Balboa Avenue Station Area Specific Plan

Acoustical Analysis Report

April 2018 | RDG-01.10

Prepared for:

RRM Design Group
3765 S. Higuera Street, Suite 102
San Luis Obispo, CA 93401

Prepared by:

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7578 El Cajon Boulevard
La Mesa, CA 91942

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ACRONYMS AND ABBREVIATIONS

ADT	Average Daily Trips
ANSI	American National Standards Institute
BASASP	Balboa Avenue Station Area Specific Plan
BNSF	Burlington Northern and Santa Fe
CALGreen	California Green Buildings Standards Code
Caltrans	California Department of Transportation
CBSC	California Building Standards Commission
CEQA	California Environmental Quality Act
City	City of San Diego
CNEL	Community Noise Equivalent Level
dB	Decibel
dBA	A-weighted decibels
FTA	Federal Transit Administration
Hz	Hertz
I-	Interstate
in./sec	inches per second
kHz	kilohertz
L_{DN}	Day-Night Level
L_{EQ}	Equivalent Sound Level
L_{MAX}	Maximum Sound Level
LRT	Light Rail Transit
mPa	micro-Pascals
MTS	Metropolitan Transit System
NSLU	Noise-Sensitive Land Use
PPV	peak particle velocity
RMS	root mean square
SANDAG	San Diego Association of Governments
SPL	Sound Pressure Level
STC	Sound Transmission Class

ACRONYMS AND ABBREVIATIONS (cont.)

TIS	Traffic Impact Study
TNM	Traffic Noise Model
U.S. DOT	U.S. Department of Transportation
VdB	Vibration Decibels

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EXECUTIVE SUMMARY

The Balboa Avenue Station Area Specific Plan (BASASP) area is within the Pacific Beach and Clairemont Mesa communities of the City of San Diego (City). The proposed BASASP is intended to provide a policy framework to guide public and private transit-oriented development, and multi-modal improvements adjacent to the Balboa Avenue Trolley Station consistent with the City's General Plan "City of Villages" planning strategy. This report presents an assessment of the potential construction and operational noise and vibration impacts associated with the proposed BASASP.

Implementation of Mitigation Measure Noi-1 would reduce construction-related noise impacts; however, at the program level it cannot be known whether the noise reduction measures would be adequate to reduce noise levels to below a level of significance. Construction-related noise impacts are therefore conservatively assessed as significant and unavoidable

Vibration-sensitive instruments and operations may require special consideration during construction activities and near rail lines. A site-specific vibration study would be required within specified distances from rail traffic, major construction sites, and pile driving activities. Although implementation of mitigation measures Noi-2 and Noi-3 would reduce potential vibration impacts, impacts would be significant and unavoidable.

Traffic noise levels would increase resulting from the buildout of the BASASP. Noise levels would increase by more than 3 A-weighted decibels (dBA) along Santa Fe Street. However, exterior noise levels would remain below the City's 65 dBA CNEL threshold for noise-sensitive land uses and would not result in a significant impact.

Exterior noise levels from implementation of the proposed BASASP may exceed the City's Noise Element exterior and interior noise level standards and the noise ordinance standards within the area. As a condition of approval, a site-specific acoustical study would be required where noise levels exceed the conditionally compatible exterior noise levels as defined in the City's Land Use/Noise Compatibility Guidelines. The completion of an exterior-to-interior noise analysis where exterior noise levels exceed 60 dBA CNEL for residential land uses and 65 dBA CNEL for commercial uses and the subsequent implementation of applicable attenuation measures (e.g., noise barriers and architectural enhancements including dual pane windows reduce interior noise) would reduce interior noise levels below the 45 dBA CNEL interior standard for residences and 50 dBA CNEL for commercial uses. Operational noise sources shall not generate noise levels in exceedance of the City's Noise Ordinance standards. Application of noise attenuation measures identified in the noise analysis would ensure that proposed new uses would be consistent with City policies and standards.

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1.0 INTRODUCTION

1.1 PURPOSE OF THE REPORT

This report analyzes potential noise and vibration impacts associated with the Balboa Avenue Station Area Specific Plan (BASASP). The report analyzes the potential impacts of future development within the BASASP area, and, as appropriate, identifies measures which can be taken to avoid adverse impacts related to noise and vibration. The analysis follows the guidelines within the City of San Diego's (City) *California Environmental Quality Act* (CEQA) *Significance Determination Thresholds* (City 2016).

1.2 PROJECT LOCATION

The BASASP area is approximately 0.70 square miles (210 acres), and is located in the Pacific Beach and Clairemont Mesa communities of the City, just north of Mission Bay Park (see Figure 1, *Regional Location Map* and Figure 2, *Project Vicinity*). Rose Creek borders the western edge of the BASASP area and provides an open space connection within the area. Interstate-5 (I-5) runs north-south through the middle of the BASASP area and is the boundary between the Pacific Beach community on the west and the Clairemont Mesa community on the east. Mission Bay Park is situated immediately south of the BASASP area.

1.3 PROJECT DESCRIPTION

The BASASP involves the preparation of a Specific Plan that would amend the Pacific Beach Community Plan/Local Coastal Plan to re-designate and rezone lands within the BASASP area. The proposed BASASP also provides recommendations and guidelines for the public right-of-way that would emphasize access to the Balboa Avenue Station and capitalize on the new regional transit connection in the BASASP area.

The proposed BASASP provides a policy framework to guide public and private transit-oriented development and multi-modal improvements adjacent to the Balboa Avenue Station consistent with the City General Plan "City of Villages" planning strategy. The Balboa Avenue Station will be a part of the San Diego Metropolitan Transit System's (MTS) light rail transit (LRT) Trolley system. MTS is currently constructing the Mid-Coast Corridor project, which involves an expansion of the Trolley's existing Blue Line from downtown San Diego to the University community, and which traverses the BASASP area. Service is anticipated to begin in 2021.

The BASASP is divided into seven major chapters: Land Use, Mobility, Urban Design, Recreation, Infrastructure and Public Utilities, Conservation, and Implementation.

The **Land Use Chapter** is designed to guide future development within the BASASP area, and it establishes land use designations for each portion of the community (see Figure 3, *Proposed Land Use Plan*). The BASASP proposes residential, community village, light industrial, institutional, and flood control/open space uses. Residential uses would be allowed within community village and residential land use designations. Up to 4,729 residential units would be allowed under the proposed BASASP.

The **Mobility Chapter** is intended to improve mobility throughout the BASASP area through the promotion of a complete streets network that capitalizes on access to transit, provision of a walkable

and pedestrian-friendly environment, and identification of traffic calming, bicycle facilities, and parking improvements.

The **Urban Design Chapter** establishes policies to enhance public plazas and roadways to create a pedestrian-oriented development pattern through building designs and streetscapes. The proposed BASASP aims to maintain and enhance the overall and individual character of the community.

The **Recreation Chapter** is intended to assure that the recreational needs of the community are met with a particular focus on enhancing and creating connections to Mission Bay Park and Rose Creek.

The **Infrastructure and Public Utilities Chapter** describes existing facilities and services, including: water, wastewater, storm water, solid waste, communications/energy services, schools, police and fire/emergency services and libraries.

The **Conservation Chapter** contains policies addressing sustainable development, urban runoff management, and air quality. The concepts of conservation and sustainability address the relationship between the built environment and the natural environment with the objective of achieving environmental benefits through energy and resource conversation.

The **Implementation Chapter** includes discussion of the administration, review process, and amendment process of the proposed BASASP.

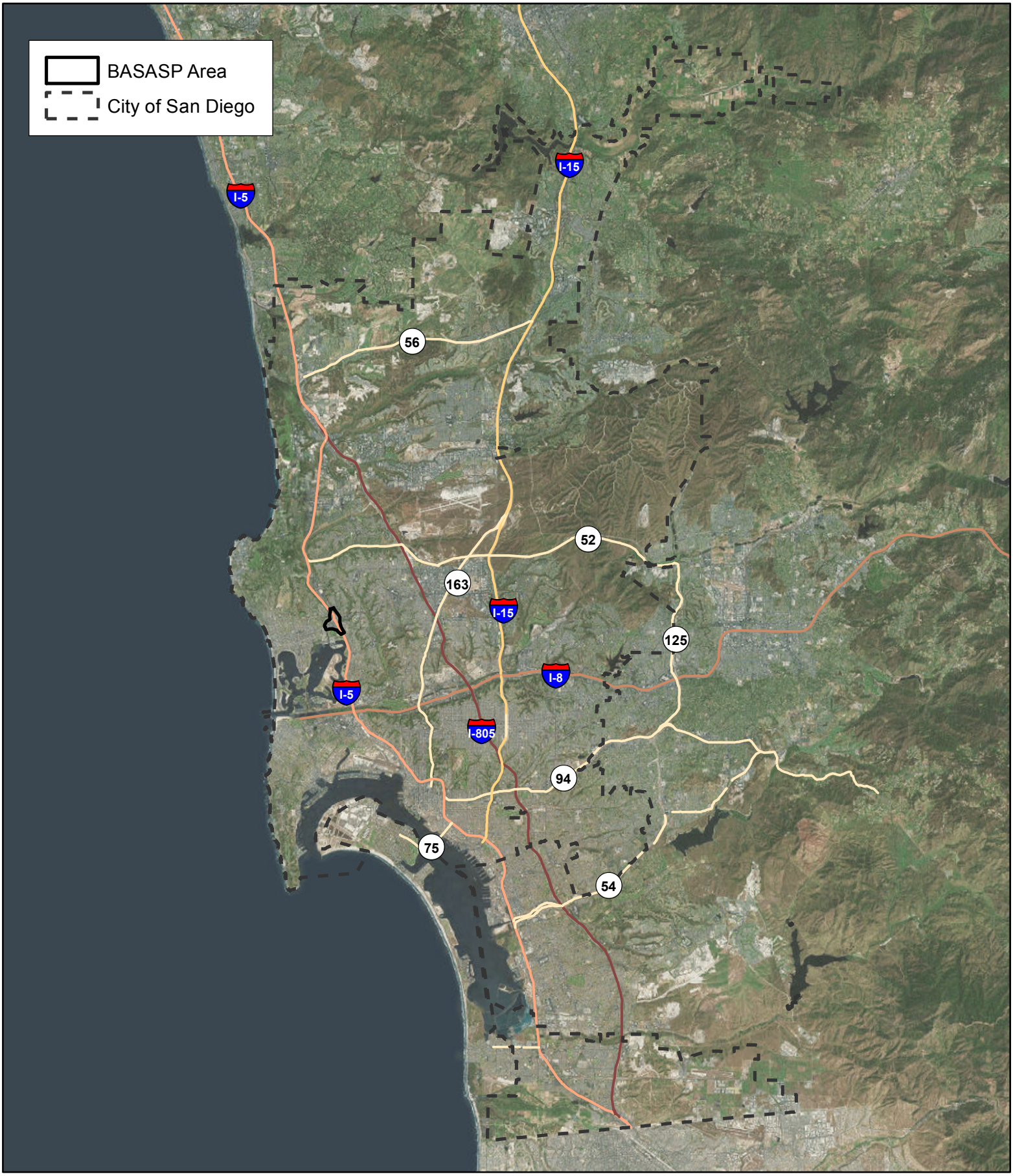
1.4 NOISE AND SOUND LEVEL DESCRIPTORS AND TERMINOLOGY

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

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air) to a hearing organ, such as a human ear. Noise is defined as loud, unexpected, or annoying sound.

In the science of acoustics, the fundamental model consists of a sound (or noise) source, a receiver, and the propagation path between the two. The loudness of the noise source and obstructions or atmospheric factors affecting the propagation path to the receiver contribute to the sound level and characteristics of the noise perceived by the receiver. The field of acoustics deals primarily with the propagation and control of sound.

