300-square-foot commercial building at 1155 Hazel Avenue. The former Mervyn's building and commercial building are proposed for demolition to accommodate the project, but the parking garage would remain.

SURROUNDING LAND USES

The project site is surrounded on all sides by existing urban development. Northwest of the project site, at the corner of Foothill Boulevard and Hazel Avenue, is a small commercial center and associated parking lot. The remaining area northwest of the site is developed with a mix of single-family and multi-family residential uses. Immediately north of the project site at the southwest corner of Foothill Boulevard and Hazel Avenue is an automotive service station. Further north, across Foothill Boulevard, are various retail uses, with multi-family housing beyond. The area northeast of the project site is developed as a large commercial center anchored by a Safeway grocery store, a multi-story office building, and the Centennial Hall Building and associated parking garage. The area south and southeast of the project site is developed with various commercial, retail, and institutional uses. Immediately west of the site is San Lorenzo Creek, with a mix of single-family and multi-family residential and community uses located beyond.

EXISTING GENERAL PLAN LAND USE DESIGNATION AND ZONING

The project site is designated Central City-Retail and Office Commercial (CC-ROC) in the Hayward General Plan. The existing zoning for the site is Central City Commercial (CC-C). The proposed development would be consistent with the General Plan land use designation and zoning for the project site.

1.2 PROJECT DESCRIPTION

The proposed project consists of the development of a six-story mixed-use development with 80,500 square feet of commercial uses and 476 apartment units, with a combination of surface and structure parking. As noted above, the existing 336,000-square-foot structure and 5,300-square-foot commercial building would be demolished to accommodate the project, and the existing parking structure would be retained. The site would be subdivided into four parcels. The proposed site plan is shown in **Figure 2**.

TABLE 1-1
LAND USE SUMMARY

Parcel	Acreage	Residential Units	Commercial Square Footage
1	0.6 acres	—	6,500
2	2.4 acres	209	—
3	3.4 acres	—	50,000
4	4.9 acres	267	24,000
Total	**11.3 acres**	**476**	**80,500**

T:_CS\Work\Hayward, City of\Lincoln Landing

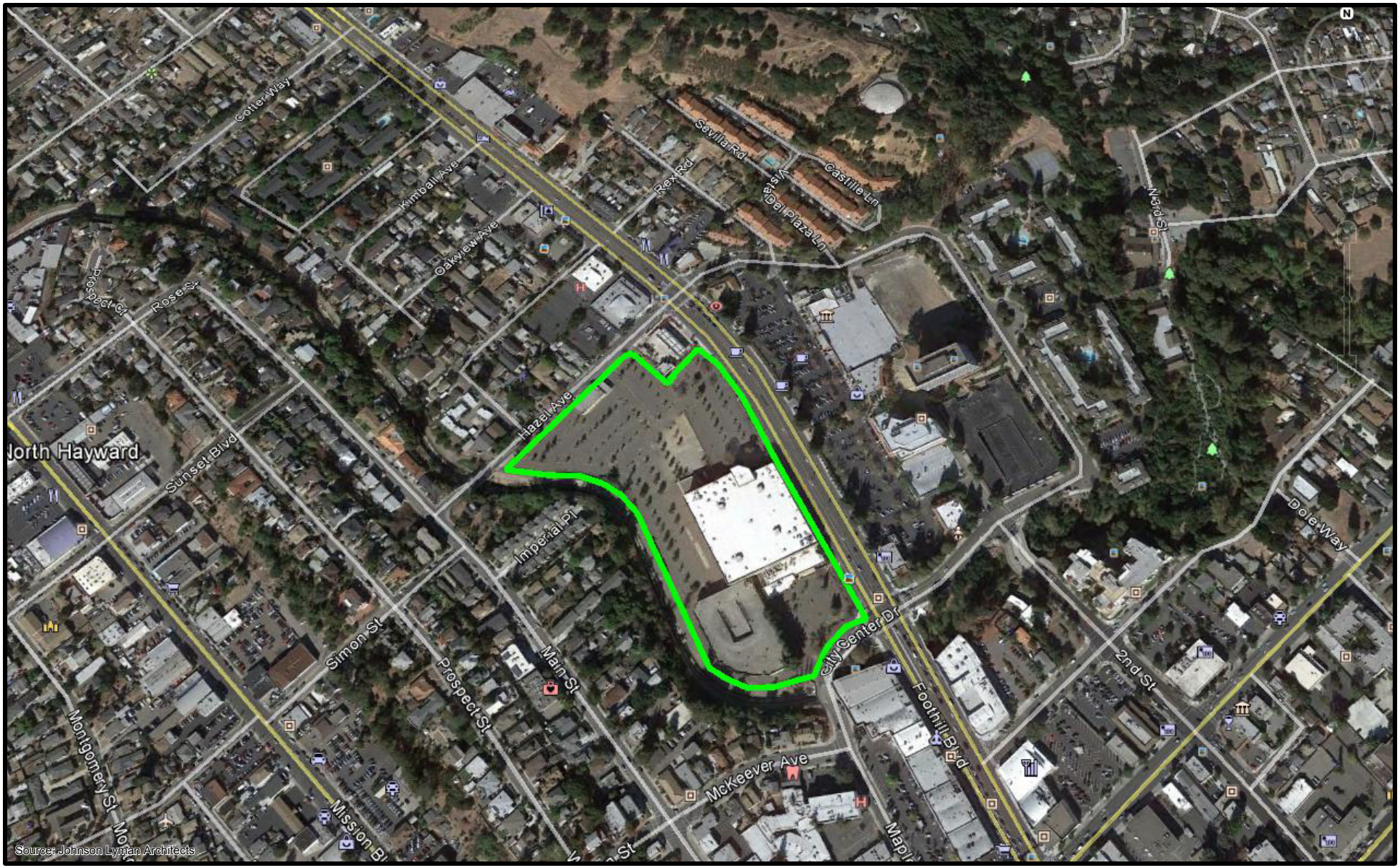

FIGURE 1
Existing Site

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Source: TJKM

Not To Scale

FIGURE 2
Site Plan

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2.0 Noise

2.1 NOISE FUNDAMENTALS

FUNDAMENTALS OF ACOUSTICS

Acoustics is the science of sound. Sound may be thought of as mechanical energy of a vibrating object transmitted by pressure waves through a medium to human (or animal) ears. If the pressure variations occur frequently enough (at least 20 times per second), they can be heard and are called sound. The number of pressure variations per second is called the frequency of sound and is expressed as cycles per second, or Hertz (Hz).

Noise is a subjective reaction to different types of sounds. Noise is typically defined as airborne sound that is loud, unpleasant, unexpected, or undesired and may therefore be classified as a more specific group of sounds. A typical noise environment consists of a base of steady "background" noise that is the sum of many distant and indistinguishable noise sources. Superimposed on this background noise is the sound from individual local sources. These sources can vary from an occasional aircraft or train passing by to virtually continuous noise from, for example, traffic on a major highway. Perceptions of sound and noise are highly subjective from person to person.

Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel scale was devised. The decibel scale uses the hearing threshold (20 micropascals) as a point of reference, defined as 0 dB. Other sound pressures are then compared to this reference pressure, and the logarithm is taken to keep the numbers in a practical range. The decibel scale allows a million-fold increase in pressure to be expressed as 120 dB, and changes in levels (dB) correspond closely to human perception of relative loudness.

The perceived loudness of sounds is dependent on many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable and can be approximated by A-weighted sound levels. There is a strong correlation between A-weighted sound levels (expressed as dBA) and the way the human ear perceives sound. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. All noise levels reported in this section are in terms of A-weighted levels, but are expressed as dB, unless otherwise noted.

Addition of Decibels

The decibel scale is logarithmic, not linear, and therefore sound levels cannot be added or subtracted through ordinary arithmetic. Two sound levels 10 dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic decibel is A-weighted, an increase of 10 dBA is generally perceived as a doubling in loudness. For example, a 70 dBA sound is half as loud as an 80 dBA sound and twice as loud as a 60 dBA sound. When two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dB higher than one source under the same conditions (FTA 2006). Under the decibel scale, three sources of equal loudness together would produce an increase of 5 dB (Caltrans 2013).

Typical noise levels associated with common noise sources are depicted in **Figure 3**.

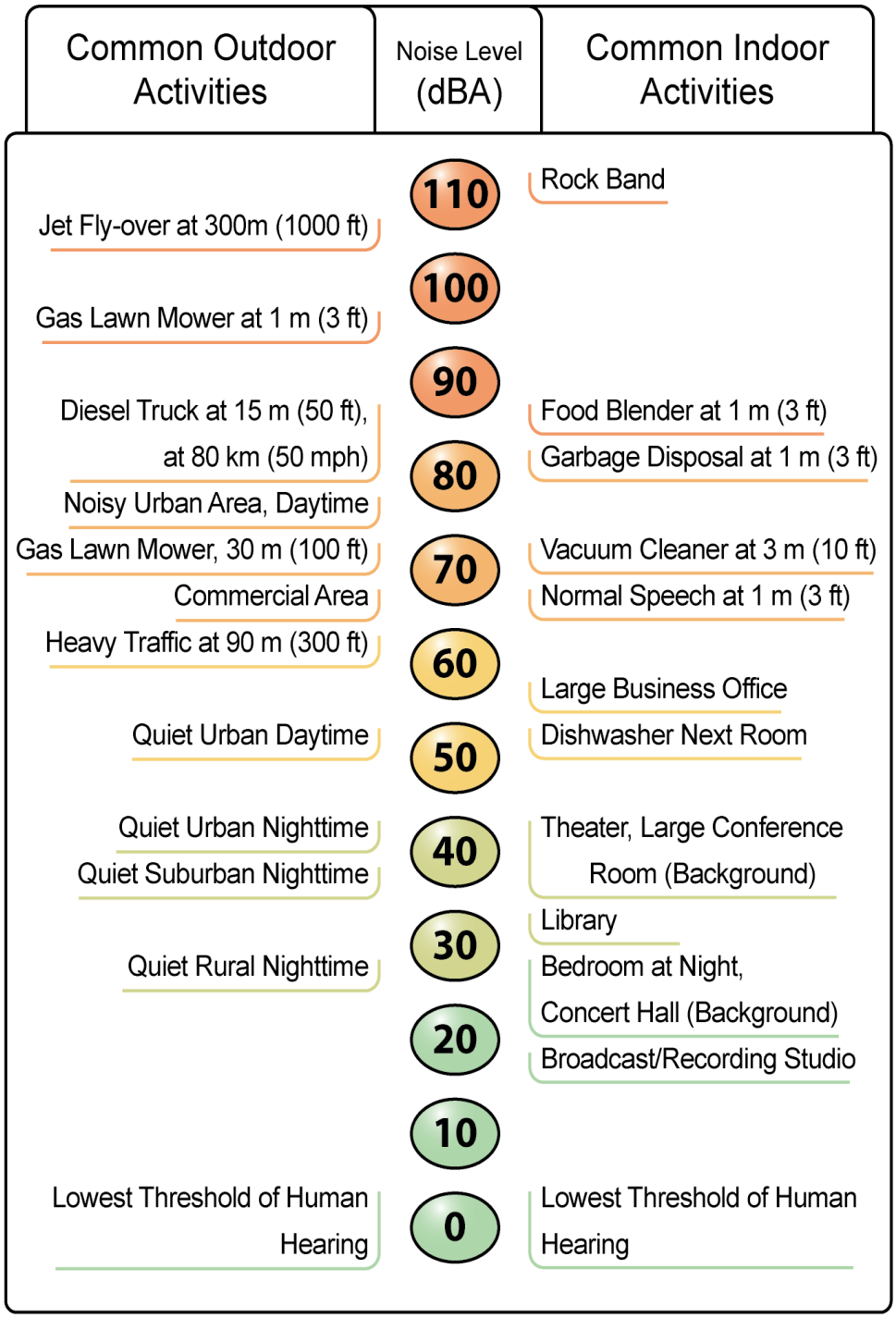
Sound Propagation and Attenuation

Sound spreads (propagates) uniformly outward in a spherical pattern, and the sound level decreases (attenuates) at a rate of approximately 6 dB for each doubling of distance from a stationary or point source. Sound from a line source, such as a highway, propagates outward in a

cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of approximately 3 dB for each doubling of distance from a line source, such as a roadway, depending on ground surface characteristics (FHWA 2011). No excess attenuation is assumed for hard surfaces like a parking lot or a body of water. Soft surfaces, such soft dirt or grass, can absorb sound, so an excess ground-attenuation value of 1.5 dB per doubling of distance is normally assumed. For line sources, an overall attenuation rate of 3 dB per doubling of distance is assumed (FHWA 2011).

