NOISE IMPACT ANALYSIS

1005-1010 NORTHGATE DRIVE PROJECT
CITY OF SAN RAFAEL, CALIFORNIA

LSA

March 2016

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CITY OF SAN RAFAEL, CALIFORNIA

Submitted to:

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NOISE IMPACT ANALYSIS

A. INTRODUCTION

LSA Associates, Inc. (LSA) has completed a Noise Impact Analysis for the proposed Northgate Project (project) located at 1005 and 1010 Northgate Drive in the City of San Rafael (City) in the County of Marin. A project location map is included in Figure 1.

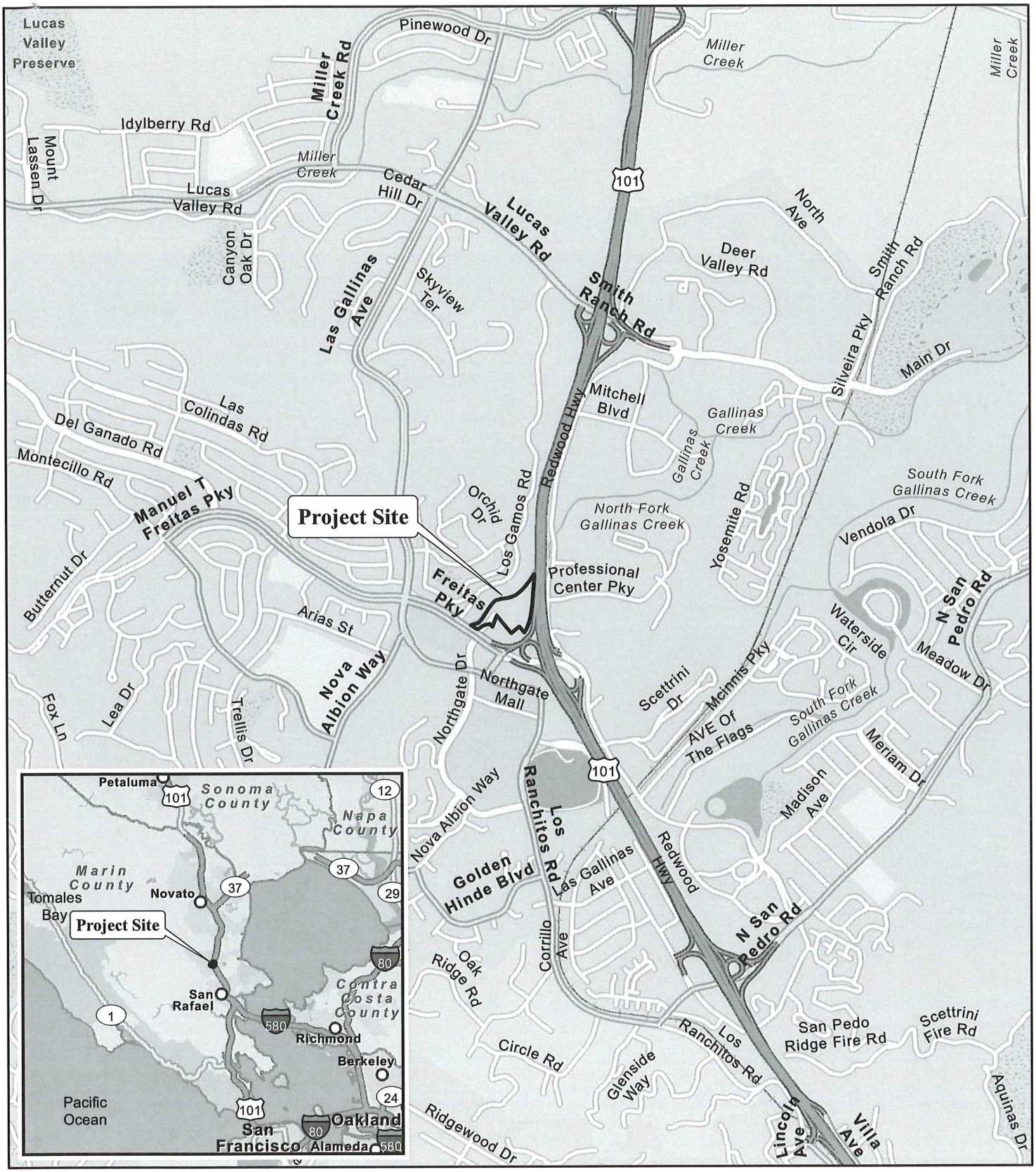
This Noise Impact Analysis examines potential impacts from noise sources in the project vicinity, including local roadways, though noise monitoring and analysis. Noise monitoring was conducted using the Larson Davis SoundTrack LxT sound level meter to assess the ambient noise environment on the project site. Construction and operational noise levels were analyzed. Once operational, the project would generate noise through stationary sources, such as heating and ventilation equipment, parking lot activities, and loading dock operations.

B. PROJECT DESCRIPTION

The proposed project includes two parcels: 1005 and 1010 Northgate Drive. The 1005 Northgate Drive parcel would include demolition of the existing commercial building and service station and the construction of a new residential building with a subterranean and ground-floor parking garage. The 1010 Northgate Drive parcel would include the preservation of the existing hotel and a portion of the surface parking area; the demolition of the remaining structures, parking and landscaping; and the construction of one mixed-use building and one residential building and two subterranean parking garages on the site. The proposed project would subdivide the 1010 Northgate Drive parcel into three new parcels: 1010 Northgate Drive (133,339 square feet), 1020 Northgate Drive (68,764 square feet) and 1025 Northgate Drive (71,562 square feet).

The approximate 7.81-acre project site is located within the Terra Linda neighborhood of the City and is generally bound to the north by existing residential development, to the east by Redwood Highway (Highway 101), to the south by a freeway exit and to the west by the Manuel T. Freitas Parkway. A segment of Las Gallinas Creek is located immediately north of the project site and separates the project site from the adjacent residential community. The project consists of APNs 178-240-17 (1005 Northgate Drive) and APN 178-24-21 (1010 Northgate Drive).

The project site is located in a developed area of the City and surrounding land uses include medium-density residential, medium-to-high density residential, commercial office, and commercial shopping uses (Northgate Mall). Land uses that are designated as large open spaces are located further east (approximately 0.9 miles) and to the northwest (approximately 0.8 miles) of the project site.



LSA

FIGURE 1

N

0 1000 2000
FEET

SOURCE: ESRI StreetMap North America (2012).

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1010 Northgate Drive, San Rafael
Project Location and Regional Vicinity Map

LSA

FIGURE 2

Project Boundary (approximate)

0 225 450
FEET

1010 Northgate Drive, San Rafael
Aerial Photograph of Project Area

SOURCES: GOOGLE EARTH, APRIL 2014; LSA ASSOCIATES, INC., 2015

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C. BACKGROUND

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

1. 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 an annoyance, while loudness can affect our ability to hear. 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 intensity 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 defines the noise environment of the project area in terms of sound intensity and the project's effect on adjacent sensitive land uses.