Continuous sound can be described by frequency (pitch) and amplitude (loudness). A low frequency sound is perceived as low in pitch. Frequency is expressed in terms of cycles per second, or Hertz (Hz) (e.g., a frequency of 250 cycles per second is referred to as 250 Hz). High frequencies are sometimes



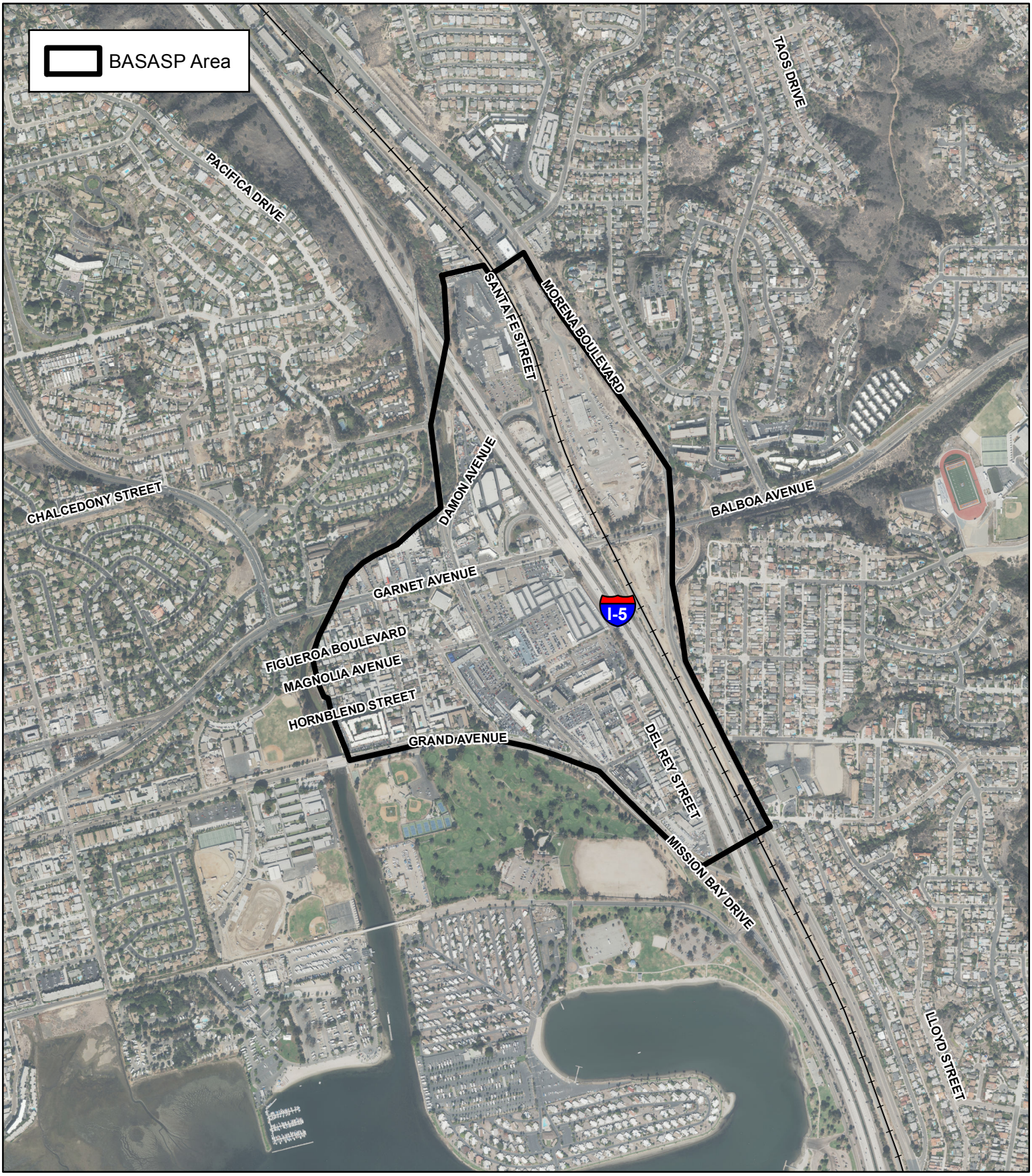
Balboa Ave Station Area Specific Plan

0 5 10 Miles

N

Figure 1

Regional Location Map



Balboa Ave Station Area Specific Plan

0 0.25 0.5 Miles

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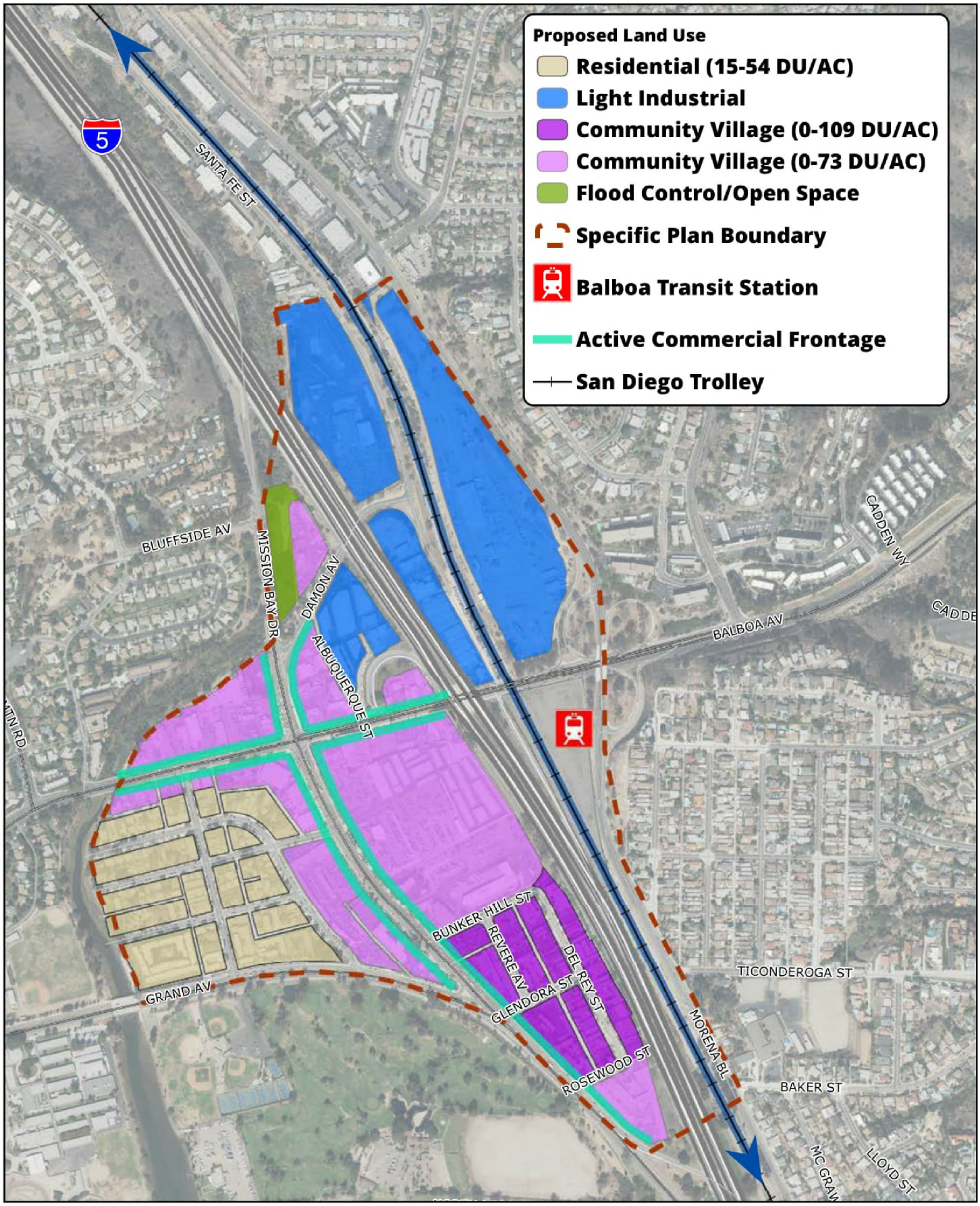
Figure 2

Project Vicinity (Aerial Photograph)



Balboa Ave Station Area Specific Plan

0 1,000 2,000 Feet

N

Figure 3

Proposed Land Use Plan

more conveniently expressed in kilohertz (kHz), or thousands of Hertz. The audible frequency range for humans is generally between 20 Hz and 20,000 Hz.

The amplitude of pressure waves generated by a sound source determines the loudness of that source. A logarithmic scale is used to describe sound pressure level (SPL) in terms of dBA units. The threshold of hearing for the human ear is approximately 0 dBA, which corresponds to 20 micro Pascals (mPa).

Because decibels are logarithmic units, SPL cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3 dBA increase. In other words, when two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dBA higher than one source under the same conditions.

1.5 VIBRATION DESCRIPTORS AND TERMINOLOGY

Vibration is defined as any oscillatory motion induced in a structure or mechanical device as a direct result of some type of input excitation. Sources of ground-borne vibrations include natural phenomena (earthquakes, volcanic eruptions, sea waves, landslides, etc.) or manufactured (explosions, trains, machinery, traffic, construction equipment, etc.). Vibration sources may be transient, steady-state (continuous), or pseudo steady-state. Examples of transient construction vibrations are those that occur from blasting with explosives, impact pile driving, demolition, and wrecking balls.

Ambient and source vibration information are expressed in terms of the peak particle velocity (PPV) in inches per second (in./sec). The root mean square (RMS) of a signal is the average of the squared amplitude of the signal in decibels (relative to 1 micro-inch per second). Because the net average of a vibration signal is zero, the RMS amplitude is used to describe the “smoothed” vibration amplitude. The RMS amplitude is always less than the PPV and is always positive. The RMS average is typically calculated over a one-second period.

The background vibration velocity level in residential areas is usually 50 vibration decibels (VdB) or lower; this is well below the level perceptible by humans, which is approximately 65 VdB. Most perceptible indoor vibration is caused by sources within buildings, such as the operation of mechanical equipment, movement of people, or slamming of doors. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If the roadway is smooth, the vibration from traffic is rarely perceptible.

2.0 REGULATORY FRAMEWORK

2.1 STATE REGULATIONS

2.1.1 California Noise Control Act of 1973

Sections 46000 through 46080 of the California Health and Safety Code, known as the California Noise Control Act of 1973 (Act), find that excessive noise is a serious hazard to the public health and welfare, and that exposure to certain levels of noise can result in physiological, psychological, and economic damage. The Act also finds that there is a continuous and increasing bombardment of noise in the urban, suburban, and rural areas. The Act declares that the State of California has a responsibility to protect the health and welfare of its citizens by the control, prevention, and abatement of noise. It is the policy of the State to provide an environment for all Californians free from noise that jeopardizes their health or welfare.

2.1.2 California Environmental Quality Act

Under CEQA, lead agencies are directed to assess conformance to local or other agency noise standards; measure and identify the potentially significant exposure of people to (or generation of) excessive ground-borne vibration or noise levels; and measure and identify potentially significant permanent or temporary increases in ambient noise levels. Implementation of CEQA ensures that during the decision-making stage of development, decision-makers and the public will be informed of any potentially excessive noise levels and available mitigation measures to reduce them to acceptable levels.

2.1.3 California Noise Insulation Standards (California Code of Regulations Title 24)

In 1974, the California Commission on Housing and Community Development adopted noise insulation standards for hotels, motels, dormitories, and multi-family residential buildings (California Building Standards Commission [CBSC] 2016a). Title 24 requires that residential structures be designed to prevent the intrusion of exterior noise so that the interior noise, with windows closed, attributable to exterior sources shall not exceed 45 dBA CNEL in any habitable room. The regulations also specify that acoustical studies must be prepared whenever a multi-family residential building or structure may be exposed to exterior noise levels of 60 dBA CNEL or greater. Such acoustical analysis must demonstrate that the residences have been designed to limit intruding noise to a maximum interior noise level of 45 dBA CNEL.

2.1.4 2016 California Green Buildings Standards Code

Section 5.507 of the California Green Buildings Standards Code ([CALGreen] CBSC 2016b) establishes requirements for acoustical control in non-residential buildings. The standards require that wall and roof-ceiling assemblies making up the building envelope shall have a Sound Transmission Class (STC) value of at least 50, and exterior windows shall have a minimum STC of 40 or Outdoor-Indoor STC of 30 for buildings within: (1) the 65 CNEL noise contour of an airport; or (2) the 65 CNEL or L_{DN} noise contour of a freeway or expressway, railroad, industrial source, or fixed-guideway source. Wall and floor-ceiling assemblies separating tenant spaces and public places shall have an STC of at least 40.

Additionally, Section A5.507.5 requires that classrooms have a maximum interior background noise level of no more than 45 dBA L_{EQ}.

2.2 LOCAL REGULATIONS

2.2.1 City of San Diego General Plan Noise Element

The Noise Element of the City of San Diego General Plan includes the following policies intended to minimize noise through standards, site planning, and noise mitigation.

1. Policy NE-A.1: Separate excessive noise-generating uses from residential and other noise-sensitive land uses with a sufficient spatial buffer of less sensitive uses.

2. Policy NE-A.2: Assure the appropriateness of proposed developments relative to existing and future noise levels by consulting the guidelines for noise-compatible land use (shown on Table NE-3) to minimize the effects on noise-sensitive land uses.

3. Policy NE-A.3: Limit future residential and other noise-sensitive land uses in areas exposed to high levels of noise.

4. Policy NE-A.4: Require an acoustical study consistent with Acoustical Study Guidelines (Table NE-4) for proposed developments in areas where the existing or future noise level exceeds or would exceed the "compatible" noise level thresholds as indicated on the Land Use -Noise Compatibility Guidelines (Table NE-3), so that noise mitigation measures can be included in the proposed project design to meet the noise guidelines.

5. Policy NE-A.5: Prepare noise studies to address existing and future noise levels from noise sources that are specific to a community when updating community plans.

In addition, the Noise Element includes Land Use - Noise Compatibility Guidelines which identify the limits for acceptable noise levels for different land use categories, as illustrated in Table 1 *City of San Diego Land Use - Noise Compatibility Guidelines.* Although not considered compatible, the City conditionally allows some uses to be exposed to an exterior noise level of up to 75 dBA CNEL in areas affected primarily by motor vehicle noise.