Noise levels may also be reduced by intervening structures. Generally, a single row of buildings between the receptor and the noise source reduces the noise level by about 5 dBA, while a solid wall or berm reduces noise levels by 5 to 10 dBA (FHWA 2006). The manner in which older homes in California were constructed generally provides a reduction of exterior-to-interior noise levels of about 20 to 25 dBA with closed windows. The exterior-to-interior reduction of newer residential units is generally 30 dBA or more.

FIGURE 3
TYPICAL COMMUNITY NOISE LEVELS



Source: Caltrans 2012

TABLE 2-1
DEFINITIONS OF ACOUSTICAL TERMS

Term	Definitions
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micropascals (or 20 micronewtons per square meter), where 1 pascal is the pressure resulting from a force of 1 newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e.g., 20 micropascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, L_{eq}	L_{eq}, the equivalent energy noise level, is the average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day/Night Noise Level, L_{dn} or DNL	L_{dn}, the Day-Night Average Level, is a 24-hour average L_{eq} with a 10 dBA "weighting" added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the nighttime. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.4 dBA L_{dn}.
Community Noise Equivalent Level, CNEL	CNEL, the Community Noise Equivalent Level, is a 24-hour average L_{eq} with a 5 dBA "weighting" during the hours of 7:00 p.m. to 10:00 p.m. and a 10 dBA "weighting" added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the evening and nighttime, respectively. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.7 dBA CNEL.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

HUMAN RESPONSE TO NOISE

The human response to environmental noise is subjective and varies considerably from individual to individual. Noise in the community has often been cited as a health problem, not in terms of actual physiological damage, such as hearing impairment, but in terms of inhibiting general well-being and contributing to undue stress and annoyance. The health effects of noise in the community arise from interference with human activities, including sleep, speech, recreation, and tasks that demand concentration or coordination. Hearing loss can occur at the highest noise intensity levels.

Noise environments and consequences of human activities are usually well represented by median noise levels during the day or night or over a 24-hour period. Environmental noise levels are generally considered low when the CNEL is below 60 dBA, moderate in the 60 to 70 dBA range, and high above 70 dBA. Examples of low daytime levels are isolated, natural settings that can provide noise levels as low as 20 dBA and quiet, suburban, residential streets that can provide noise levels around 40 dBA. Noise levels above 45 dBA at night can disrupt sleep. Examples of moderate-level noise environments are urban residential or semi-commercial areas (typically 55 to 60 dBA) and commercial locations (typically 60 dBA). People may consider louder environments adverse, but most will accept the higher levels associated with more noisy urban residential or residential-commercial areas (60 to 75 dBA) or dense urban or industrial areas (65 to 80 dBA). Regarding increases in A-weighted noise levels (dBA), the following relationships should be noted for understanding this analysis:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived by humans.
- Outside of the laboratory, a 3 dBA change is considered a just-perceivable difference.
- A change in level of at least 5 dBA is required before any noticeable change in community response would be expected. An increase of 5 dBA is typically considered substantial.
- A 10 dBA change is subjectively heard as an approximate doubling in loudness and would almost certainly cause an adverse change in community response.

EFFECTS OF NOISE ON PEOPLE

Hearing Loss

While physical damage to the ear from an intense noise impulse is rare, a degradation of auditory acuity can occur even in a community noise environment. Hearing loss occurs mainly due to chronic exposure to excessive noise but may be caused by a single event such as an explosion. Natural hearing loss associated with aging may also be accelerated from chronic exposure to loud noise.

The Occupational Safety and Health Administration (OSHA) has a noise exposure standard that is set at the noise threshold where hearing loss could occur from long-term exposures. The maximum allowable level is 90 dBA averaged over 8 hours. If the noise is above 90 dBA, the allowable exposure time is correspondingly shorter.

Annoyance

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The L_{dn} as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise, but there continues to be disagreement about the relative annoyance of these different sources. For ground vehicles, the noise level of about 55 dBA L_{dn} is the threshold at which a substantial percentage of people begin to report annoyance.

FUNDAMENTALS OF ENVIRONMENTAL GROUNDBORNE VIBRATION

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One is the peak particle velocity (PPV); another is the root mean square (RMS) velocity. The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. The RMS velocity is defined as the average of the squared amplitude of the signal. The PPV and RMS vibration velocity amplitudes are used to evaluate human response to vibration. For the purposes of this analysis, a PPV descriptor with units of inches per section (in/sec) is used to evaluate construction-generated vibration for building damage and human complaints. **Table 2-2** displays reactions of people and the effects on buildings that continuous vibration levels produce. The annoyance levels shown in **Table 2-2** should be interpreted with care since vibration may be found to be annoying at much lower levels than those shown, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage. In high noise environments, which are more prevalent where groundborne vibration approaches perceptible levels, this rattling phenomenon may also be produced by loud airborne environmental noise causing induced vibration in exterior doors and windows.

TABLE 2-2
DAMAGE TO BUILDINGS FOR CONTINUOUS OR FREQUENT INTERMITTENT VIBRATION LEVELS

Velocity Level, PPV (in/sec)	Human Reaction	Effects on Buildings
0.01	Barely perceptible	No effect
0.04	Distinctly perceptible	Vibration unlikely to cause damage of any type to any structure
0.08	Distinctly perceptible to strongly perceptible	Recommended upper level of the vibration to which runs and ancient monuments should be subjected
0.01	Strongly perceptible	Virtually no risk of damage to normal buildings
0.3	Strongly perceptible to severe	Threshold at which there is a risk of damage to older residential dwellings such as plastered walls or ceilings
0.5	Severe – Vibrations considered unpleasant	Threshold at which there is a risk of damage to newer residential structures

Source: Caltrans 2004

NOISE-SENSITIVE RECEPTORS

Noise-sensitive land uses are those that may be subject to stress and/or interference from excessive noise. Noise-sensitive land uses in Hayward include schools, hospitals, and institutional uses such as churches. Typically, residential uses are also considered noise-sensitive receptors. Industrial and commercial land uses are generally not considered sensitive to noise. Commercial and residential uses surround the project site.

2.2 EXISTING NOISE SETTING

EXISTING AMBIENT NOISE LEVELS

Regional noise sources include traffic-related noise on roadways and highways, airplanes flying overhead, and noise associated with typical residential development (e.g., people talking, dogs barking, children playing, yard maintenance equipment). Sound is affected by distance from the source, surrounding obstacles, and atmospheric properties. Thus, regional noise sources would not typically interfere or combine with noise sources within or in proximity to the project site.

The sound levels in most communities fluctuate, depending on the activity of nearby and distant noise sources, time of the day, or season of the year. To characterize the existing environment, noise measurements were taken at four locations in the project vicinity on June 15, 2015 (see **Figure 4**). The primarily noise source captured by these noise measurements is traffic.

The measurements were taken with a Larson Davis SoundExpert LxT precision sound level meter, which satisfies the American National Standards Institute (ANSI) for general environmental noise measurement instrumentation. Prior to the measurements, the SoundExpert LxT sound level meter was calibrated according to manufacturer specifications with a Larson Davis CAL200 Class I Calibrator. The average noise levels and sources of noise measured at each location are identified in **Table 2-3**. The existing daytime noise levels ranged from 60.6 to 63.2 dBA L_{dn}.

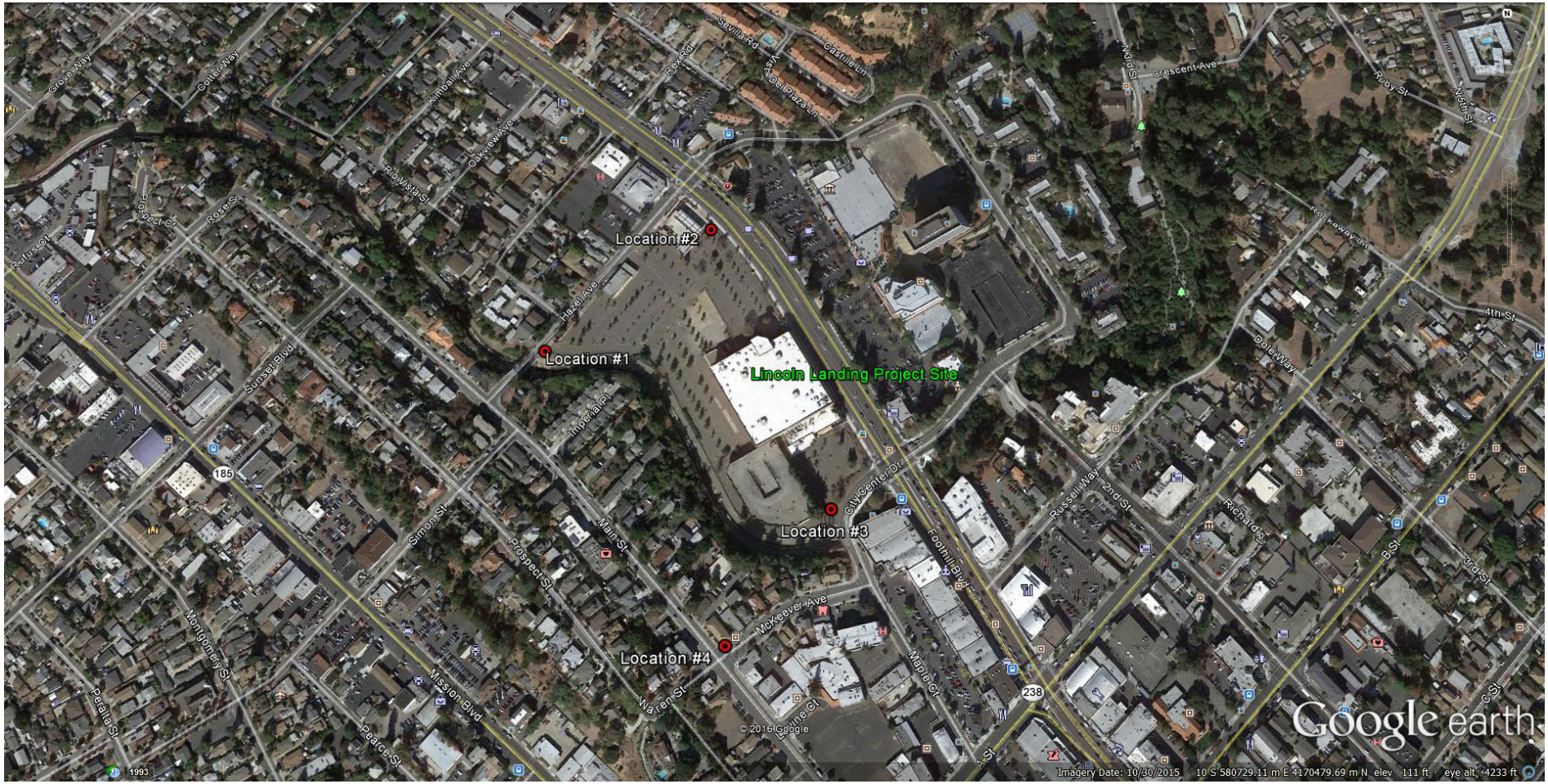
TABLE 2-3
EXISTING NOISE LEVELS IN THE PROJECT VICINITY

Map #	Location	Run Time	Primary Noise Sources	Noise Level Statistics		
				L_{dn} (dBA)	L_{min} (dBA)	L_{max} (dBA)
1	Hazel Ave./San Lorenzo Creek NE	June 15, 2015 7:37 a.m.	Hazel Ave traffic, train/BART	63.2	46.1	84.7
2	Hazel Ave./Foothill Blvd. SE	June 15, 2015 7:55 a.m.	Foothill Blvd traffic, gas station, Safeway across street	62.9	49.7	74.8
3	City Center Dr./Foothill SW	June 15, 2015 8:14 a.m.	City Center Dr./ Foothill Blvd. traffic	60.6	46.6	74.3
4	Main St./McKeever Ave NE	June 15, 2015 8:30 a.m.	Intersection traffic, residences	61.6	42.2	79.1