2. Measurement of Sound

Sound intensity is measured through the A-weighted scale to correct for the relative frequency response of the human ear. That is, an A-weighted noise level de-emphasizes low and very high frequencies of sound similar to the human ear's de-emphasis of these frequencies. 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. The decibel scale increases as the square of the change, representing the sound pressure energy. 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 in a hard-site environment, 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 rate noise for various time periods, an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. Equivalent continuous sound level (L_{eq}) is the total sound energy of time varying noise over a sample period. However, the predominant rating scales for communities in the State of California are the L_{eq} and Community Noise Equivalent

Level (CNEL) or the day-night average level (L_{dn}) based on dBA. 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). L_{dn} is similar to the CNEL scale, but without the adjustment for events occurring during the evening hours. CNEL and L_{dn} are within 1 dBA of each other and are normally interchangeable.

Other noise rating scales 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 another noise scale, or noise standards in terms of 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 level, and half of the time it is less than this 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 a change of 3.0 dB 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 a change in the noise level between 1.0 and 3.0 dB, which is only noticeable in laboratory environments. The last category includes changes in noise levels of less than 1.0 dB, which are inaudible to the human ear. Only audible changes in existing ambient or background noise levels are considered potentially significant.

3. 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 dB, 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 dB, 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 dB will result in dizziness or loss of equilibrium. The ambient or background noise problem is widespread and generally more concentrated in urban areas than in outlying less developed areas.

Table 1 lists "Definitions of Acoustical Terms," and Table 2 displays "Common Sound Levels and Their Noise Sources."

Table 1: 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 5 dB to sound levels occurring in the evening from 7:00 p.m. to 10:00 p.m. and after the addition of 10 dB to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
Day/Night Noise Level, L_{dn}	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 10 dB 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 M., *Handbook of Acoustical Measurements and Noise Control,* 1991.

Table 2: 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
	0	Very Faint	

Source: Compiled by LSA Associates, Inc., 2015.

4. Characteristics of Groundborne 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 groundborne noise. When assessing annoyance from groundborne 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. Groundborne 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 groundborne 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 3. 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 provides a reasonable estimate for a wide range of soil conditions. In extreme cases, excessive groundborne 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.[1]

Table 3: Typical Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft (in/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

Notes: PPV= peak particle velocity; in/sec= inches per second

Source: Federal Transit Administration, 2006. *Transit Noise and Vibration Impact Assessment*. May.

5. Regulatory Framework

The federal, State, and local framework for noise standards is outlined below. The City of San Rafael has established standards in the 2020 General Plan and in the Municipal Code for land use projects that could potentially expose sensitive receptors to excessive noise levels.

a. U.S. Environmental Protection Agency. In 1972 Congress enacted the Noise Control Act. This act authorized the (U.S. EPA) to publish descriptive data on the effects of noise and 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 4. The U.S. EPA cautions that these identified levels are not standards because they do not take into account the cost or feasibility of the levels.

Table 4: Summary of U.S. EPA 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, play-grounds, 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, 1974. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*. March.

For protection against hearing loss, 96 percent of the population would be protected if sound levels are less than or equal to an $L_{eq(24)}$ of 70 dBA. The "(24)" signifies an L_{eq} duration of 24 hours. The

[1] Harris, C.M., 1998. *Handbook of Acoustical Measurements and Noise Control.*

U.S. EPA activity and interference guidelines are designed to ensure reliable speech communication at about 5 feet 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 5. At 55 dBA L_{dn}, 95 percent sentence clarity (intelligibility) may be expected at 11 feet, and no community reaction. However, 1 percent of the population may complain about noise at this level and 17 percent may indicate annoyance.

b. 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.

Table 5: Summary of Human Effects in Areas Exposed to 55 dBA L_{dn}

Type of Effects	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 1.4 feet. 99 percent sentence intelligibility (average) at 3.2 feet. 95 percent sentence intelligibility (average) at 11.5 feet.
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, 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. March.

The State has also established land use compatibility guidelines for determining acceptable noise levels for specified land uses. The City has adopted and modified the State's land use compatibility guidelines, as discussed below.

c. City of San Rafael's General Plan. The Noise Element of the City's General Plan seeks to limit the impacts of noise on residents and employees in two ways. First, the General Plan contains standards to determine the suitability of new land uses depending upon the extent of noise exposure in the area. Second, General Plan policies limit the extent of new noise sources that proposed development can add to existing noise levels in the surrounding area and through implementation of the

City's Noise Ordinance.[2] The following policies and programs from the Noise Element are applicable to the proposed project.

- Policy N-1: Noise Impacts on New Development. Protect people in new development from excessive noise by applying noise standards in land use decisions. Apply the Land Use Compatibility Standards (see Table 6) to the siting of new uses in existing noise environments. These standards identify the acceptability of a project based on noise exposure. If a project exceeds the standards in Table 6, an acoustical analysis shall be required to identify noise impacts and potential noise mitigations. Mitigation should include the research and use of state-of-the-art abating materials and technology.
  - Program N-1a: Acoustical Studies. Require acoustical studies for all new residential projects within the projected Ldn 60 dB noise contours (Table 6) so that noise mitigation measures can be incorporated into project design. Acoustical studies shall identify noise sources and contain a discussion of the existing and future noise exposure and the mitigation measures that may be used to achieve the appropriate outdoor and indoor noise standards.

Table 6: Land Use Compatibility Standards for New Development

Land Use	Normally Acceptable [a]	Conditionally Acceptable [b]	Clearly Unacceptable [c]
Exterior Noise Exposure to the Site L_{dn} (dB)			
Residential, Hotels, Motels	< 60	60 – 75	> 75
Schools, Libraries, Churches, Hospitals, Nursing Homes	< 60	60 –80	> 80
Auditoriums, Concert Halls, Amphitheaters	< 70	--	> 70
Sports Arena, Outdoor Spectator Sports	< 75	--	> 75
Playgrounds, Neighborhood Parks	< 60	60 – 70	> 70
Other Outdoor Recreation and Cemeteries	< 60	60 – 80	> 80
Office and Other Commercial Uses	< 65	65 – 85	--
Industrial, Manufacturing, Utilities, Agriculture	< 70	70 – 85	--
Interior Noise Exposure L_{dn} (dB)			
Bedrooms in Residential Units not in Downtown	< 40	--	> 40
Other Rooms in Residential Units not in Downtown	< 45	--	> 45
Bedrooms in Residential Units in Downtown	< 45	--	> 45
Hotels, Motels, Downtown Multifamily	< 45	--	> 45

Notes:
[a] Normally Acceptable – Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
[b] Conditionally Acceptable – Specific land use may be permitted only after detailed analysis of the noise reduction requirements and needed noise insulation features included in the design.
[c] Clearly Unacceptable – New construction of development clearly should not be undertaken.
Source: San Rafael, City of, 2004.

- Policy N-2: Exterior Noise Standards for Residential Use Areas. The exterior noise standard for backyards and/or common usable outdoor areas in new residential development is up to L_{dn} of 60 dB. In common usable outdoor areas in Downtown, mixed-use residential and high density

[2] San Rafael, City of, 2004. The City of San Rafael General Plan 2020: Noise Element.

residential districts, up to L_{dn} of 65 dB may be allowed if determined acceptable through development review.

