APPENDIX D:

NOISE IMPACT ANALYSIS

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DRAFT

NOISE AND VIBRATION IMPACT ANALYSIS

GENERAL PLAN LAND USE AND URBAN DESIGN ELEMENTS PROJECT

CITY OF LONG BEACH, CALIFORNIA

LSA

June 2019

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DRAFT

NOISE AND VIBRATION IMPACT ANALYSIS

GENERAL PLAN LAND USE AND URBAN DESIGN ELEMENTS PROJECT

CITY OF LONG BEACH, CALIFORNIA

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Project No. CLB1804

June 2019

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EXECUTIVE SUMMARY

This Noise and Vibration Impact Analysis has been prepared to evaluate the impacts that may result from implementation of the proposed General Plan Land Use Element and Urban Design Element (LUE/UDE) Project in the City of Long Beach (City).

This Noise and Vibration Impact Analysis describes existing noise and vibration conditions, discusses the characteristics of sound, sets forth criteria for determining the significance of noise and vibration impacts, and estimates the potential noise and vibration impacts resulting from the implementation of the LUE/UDE. Noise monitoring was conducted in order to assess the ambient noise environment within the City. Traffic data obtained from the *City of Long Beach General Plan Land Use and Urban Design Elements Traffic Impact Analysis* (LSA, 2019) was used to calculate anticipated increase in overall daily traffic on major roadway segments in the City in order to provide a quantitative assessment of the potential increase in noise associated with the LUE/UDE.

Construction of future projects associated with implementation of the LUE/UDE could result in the generation of ground-borne vibration. Any future construction activities associated with implementation of the LUE/UDE would be required to comply with the Noise Ordinance requirements in effect at the time of project construction. Therefore, impacts from typical construction methods would not result in the exposure of sensitive receptors to excessive ground-borne vibration or noise levels.

Construction associated with implementation of the LUE/UDE would occur over a period of approximately 21 years. Construction activities associated with development allowed under the LUE/UDE could result in substantial temporary or periodic increases in ambient noise levels at development sites throughout the City. Noise-sensitive receptors include residences, schools, hospitals, churches, and similar uses that are sensitive to noise. Construction and operation of development allowed under the LUE/UDE could adversely affect nearby noise-sensitive land uses. Construction noise is permitted by the Municipal Code when activities occur between the hours of 7:00 a.m. and 7:00 p.m. on weekdays and federal holidays and between 9:00 a.m. and 6:00 p.m. on Saturdays. No construction would be permitted on Sundays. Construction activities associated with development allowed under the LUE/UDE would be subject to compliance with the City's Noise Ordinance to ensure that noise impacts from construction sources are reduced to a less than significant level. While construction noise impacts are currently exempt from specific noise level limits, projects that have unusual or extremely loud construction activities would be evaluated on a case-by-case basis.

A permanent increase in ambient noise would include noise increases associated with increased traffic on roadways in the City. It is projected that traffic volumes on some streets within the City would increase due to the growth envisioned in the LUE/UDE. This increase in traffic volumes would result in increased traffic noise levels compared to existing conditions; however, the future traffic noise levels calculated were less than 1.0 dBA and therefore would be less than perceptible.

Long Beach Airport is located centrally within the City, approximately 3 miles northeast of downtown. Implementation of the LUE/UDE would locate business parks and airport-related land uses surrounding the airport and would not introduce any new noise-sensitive receptors within the 65 dBA noise contour. Therefore, the LUE/UDE would not result in the exposure of sensitive receptors to excessive noise levels from aircraft noise sources.

The proposed project would not create a cumulatively considerable contribution to regional noise conditions. Additionally, implementation of the LUE/UDE policies and land use strategies would require the City to consider noise and land use compatibility issues when evaluating individual development proposals. Therefore, under cumulative conditions, implementation of the proposed General Plan LUE/UDE would result in a less than significant noise impact.

TABLE OF CONTENTS

APPENDIX

FIGURES AND TABLES

FIGURES

TABLES

LIST OF ABBREVIATIONS AND ACRONYMS

ADT	average daily traffic
Blue line	County Metro Rail Blue line
BNSF	Burlington Northern Santa Fe
City	City of Long Beach
CNEL	Community Noise Equivalent Level
County	Los Angeles County
dB	decibels
dBA	A-weighted decibels
FHWA	Federal Highway Administration
ft	foot/feet
FTA	Federal Transit Administration
HVAC	heating, ventilation, and air conditioning
Hz	frequency
I	Interstate
inch/sec	inch(es) per second
L_{01}, L_{10}, L_{50}, L_{90}	A-weighted noise levels for 1 percent, 10 percent, 50 percent, and 90 percent of a stated time period.
L_{dn}	day-night average level
L_{eq}	equivalent continuous sound level
L_{max}	maximum noise level
L_{min}	minimum noise level
LUE	Land Use Element
Metro	Los Angeles County Metropolitan Transportation Authority

mph	miles per hour
MPO	Metropolitan Planning Organization
OITC	Outdoor/Indoor Transmission Class
OSHA	Occupational Safety and Health Administration
PCH	Pacific Coast Highway
PHL	Pacific Harbor Line Incorporated
planning area	City of Long Beach
re	relative
RHNA	Regional Housing Needs Assessment
RMS	root mean square
RTP	Regional Transportation Plan
SCAG	Southern California Association of Governments
SCS	Sustainable Communities Strategy
SEASP	Southeast Area Specific Plan
SRE	Scenic Routes Element
STC	Sound Transmission Class
TOD	Transit-Oriented Development
UDE	Urban Design Element
UPRR	Union Pacific Railroad
USEPA	United States Environmental Protection Agency
VdB	vibration velocity decibels

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NOISE AND VIBRATION IMPACT ANALYSIS

INTRODUCTION

This Noise and Vibration Impact Analysis has been prepared to evaluate the impacts that may result from implementation of the proposed General Plan Land Use Element and Urban Design Elements (LUE/UDE) Project in the City of Long Beach (City). The project location map is included in Figure 1.

This Noise and Vibration Impact Analysis describes existing noise and vibration conditions, discusses the characteristics of sound, sets forth criteria for determining the significance of noise and vibration impacts, and estimates the potential noise and vibration impacts resulting from the implementation of the proposed project. Noise monitoring was conducted using the Larson Davis SoundTrack LxT sound level meter at 11 locations in order to assess the ambient noise environment within the City. The *City of Long Beach General Plan Land Use and Urban Design Elements Traffic Impact Analysis* (LSA, 2019) prepared for the proposed project provides total traffic volume by City section. LSA used the projected increase in overall daily traffic on major roadway segments in the City to provide a quantitative assessment of the potential increase in noise associated with the proposed project.

PROJECT DESCRIPTION

As illustrated by Figure 1, Project Location, the City (also referred to as the “planning area”) includes the entire 50 square miles within the limits of the City of Long Beach (excluding the City of Signal Hill, which is completely surrounded by the City of Long Beach) in Los Angeles County (County), California. The City is bordered on the west by the Cities of Carson and Los Angeles (including the neighborhood of Wilmington and the Port of Los Angeles); on the north by the Cities of Compton, Paramount, and Bellflower; and on the east by the Cities of Lakewood, Hawaiian Gardens, Cypress, Los Alamitos, and Seal Beach, and the unincorporated community of Rossmoor. The Pacific Ocean borders the southern portion of the City, and as such, portions of the City are located within the California Coastal Zone.

The proposed project is an update to the City’s existing General Plan and is intended to guide growth and future development through the year 2040. While the existing General Plan does not currently include an Urban Design Element (UDE), the existing Scenic Routes Element (SRE) (1975) designates roadways within the City for which view protection should be considered and also establishes varying design standards to ensure the continued maintenance of the aesthetic character of these roadways. The proposed project includes the approval of both the General Plan LUE and UDE, which would replace the existing LUE and SRE. The following discussion summarizes the key components of each of the proposed General Plan Elements.

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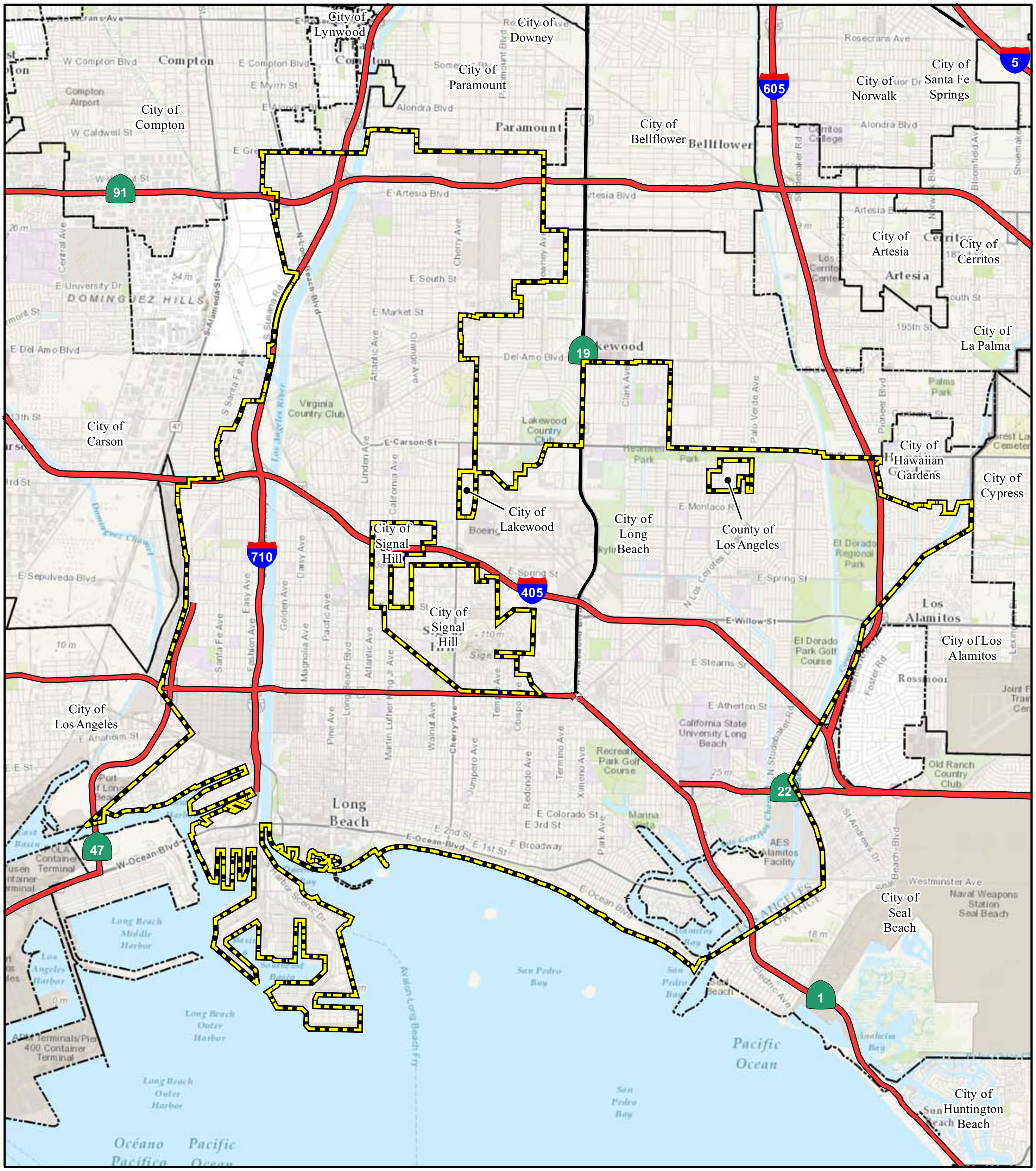

FIGURE 1

LEGEND

Project Area (City of Long Beach)

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MILES

Long Beach General Plan
Land Use and Urban Design Elements
Project Location

SOURCE: Bing Maps (c. 2008); ESRI (2008)

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Land Use Element

The proposed updated LUE would divide the City into nine distinct Community Plan Areas, comprised of the following: (1) North Long Beach; (2) Bixby Knolls; (3) Westside and Wrigley; (4) Eastside; (5) Central; (6) Traffic Circle; (7) Downtown; (8) Midshore; and (9) Southeast. While there are over 70 neighborhoods identified by residents of the City, the community plan areas are defined by strong physical boundaries such as freeways, rivers, City boundaries, and railroad tracks. For each Community Plan Area, the proposed LUE provides a description of its geographic context, outlines issues and needs unique to the area, and establishes neighborhood-specific land use strategies.

In addition to establishing Community Plan Areas, the proposed updated LUE would introduce the concept of "PlaceTypes," which would replace the current approach in the existing LUE of segregating property within the City through traditional land use designations and zoning classifications. The updated LUE would establish 14 primary PlaceTypes that would divide the City into distinct neighborhoods, thus allowing for greater flexibility and a mix of compatible land uses within these areas. Each PlaceType would be defined by unique land use, form, and character-defining goals, policies, and implementation strategies tailored specifically to the particular application of that PlaceType within the City. The PlaceTypes are shown in Figure 2.

The new LUE would reflect the current needs and opportunities within the City, update land uses and bring the General Plan into conformity with the City's adopted General Plan Mobility Element (October 2013). The project would also provide for future development opportunities that would alleviate overcrowding documented in the City's Assessment of Fair Housing, and would accommodate projected growth and housing needs established in the City's General Plan 2013–2021 Housing Element and the 2016–2040 SCAG RTP/SCS.

The proposed LUE would allow for the opportunity for major changes to approximately 13 percent of the City. These areas are referred to as "Major Areas of Change" throughout the LUE and signify areas where growth is anticipated to be most profound. However, areas that are not designated as "Major Areas of Change" and/or are not anticipated to result in changes in existing land use patterns may also experience demographic growth.

In establishing PlaceTypes and focusing new development within the Major Areas of Change, the proposed LUE takes into account existing land use patterns in the City, adopted land use plans, and the demand for new land uses and increased densities to alleviate overcrowding of existing residences and accommodate the projected population growth. The proposed LUE also considers the location of undeveloped or underutilized parcels that are best suited for future development and accounts for which types of land uses and infrastructure would be required to serve new development facilitated by the new PlaceType categories. While the proposed LUE would provide for new development opportunities, it would not cause development to occur. Rather, the proposed LUE recognizes that ultimately growth and development depend on the initiative of individual developers and property owners. The LUE strategically accommodates projected growth along key corridors and near transit.

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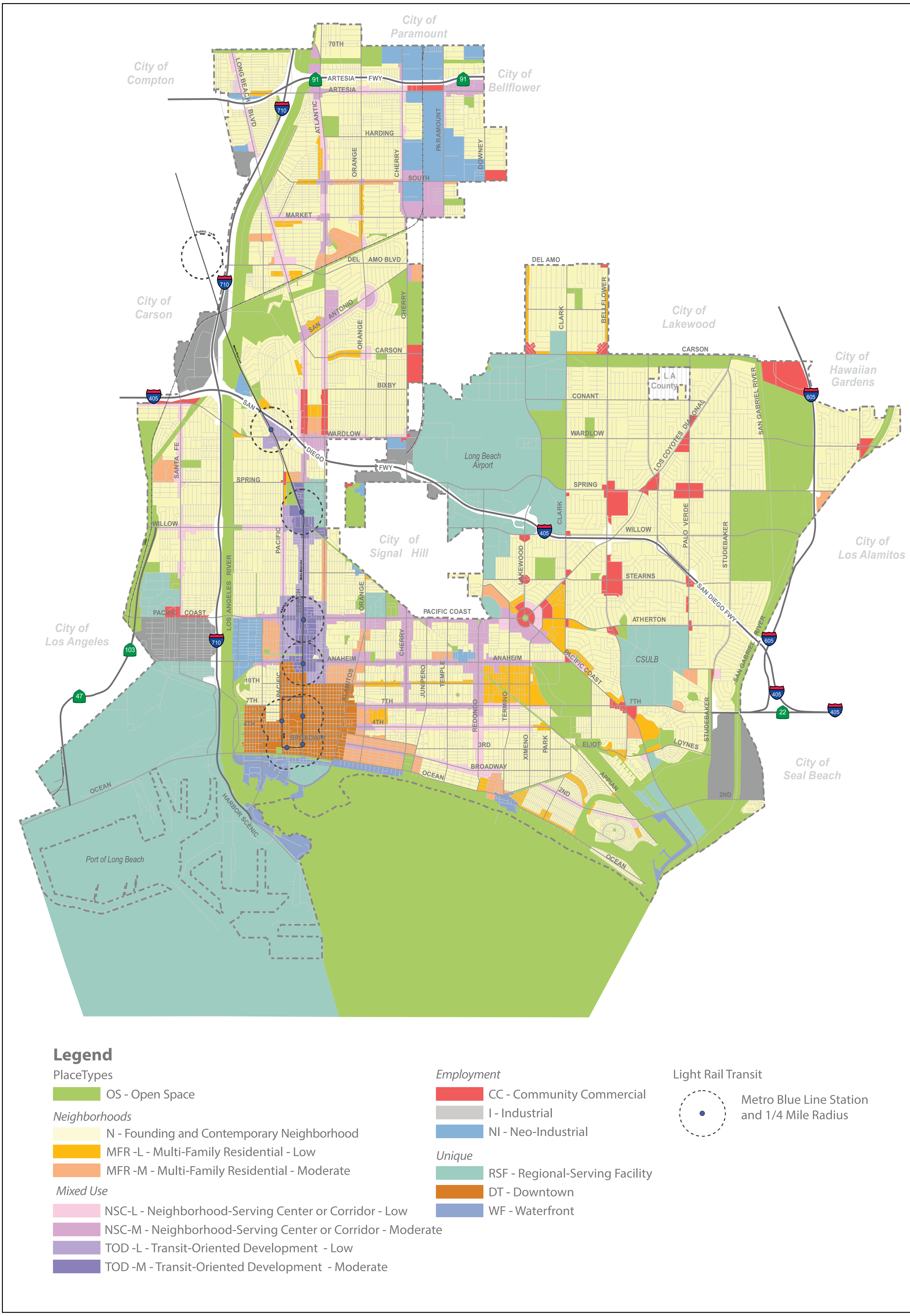

FIGURE 2

LSA

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SOURCE: Proposed Long Beach General Plan Land Use Element, March 2018

Long Beach General Plan
Land Use and Urban Design Elements
Project PlaceTypes

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Urban Design Element

Unlike the proposed LUE, the proposed UDE would be an entirely new element of the City's General Plan and would replace the existing SRE upon approval by the City Council. The decision to include a UDE in the City's General Plan grew from the City's stated need to provide an urban framework that addresses the varying aesthetic characteristics associated with the historic districts, traditional neighborhoods, auto-oriented commercial centers, urbanized centers, and corridors located throughout the City. As the City continues to evolve, the UDE seeks to shape the urban environment by preserving the character of existing neighborhoods that define the City's unique physical and aesthetic character while allowing for the continued evolution and improvement of the City in areas targeted for new development.