EXISTING ROADWAY NOISE LEVELS

Existing roadway noise levels were calculated for the roadway segments in the project vicinity. This task was accomplished using the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA-RD-77-108) and traffic volumes from the project transportation impact analysis (see **Appendix A**). The model calculates the average noise level at specific locations based on traffic volumes, average speeds, roadway geometry, and site environmental conditions. The average vehicle noise rates (energy rates) used in the FHWA model have been modified to reflect average vehicle noise rates identified for California by the California Department of Transportation (Caltrans). The Caltrans data shows that California automobile noise is 0.8 to 1.0 dBA higher than national levels and that medium and heavy truck noise is 0.3 to 3.0 dBA lower than national levels.

Table 2-4 summarizes the modeled existing traffic noise levels at 100 feet from the centerline of each project roadway and lists distances from each roadway centerline to the 65 dB, 60 dB, and 55 dB L_{dn} traffic noise contours.



Source: Google Earth

Not To Scale

FIGURE 4
Noise Measurement Locations

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TABLE 2-4
EXISTING TRAFFIC NOISE LEVELS

Roadway Segment	Surrounding Uses	L_{dn} (dB) at 100 Feet from Roadway Centerline	Distance (feet) from Roadway Centerline to L_{dn} (dB)		
			65 dBA	60 dBA	55 dBA
A St					
Mission to west	Commercial & Residential	51.9 dBA	—	—	62
Mission to Foothill	Commercial	56.5 dBA	—	58	126
Foothill Blvd					
Grove to Hazel	Commercial & Residential	63.2 dBA	76	164	354
Hazel to City Center	Commercial & Project Site	61.5 dBA	59	127	273
City Center to A	Commercial	60.3 dBA	—	105	227
Mission Blvd					
Grove to Sunset	Commercial	55.1 dBA	—	47	102
Sunset to Simon	Commercial	54.4 dBA	—	—	91
Simon to Hotel	Commercial	54.4 dBA	—	—	91
Hotel to A	Commercial & Residential	54.6 dBA	—	—	94
A to B	Commercial	60.7 dBA	51	111	239
Main St					
Hazel to Warren/McKeever	Commercial & Residential	48.3 dBA	—	—	—
Warren/McKeever to Hotel	Commercial & Residential	49.1 dBA	—	—	—

*Note: Traffic noise levels were calculated using the FHWA roadway noise prediction model. Refer to **Appendix A** for noise modeling assumptions and results.*

As shown in **Table 2-4**, the location of the 55 dB L_{dn} traffic noise contours along road segments in the project vicinity range from 62 to 354 feet from the centerline for A Street, Foothill Boulevard, and Mission Boulevard. As also shown, existing traffic volumes do not generate enough noise to reach the 70 dB mixed-use standard at any location in the project vicinity. Four segments on Foothill Boulevard exceed the 60 dB standard for residential use but are within the standard at 164, 127, 105, and 111 feet from the center of the roadway. The extent to which existing land uses in the project vicinity are affected by existing traffic noise depends on their proximity to the roadways and their individual sensitivity to noise.

EXISTING AIRPORT NOISE LEVELS

The State of California requires the Airport Land Use Commission (ALUC) to prepare an airport land use compatibility plan (ALUCP) for each public use airport in the county. The intent of each ALUCP is to encourage compatibility between the airport and the various surrounding land uses. The Hayward Executive Airport Land Use Compatibility Plan, adopted in 2012, is the primary document used by the ALUC to ensure compatibility between Hayward Executive Airport and its environs. More specifically, the ALUCP acts as a guide for the ALUC and the City of Hayward to use in order to safeguard the general welfare of the public as the airport expands. The document also serves as a tool for the ALUC to fulfill its duty to review airport and land use development proposals within

the airport influence area or referral area associated with the airport. In addition to Hayward Executive Airport, Oakland International Airport is near the project site. Oakland International Airport also has an ALUCP, which was adopted in 2010. The noise contour boundaries for both airports are shown in **Figure 5**.

EXISTING RAILROAD NOISE LEVELS

Noise from railroads is generated primarily by diesel locomotive engines, warning horns, and gate bells at railroad crossings. Other components of noise include diesel exhaust, cooling fans, and railroad car wheel/rail interaction.

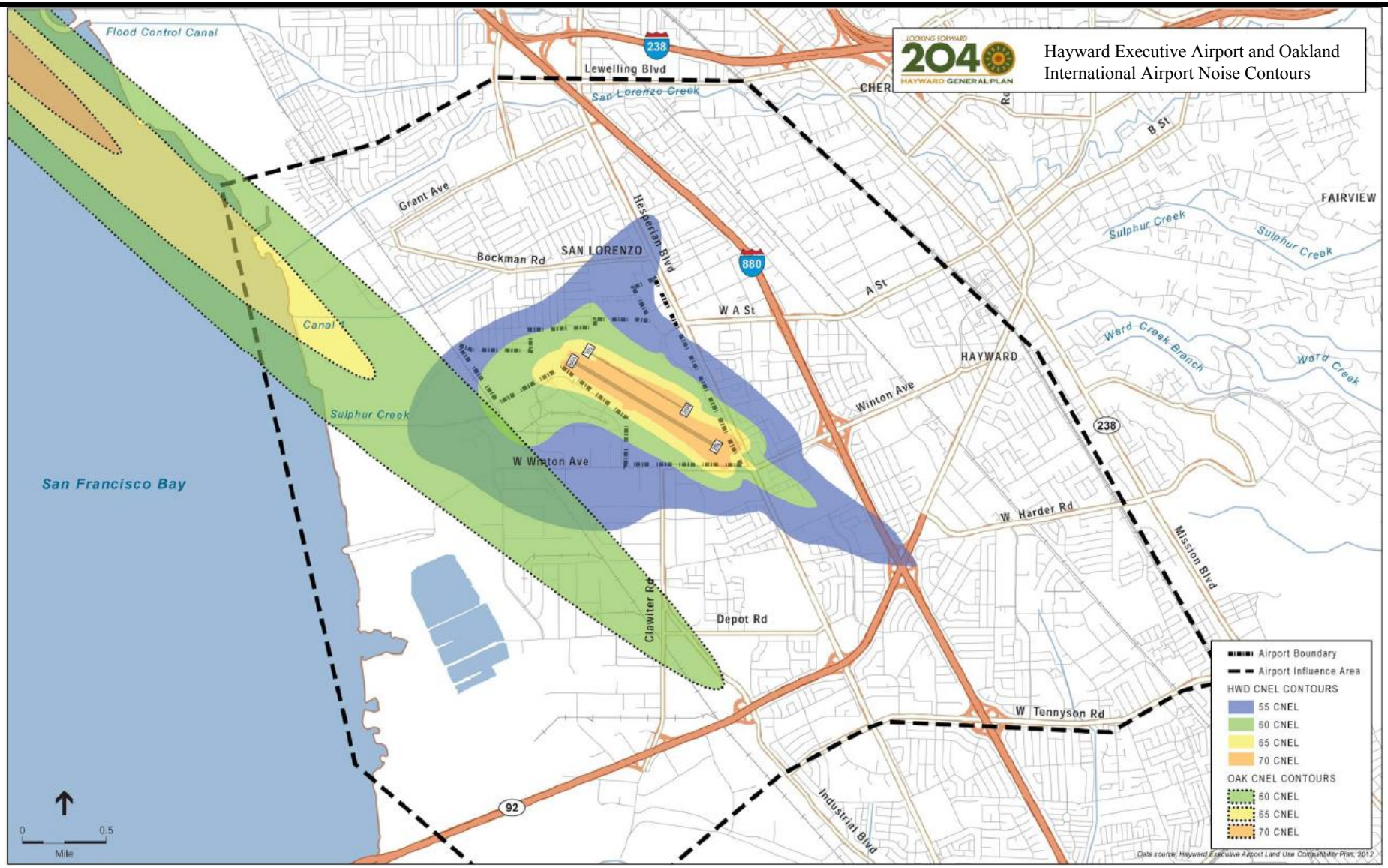
There are three primary shared freight and passenger railroad corridors in Hayward, summarized as follows:

- The Santa Clara branch line, owned by the Union Pacific Railroad (UPRR), runs parallel to and west of Industrial Boulevard. Approximately 19 freight trains per day and 2 passenger trains per day (Amtrak's Coast Starlight) travel on this railroad line in Hayward. There are no Amtrak passenger stations on this line within the city.

- The Niles branch line, owned by the UPRR, runs parallel to and east of Interstate 880. Approximately 22 freight trains per day and 14 passenger trains per day (Amtrak's Capitol Corridor) travel on this railroad in Hayward. The Hayward Amtrak station is located on this line at Meekland Avenue south of A Street.

- The Canyon Subdivision branch line, owned by the UPRR, runs parallel to and west of Mission Boulevard. Approximately 15 freight trains per day travel on this railroad line. Within this right-of-way, parallel and adjacent to the freight railroad line, is a separate dedicated heavy rail line for the Bay Area Rapid Transit (BART) system that runs on an elevated aerial structure in the downtown Hayward area and at grade south of downtown to the southern end of the city. The Hayward BART Station is located at Montgomery Ave south of B Street. The South Hayward BART Station is located on the west side of Dixon Street to the south of Tennyson Road. Approximately 256 BART trains per day travel on this line in Hayward. The BART Hayward Maintenance Yard is also accessed from this line and is located south of Industrial Parkway West, north of Whipple Road, and west of the Fairway Park neighborhood.

Railroad noise along these three corridors was modeled based on Noise Impact Assessment Guidelines for assessing railroad and transit noise (Hayward 2014a). **Table 2-5** summarizes the modeled existing railroad noise levels at 50 feet from the railroad centerline, along with approximate distances from the railroad centerlines to the 70 dB, 65 dB, 60 dB, and 55 dB CNEL/L_{dn} noise contours. The values shown in **Table 2-5** assume that the receiver category is residential with no natural or human-made noise shielding or barriers (e.g., topography, vegetation, berms, walls or buildings, or other attenuation measures) and are therefore considered "worst-case" railroad noise conditions along the length of each corridor.