- See Program N1-a Acoustical Studies

- Policy N-3: Planning and Design of New Development. Encourage new development to be planned and designed to minimize noise impacts from outside noise sources.
  - Program N-3a: Noise Mitigation. Require, where appropriate, the following mitigation measures to minimize noise impacts on proposed development projects:
    1. Site Planning. Proper site planning is the first mitigation measure that should be investigated to reduce noise impacts. By taking advantage of the natural shape and terrain of the site, it often is possible to arrange the buildings and other uses in a manner that will reduce and possibly eliminate noise impacts. Specific site planning techniques include:
       a. Increasing the distance between the noise source and the receiver;
       b. Placing non-noise sensitive land uses such as parking lots, maintenance facilities, and utility areas between the source and the receiver;
       c. Using non-noise sensitive structures such as garages to shield noise-sensitive areas; and
       d. Orienting buildings to shield outdoor spaces from a noise source.
    2. Architectural Layout of Buildings. In many cases, noise reduction can be attained by careful layout of noise-sensitive spaces. Bedrooms, for example, should be placed away from freeways. Quiet outdoor spaces can be provided next to a noisy highway by creating a U-shaped development, which faces away from the highway.
    3. Noise Barriers. Absorptive types of noise barriers or walls should be used to reduce noise levels from ground transportation noise sources and industrial sources. A barrier must interrupt the line of sight between the noise source and the receiver in order to reduce noise level both outdoors and indoors. A barrier should provide at least L_{dn} 5 dB of noise reduction to achieve a noticeable change in noise levels.
    4. Construction Modifications. If site planning, architectural layout, noise barriers, or a combination of these measures does not achieve the required noise reduction, then mitigation should be facilitated through construction modification to walls, roofs, ceilings, doors, windows.
    5. Alternatives to Sound Walls. Encourage new development to identify alternatives to the use of sound walls to ease noise impacts.

- Policy N-4: Noise from New Nonresidential Development. Design nonresidential development to minimize noise impacts on neighboring uses.
  a. Performance Standards for Uses Affecting Residential Districts. New nonresidential development shall not increase noise levels in a residential district by more than L_{dn} 3 dB, or crease noise impacts that would increase noise levels to more than L_{dn} 6 dB at the property line of the noise receiving use, whichever is the more restrictive standard.
  b. Performance Standards for Uses Affecting Nonresidential and Mixed Use Districts. New nonresidential projects shall not increase noise levels in a nonresidential or mixed-use district by more than L_{dn} 5 dB, or create noise impacts that would increase noise levels to more than L_{dn} 65 dB (Office, Retail) or L_{dn} 70 dB (Industrial), at the property line of the noise receiving use, whichever is the more restrictive standard.

c. Waiver. These standards may be waived if, as determined by an acoustical study, there are mitigating circumstances (such as higher existing noise levels), and no uses would be adversely affected.

- Program N-4a: Require Acoustical Study. Identify through an acoustical study noise mitigation measures to be designed and built into two nonresidential and mixed-use development, and encourage absorptive types of mitigation measures between noise sources and residential districts.

- Policy N-5: Traffic Noise from New Development. Minimize noise impacts of increased off-site traffic caused by new development. Where the exterior L_{dn} is 65 dB or greater at a residential building or outdoor use area and a plan, program, or project increases traffic noise levels by more than L_{dn} 3 dB, reasonable noise mitigation measures shall be included in the plan, program or project.
  - Program N-5a: Traffic Noise Studies. Require acoustical studies to evaluate potential off-site noise impacts resulting from traffic generated by new development.
  - Program N-8a: Future Transitway Mitigation Measures. A detailed noise assessment and appropriate mitigation measures should be prepared for any rail project on the Sonoma Marin Area Rail Transit right-of-way. The analysis should address the City's noise standards and the Federal Transit Administration (FTA) guidelines.
- Policy N-9: Nuisance Noise. Minimize impacts from noise levels that exceed community sound levels.
  - Program N-9a: Enforce and Update the Noise Ordinance. Enforce and update, as necessary, the City's Noise Ordinance that addresses common noise nuisances including amplified music, outdoor mechanical equipment, and construction activities.
  - Program N-9b: Mitigation for Construction Activity Noise. Through environmental review, identify mitigation measures to minimize the exposure of neighboring properties to excessive noise levels from construction-related activity.
  - Program N-9c: Noise Specifications. Include noise specifications in requests for equipment information and bids for new City equipment and consider this information as part of evaluation of the bids.
  - Program: N-9d: San Rafael Rock Quarry. Seek to minimize noise impacts of the quarry and brickyard operations through cooperative efforts with the County of Marin through its code enforcement and land use entitlement process.

d. City of San Rafael Municipal Code. The City of San Rafael's Municipal Code addresses noise in Chapter 8.13 Noise and in Section 14.16.260 Noise Standards.[3]

Chapter 8.13, Noise. Subject to the exceptions and exemptions, the general noise limits set forth in this section shall apply. A summary of the general noise limits set forth in this section is set forth in Table 7. Where two or more noise limits may apply, the more restrictive noise limit shall govern.

[3] San Rafael, City of, 2014. *San Rafael, California – Code of Ordinances*. April.

Table 7: General Noise Limits

Property Type or Zone	Daytime Limits	Nighttime Limits
Residential	60 dBA intermittent 50 dBA constant	50 dBA intermittent 40 dBA constant
Mixed-Use	65 dBA intermittent 55 dBA constant	55 dBA intermittent 45 dBA constant
Multifamily Residential (interior sound source)	40 dBA intermittent 35 dBA constant	35 dBA intermittent 30 dBA constant
Commercial	65 dBA intermittent 55 dBA constant	65 dBA intermittent 55 dBA constant
Industrial	70 dBA intermittent 60 dBA constant	70 dBA intermittent 60 dBA constant
Public Property	Most restrictive noise limit applicable to adjoining private property	Most restrictive noise limit applicable to adjoining private property

Source: San Rafael, City of, 2014.

The following standard exceptions shall be allowed as of right, to the extent and during the hours specified.

> Construction. Except as otherwise provided in subsection B of this section, or by the planning commission or city council as part of the development review for the project, on any construction project on property within the city, construction, alteration, demolition, maintenance of construction equipment, deliveries of materials or equipment, or repair activities otherwise allowed under applicable law shall be allowed between the hours of seven a.m. (7:00 a.m.) and six p.m. (6:00 p.m.), Monday through Friday, and nine a.m. (9:00 a.m.) and six p.m. (6:00 p.m.) on Saturdays, provided that the noise level at any point outside of the property plane of the project shall not exceed ninety (90) dBA. All such activities shall be precluded on Sundays and holidays. Violation of the foregoing may subject the permittee to suspension of work by the chief building official for up to two (2) days per violation.
>
> For any construction project involving the construction of one or more new buildings or residences within the city, or when required by the planning commission or city council as part of their development review for the property, the property owner or occupant shall post a sign at all entrances to the construction site upon commencement of construction, for the purpose of informing all contractors and subcontractors, their employees, agents, materialmen and all other persons at the construction site, of the basic requirements of this chapter.
>
> 1) Said sign(s) shall be posted in a conspicuous place visible from the public right-of-way near the entrance to the job site, at least five feet (5') above ground level, and shall be of a white background, with legible black lettering, which lettering shall be a minimum of one and one-half inches (1 1/2") in height.
>
> 2) Said sign shall read as follows in Table 8 (or as consistent with other hours approved by the planning commission or city council):

Table 8: Construction Hours

Monday—Friday	7:00 a.m. to 6:00 p.m.
Saturday	9:00 a.m. to 6:00 p.m.
Sunday/Holidays	Prohibited

Notes: Includes any and all deliveries.