Table 1
CITY OF SAN DIEGO LAND USE NOISE COMPATIBILITY GUIDELINES[1]

Land Use Category	Exterior Noise Exposure (dBA CNEL)				
	<60	60-65	65-70	70-75	75+
Parks and Recreational					
Parks, Active and Passive Recreation					
Outdoor Spectator Sports, Golf Courses; Water Recreational Facilities; Indoor Recreation Facilities					
Agricultural					
Crop Raising & Farming; Community Gardens, Aquaculture, Dairies; Horticulture Nurseries & Greenhouses; Animal Raising, Maintain & Keeping; Commercial Stables					
Residential					
Single Dwelling Units; Mobile Homes		45			
Multiple Dwelling Units		45	45		
Institutional					
Hospitals; Nursing Facilities; Intermediate Care Facilities; K-12 Educational Facilities; Libraries; Museums; Child Care Facilities		45			
Other Educational Facilities including Vocational/Trade Schools and Colleges, and Universities)		45	45		
Cemeteries					
Retail Sales					
Building Supplies/Equipment; Groceries; Pets & Pet Supplies; Sundries, Pharmaceutical, & Convenience Sales; Apparel & Accessories			50	50	
Commercial Services					
Building Services; Business Support; Eating & Drinking; Financial Institutions; Maintenance & Repair; Personal Services; Assembly & Entertainment (includes public and religious assembly); Radio & Television Studios; Golf Course Support			50	50	
Visitor Accommodations		45	45	45	
Offices					
Business & Professional; Government; Medical, Dental & Health Practitioner; Regional & Corporate Headquarters			50	50	
Vehicle and Vehicular Equipment Sales and Services Use					
Vehicle Repair & Maintenance; Vehicle Sales & Rentals; Vehicle Equipment & Supplies Sales & Rentals; Vehicle Parking					
Wholesale, Distribution, Storage Use Category					
Equipment & Materials Storage Yards; Moving & Storage Facilities; Warehouse; Wholesale Distribution					

Table 1 (cont.)
CITY OF SAN DIEGO LAND USE NOISE COMPATIBILITY GUIDELINES[1]

Land Use Category				Exterior Noise Exposure (dBA CNEL)				
				<60	60-65	65-70	70-75	75+
Industrial								
Heavy Manufacturing; Light Manufacturing; Marine Industry; Trucking & Transportation Terminals; Mining & Extractive Industries								
Research & Development							50	
	Compatible	Indoor Uses	Standard construction methods should attenuate exterior noise to an acceptable indoor noise level.					
		Outdoor Uses	Activities associated with the land use may be carried out.					
45, 50	Conditionally Compatible	Indoor Uses	Building structure must attenuate exterior noise to the indoor noise level indicated by the number (45 or 50) for occupied areas.					
		Outdoor Uses	Feasible noise mitigation techniques should be analyzed and incorporated to make the outdoor activities acceptable.					
	Incompatible	Indoor Uses	New construction should not be undertaken.					
		Outdoor Uses	Severe noise interference makes outdoor activities unacceptable.					

Source: City 2008 (as amended in 2015)

[1] Compatible noise levels and land use definitions reflect amendments to the City's General Plan Noise Element approved in 2015.

2.2.2 City of San Diego Municipal Code

The City of San Diego Municipal Code Chapter 5 Article 9.5, Noise Abatement, and Control, declares that the making, creation, or continuance of excessive noises are detrimental to the public health, comfort, convenience, safety, welfare, and prosperity of the residents of the City. Section 59.5.0401 establishes sound level limits. The exterior noise limits for each land use classification are summarized in Table 2, *City of San Diego Table of Applicable Limits*. One-hour average sound levels are not to exceed the applicable limit. The noise subject to these limits is defined as that part of the total noise at the specified location that is due solely to the action of said person.

Per the Municipal Code Section 59.5.0404, construction noise levels measured at or beyond the property lines of any property zoned residential shall not exceed an average sound level greater than 75 dB during the 12-hour period from 7:00 a.m. to 7:00 p.m. Further, construction activity is prohibited between the hours of 7:00 p.m. of any day to 7:00 a.m. of the following day, or on legal holidays as specified in Section 21.04 of the Municipal Code. Exceptions are allowed and subject to a permit granted by the Noise Abatement and Control Administrator.

Table 2
CITY OF SAN DIEGO TABLE OF APPLICABLE NOISE LIMITS

Land Use Zone	Time of Day	One-hour Average Sound Level (dBA)
Single Family Residential	7:00 a.m. to 7:00 p.m.	50
	7:00 p.m. to 10:00 p.m.	45
	10:00 p.m. to 7:00 a.m.	40
Multi-Family Residential (up to a maximum density of 1/2000)	7:00 a.m. to 7:00 p.m.	55
	7:00 p.m. to 10:00 p.m.	50
	10:00 p.m. to 7:00 a.m.	45
All other Residential	7:00 a.m. to 7:00 p.m.	60
	7:00 p.m. to 10:00 p.m.	55
	10:00 p.m. to 7:00 a.m.	50
Commercial	7:00 a.m. to 7:00 p.m.	65
	7:00 p.m. to 10:00 p.m.	60
	10:00 p.m. to 7:00 a.m.	60
Industrial or Agricultural	Anytime	75

Source: City of San Diego Municipal Code, Chapter 5, Article 9.5, Division 4, §59.5.0401, Sound Level Limits

3.0 EXISTING NOISE ENVIRONMENT

3.1 EXISTING LAND USES

The BASASP area contains a mix of residential, commercial, industrial, institutional, and open space uses.

3.2 NOISE AND VIBRATION SENSITIVE LAND USES

Noise-sensitive land uses (NSLUs) are land uses that may be subject to stress and/or interference from excessive noise, such as residential dwellings, schools, transient lodging (hotels), hospitals, educational facilities, and libraries. Industrial and commercial land uses are generally not considered sensitive to noise. NSLUs in the BASASP area include residences, hotels, and open space.

Land uses in which ground-borne vibration could potentially interfere with operations or equipment, such as research, manufacturing, hospitals, and university research operations (California Department of Transportation [Caltrans] 2013) are considered "vibration-sensitive." The degree of sensitivity depends on the specific equipment that would be affected by the ground-borne vibration. Certain historic structures, depending on age and construction, can be more vulnerable to damage from excessive vibration. Vibration-sensitive land uses within the BASASP area include research facilities along Bunker Hill Street, and potential vibration-sensitive manufacturing facilities. In addition, excessive levels of ground-borne vibration of either a regular or an intermittent nature can result in annoyance to residential and hotel uses.

3.3 AMBIENT NOISE LEVELS

A community noise survey was conducted to document noise levels throughout the BASASP area. Short-term daytime measurements at nine locations were selected to be representative of typical conditions in the planning area. The short-term measurements show the average sound level over roughly 15-minute periods on a weekday in September 2017. The locations were chosen based on land uses and proximity to nearby roadways. Noise measurement locations are shown on Figure 4, *Ambient Noise Survey*.

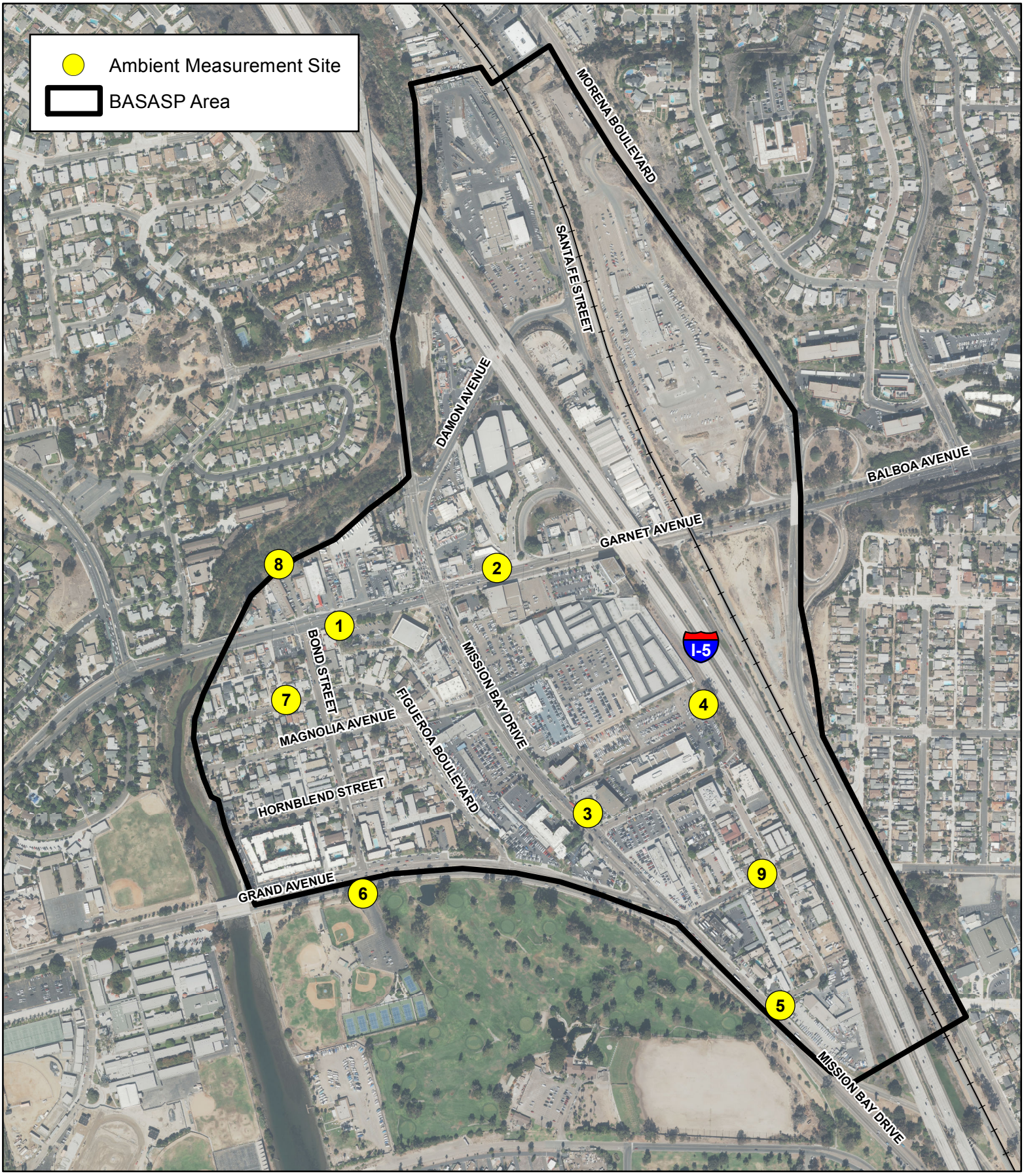
The community noise survey represents a range of the existing conditions and provides a representation of baseline conditions in the study area. The sources of noise varied between sites, but the primary noise generator in most locations is vehicular traffic.

The measured average noise levels ranged from 53 to 73 dBA L_{EQ}. The loudest average noise level was 72.8 dBA L_{EQ}. This measurement (Site 2) was located adjacent to Garnet Avenue which runs perpendicular to I-5. Another site measuring at 71.7 dBA L_{EQ} (Site 5) was located along Mission Bay Drive. Though these measurements provide a snapshot observation of the noise environment, noise can fluctuate widely throughout the day. Complete noise monitoring results are included in Table 3, *Noise Monitoring Results*. Individual site survey sheets can be found in Appendix A, *Site Survey Measurement Sheets*.

Table 3
NOISE MONITORING RESULTS

Site	Location	Time	Measured Noise Level (dBA L_{eq})
Site 1	Garnet Avenue east of Bond Street	11:31 a.m.- 11:41 a.m.	70.8
Site 2	Garnet Avenue west of I-5 SB Onramp	11:06 a.m. - 11:16 a.m.	72.8
Site 3	Mission Bay Drive north of Bunker Hill Street	9:25 a.m. - 9:35 a.m.	66.1
Site 4	3030 Bunker Hill Street Parking Lot	9:52 a.m. - 10:00 a.m.	65.2
Site 5	Mission Bay Drive at Rosewood Street	1:26 p.m. - 1:36 p.m.	71.7
Site 6	Grand Avenue at Bond Street	1:09 p.m. - 1:19 p.m.	69.5
Site 7	Figueroa Boulevard west of Bond Street	11:53 a.m. - 12:01 p.m.	53.2
Site 8	North of Bond Street and Garnet Avenue	12:20 p.m. - 12:30 p.m.	53.3
Site 9	Glendora Street at Del Rey Street	1:40 pm. - 1:50 p.m.	61.3

Note: All site measurements taken on September 19, 2017.



Balboa Ave Station Area Specific Plan

0 750 1,500 Feet

N

Figure 4

Ambient Noise Survey

4.0 ANALYSIS METHODOLOGY AND ASSUMPTIONS

4.1 METHODOLOGY AND EQUIPMENT

4.1.1 Ambient Noise Survey

The following equipment was used to measure existing noise levels in the BASASP area:

- Larson Davis System LxT Integrating Sound Level Meters
- Larson Davis Model CAL150 Calibrator
- Windscreen and tripod for the sound level meter
- Digital camera

The sound level meter was field-calibrated immediately prior to the noise measurements to ensure accuracy. All sound level measurements conducted and presented in this report were made with a sound level meter that conforms to the American National Standards Institute (ANSI) specifications for sound level meters (ANSI SI.4-1983 R2006). All instruments were maintained with National Institute of Standards and Technology traceable calibration per the manufacturers' standards.

4.1.2 Noise Modeling Software

Modeling of the outdoor noise environment for this report used the TNM 2.5 software. The TNM was released in February 2004, by the U.S. Department of Transportation (U.S. DOT), and calculates the daytime average Hourly L_{EQ} from three-dimensional model inputs and traffic data (Caltrans 2004).

The one-hour L_{EQ} noise level is calculated utilizing peak-hour traffic; peak-hour traffic volumes can be estimated based on the assumption that 10 percent of the average daily traffic would occur during a peak hour. The model-calculated one-hour L_{EQ} noise output is the equivalent to the CNEL (Caltrans 2009).