Source: Hayward 2040 General Plan

FIGURE 5

Hayward Executive Airport and Oakland International Airport Noise Contours

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TABLE 2-5
SUMMARY OF MODELED EXISTING RAILROAD NOISE LEVELS

Railroad Line	Location	CNEL/Ldn (dBA) at 50 feet from Railroad Centerline	Distance (feet) from Railroad Centerline to Noise Contours			
			70 CNEL (dBA)	65 CNEL (dBA)	60 CNEL (dBA)	55 CNEL (dBA)
UP Santa Clara Branch/ Amtrak Coast Starlight	West of Industrial Boulevard	80	225	480	1,050	2,240
UP Niles Branch/Amtrak Capitol Corridor	East of Interstate 880	81	240	520	1,120	2,400
UP Canyon Branch/Bay Area Rapid Transit (BART)	West of Mission Boulevard	80	210	440	950	2,030

Source: Hayward 2014a

The Amtrak Capitol Corridor line traverses approximately 1.1 miles (5,808 feet) from the project site at its closest, and the Amtrak Coast Starlight traverses about 3.15 miles (16,632 feet) from the project site at its closest. The BART line traverses approximately 0.5 miles (2,640 feet) from the project site at the nearest.

EXISTING ENVIRONMENTAL GROUNDBORNE VIBRATION

The typical background vibration-velocity level in residential areas is approximately 50 vibration decibels (VdB). Groundborne vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels (FTA 2006).

The existing active railroad lines are the primary ground vibration source in Hayward. Based on the generalized ground surface vibration curves in the Federal Transit Administration guidance, proposed development within 200 feet of an existing railroad could exceed the recommended threshold for human disturbance of 72 VdB for sensitive receptors that are exposed to a frequent amount of vibration events (i.e., 70 or more trains passing by in one day) (Hayward 2014a).

2.3 REGULATORY FRAMEWORK

FEDERAL

Federal Transit Administration

The Federal Transit Administration (FTA) has identified vibration impact criteria for sensitive buildings, residences, and institutional land uses near rail transit and railroads. The thresholds for residences and buildings where people normally sleep (e.g., nearby residences) are 72 VdB for frequent events (more than 70 events of the same source per day), 75 VdB for occasional events (30 to 70 vibration events of the same source per day), and 85 VdB for infrequent events (less than 30 vibration events of the same source per day).

LOCAL

City of Hayward General Plan Hazards Element

The City's (2014b) General Plan Hazards Element contains exterior noise compatibility guidelines for various land uses. For mixed-use land uses, such as those proposed by the project, the City's compatibility guidelines identify noise levels up to 70 L_{dn} as "normally acceptable" for Urban Residential Infill and Mixed Use Projects, as shown in **Table 2-6**.

TABLE 2-6
EXTERIOR NOISE COMPATIBILITY STANDARDS FOR VARIOUS LAND USES

Land Use Type	Highest Level of Exterior Noise Exposure That Is Regarded as "Normally Acceptable" (L_{dn} or CNEL)
Residential: Single-Family Homes, Duplex, Mobile Home	60
Residential: Townhomes and Multi-Family Apartments and Condominiums	65
Urban Residential Infill and Mixed-Use Projects	70
Lodging: Motels and Hotels	65
Schools, Libraries, Churches, Hospitals, Nursing Homes	70
Auditoriums, Concert Hall, Amphitheaters	Mitigation based on site-specific study
Sports Arena, Outdoor Spectator Sports	Mitigation based on site-specific study
Playgrounds, Neighborhood Parks	70
Golf Courses, Riding Stables, Water Recreation, Cemeteries	75
Office Buildings: Business, Commercial, and Professional	70
Industrial Manufacturing, Utilities, Agriculture	75

Source: Hayward 2014b

General Plan Policy HAZ-8.5 has specific residential noise standards, including the following:

- The maximum acceptable interior noise level for all new residential units (single-family, duplex, mobile home, multi-family, and mixed use units) shall be an Ldn of 45 dB with windows closed.

- For project locations that are primarily exposed to aircraft, train, and BART noise, the maximum instantaneous noise level in bedrooms shall not exceed 50dB(A) at night (10:00 pm to 7:00 am), and the maximum instantaneous noise level in all interior rooms shall not exceed 55dB(A) during the day (7:00 am to 10:00 pm) with windows closed.

- The maximum acceptable exterior noise level for the primary open space area of a detached single-family home, duplex or mobile home, which is typically the backyard or a fenced side yard, shall be an Ldn of 60 dB. This standard shall be measured at the approximate center of the primary open space area. This standard does not apply to secondary open space areas, such as front yards, balconies, stoops, and porches.

- The maximum acceptable exterior noise level for the primary open space area of townhomes and multi-family apartments or condominiums (private rear yards for

townhomes; and common courtyards, roof gardens, or gathering spaces for multi-family projects) shall be an Ldn of 65 dB. This standard shall be measured at the approximate center of the primary open space area. This standard does not apply to secondary open space areas, such as front yards, balconies, stoops, and porches.

- The maximum acceptable exterior noise level for the primary open space area of urban residential infill and mixed-use projects (private rear yards for townhomes; and common courtyards, roof gardens, or gathering spaces for multi-family or mixed use projects) shall be an Ldn of 70 dB. Urban residential infill would include all types of residential development within existing or planned urban areas (such as Downtown, The Cannery Neighborhood, and the South Hayward BART Urban Neighborhood) and along major corridors (such as Mission Boulevard). This standard shall be measured at the approximate center of the primary open space area. This standard does not apply to secondary open space areas, such as front yards, balconies, stoops, and porches.

City of Hayward Municipal Code Section 4-1.03.4

In addition to mandating noise-reducing construction best management practices, Section 4-1.03.4 of the City's Municipal Code includes noise regulations for construction and alteration of structures for individual devices/pieces of equipment. For instance, the City limits construction noise to 83 dBA at a distance of 25 feet from the source and limits construction noise to 86 dBA at any point outside of the property plane.

Furthermore, the City limits the hours in which construction and alteration of structures is allowed to 7:00 a.m. to 7:00 p.m. Monday through Saturday and 10:00 a.m. to 6:00 p.m. on Sunday. For all other hours, various land use noise limits apply (Hayward 2011).

2.4 NOISE IMPACT ASSESSMENT

THRESHOLDS OF SIGNIFICANCE

Criteria for determining the significance of noise impacts were developed based on information contained in the City's noise standards and guidelines (see **Table 2-6**). In addition to reviewing proposed development for compliance with the noise standards in **Table 2-6**, the analysis takes into account the increases in noise levels over the pre-project noise conditions. The Hayward General Plan establishes that traffic-related noise increases more than 3 dB over the existing noise environment, the level typically audible to the human ear, constitute a significant impact.

METHODOLOGY

This analysis of the existing and future noise environments is based on noise prediction modeling and empirical observations. The residential uses in the project vicinity are considered noise-sensitive receptors. The commercial land uses are not.

Short-Term Construction Noise

Predicted noise levels at nearby noise-sensitive land uses were calculated using typical noise levels and usage rates associated with construction equipment, derived from representative data obtained from similar construction projects. Construction noise levels were predicted assuming an average noise attenuation rate of 6 dB per doubling of distance from the source.

Groundborne Vibration

Groundborne vibration levels associated with construction-related activities as well as operations were evaluated using typical groundborne vibration levels associated with construction equipment and heavy-duty trucks, obtained from the Caltrans guidelines described above. Potential groundborne vibration impacts were evaluated taking into account the distance from construction activities to nearby structures and typically applied criteria for structural damage.

Long-Term Traffic Noise

The project's potential to permanently increase traffic noise is addressed under the following scenarios: the existing plus project and the cumulative plus project. Traffic noise levels were calculated using the FHWA roadway noise prediction model (FHWA-RD-77-108) based on California vehicle reference noise emission factors and traffic data obtained from the transportation impact study prepared for the project. Additional input data included vehicle speeds, ground attenuation factors, and roadway widths. Vehicle distribution was adjusted based on volume data obtained from the transportation impact analysis (**Appendix A**).

Long-Term Operational Stationary-Source Noise

Predicted noise levels associated with on-site stationary noise sources were calculated based on representative data obtained from existing literature and noise assessments prepared for similar projects. Operational noise levels were predicted assuming an average noise attenuation rate of 6 dB per doubling of distance from the source. Operational noise levels were calculated at the property lines and nearby land uses for comparison to the City's noise standards.

POTENTIAL IMPACTS

Short-Term Construction-Generated Noise

Construction noise typically occurs intermittently and varies depending on the nature or phase of construction (e.g., land clearing, grading, excavation, paving). Noise generated by construction equipment, including earth movers, material handlers, and portable generators, can reach high levels. Noise levels associated with individual construction equipment are summarized in **Table 2-7.**

TABLE 2-7
TYPICAL CONSTRUCTION EQUIPMENT NOISE LEVELS

Equipment	Typical Noise Level (dBA L_{max}) 50 Feet from Source
Air Compressor	81
Backhoe	80
Compactor	82
Concrete Mixer	85
Concrete Vibrator	76
Crane, Mobile	83
Dozer	85
Generator	81
Grader	85
Impact Wrench	85
Jackhammer	88
Loader	85
Truck	88
Paver	89
Pneumatic Tool	85
Roller	74
Saw	76

Source: FTA 2006

As depicted in **Table 2-7**, noise levels generated by individual pieces of construction equipment typically range from approximately 74 dBA to 89 dBA L_{max} at 50 feet (FTA 2006). Short-term increases in vehicle traffic, including worker commute trips and haul truck trips, may also result in temporary increases in ambient noise levels at nearby receptors. During project construction, exterior noise levels could affect the nearest existing sensitive receivers in the vicinity. The nearest sensitive receptors include residences to the west and north, which are approximately 50 feet from the project boundary line. Therefore, adjacent residential land uses could be exposed to temporary and intermittent noise levels up to 89 dBA.

The City of Hayward has noise regulations for construction and alteration of structures for individual devices/pieces of equipment. Specifically, the City limits construction noise to 83 dBA at a distance of 25 feet from the source and limits construction noise to 86 dBA at any point outside of the property plane. The City also limits the hours in which construction and alteration of structures is allowed to 7:00 a.m. to 7:00 p.m. Monday through Saturday and 10:00 a.m. to 6:00 p.m. on Sunday. For all other hours, various land use noise limits apply (Hayward 2011).

Some individual pieces of equipment may temporarily exceed the City's noise regulations in the absence of noise control mechanisms. However, City Municipal Code Section 4-1.03.4 includes construction best management practices as described below. According to the City of Hayward, adherence to these best management practices reduces construction noise to less than

significant levels. The following best management practices must be adhered to pursuant to the City's Municipal Code:

- Noise-generating activities at the construction site or in areas adjacent to the construction site will be restricted to the hours of 7:00 a.m. to 7:00 p.m., Monday through Saturday and 10:00 a.m. to 6:00 p.m. on Sundays and holidays.
- Noise from individual pieces of construction equipment must comply with the limits let forth in the Municipal Code.
- All internal combustion engine driven equipment will be equipped with intake and exhaust mufflers that are in good condition and appropriate for the equipment.
- Unnecessary idling of internal combustion engines is strictly prohibited.
- Stationary noise-generating equipment such as air compressors or portable power generators will be located as far as possible from sensitive receptors.
- Temporary noise barriers will be constructed to screen stationary noise-generating equipment when located near adjoining sensitive land uses. Temporary noise barriers could reduce construction noise levels by 5 dBA.
- "Quiet" air compressors and other stationary noise sources will be utilized where technology exists.
- All construction traffic to and from the project site will be routed via designated truck routes where possible. Construction-related heavy truck traffic is prohibited in residential areas where feasible.
- Noise from construction workers' radios will be controlled to a point where they are not audible at existing residences bordering the project site.
- The contractor will prepare and submit to the City for approval a detailed construction plan identifying the schedule for major noise-generating construction activities.
- A "disturbance coordinator" will be designated who would be responsible for responding to any local complaints about construction noise. The disturbance coordinator will determine the cause of the noise complaint (starting too early, bad muffler, etc.) and will require that reasonable measures warranted to correct the problem be implemented. A telephone number for the disturbance coordinator will be conspicuously posted at the construction site, including the notice sent to neighbors regarding the construction schedule.