Source: San Rafael, City of, 2014.

Chapter 14.16.260 Noise Standards. Any new development located in a "conditionally acceptable" or "normally unacceptable" noise exposure area, based on the land use compatibility chart standards in the general plan, shall require an acoustical analysis. Noise mitigation features shall be incorporated where needed to assure consistency with general plan standards. New construction is prohibited in noise exposure areas where the land use compatibility chart indicates the noise exposure is "clearly unacceptable."

A. Residential Development. The following standards apply to residential development:

1. Acoustical studies shall be required for all new residential development within projected sixty (60) dBA (L_{dn}) noise contours so that noise mitigation measures can be incorporated into project designs.
2. Usable outdoor area in low and medium density districts shall be sixty (60) dBA (L_{dn}) or less.
3. In high density and mixed use districts, residential interior standards shall be met and common, usable outdoor areas shall be designed to minimize noise impacts. Where possible, a sixty (60) dBA (L_{dn}) standard shall be applied to usable outdoor areas.
4. Interior noise standards for new single-family residential and residential health care development shall be forty (40) dBA (L_{dn}) for bedrooms and forty-five (45) dBA (L_{dn}) for other rooms. New hotels and motels shall meet a forty-five (45) dBA (L_{dn}) standard. For new multifamily development, hotels and motels, interior noise standards shall be described by State Administrative Code standards, Title 25, Part 2.
5. Noise standards shall be applied to multifamily remodeling requiring major environmental design review permits.
6. Post-construction monitoring and approval by an acoustical engineer shall be required in residential development near high noise sources to insure that city standards have been met.

B. Development Adjacent to Residential Areas. New nonresidential construction adjacent to residential areas shall not increase noise levels in a residential area by more than three (3) dBA (L_{dn}), or create noise impacts which would increase noise levels to more than sixty (60) dBA (L_{dn}) at the boundary of a residential area, whichever is the more restrictive standard. This standard may be waived by the planning director if, as determined by a noise analysis, there are mitigating circumstances (such as higher existing noise levels), and no uses would be adversely affected.

C. Development Adjacent to Commercial, Mixed Use and Industrial Districts. New nonresidential development shall not increase noise levels in a commercial area by more than five (5) dBA (L_{dn}), or create noise impacts which would increase noise levels to more than sixty-five (65) dBA (L_{dn}) for office, retail or mixed use districts, or seventy

(70) dBA (L_{dn}) for industrial districts, at the property line of the noise receiving use, whichever is the more restrictive standard. This standard may be waived by the planning director if, as determined by a noise analysis, there are mitigating circumstances (such as higher existing noise levels), and no uses would be adversely affected.

D. Traffic Noise Mitigation. A sixty-five (65) dBA (L_{dn}) level is considered an acceptable upper limit for existing residences constructed before July, 1988. Where exterior levels are sixty-five (65) dBA (L_{dn}) or greater at the face of a residential building, and traffic noise level increases of more than three (3) dBA (L_{dn}) affecting residential areas will be created by a program or development, reasonable noise mitigation measures shall be included in the program or development which is creating the increase.

D. SETTING

This section describes the existing noise environment in the project site vicinity. Noise monitoring, traffic modeling, and noise modeling were used to quantify existing and future noise levels at the project site.

1. Existing Sensitive Land Uses in the Project Area

Sensitive receptors include residences, schools, hospitals, churches and similar uses that are sensitive to noise. Project construction and operation could adversely affect nearby noise-sensitive land uses. Existing sensitive land uses within the project area include multi-family homes located approximately 80 feet north and single-family homes located approximately 300 feet northwest of the boarder of the project site. The commercial retail shops and restaurants located along Northgate Drive south of Manual T. Freitas Parkway are not considered noise-sensitive uses.

2. Overview of the Existing Noise Environment

In the City of San Rafael, vehicular traffic on the roadways is the single largest source of noise. Airplanes and mechanical equipment are also contributors, as are intermittent sources such as leaf blowers and construction equipment. Average noise levels are highest along Highways 101 and 580 and along major traffic corridors.[4] 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. The proposed project is not within the 65 dBA CNEL contour of the San Rafael Airport located approximately 2.5 miles northeast, the San Rafael Heliport located approximately 6 miles southeast, or the Marin County Airport located approximately 10 miles north. Operational rail noise is also a source of noise in San Rafael. Sonoma Marin Area Rail Transit (SMART) will provide two stops in San Rafael at the Marin Civic Center and Downtown. The Marin Civic Center SMART station will be located approximately 1 mile southeast and the Downtown SMART station will be located approximately 4 miles south of the project site.

[4] San Rafael, City of, op. cit.

a. Ambient Noise Levels. To assess existing noise levels, LSA conducted four short-term noise measurements and one long-term noise measurement on the project site on December 14, 2015. The short-term 15-minute noise measurements were recorded at different locations on-site between 11:00 a.m. and 12:15 p.m. The long-term noise measurement recorded a 24-hour measurement from December 14, 2015 to December 15, 2015. The first short-term measurement was taken at the southern edge of the 1010 Northgate Drive boundary. The second short-term measurement was taken at the western boundary of the 1010 Northgate Drive boundary. The third short-term measurement was taken at 1005 Northgate Drive, while the fourth short-term measurement was located near the northern boundary of 1010 Northgate Drive, closest to Highway 101. Noise monitoring locations are shown in Figure 3. Noise measurement data collected during monitoring is summarized in Table 9. The meteorological conditions at the time of the noise monitoring are shown in Table 10. The short-term noise measurements indicate that ambient noise in the project site vicinity ranges from approximately 65.3 dBA to 74.7 dBA L_{eq}. The long-term noise measurement was 70.7 dBA CNEL. Traffic on surrounding roadways was reported as the primary noise source.

Table 9: Ambient Noise Monitoring Results, dBA

Location Number	Location Description	Start Time	L_{eq}/L_{dn} [a]	L_{max} [b]	L_{min} [c]	Primary Noise Sources
ST-1	Southern boundary of 1010 Northgate Drive	10:59 a.m.	65.5	80.8	57.0	Parking lot noise – car doors slamming, people talking, cars starting
ST-2	Western boundary of 1010 Northgate Drive	11:18 a.m.	65.3	81.4	56.2	Traffic from Highway 101 and Northgate Drive
ST-3	1005 Northgate Drive	11:37 a.m.	74.7	102.2	59.5	Traffic from Northgate Drive and Manuel T. Freitas Parkway; parking lot noise
ST-4	Northern boundary of 1010 Northgate Drive	11:58 a.m.	69.6	79.1	64.0	Traffic from Highway 101
LT-1	Northern boundary of 1010 Northgate Drive	12:36 p.m.	70.7	105.8	42.7	Traffic from Highway 101

[a] L_{eq} represents the average of the sound energy occurring over the measurement time period for the short-term noise measurements and L_{dn} represents the day-night sound level for the long-term 24-hour noise measurement.
[b] L_{max} is the highest sound level measured during the measurement time period.
[c] L_{min} is the lowest sound level measured during the measurement time period.