4.2 ASSUMPTIONS

4.2.1 Vehicular Traffic Noise

Vehicles traveling along major local roadways and freeways generate noise levels which affect adjacent land uses. Traffic noise generated on a roadway is dependent on vehicle speed, volume, flow, percentage of vehicle types, properly functioning muffler systems, and pavement type and conditions. Traffic noise is also dependent on the presence of barriers and the distance between the noise source and receptor. In general, as traffic volumes increase, noise levels increase. This condition exists until there is so much traffic that flow degrades, and speeds decrease which reduces noise levels. Furthermore, a heavy truck generates more noise than a car when travelling at the same speed and distance. Roads with the same amount of traffic can have higher or lower sound levels depending on the mixture of vehicles.

A noise contour map displays linear bands of similar noise levels emanating from a noise source. Noise is at the highest level near the source and decreases with distance from the source. Existing and future (2035) traffic volumes for BASASP area streets were derived from the Traffic Impact Study prepared for the BASASP (Kimley Horn 2017). Existing and future (2035) traffic volumes for I-5 were provided by SANDAG's Transportation Forecast Information Center (SANDAG 2017a).

Existing vehicular traffic noise level contours in the area are depicted in Figure 5, *Existing Transportation Noise Contours*. The noise levels are expressed in terms of CNEL. All noise contours depict the predicted noise level based on existing traffic volumes, and do not reflect attenuating effects of existing features such as noise barriers, buildings, topography, and dense vegetation. Modeling data used to develop the traffic contour maps is included in Appendix B, *Existing and Future Traffic Noise Levels*.

The roadway generating the greatest noise levels in the area is the I-5. Within the BASASP area, major traffic noise generators are associated with Garnet Avenue, Balboa Avenue, Grand Avenue, Morena Boulevard, and Mission Bay Drive. The portions of the BASASP area currently affected by noise levels exceeding 65 CNEL are generally located adjacent to freeways and major roadways. In many areas along freeways, noise levels exceed 70 CNEL. Existing land uses in these areas include industrial, commercial, and open space. Residential uses are currently exposed to noise levels exceeding 65 CNEL along the I-5, Grand Avenue, Mission Bay Drive, and Garnet Avenue corridors, and include single- and multi-family residential development.

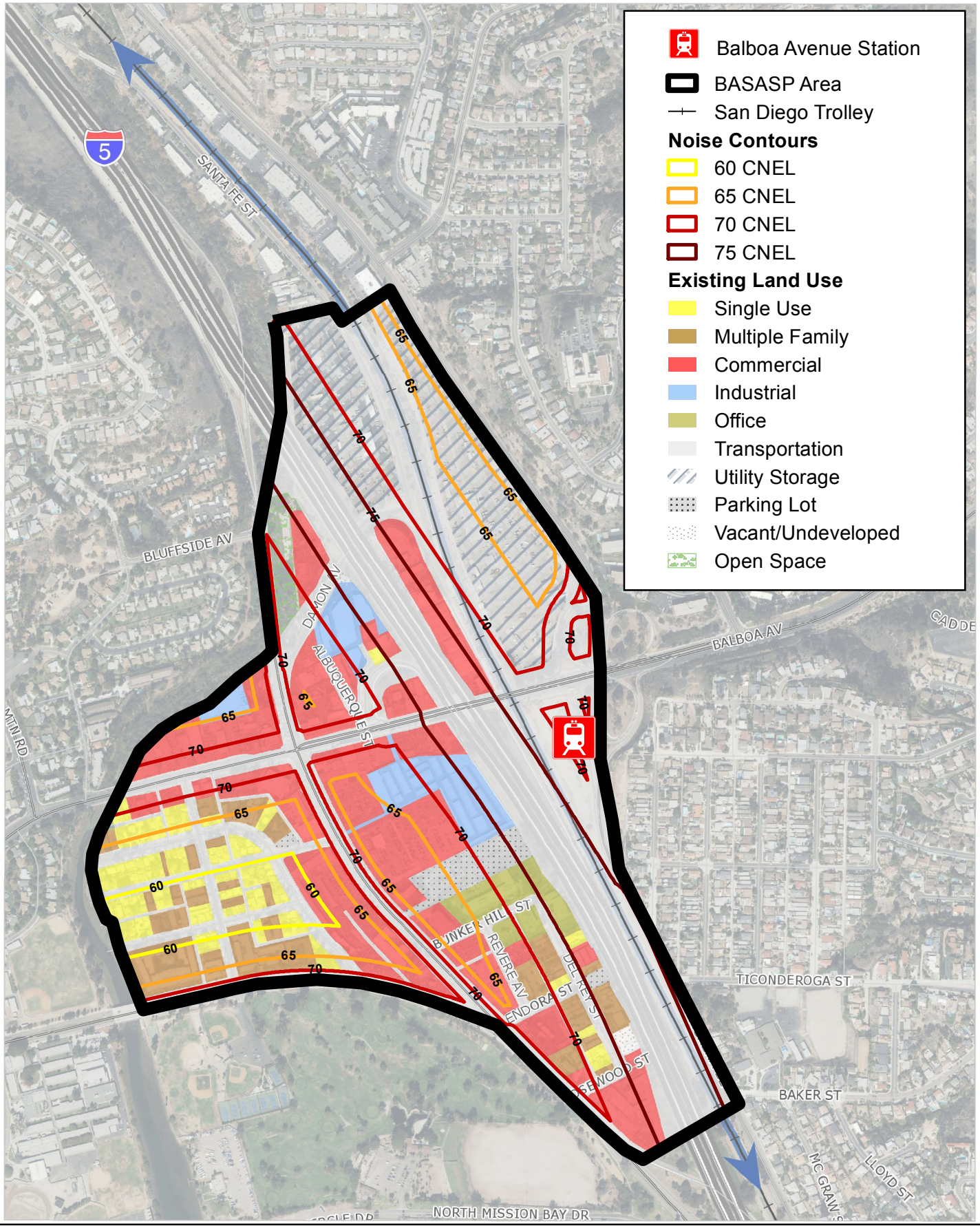
4.2.2 Railway Noise

Rail traffic on existing tracks would generate elevated noise levels within the BASASP area. These tracks are located east of, and are roughly parallel to I-5. They currently support the operation of Amtrak passenger trains, COASTER commuter trains operated by the North County Transit District (NCTD), and freight trains operated by Burlington Northern and Santa Fe (BNSF). Upon completion, the San Diego MTS Trolley Blue Line extension will also use the railway corridor through the BASASP area.

Passenger trains, freight trains, and LRT vehicles generate high, relatively brief, intermittent noise events. Although there are no at-grade crossings with warning bells within the BASASP area, all trains and LRT vehicles are equipped with horns, whistles, and/or bells for use in emergency situations and as a general audible warning to alert people in the vicinity of the tracks. Sound level distances from future Trolley service were derived from the SANDAG's Noise and Vibration Impacts Technical Report for the Mid-Coast Corridor project (SANDAG 2014). Freight and passenger train noise levels were calculated based on Amtrak, COASTER, and freight train assumptions provided by the Los Angeles-San Diego-San Luis Obispo Rail Corridor Agency (LOSSAN; 2012).

4.2.3 Stationary Noise Sources

The BASASP area includes various stationary noise sources including industrial and commercial activities. Noise levels from stationary sources are highly localized, and may vary during the day based on the specific activity being performed, atmospheric conditions, and other factors. These noise sources can be continuous, and may contain tonal components that may be annoying to people who live in the nearby vicinity. Stationary noise levels throughout the BASASP area may also vary due to different periods of activity depending on the time of day or day of the week.



Balboa Avenue Station Area Specific Plan

0 1,000 2,000 Feet

N

Figure 5

Existing Transportation Noise Contours

4.3 GUIDELINES FOR THE DETERMINATION OF SIGNIFICANCE

The following thresholds are based on the City's CEQA Significance Determination Thresholds and Noise Ordinance, as applicable to the proposed project.

A significant noise impact would occur if the proposed project would:

1. Result in temporary construction noise that exceeds 75 dBA L_{EQ} (12 hour) at the property line of a residentially-zoned property from 7:00 a.m. to 7:00 p.m. (as identified in Section 59.0404 of the City's Municipal Code) or if non-emergency construction occurs during the 12-hour period from 7:00 p.m. to 7:00 a.m.

2. Locate vibration-sensitive land uses within screening distances from the railway corridor as specified by the Federal Transit Administration (FTA; 2006). Subject vibration-sensitive land uses to construction-related ground-borne vibration that exceeds the "strongly perceptible" vibration annoyance potential criteria for human receptors, as specified by Caltrans (2013), of 0.1 inches per second peak particle velocity (PPV), and 0.5 inches per second PPV for damage to older residential structures for continuous/frequent intermittent construction sources (such as impact pile drivers, vibratory pile drivers, and vibratory compaction equipment).

3. Result in or create a significant permanent increase in the existing noise levels. For the purposes of this analysis, a significant increase would be greater than a perceptible change (3 CNEL) over existing conditions or the generation of noise levels at a common property line that exceed the limits shown in Table 2.

The following conditions of approval would be required for all proposed new uses:

4. Projects shall not expose new development to noise levels at exterior use areas or interior areas in excess of the noise compatibility guidelines established in the City's General Plan Noise Element. The conditionally compatible noise levels for project land uses are 65 CNEL for single-family residential, 70 CNEL for multi-family residential, and 75 CNEL for commercial-retail and for active and passive recreation. For outdoor uses at a conditionally compatible land use, feasible noise mitigation techniques should be analyzed and incorporated to make the outdoor activities acceptable. For indoor uses at a conditionally compatible land use, exterior noise must be attenuated to 45 CNEL for single- and multi-family residential and 50 CNEL for commercial-retail to be considered a compatible land use.

5. Projects located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or private airstrip, shall not expose people residing or working in the project area to excessive noise levels.

5.0 IMPACTS

5.1 ISSUE 1: TEMPORARY INCREASE IN AMBIENT NOISE LEVELS

5.1.1 Impacts

Although typically short-term, construction can be a substantial source of noise. The primary noise source is the operation of heavy construction equipment and the impact noise associated with blasting and pile driving. As shown in Table 4, *Typical Construction Equipment Noise Levels*, operation of construction equipment would have the potential to generate high noise levels for construction activities, depending on the type, duration, and location of the activity.

Table 4
TYPICAL CONSTRUCTION EQUIPMENT
NOISE LEVELS

Equipment	Typical Noise Level (dBA at 50 feet from source)
Air Compressor	74
Backhoe	74
Ground Compactor	76
Concrete Mixer Truck	75
Crane	73
Dozer	78
Grader	81
Jack Hammer	82
Front End Loader	75
Paver	74
Impact Pile Driver	94
Pumps	78
Roller	73
Scraper	80
Dump Truck	73

Source: U.S. Department of Transportation Roadway Construction Noise Model, 2008.

Construction activities related to implementation of the proposed BASASP would not take place all at once; however, future development accommodated by the proposed BASASP would have the potential to temporarily generate construction noise resulting in a short-term elevated noise levels to nearby noise sensitive land uses.

The City regulates noise associated with construction equipment and activities through enforcement of Municipal Code Section 59.5.0404 standards related to hours and days of construction activity. The ordinance prohibits noise levels greater than 75 dBA L_{EQ} (12-hour) at any residential property line during the 12-hour period from 7:00 a.m. to 7:00 p.m. Furthermore, the City imposes conditions for approval of building or grading permits.

5.1.2 Significance of Impacts

Because construction noise attributed to future projects in the BASASP area would be regulated by the City's Municipal Code, construction noise impacts due to the implementation of the proposed BASASP would be determined by those project's conformance to the Noise Ordinance. Future infill projects, such as those allowed under the BASASP, may be located in close proximity to existing and future noise-sensitive land uses. Construction activities related to implementation of the BASASP would potentially generate short-term noise levels in excess of 75 dBA L_{EQ} (12 hour) at adjacent properties. The ability for future projects to conform to the Noise Ordinance cannot be determined at the programmatic level. Noise impacts from construction activity are therefore considered potentially significant.

5.1.3 Mitigation Measures

Implementation of the following mitigation measure would reduce potential construction-related noise impacts.

Noi-1 Construction contractors for projects within the BASASP shall implement the following measures to minimize short-term noise levels caused by construction activities. Measures to reduce construction noise shall be included in contractor specifications and shall include, but not be limited to, the following:

- Construction activities shall be limited to the hours between 7:00 a.m. and 7:00 p.m. Construction is not allowed on legal holidays as specified in Section 21.04 of the San Diego Municipal Code, with exception of Columbus Day and Washington's Birthday, or on Sundays (consistent with Section 59.5.0404 of the Municipal Code).

- Properly outfit and maintain construction equipment with manufacturer-recommended noise reduction devices to minimize construction-generated noise.

- Operate all diesel equipment with closed engine doors and equip with factory recommended mufflers.

- Use electrical power to operate air compressors and similar power tools.

- Employ additional noise attenuation techniques as needed to reduce excessive noise levels so that construction noise would be in compliance with Municipal Code Section 59.5.0404. Such techniques shall include, but not be limited to, the construction of temporary sound barriers or sound blankets between construction sites and nearby noise-sensitive receptors.

- Notify adjacent noise-sensitive receptors in writing within two weeks of any construction activity such as jackhammering, concrete sawing, asphalt removal, pile driving, and largescale grading operations that would occur within 100 feet of the property line of the nearest noise-sensitive receptor. The extent and duration of the construction activity will be included in the notification.

- Designate a "disturbance coordinator" who would be responsible for receiving and responding to any complaints about construction noise or vibration. The disturbance

coordinator will determine the cause of the noise complaint and, if identified as a sound generated by construction area activities, will require that reasonable measures be implemented to correct the problem.