The UDE would define the physical aspects of the urban environment. Specifically, the UDE aims to further enhance the City's PlaceTypes established in the LUE by creating great places; improving the urban fabric, and public spaces; and defining edges, thoroughfares, and corridors. It is the City's intention that creating great places would provide gathering spaces for community members to meet and provide a space for spontaneous activities to occur. By improving the urban fabric, the City would allow for new development that would complement the existing historical development while serving as a unique and distinctive feature of the City.

Similar to the concept of creating great places, the City aims to provide public spaces to allow for community engagement opportunities. The creation of edges, thoroughfares, and corridors would define the larger commercial and business centers of the City while also integrating pedestrian amenities that would provide transitions into adjacent PlaceTypes. Examples of such pedestrian amenities include the creation of "public rooms" where pedestrians can dine and gather along street frontages adjacent to ground-floor cafes and retail uses.

In addition to creating great places, urban fabrics, and public spaces, and defining edges, thoroughfares, and corridors, the City intends to utilize the UDE to foster healthy, sustainable neighborhoods; promote compact and connected development; minimize and fill in gaps in the urban fabric of existing neighborhoods; improve the cohesion between buildings, roadways, public spaces, and people; and improve the economic vitality of the City.

General Plan Build Out

The proposed project would direct the long-term physical development in the City by guiding use, form, and characteristics of land improvements through the year 2040. In order to plan for future growth in the City through the year 2040, the proposed LUE accommodates demographic projections provided to the City by State and regional agencies. For the City and much of the Southern California region, the Southern California Association of Governments (SCAG) is the Metropolitan Planning Organization (MPO) that prepares demographic projections. SCAG projects population and employment growth as part of the Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) process. For the 2016 RTP/SCS, SCAG forecasts population growth of 18,200 new residents and employment growth of 28,500 new jobs in the City by 2040.

The proposed LUE also incorporates housing projections provided by the Department of Housing and Community Development. Unlike other data projections, rather than being simply informative, the housing allocation provided to jurisdictions through the Regional Housing Needs Assessment (RHNA) process is enforceable through the Housing Accountability Act. As an outcome of the most recent RHNA process, the City is required to plan for 7,048 new dwelling units by the year 2021. Further, due to insufficient construction of new housing units within Long Beach and the region in the past, the City has many residential areas where existing housing units are overcrowded. In order to identify the number of new housing units required to alleviate overcrowding, the City engaged in an Assessment of Fair Housing with the United States Department of Housing and Urban Development (2016). As an outcome of this assessment, it was determined that the City has anticipated housing needs for 21,476 housing units to address existing housing needs due to overcrowding. In total, 28,524 housing units are required to address future (7,048) and existing (21,476) housing needs. It is this number of units, which complies with both the State and federal assessments, which must be accommodated in City planning documents, including the proposed LUE. Of the 28,524 new units, a total of 13,403 new housing units are already accommodated in recently approved specific plans (e.g., Downtown Plan, Midtown Specific Plan, and Southeast Area Specific Plan).[1] Therefore, the City would be required to facilitate the development of 15,121 new housing units outside of these specific plan areas.

As a result of the processes described above, anticipated build out of the proposed project includes the following quantities of demographic data growth:

- Population: 18,230 new residents, for a total of 484,485 by 2040
- Housing: 28,524 new dwelling units, for a total of 192,318 by 2040
- Employment: 28,511 new jobs anticipated, for a total of 181,665 by 2040

BACKGROUND

This section provides background information on the evaluation of noise impacts including the characteristics of sound, the measurement of sound, the physiological effects of noise, and the regulatory framework for this analysis.

Characteristics of Sound

Noise is usually defined as unwanted sound and consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, or sleep. To the human ear, sound has two significant characteristics: pitch and loudness. Pitch is generally related to annoyance, while loudness can affect our ability to hear through hearing damage. Pitch is the number of complete vibrations, or cycles per second, of a wave, resulting in the tone's range from high to low. Loudness is the strength of a sound that describes a noisy or quiet environment and is measured by the amplitude of the sound wave. Loudness is determined by the intensity of the sound waves, combined with the reception characteristics of the human ear. Sound pressure refers to how hard the sound wave strikes an object, which in turn produces the sound's effect. This characteristic of sound can be measured precisely with instruments. The project analysis

[1] In total, 39.3 percent of the anticipated future housing growth would occur within these Specific Plan areas (i.e., 17.5 percent in the Downtown area, 12.7 percent in the Transit-Oriented Development areas of the Midtown Specific Plan, and 9.1 percent in the Southeast Area Specific Plan).

defines the noise environment of the project area in terms of sound pressure and the project's effect on sensitive land uses.

Measurement of Sound

Sound pressure is measured through the A-weighted scale to correct for the relative frequency response of the human ear. Unlike linear units (e.g., inches or pounds), decibels are measured on a logarithmic scale representing points on a sharply rising curve. For example, 10 decibels (dB) are 10 times more intense than 1 dB; 20 dB are 100 times more intense than 1 dB; and 30 dB are 1,000 times more intense than 1 dB. Thirty decibels (30 dB) represent 1,000 times as much acoustic energy as 1 dB. A sound as soft as human breathing is about 10 times greater than 0 dB. The decibel system of measuring sound gives a rough connection between the physical intensity of sound and its perceived loudness to the human ear. A 10 dB increase in sound level is perceived by the human ear as only a doubling of the loudness of the sound. Ambient sounds generally range from 30 A-weighted decibels (dBA) (very quiet) to 100 dBA (very loud).

Sound levels are generated from a source, and their decibel level decreases as the distance from that source increases. Sound dissipates exponentially with distance from the noise source. For a single point source, sound levels decrease approximately 6 dBA for each doubling of distance from the source. This drop-off rate is appropriate for noise generated by stationary equipment. If noise is produced by a line source (e.g., highway traffic or railroad operations), the sound decreases 3 dBA for each doubling of distance over hard surfaces, and the sound decreases 4.5 dBA for each doubling of distance in a relatively flat environment with absorptive vegetation.

There are many ways to measure noise for various time periods; an appropriate ambient noise metric affecting humans also accounts for the annoying effects of sound. The equivalent continuous sound level (L_{eq}) is the total sound energy of time-varying noise over a sample period. However, the predominant metrics for communities in the State of California are the L_{eq} and the Community Noise Equivalent Level (CNEL) or the day-night average level (L_{dn}) based on dBA. The CNEL is the time-varying noise over a 24-hour period, with a 5 dBA weighting factor applied to the hourly L_{eq} for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as evening hours) and a 10 dBA weighting factor applied to noise occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). The L_{dn} is similar to the CNEL scale, but without the adjustment for events occurring during the evening hours. The CNEL and the L_{dn} are normally within 1 dBA of each other and are considered interchangeable.

Other noise level metrics that are important when assessing the annoyance factor include the maximum noise level (L_{max}), which is the highest exponential time averaged sound level that occurs during a stated time period. The noise environments discussed in this analysis for short-term noise impacts are specified in terms of maximum levels denoted by L_{max}, which reflects peak operating conditions and addresses the annoying aspects of intermittent noise. It is often used together with percentile noise levels, in noise ordinances for enforcement purposes. For example, the L_{10} noise level represents the noise level exceeded 10 percent of the time during a stated period. The L_{50} noise level represents the median noise level. Half of the time, the noise level exceeds this median noise level, and half of the time, it is less than this median noise level. The L_{90} noise level represents the noise level exceeded 90 percent of the time and is considered the background noise level during a monitoring period. For a relatively constant noise source, the L_{eq} and L_{50} are approximately the same.

Noise impacts can be described in three categories. The first category includes audible impacts that refer to increases in noise levels noticeable to humans. Audible increases in noise levels generally refer to changes of 3 dBA or greater since this level has been found to be the lowest audible change perceptible to humans in outdoor environments. The second category, potentially audible, refers to changes in the noise level between 1 and 3 dBA, which are only noticeable in laboratory environments. The last category includes changes in noise levels of less than 1 dBA, which are inaudible to the human ear.

Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure (typically more than 8 hours, as defined by the Occupational Safety and Health Administration [OSHA]) to noise levels higher than 85 dBA. Exposure to high noise levels affects our entire system, with prolonged noise exposure in excess of 75 dBA increasing body tensions (thereby, affecting blood pressure and functions of the heart and the nervous system). In comparison, extended periods of noise exposure above 90 dBA would result in permanent cell damage. When the noise level reaches 120 dBA, a tickling sensation occurs in the human ear, even with short-term exposure. This level of noise is called the threshold of feeling. As the sound reaches 140 dBA, the tickling sensation is replaced by the feeling of pain in the ear. This is called the threshold of pain. A sound level of 160 to 165 dBA will result in dizziness or loss of equilibrium.

For further detail, Table A, below, lists "Definitions of Acoustical Terms," and Table B displays "Common Sound Levels and Their Noise Sources."

Table A: Definitions of Acoustical Terms

Term	Definitions
Decibel, dB	A unit of level that denotes the ratio between two quantities proportional to power; the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
Frequency, Hz	Of a function periodic in time, the number of times that the quantity repeats itself in one second (i.e., number of cycles per second).
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. 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. All sound levels in this report are A-weighted, unless reported otherwise.
L_{01}, L_{10}, L_{50}, L_{90}	The fast A-weighted noise levels equaled or exceeded by a fluctuating sound level for 1 percent, 10 percent, 50 percent, and 90 percent of a stated time period.
Equivalent Continuous Noise Level, L_{eq}	The level of a steady sound that, in a stated time period and at a stated location, has the same A-weighted sound energy as the time varying sound.
Community Noise Equivalent Level, CNEL	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of five decibels to sound levels occurring in the evening from 7:00 p.m. to 10:00 p.m. and after the addition of 10 decibels to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.

Table A: Definitions of Acoustical Terms

Term	Definitions
Day/Night Noise Level, L_{dn}	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 10 decibels to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
L_{max}, L_{min}	The maximum and minimum A-weighted sound levels measured on a sound level meter, during a designated time interval, using fast time averaging.
Ambient Noise Level	The all-encompassing noise associated with a given environment at a specified time, usually a composite of sound from many sources at many directions, near and far; no particular sound is dominant.
Intrusive	The noise that 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.

Source: Harris, Cyril. *Handbook of Acoustical Measurements and Noise Control* (1998).

Table B: Common Sound Levels and Their Noise Sources

Noise Source	A-Weighted Sound Level in Decibels	Noise Environment	Subjective Evaluation
Near jet engine	140	Deafening	128 times as loud
Civil defense siren	130	Threshold of Pain	64 times as loud
Hard rock band	120	Threshold of Feeling	32 times as loud
Accelerating motorcycle (a few feet away)	110	Very Loud	16 times as loud
Pile driver; noisy urban street/heavy city traffic	100	Very Loud	8 times as loud
Ambulance siren; food blender	95	Very Loud	
Garbage disposal	90	Very Loud	4 times as loud
Freight cars; living room music	85	Loud	
Pneumatic drill; vacuum cleaner	80	Loud	2 times as loud
Busy restaurant	75	Moderately Loud	
Near freeway auto traffic	70	Moderately Loud	Reference Level
Average office	60	Quiet	½ as loud
Suburban street	55	Quiet	
Light traffic; soft radio music (in apartment)	50	Quiet	¼ as loud
Large transformer	45	Quiet	
Average residence without stereo playing	40	Faint	⅛ as loud
Soft whisper	30	Faint	
Rustling leaves	20	Very Faint	
Human breathing	10	Very Faint	Threshold of Hearing

Source: Compiled by LSA (2016).

Characteristics of Ground-borne Vibration

Vibrating objects in contact with the ground radiate vibration waves through various soil and rock strata to the foundations of nearby buildings. As the vibration propagates from the foundation throughout the remainder of the building, the vibration of floors and walls may be perceptible from the rattling of windows or a rumbling noise. The rumbling sound caused by the vibration of room surfaces is called ground-borne noise. When assessing annoyance from ground-borne noise, vibration is typically expressed as root mean square (RMS) velocity in units of decibels of 1 micro-inch per second. To distinguish vibration levels from noise levels, the unit is written as "VdB." Human perception to vibration starts at levels as low as 67 VdB and sometimes lower. Annoyance due to vibration in residential settings starts at approximately 70 VdB. Ground-borne vibrations are almost never annoying to people who are outdoors. Although the motion of the ground may be perceived, without the effects associated with the shaking of the building, the motion does not provoke the same adverse human reaction.

Common sources of ground-borne vibration include trains and construction activities such as blasting, pile driving, and operating heavy earthmoving equipment. Typical vibration source levels from construction equipment are shown in Table C. Although the table gives one level for each piece of equipment, it should be noted that there is a considerable variation in reported ground vibration levels from construction activities. The data provide a reasonable estimate for a wide range of soil conditions. In extreme cases, excessive ground-borne vibration has the potential to cause structural damage to buildings. For buildings considered of particular historical significance or that are particularly fragile structures, the damage threshold is approximately 96 VdB; the damage threshold for other structures is 100 VdB.[2]

Table C: Typical Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 feet (inch/sec)	Approximate VdB at 25 feet
Pile Driver (impact)	Upper range	1.518	112
	Typical	0.644	104
Pile Driver (sonic)	Upper range	0.734	105
	Typical	0.170	93
Clam shovel drop (slurry wall)		0.202	94
Hydromill (slurry wall)	In soil	0.008	66
	In rock	0.017	75
Vibratory roller		0.210	94
Hoe ram		0.089	87
Large bulldozer		0.089	87
Caisson drilling		0.089	87
Loaded trucks		0.076	86
Jackhammer		0.035	79
Small bulldozer		0.003	58

Source: Federal Transit Administration (FTA). *Transit Noise and Vibration Impact Assessment Manual* (September 2018).
inch/sec = inch(es) per second
VdB = vibration velocity decibels

Regulatory Framework

The following section summarizes the regulatory framework related to noise, including federal, State and City of Long Beach plans, policies, and standards.

United States Environmental Protection Agency

In 1972, Congress enacted the Noise Control Act. This act authorized the United States Environmental Protection Agency (USEPA) to publish descriptive data on the effects of noise and

2 Harris, C.M., 1998. *Handbook of Acoustical Measurements and Noise Control.*

establish levels of sound *requisite to protect the public welfare with an adequate margin of safety.* These levels are separated into health (hearing loss levels) and welfare (annoyance levels), as shown in Table D. The USEPA cautions that these identified levels are not standards because they do not take into account the cost or feasibility of the levels.

Table D: Summary of USEPA Noise Levels

Effect	Level	Area
Hearing loss	$L_{eq}(24) \leq 70$ dB	All areas.
Outdoor activity interference and annoyance	$L_{dn} \leq 55$ dB	Outdoors in residential areas and farms and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use.
	$L_{eq}(24) \leq 55$ dB	Outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, etc.
Indoor activity interference and annoyance	$L_{eq} \leq 45$ dB	Indoor residential areas.
	$L_{eq}(24) \leq 45$ dB	Other indoor areas with human activities such as schools, etc.

Source: U.S. Environmental Protection Agency (USEPA). *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety* (March 1974).
dB = decibels
L_{eq} = equivalent continuous sound level

For protection against hearing loss, 96 percent of the population would be protected if sound levels were less than or equal to an $L_{eq}(24)$ of 70 dBA. The "(24)" signifies an L_{eq} duration of 24 hours. The USEPA activity and interference guidelines are designed to ensure reliable speech communication at about 5 feet (ft) in the outdoor environment. For outdoor and indoor environments, interference with activity and annoyance should not occur if levels are below 55 dBA and 45 dBA, respectively.

The noise effects associated with an outdoor L_{dn} of 55 dBA are summarized in Table E. At 55 dBA L_{dn}, 95 percent sentence clarity (intelligibility) may be expected at 11 ft, with no community reaction. However, 1 percent of the population may complain about noise at this level, and 17 percent may indicate annoyance.

Table E: Summary of Human Effects in Areas Exposed to 55 dBA CNEL

Type of Effect	Magnitude of Effect
Speech – Indoors	100 percent sentence intelligibility (average) with a 5 dB margin of safety.
Speech – Outdoors	100 percent sentence intelligibility (average) at 0.35 meter. 99 percent sentence intelligibility (average) at 1.0 meter. 95 percent sentence intelligibility (average) at 3.5 meters.
Average Community Reaction	None evident; 7 dB below level of significant complaints and threats of legal action and at least 16 dB below "vigorous action."
Complaints	1 percent dependent on attitude and other non-level related factors.
Annoyance	17 percent dependent on attitude and other non-level related factors.
Attitude Towards Area	Noise essentially the least important of various factors.

Source: U.S. Environmental Protection Agency (USEPA). *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety* (March 1974).
CNEL = Community Noise Equivalent Level
dB = decibels
dBA = A-weighted decibels

Federal Vibration Impact Standards

Vibration impact criteria included in the Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment Manual* (September 2018) are used in this analysis for ground-borne vibration impacts on human annoyance, as shown in Table F. The criteria presented in Table F account for variation in project types as well as the frequency of events, which differ widely among projects. It is intuitive that when there will be fewer events per day, it should take higher vibration levels to evoke the same community response. This is accounted for in the criteria by distinguishing between projects with frequent and infrequent events, in which the term "frequent events" is defined as more than 70 events per day. The vibration impact levels indicated in Table F are used as thresholds to determine acceptable levels for development adjacent to vibration sources. The criteria for environmental impact from ground-borne vibration and noise are based on the maximum levels for a single event.

Table F: Ground-Borne Vibration and Noise Impact Criteria

Land Use Category	Ground-Borne Vibration Impact Levels (VdB re 1 micro-inch/sec)		Ground-Borne Noise Impact Levels (dB re 20 micro-Pascals)	
	Frequent [1] Events	Infrequent [2] Events	Frequent [1] Events	Infrequent [2] Events
Category 1: Buildings in which low ambient vibration is essential for interior operations (i.e., vibration-sensitive manufacturing, hospitals with vibration sensitive equipment, and university research operation).	65 VdB[3]	65 VdB[3]	--[4]	--[4]
Category 2: Residences and buildings in which people normally sleep.	72 VdB	80 VdB	35 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime uses.	75 VdB	83 VdB	40 dBA	48 dBA

Source: Federal Transit Administration (FTA). *Transit Noise and Vibration Impact Assessment Manual* (September 2018).

[1] Frequent events are defined as more than 70 events per day.

[2] Infrequent events are defined as fewer than 70 events per day.