With the incorporation of these standard practices, temporary noise impacts resulting from project construction would be considered less than significant.

Exposure to Groundborne Vibration

Increases in groundborne vibration levels attributable to the proposed project would be primarily associated with short-term construction-related activities. Construction on the project site would have the potential to result in varying degrees of temporary groundborne vibration, depending on the specific construction equipment used and the operations involved. The Hayward General

Plan does not set decibel standards for temporary construction vibration impacts. To determine a threshold for construction-generated groundborne vibration, standards provided by the FTA and Caltrans are referenced.

The FTA threshold for short-term, construction-generated groundborne vibration is 85 vibration decibels (VdB). VdB is particle velocity in inches per second and measures the rumbling sound caused by the vibration of room surfaces. According to the FTA, 85 VdB is distinctly perceptible and unacceptable unless occurring very infrequently.

Construction activities would require the use of off-road equipment such as tractors, jackhammers, and haul trucks. Groundborne vibration levels associated with representative construction equipment are summarized in **Table 2-8**. Based on the vibration levels presented in the table, ground vibration generated by construction equipment would not be anticipated to exceed 85 VdB at 50 feet.

TABLE 2-8
REPRESENTATIVE VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT (VDB)

Equipment	Approximate VdB	
	50 Feet	100 Feet
Large Bulldozer	81	75
Caisson Drilling	81	75
Loaded Trucks	80	74
Jackhammer	73	67
Small Bulldozer	52	46

Source: FTA 2006

Notes: The vibration levels at off-site sensitive uses are determined with the following equation from the FTA Transit Noise and Vibration Impact Assessment, Final Report: Lv(D)=Lv(25 ft)–20log(D/25), where Lv = vibration level of equipment, D = distance from the equipment to the receiver, Lv(25 ft) = vibration level of equipment at 25 feet.

The nearest residences to the project site are located 50 feet from the site's western and northern boundaries. Based on the vibration levels presented in **Table 2-8**, ground vibration generated by construction equipment would not exceed the short-term, construction-generated FTA threshold of 85 VdB at these residences.

The Caltrans threshold for groundborne vibration is 0.3 inches per second, peak particle velocity (in/sec, PPV), which is considered the vibration level able to result in structural damage for sensitive buildings and residences. If this groundborne vibration level threshold is exceeded, the result may be "architectural" damage to normal dwellings. Groundborne vibration levels associated with representative construction equipment are summarized in **Table 2-9**.

TABLE 2-9
REPRESENTATIVE VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT (PPV)

Equipment	Peak Particle Velocity at 25 Feet (in/sec)
Loaded Trucks	0.076
Jackhammer	0.035
Small Bulldozers/Tractors	0.003
Large Bulldozer	0.089
Caisson Drilling	0.089

Source: FTA 2006; Caltrans 2004

As noted, the nearest residential structures to the project site are approximately 50 feet from the site's western and northern boundaries. Based on the vibration levels presented in **Table 2-9**, ground vibration generated by heavy-duty equipment would not be anticipated to exceed approximately 0.08 inches per second peak particle velocity at 25 feet. Therefore, predicted vibration levels at the nearest residences would not exceed the Caltrans recommended criteria.

As demonstrated, construction activities associated with the proposed project would not exceed either the FTA or Caltrans recommended thresholds for groundborne vibration impacts. Once construction is complete, all construction-generated groundborne vibration would cease. There would be no source of ground vibration associated with the proposed project operations. This impact is less than significant.

Exposure of Persons to or Generation of Operational Noise Levels in Excess of Standards

The proposed Lincoln Landing Project would result in the development of a six-story mixed-use development with 80,500 square feet of commercial uses and 476 apartment units, with a combination of surface and structure parking. Slight increases in noise are expected with the project.

New Sensitive Receptors

The primary source of noise potentially affecting the proposed project would be traffic-related noise. Using the FHWA roadway noise prediction model based on data obtained from the traffic analysis prepared for this project by TJKM Transportation Consultants in 2016, increases in noise levels with the project were calculated.

Predicted levels in existing plus project noise levels range from 47.8 to 62.9 dBA L_{dn} (see **Table 2-10**). This is an acceptable noise environment for the proposed mixed-use project per the noise provisions listed in the City of Hayward General Plan, which establishes a standard of 70 dBA for mixed-use development such as the proposed project.

The project would also be affected by stationary noise sources. Large-scale heating, ventilating, and air conditioning (HVAC) systems would be installed on the new residential and commercial buildings located on the project site. Large HVAC systems associated with these buildings can result in noise levels that average between 50 and 65 dBA L_{eq} at 50 feet from the equipment. However, these HVAC units would be mounted within HVAC wells on the rooftops of the proposed buildings and would therefore provide a buffer around the HVAC systems. According to the FTA (2006), such screening buffers can reduce noise levels by an average of 5–10 dBA depending on

the distance to the receiver; therefore, noise levels would not impact sensitive receptors on or off the project site. Additionally, noise from mechanical equipment associated with operation of the project would be required to comply with California Building Code requirements pertaining to noise attenuation and with City regulations requiring adequate buffering of such equipment.

Operation of the proposed project would also involve the delivery of goods to the commercial operations associated with the proposed project, as well as refuse pickup for both the commercial and residential components. Two noise sources would be identified with delivery operations: the noise of the diesel engines of the semi-trailer trucks and the backup beeper alarm that sounds when a truck is put in reverse, as required and regulated by the California Department of Occupational Safety and Health (Cal/OSHA). The noise generated by idling diesel engines typically ranges between 64 and 66 dBA L_{eq} at 75 feet. This noise would be temporary in nature, typically lasting no more than 5 minutes. Further, a review of the project site plan (see **Figure 2**), shows that the commercial delivery areas associated with the proposed project would be screened from the future on-site residential receptors by intervening structures and the design of the delivery zones. Backup beepers are required by Cal/OSHA to be at least 5 dBA above ambient noise levels. These devices are highly directional in nature, and when in reverse, the trucks and the beeper alarms would be directed toward the loading area and adjacent commercial structures. Backup beepers are, of course, intended to warn people who are behind the vehicle when it is backing up.

Existing Sensitive Receptors

Future traffic noise levels throughout the area surrounding the project site were modeled based on the traffic volumes identified by TJKM Transportation Consultants (2016) to determine the noise level contours along project area roadways (see **Appendix A**). **Table 2-10** shows a comparison of the calculated roadway noise levels under existing traffic levels and the development potential allowed under the proposed project.

TABLE 2-10
PROJECT CONDITIONS NOISE LEVELS ALONG PROJECT VICINITY ROADWAYS

Roadway Segment	L_{dn} at 100 Feet, dBA*	
	Existing Conditions	Existing Plus Project Conditions
A St		
Mission to west	51.9	51.9
Mission to Foothill	56.5	56.6
Foothill Blvd		
Grove to Hazel	63.2	63.4
Hazel to City Center	61.5	61.7
City Center to A	60.3	60.5
Mission Blvd		
Grove to Sunset	55.1	55.2
Sunset to Simon	54.4	54.4
Simon to Hotel	54.4	54.4
Hotel to A	54.6	54.7
A to B	60.7	60.8
Main St		
Hazel to Warren/McKeever	48.3	48.6
Warren/McKeever to Hotel	49.1	49.3

** Noise levels for highways and expressways are given at a distance of 75 feet from the center of the near direction of travel.*

The existing area around the proposed project has commercial uses, as well as sensitive residential uses. As shown in **Table 2-6**, the noise standard for mixed-use development is 70 dBA, while the noise standard for residential neighborhoods is 60 dBA. Noise levels on vicinity roadways as a result of the project would increase slightly, as the Traffic Impact Analysis Report (TJKM 2016) projected a slight increase in trips. The projected noise levels as a result of the project would range from 48.6 to 63.4 dBA L_{dn}, an acceptable noise environment for the proposed mixed-use project. However, three street segments on Foothill Boulevard and one street segment on Mission Boulevard are adjacent to commercial and residential uses as well as the proposed project site and would experience predicted existing plus project condition noise levels that exceed the 60 dBA standard for residential land uses. However, the four segments already experience traffic-related noise levels above 60 dBA without the project. Since the increase of noise resulting from the proposed project is at most only 0.2 dBA and it takes 3 dBA to perceive an increase in noise, the slight increase with the project is not significant for those already living in the area.

For the reasons described, neither future sensitive receptors on-site nor existing sensitive receptors in the area would experience noise levels in excess of City standards from project operations.

Result in a Substantial Permanent Increase in Ambient Noise Levels Above Levels Existing Without the Project

As previously described, in addition to reviewing proposed development for compliance with specific noise thresholds, this analysis accounts for the increases in noise levels over pre-project noise conditions. As described in the Human Response to Noise subsection above, a change in level of at least 5 dBA is required before any noticeable change in community response would be expected. The City of Hayward General Plan, however, uses the level typically audible to the human ear, which is 3 dBA. An increase of more than 3 dBA would therefore be considered a substantial increase in noise and would represent a significant impact.

The primary factor contributing to the ambient noise environment as a result of the project would be the increase in vehicular traffic from development in the project area. **Table 2-11** shows the calculated roadway noise levels under existing traffic levels compared to the existing plus project scenario.

TABLE 2-11
PREDICTED INCREASES IN TRAFFIC NOISE LEVELS EXISTING PLUS PROJECT CONDITIONS

Roadway Segment	L_{dn} at 100 Feet from Near-Travel-Lane Centerline[1]		Increase	Threshold	Impact	Affected Land Use
	Without Project	With Project				
A St						
Mission to west	51.9	51.9	0	>3.0	**No**	Commercial & Residential
Mission to Foothill	56.5	56.6	0.1	>3.0	**No**	Commercial
Foothill Blvd						
Grove to Hazel	63.2	63.4	0.2	>3.0	**No**	Commercial & Residential
Hazel to City Center	61.5	61.7	0.2	>3.0	**No**	Commercial & Project Site
City Center to A	60.3	60.5	0.2	>3.0	**No**	Commercial
Mission Blvd						
Grove to Sunset	55.1	55.2	0.1	>3.0	**No**	Commercial
Sunset to Simon	54.4	54.4	0	>3.0	**No**	Commercial
Simon to Hotel	54.4	54.4	0	>3.0	**No**	Commercial
Hotel to A	54.6	54.7	0.1	>3.0	**No**	Commercial & Residential
A to B	60.7	60.8	0.1	>3.0	**No**	Commercial
Main St						
Hazel to Warren/McKeever	48.3	48.6	0.3	>3.0	**No**	Commercial & Residential
Warren/McKeever to Hotel	49.1	49.3	0.2	>3.0	**No**	Commercial & Residential

Notes:

1. Traffic noise levels were calculated using the FHWA roadway noise prediction model based on data obtained from the traffic analysis prepared for this project (TJKM Transportation Consultants 2016).