Source: LSA Associates, Inc., December 2015.

Table 10: Meteorological Conditions During Ambient Noise Monitoring

Location Number	Maximum Wind Speed (mph)	Average Wind Speed (mph)	Temperature (°F)	Relative Humidity (percent)	Sky Conditions
ST-1	7.8	1.9	58.0	35.0	Sunny and clear
ST-2	5.5	1.5	58.8	32.0	Sunny and clear
ST-3	7.9	1.4	60.4	39.0	Sunny and clear
ST-4	4.7	1.7	61.5	40.0	Sunny and clear

Source: LSA Associates, Inc., December 2015.

b. Existing Roadway Noise Levels. Documentation of the existing roadway traffic in the project vicinity was obtained by the Trip Generation Memorandum prepared for the proposed project. Counts were obtained at both driveways at 1005 Northgate Drive during both the morning and evening peak

periods for three consecutive days of October 27-29, 2015.[5] The average of the counts for the three days indicated that the existing gas station and UPS store located at 1005 Northgate Drive currently generate an average of 53 trips during the morning peak hour and 128 trips during the evening peak hour, indicating a total of 1,145 trips daily.

E. PROJECT IMPACTS

A project will normally have a significant effect on the environment related to noise if it will substantially increase the ambient noise levels for adjoining areas or conflict with adopted environmental plans and goals of the community in which it is located. The applicable noise standards governing the project site include the Noise Element of the City's General Plan and Municipal Code.

1. Construction Noise

Short-term noise impacts would be associated with excavation, grading, and construction of buildings on site during construction of the proposed project. Table 11 lists maximum noise levels recommended for noise impact assessments for typical construction equipment, based on a distance of 50 feet between the equipment and a noise receptor. Construction-related short-term noise levels would be higher than existing ambient noise levels currently in the project area but would no longer occur once construction of the project is completed.

[5] W-Trans, 2016. *Trip Generation for 1005 and 1010 Northgate Drive Memorandum.* February 5.

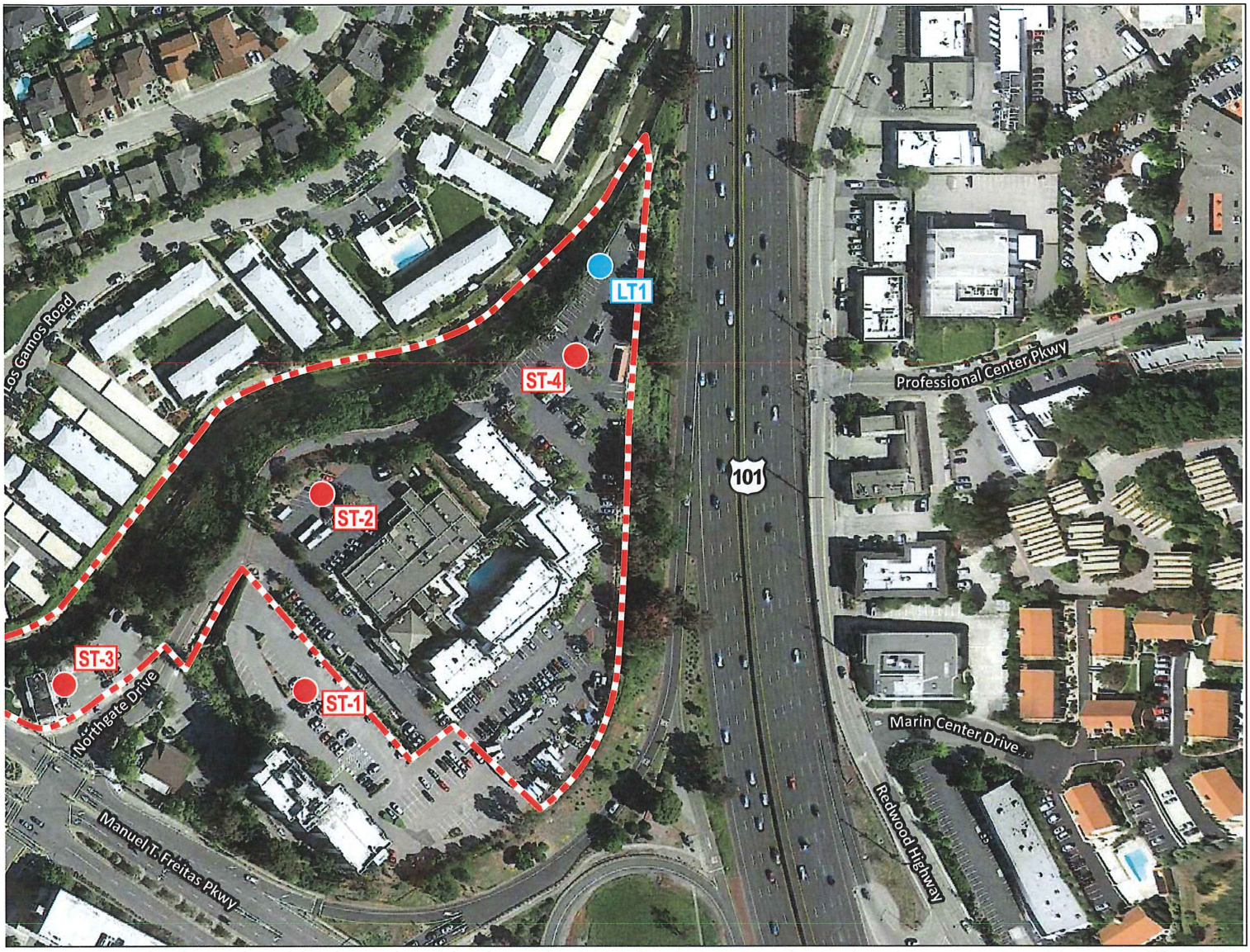

FIGURE 3

ST# Short-Term Noise Monitoring Locations

LT# Long-Term Monitoring Location

Project Boundary (approximate)

1010 Northgate Drive, San Rafael
Noise Monitoring Locations

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Table 11: Typical Construction Equipment Maximum Noise Levels, L_{max}

Type of Equipment	Range of Maximum Sound Levels (dBA at 50 feet)	Suggested Maximum Sound Levels for Analysis (dBA at 50 feet)
Pile Drivers	81 to 96	93
Rock Drills	83 to 99	96
Jackhammers	75 to 85	82
Pneumatic Tools	78 to 88	85
Pumps	74 to 84	80
Scrapers	83 to 91	87
Haul Trucks	83 to 94	88
Cranes	79 to 86	82
Portable Generators	71 to 87	80
Rollers	75 to 82	80
Dozers	77 to 90	85
Tractors	77 to 82	80
Front-End Loaders	77 to 90	86
Hydraulic Backhoe	81 to 90	86
Hydraulic Excavators	81 to 90	86
Graders	79 to 89	86
Air Compressors	76 to 89	86
Trucks	81 to 87	86

Source: Bolt, Beranek & Newman, 1987. *Noise Control for Buildings and Manufacturing Plants.*

Two types of short-term noise impacts could occur during construction of the proposed project. The first type involves construction crew commutes and the transport of construction equipment and materials to the site for the proposed project, which would incrementally increase noise levels on roads leading to the site. As shown in Table 11, there would be a relatively high single-event noise exposure potential at a maximum level of 84 dBA L_{max} with trucks passing at 50 feet.