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

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

dB = decibels
dBA = A-weighted decibels
HVAC = heating, ventilation, and air conditioning
inch/sec = inch(es) per second
re = relative
VdB = vibration velocity decibels

State of California

The State of California has established regulations that help prevent adverse impacts to occupants of buildings located near noise sources. Referred to as the *State Noise Insulation Standard*, it requires buildings to meet performance standards through design and/or building materials that would offset any noise source in the vicinity of the receptor. State regulations include requirements for the construction of new hotels, motels, apartment houses, and dwellings other than detached single-family dwellings that are intended to limit the extent of noise transmitted into habitable spaces. These requirements are found in the California Code of Regulations, Title 24 (known as the Building Standards Administrative Code), Part 2 (known as the California Building Code), Appendix

Chapters 12 and 12A. For limiting noise transmitted between adjacent dwelling units, the noise insulation standards specify the extent to which walls, doors, and floor ceiling assemblies must block or absorb sound. For limiting noise from exterior noise sources, the noise insulation standards set an interior standard of 45 dBA CNEL in any habitable room with all doors and windows closed. In addition, the standards require preparation of an acoustical analysis demonstrating the manner in which dwelling units have been designed to meet this interior standard, where such units are proposed in an area with exterior noise levels greater than 60 dBA CNEL.

In addition, Chapter 5, Section 5.507 of the California Green Building Standards Code includes nonresidential mandatory measures, which require that buildings exposed to a noise level of 65 dB L_{eq}-1-hour during any hour of operation shall have building, addition, or alteration exterior wall and roof-ceiling assemblies exposed to the noise source meeting a composite Sound Transmission Class (STC) rating of at least 45 (or Outdoor/Indoor Transmission Class [OITC] 35) with exterior windows of a minimum STC of 40 (or OITC 30).

The State has established land use compatibility guidelines for determining acceptable noise levels for specified land uses in the State of California General Plan Guidelines as shown in Table G.[3]

City of Long Beach General Plan

The adopted City of Long Beach General Plan addresses noise in the Noise Element, which was adopted in 1975 and is currently in the process of being updated.[4] The Noise Element contains goals and policies for noise control and abatement in the City. The goals and policies contained in the Noise Element address noise in relation to land use planning, the noise environment, transportation noise, construction and industrial noise, population and housing noise, and public health and safety. General noise goals for Long Beach aim to attain a healthier and quieter environment for all its citizens while maintaining a reasonable level of economic progress and development.

The Noise Element considers the impacts of stationary noise producers. Stationary noise producers are entities with a fixed location that emit noise. The General Plan requires that sensitive land uses not be subjected to excessive stationary noise, either by implementing mitigation at the source or through planning measures that reduce sound exposure. While the current Noise Element does not contain a land use compatibility table, Table H summarizes the criteria for the maximum acceptable noise levels by land use type.

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3 State of California Governor's Office of Planning and Research, 2017. *State of California General Plan Guidelines*. Appendix D: Noise Element Guidelines. July.

4 City of Long Beach. 1975. *Long Beach General Plan*. Noise Element. Website: http://www.lbds.info/civica/filebank/blobdload.asp?BlobID=3051 (accessed June 3, 2019).

Please also note that the City is currently in the process of updating the General Plan Noise Element. Information regarding this process can be found at the following website: http://www.lbds.info/noise_element_update/.

Table G: Community Noise Exposure L_{dn} or CNEL (dB)

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

Source: California Office of Planning and Research, General Plan Guidelines (2017), Appendix D.

Table H: Recommended Criteria for Maximum Acceptable Noise Levels[1] in A-Weighted Decibels (dBA)

Major Land Use Type	Stationary Source Land Use Noise Standards			
	Outdoor			Indoor
	Maximum Single Hourly Peak	L_{10}[2]	L_{50}[3]	L_{dn}[4]
Residential[5] (7:00 a.m. to 10:00 p.m.)	70	55	45	45
Residential[5] (10:00 p.m. to 7:00 a.m.)	60	45	35	35
Commercial (anytime)	75	65	55	- -[6]
Industrial (anytime)	85	70	60	- -[6]

Source: City of Long Beach Noise Element, Table 11 (1975).
[1] Based on existing ambient level ranges in Long Beach and recommended U.S. Environmental Protection Agency ratios and standards for interference and annoyance.
[2] Noise levels exceeded 10 percent of the time.
[3] Noise levels exceeded 50 percent of the time.
[4] Day-night average sound level. The 24-hour A-weighted equivalent sound level with a 10-decibel penalty applied to nighttime levels.
[5] Includes all residential categories and all noise-sensitive land uses (e.g., hospitals and schools).
[6] Because different types of commercial and industrial activities appear to be associated with different noise levels, identification of a maximum indoor level for activity interference is unfeasible.

Goals, Plans, and Policies

One of the major functions of a General Plan Noise Element is to establish goals to strive for, plans to help achieve those goals, and polices which regulate both current and future developments and all activities within the City limits. In the current version of the City's Noise Element, these are referenced as Implementation Strategies, Categorical Recommendations, and Transportation Noise Reduction Measures.

City of Long Beach Municipal Code

The City of Long Beach addresses noise impacts in its Title 8: Health and Safety, Chapter 8.80, Noise, and sets regulations to minimize airport noise in Title 16: Public Facilities and Historical Landmarks, Chapter 16.43, Airport Noise Compatibility.[5] The Municipal Code establishes exterior and interior noise standards at receiving land uses and establishes permitted hours of construction activity noise as described below.

Chapter 8.80, Noise, establishes exterior and interior noise limits for the generation of sound within the City. The maximum noise levels vary based on the receiving land use type and the cumulative duration of noise. The ordinance also limits noise generated by construction. The Municipal Code restricts construction activities to weekdays and federal holidays between the hours of 7:00 a.m. and 7:00 p.m. and on Saturdays, restricts construction to between the hours of 9:00 a.m. and 6:00 p.m., except for emergency work. Construction work on Sundays is prohibited unless the City's Noise Control Officer issues a permit. The permit may allow work on Sundays between 9:00 a.m. and 6:00 p.m. Additionally, Chapter 16.43, Airport Noise Compatibility, establishes cumulative noise limits and noise budgets for properties in the vicinity of the Airport. The Municipal Code establishes

[5] City of Long Beach. 2019. Municipal Code. February.

a goal that incompatible property in the vicinity of the airport shall not be exposed to noise above 65 dBA CNEL.

Loading and unloading activities are also regulated under the noise ordinance. The ordinance states that loading, unloading, opening, closing, or other handling of boxes, crates, containers, building materials, garbage cans, or similar objects between the hours of 10:00 p.m. and 7:00 a.m. is restricted to the noise level provisions of Exterior Noise Limits shown in Table I and the Interior Noise Limits shown in Table J.

Table I: Maximum Exterior Local Noise Criteria

Receiving Land Use District	Maximum Noise Criteria (dB L_{max})	
	Daytime (7:00 a.m. to 10:00 p.m.)	Nighttime (10:00 p.m. to 7:00 a.m.)
District One — Predominantly residential with other land use types also present	50	45
District Two — Predominantly commercial with other land use types also present	60	55
District Three[1] — Predominantly industrial with other land use types also present	65	65
District Four[1] — Predominantly industrial with other land types use also present	70	70
District Five — Airport, freeways, and waterways regulated by other agencies	Regulated by other agencies and laws	

Source: City of Long Beach Municipal Code (2018).
[1] Districts Three and Four limits are intended primarily for use at their boundaries rather than for noise control within those districts.
dB = decibel(s)
L_{max} = maximum instantaneous noise level

Table J: Interior Noise Limits

Receiving Land Use District	Type of Land Use	Time Interval	Allowable Interior Noise Level (dBA)
All	Residential	10:00 p.m.–7:00 a.m. 7:00 a.m. –10:00 p.m.	35 45
All	School	7:00 a.m. –10:00 p.m. (while school is in session)	45
Hospital, designated quiet zones, and noise-sensitive zones		Any time	40

Source: City of Long Beach Municipal Code (2018).
dBA = A-weighted decibel(s)

Additionally, the ordinance states that operating or permitting the operation of any device that creates vibration, which is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property or at 150 ft from the source if on a public space or public right-of-way, is prohibited.

SETTING

This section describes the existing noise environment in the City of Long Beach. Noise monitoring, traffic modeling, and noise modeling were used to quantify existing noise levels in the City.

Existing Sensitive Land Uses

Noise sensitive receptors in the City include residences, schools, hospitals, churches, and similar uses that are sensitive to noise. Construction and operation of development allowed under the LUE could adversely affect nearby noise-sensitive land uses and could place new sensitive receptors in areas of unacceptable noise exposure. Although CEQA generally does not require analysis or mitigation of the impact of existing environmental conditions on a project, including a project's future users or residents, the City, as the lead agency, has authority to require measures to protect public health and safety. Therefore, this document includes a discussion of the project's potential to introduce new sensitive receptors to areas where conditions would be exacerbated by project implementation.

Overview of the Existing Noise Environment

In the City of Long Beach, the dominant source of noise is transportation noise, including vehicular traffic, rail, and airport noise. Industrial and mechanical equipment are also contributors to the noise environment in the City, as are intermittent sources such as construction equipment and leaf blowers. Noise from motor vehicles is generated by engine vibrations, the interaction between the tires and the road, and the exhaust systems. Airport-related noise levels are primarily associated with aircraft engine noise made while aircraft are taking off, landing, or running their engines while still on the ground. Existing noise sources are further discussed below. Noise contours for the City's existing major noise sources shown in Figure 3 below.

Ambient Noise Levels

To assess existing noise levels, LSA conducted eleven short-term (15-minute) noise measurements in the City on February 11, 2016. The noise measurements were recorded at different locations within the City based on the Major Areas of Change identified in the LUE. Noise monitoring locations are shown in Figure 4. Noise measurement data collected during monitoring is summarized in Table K. The meteorological conditions at the time of the noise monitoring are shown in Table L. The short-term noise measurements indicate that ambient noise in the City ranges from approximately 62.0 dBA to 76.2 dBA L_{eq}. Traffic on surrounding roadways was reported as the primary noise source.

Existing Roadway Noise Levels

Motor vehicles with their distinctive noise characteristics are one of the primary sources of noise in Long Beach. The amount of noise varies according to many factors, such as volume of traffic, vehicle mix (percentage of cars and trucks), average traffic speed, and distance from the observer. Major contributing roadway noise sources include Interstates 710 and 405, State Route 91, Pacific Coast Highway (PCH) and local roadways including Long Beach Boulevard, Santa Fe Avenue, Atlantic Avenue, Alamitos Avenue, 7th Street, 2nd Street, Ocean Boulevard, and other arterial and collector roadways throughout the City.

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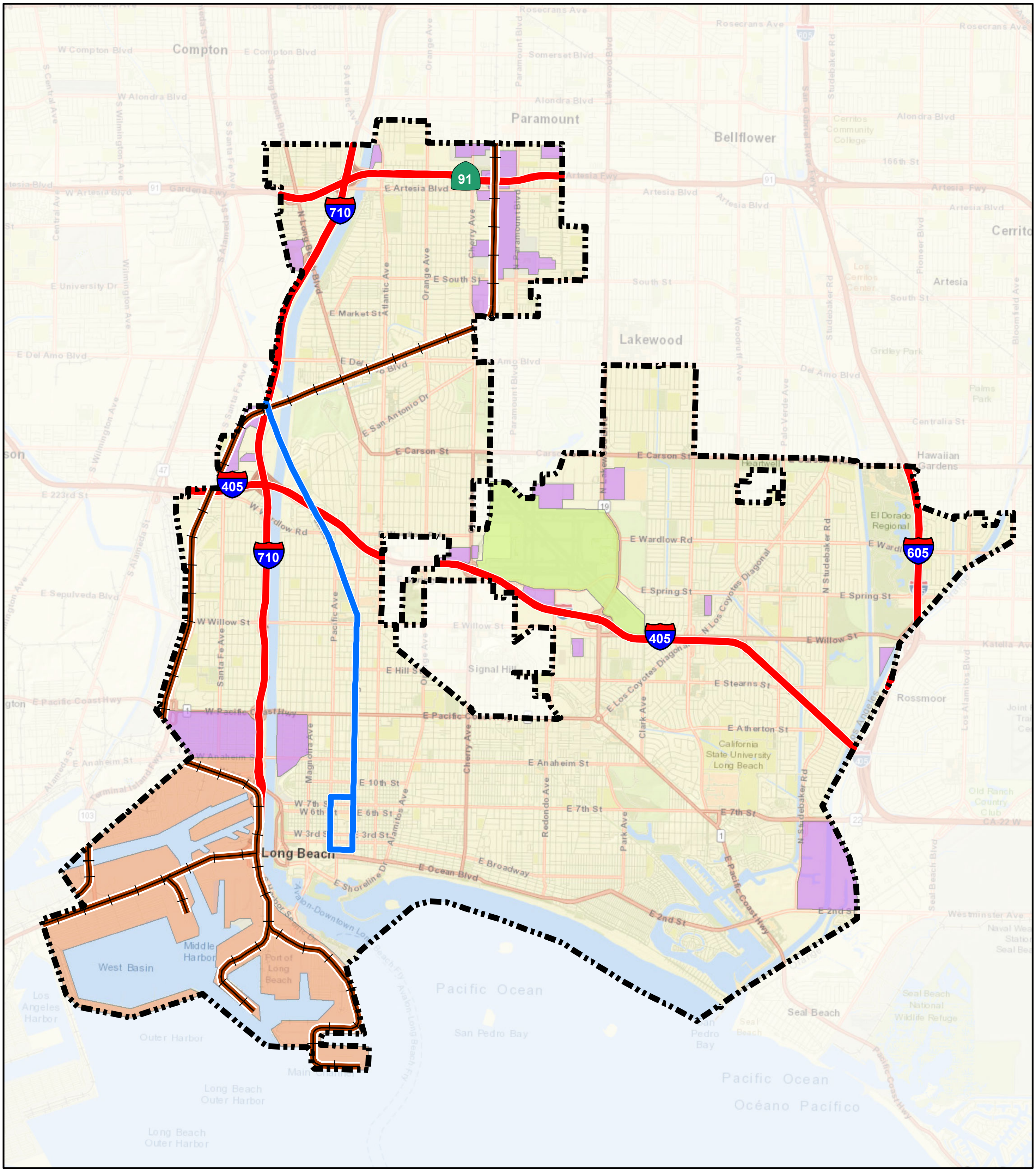

LSA

LEGEND

- Long Beach City Boundary
- Long Beach Airport
- Port of Long Beach
- Industrial Area
- Freeway
- Metro Blue Line
- Freight Line

0 0.75 1.5
MILES

SOURCE: Esri (2016); LSA (5/2017)

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FIGURE 3

Long Beach General Plan
Land Use and Urban Design Elements

Existing Major Noise Sources

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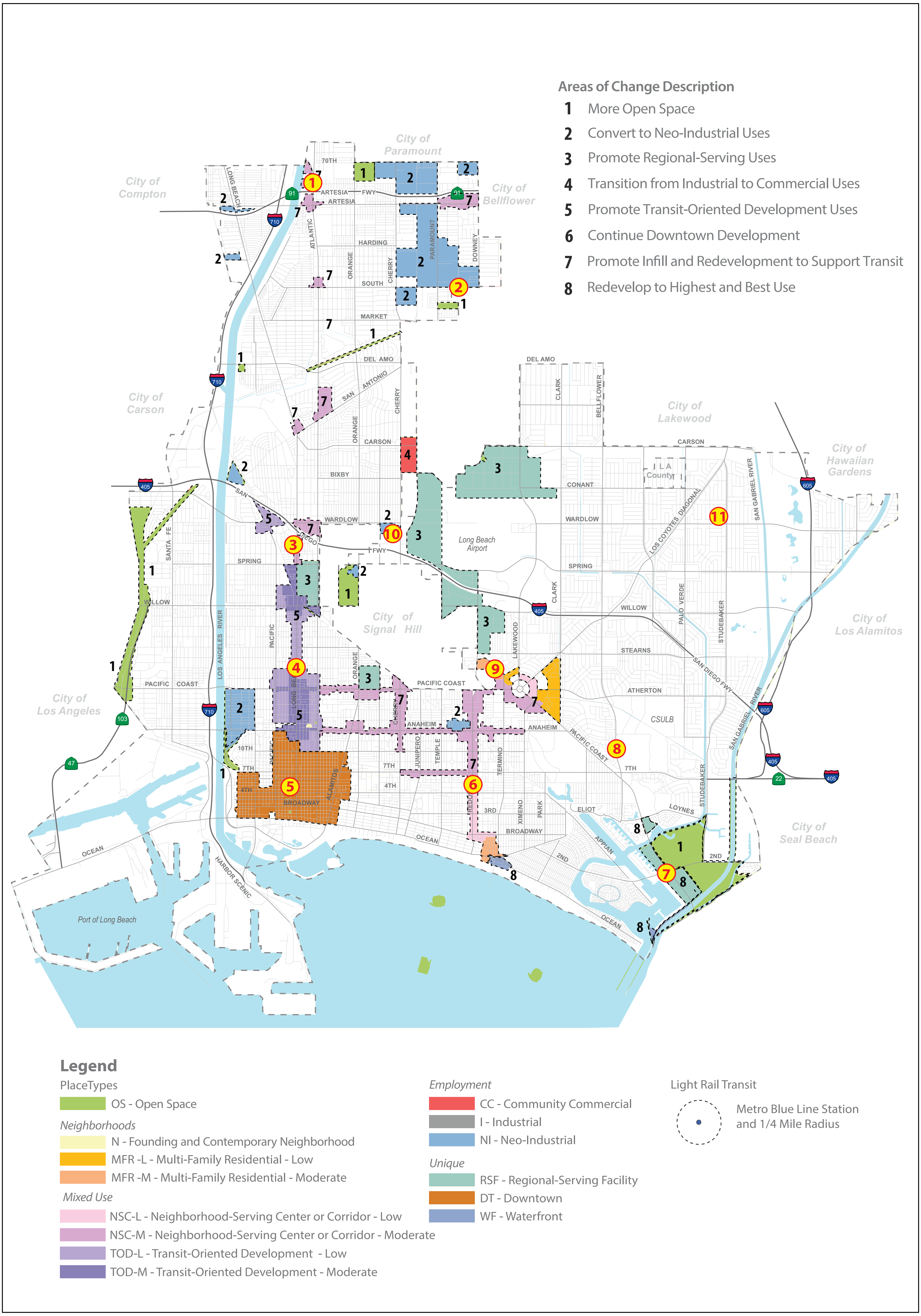

LSA

LEGEND

- Noise Monitoring Locations

0 .5 1 MILE

FIGURE 4

Long Beach General Plan
Land Use and Urban Design Elements
Noise Monitoring Locations

SOURCE: Proposed Land Use Element, City of Long Beach, March 2018

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Table K: Existing Ambient Noise Monitoring Results (dBA)