5.1.4 Significance After Mitigation

Implementation of Mitigation Measure Noi-1 would reduce construction-related noise impacts; however, at the program level it cannot be known whether the noise reduction measures would be adequate to reduce noise levels to below a level of significance. Construction-related noise impacts would therefore be significant and unavoidable.

5.2 ISSUE 2: EXCESSIVE GROUND-BORNE VIBRATION

5.2.1 Impacts

The main concerns related to ground-borne vibration are annoyance and damage. However, vibration sensitive instruments and operations can be disrupted at much lower levels. Vibration sensitive land uses may include machinery in manufacturing and processing uses or medical laboratory equipment.

5.2.1.1 Rail Vibration

One potential source of ground-borne vibration is from trains on the rail line through the BASASP area. The FTA provides screening distances for land uses that may be subject to vibration impacts from commuter rail (FTA 2006). For Category 1 uses such as vibration-sensitive equipment, the screening distance from the public right-of-way is 600 feet. For Category 2 land uses such as residences and buildings, where people would normally sleep, the screening distance is 200 feet. The screening distance for Category 3 land uses, such as institutional land uses, is 120 feet. The nearest proposed land uses containing residences would not be within 200 feet of a rail line. Land use designations proposed by the BASASP within these screening distances would potentially accommodate land uses associated with Category 1. Future development pursuant to the proposed BASASP therefore has the potential to locate new vibration-sensitive land uses within the screening distance of the railway tracks.

5.2.1.2 Construction Vibration

Construction activities are known to generate excessive ground-borne vibration. Construction activities related to implementation of the proposed BASASP would not take place all at once; however, future development accommodated by the proposed BASASP would have the potential to temporarily generate vibration resulting in a short-term effect on nearby vibration-sensitive land uses. Sources of vibration during the construction of future projects within the proposed BASASP include the potential for pile driving equipment and smaller equipment such as a vibratory roller. According to the Caltrans Transportation and Construction Vibration Guidance Manual, “strongly perceptible” ground-borne vibration is defined as equal to or exceeding 0.1 in/sec PPV. Construction activities within 200 feet and pile-driving within 600 feet of a vibration sensitive use would be potentially disruptive to vibration-sensitive operations (Caltrans 2013).

5.2.2 Significance of Impacts

New development proposed within the screening distance of the tracks and development proposing the use of vibratory construction equipment would require further analysis to determine vibration-sensitive impacts. Impacts due to ground-borne vibration could be potentially significant.

5.2.3 Mitigation Framework

Implementation of the following mitigation measures would reduce potential vibration-related impacts.

Noi-2 **Site-specific Vibration Study for Land Uses Near Railways.** A site-specific vibration study shall be prepared for proposed land uses within FTA screening distances for potential vibration impacts related to train activity. For Category 1 uses such as vibration-sensitive equipment, the screening distance from the public right-of-way is 600 feet. For Category 2 land uses such as residences and buildings, where people would normally sleep, the screening distance is 200 feet. The screening distance for Category 3 land uses, such as institutional land uses, is 120 feet. Proposed development shall implement recommended measures within the technical study to ensure that projects meet the FTA criteria for vibration impacts.

Noi-3 **Construction Vibration Analysis.** A site-specific vibration study shall be prepared for proposed land uses that have the potential for construction-related vibration impacts. Construction activities within 200 feet and pile-driving within 600 feet of a vibration-sensitive use could be potentially disruptive to vibration-sensitive operations. Proposed development shall implement recommended measures within the technical study to ensure that projects reduce construction-related vibration impacts to below 0.1 in/sec PPV at vibration-sensitive uses.

5.2.4 Significance After Mitigation

Implementation of Noi-2 and Noi-3 would reduce potential vibration-related impacts; however, at the program level it cannot be known whether the vibration reduction measures would be adequate to minimize vibration levels to below a level of significance. Vibration impacts would therefore be significant and unavoidable.

5.3 ISSUE 3: PERMANENT INCREASE IN AMBIENT NOISE LEVELS

5.3.1 Impacts

Issues related to a permanent increase in ambient noise levels are primarily associated with roadway traffic noise levels. Increases related to stationary or operational noise sources would be subject to City standards and are discussed below under Section 5.4.

As noted in the assumptions, future traffic noise levels presented in this analysis are based on traffic volumes provided by the Traffic Impact Study (Kimley Horn 2017). TNM software was used to calculate the noise contour distances for Existing and Future conditions. The off-site roadway modeling represents a conservative analysis that does not consider topography or attenuation provided by existing structures. The results of this analysis for the CNEL at 100 feet from the roadway centerline are shown below in Table 5, *Off-site Traffic Noise Levels.* Additional analysis for the 75, 70, 65, and 60 CNEL distances are provided in Appendix B.

As noted in Section 4.3, a significant direct impact would occur if existing noise conditions approach or exceed the City significance thresholds for traffic noise for nearby land uses and the project more than doubles (increases by more than 3 CNEL) the existing noise level. Vehicular traffic in the BASASP area would generally increase with buildout under the proposed BASASP. The future noise environment, however, would be dominated by highway traffic noise, which would overshadow any increased traffic noise on local streets near the freeways. Roadway noise increases associated with future development pursuant to the proposed BASASP are shown in Table 5.

Table 5
OFF-SITE TRAFFIC NOISE LEVELS[1]

Roadway Segment	Existing Conditions	Future Conditions (2035)		
	CNEL at 100 ft.	CNEL at 100 ft.	Change in CNEL	Significant Impact
Balboa Avenue				
Garnet Avenue to Grand Avenue	62.3	62.0	-0.3	No
Garnet Avenue				
Bond Street to Mission Bay Drive	71.0	71.0	0.0	No
Mission Bay Drive to I-5 SB Onramp	69.5	70.1	0.6	No
I-5 SB Onramp to I-5 NB Offramp	70.7	71.6	0.9	No
I-5 NB Offramp to Morena Boulevard SB Ramps	70.9	72.3	1.4	No
Balboa Avenue (CA-274)				
Morena Boulevard SB Ramps to Morena Boulevard NB Ramps	70.5	70.4	-0.1	No
Morena Boulevard NB Ramps to Moraga Avenue	70.1	69.3	-0.8	No
Moraga Avenue to Clairemont Drive	69.2	68.9	-0.3	No
East of Clairemont Drive	69.5	70.1	0.6	No
Grand Avenue				
Kendall Street to Lamont Street	67.9	64.6	-3.3	No
Lee Street to Bond Street	66.6	66.5	-0.1	No
Figueroa Boulevard to Mission Bay Drive	66.6	66.6	0.0	No
Mission Bay Drive				
Bluffside Avenue to Damon Avenue	66.3	66.7	0.4	No
Damon Avenue to Garnet Avenue	66.9	67.0	0.1	No

Table 5 (cont.)
OFF-SITE TRAFFIC NOISE LEVELS[1]

Roadway Segment	Existing Conditions	Future Conditions (2035)		
	CNEL at 100 ft.	CNEL at 100 ft.	Change in CNEL	Significant Impact
Mission Bay Drive				
Garnet Avenue to Magnolia Avenue	65.5	66.6	1.1	No
Magnolia Avenue to Bunker Hill Street	65.5	66.6	1.1	No
Bunker Hill Street to Grand Avenue	65.4	66.3	0.9	No
Grand Avenue to I-5 Ramps	68.2	68.3	0.1	No
Morena Boulevard				
Jutland Drive to Avati Drive	64.4	66.1	1.7	No
Avati Drive to Balboa Avenue Ramps	66.8	67.2	0.4	No
Balboa Avenue Ramps to Ticonderoga Street	65.8	65.2	-0.6	No
Gesner Street to Clairemont Drive	65.7	65.4	-0.3	No
Clairemont Drive				
Chippewa Court to Balboa Avenue	64.1	64.8	0.7	No
Balboa Avenue to Ute Drive	63.6	64.4	0.8	No
Denver Street to Morena Boulevard	65.7	66.9	1.2	No
Damon Avenue				
Mission Bay Drive to Santa Fe Street	57.2	58.5	1.3	No
Santa Fe Street				
Damon Avenue to Balboa Avenue	51.2	54.9	3.7	No[2]
Soledad Mountain Road				
Beryl Street to Garnet Avenue	66.7	66.8	0.1	No
North Mission Bay Drive				
De Anza Road to Mission Bay Drive	56.2	56.3	0.1	No

1 Noise levels are for the individual streets only and exclude freeway noise.
2 Although noise levels along this roadway would increase by more than 3 CNEL, exterior noise levels would remain below 65 CNEL.
Note: SB = Southbound; NB = Northbound

5.3.2 Significance of Impacts

In comparison with existing conditions, future development pursuant to the proposed BASASP would increase by more than 3 CNEL along one roadway segment of Santa Fe Street between Damon Avenue and Balboa Avenue. However, because exterior noise levels along this segment would remain below 65 CNEL, exclusive of freeway noise, implementation of the proposed BASASP would not result in a significant increase in noise levels on local roadways.

5.3.3 Mitigation Framework

Because there would be no significant impacts with respect to traffic noise on local streets, exclusive of freeway noise, within the BASASP area, no mitigation measures are required.

5.3.4 Significance After Mitigation

Impacts related to a permanent increase in ambient noise levels would be less than significant.

5.4 ISSUE 4: NOISE LEVEL STANDARD COMPLIANCE FOR NEW USES

5.4.1 Impacts

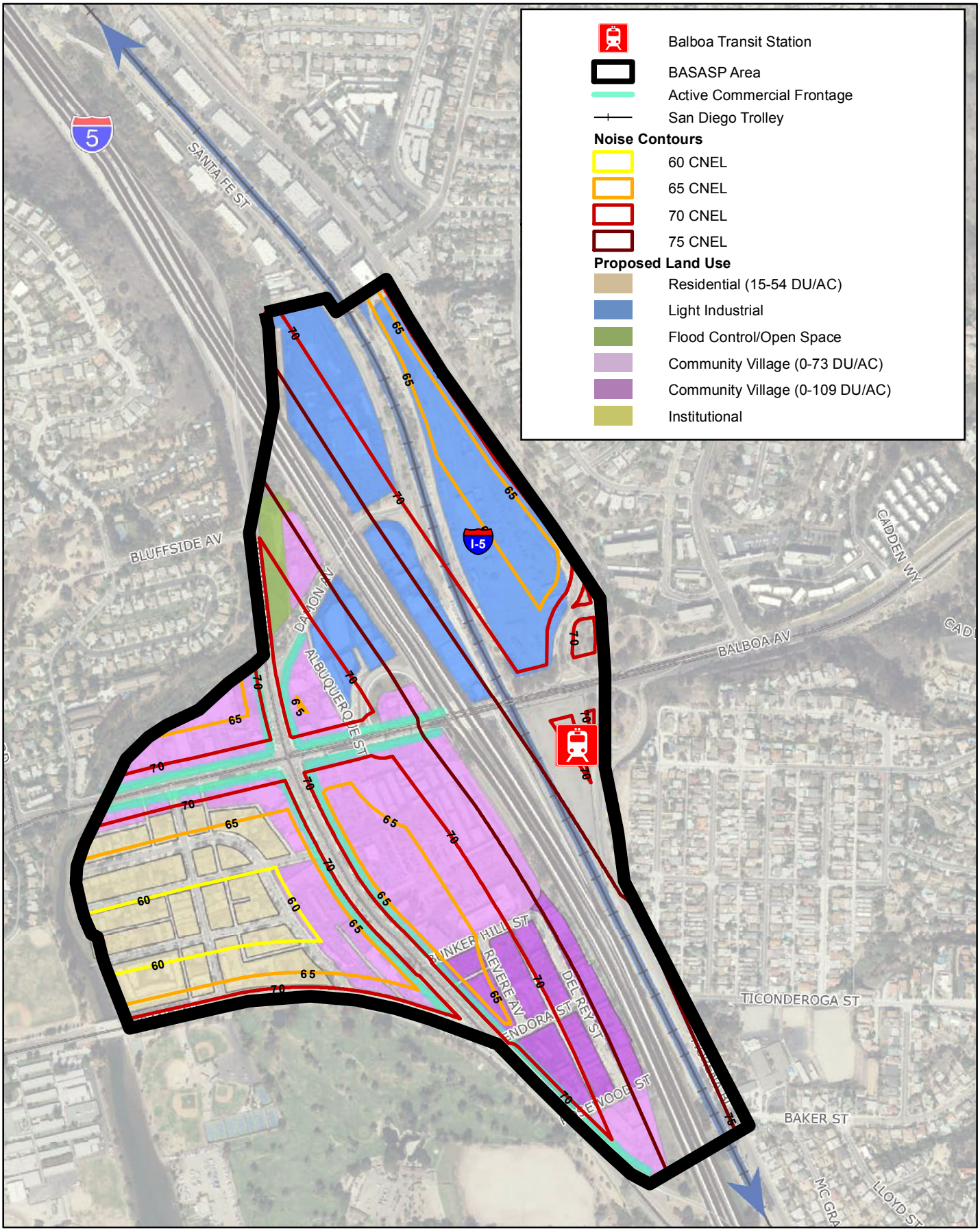
5.4.1.1 Vehicular Traffic Noise

Noise levels in the BASASP area would generally increase or decrease in accordance with traffic levels. Following implementation of the proposed BASASP, traffic levels on roadway segments along Garnet Avenue, Mission Bay Drive, Morena Boulevard, Damon Avenue, and Santa Fe Street would increase. Multiple segments along Balboa Avenue, Grand Avenue, and Morena Boulevard would see a decrease in traffic levels. Noise levels from the I-5 corridor would increase. Future transportation, including vehicular traffic noise, is shown on Figure 6, *Buildout Transportation Noise Contours (2035)*. The projected ADT for selected road segments, calculated CNEL at 100 feet from the centerline of each roadway, and the distance from the roadway centerline to the 60, 65, 70, and 75 CNEL contours are contained in Appendix B.