2. For purposes of this analysis, a noise level increase of 3.0 or greater would typically be considered to result in increased levels of annoyance (Hayward 2014a).

Predicted existing plus project noise levels range from 48.6 to 63.4 dBA L_{dn}. All predicted increases in traffic noise levels associated with the project would be less than 3 dBA over pre-project noise conditions. Specifically, the increase of noise ranges from 0.1 to 0.3 dBA. In comparison to existing traffic noise levels, the project's predicted increase in traffic noise levels is below the applicable City noise level threshold of a 3 dBA increase. Therefore, predicted traffic noise levels would not result in a substantial increase in traffic noise levels along other primarily affected roadways.

Result in the Exposure of People Residing and Working at the Project Site to Excessive Airport Noise

The noise contour boundaries for both Hayward Executive Airport and Oakland International Airport are shown in **Figure 5**. The project site is outside of the noise contour boundaries of both airports, so noise from the airports would be considered less than significant for the proposed project.

Cumulative Noise Impacts

Cumulative noise impacts would occur primarily as a result of increased traffic on local roadways. Therefore, cumulative traffic-generated noise impacts were assessed based on the project's contribution to the future cumulative base traffic volumes in the project vicinity. The noise levels associated with cumulative base traffic volumes without the project and cumulative base traffic volumes with the project are identified in **Table 2-12**. The City of Hayward General Plan establishes that traffic-related noise increases more than 3 dB over the existing noise environment, the level typically audible to the human ear, constitute a significant impact. An increase of more than 3 dB would therefore be considered a substantial increase in noise and would represent a cumulatively considerable impact.

TABLE 2-12
PREDICTED INCREASES IN CUMULATIVE TRAFFIC NOISE LEVELS

Roadway Segment	L_{dn} at 100 Feet from Near-Travel-Lane Centerline[1]		Increase	Threshold	Impact	Affected Land Use
	Without Project	With Project				
A St						
Mission to west	53.8	53.9	0.1	> 3.0	**No**	Commercial & Residential
Mission to Foothill	57.4	57.5	0.1	> 3.0	**No**	Commercial
Foothill Blvd						
Grove to Hazel	64.5	64.7	0.2	> 3.0	**No**	Commercial & Residential
Hazel to City Center	62.8	62.9	0.1	> 3.0	**No**	Commercial & Project Site
City Center to A	61.0	61.1	0.1	> 3.0	**No**	Commercial
Mission Blvd						
Grove to Sunset	58.7	58.7	0	> 3.0	**No**	Commercial
Sunset to Simon	58.0	58.0	0	> 3.0	**No**	Commercial
Simon to Hotel	57.6	57.6	0	> 3.0	**No**	Commercial
Hotel to A	57.1	57.1	0	> 3.0	**No**	Commercial & Residential
A to B	62.0	62.1	0.1	> 3.0	**No**	Commercial
Main St						
Hazel to Warren/McKeever	50.9	51.1	0.2	> 3.0	**No**	Commercial & Residential
Warren/McKeever to Hotel	53.3	53.4	0.1	> 3.0	**No**	Commercial & Residential

Notes:

1. Traffic noise levels were calculated using the FHWA roadway noise prediction model based on data obtained from the traffic analysis prepared for this project (TJKM Transportation Consultants 2016).

2. For purposes of this analysis, a noise level increase of 3.0 or greater would typically be considered to result in increased levels of annoyance (Hayward 2014b).

The proposed project is consistent with the General Plan land use designation for the project site, so noise levels predicted in the General Plan considered development on the site that is similar in intensity to that of the proposed project. As shown in **Table 2-12**, predicted cumulative plus project traffic noise levels range from 51.1 to 64.7 dBA L_{dn}, an acceptable noise environment for the proposed mixed-use project according to City noise provisions. All predicted increases in cumulative traffic noise levels associated with the project would be less than 3 dBA over pre-project cumulative noise conditions. Specifically, the increase of noise ranges from 0.1 to 0.2 dBA. In comparison to cumulative no project traffic noise levels, the project's cumulative contribution to traffic noise levels is below the applicable City noise level threshold of a 3 dBA increase. Therefore, predicted traffic noise levels would not result in a substantial increase in traffic noise levels along affected roadways under cumulative plus project conditions.

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3.0 References

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Appendices

Appendix A – Noise Measurements

General Information

Serial Number	03788
Model	SoundExpert™ LxT
Firmware Version	2.206
Filename	LxT_Data.005
User	
Job Description	
Location	

Measurement Description	
Start Time	Monday, 2015 June 15 07:37:25
Stop Time	Monday, 2015 June 15 07:52:25
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre Calibration	Monday, 2015 June 15 07:36:15
Post Calibration	None
Calibration Deviation	---

Note

Overall Data

LASeq		63.2	dB
LASmax	2015 Jun 15 07:40:14	84.7	dB
LApeak (max)	2015 Jun 15 07:40:14	99.5	dB
LASmin	2015 Jun 15 07:45:05	46.1	dB
LCSeq		74.2	dB
LASeq		63.2	dB
LCSeq - LASeq		11.0	dB
LAIeq		66.5	dB
LAeq		63.2	dB
LAIeq - LAeq		3.3	dB
Ldn		63.2	dB
LDay 07:00-23:00		63.2	dB
LNight 23:00-07:00		---	dB
Lden		63.2	dB
LDay 07:00-19:00		63.2	dB
LEvening 19:00-23:00		---	dB
LNight 23:00-07:00		---	dB
LASE		92.7	dB
# Overloads		0	
Overload Duration		0.0	s
# OBA Overloads		0	
OBA Overload Duration		0.0	s

Statistics

LAS5.00	68.7	dBA
LAS10.00	66.4	dBA
LAS33.30	57.5	dBA
LAS50.00	52.3	dBA
LAS66.60	49.9	dBA
LAS90.00	47.6	dBA

LAS > 85.0 dB (Exceedence Counts / Duration)	0 / 0.0	s
LAS > 115.0 dB (Exceedence Counts / Duration)	0 / 0.0	s
LApeak > 135.0 dB (Exceedence Counts / Duration)	0 / 0.0	s
LApeak > 137.0 dB (Exceedence Counts / Duration)	0 / 0.0	s
LApeak > 140.0 dB (Exceedence Counts / Duration)	0 / 0.0	s

Settings

RMS Weight	A Weighting
Peak Weight	A Weighting
Detector	Slow
Preamp	PRMLxT1L
Microphone Correction	Off
Integration Method	Exponential
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Freq. Weighting	Z Weighting
OBA Max Spectrum	At Lmax

Under Range Limit	24.8	dB
Under Range Peak	75.5	dB
Noise Floor	15.7	dB
Overload	119.2	dB

1/1 Spectra

Freq. (Hz):	8.0	16.0	31.5	63.0	125	250	500	1k	2k	4k	8k	16k
LZSeq	64.5	59.4	63.8	68.9	71.4	65.1	60.1	57.1	52.3	46.7	37.2	28.1
LZSmax	60.2	63.5	72.3	87.0	96.0	88.8	81.3	67.2	68.8	68.5	59.5	49.0
LZSmin	45.1	49.2	51.0	53.1	51.0	44.1	40.7	41.0	31.4	24.6	18.1	19.7

1/3 Spectra

Freq. (Hz):	6.3	8.0	10.0	12.5	16.0	20.0	25.0	31.5	40.0	50.0	63.0	80.0
LZSeq	61.7	59.4	56.9	55.8	54.0	53.8	55.3	59.0	61.0	61.8	61.7	66.7
LZSmax	58.8	54.6	54.3	65.7	57.3	60.5	72.3	62.5	69.1	83.4	68.8	84.4
LZSmin	38.1	37.0	39.2	40.1	42.1	42.9	44.3	46.0	46.6	47.7	47.1	47.7

Freq. (Hz):	100	125	160	200	250	315	400	500	630	800	1k	1.25k
LZSeq	63.4	69.4	64.8	60.6	58.9	61.0	56.8	54.5	52.6	53.4	53.0	50.2
LZSmax	79.6	94.7	89.7	83.7	80.4	86.3	79.3	73.7	65.5	63.3	62.1	61.7
LZSmin	46.6	46.4	42.8	41.4	38.1	36.7	36.3	34.8	35.7	37.3	36.4	32.7

Freq. (Hz):	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	12.5k	16k	20k
LZSeq	48.8	47.2	46.3	44.7	41.2	36.5	35.0	31.8	28.1	25.1	22.8	20.7
LZSmax	60.9	66.1	64.2	66.0	64.7	57.8	57.9	53.4	48.8	45.2	44.7	41.8
LZSmin	28.9	25.6	22.6	20.5	18.9	15.9	14.0	12.7	12.6	13.4	14.3	16.6

Calibration History

Preamp	Date	dB re. 1V/Pa
Direct	01 Jul 2014 09:45:44	-27.0
PRMLxT1L	15 Jun 2015 07:36:12	-25.5
PRMLxT1L	01 Jun 2015 12:15:06	-26.2
PRMLxT1L	29 May 2015 14:30:59	-26.0
PRMLxT1L	26 May 2015 02:19:51	-26.0
PRMLxT1L	26 May 2015 01:05:23	-26.0
PRMLxT1L	06 May 2015 12:55:07	-26.1
PRMLxT1L	06 May 2015 11:06:52	-26.0
PRMLxT1L	14 Jan 2015 10:20:59	-26.0
PRMLxT1L	31 Oct 2014 10:59:41	-27.8
PRMLxT1L	15 Oct 2014 13:40:29	-27.8
PRMLxT1L	08 Oct 2014 08:57:55	-27.8

General Information

Serial Number	03788
Model	SoundExpert™ LxT
Firmware Version	2.206
Filename	LxT_Data.006
User	
Job Description	
Location	

Measurement Description	
Start Time	Monday, 2015 June 15 07:55:09
Stop Time	Monday, 2015 June 15 08:10:09
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre Calibration	Monday, 2015 June 15 07:36:12
Post Calibration	None
Calibration Deviation	---

Note

Overall Data

LASeq		62.9	dB
LASmax	2015 Jun 15 07:55:39	74.8	dB
LApeak (max)	2015 Jun 15 08:08:10	89.6	dB
LASmin	2015 Jun 15 08:01:53	49.7	dB
LCSeq		76.3	dB
LASeq		62.9	dB
LCSeq - LASeq		13.4	dB
LAIeq		64.0	dB
LAeq		62.9	dB
LAIeq - LAeq		1.1	dB
Ldn		62.9	dB
LDay 07:00-23:00		62.9	dB
LNight 23:00-07:00		---	dB
Lden		62.9	dB
LDay 07:00-19:00		62.9	dB
LEvening 19:00-23:00		---	dB
LNight 23:00-07:00		---	dB
LASE		92.5	dB
# Overloads		0	
Overload Duration		0.0	s
# OBA Overloads		0	
OBA Overload Duration		0.0	s

Statistics

LAS5.00	67.7	dBA
LAS10.00	66.0	dBA
LAS33.30	62.6	dBA
LAS50.00	60.9	dBA
LAS66.60	58.6	dBA
LAS90.00	54.2	dBA

LAS > 85.0 dB (Exceedence Counts / Duration)	0 / 0.0	s
LAS > 115.0 dB (Exceedence Counts / Duration)	0 / 0.0	s
LApeak > 135.0 dB (Exceedence Counts / Duration)	0 / 0.0	s
LApeak > 137.0 dB (Exceedence Counts / Duration)	0 / 0.0	s
LApeak > 140.0 dB (Exceedence Counts / Duration)	0 / 0.0	s