Location Number	Location Description	Start Time	L_{eq} [1]	L_{max} [2]	L_{min} [3]	Primary Noise Sources
ST-1	6857–6909 Atlantic Avenue	7:27 a.m.	66.6	82.1	59.6	Traffic on Atlantic Avenue, faint traffic on I-710, trucks with trailers turning in nearby lot
ST-2	3114 South Street – Church of Latter Day Saints	7:58 a.m.	70.3	80.8	53.6	Traffic on South Street, birds
ST-3	3115 Long Beach Boulevard	8:58 a.m.	63.6	73.6	49.2	Traffic on Long Beach Boulevard, back up beeper across Long Beach Boulevard, birds
ST-4	1940 Long Beach Boulevard	9:35 a.m.	65.7	80.9	45.0	Traffic on Long Beach Boulevard, birds, distant music
ST-5	614 Locust Avenue in parking lot adjacent to 6th Street	10:13 a.m.	63.3	77.3	47.7	Traffic on 6th Street, birds
ST-6	600 Redondo Avenue in parking lot	10:51 a.m.	64.0	81.5	45.5	Traffic on Redondo Avenue, car with loud music
ST-7	5800–6462 E. Marina Drive adjacent to 2nd Street, near bus stop	2:11 p.m.	62.3	81.5	49.0	Traffic on 2nd Street, birds
ST-8	California State University Long Beach near Bellflower Boulevard and Beach Drive	1:15 p.m.	66.0	74.8	49.3	Traffic on Bellflower Boulevard, birds, music in car, horn
ST-9	3500 Hathaway Avenue apartment complex open grass area	11:42 a.m.	62.0	75.0	42.4	Traffic on Hathaway Avenue, distant music in apartment
ST-10	3245 Cherry Avenue in parking area	8:31 a.m.	76.2	99.3	61.3	Traffic on Cherry Avenue
ST-11	3401 Studebaker Road in parking lot adjacent to Wardlow Road	2:47 p.m.	62.5	79.2	46.9	Traffic on Wardlow Road

Source: LSA (February 2016).
[1] L_{eq} represents the average of the sound energy occurring over the measurement time period.
[2] L_{max} is the highest sound level measured during the measurement time period.
[3] L_{min} is the lowest sound level measured during the measurement time period.
dBA = A-weighted decibels I-710 = Interstate 710 mph = miles per hour

Table L: Meteorological Conditions During Ambient Noise Monitoring

Location Number	Maximum Wind Speed (mph)	Average Wind Speed (mph)	Temperature (˚F)	Relative Humidity (%)
ST-1	0.8	0.0	63.2	38.8
ST-2	0.0	0.0	69.4	38.4
ST-3	3.4	1.6	68.6	29.6
ST-4	0.0	0.0	80.9	22.3
ST-5	3.5	2.3	75.7	27.1
ST-6	2.3	1.5	78.5	29.8
ST-7	1.3	1.0	81.0	27.9
ST-8	4.1	1.8	81.3	33.3
ST-9	3.7	1.0	85.1	27.5
ST-10	1.2	0.9	67.1	35.1
ST-11	4.9	3.1	83.6	17.1

Source: LSA (February 2016). mph = miles per hour

Existing Rail Noise Levels

Currently, three freight rail lines pass through the City which are operated by Burlington Northern Santa Fe (BNSF) Railway, the Union Pacific Railroad (UPRR), and the Pacific Harbor Line Incorporated (PHL). The rail lines run north-south through the west side of the City, and through the northwest corner of the City, around the neighborhood of North Long Beach.

The City is also subject to operational rail noise. The Los Angeles County Metropolitan Transportation Authority (Metro) Rail Blue line (Blue line) passes north to south through Long Beach along Long Beach Boulevard. The Metro services hours are from approximately 4:45 a.m. until 1:00 a.m. on weekdays and from 4:45 a.m. until 2:00 a.m. on weekends. Land uses surrounding the rail line include multi- and single-family residential, and commercial uses, the Senior Arts Colony, high-rise office towers, the Pacific Coast Campus of Long Beach City College, and the Long Beach Transit Mall. Seven different Metro stations serve local neighborhoods throughout the City. Activity on the Blue line affects the ambient noise environment along the railroad alignment.

Based on Federal Railroad Administration crossing inventories for various crossings in the City, typical operations along the main rail line include up to 74 trains per day that range in speed from 5 to 25 miles per hour (mph).

Existing Stationary Source Noise Levels

A wide variety of existing stationary sources contribute to noise throughout the City of Long Beach, which include heating ventilation and cooling (HVAC) mechanical systems, delivery truck idling and loading/unloading activities, and recreational and parking lot activities (such as slamming car doors and people talking). Of these noise sources, noise generated by delivery truck activity typically generates the highest maximum noise levels. Delivery truck loading and unloading activities can result in maximum noise levels of 75 dBA to 85 dBA L_{max} at 50 ft. Typical parking lot activities, such as people conversing or doors slamming, generate approximately 60 dBA to 70 dBA L_{max} at 50 ft. Other sources of noise include commercial centers and industrial zones that emit noise during operation. Domestic noise sources, such as leaf blowers, and gas-powered lawn equipment, etc., are common stationary noise sources and can produce noise levels measured at 70 dBA to 75 dBA at 50 ft.[6]

Existing Port of Long Beach Noise Levels

Port of Long Beach operations noise levels are generally limited to the areas within the perimeter of the Port. Noise associated with the Port includes cranes, vessel horns, forklifts, and truck activities. Due to the distance between the nearest sensitive receptors from daily Port operations, noise is rarely audible at these sensitive receptor locations. Heavy truck traffic associated with the transport of cargo along the I-710 corridor is the primary source of noise associated with the Port. Impacts associated with the Port of Long Beach, including noise, were assessed in the *Port of Long Beach Community Impact Study* in July 2016.

[6] Noise Free America. *Citizens for a Quieter Sacramento Rebuttal to the CLCA Position on Leaf Blowers.* Website: https://noisefree.org/sources-of-noise/lawn-and-garden-equipment/ (accessed March 2019).

Existing Airport Noise Levels

Long Beach Airport is a public airport centrally located in the City, approximately 3 miles northeast of Downtown. This airport has limited passenger flights and is restricted by ordinances that minimize airport-related noise. Although commercial flights are restricted, several charters, private aviation, flight schools, law enforcement flights, helicopters, advertising blimps, and planes towing advertising banners still frequently operate from this airport.

Operations at the Long Beach Airport typically occur within the daytime hours of 7:00 a.m. to 10:00 p.m., with the exception of occasional unscheduled landings that occur after 10:00 p.m., and emergency and police helicopter activities. *The Long Beach Airport Community Guide to Aircraft Noise* presents factual information on the City of Long Beach Airport Noise Compatibility Ordinance (Long Beach Municipal Code Chapter 16.43) and Long Beach Airport's efforts to minimize aircraft noise over nearby neighborhoods. While the City is not able to control the flight paths, typical operations include approaches from the southeast of the airport and departures taking off in a northwest direction.

Other airports with aircraft activity that affect the ambient noise environment within the City limits include Los Angeles International Airport and John Wayne Airport. Los Angeles International Airport is located approximately 20 miles northwest of the City, and John Wayne Airport is located approximately 30 miles southwest of the City. Although noise from aircraft activity is occasionally audible throughout the City, the City is not located within the 65 dBA CNEL noise contour of these airports.

Existing Vibration Sources

Vibration Sources

Major vibration sources in the City include construction activities, rail operations, and heavy vehicle traffic. Other sources which have the potential to cause vibration impacts are aircraft operations, low-frequency music and some stationary sources. Similar to noise standards, cities can adopt vibration exposure standards regarding the sensitivity of land uses which may be affected. In relation to vibration impacts, there are two factors that are considered to assessing the level of impact expected: the potential for damage to a building or structure and the potential of annoyance to people. Also similar to potential noise impacts, the most efficient actions to help reduce vibration impacts occur during the planning and permitting phases of any project or development.

Construction Activity Vibration

Construction activities can cause vibration that varies in intensity depending on several factors. The use of pile driving and vibratory compaction equipment typically generates the highest construction related ground-borne vibration levels. Because of the impulsive nature of such activities, the use of the PPV descriptor has been routinely used to measure and assess ground-borne vibration and almost exclusively to assess the potential of vibration to induce structural damage and the degree of annoyance for humans. The two primary concerns with construction-induced vibration, the potential to damage a structure and the potential to interfere with the enjoyment of life, are evaluated against different vibration limits. Studies have shown that the threshold of perception for average persons is in the range of 0.2 to 0.3 millimeters per second (0.008 to 0.012 inches per second), PPV. Human perception to vibration varies with the individual and is a function of physical setting and the type of vibration. Persons exposed to elevated ambient vibration levels (e.g., people in an urban environment) may tolerate a higher vibration level. Structural damage can be classified as cosmetic only (e.g., minor cracking of building elements) or may threaten the integrity of the building. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher and there is no general consensus as to what amount of vibration may pose a threat for structural damage to the building. Construction-induced vibration that can be detrimental to a building is very rare and has only been observed in instances where the structure is at a high state of disrepair and the construction activity (e.g., impact pile driving) occurs immediately adjacent to the structure.

Rail Activity Related Vibration

Rail operations are potential sources of substantial ground-borne vibration depending on distance, the type and the speed of trains, and the type of railroad track. People's response to ground-borne vibration has been correlated best with the velocity of the ground. The velocity of the ground is expressed on the decibel scale. The reference velocity is 1 x 10-6 inches per second. RMS, which equals 0 vibration velocity decibels (VdB), and 1 inch per second equals 120 VdB. Although not a universally accepted notation, the abbreviation "VdB" is used in this document for vibration decibels to reduce the potential for confusion with sound decibels.

One of the problems with developing suitable criteria for ground-borne vibration is the limited research into human response to vibration and, more importantly, human annoyance inside buildings. The United States Department of Transportation Federal Transit Administration has developed rational vibration limits that can be used to evaluate human annoyance to ground-borne vibration. These criteria are primarily based on experience with passenger train operations (e.g., rapid transit and commuter rail systems). The main difference between passenger and freight operations is the time duration of individual events; a passenger train lasts a few seconds whereas a long freight train may last several minutes, depending on speed and length.

Heavy Vehicles and Buses

Ground-borne vibration levels from heavy trucks and buses are not normally perceptible, especially if roadway surfaces are smooth. Buses and trucks typically generate ground-borne vibration levels of about 63 VdB at a distance of 25 ft when traveling at a speed of 30 mph. Higher vibration levels can occur when buses or trucks travel at higher rates of speed or when the pavement is in poor condition. Vibration levels below 65 VdB are below the threshold for human perception.

Other Sources of Vibration Annoyance

In addition to sources that have vibration impacts which translate through the ground surface between source and receptor, sources which generate high levels of low-frequency noise may generate vibration through air. These sources may include aircraft and helicopter operations, low-frequency music and other large stationary sources.

PROJECT IMPACTS

Implementation of the LUE/UDE would be considered to result in significant noise impacts if it would:

- Generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Generate excessive ground-borne vibration or ground-borne noise levels; or
- For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels.

A 3 dBA increase is considered to be perceptible by the human ear in an outdoor environment. Therefore, the significance criteria define a significant impact to occur if the project would result in a substantial (3 dBA or greater) permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

CEQA generally does not require analysis or mitigation of the impact of existing environmental conditions on a project, including a project's future users or residents. However, as with other laws and regulations enforced by other agencies that protect public health and safety, the City, as the lead agency, has authority other than CEQA to require measures to protect public health and safety. Therefore, this document includes an evaluation of the environment's impacts on the project and includes an assessment of the project’s potential to introduce new sensitive receptors to areas where conditions would be exacerbated by project implementation.

Noise Exposure

Major land use changes proposed as part of the LUE/UDE are identified as Major Areas of Change, and are illustrated on Figure 2. There are eight primary change areas associated with the updated LUE.

- The first Major Area of Change involves the creation, restoration, and preservation of more open space throughout the City.
- The second Major Area of Change proposes to convert industrial edges and districts to Neo-Industrial uses.
- The third Major Area of Change aims to promote regional-serving uses by maintaining existing regional-serving facilities throughout the City.
- The fourth Major Area of Change proposes to convert some industrial uses to commercial and regional-serving uses.
- The fifth Major Area of Change aims to promote transit-oriented development.
- The sixth Major Area of Change aims to continue development in the Downtown area.
- The seventh Major Area of Change aims to promote infill and redevelopment to support transit.

- The eighth Major Area of Change aims to revitalize the Belmont Pier Complex and Alamitos Bay to their "highest and best use."

In total, the LUE proposes changes to approximately 13 percent of the land area in the City. The identification of these Major Areas of Change reflects the City's desire to address land use issues within these areas.

Development allowed by the LUE may include the development of new sensitive land uses in the vicinity of existing noise sources. Development allowed under the proposed LUE may include installation or creation of new stationary sources of noise, or could include the development of new sensitive land uses in the vicinity of existing noise sources. For commercial or industrial uses, these noise sources could include loading/unloading operations, generators, and outdoor speakers; for residential uses, stationary noise sources may include air conditioners or pool pumps. These stationary sources of noise would have the potential to disturb adjacent sensitive receptors. However, noise generation would continue to be limited by the City's Noise Ordinance, Chapter 8.80.

Implementation of the LUE is not anticipated to result in increased railroad operations within the City. However, the LUE proposes the Transit-Oriented Development PlaceType, which would allow future multi-family developments to be located along the Metro Blue line fixed rail route. Locating multi-family developments near the light rail corridor could expose sensitive land uses to operational rail noise.

The LUE/UDE includes policies that protect sensitive receptors from stationary noise sources and encourage land use compatibility and are included below:

Urban Design Element Policies

- **Policy UD 14-2:** Acknowledge transitions between commercial and residential uses by transitioning in height, scale, and intensity in a thoughtful way to provide a buffer to lower density residential development and transition from higher to lower density.
- **Policy UD 14-4**: Protect neighborhoods from the encroachment of incompatible activities or land uses that may have negative impacts on the residential living environment.
- **Policy UD 14-5:** Promote commercial center and corridor development compatibility with adjacent residential uses, including ensuring that project design and function minimizes the potential adverse impacts of vehicle access, parking and loading facilities, building massing, signage, lighting, trash enclosures and noise generating uses and areas.
- **Policy UD 19-2:** Ensure that project site design and function minimizes the potential adverse impacts of vehicle access, parking and loading facilities, signage, lighting, trash enclosures, and sound systems.
- **Policy UD 22-1:** Encourage the massing of buildings and setbacks behind the Long Beach Boulevard light rail corridor to transition from moderate to low, in order to gracefully handle the transition from more intense to less intense development.

- **Policy UD 23-1:** Provide adequate setbacks, along with visual and noise buffers, to separate automobile-oriented developments from adjacent residential neighborhoods.
- **Policy UD 24-3**: Promote the incorporation of buffers between residential and industrial uses, such as surface parking, landscaped open space buffers, and lower buildings.
- **Policy UD 24-5:** Encourage incompatible land uses and operations to be located away from and screened from view of residential neighborhoods.
- **Policy UD 26-2:** Encourage separation of incompatible land uses with site planning strategies and appropriate design treatments.

Land Use Element Policies

- **LU Policy 9-1:** Protect neighborhoods from the encroachment of incompatible activities or land uses that may have negative impacts on residential living environments.
- **LU Policy 16-6:** Work with regional agencies, residents, and businesses to preserve established homes, businesses, and open spaces. Limit the exposure of toxic pollutants and vehicle noise. Minimize traffic issues impacting residential neighborhoods resulting from freeway expansion and other similar large-scale projects.
- **LU Policy 16-8:** Require an acoustical analysis prior to project approval for projects subject to CEQA review, for all noise sensitive projects located in an area with noise levels greater than 60 dBA CNEL. All new residential land uses shall be designed to maintain a standard of 45 dBA CNEL or less in building interiors, consistent with the General Plan. Noise reduction measures to achieve this noise level could include, but are not limited to, forced air ventilation so that windows can remain closed and/or upgraded wall and window assemblies.
- **LU Policy 16-9:** The Los Angeles County Metropolitan Transportation Authority (Metro) shall be notified of any planned development or construction activities on properties that are within 100 feet of Metro right-of-way (ROW). Metro must be provided the opportunity early in the development process to review plans and comment, if necessary, to ensure that the project does not impact the safe operation of Metro transit service and/or compromise Metro infrastructure. As the project design advances, Metro may review construction drawings and work plans for potential impacts to the Metro system and to ensure safe operation of cranes, overhead loads, excavation, drainage, worker safety, and other construction activities. Projects immediately adjacent to Metro ROW may be required to include a setback from the Metro property line and to accommodate construction and maintenance activities on private property. Developers should not assume that Metro will grant a right-of-entry permit for construction or maintenance activities on Metro property. For this reason, Metro recommends a minimum five (5) foot setback from the adjacent Metro property line. At the City's discretion and Metro's request, a noise easement may be required to deed Metro the right to cause in-said easement noise, vibrations, and other effects that may be caused by the operation of transit vehicles.
- **LU Policy 16-10:** Locate schools and other sensitive receptors at least 500 feet away from freeways, as feasible.

- **Bixby Knolls Land Use Strategy 1:** Continue to monitor noise levels and implement the Long Beach Noise Ordinance, especially as it pertains to noise generated from airport-related activities.
- **Westside and Wrigley Land Use Strategy 6:** Uses allowed in the Edison and UPRR utility rights-of-way must be designed to have minimal dust, noise, traffic, visual and other nuisance impacts on residential neighbors. These properties shall be screened with landscape (green) buffers and proactively maintained.

Several of the LUE and UDE policies, specifically Policy UD 26-2, require new development projects to incorporate site planning and project design strategies to separate or buffer neighborhoods from incompatible activities or land uses.

Development allowed by the LUE and UDE may include the development of new sensitive land uses in the vicinity of existing noise sources. The LUE and UDE includes policies that promote traffic-calming measures in neighborhoods to provide safe and secure neighborhoods and encourage streets to be repurposed to accommodate slower speeds and better serve pedestrians, cyclists, and local transit. The dominant noise source in the City of Long Beach is traffic-related noise. As shown in Table K, the short-term noise measurements indicate that ambient noise in the City ranges from approximately 62.0 dBA to 76.2 dBA L_{eq}. The noise measurements were recorded at different locations within the City based on the Major Areas of Change identified in the LUE/UDE.

The City of Long Beach Municipal Code addresses noise in Title 8: Health and Safety, Chapter 8.80, Noise. The primary objective of Chapter 8.80 is to establish exterior and interior noise standards at receiving land uses and construction activity noise regulations. As discussed above, implementation of the LUE/UDE would include policies and strategies that protect sensitive receptors from stationary noise sources in excess of acceptable levels. Therefore, implementation of the LUE/UDE would not expose persons to noise levels in excess of the City's Municipal Code.

In addition, any new noise generating sources would be subject to compliance with Chapter 8.80, Noise, including Table A: Exterior Noise Limits, of the City's Municipal Code, which sets exterior noise standards for the various land uses within the City.