The second type of short-term noise impact is related to noise generated during excavation, grading, and construction on the project site and off-site infrastructural connection areas. Construction is performed in discrete steps, or phases, each of which has its own mix of equipment and, consequently, its own noise characteristics. These various sequential phases would change the character of the noise generated on site. Therefore, the noise levels vary as construction progresses. 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.

Table 11 lists maximum noise levels recommended for noise impact assessments for typical construction equipment, based on a distance of 50 feet between the equipment and a noise receptor. Typical maximum noise levels range up to 91 dBA L_{max} at 50 feet during the noisiest construction phases. The site preparation phase, which includes excavation and grading of the site, tends to generate the highest noise levels because earthmoving machinery is the noisiest construction equipment. Earthmoving equipment includes excavating machinery such as backfillers, 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.

Sensitive receptors are located approximately 80 feet north of the project site. Based on attenuation, the closest off-site residences may be subject to short-term construction noise reaching 87 dBA L_{max} when construction is occurring at the project site boundary. Construction noise is permitted by the Municipal Code when activities occur between the hours of 7:00 a.m. and 6:00 p.m. on weekdays and between 9:00 a.m. and 6:00 p.m. on Saturdays, provided that construction noise levels do not exceed 90 dBA. No construction shall be permitted on Sundays or holidays. Best construction management practices are included below to further reduce the construction noise levels.

As discussed above, construction noise levels may reach 87 dBA L_{max} at the nearest off-site residences, which is below the City's construction noise criterion of 90 dBA during construction activities. However, because of the close proximity of the off-site residences, the following measures should be implemented to reduce potential construction noise impacts on nearby sensitive receptors.

- Equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers consistent with manufacturers' standards.
- Place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the active project site.
- 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.
- All noise producing construction activities, including warming-up or servicing equipment and any preparation for construction, shall be limited to the hours between of 7:00 a.m. and 6:00 p.m. on weekdays and between 9:00 a.m. and 6:00 p.m. on Saturdays. No construction shall be permitted on Sundays or holidays.
- Designate a "disturbance coordinator' who would be responsible for responding to any local complaints about construction noise. The disturbance coordinator would determine the cause of the noise complaint (e.g., starting too early, bad muffler) and would determine and implement reasonable measures warranted to correct the problem.

Implementation of these best construction management practices would ensure that construction noise impacts would be reduced at nearby sensitive receptors.

2. Vibration Impacts

Vibration refers to groundborne noise and perceptible motion. Groundborne vibration is almost exclusively a concern inside buildings and is rarely perceived as a problem outdoors. Vibration energy propagates from a source, through intervening soil and rock layers, to the foundations of nearby buildings. The vibration then propagates from the foundation throughout the remainder of the structure. Building vibration may be perceived by the occupants as the motion of building surfaces, rattling of items on shelves or hanging on walls, or as a low-frequency rumbling noise. The rumbling noise is caused by the vibrating walls, floors, and ceilings radiating sound waves. Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by 10 dB or less. This is an order of magnitude below the damage threshold for normal buildings.

Typical sources of groundborne vibration are construction activities (e.g., pavement breaking and operating heavy-duty earthmoving equipment), and occasional traffic on rough roads. In general, groundborne vibration from standard construction practices is only a potential issue when within 25 feet of sensitive uses. Groundborne vibration levels from construction activities very rarely reach levels that can damage structures; however, these levels are perceptible near the active construction site. With the exception of old buildings built prior to the 1950s or buildings of historic significance, potential structural damage from heavy construction activities rarely occurs. When roadways are smooth, vibration from traffic (even heavy trucks) is rarely perceptible.

The streets surrounding the project area are paved, smooth, and unlikely to cause significant groundborne vibration. In addition, the rubber tires and suspension systems of buses and other on-road vehicles make it unusual for on-road vehicles to cause groundborne noise or vibration problems. It is, therefore, assumed that no such vehicular vibration impacts would occur and, therefore, no vibration impact analysis of on-road vehicles is necessary.

The existing multi-family residential units located west of the project site would be approximately 80 feet from major building construction; the area between the proposed building and the existing residential units is Las Gallinas Creek. Therefore, the existing residences would not be susceptible to significant groundborne vibration levels. The buildings surrounding the proposed project are unlikely to experience structural damage from groundborne vibration associated with construction activity. The proposed project would not result in a significant project impact related to vibration, and no mitigation is required.

3. Operational Noise

The proposed project would include residential and commercial uses in a developed area in the City of San Rafael. Operational noise can be categorized as mobile source noise and stationary source noise. Mobile source noise would be attributable to the additional trips that would be a result of the proposed project. Stationary source noise includes noise generated by the residential and commercial land uses.

a. Mobile Source Noise. Traffic in the project site vicinity could increase as a result of the proposed project. To assess traffic noise impacts, the traffic noise level in the project vicinity was projected in the Trip Generation Memorandum prepared for the proposed project using rates published by the Institute of Transportation Engineers (ITE) in *Trip Generation Manual*, 9th Edition, 2012 for "Residential Condominiums/Townhouse." [6]

The proposed project would generate a net decrease of 391 vehicle trips per day, including 27 fewer trips during the AM peak hour and 28 fewer trips during the PM peak hour as indicated in the Trip Generation Memorandum prepared for the project. Due to the expected decrease in traffic volumes in the study area, the project would not result in an increase in traffic noise levels and would likely decrease, therefore the project would not result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

[6] W-Trans, 2016. *Trip Generation for 1005, 1020 and 1052 Northgate Drive.* February.

b. Stationary Source Noise. Implementation of the proposed project would generate various on-site stationary noise sources, including heating, ventilation, and air conditioning (HVAC) equipment, parking lot activities, and loading dock operations.

The nearest off-site sensitive receptors in the vicinity of the project are the multi-family residences located approximately 80 feet north of the proposed project site boundary and approximately 90 feet north of proposed buildings at 1005 Northgate Drive. The residences are located on Los Gamos Road along the northeast side of Manuel T. Freitas Parkway.

(1) HVAC Equipment. HVAC equipment could be a primary noise source associated with residential and commercial uses. HVAC equipment is often mounted on rooftops, located on the ground, or located within mechanical rooms. The noise sources could take the form of fans, pumps, air compressors, chillers, or cooling towers. HVAC operations would be required to meet all noise standards.