Settings

RMS Weight	A Weighting
Peak Weight	A Weighting
Detector	Slow
Preamp	PRMLxT1L
Microphone Correction	Off
Integration Method	Exponential
OBA Range	Normal
OBA Bandwidth	1/1 and 1/3
OBA Freq. Weighting	Z Weighting
OBA Max Spectrum	At Lmax

Under Range Limit	24.8	dB
Under Range Peak	75.5	dB
Noise Floor	15.7	dB
Overload	119.2	dB

1/1 Spectra

Freq. (Hz):	8.0	16.0	31.5	63.0	125	250	500	1k	2k	4k	8k	16k
LZSeq	61.2	61.8	66.5	73.8	72.3	63.9	57.4	57.8	53.1	45.8	37.2	30.1
LZSmax	71.8	72.3	75.0	93.6	87.5	77.2	69.4	68.1	64.0	59.2	57.1	53.6
LZSmin	48.1	53.0	58.8	59.9	55.2	48.1	44.2	44.7	38.7	31.8	21.7	20.3

1/3 Spectra

Freq. (Hz):	6.3	8.0	10.0	12.5	16.0	20.0	25.0	31.5	40.0	50.0	63.0	80.0
LZSeq	56.5	54.8	55.8	57.3	56.1	57.5	60.7	61.5	62.9	64.8	71.5	68.5
LZSmax	69.3	65.8	66.8	64.6	70.6	67.9	67.1	73.7	69.0	74.0	93.2	85.6
LZSmin	38.3	39.0	44.1	44.8	45.8	48.8	52.3	50.8	53.9	54.3	53.2	52.4

Freq. (Hz):	100	125	160	200	250	315	400	500	630	800	1k	1.25k
LZSeq	68.1	68.2	66.0	60.9	59.4	56.1	53.0	52.2	52.5	53.1	53.8	52.2
LZSmax	87.4	77.4	72.5	74.4	71.9	72.7	65.4	63.6	64.4	62.6	64.5	62.8
LZSmin	49.1	49.3	46.6	43.7	44.1	41.4	38.8	39.4	38.5	39.8	40.2	39.4

Freq. (Hz):	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	12.5k	16k	20k
LZSeq	50.0	48.2	45.5	43.4	40.7	36.8	34.5	32.7	27.5	28.5	23.9	18.7
LZSmax	60.3	59.5	57.5	57.3	52.5	50.3	53.6	54.1	46.3	52.6	47.1	34.9
LZSmin	36.5	32.5	30.0	29.2	25.5	20.7	17.8	16.2	14.9	14.1	14.8	17.1

Calibration History

Preamp	Date	dB re. 1V/Pa
Direct	01 Jul 2014 09:45:44	-27.0
PRMLxT1L	15 Jun 2015 07:36:12	-25.5
PRMLxT1L	01 Jun 2015 12:15:06	-26.2
PRMLxT1L	29 May 2015 14:30:59	-26.0
PRMLxT1L	26 May 2015 02:19:51	-26.0
PRMLxT1L	26 May 2015 01:05:23	-26.0
PRMLxT1L	06 May 2015 12:55:07	-26.1
PRMLxT1L	06 May 2015 11:06:52	-26.0
PRMLxT1L	14 Jan 2015 10:20:59	-26.0
PRMLxT1L	31 Oct 2014 10:59:41	-27.8
PRMLxT1L	15 Oct 2014 13:40:29	-27.8
PRMLxT1L	08 Oct 2014 08:57:55	-27.8

General Information

Serial Number	03788
Model	SoundExpert™ LxT
Firmware Version	2.206
Filename	LxT_Data.007
User	
Job Description	
Location	

Measurement Description	
Start Time	Monday, 2015 June 15 08:14:19
Stop Time	Monday, 2015 June 15 08:29:19
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre Calibration	Monday, 2015 June 15 07:36:12
Post Calibration	None
Calibration Deviation	---

Note

Overall Data

LASeq		60.6	dB
LASmax	2015 Jun 15 08:25:08	74.3	dB
LApeak (max)	2015 Jun 15 08:25:08	87.2	dB
LASmin	2015 Jun 15 08:26:24	46.6	dB
LCSeq		73.9	dB
LASeq		60.6	dB
LCSeq - LASeq		13.3	dB
LAIeq		62.3	dB
LAeq		60.6	dB
LAIeq - LAeq		1.6	dB
Ldn		60.6	dB
LDay 07:00-23:00		60.6	dB
LNight 23:00-07:00		---	dB
Lden		60.6	dB
LDay 07:00-19:00		60.6	dB
LEvening 19:00-23:00		---	dB
LNight 23:00-07:00		---	dB
LASE		90.2	dB
# Overloads		0	
Overload Duration		0.0	s
# OBA Overloads		0	
OBA Overload Duration		0.0	s

Statistics

LAS5.00	67.1	dBA
LAS10.00	65.0	dBA
LAS33.30	58.3	dBA
LAS50.00	56.0	dBA
LAS66.60	54.2	dBA
LAS90.00	51.5	dBA

LAS > 85.0 dB (Exceedence Counts / Duration)	0 / 0.0	s
LAS > 115.0 dB (Exceedence Counts / Duration)	0 / 0.0	s
LApeak > 135.0 dB (Exceedence Counts / Duration)	0 / 0.0	s
LApeak > 137.0 dB (Exceedence Counts / Duration)	0 / 0.0	s
LApeak > 140.0 dB (Exceedence Counts / Duration)	0 / 0.0	s

Settings

RMS Weight	A Weighting	
Peak Weight	A Weighting	
Detector	Slow	
Preamp	PRMLxT1L	
Microphone Correction	Off	
Integration Method	Exponential	
OBA Range	Normal	
OBA Bandwidth	1/1 and 1/3	
OBA Freq. Weighting	Z Weighting	
OBA Max Spectrum	At Lmax	
Under Range Limit	24.8	dB
Under Range Peak	75.5	dB
Noise Floor	15.7	dB
Overload	119.2	dB

1/1 Spectra

Freq. (Hz):	8.0	16.0	31.5	63.0	125	250	500	1k	2k	4k	8k	16k
LZSeq	74.5	68.3	68.5	70.7	68.9	62.6	56.6	55.2	50.3	43.4	34.8	30.1
LZSmax	72.5	64.4	72.9	91.4	86.7	79.5	65.3	61.8	57.2	50.2	40.1	32.9
LZSmin	46.1	51.8	56.9	58.6	53.4	46.2	41.9	41.5	36.8	26.9	18.5	20.1

1/3 Spectra

Freq. (Hz):	6.3	8.0	10.0	12.5	16.0	20.0	25.0	31.5	40.0	50.0	63.0	80.0
LZSeq	70.9	70.3	68.1	65.4	63.0	61.7	62.4	63.9	64.0	64.6	68.0	64.2
LZSmax	63.9	59.0	60.2	59.9	60.4	61.1	65.4	69.7	70.9	80.4	91.2	69.6
LZSmin	37.8	39.1	39.6	41.9	44.3	46.6	48.3	52.0	50.3	49.8	52.2	54.6

Freq. (Hz):	100	125	160	200	250	315	400	500	630	800	1k	1.25k
LZSeq	64.9	65.4	61.0	58.2	58.5	56.5	53.1	51.7	50.1	50.7	51.5	48.9
LZSmax	81.1	85.1	80.0	77.9	73.9	64.4	61.7	59.8	60.5	58.2	57.6	55.2
LZSmin	48.7	48.3	45.6	41.1	42.9	38.2	36.9	37.2	36.5	37.0	37.2	34.6

Freq. (Hz):	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	12.5k	16k	20k
LZSeq	46.5	45.7	44.0	40.9	38.4	33.7	31.8	29.6	27.9	26.9	25.6	21.7
LZSmax	53.6	52.8	51.5	48.1	44.8	39.6	37.4	34.6	32.9	30.6	27.8	22.4
LZSmin	33.2	32.5	28.6	24.3	22.0	16.9	14.7	13.2	12.9	13.6	15.0	16.9

Calibration History

Preamp	Date	dB re. 1V/Pa
Direct	01 Jul 2014 09:45:44	-27.0
PRMLxT1L	15 Jun 2015 07:36:12	-25.5
PRMLxT1L	01 Jun 2015 12:15:06	-26.2
PRMLxT1L	29 May 2015 14:30:59	-26.0
PRMLxT1L	26 May 2015 02:19:51	-26.0
PRMLxT1L	26 May 2015 01:05:23	-26.0
PRMLxT1L	06 May 2015 12:55:07	-26.1
PRMLxT1L	06 May 2015 11:06:52	-26.0
PRMLxT1L	14 Jan 2015 10:20:59	-26.0
PRMLxT1L	31 Oct 2014 10:59:41	-27.8
PRMLxT1L	15 Oct 2014 13:40:29	-27.8
PRMLxT1L	08 Oct 2014 08:57:55	-27.8

General Information

Serial Number	03788
Model	SoundExpert™ LxT
Firmware Version	2.206
Filename	LxT_Data.008
User	
Job Description	
Location	
Measurement Description	
Start Time	Monday, 2015 June 15 08:30:58
Stop Time	Monday, 2015 June 15 08:45:58
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre Calibration	Monday, 2015 June 15 07:36:12
Post Calibration	None
Calibration Deviation	---

Note

Overall Data

LASeq		61.6	dB
LASmax	2015 Jun 15 08:40:38	79.1	dB
LApeak (max)	2015 Jun 15 08:38:55	93.5	dB
LASmin	2015 Jun 15 08:38:15	42.2	dB
LCSeq		73.9	dB
LASeq		61.6	dB
LCSeq - LASeq		12.3	dB
LAIeq		64.1	dB
LAeq		61.6	dB
LAIeq - LAeq		2.5	dB
Ldn		61.6	dB
LDay 07:00-23:00		61.6	dB
LNight 23:00-07:00		---	dB
Lden		61.6	dB
LDay 07:00-19:00		61.6	dB
LEvening 19:00-23:00		---	dB
LNight 23:00-07:00		---	dB
LASE		91.1	dB
# Overloads		0	
Overload Duration		0.0	s
# OBA Overloads		0	
OBA Overload Duration		0.0	s

Statistics

LAS5.00	67.2	dBA
LAS10.00	64.6	dBA
LAS33.30	58.0	dBA
LAS50.00	54.8	dBA
LAS66.60	50.6	dBA
LAS90.00	44.4	dBA
LAS > 85.0 dB (Exceedence Counts / Duration)	0 / 0.0	s
LAS > 115.0 dB (Exceedence Counts / Duration)	0 / 0.0	s
LApeak > 135.0 dB (Exceedence Counts / Duration)	0 / 0.0	s
LApeak > 137.0 dB (Exceedence Counts / Duration)	0 / 0.0	s
LApeak > 140.0 dB (Exceedence Counts / Duration)	0 / 0.0	s

Settings

RMS Weight	A Weighting	
Peak Weight	A Weighting	
Detector	Slow	
Preamp	PRMLxT1L	
Microphone Correction	Off	
Integration Method	Exponential	
OBA Range	Normal	
OBA Bandwidth	1/1 and 1/3	
OBA Freq. Weighting	Z Weighting	
OBA Max Spectrum	At Lmax	
Under Range Limit	24.8	dB
Under Range Peak	75.5	dB
Noise Floor	15.7	dB
Overload	119.2	dB