Community village land use designations which allow residential development are proposed throughout the BASASP area west of I-5. These areas would be subject to noise levels of up to 70 CNEL from traffic noise increases due to implementation of the BASASP. The I-5 freeway would continue to generate substantial amounts of traffic noise, with noise levels at nearby community village land use areas above 75 CNEL. The distance to the 65 CNEL noise contour along I-5 would extend between approximately 350 to 400 feet from the northbound and southbound freeway centerlines.

A variety of noise sensitive uses would be located along local roadways within the BASASP area where traffic noise levels would exceed 65 CNEL, including freeway noise. The 65 CNEL contour south of Garnet Avenue may encompass some residential structures, and the 60 CNEL contours of Garnet Avenue, Grand Avenue, and Mission Bay Drive may affect residential structures. 60 CNEL noise levels would extend into proposed residential and community village areas as designated in the proposed BASASP. Proposed community village areas are located north and south of Garnet Avenue, and east and west of Mission Bay Drive. These include areas within the larger freeway noise contours of I-5. Although noise levels throughout the BASASP area would generally increase, many roadways, including segments along Balboa Avenue, Grand Avenue, and Morena Boulevard, would see reduced traffic and therefore lower noise levels upon implementation of the proposed BASASP.

Noise-sensitive land uses are generally considered incompatible with an outdoor noise levels of 65 to 70 CNEL. However, as indicated in Table 1, the General Plan conditionally allows multiple dwelling unit residential development up to 70 CNEL. Proposed NSLUs under the BASASP would be primarily multi-family or mixed-use in nature. Substantial numbers of new single-family residences are not



Balboa Avenue Station Area Specific Plan

0 1,000 2,000 Feet

N

Figure 6

Future Transportation Noise Contours (2035)

anticipated. No institutional sites such as schools or hospitals are located or proposed within the BASASP area.

5.4.1.2 Railway Traffic Noise

The San Diego MTS Trolley Blue Line extension project aims to have trains operating through the BASASP area upon the line's full buildout by 2021 (SANDAG 2017b). Freight trains would likely operate on an as needed basis and would not have a fixed schedule, with future service potentially increasing or decreasing depending on future demand. Amtrak and COASTER services are assumed to operate at conditions similar to existing conditions. Noise levels and frequency would therefore continue to vary.

As noted in Section 4.2.2, sound level distances for railway traffic were derived by combining future Trolley service from the Mid-Coast Corridor project (SANDAG 2014) and train assumptions provided by LOSSAN (2012). It is anticipated that rail traffic would generate noise levels of 60 CNEL at a distance of approximately 270 feet from the railway centerline.

Light industrial and transportation-related land uses are proposed in the immediate vicinity of the tracks. Land uses allowing residential development are not proposed under the BASASP within the vicinity of the tracks. Furthermore, due to the location of the I-5 freeway, exposure of potential future residences west of I-5 to rail noise would be overshadowed by freeway and vehicular traffic noise. As a result, the proposed BASASP would not increase the number of sensitive noise receptors exposed to railway noise.

5.4.1.3 Stationary Noise

Similar to existing conditions, future development within the BASASP area would be subject to various stationary noise sources including noise from equipment and commercial activities. Enforcement of noise limits imposed by the City's Noise Ordinance would avoid significant impacts on future development from stationary sources.

5.4.1.4 Airport Noise

The closest airports to the BASASP area are Montgomery Field, located 3.8 miles to the east, and San Diego International Airport, located 4.3 miles to the south. No private airstrips are located in the vicinity of the planning area. The BASASP area is not located within the 60 CNEL noise contours of either airport. Therefore, no inconsistency with City noise standards or the standards within the Airport Land Use Compatibility Plans are anticipated.

5.4.1.5 Interior Noise

Standard construction techniques generally provide a 15 dBA reduction of exterior noise within the interior space of buildings. Given this assumption, standard building construction could be assumed to maintain interior noise to levels less than 45 CNEL for residential uses when exterior noise sources are 60 CNEL or less. If exterior noise levels exceed 60 CNEL for new residences, interior noise levels could potentially exceed the interior General Plan Noise Element's interior noise standard of 45 CNEL.

Traffic associated with the proposed BASASP would increase noise levels along a number of roadway segments throughout the BASASP area. Furthermore, the proposed BASASP would allow new residential development in areas where noise levels exceed 60 CNEL. As a result, additional noise attenuation

would be required for new structures to achieve or maintain interior noise levels which would not exceed 45 CNEL for residences, and 50 CNEL for new commercial uses.

5.4.2 Consistency with City Standards

Implementation of the proposed BASASP would potentially expose new development to noise levels at exterior use areas or interior areas in excess of the Land Use – Noise Compatibility Guidelines established in the General Plan Noise Element, which would result in an inconsistency with City standards.

5.4.3 Conditions of Approval

The following conditions of approval would be required to ensure project consistency with the General Plan Noise Element Policy NE-A.4:

Noi-4: **Site-Specific Acoustic Analysis**. Where new development would expose people to noise exceeding normally acceptable levels, a site-specific acoustical analysis shall be performed prior to the approval of building permits for:

- Single-family homes, senior housing, and mobile homes where exterior noise levels range between 60 and 65 CNEL.
- Multi-family homes and mixed-use/commercial and residential, where exterior noise levels range between 65 and 70 CNEL.
- All land uses where noise levels exceed the conditionally compatible exterior noise exposure levels as defined in the City's General Plan Noise Element Land Use – Noise Compatibility Guidelines.

The acoustical analysis shall be conducted to ensure that barriers, building design and/or location are capable of reducing residential outdoor use area noise levels to their conditionally compatible limits as specified in the General Plan Noise Element Land Use – Noise Compatibility Guidelines. The analysis shall also ensure interior noise levels at 45 CNEL or less for residences and 50 CNEL or less for commercial uses. Barriers may include a combination of earthen berms, masonry block, and plexiglass. Building location may include the use of appropriate setbacks. Building design measures may include dual-pane windows, solid core exterior doors with perimeter weather stripping, and mechanical ventilation to allow windows and doors to remain closed.

5.4.4 Policy Consistency After Implementation of Conditions of Approval

With the implementation of Noi-4, potential interior noise levels at noise-sensitive land uses would be consistent with City's General Plan Noise Element standards.

6.0 LIST OF PREPARERS

Jason Runyan	Acoustic Analyst
Hunter Stapp	Acoustic Analyst
Charles Terry	Senior Acoustic Specialist
Joanne M. Dramko, AICP	Senior Technical Specialist, Quality Assurance Reviewer
Tim Belzman	Project Manager

7.0 REFERENCES

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Appendix A

Site Survey Measurement Sheets

Site Survey

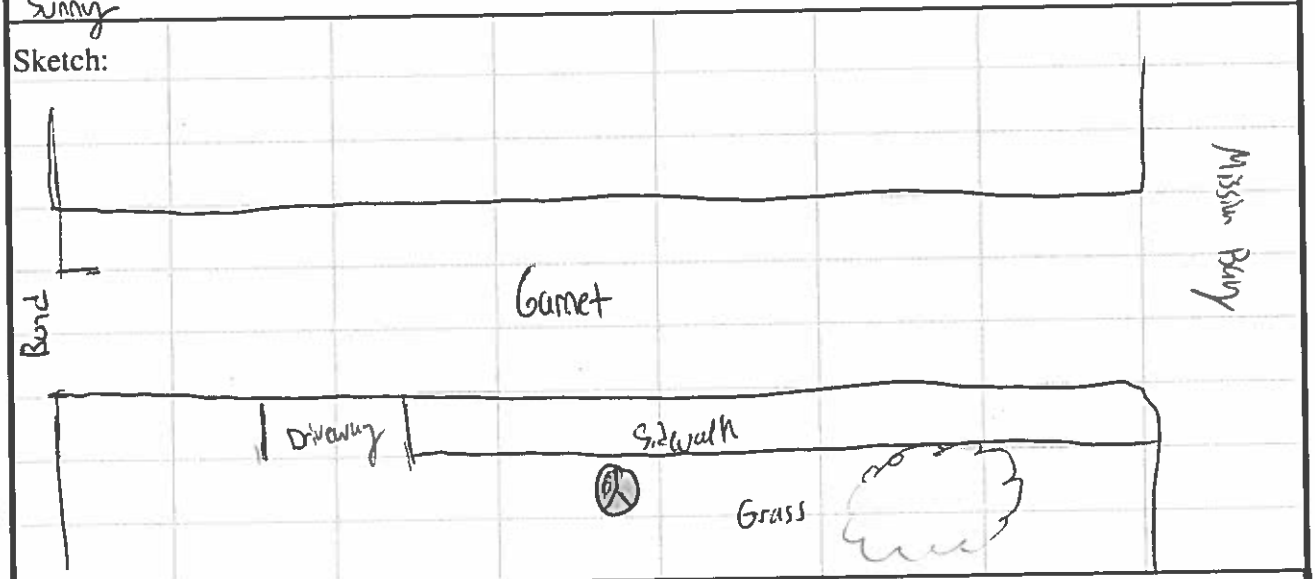
Job # RDG-01.09	Project Name: Balboa Ave Station SP		
Date: 9/19/17	Site #: 1	Engineer: Hunter Stapp	
Address: Garnet Road	32°48'20.33" N // 117°13'13.66" W		
Meter: LD-LxT	Serial #: 1741	Calibrator: CAL150	Serial #: 3688

Notes: Congested; slow traffic between two intersections; soft music from motorcycle shop

U28

Sunny

Sketch:



Temp: 73	Wind Spd: 7 mph	Humidity: 63 %			
Start of Measurement: 11:31 am	End of Measurement: 11:41	70.8 dBA L_{EQ}			

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)

Noise Measurement for Information Only

No Through Roadways

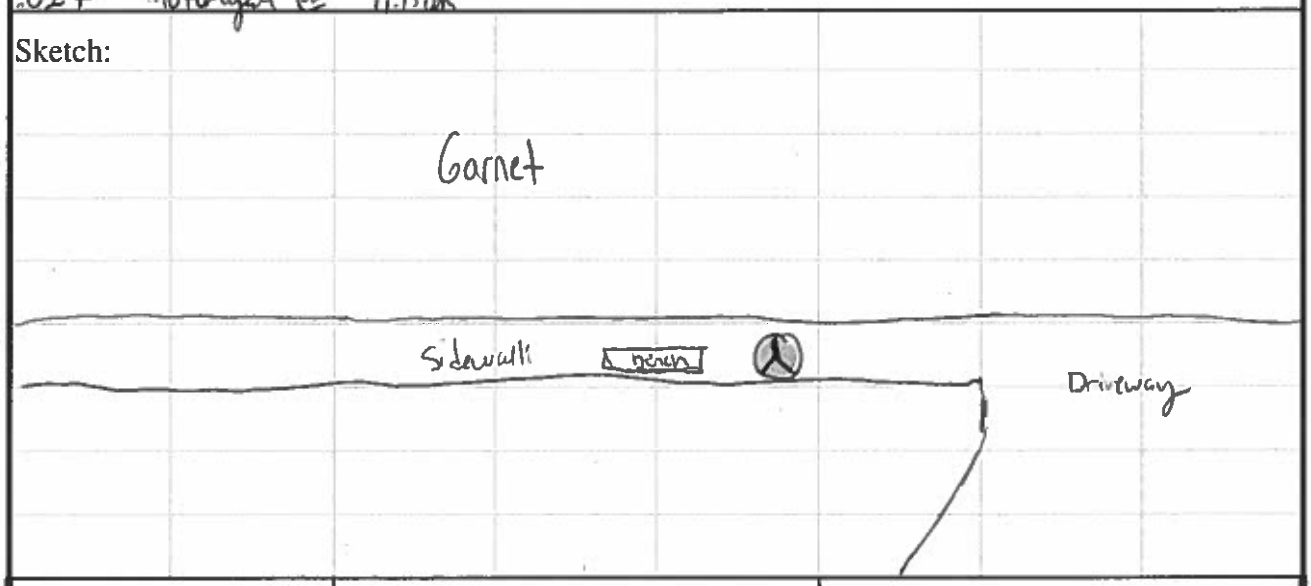
No Calibration Analysis Will Be Provided

Site Survey

Job # RDG-01.09	Project Name: Balboa Ave Station SP		
Date: 9/19/17	Site #: 2	Engineer: Hunter Stapp	
Address: 2830 Garnet Rd.	32°48'23.19"N // 117°13'4.71"W		
Meter: LD-LxT	Serial #: 1741	Calibrator: CAL150	Serial #: 3688

Notes: Busy Road; some slowing for intersection
Quick pause for comment from pedestrian
.027 motorcycle @ 11:15am

Sketch:



Temp: 71	Wind Spd: 7 mph	Humidity: 62 %
Start of Measurement: 11:06 am	End of Measurement: 11:16 am	72.8 dBA L_{EQ}

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)