Generation of Excessive Ground-borne Vibration

Common sources of ground-borne vibration and noise include trains and construction activities such as blasting, pile driving, and operating heavy earthmoving equipment. Typically, the main effect of ground-borne vibration and noise is to cause annoyances for occupants of nearby buildings.

Chapter 8.80 of the City's Noise Ordinance limits the operation of any device that creates vibration, including pile driving, that is above the vibration perception threshold. Any construction activities associated with implementation of the LUE/UDE would be required to comply with the Noise Ordinance requirements. However, because the construction of future projects associated with implementation of the proposed project could result in the generation of ground-borne vibration, future discretionary projects occurring under the proposed project would also be required to comply with Mitigation Measure MM NOI-1. Specifically, Mitigation Measure MM NOI-1 would require future construction projects implemented under the LUE/UDE to implement construction best management practices to minimize vibration impacts for nearby sensitive receptors to a less than significant level. Compliance with Mitigation Measure MM NOI-1 would serve to reduce impacts from construction methods related to the exposure of sensitive receptors to excessive ground-borne vibration or noise levels.

Moreover, as discussed above, implementation of the proposed project would include policies and strategies that protect sensitive receptors from vibration in excess of acceptable levels. However, construction projects may result in an increase in groundborne vibration, and mitigation would be required. Mitigation Measure MM NOI-1 would require future construction projects implemented under the LUE/UDE to implement construction best management practices to minimize vibration impacts for nearby sensitive receptors to a less than significant level.

Substantial Permanent Increase in Ambient Noise Levels

Stationary-Source Noise

Development allowed under the proposed LUE may include the installation or creation of new stationary sources of noise, or could include the development of new sensitive land uses in the vicinity of existing noise sources. For commercial or industrial uses, these noise sources could include loading/unloading operations, generators, and outdoor speakers; for residential uses, stationary noise sources may include air conditioners or pool pumps. These stationary sources of noise would have the potential to disturb adjacent sensitive receptors. However, noise generation would continue to be limited by the City's Noise Ordinance, Chapter 8.80.

Implementation of the LUE is not anticipated to result in increased railroad operations within the City. However, the LUE proposes the TOD PlaceType, which would allow future multifamily developments to be located along the Metro Blue Line fixed rail route. Locating multifamily developments near the light-rail corridor could expose sensitive land uses to operational rail noise.

The City's Municipal Code addresses noise in Title 8: Health and Safety, Chapter 8.80, Noise. The primary objective of Chapter 8.80 is to establish exterior and interior noise standards at receiving land uses. In addition to the policies identified the Noise Element of the General Plan to minimize the effects of noise on noise-sensitive uses, the LUE/UDE includes the following policies and land use strategies to protect sensitive receptors from stationary noise sources and encourage land use compatibility: LU Policy 9-1, LU Policy 16-6, LU Policy 16-8, LU Policy 16-9, LU Policy 16-10, Bixby Knolls Land Use Strategy 1, Westside and Wrigley Land Use Strategy 6, Eastside Land Use Strategy 4, Central Land Use Strategy 3, Traffic Circle Land Use Strategy 3, Midshore Land Use Strategy 5, Downtown Land Use Strategy 7, Policy UD 14-2, Policy UD 14-4, Policy UD 14-5, Policy UD 19-2, Policy UD 22-1, Policy UD 23-1, Policy UD 24-3, Policy UD 24-5, and Policy UD 26-2 (refer to Subsection 4.5.7.1).

Development allowed by the LUE and UDE may include the development of new sensitive land uses in the vicinity of existing noise sources and could potentially subject sensitive land uses to long-term noise impacts. However, several of the LUE and UDE policies, specifically Policy UD 26-2, require new development projects to incorporate site planning and project design strategies to separate or buffer neighborhoods from incompatible activities or land uses. Furthermore, to ensure that new development will meet the interior noise standards identified by the State, the LUE has incorporated

LU Policy 16-8. LU Policy 16-8 requires that all new developments in areas with noise levels greater than 60 dBA CNEL prepare an acoustical analysis and requires new residential land uses to be designed to maintain a standard of 45 dBA L_{dn} or less in building interiors. Policy UD 19-2 ensures that project site design and function minimizes potential adverse impacts of vehicle access, parking and loading facilities, signage, lighting, trash enclosures, and sound systems. In addition, any new noise-generating sources would be subject to compliance with Chapter 8.80, Noise (including Table A: Exterior Noise Limits), of the City's Municipal Code (Table I of this Noise and Vibration analysis), which sets exterior noise standards for the various land uses within the City. As discussed above, implementation of the LUE/UDE would include policies and strategies that would ensure that new development projects incorporate site planning and project design strategies to separate or buffer neighborhoods from incompatible activities or land uses, which would protect sensitive receptors from stationary noise sources in excess of acceptable levels. Therefore, implementation of the LUE/UDE would not expose persons to noise levels in excess of the City's Municipal Code.

Traffic Noise

Potential sources of permanent increase in ambient noise include increases associated with an increase in traffic on roadways in the plan area. It is projected that traffic volumes on some streets within the City would increase due to the growth envisioned in the LUE/UDE. This increase in traffic volumes would result in increased traffic noise levels compared to existing conditions.

The significance criteria define a significant impact to occur if the project would result in a substantial (3 dBA or greater) permanent increase in ambient noise levels in the project vicinity above levels existing without the project. For traffic noise to increase by 3 dBA, traffic volumes would have to double. As noted in the Setting section of this analysis, noise increases of 3 dBA or more are generally considered to be the smallest increases in noise levels readily perceptible in suburban or urban outdoor environments. The average daily traffic (ADT) volumes were used to determine the CNEL change. The following formula was used to calculate the change in noise levels with traffic volumes:

$$(\Delta) = 10 \log\left(\frac{a}{b}\right)$$

where:	(Δ)	=	change in noise level (dBA) due to implementation of the Project
	a	=	future ADT volume with the Project
	b	=	future ADT volume without Project

Table M shows the ADT and project-related traffic noise level change under the existing and 2040 with and without project conditions for roadway segments in the City. As shown in Table M, the project-related traffic noise increase would be up to 2.1 dBA, which is considered less than the threshold of perceptibility for humans. Future traffic noise contours, consistent with Land Use Element and Mobility Element assumptions, have been modeled and are shown in Figure 5.

Table M: Traffic Noise Levels Assessment for the Proposed Project

Street Name	Segment	Existing Conditions			Year 2040			
		Volume (ADT)		Change in Noise Level (dBA CNEL)	Volume (ADT)		Change in Noise Level (dBA CNEL)	Increase over Existing Conditions (dBA CNEL)
		No Project	With Project		No Project	With Project		
Avalon Boulevard	North of PCH	16,820	16,820	0.0	19,440	19,440	0.0	0.6
	PCH to Anaheim Street	16,410	16,360	0.0	18,542	18,492	0.0	0.5
	South of PCH	9,700	9,700	0.0	10,004	10,004	0.0	0.1
Wilmington Avenue	North of I-405	26,420	25,685	-0.1	30,832	30,097	-0.1	0.6
	I-405 to Sepulveda Boulevard	17,670	17,670	0.0	20,422	20,422	0.0	0.6
Terminal Island Freeway	South of Willow Street	12,620	12,760	0.0	14,818	14,958	0.0	0.7
Santa Fe Avenue	North of Wardlow Road	27,140	26,948	0.0	31,367	31,175	0.0	0.6
	Wardlow Road to Willow Street	21,670	21,569	0.0	24,455	24,354	0.0	0.5
	Willow Street to PCH	14,570	14,662	0.0	16,473	16,565	0.0	0.6
	PCH to Anaheim Street	12,470	12,687	0.1	14,056	14,273	0.1	0.6
Magnolia Avenue	North of Ocean Boulevard	9,190	9,190	0.0	10,621	10,621	0.0	0.6
Pacific Avenue	North of 7th Street	8,180	8,180	0.0	9,454	9,454	0.0	0.6
	7th Street to 6th Street	8,320	8,310	0.0	9,959	9,949	0.0	0.8
	6th Street to 3rd Street	8,670	8,680	0.0	10,127	10,137	0.0	0.7
	3rd Street to Broadway	7,730	7,900	0.1	8,994	9,164	0.1	0.7
	Broadway to Ocean Boulevard	11,840	12,000	0.1	13,124	13,284	0.1	0.5
Long Beach Boulevard	North of Alondra Boulevard	20,440	20,400	0.0	23,296	23,256	0.0	0.6
	Alondra Boulevard to Artesia Boulevard	19,810	20,025	0.0	22,681	22,896	0.0	0.6
	Artesia Boulevard to Market Street	23,110	23,528	0.1	25,623	26,041	0.1	0.5
	Market Street to Del Amo Boulevard	21,670	21,800	0.0	24,202	24,332	0.0	0.5
	Del Amo Boulevard to San Antonia Drive	21,550	21,590	0.0	25,147	25,187	0.0	0.7
	Carson Street to Wardlow Road	25,160	25,292	0.0	28,947	29,079	0.0	0.6
	Wardlow Road to Spring Street	46,210	47,186	0.1	52,902	53,878	0.1	0.7
	Spring Street to Willow Street	44,340	44,340	0.0	51,246	51,246	0.0	0.6
	Willow Street to PCH	18,010	18,732	0.2	20,093	20,815	0.2	0.6
	PCH to Anaheim Street	14,890	15,020	0.0	17,022	17,152	0.0	0.6
	Anaheim Street to 7th Street	21,250	19,715	-0.3	23,169	21,634	-0.3	0.1
	7th Street to 6th Street	22,970	21,889	-0.2	24,725	23,644	-0.2	0.1
	6th Street to 3rd Street	9,720	9,860	0.1	10,586	10,726	0.1	0.4
	3rd Street to Broadway	7,910	8,396	0.3	8,562	9,048	0.2	0.6
Long Beach Boulevard	Broadway to Ocean Boulevard	7,060	6,804	-0.2	7,886	7,630	-0.1	0.3

Table M: Traffic Noise Levels Assessment for the Proposed Project

Street Name	Segment	Existing Conditions			Year 2040			
		Volume (ADT)		Change in Noise Level (dBA CNEL)	Volume (ADT)		Change in Noise Level (dBA CNEL)	Increase over Existing Conditions (dBA CNEL)
		No Project	With Project		No Project	With Project		
Atlantic Avenue	North of Alondra Boulevard	21,120	21,230	0.0	23,829	23,939	0.0	0.5
	Alondra Boulevard to Artesia Boulevard	25,990	26,080	0.0	29,658	29,748	0.0	0.6
	Artesia Boulevard to South Street	21,630	21,700	0.0	25,040	25,110	0.0	0.6
	South Street to Del Amo Boulevard	17,830	18,014	0.0	20,423	20,607	0.0	0.6
	Del Amo Boulevard to I-405	22,200	20,387	-0.4	25,712	23,899	-0.3	0.3
	I-405 to Willow Street	25,000	25,836	0.1	27,499	28,335	0.1	0.5
	Willow Street to PCH	16,480	16,475	0.0	18,378	18,373	0.0	0.5
	PCH to Anaheim Street	15,970	16,180	0.1	19,640	19,850	0.0	0.9
	Anaheim Street to 7th Street	13,740	13,160	-0.2	17,850	17,270	-0.1	1.0
	7th Street to 6th Street	14,450	14,400	0.0	16,145	16,095	0.0	0.5
	6th Street to 3rd Street	9,380	9,467	0.0	12,733	12,820	0.0	1.4
	3rd Street to Broadway	5,820	5,926	0.1	7,101	7,207	0.1	0.9
	Broadway to Ocean Boulevard	6,260	6,320	0.0	6,961	7,021	0.0	0.5
Orange Avenue	North of Wardlow Road	13,760	13,350	-0.1	16,112	15,702	-0.1	0.6
	Wardlow Road to PCH	13,610	13,596	0.0	15,631	15,617	0.0	0.6
	PCH to Anaheim Street	15,430	15,430	0.0	17,833	17,833	0.0	0.6
Alamitos Avenue	Anaheim Street to 7th Street	11,990	12,090	0.0	13,569	13,669	0.0	0.6
	7th Street to 6th Street	18,220	17,797	-0.1	20,247	19,824	-0.1	0.4
	6th Street to 3rd Street	16,140	15,927	-0.1	18,894	18,681	0.0	0.6
	3rd Street to Broadway	17,460	17,368	0.0	20,389	20,297	0.0	0.7
	Broadway to Ocean Boulevard	14,650	14,640	0.0	17,036	17,026	0.0	0.7
Cherry Avenue	North of Artesia Boulevard	22,030	21,766	-0.1	25,461	25,197	0.0	0.6
	Artesia Boulevard to Market Street	23,550	23,320	0.0	27,758	27,528	0.0	0.7
	Market Street to Del Amo Boulevard	25,490	25,490	0.0	29,460	29,460	0.0	0.6
	Del Amo Boulevard to Carson Street	31,340	30,910	-0.1	36,222	35,792	-0.1	0.6
	Carson Street to Wardlow Road	40,570	37,989	-0.3	46,173	43,592	-0.2	0.3
	Wardlow Road to Willow Street	36,570	33,722	-0.4	41,990	39,142	-0.3	0.3
	Willow Street to PCH	24,680	24,547	0.0	28,524	28,391	0.0	0.6
	PCH to 7th Street	12,450	12,520	0.0	14,170	14,240	0.0	0.6
	South of 7th Street	7,080	7,194	0.1	8,005	8,119	0.1	0.6

Table M: Traffic Noise Levels Assessment for the Proposed Project

Street Name	Segment	Existing Conditions			Year 2040			
		Volume (ADT)		Change in Noise Level (dBA CNEL)	Volume (ADT)		Change in Noise Level (dBA CNEL)	Increase over Existing Conditions (dBA CNEL)
		No Project	With Project		No Project	With Project		
Paramount Boulevard	North of Artesia Boulevard	19,830	19,601	-0.1	22,919	22,690	0.0	0.6
	Artesia Boulevard to South Street	18,950	18,960	0.0	21,771	21,781	0.0	0.6
	South Street to Del Amo Boulevard	19,070	19,300	0.1	22,025	22,255	0.0	0.7
	Del Amo Boulevard to Carson Street	19,520	19,540	0.0	22,410	22,430	0.0	0.6
Redondo Avenue	Spring Street to Willow Street	18,390	27,536	1.8	20,754	29,900	1.6	2.1
	Willow Street to PCH	24,120	24,916	0.1	27,393	28,189	0.1	0.7
	PCH to Anaheim Street	22,860	22,510	-0.1	25,941	25,591	-0.1	0.5
	Anaheim Street to 7th Street	22,900	22,731	0.0	26,467	26,298	0.0	0.6
	7th Street to 3rd Street	20,390	20,390	0.0	23,566	23,566	0.0	0.6
	3rd Street to Ocean Boulevard	13,120	12,228	-0.3	15,117	14,225	-0.3	0.4
Lakewood Boulevard	North of Del Amo Boulevard	27,340	27,370	0.0	31,304	31,334	0.0	0.6
	Del Amo Boulevard to Carson Street	27,480	26,942	-0.1	31,760	31,222	-0.1	0.6
	Carson Street to Spring Street	46,730	51,330	0.4	52,590	57,190	0.4	0.9
	Spring Street to Willow Street	37,450	38,570	0.1	43,167	44,287	0.1	0.7
Ximeno Avenue	PCH to 7th Street	19,650	19,700	0.0	22,599	22,649	0.0	0.6
	7th Street to 4th Street	9,160	9,255	0.0	10,256	10,351	0.0	0.5
	South of 4th Street	6,090	6,090	0.0	7,039	7,039	0.0	0.6
Park Avenue	7th Street to 4th Street	10,970	10,970	0.0	12,679	12,679	0.0	0.6
	South of 4th Street	5,750	5,750	0.0	6,646	6,646	0.0	0.6
Pacific Coast Highway	Ximeno Avenue to Anaheim Street	21,870	21,995	0.0	24,191	24,316	0.0	0.5
	Anaheim Street to 7th Street	29,970	30,049	0.0	32,799	32,878	0.0	0.4
	7th Street to Bellflower Boulevard	22,220	22,380	0.0	25,754	25,914	0.0	0.7
	Bellflower Boulevard to 2nd Street	33,390	33,320	0.0	38,084	38,014	0.0	0.6
Los Coyotes Diagonal	Studebaker Road to Spring Street	19,650	19,650	0.0	22,711	22,711	0.0	0.6
	Spring Street to Bellflower Boulevard	24,630	22,237	-0.4	28,466	26,073	-0.4	0.2
	South of Bellflower Boulevard	27,480	26,135	-0.2	31,278	29,933	-0.2	0.4

Table M: Traffic Noise Levels Assessment for the Proposed Project

Street Name	Segment	Existing Conditions			Year 2040			
		Volume (ADT)		Change in Noise Level (dBA CNEL)	Volume (ADT)		Change in Noise Level (dBA CNEL)	Increase over Existing Conditions (dBA CNEL)
		No Project	With Project		No Project	With Project		
Bellflower Boulevard	North of Del Amo Boulevard	18,400	18,400	0.0	21,266	21,266	0.0	0.6
	Del Amo Boulevard to Carson Street	21,270	20,552	-0.1	24,955	24,237	-0.1	0.6
	Carson Street to Spring Street	22,650	21,032	-0.3	26,178	24,560	-0.3	0.4
	Spring Street to Los Coyotes Diagonal	31,010	29,964	-0.1	33,983	32,937	-0.1	0.3
	Los Coyotes Diagonal to Atherton Street	36,160	35,029	-0.1	39,453	38,322	-0.1	0.3
	Atherton Street to PCH	26,570	26,570	0.0	30,709	30,709	0.0	0.6
Studebaker Road	Carson Street to Spring Street	17,680	17,680	0.0	20,434	20,434	0.0	0.6
	Spring Street to Willow Street	22,510	22,291	0.0	26,016	25,797	0.0	0.6
	Willow Street to 2nd Street	32,340	30,990	-0.2	38,727	37,377	-0.2	0.6
Norwalk Boulevard	North of Carson Street	16,480	16,480	0.0	19,047	19,047	0.0	0.6
	Carson Street to Cerritos Street	20,910	20,930	0.0	24,086	24,106	0.0	0.6
	Cerritos Street to Katella Avenue	27,160	27,440	0.0	31,434	31,714	0.0	0.7
	Katella Avenue to Westminster Road	35,900	35,900	0.0	41,492	41,492	0.0	0.6
Campus Drive	North of 7th Street	6,740	6,740	0.0	7,478	7,478	0.0	0.5
Alondra Boulevard	West of Long Beach Boulevard	17,310	17,260	0.0	19,426	19,376	0.0	0.5
	Long Beach Boulevard to Atlantic Avenue	23,520	23,430	0.0	26,418	26,328	0.0	0.5
	East of Atlantic Avenue	26,110	26,130	0.0	28,830	28,850	0.0	0.4
Artesia Boulevard	West of Long Beach Boulevard	21,480	20,953	-0.1	24,539	24,012	-0.1	0.5
	Long Beach Boulevard to Atlantic Avenue	22,160	22,140	0.0	25,462	25,442	0.0	0.6
	Atlantic Avenue to Cherry Avenue	21,020	20,840	0.0	24,484	24,304	0.0	0.6
	Cherry Avenue to Paramount Boulevard	20,390	20,240	0.0	22,901	22,751	0.0	0.5
South Street	Atlantic Avenue to Paramount Boulevard	21,160	21,160	0.0	24,456	24,456	0.0	0.6
	East of Paramount Boulevard	21,810	22,120	0.1	25,240	25,550	0.1	0.7
Market Street	Long Beach Boulevard to Cherry Avenue	13,520	13,460	0.0	15,787	15,727	0.0	0.7
	East of Cherry Avenue	16,200	16,030	0.0	19,102	18,932	0.0	0.7
Del Amo Boulevard	West of Long Beach Boulevard	26,440	26,253	0.0	30,410	30,223	0.0	0.6
	Long Beach Boulevard to Atlantic Avenue	29,460	29,634	0.0	33,667	33,841	0.0	0.6
	Atlantic Avenue to Cherry Avenue	26,810	26,810	0.0	30,986	30,986	0.0	0.6
	Cherry Avenue to Paramount Boulevard	26,860	26,430	-0.1	31,044	30,614	-0.1	0.6
	Paramount Boulevard to Bellflower Boulevard	28,720	28,780	0.0	32,770	32,830	0.0	0.6
	East of Bellflower Boulevard	30,840	30,840	0.0	35,644	35,644	0.0	0.6