1/1 Spectra

Freq. (Hz):	8.0	16.0	31.5	63.0	125	250	500	1k	2k	4k	8k	16k
LZSeq	56.6	59.2	66.7	68.5	71.3	63.2	57.2	55.9	50.1	43.8	51.5	47.0
LZSmax	56.2	62.2	82.8	81.9	93.6	87.0	71.9	63.6	59.1	50.2	43.8	36.5
LZSmin	46.1	49.0	50.7	50.8	48.2	40.8	38.6	37.9	30.0	19.7	16.4	20.8

1/3 Spectra

Freq. (Hz):	6.3	8.0	10.0	12.5	16.0	20.0	25.0	31.5	40.0	50.0	63.0	80.0
LZSeq	53.3	53.2	53.7	58.8	54.7	51.5	58.9	62.7	63.3	64.8	64.5	61.2
LZSmax	51.6	52.4	53.6	59.9	57.9	53.9	63.7	74.3	82.1	78.4	78.5	74.3
LZSmin	34.0	39.0	40.3	44.5	42.5	41.2	42.9	47.1	45.5	43.9	46.3	44.9

Freq. (Hz):	100	125	160	200	250	315	400	500	630	800	1k	1.25k
LZSeq	66.9	68.9	60.8	61.1	57.1	54.7	52.5	52.9	51.7	51.6	51.9	49.6
LZSmax	93.1	92.4	84.0	86.1	80.2	73.8	64.5	66.8	69.3	61.4	56.7	52.2
LZSmin	17.9	40.6	38.9	36.2	35.2	34.8	34.1	33.6	33.2	33.7	33.5	30.8

Freq. (Hz):	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	12.5k	16k	20k
LZSeq	47.6	44.6	42.1	40.1	39.1	37.6	34.7	32.6	51.8	42.9	25.9	32.5
LZSmax	49.4	57.3	52.6	47.2	43.9	44.0	41.0	38.9	35.9	33.2	32.2	27.8
LZSmin	27.7	24.0	19.7	17.3	14.0	11.7	10.9	11.4	12.3	13.5	14.5	18.5

Calibration History

Preamp	Date	dB re. 1V/Pa
Direct	01 Jul 2014 09:45:44	-27.0
PRMLxT1L	15 Jun 2015 07:36:12	-25.5
PRMLxT1L	01 Jun 2015 12:15:06	-26.2
PRMLxT1L	29 May 2015 14:30:59	-26.0
PRMLxT1L	26 May 2015 02:19:51	-26.0
PRMLxT1L	26 May 2015 01:05:23	-26.0
PRMLxT1L	06 May 2015 12:55:07	-26.1
PRMLxT1L	06 May 2015 11:06:52	-26.0
PRMLxT1L	14 Jan 2015 10:20:59	-26.0
PRMLxT1L	31 Oct 2014 10:59:41	-27.8
PRMLxT1L	15 Oct 2014 13:40:29	-27.8
PRMLxT1L	08 Oct 2014 08:57:55	-27.8

TRAFFIC NOISE LEVELS AND NOISE CONTOURS

Existing Conditions

Project Number: 1A
Project Name: Lincoln Landing

Background Information

Model Description: FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.
Source of Traffic Volumes: TJKM
Community Noise Descriptor: L_{dn}: x CNEL:

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

Analysis Condition				Design		Vehicle Mix		Distance from Centerline of Roadway				
		Median	ADT	Speed	Alpha	Medium	Heavy	Ldn at	Distance to Contour			
Roadway, Segment	Lanes	Width	Volume	(mph)	Factor	Trucks	Trucks	100 Feet	70 Ldn	65 Ldn	60 Ldn	55 Ldn
A St												
Mission to west	4	0	6,417	25	0.5	1.8%	0.1%	51.9	-	-	-	62
Mission to Foothill	4	0	18,477	25	0.5	1.8%	0.1%	56.5	-	-	58	126
Foothill Blvd												
Grove to Hazel	6	3	37,296	35	0.5	1.8%	0.1%	63.2	-	76	164	354
Hazel to City Center	6	3	36,297	30	0.5	1.8%	0.1%	61.5	-	59	127	273
City Center to A	6	3	27,513	30	0.5	1.8%	0.1%	60.3	-	-	105	227
Mission Blvd												
Grove to Sunset	4	0	13,473	25	0.5	1.8%	0.1%	55.1	-	-	47	102
Sunset to Simon	4	0	11,412	25	0.5	1.8%	0.1%	54.4	-	-	-	91
Simon to Hotel	4	0	11,313	25	0.5	1.8%	0.1%	54.4	-	-	-	91
Hotel to A	4	0	12,006	25	0.5	1.8%	0.1%	54.6	-	-	-	94
A to B	4	0	48,447	25	0.5	1.8%	0.1%	60.7	-	51	111	239
Main St												
Hazel to Warren/McKeever	4	0	2,817	25	0.5	1.8%	0.1%	48.3	-	-	-	-
Warren/McKeever to Hotel	4	0	3,339	25	0.5	1.8%	0.1%	49.1	-	-	-	-

TRAFFIC NOISE LEVELS AND NOISE CONTOURS

Existing Plus Project Conditions

Project Number: 1B
Project Name: Lincoln Landing

Background Information

Model Description: FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.
Source of Traffic Volumes: TJKM
Community Noise Descriptor: L_{dn}: x CNEL: _____

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

Analysis Condition Roadway, Segment	Lanes	Median Width	ADT Volume	Design Speed (mph)	Alpha Factor	Vehicle Mix Medium Trucks	Vehicle Mix Heavy Trucks	Distance from Centerline of Roadway: Ldn at 100 Feet	Distance to Contour: 70 Ldn	65 Ldn	60 Ldn	55 Ldn
A St												
Mission to west	4	0	6,507	25	0.5	1.8%	0.1%	51.9	-	-	-	63
Mission to Foothill	4	0	19,161	25	0.5	1.8%	0.1%	56.6	-	-	60	129
Foothill Blvd												
Grove to Hazel	6	3	38,826	35	0.5	1.8%	0.1%	63.4	-	78	169	363
Hazel to City Center	6	3	38,097	30	0.5	1.8%	0.1%	61.7	-	61	131	282
City Center to A	6	3	28,881	30	0.5	1.8%	0.1%	60.5	-	-	109	234
Mission Blvd												
Grove to Sunset	4	0	13,905	25	0.5	1.8%	0.1%	55.2	-	-	48	104
Sunset to Simon	4	0	11,502	25	0.5	1.8%	0.1%	54.4	-	-	-	92
Simon to Hotel	4	0	11,430	25	0.5	1.8%	0.1%	54.4	-	-	-	91
Hotel to A	4	0	12,159	25	0.5	1.8%	0.1%	54.7	-	-	44	95
A to B	4	0	49,707	25	0.5	1.8%	0.1%	60.8	-	52	113	243
Main St												
Hazel to Warren/McKeever	4	0	3,015	25	0.5	1.8%	0.1%	48.6	-	-	-	-
Warren/McKeever to Hotel	4	0	3,573	25	0.5	1.8%	0.1%	49.3	-	-	-	-

TRAFFIC NOISE LEVELS AND NOISE CONTOURS

Cumulative No Project Conditions

Project Number: 2A
Project Name: Lincoln Landing

Background Information

Model Description: FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.
Source of Traffic Volumes: TJKM
Community Noise Descriptor: L_{dn}: x CNEL:

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

Analysis Condition				Design		Vehicle Mix		Distance from Centerline of Roadway				
		Median	ADT	Speed	Alpha	Medium	Heavy	Ldn at	Distance to Contour			
Roadway, Segment	Lanes	Width	Volume	(mph)	Factor	Trucks	Trucks	100 Feet	70 Ldn	65 Ldn	60 Ldn	55 Ldn
A St												
Mission to west	4	0	10,008	25	0.5	1.8%	0.1%	53.8	-	-	-	83
Mission to Foothill	4	0	22,932	25	0.5	1.8%	0.1%	57.4	-	-	67	145
Foothill Blvd												
Grove to Hazel	6	3	50,265	35	0.5	1.8%	0.1%	64.5	-	93	200	432
Hazel to City Center	6	3	48,105	30	0.5	1.8%	0.1%	62.8	-	71	153	329
City Center to A	6	3	31,743	30	0.5	1.8%	0.1%	61.0	-	-	116	249
Mission Blvd												
Grove to Sunset	4	0	30,465	25	0.5	1.8%	0.1%	58.7	-	-	81	175
Sunset to Simon	4	0	26,082	25	0.5	1.8%	0.1%	58.0	-	-	73	158
Simon to Hotel	4	0	24,012	25	0.5	1.8%	0.1%	57.6	-	-	69	150
Hotel to A	4	0	21,312	25	0.5	1.8%	0.1%	57.1	-	-	64	138
A to B	4	0	66,114	25	0.5	1.8%	0.1%	62.0	-	63	136	294
Main St												
Hazel to Warren/McKeever	4	0	5,112	25	0.5	1.8%	0.1%	50.9	-	-	-	53
Warren/McKeever to Hotel	4	0	8,820	25	0.5	1.8%	0.1%	53.3	-	-	-	77

TRAFFIC NOISE LEVELS AND NOISE CONTOURS

Cumulative Plus Project Conditions

Project Number: 2B
Project Name: Lincoln Landing

Background Information

Model Description: FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.
Source of Traffic Volumes: TJKM
Community Noise Descriptor: L_{dn}: x CNEL:

Assumed 24-Hour Traffic Distribution:	Day	Evening	Night
Total ADT Volumes	77.70%	12.70%	9.60%
Medium-Duty Trucks	87.43%	5.05%	7.52%
Heavy-Duty Trucks	89.10%	2.84%	8.06%

Analysis Condition				Design		Vehicle Mix		Distance from Centerline of Roadway				
		Median	ADT	Speed	Alpha	Medium	Heavy	Ldn at	Distance to Contour			
Roadway, Segment	Lanes	Width	Volume	(mph)	Factor	Trucks	Trucks	100 Feet	70 Ldn	65 Ldn	60 Ldn	55 Ldn
A St												
Mission to west	4	0	10,098	25	0.5	1.8%	0.1%	53.9	-	-	-	84
Mission to Foothill	4	0	23,616	25	0.5	1.8%	0.1%	57.5	-	-	69	148
Foothill Blvd												
Grove to Hazel	6	3	51,795	35	0.5	1.8%	0.1%	64.7	-	95	204	440
Hazel to City Center	6	3	49,905	30	0.5	1.8%	0.1%	62.9	-	73	156	337
City Center to A	6	3	33,111	30	0.5	1.8%	0.1%	61.1	-	-	119	256
Mission Blvd												
Grove to Sunset	4	0	30,897	25	0.5	1.8%	0.1%	58.7	-	-	82	177
Sunset to Simon	4	0	26,172	25	0.5	1.8%	0.1%	58.0	-	-	73	158
Simon to Hotel	4	0	24,129	25	0.5	1.8%	0.1%	57.6	-	-	70	150
Hotel to A	4	0	21,483	25	0.5	1.8%	0.1%	57.1	-	-	64	139
A to B	4	0	67,374	25	0.5	1.8%	0.1%	62.1	-	64	138	297
Main St												
Hazel to Warren/McKeever	4	0	5,310	25	0.5	1.8%	0.1%	51.1	-	-	-	55
Warren/McKeever to Hotel	4	0	9,054	25	0.5	1.8%	0.1%	53.4	-	-	-	78