Noise Measurement for Information Only

No Through Roadways

No Calibration Analysis Will Be Provided

Site Survey

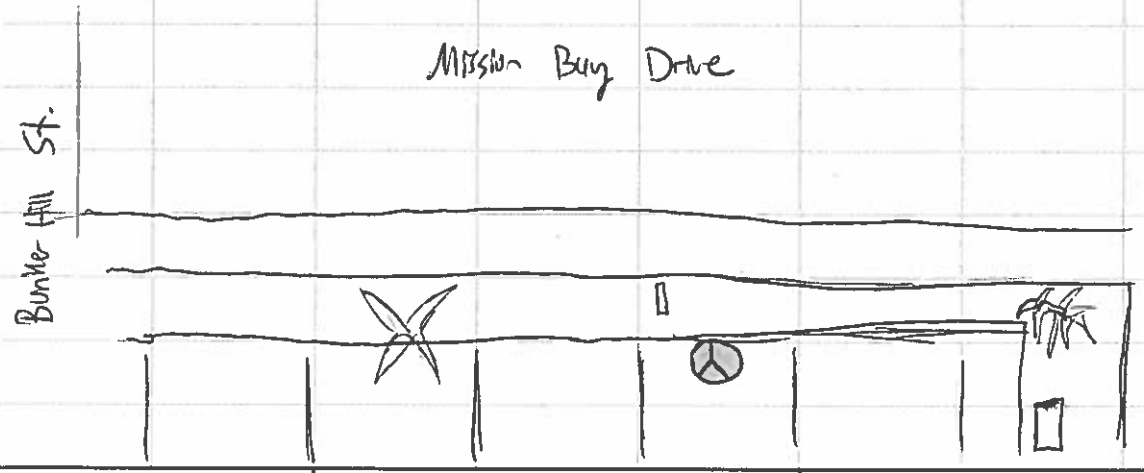
Job # RDG-01.09	Project Name: Balboa Ave Station SP		
Date: 9/19/17	Site #: 3	Engineer: Hunter Stapp	
Address: Mission Bay Dr.	32°48'11.41"N // 117°12'59.41"W		
Meter: LD-LxT	Serial #: 1741	Calibrator: CAL150	Serial #: 3688

Notes: Car honk @ 9:29 am ; 35 mph road ; some slowing for intersection

Clarity

LxT-Data.024

Sketch:



Temp: 70	Wind Spd: 6 mph	mph	Humidity: 67	%	
Start of Measurement: 9:25 am	End of Measurement: 9:35 am		66.1	dBA L_{EQ}	

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)

Noise Measurement for Information Only

No Through Roadways

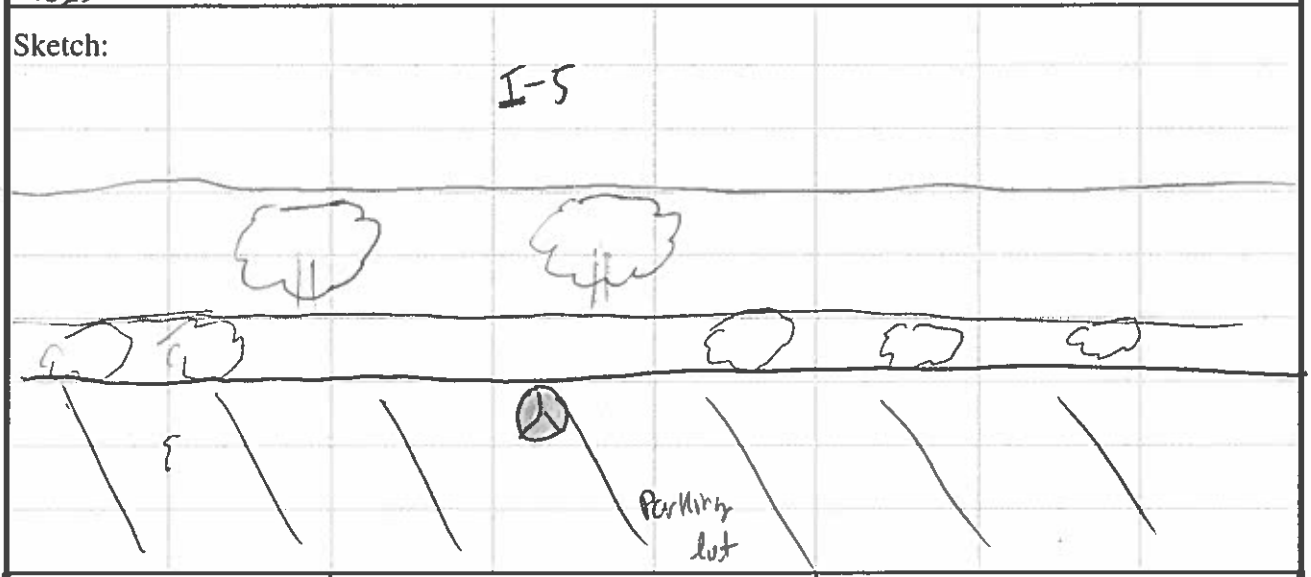
No Calibration Analysis Will Be Provided

Site Survey

Job # RDG-01.09	Project Name: Balboa Ave Station SP		
Date: 9/19/17	Site #: 4	Engineer: Hunter Stapp	
Address: Parking lot off of Mission Bay Dr.	32°48'16.69"N // 117°12'52.86"W		
Meter: LD-LxT	Serial #: 1741	Calibrator: CAL150	Serial #: 3688

Notes: Asked to leave property after 8-minute measurement; quiet parking lot
Mostly cloudy; parking lot below the level of I-5
.025

Sketch:



Temp: 71°F	Wind Spd: 7 mph	Humidity: 66 %
Start of Measurement: 9:52 am	End of Measurement: 10 am	65.2 dBA L_{EQ}

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)

Noise Measurement for Information Only

No Through Roadways

No Calibration Analysis Will Be Provided

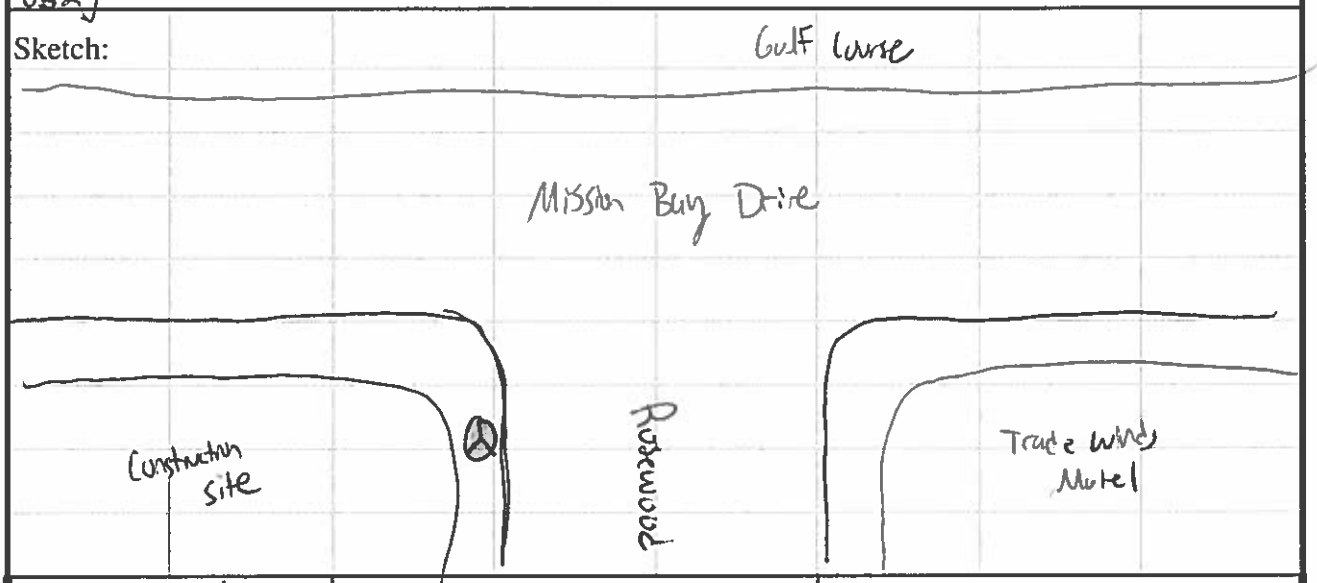
Site Survey

Job # RDG-01.09	Project Name: Balboa Ave Station SP		
Date: 9/19/17	Site #: 5	Engineer: Hunter Stapp	
Address: Corner of Rosecrans St and Mission Bay Dr. 32°48'2.25"N // 117°12'43.33"W			
Meter: LD-LxT	Serial #: 1741	Calibrator: CAL150	Serial #: 3688

Notes: Steady traffic coming off of I-5
Light construction activity

0832

Sketch:



Temp: 74	Wind Spd: 10 mph	Humidity: 61 %
Start of Measurement: 1:26 pm	End of Measurement: 1:36	71.7 dBA L_{EQ}

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)

Noise Measurement for Information Only

No Through Roadways

No Calibration Analysis Will Be Provided

Site Survey

Job # RDG-01.09	Project Name: Balboa Ave Station SP		
Date: 9/19/17	Site #: 6	Engineer: Hunter Stapp	
Address: Grand Ave	32°48'7.44"N // 117°13'12.19"W		
Meter: LD-LxT	Serial #: 1741	Calibrator: CAL150	Serial #: 3688

Notes: Steady flowing traffic (35 mph) w/ intermittent gaps

US1

Sketch:

Temp: 74	Wind Spd: 10 mph	Humidity: 62 %			
Start of Measurement: 1:09 pm	End of Measurement: 1:19 pm	69.5 dBA L_{EQ}			

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)

Noise Measurement for Information Only

No Through Roadways

No Calibration Analysis Will Be Provided

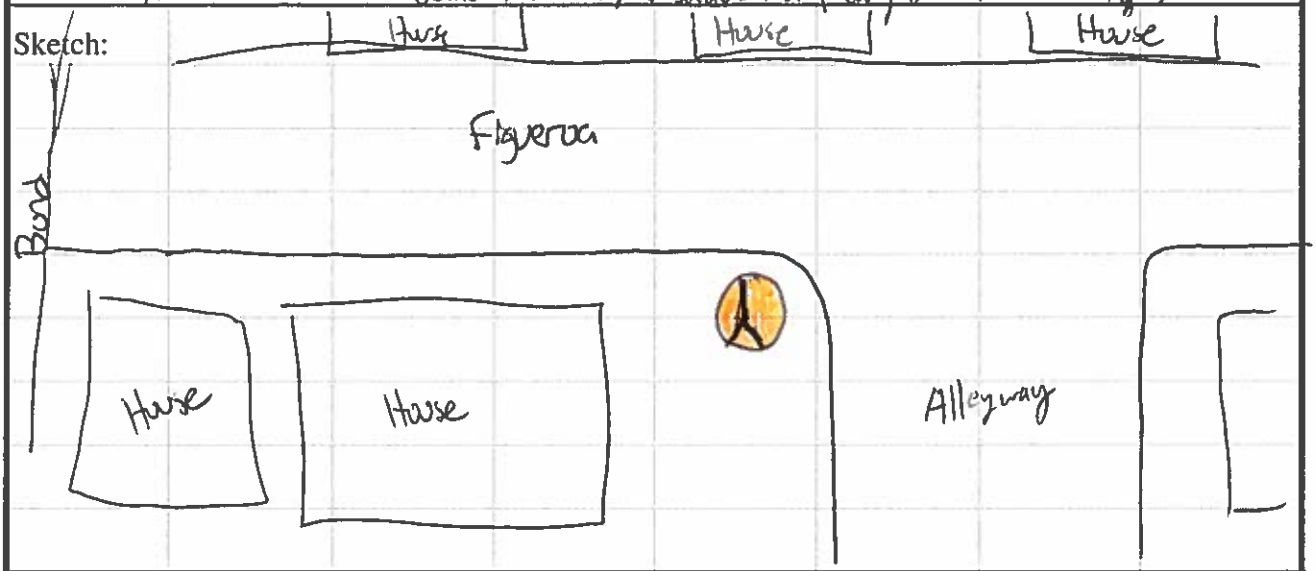
Site Survey

Job # RDG-01.09	Project Name: Balboa Ave Station SP		
Date: 9/19/17	Site #: 7	Engineer: Hunter Stapp	
Address: 2680 Figueroa Blvd	32°48'16.73"N // 117°13'16.66"W		
Meter: LD-LxT	Serial #: 1741	Calibrator: CAL150	Serial #: 3688

Notes: Pause @ 11:53 am for tree-trimming truck driving by

029 far off honking; lawnmower; few cars passing by; playground noise from school; traffic noise from Gomet; rustling of leaves; stop early b/c tree trimming started

Sketch:



Temp:	73	Wind Spd:	8 mph	Humidity:	63 %
Start of Measurement:	11:53 am	End of Measurement:	12:08 pm	53.2	dBA L_{EQ}

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)