Precise details of HVAC equipment, including future location and sizing, are unknown at this time; therefore, for purposes of this analysis, 95 dBA at 1 foot was assumed to represent HVAC-related noise. Some off-site noise-sensitive receptors would be within 90 feet of proposed multi-family residential buildings. Adjusted for distance to the nearest off-site sensitive receptors, the off-site residences would be exposed to a noise level of 56 dBA L_{max} generated by HVAC equipment, which would exceed the City's noise level criterion of 50 dBA L_{eq} for constant noise sources at residential land uses.

It is assumed that, as a worst-case scenario, HVAC equipment would operate continuously through the day, evening, and night. In order to reduce noise levels associated with HVAC equipment, design considerations and shielding must be implemented to ensure that the HVAC equipment will be located, enclosed, shielded, or otherwise designed to create the greatest possible distance between HVAC-related noise sources and nearest off-site sensitive receptors. Placing HVAC equipment on the rooftop and/or including a parapet create a natural noise barrier that reduces noise levels from these rooftop HVAC units by 8 dBA or more, would reduce the HVAC noise level to approximately 48 dBA L_{max}, which would be below the City's noise level criterion.

(2) Parking Lot Activities. Parking lot noise, including engine sounds, car doors slamming, car alarms, loud music, and people conversing, would occur as a result of the proposed project at the project site and on nearby streets. Typical parking lot activities, such as people conversing or doors slamming, generates approximately 60 dBA to 70 dBA L_{max} at 50 feet. Existing sensitive receptors are located approximately 200 feet from proposed parking lots. Adjusted for distance, the nearest off-site residences would be exposed to a noise level of 48 to 58 dBA L_{max} generated by parking lot activities, which is below the City's noise level criterion of 60 dBA L_{eq} for intermittent noise sources at residential land uses. However, the majority of future on-site parking is proposed to be provided via two subterranean parking garages and one subterranean and ground-floor parking garage. The proposed parking garages would be located below the proposed mixed-use and residential buildings and would be approximately 90 feet from the nearest off-site residences. The parking garages would shield the residences from project-related parking lot noise. Therefore, the proposed project would not result in a significant impact related to parking lot noise, and no mitigation is required.

(3) Loading Dock and Delivery Noise. Additional on-site stationary noise sources would include delivery trucks and parking lot noise. Of the on-site stationary noise sources, noise generated by delivery truck activity would generate the highest maximum noise levels. Delivery truck loading and unloading activities would result in maximum noise levels from 75 dBA to 85 dBA L_{max} at 50 feet.

There are generally two types of loading that would occur on the site: small deliveries like parcels and packages, and large deliveries such as retail items or weekly food deliveries for dining facilities. The former are typically made via passenger car, van, or single-unit truck. These activities are potential noise sources that could affect noise-sensitive receptors in the project site vicinity. Loading and unloading activities could generate noise levels from 70 to 80 dBA L_{max} at the closest off-site receptor. However, peak noise levels from loading and unloading would be intermittent and when averaged over a one hour period would be much lower than the peak noise levels.

Loading dock and delivery noise is permitted by the Municipal Code when activities occur between 7:00 a.m. and 6:00 p.m. Monday through Saturday, provided that activities do not exceed 20 minutes. To reduce loading dock and delivery noise levels at nearby sensitive receptors, design considerations and shielding must be implemented to ensure that the loading and delivery activities are located in areas that would create the greatest possible distance between loading- and delivery-related noise sources and nearest off-site sensitive receptors.

4. Land Use Compatibility

The dominant source of noise in the project vicinity is traffic noise from Manual T. Freitas Parkway, Northgate Drive, and Highway 101. As such, 1005 Northgate Drive and the northern portion of 1010 Northgate Drive would have a higher noise level than other areas of the site because they are closer to the roadways. As shown in Table 9, the measured noise levels at the noise monitoring sites ST-3 and ST-4 were taken at 1005 Northgate Drive and the northern boundary of 1010 Northgate Drive and measured 74.7 dBA L_{eq} and 69.9 dBA L_{eq} respectively. ST-1 and ST-2 were taken along the southern and western boundaries of 1010 Northgate Drive and measured 65.5 dBA L_{eq} and 65.3 dBA L_{eq} respectively. The long-term noise monitoring site was 70.7 dBA L_{dn} and was taken approximately 120 feet from Highway 101.

The City sets forth normally acceptable noise level standards for land use compatibility and interior noise exposure of new development. The normally acceptable exterior noise level for residential units is 60 dBA L_{dn}. The normally acceptable interior noise level for residential units is 40 dBA L_{dn} in bedrooms and 45 dBA L_{dn} in other rooms. The nearest proposed residential units to Highway 101 are located approximately 70 feet from the highway and the noise exposure to the residential units would be 75.3 dBA L_{dn}.

Based on the EPA's Protective Noise Levels,[7] with a combination of walls, doors, and windows, standard construction for Northern California residential buildings (STC-24 to STC-28) would provide more than 25 dBA in exterior-to-interior noise reduction with windows closed and 15 dBA or more with windows open. With windows open, residents would not meet the City's normally

[7] Environmental Protection Agency, 1978. *Protective Noise Levels, Condensed Version of EPA Levels Document.* November.

acceptable residential interior noise standard of 40 dBA L_{dn} (i.e., 75.3 dBA – 15 dBA = 60.3 dBA). The distance at which a windows-open condition would meet the interior noise standard would be approximately 600 feet. Therefore, an alternate form of ventilation, such as an air-conditioning system, would be required to ensure that windows can remain closed for a prolonged period of time for all units at the proposed project. A ventilation system would reduce traffic noise levels for residents with windows closed; however, interior noise levels would still remain above the City's normally acceptable interior noise level criterion of 40 dBA for units adjacent to Highway 101 (i.e., 75.3 dBA – 25 dBA = 50.3 dBA). The distance at which standard building construction would reduce noise to 40 dBA is approximately 300 feet from Highway 101. All units at 1025 Northgate would fall within this contour, therefore, upgraded windows will be necessary.

Implementation of the following measures would be required for all units to reduce interior noise impacts to a less-than-significant level:

- In order for windows and doors to remain closed, mechanical ventilation such as air conditioning shall be provided for all units.
- All vent ducts connecting interior spaces to the exterior (i.e., bathroom exhaust, etc.) shall have at least two 90 degree turns in the duct.
- All windows and doors shall be installed in an acoustically-effective manner. Sliding-window panels shall form an air-tight seal when in the closed position and the window frames shall be caulked to the wall opening around the perimeter with a non-hardening caulking compound to prevent sound infiltration. Exterior doors shall seal air-tight around the full perimeter when in the closed position.

For all units at 1025 Northgate, windows and exterior doors shall be constructed with the Sound Transmission Class (STC) ratings. All windows and glass doors rated STC 36 (or higher) shall have glass lite thickness no less than 3/16 inch. Single-strength (3/32 inch) glass shall not be permitted in any of the window or glass door assemblies.

Implementation of these measures would reduce interior noise levels by 36 dBA resulting in interior noise levels of 39 dBA CNEL, which would meet the City's interior noise standard of 40 dBA CNEL.

An acoustical test report of all the sound-rated windows and doors shall be provided to the City for review by a qualified acoustical consultant to ensure that the selected windows and doors would reduce interior noise levels to the extent feasible.