Table M: Traffic Noise Levels Assessment for the Proposed Project

Street Name	Segment	Existing Conditions			Year 2040			
		Volume (ADT)		Change in Noise Level (dBA CNEL)	Volume (ADT)		Change in Noise Level (dBA CNEL)	Increase over Existing Conditions (dBA CNEL)
		No Project	With Project		No Project	With Project		
Carson Street	West of Cherry Avenue	21,190	21,256	0.0	24,241	24,307	0.0	0.6
	Cherry Avenue to Paramount Boulevard	29,660	29,660	0.0	34,280	34,280	0.0	0.6
	Paramount Boulevard to Lakewood Boulevard	30,930	30,900	0.0	35,761	35,731	0.0	0.6
	Lakewood Boulevard to Bellflower Boulevard	28,160	28,160	0.0	32,546	32,546	0.0	0.6
	Bellflower Boulevard to Los Coyotes Diagonal	30,060	29,549	-0.1	34,855	34,344	-0.1	0.6
	Los Coyotes Diagonal to I-605	40,090	32,162	-1.0	54,262	46,334	-0.7	0.6
	I-605 to Norwalk Boulevard	47,280	46,556	-0.1	54,644	53,920	-0.1	0.6
223rd Street	West of Wilmington Avenue	21,360	20,715	-0.1	24,687	24,042	-0.1	0.5
	Wilmington Avenue to Santa Fe Avenue	21,940	21,720	0.0	24,903	24,683	0.0	0.5
Wardlow Road	Santa Fe Avenue to Long Beach Boulevard	25,460	25,068	-0.1	29,426	29,034	-0.1	0.6
	Long Beach Boulevard to Orange Avenue	19,900	20,082	0.0	22,606	22,788	0.0	0.6
	Orange Avenue to Cherry Avenue	12,330	11,859	-0.2	14,251	13,780	-0.1	0.5
	Lakewood Boulevard to Palo Verde Avenue	18,450	18,450	0.0	21,324	21,324	0.0	0.6
	East of Palo Verde Avenue	20,980	20,980	0.0	24,248	24,248	0.0	0.6
Spring Street	Long Beach Boulevard to Redondo Avenue	38,020	39,201	0.1	42,436	43,617	0.1	0.6
	Redondo Avenue to Lakewood Boulevard	31,130	36,341	0.7	33,889	39,100	0.6	1.0
	Lakewood Boulevard to Bellflower Boulevard	27,850	27,341	-0.1	31,634	31,125	-0.1	0.5
	Bellflower Boulevard to Los Coyotes Diagonal	24,350	24,095	0.0	28,143	27,888	0.0	0.6
	Los Coyotes Diagonal to Studebaker Road	23,840	23,840	0.0	27,553	27,553	0.0	0.6
	Studebaker Road to Norwalk Boulevard	25,780	25,780	0.0	29,795	29,795	0.0	0.6
Sepulveda Boulevard	Wilmington Avenue to Terminal Island Freeway	20,250	19,850	-0.1	27,016	26,616	-0.1	1.2
Willow Street	Terminal Island Freeway to Santa Fe Avenue	20,530	19,990	-0.1	25,885	25,345	-0.1	0.9
	Santa Fe Avenue to Long Beach Boulevard	31,500	32,030	0.1	34,909	35,439	0.1	0.5
	Long Beach Boulevard to Atlantic Avenue	30,170	30,752	0.1	33,191	33,773	0.1	0.5
	Atlantic Avenue to Cherry Avenue	29,350	29,063	0.0	32,962	32,675	0.0	0.5
	Cherry Avenue to Redondo Avenue	32,900	33,456	0.1	37,701	38,257	0.1	0.7
	Redondo Avenue to Lakewood Boulevard	37,530	37,990	0.1	41,753	42,213	0.0	0.5

Table M: Traffic Noise Levels Assessment for the Proposed Project

Street Name	Segment	Existing Conditions			Year 2040			
		Volume (ADT)		Change in Noise Level (dBA CNEL)	Volume (ADT)		Change in Noise Level (dBA CNEL)	Increase over Existing Conditions (dBA CNEL)
		No Project	With Project		No Project	With Project		
Pacific Coast Highway	Avalon Boulevard to Santa Fe Avenue	28,730	28,740	0.0	33,055	33,065	0.0	0.6
	Santa Fe Avenue to I-710	30,590	29,341	-0.2	36,043	34,794	-0.2	0.6
	I-710 to Pacific Avenue	29,280	28,171	-0.2	33,736	32,627	-0.1	0.5
	Pacific Avenue to Long Beach Boulevard	26,600	26,700	0.0	29,961	30,061	0.0	0.5
	Long Beach Boulevard to Atlantic Avenue	26,000	26,190	0.0	29,862	30,052	0.0	0.6
	Atlantic Avenue to Orange Avenue	26,840	27,714	0.1	30,089	30,963	0.1	0.6
	Orange Avenue to Cherry Avenue	30,130	30,200	0.0	34,604	34,674	0.0	0.6
	Cherry Avenue to Redondo Avenue	30,390	30,390	0.0	35,124	35,124	0.0	0.6
	Redondo Avenue to Ximeno Avenue	32,640	32,290	0.0	37,244	36,894	0.0	0.5
Anaheim Street	Avalon Boulevard to Santa Fe Avenue	20,520	20,650	0.0	23,724	23,854	0.0	0.7
	Santa Fe Avenue to Pacific Avenue	22,110	22,600	0.1	24,445	24,935	0.1	0.5
	Pacific Avenue to Long Beach Boulevard	23,470	23,450	0.0	25,844	25,824	0.0	0.4
	Long Beach Boulevard to Atlantic Avenue	24,180	24,020	0.0	27,258	27,098	0.0	0.5
	Atlantic Avenue to Alamitos Avenue	24,480	24,540	0.0	28,109	28,169	0.0	0.6
	Alamitos Avenue to Redondo Avenue	24,730	24,770	0.0	28,477	28,517	0.0	0.6
	Redondo Avenue to PCH	24,520	24,520	0.0	28,339	28,339	0.0	0.6
7th Street	West of Pacific Avenue	6,950	6,830	-0.1	7,559	7,439	-0.1	0.3
	Pacific Avenue to Long Beach Boulevard	17,050	16,960	0.0	17,470	17,380	0.0	0.1
	Long Beach Boulevard to Atlantic Avenue	17,310	17,473	0.0	17,814	17,977	0.0	0.2
	Atlantic Avenue to Alamitos Avenue	17,060	16,746	-0.1	18,860	18,546	-0.1	0.4
	Alamitos Avenue to Cherry Avenue	24,940	24,836	0.0	28,474	28,370	0.0	0.6
	Cherry Avenue to Redondo Avenue	25,580	25,580	0.0	29,564	29,564	0.0	0.6
	Redondo Avenue to Ximeno Avenue	27,900	27,985	0.0	32,161	32,246	0.0	0.6
	Ximeno Avenue to Park Avenue	30,100	30,087	0.0	34,742	34,729	0.0	0.6
	Park Avenue to PCH	34,330	34,400	0.0	39,590	39,660	0.0	0.6
	PCH to Bellflower Boulevard	39,530	38,522	-0.1	45,557	44,549	-0.1	0.5
	Bellflower Boulevard to Campus Drive	42,830	42,830	0.0	49,190	49,190	0.0	0.6
	Campus Drive to Studebaker Road	45,630	45,767	0.0	52,600	52,737	0.0	0.6

Table M: Traffic Noise Levels Assessment for the Proposed Project

Street Name	Segment	Existing Conditions			Year 2040			
		Volume (ADT)		Change in Noise Level (dBA CNEL)	Volume (ADT)		Change in Noise Level (dBA CNEL)	Increase over Existing Conditions (dBA CNEL)
		No Project	With Project		No Project	With Project		
6th Street	West of Pacific Avenue	16,120	16,120	0.0	19,208	19,208	0.0	0.8
	Pacific Avenue to Long Beach Boulevard	17,510	17,510	0.0	20,237	20,237	0.0	0.6
	Long Beach Boulevard to Atlantic Avenue	17,000	17,010	0.0	20,283	20,293	0.0	0.8
	Atlantic Avenue to Alamitos Avenue	16,520	16,520	0.0	19,093	19,093	0.0	0.6
3rd Street	West of Pacific Avenue	5,020	5,020	0.0	5,802	5,802	0.0	0.6
	Pacific Avenue to Long Beach Boulevard	5,300	5,340	0.0	5,991	6,031	0.0	0.6
	Long Beach Boulevard to Atlantic Avenue	4,950	4,950	0.0	5,721	5,721	0.0	0.6
	Atlantic Avenue to Alamitos Avenue	4,060	4,015	0.0	4,919	4,874	0.0	0.8
	Alamitos Avenue to Redondo Avenue	5,850	5,735	-0.1	6,876	6,761	-0.1	0.6
Broadway	West of Pacific Avenue	9,410	9,400	0.0	10,805	10,795	0.0	0.6
	Pacific Avenue to Long Beach Boulevard	12,730	12,720	0.0	14,813	14,803	0.0	0.7
	Long Beach Boulevard to Atlantic Avenue	12,560	12,560	0.0	14,239	14,239	0.0	0.5
	Atlantic Avenue to Alamitos Avenue	13,040	13,040	0.0	15,071	15,071	0.0	0.6
Ocean Boulevard	West of Magnolia Avenue	30,620	30,520	0.0	34,828	34,728	0.0	0.5
	Magnolia Avenue to Pacific Avenue	58,900	59,240	0.0	60,955	61,295	0.0	0.2
	Pacific Avenue to Long Beach Boulevard	57,010	57,310	0.0	59,213	59,513	0.0	0.2
	Long Beach Boulevard to Atlantic Avenue	29,270	28,744	-0.1	31,916	31,390	-0.1	0.3
	Atlantic Avenue to Alamitos Avenue	27,840	27,880	0.0	29,750	29,790	0.0	0.3
	Alamitos Avenue to Redondo Avenue	29,400	29,363	0.0	31,949	31,912	0.0	0.4
Livingston Drive	Redondo Avenue to 2nd Street	25,260	22,735	-0.5	28,400	25,875	-0.4	0.1
	2nd Street to PCH	38,370	38,520	0.0	44,227	44,377	0.0	0.6
2nd Street	PCH to Studebaker Road	40,090	32,162	-1.0	54,262	46,334	-0.7	0.6
	Studebaker Road to Seal Beach Boulevard	29,770	20,493	-1.6	43,684	34,407	-1.0	0.6

Source: LSA (2019)
ADT = average daily traffic
CNEL = Community Noise Equivalent Level
I = Interstate
PCH = Pacific Coast Highway

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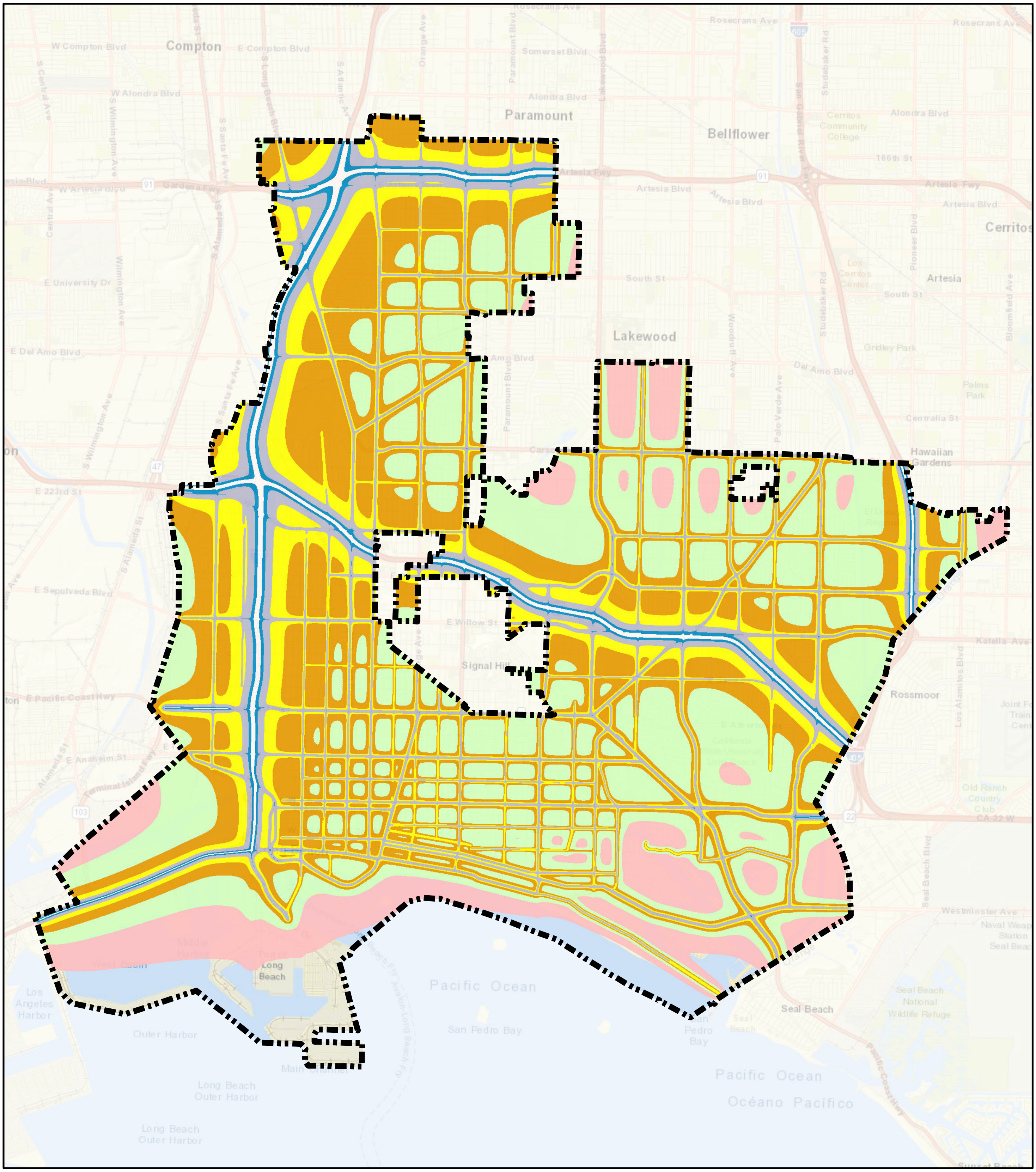

LSA

LEGEND

Long Beach City Boundary

Future 2040 Traffic Noise Contours

- 55 dBA Ldn
- 60 dBA Ldn
- 65 dBA Ldn
- 70 dBA Ldn
- 75 dBA Ldn
- 80 dBA Ldn
- 85 dBA Ldn

N

0 0.75 1.5
MILES

SOURCE: Esri (2016); LSA (2/2019)

FIGURE 5

Long Beach General Plan

Land Use and Urban Design Elements

Future 2040 Traffic Noise Contours

I:\RDG1701\GIS\FutureTrafficNoiseContours_Regional.mxd (2/27/2019)

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Substantial Temporary Increase in Ambient Noise Levels

Construction associated with implementation of the LUE/UDE would occur over a period of approximately 21 years. Construction activities associated with development allowed under the LUE/UDE could result in substantial temporary or periodic increases in ambient noise levels at development sites throughout the City.

Two types of short-term noise impacts would occur during demolition, site preparation, and construction of projects that would be anticipated by the proposed plan. The first type would result from the increase in traffic flow on local streets, associated with the transport of workers, equipment, and materials to and from the project site. The transport of workers, construction equipment, and materials to the project site would incrementally increase noise levels on access roads leading to the site. The second type would result from equipment use and activities associated with demolition, site preparation, and construction of proposed projects. Construction is performed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. These phases would change the character of the noise generated on project sites and, therefore, the noise levels surrounding the sites as construction progresses.

Table N lists typical maximum noise levels for various pieces of construction equipment, as measured at a distance of 50 ft from the operating equipment. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. The site preparation phase, which includes excavation and grading, tends to generate the highest noise levels because the noisiest construction equipment is earthmoving equipment. Earthmoving equipment includes excavating machinery such as pile driving, backhoes, bulldozers, draglines, and front loaders. Earthmoving and compacting equipment includes compactors, scrapers, and graders. Typical operating cycles for these types of construction equipment may involve 1 or 2 minutes of full-power operation followed by 3 or 4 minutes at lower power settings. Typical maximum noise levels during the site preparation phase of construction can range up to 86 dBA L_{max} at 50 ft from multiple pieces of operating equipment.

Construction anticipated under the LUE is expected to require the use of earthmoving equipment, dozers, and water and pickup trucks. Besides pile driving, which is not common on most construction sites, a scraper is one of the loudest pieces of construction equipment. The estimated noise level generated by each scraper on future project sites would be approximately 84 dBA L_{max} at 50 ft from the scraper. Each dozer, another common piece of construction equipment, would generate approximately 82 dBA L_{max} at 50 ft. The estimated noise level generated by water and pickup trucks would be approximately 75 dBA L_{max} at 50 ft from these vehicles. Each doubling of the sound sources with equal strength increases the noise level by 3 dBA. Assuming that each piece of construction equipment operates at some distance from the other equipment, the worst-case combined noise level during this phase of future construction would be 86 dBA L_{max} at a distance of 50 ft from the active construction area. In addition, some construction projects could require pile driving, which would have an estimated noise level of approximately 101 dBA L_{max} at 50 ft.