Noise Measurement for Information Only

No Through Roadways

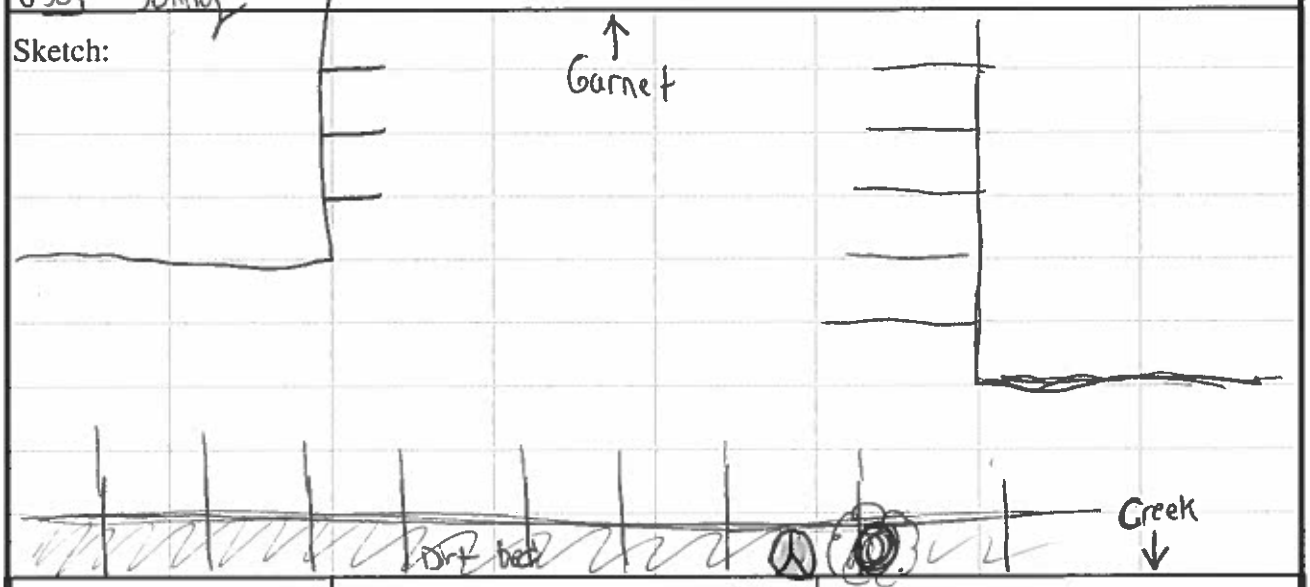
No Calibration Analysis Will Be Provided

Site Survey

Job # RDG-01.09	Project Name: Balboa Ave Station SP		
Date: 9/19/17	Site #: 8	Engineer: Hunter Stapp	
Address: Parking Lot off of Garnet Ave	32°48'23.26"N // 117°13'17.15"W		
Meter: LD-LxT	Serial #: 1741	Calibrator: CAL150	Serial #: 3688

Notes: Ambient natural noises: birds chirping, leaves rustling
Traffic noise from Garnet; airplane overhead
1030 Sunny

Sketch:



Temp: 73°F	Wind Spd: 10	mph	Humidity: 62	%	
Start of Measurement: 12:20 pm	End of Measurement:		53.3	dBA L_{EQ}	

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)

Noise Measurement for Information Only

No Through Roadways

No Calibration Analysis Will Be Provided

Site Survey

Job # RDG-01.09	Project Name: Balboa Ave Station SP		
Date: 9/19/17	Site #: 9	Engineer: Hunter Stapp	
Address: Corner of Glendora St. and Del Rey St.	32°48'8.58"N // 117°12'49.44"W		
Meter: LD-LxT	Serial #: 1741	Calibrator: CAL150	Serial #: 3688

Notes: I-5 less elevated here than @ site 4. (~5 ft. higher than site elevation)
Amtrak passes @ 1:44 pm; very light residential traffic; FedEx truck @ 1:46 pm
033

Sketch:

Temp: 74	Wind Spd: 10 mph	Humidity: 61 %
Start of Measurement: 1:40 pm	End of Measurement: 1:50 pm	61.3 dBA L_{EQ}

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)

Noise Measurement for Information Only

No Through Roadways

No Calibration Analysis Will Be Provided

Appendix B

Existing and Future Traffic Noise Levels

Existing and Future Traffic									
Roadway /Segment	Existing			Future Preferred/2035					Posted Speed (mph)
	Traffic Breakdown			ADT	Peak Hour Traffic	Traffic Breakdown			
	Cars 97.5%	MT 2.0%	HT 0.5%			Cars 97.5%	MT 2.0%	HT 0.5%	
Balboa Avenue									
Garnet Ave to Grand Ave	1391	29	7	13,200	1320	1287	26	7	35
Garnet Avenue									
Bond St to Mission Bay Dr	5723	117	29	52,200	5220	5090	104	26	45
Mission Bay Dr to I-5 SB Onramp	3647	75	19	43,000	4300	4193	86	22	45
I-5 SB onramp to I-5 NB Offramp	4764	98	24	60,500	6050	5899	121	30	45
I-5 NB Offramp to Morena Boulevard SB Ramps	5077	104	26	71,500	7150	6971	143	36	45
Balboa Avenue (CA-274)									
Morena Blvd SB Ramps to Morena Blvd NB Ramps	4785	98	25	45,700	4570	4456	91	23	45
Morena Blvd NB ramps to Moraga Ave	4204	86	22	39,800	3980	3881	80	20	45
Moraga Ave to Clairemont Dr	3403	70	17	32,600	3260	3179	65	16	45
East of Clairemont Dr	3645	75	19	42,500	4250	4144	85	21	45
Grand Avenue									
Kendall St to Lamont St	5048	104	26	24,000	2400	2340	48	12	35
Lee St to Bond St (Rose Creek Bridge)	3697	76	19	37,200	3720	3627	74	19	35
Figueroa Blvd to Mission Bay Dr	3725	76	19	37,900	3790	3695	76	19	35
Mission Bay Drive									
Bluffside Ave to Damon Ave	3469	71	18	39,000	3900	3803	78	20	35
Damon Ave to Garnet Ave	3966	81	20	41,300	4130	4027	83	21	35
Garnet Ave to Magnolia Ave	2896	59	15	38,300	3830	3734	77	19	35
Magnolia Ave to Bunker Hill St	2908	60	15	38,700	3870	3773	77	19	35
Bunker Hill St to Grand Ave	2828	58	15	35,900	3590	3500	72	18	35
Grand Ave to I-5 Ramps	5367	110	28	56,600	5660	5519	113	28	35
Morena Boulevard									
Jutland Dr to Avati Dr	1127	23	6	17,200	1720	1677	34	9	45
Avati Dr to Balboa Ave Ramps	1963	40	10	21,800	2180	2126	44	11	45
Balboa Ave Ramps to Ticonderoga St	1543	32	8	13,900	1390	1355	28	7	45
Gesner St to Clairemont Dr	1519	31	8	14,600	1460	1424	29	7	45

Existing and Future Traffic (cont.)									
Roadway /Segment	Existing			Future Preferred/2035					Posted Speed (mph)
	Traffic Breakdown			ADT	Peak Hour Traffic	Traffic Breakdown			
	Cars 97.5%	MT 2.0%	HT 0.5%			Cars 97.5%	MT 2.0%	HT 0.5%	
Clairemont Drive									
Chippewa Ct to Balboa Ave	2073	43	11	25,300	2530	2467	51	13	35
Balboa Ave to Ute Dr	1884	39	10	22,900	2290	2233	46	11	35
Denver St to Morena Blvd	3038	62	16	41,200	4120	4017	82	21	35
Damon Avenue									
Mission Bay Dr to Santa Fe St	430	9	2	5,900	590	575	12	3	35
Santa Fe Street									
Damon Ave to Balboa Ave	237	5	1	5,600	560	546	11	3	25
Soledad Mountain Road									
Beryl St to Garnet Ave	2655	54	14	27,900	2790	2720	56	14	40
North Mission Bay Drive									
De Anza Rd to Mission Bay Dr	239	5	1	2,500	250	244	5	1	40
Interstate 5 NB									
N of Onramp from Mission Bay Drive	9165	188	47	99,300	9930	9682	199	50	65
N of Exit 23b (Garnet Ave)	7449	153	38	81,000	8100	7898	162	41	65
S of Exit 23b (Garnet Ave)	9038	185	46	98,000	9800	9555	196	49	65
Interstate 5 SB									
N of Exit 23 (Mission Bay Drive)	9789	201	50	102,000	10200	9945	204	51	65
N of Onramp from Garnet Avenue	7517	154	39	79,000	7900	7703	158	40	65
S of Onramp from Garnet Avenue	8970	184	46	94,900	9490	9253	190	47	65

Source: Kimley Horn 2017

Note: Existing and future traffic on Interstate-5 derived from SANDAG's TFIC Series 13 forecasts 2012 (Existing) and 2035 (Buildout)

Existing and Future Traffic Noise									
Roadway/Segment	Existing Conditions				Buildout/2035				
	CNEL @ 100 ft. (dBA)	70 CNEL (ft.)	65 CNEL (ft.)	60 CNEL (ft.)	CNEL @ 100 ft. (dBA)	Δ at 100ft. (dBA)	70 CNEL (ft.)	65 CNEL (ft.)	60 CNEL (ft.)
Balboa Avenue									
Garnet Ave to Grand Ave	62.3	20	60	155	62.0	-0.3	18	55	145
Garnet Avenue									
Bond St to Mission Bay Dr	71.0	120	280	580	71.0	0.0	120	280	580
Mission Bay Dr to I-5 SB Onramp	69.5	93	220	470	70.1	0.6	103	245	515
I-5 SB onramp to I-5 NB Offramp	70.7	115	270	550	71.6	0.9	135	310	620
I-5 NB Offramp to Morena Boulevard SB Ramps	70.9	120	280	570	72.3	1.4	155	350	650
Balboa Avenue (CA-274)									
Morena Blvd SB Ramps to Morena Blvd NB Ramps	70.5	110	260	540	70.4	-0.1	107	255	530
Morena Blvd NB ramps to Moraga Ave	70.1	103	250	515	69.3	-0.8	87	215	460
Moraga Ave to Clairemont Dr	69.2	87	210	450	68.9	-0.3	83	200	435
East of Clairemont Dr	69.5	93	220	470	70.1	0.6	102	242	510
Grand Avenue									
Kendall St to Lamont St	67.9	67	170	385	64.6	-3.3	35	90	225
Lee St to Bond St (Rose Creek Bridge)	66.6	53	135	315	66.5	-0.1	53	133	310
Figueroa Blvd to Mission Bay Dr	66.6	53	135	315	66.6	0.0	53	135	315
Mission Bay Drive									
Bluffside Ave to Damon Ave	66.3	48	127	300	66.7	0.4	54	137	320
Damon Ave to Garnet Ave	66.9	55	143	330	67.0	0.1	55	145	340
Garnet Ave to Magnolia Ave	65.5	41	110	265	66.6	1.1	57	135	315
Magnolia Ave to Bunker Hill St	65.5	41	110	265	66.6	1.1	57	135	320
Bunker Hill St to Grand Ave	65.4	41	109	260	66.3	0.9	50	130	300
Grand Ave to I-5 Ramps	68.2	70	180	400	68.3	0.1	72	183	410
Morena Boulevard									
Jutland Dr to Avati Dr	64.4	33	90	215	66.1	1.7	50	125	285
Avati Dr to Balboa Ave Ramps	66.8	55	140	320	67.2	0.4	60	150	335
Balboa Ave Ramps to Ticonderoga St	65.8	45	115	270	65.2	-0.6	40	105	250
Gesner St to Clairemont Dr	65.7	45	115	270	65.4	-0.3	43	107	255

Existing and Future Traffic Noise (cont.)									
Roadway/Segment	Existing Conditions				Buildout/2035				
	CNEL @ 100 ft. (dBA)	70 CNEL (ft.)	65 CNEL (ft.)	60 CNEL (ft.)	CNEL @ 100 ft. (dBA)	Δ at 100ft. (dBA)	70 CNEL (ft.)	65 CNEL (ft.)	60 CNEL (ft.)
Clairemont Drive									
Chippewa Ct to Balboa Ave	64.1	31	85	210	64.8	0.7	37	97	235
Balboa Ave to Ute Dr	63.6	27	77	195	64.4	0.8	33	87	220
Denver St to Morena Blvd	65.7	43	115	275	66.9	1.2	55	142	330
Damon Avenue									
Mission Bay Dr to Santa Fe St	57.2	-	20	58	58.5	1.3	7	27	75
Santa Fe Street									
Damon Ave to Balboa Ave	51.2	-		15	54.9	3.7	-	10	35
Soledad Mountain Road									
Beryl St to Garnet Ave	66.7	53	137	315	66.8	0.1	55	140	320
North Mission Bay Drive									
De Anza Rd to Mission Bay Dr	56.2	-	12	46	56.3	0.1	-	15	49

Roadway/Segment	Existing Conditions					Buildout/2035					
	CNEL @ 100 ft. (dBA)	75 CNEL (ft.)	70 CNEL (ft.)	65 CNEL (ft.)	60 CNEL (ft.)	CNEL @ 100 ft. (dBA)	Δ at 100ft. (dBA)	75 CNEL (ft.)	70 CNEL (ft.)	65 CNEL (ft.)	60 CNEL (ft.)
Interstate 5 NB											
N of Onramp from Mission Bay Drive	78.3	180	380	730	1240	78.6	0.3	185	395	750	1270
N of Exit 23b (Garnet Ave)	77.4	155	335	650	1140	77.7	0.3	160	350	670	1170
S of Exit 23b	78.2	175	380	720	1240	78.5	0.3	183	390	750	1270
Interstate 5 SB											
N of Exit 23 (Mission Bay Drive)	78.6	185	400	750	1210	78.7	0.1	187	400	760	1290
N of Onramp from Garnet Avenue	77.5	153	340	660	1140	77.6	0.1	155	345	660	1160
S of Onramp from Garnet Avenue	78.2	175	375	220	1230	78.4	0.2	178	385	730	1250

Source: Traffic Noise Model (TNM), version 2.5
Traffic Source Data: Kimley Horn 2017; SANDAG 2017