Table N: Noise Emission Reference Levels and Usage Factors

Equipment Description	Acoustical Usage Factor[1]	Predicted L_{max} at 50 feet (dBA, slow)[2]	Actual Measured L_{max} at 50 feet (dBA, slow)[3]
All Other Equipment > 5 HP	50	85	N/A[4]
Backhoe	40	80	78
Compactor (ground)	20	80	83
Compressor (air)	40	80	78
Crane	16	85	81
Dozer	40	85	82
Dump Truck	40	84	76
Excavator	40	85	81
Flat Bed Truck	40	84	74
Front-End Loader	40	80	79
Generator	50	82	81
Gradall	40	85	83
Grader	40	85	N/A
Impact Pile Driver	20	95	101
Man Lift	20	85	75
Paver	50	85	77
Pickup Truck	40	55	75
Roller	20	85	80
Scraper	40	85	84
Tractor	40	84	N/A

Source: Federal Highway Administration (FHWA). *Construction Noise Handbook*, Table 9.1 (August 2006).
Note: Noise levels reported in this table are rounded to the nearest whole number.
1 Usage factor is the percentage of time during a construction noise operation that a piece of construction equipment is operating at full power.
2 Maximum noise levels were developed based on Specification (Spec.) 721.560 from the Central Artery/Tunnel (CA/T) program to be consistent with the City of Boston's Noise Code for the "Big Dig" project.
3 The maximum noise level was developed based on the average noise level measured for each piece of equipment during the CA/T program in Boston, Massachusetts.
4 Since the maximum noise level based on the average noise level measured for this piece of equipment was not available, the maximum noise level developed based on Spec 721.560 would be used.
dBA = A-weighted decibel
L_{max} = maximum instantaneous noise level
N/A = not applicable

Noise-sensitive receptors include residences, schools, hospitals, churches, and similar uses that are sensitive to noise. Construction and operation of development allowed under the LUE/UDE could adversely affect nearby noise-sensitive land uses. Construction noise is permitted by the Municipal Code when activities occur between the hours of 7:00 a.m. and 7:00 p.m. on weekdays and between 9:00 a.m. and 6:00 p.m. on Saturdays. No construction would be permitted on Sundays. Construction noise impacts are currently exempt from specific noise levels limits.

Construction activities associated with development allowed under the LUE/UDE would be subject to compliance with the City's Noise Ordinance to ensure that noise impacts from construction sources are reduced. Specific construction project data that may occur with implementation of the LUE/UDE, including location and noise levels at surrounding sensitive receptors, are unknown at this time. Some projects may have unusual or extremely loud construction activities (such as pile driving, nighttime construction work, and unusually long construction duration, etc.). Therefore, construction projects may result in a substantial increase in ambient noise levels, and mitigation would be required. Mitigation Measure MM NOI-1 would require future construction projects implemented under the LUE/UDE to implement construction best management practices to reduce potential construction-period noise impacts for nearby sensitive receptors. Although Mitigation Measure MM NOI-1 would reduce construction noise associated with future projects, since the location, proximity to sensitive receptors, and type of construction equipment associated with new construction projects are unknown at this time, in an abundance of caution this impact is considered significant and unavoidable.

Airport Noise

As noted in the existing conditions discussion above, aircraft noise in the City of Long Beach is primarily related to aircraft operations at Long Beach Airport, Los Angeles International Airport, and John Wayne Airport. Long Beach Airport is located centrally within the City, approximately 3 miles northeast of downtown. As stated in Section 16.43.050 of the Municipal Code, it is the goal of the City that incompatible property in the vicinity of the Airport shall not be exposed to noise above 65 dBA CNEL. The LUE/UDE includes the following policies and land use strategies to encourage land use compatibility: LU Policy 9-1, LU Policy 16-6, LU Policy 16-8, LU Policy 16-9, Policy UD 14-2, Policy UD 14-4, Policy UD 14-5, Policy UD 23-1, Policy UD 24-3, Policy UD 24-5, and Policy UD 26-2 (refer to Subsection 4.5.7.1). Therefore, implementation of the LUE and UDE would locate business parks and airport-related land uses surrounding the airport and would not introduce any new noise-sensitive receptors within the 65 dBA noise contour. Therefore, the LUE/UDE would not result in the exposure of sensitive receptors to excessive noise levels from aircraft noise sources.

Cumulative Impacts

Cumulative growth within the City could result in temporary or periodic increases in ambient noise levels at development sites throughout the City. However, construction-related noise would be temporary and would no longer occur once construction of individual projects is completed. In addition, construction activities associated with development allowed under the proposed project would be subject to compliance with the City's Noise Ordinance to ensure that noise impacts from construction sources are reduced. In addition, with implementation of Mitigation Measure MM NOI-1, individual projects would be required to implement construction best management practices to reduce potential construction-period noise impacts for nearby sensitive receptors. Therefore, even with implementation of Mitigation Measure MM NOI-1 construction activities would be considered to have a cumulatively considerable contribution to the total noise environment in the City.

The proposed project would not create a cumulatively considerable contribution to regional noise conditions. For traffic noise to increase by 3 dBA, traffic volumes would have to double. Implementation of the proposed project would not result in a doubling of average daily trips, and therefore, implementation of the LUE/UDE would not result in a 3 dBA increase in traffic noise level in the City and would not generate a significant impact under cumulative noise conditions.

Additionally, as shown in the traffic noise impact discussion above, implementation of the LUE/UDE policies and land use strategies would require the City to consider noise and land use compatibility issues when evaluating individual development proposals. As described above, implementation of the proposed project would not result in a substantial cumulative increase in long-term noise.

Noise Mitigation Measures

The proposed project could result in a substantial temporary increase in noise and vibration due to construction activities, and mitigation would be required.

MM NOI-1 Project contractors shall implement the following construction best management practices during construction activities:

- Schedule high-noise and vibration-producing activities to a shorter window of time during the day outside early morning hours to minimize disruption to sensitive uses.
- Grading and construction contractors shall use equipment that generates lower noise and vibration levels, such as rubber-tired equipment rather than metal-tracked equipment.
- Construction haul trucks and materials delivery traffic shall avoid residential areas whenever feasible.
- The construction contractor shall place noise- and vibration-generating construction equipment and locate construction staging areas away from sensitive uses whenever feasible.
- Locate equipment staging in areas that would create the greatest possible distance between construction-related noise sources and noise-sensitive receptors nearest the active project site during all project construction.
- Prohibit extended idling time of internal combustion engines.
- Ensure that all general construction-related activities are restricted to 7:00 a.m. and 7:00 p.m. on weekdays and federal holidays, and between 9:00 a.m. and 6:00 p.m. on Saturdays. No construction would be permitted on Sundays. Construction activities occurring outside of these hours may be permitted with authorization by the Building Official and/or a permit issued by the Noise Control Officer.
- All residential units located within 500 feet of a construction site shall be sent a notice regarding the construction schedule. A sign legible at a distance of 50 feet shall also be posted at the construction site. All notices and the signs shall indicate the dates and durations of construction activities, as well as provide a telephone number for a "noise disturbance coordinator."
- A "noise disturbance coordinator" shall be established. The disturbance coordinator shall be responsible for responding to any local complaints about construction noise. The disturbance coordinator shall determine the cause of the noise complaint (e.g., starting too early or bad muffler, etc.) and shall be required to implement reasonable measures to reduce noise levels.
- For all projects determined to have unusual or extremely loud construction activities (e.g., pile driving, nighttime construction work, or unusually long construction duration, etc.) that would generate noise levels over 90 dBA L_{eq} at

nearby sensitive receptors, temporary noise control blanket barriers shall be installed in a manner to shield sensitive receptors land uses.

Level of Significance After Mitigation

Potential impacts related to construction noise associated with future development projects that would be implemented as part of the LUE/UDE would be reduced with implementation of Mitigation Measure MM NOI-1. However, since the location, proximity to sensitive receptors, and type of construction equipment associated with new construction projects are unknown at this time, in an abundance of caution this impact is considered significant and unavoidable.

Potential impacts related to the construction vibration associated with future development projects that would be implemented as part of the LUE/UDE would be reduced with implementation of Mitigation Measure MM NOI-1. Therefore, the proposed project would not generate excessive ground-borne vibration or ground-borne noise levels.

REFERENCES

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APPENDIX A

NOISE MONITORING DATA

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Olive Ave
N Lime Ave
Lime Ave
Eastondale Ave
E Penfold St
Millmark Ave
E 68th St
N Atlantic Pl
ST1
S Atlantic Ave
Atlantic Ave
Los Angeles River Bicycle Path

Noise Measurement Survey

Project Number: CLB
Project Name: LB GENERAL PLAN
Test Personnel: L. FREEBERG
Equipment: LD 831

Site Number: ST 1 Date: 2/11/16
Time: From 7:27A To 7:42A

Site Location: 6857-6909 ATLANTIC AVE.

Primary Noise Sources: TRAFFIC ON ATLANTIC, FAINT TRAFFIC ON I-710
TRUCKS W/ TRAILERS TURNING IN NEARBY LOT

Comments: DATA FILE 226
PAUSED OUT PEDESTRIAN PASSBY TALKING LOUDLY

Adjacent Roadways: ATLANTIC

File:	
L_{eq}	66.6
L_{max}	82.1
L_{min}	59.6
L_2	71.7
L_8	69.2
L_{25}	67.2
L_{50}	65.2
L_{90}	62.0
L_{99}	60.6

Atmospheric Conditions	
Average Wind Velocity (mph)	0.0
Maximum Wind Velocity (mph)	0.8
Temperature (F)	63.2
Relative Humidity (%)	38.8

E Hullett St
Obispo Ave
E South St
ST2
CONSTRUCTION NOISE
MOVED TO FAR SIDE OF CHURCH
E 57th St
N Orizaba Ave

Noise Measurement Survey

Project Number:
Project Name: LB GENERAL PLAN

Test Personnel: L. FREEBERG
Equipment: LD 831

Site Number: ST2 Date: 2/11/16

Time: From 7:58A To 8:13A

Site Location: 3114 SOUTH STREET - CHURCH OF LATTER DAY SAINTS

Primary Noise Sources: TRAFFIC ON SOUTH STREET, BIRDS

Comments: DATA FILE 227

Adjacent Roadways: SOUTH ST. / OBISPO AVE

File:	
L_{eq}	70.3
L_{max}	80.8
L_{min}	53.6
L_2	75.5
L_8	74.2
L_{25}	71.7
L_{50}	69.1
L_{90}	62.1
L_{99}	55.2

Atmospheric Conditions	
Average Wind Velocity (mph)	0.0
Maximum Wind Velocity (mph)	0.0
Temperature (F)	69.4
Relative Humidity (%)	38.4

Long Beach
E Spring St
Elm Ave
ST3
St
Locust Ave

Noise Measurement Survey

Project Number: ______________________ Test Personnel: L. FREEBERG

Project Name: LB GENERAL PLAN Equipment: LD 831

Site Number: ST-3 Date: 2/11/16 Time: From 8:58A To 9:13A

Site Location: 3115 LONG BEACH BLVD.

Primary Noise Sources: TRAFFIC ON LONG BEACH BLVD, BACK UP BEEPER ACROSS L.B. BLVD, BIRDS

Comments: DATA FILE 229
AIRPLANE - 15 SECONDS - 70 LEQ

Adjacent Roadways: LONG BEACH BLVD,

File:	
L_{eq}	63.6
L_{max}	73.6
L_{min}	49.2
L_2	68.8
L_8	67.3
L_{25}	65.2
L_{50}	62.4
L_{90}	54.5
L_{99}	50.6

Atmospheric Conditions	
Average Wind Velocity (mph)	1.6
Maximum Wind Velocity (mph)	3.4
Temperature (F)	68.6
Relative Humidity (%)	29.6


ST4
E 20th St
E Rhea St
E 19th St
E Dayman St
Long Beach Blvd
Linde
Pasa
Ct

Noise Measurement Survey

Project Number: ______________________
Project Name: LB GENERAL PLAN

Test Personnel: L. FREEBERG
Equipment: LD 831

Site Number: ST 4 Date: 2/11/16

Time: From 9:35A To 9:50A

Site Location: 1940 LONG BEACH BLVD

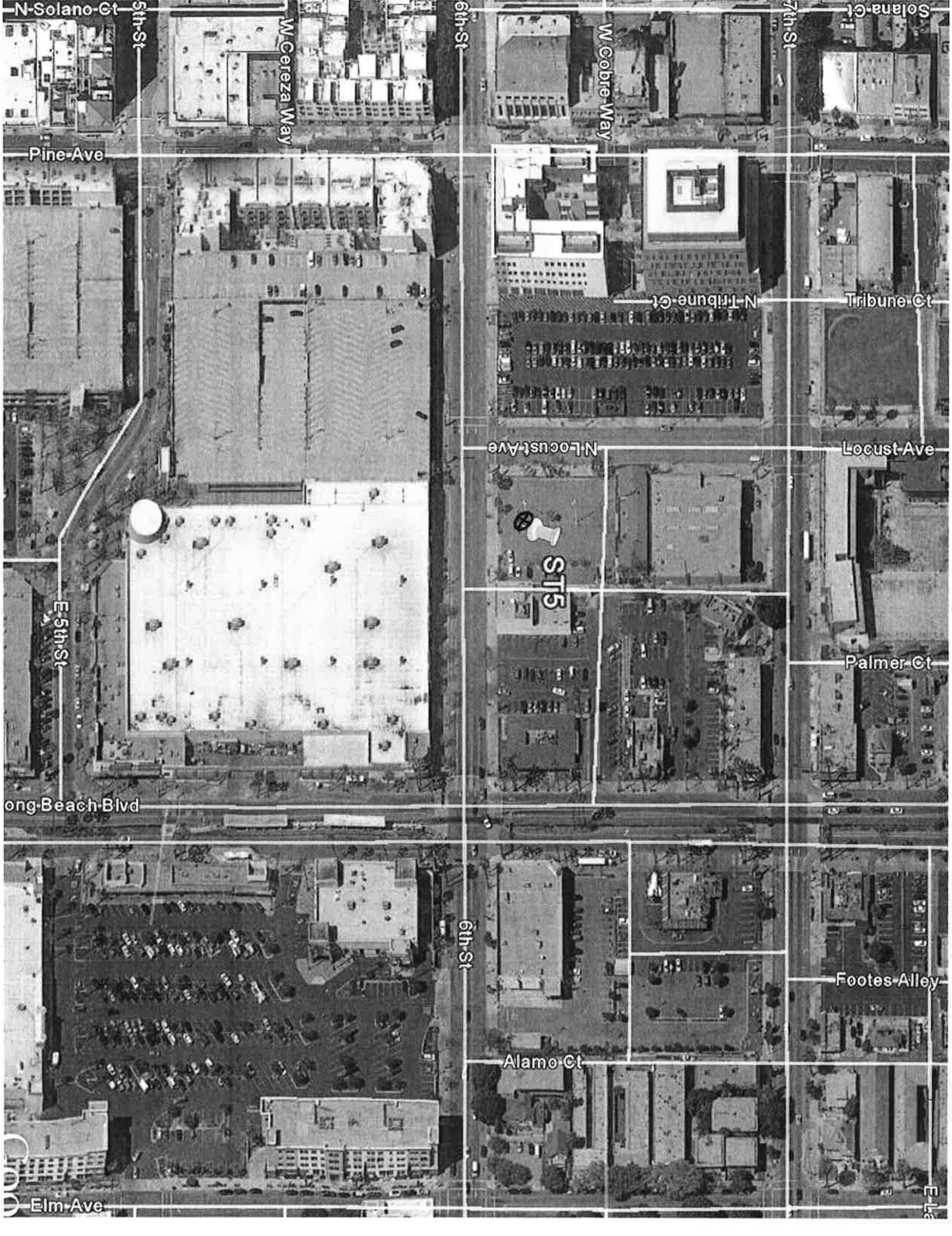
Primary Noise Sources: TRAFFIC ON LONG BEACH BLVD, BIRDS, DISTANT MUSIC

Comments: DATA FILE 230
PAUSED OUT PEDESTRIAN PASSBYS
TRAIN ON LB BLVD - 5 SECONDS 68 LEQ / 3 SECONDS 70 LEQ

Adjacent Roadways: LONG BEACH BLVD / RHEA ST.

File:	
L_{eq}	65.7
L_{max}	80.9
L_{min}	45.0
L_{2}	72.5
L_{8}	69.8
L_{25}	67.0
L_{50}	61.7
L_{90}	47.8
L_{99}	46.3

Atmospheric Conditions	
Average Wind Velocity (mph)	0.0
Maximum Wind Velocity (mph)	0.0
Temperature (F)	80.9
Relative Humidity (%)	22.3


N Solano Ct
5th St
W Cereza Way
6th St
W Cobre Way
7th St
Solana Ct
Pine Ave
N Tribune Ct
Tribune Ct
N Locust Ave
Locust Ave
ST5
E 5th St
Palmer Ct
ong Beach Blvd
6th St
Footes Alley
Alamo Ct
Elm Ave

Noise Measurement Survey

Project Number:
Project Name: LB GENERAL PLAN
Test Personnel: L. FREEBERG
Equipment: LD 831

Site Number: ST-5 Date: 2/11/16
Time: From 10:13A To 10:28A

Site Location: 614 LOCUST AVE IN PARKING LOT ADJACENT TO 6TH STREET.

Primary Noise Sources: TRAFFIC ON 6TH STREET, BIRDS

Comments: DATA FILE 231
PAUSED OUT SIRENS, PEDESTRIANS

Adjacent Roadways: 6 TH STREET, LOCUST AVE

File:	
L_{eq}	63.3
L_{max}	77.3
L_{min}	47.7
L_2	71.6
L_8	68.0
L_{25}	64.1
L_{50}	58.1
L_{90}	50.6
L_{99}	48.9

Atmospheric Conditions	
Average Wind Velocity (mph)	2.3
Maximum Wind Velocity (mph)	3.5
Temperature (F)	75.7
Relative Humidity (%)	27.1

Coronado Ave
6th St
MOVED TO
NEXT BLOCK
Redondo Ave
ST6
Newport Ave
E 4th St
Loma Ave
E 5th
©2010
Goo

Noise Measurement Survey

Project Number: ______
Project Name: LB GENERAL PLAN
Test Personnel: L. FREEBERG
Equipment: LD 831

Site Number: ST-6 Date: 2/11/16
Time: From 10:51A To 11:11A

Site Location: 600 REDONDO AVENUE IN PARKING LOT

Primary Noise Sources: TRAFFIC ON REDONDO AVE
CAR W/ LOUD MUSIC PASSBY

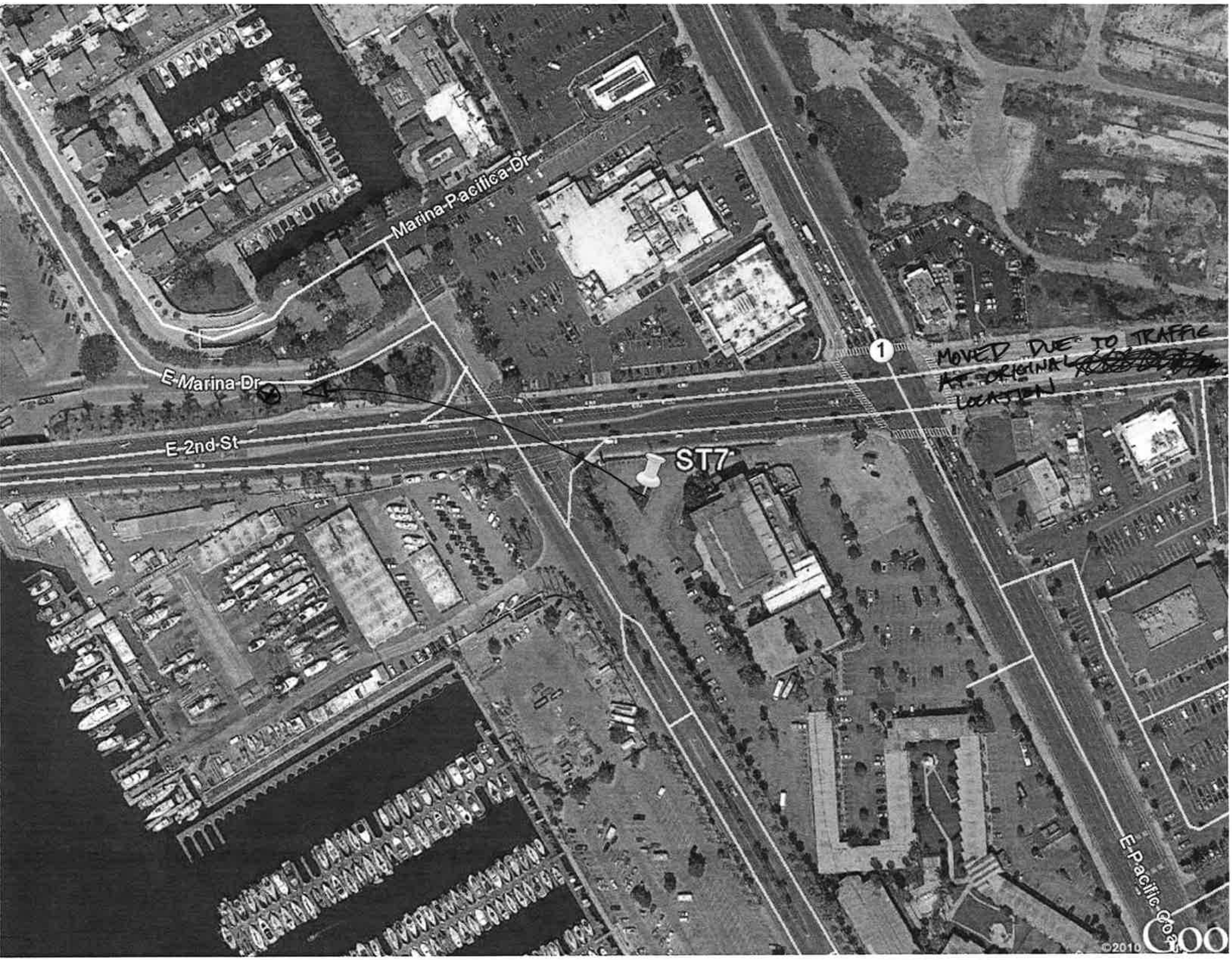
Comments: DATA FILE 232
AIRPLANE 27 SECONDS - 62 LEQ / 15 SECONDS - 68 LEQ / 30 SECONDS - 72 LEQ
PAUSED OUT CAR IN PARKING LOT PAST METER
MOTORCYCLE - 70 LEQ - 2 SECONDS / 2 SECONDS 63 LEQ / 4 SECONDS - 68 LEQ
HELICOPTER - 22 SECONDS - 77 LEQ

Adjacent Roadways: REDONDO AVE / 6TH STREET
27" HIGH BLOCK WALL ON A PORTION OF PARKING LOT ADJACENT TO REDONDO AVE.

File:	
L_{eq}	64.0
L_{max}	81.5
L_{min}	45.5
L_2	72.5
L_8	67.3
L_{25}	63.9
L_{50}	60.3
L_{90}	51.8
L_{99}	47.3

Atmospheric Conditions	
Average Wind Velocity (mph)	1.5
Maximum Wind Velocity (mph)	2.3
Temperature (F)	78.5
Relative Humidity (%)	29.8

*RAN MEASUREMENT 5 MIN LONGER TO BALANCE PAUSES
- 20 MINUTE MEASUREMENT


Marina-Pacifica-Dr
E-Marina-Dr
E-2nd-St
ST7
1
MOVED DUE TO TRAFFIC
AT ORIGINAL
LOCATION
E-Pacific-Coa
©2010
Goo

Noise Measurement Survey

Project Number: ______
Project Name: LB GENERAL PLAN
Test Personnel: L. FREEBERG
Equipment: LD 831

Site Number: ST-7 Date: 2/11/16
Time: From 2:11 P To 2:26

Site Location: 5800-6462 E. MARINA DR. ADJACENT TO 2ND STREET, NEAR BUS STOP

Primary Noise Sources: TRAFFIC ON 2ND STREET, BIRDS

Comments: DATA FILE 235
PAUSED OUT CARS ON MARINA ~~WAY~~ DRIVE
2ND STREET LEVEL IS ~10 FT HIGHER THAN MEASUREMENT LOCATION LEVEL

Adjacent Roadways: 2ND STREET / MARINA ~~WAY~~ DRIVE

File:	
L_{eq}	62.3
L_{max}	81.5
L_{min}	49.0
L_2	68.0
L_8	65.4
L_{25}	63.3
L_{50}	60.0
L_{90}	53.5
L_{99}	50.7

Atmospheric Conditions	
Average Wind Velocity (mph)	1.0
Maximum Wind Velocity (mph)	1.3
Temperature (F)	81.0
Relative Humidity (%)	27.9


E Las Lomas St
E El Jardin St
E La Pasada St
Los Altos Ave
N Bellflower Blvd
ST8
Earl Warren Dr
Merriam Way
Beach Dr
Pine Rd
Sam Johnson Rd
N Bryant Rd
E Lonna Linda Dr
Rd

Noise Measurement Survey

Project Number:
Project Name: LB GENERAL PLAN

Test Personnel: L. FREEBERG
Equipment: LD 831

Site Number: ST-8 Date: 2/11/16

Time: From 1:15P To 1:30P

Site Location: CAL STATE UNIVERSITY LONG BEACH NEAR BELLFLOWER BLVD AND BEACH DRIVE

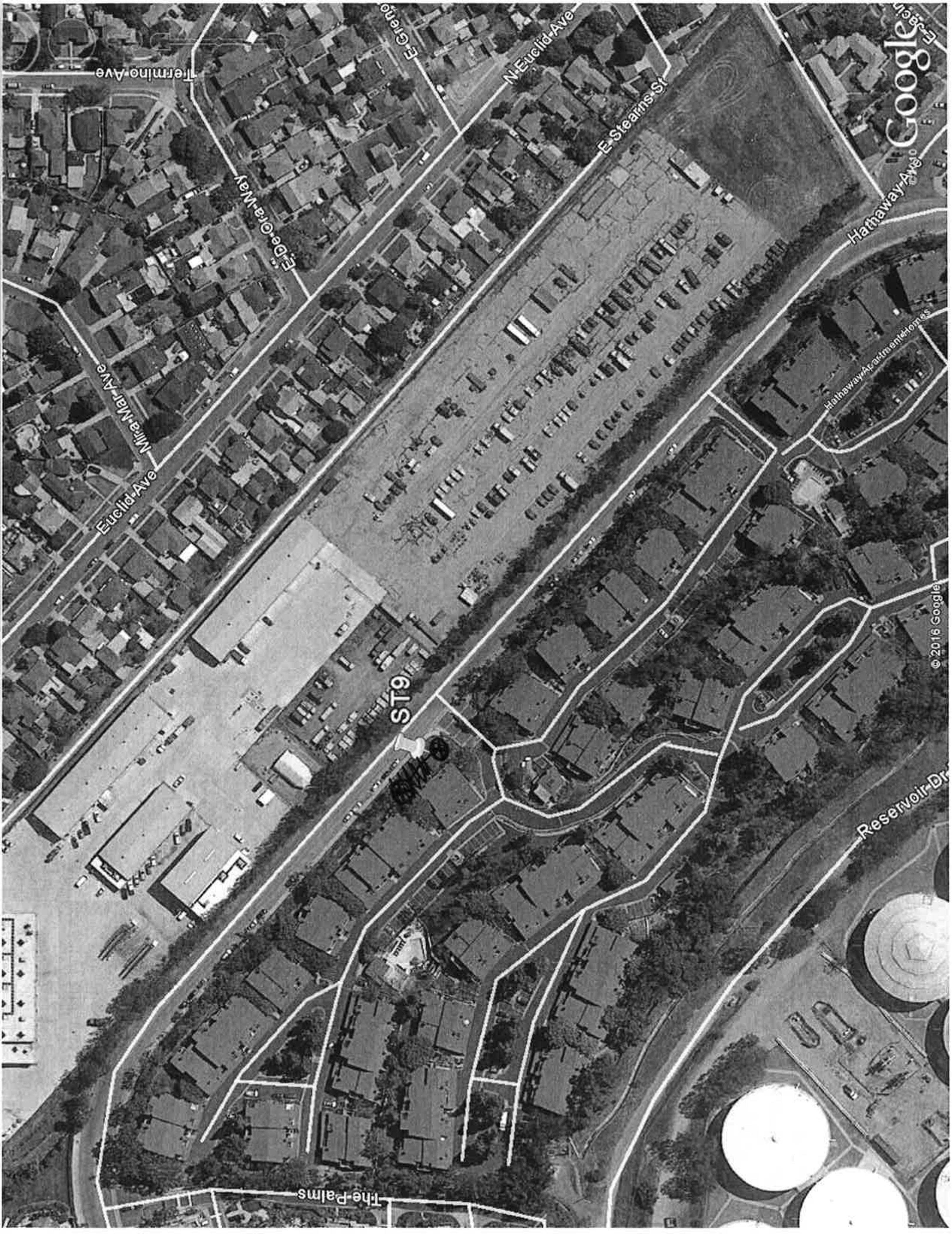
Primary Noise Sources: TRAFFIC ON BELLFLOWER BLVD, BIRDS MUSIC IN CAR / HORN

Comments: DATA FILE 234
AIRPLANE - 7 SECONDS - 63 DB / 23 SECONDS - 62 DB /

Adjacent Roadways: BELLFLOWER BLVD / BEACH DRIVE

File:	
L_{eq}	66.0
L_{max}	74.8
L_{min}	49.3
L_2	71.5
L_8	69.8
L_{25}	67.5
L_{50}	64.6
L_{90}	57.8
L_{99}	49.3

Atmospheric Conditions	
Average Wind Velocity (mph)	1.8
Maximum Wind Velocity (mph)	4.1
Temperature (F)	81.3
Relative Humidity (%)	33.3



Termino Ave
N Euclid Ave
E Stearns St
Mira Mar Ave
Euclid Ave
Hathaway Ave
Hathaway Apartment Homes
ST9
Reservoir Dr
The Palms
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Google

Noise Measurement Survey

Project Number:
Project Name: LB GENERAL PLAN
Test Personnel: L. FREEBERG
Equipment: LD 831

Site Number: ST-9 Date: 2/11/16 Time: From 11:42 A To 11:57 A

Site Location: 3500 HATHAWAY AVE APARTMENT COMPLEX OPEN GRASS AREA

Primary Noise Sources: TRAFFIC ON HATHAWAY AVE, DISTANT MUSIC IN APARTMENT

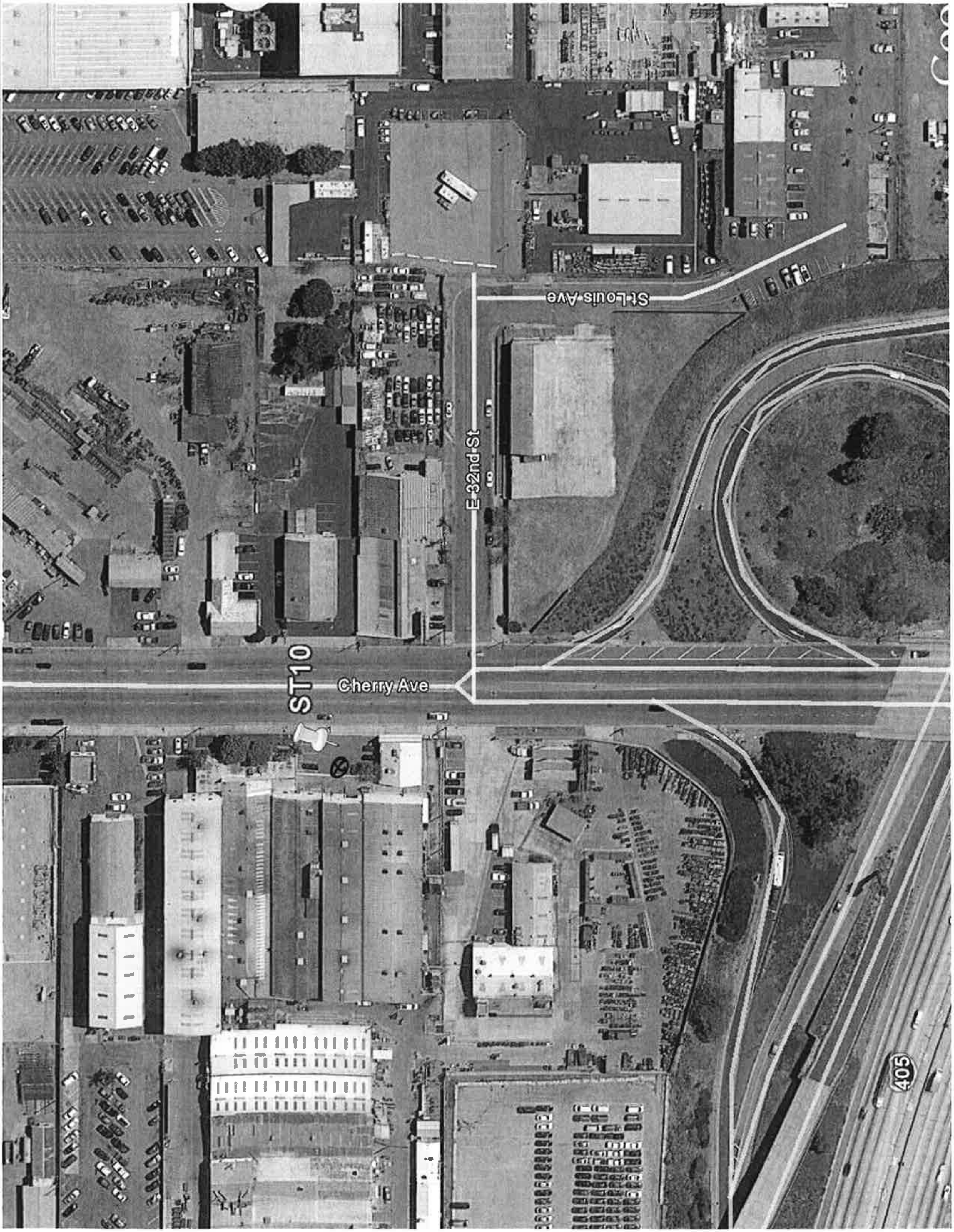
Comments: DATA FILE 233
AIRPLANE - 35 SECONDS - 54 DB / 8 SECONDS - 58 DB / 12 SECONDS - 59 DB - 17 SECONDS - 56 DB / 15 SECONDS - 55 DB
PAUSED OUT SIREN

Adjacent Roadways: HATHAWAY AVE

File:	
L_{eq}	62.0
L_{max}	75.0
L_{min}	42.4
L_2	69.9
L_8	67.5
L_{25}	62.6
L_{50}	55.6
L_{90}	46.4
L_{99}	43.6

Atmospheric Conditions	
Average Wind Velocity (mph)	1.0
Maximum Wind Velocity (mph)	3.7
Temperature (F)	85.1
Relative Humidity (%)	27.5

* LOCATION ~ 10 FT ABOVE ROAD LEVEL ON BERM OF APARTMENT LEVEL.



ST10
Cherry Ave
E 32nd St
St Louis Ave
405

Noise Measurement Survey

Project Number:
Project Name: LB GENERAL PLAN
Test Personnel: L. FREEBERG
Equipment: LD 831

Site Number: ST10 Date: 2/11/16
Time: From 8:31A To 8:46A

Site Location: 3245 CHERRY AVE IN PARKING AREA

Primary Noise Sources: TRAFFIC ON CHERRY AVE

Comments: DATA FILE 228
AIRPLANE - 5 SECONDS - 82 LEQ
HELICOPTER - 8 SECONDS - 74 LEQ / 5 SECONDS - 76 LEQ
MOTORCYCLE - 2 SECONDS - 96 LEQ

Adjacent Roadways: CHERRY AVE / 32ND ST

File:	
L_{eq}	76.2
L_{max}	99.3
L_{min}	61.3
L_2	80.7
L_8	78.5
L_{25}	76.7
L_{50}	73.9
L_{90}	67.7
L_{99}	63.0

Atmospheric Conditions	
Average Wind Velocity (mph)	0.9
Maximum Wind Velocity (mph)	1.2
Temperature (F)	67.1
Relative Humidity (%)	35.1


ST11
6800 E Wardlow Rd
Petaluma Ave
E Coralite St
E Premium St
Studebaker Rd
Lees Ave
Kallin Ave
Roxanne Ave

Noise Measurement Survey

Project Number:
Project Name: LB GENERAL PLAN

Test Personnel: L. FREEBERG
Equipment: LD 831

Site Number: ST-11 Date: 2/1/16

Time: From 2:47P To 3:02P

Site Location: 3401 STUDEBAKER ROAD IN PARKING LOT ADJACENT TO WARDLOW ROAD

Primary Noise Sources: TRAFFIC ON WARDLOW ROAD, WIND GUSTS TO 7.5MPH

Comments: DATA FILE 236

Adjacent Roadways: WARDLOW ROAD / PETALUMA AVE

File:	
L_{eq}	62.5
L_{max}	79.2
L_{min}	46.9
L_2	69.8
L_8	67.0
L_{25}	63.0
L_{50}	58.5
L_{90}	52.0
L_{99}	48.1

Atmospheric Conditions	
Average Wind Velocity (mph)	3.1
Maximum Wind Velocity (mph)	4.9
Temperature (F)	83.6
Relative Humidity (%)	17.1