5. Excessive Airport Noise

As noted in the existing conditions discussion above, aircraft noise in the City of San Rafael is primarily related to aircraft operations at the San Rafael Airport, the San Rafael Heliport, or the Marin County Airport. Aircraft noise is occasionally audible at the project site, due to the distance to surrounding airports; however, no portion of the project site lies within the 65 dBA CNEL noise contours of any public airport nor does any portion of the project site lie within 2 miles of any private airfield or heliport. Therefore, the proposed project would not result in the exposure of sensitive receptors to the excessive noise levels form aircraft noise sources.

6. Cumulative Impacts

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 result in a decrease of vehicle trips per day, and therefore, traffic volumes would lessen as a result of the proposed project. Therefore, the number of trips generated as a result of the proposed project would potentially decrease traffic noises level in the project site area and the proposed project would not generate a significant impact under cumulative noise conditions.

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APPENDIX A

Noise Monitoring Data

HMB_1572.038

Project Number: EMPISOIA
Project Name: Normgate Drive
Test Personnel: Cara Canuci

Sheet ___ of ___

Noise Measurement Survey

Site Number: ST-1 Date: 12/14/15 Time: From 10:59 To 11:14

Site Location: Southern portion of site along 1050 Normgate Drive in parking lot

Primary Noise Sources: traffic, people talking, car doors, cars starting

Measurement Results

	dBA
Leq	65.5
Lmax	80.8
Lmin	57.0
Lpeak	113.9
L2	
L8	
L25	
L50	
SEL	

Observed Noise Sources/Events

Time	Noise Source/Event	dBA

Comments: trucks unloading, air planes, helicopters

Equipment: Larson Davis Sound Track LXT
Settings: A-Weighted☐ Other☐ _____

Calibration Offset: _____ dBA
Slow☐ Fast☐ Windscreen☑

Atmospheric Conditions:

Maximum Wind Velocity (mph)	Average Wind Velocity (mph)	Temperature (F)	Relative Humidity (%)	
7.8	1.9	56	35	
Comments:	Sunny			

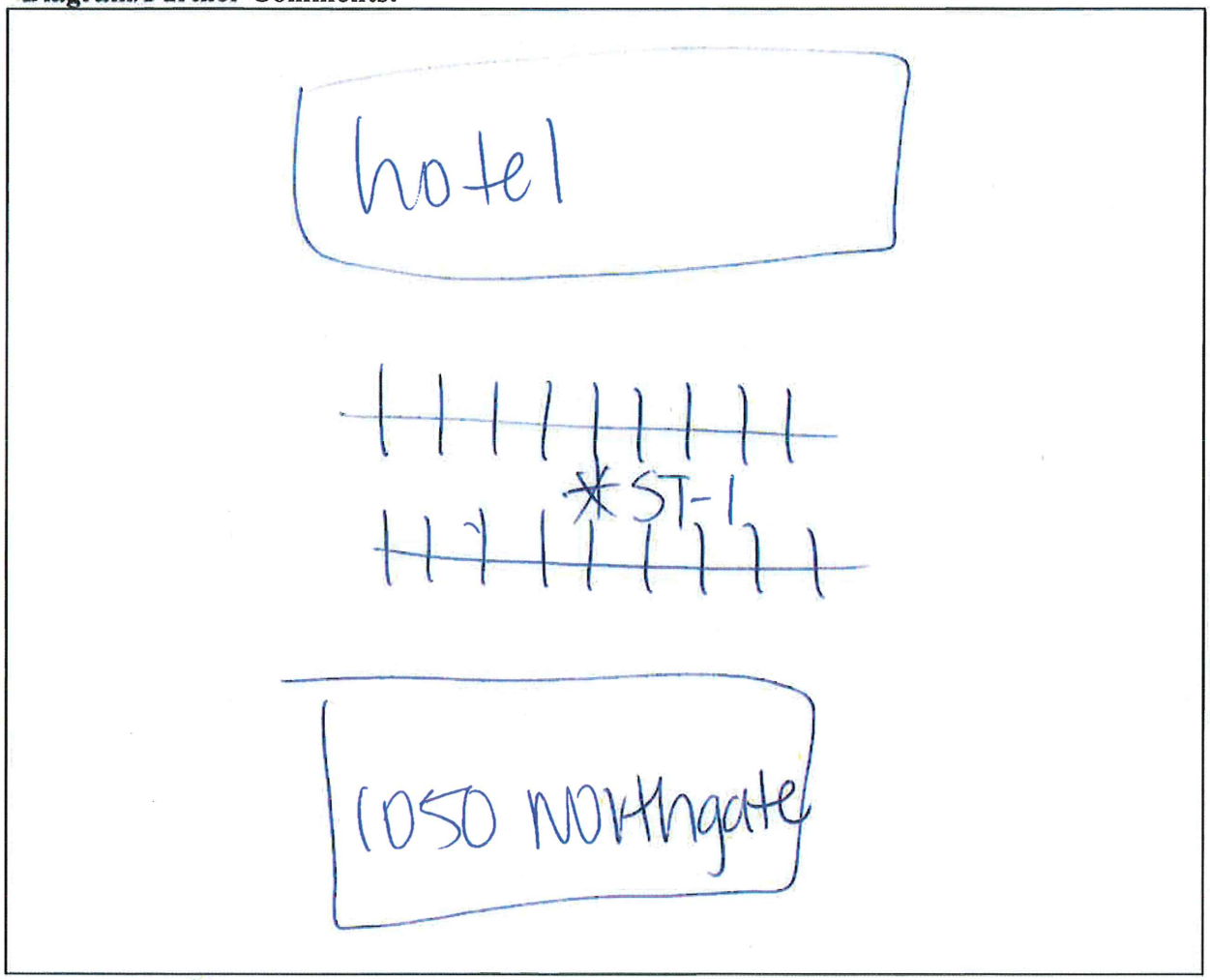
Photos Taken:

Photo Number	Location/Description

Traffic Description:

Roadway	# Lanes	Posted Speed	Average Speed	NB/EB Counts	SB/WB Counts

Diagram/Further Comments:



Cars
IIII IIII ||

trucks
||

IIII
= parking

HMB-1572.039

Project Number: EMP1501A
Project Name: Northgate Drive
Test Personnel: Cara Canuca

Sheet ___ of ___

Noise Measurement Survey

Site Number: ST2 Date: 12/14/15 Time: From 11:18 To 11:33

Site Location: West side of 1010 Northgate Drive - parking lot

Primary Noise Sources: traffic from 101, cars in parking lot starting

Measurement Results

	dBA
Leq	65.3
Lmax	81.4
Lmin	56.2
Lpeak	119.0
L2	
L8	
L25	
L50	
SEL	

Observed Noise Sources/Events

Time	Noise Source/Event	dBA
11:31	trash being taken out	

Comments: overhead airplanes

Equipment: Larson Davis Sound Track LXT
Settings: A-Weighted☐ Other☐ _____

Calibration Offset: _____dBA
Slow☐ Fast☐ Windscreen☐

Atmospheric Conditions:

Maximum Wind Velocity (mph)	Average Wind Velocity (mph)	Temperature (F)	Relative Humidity (%)	
5.5	1.5	50.8	32	
Comments:	sunny			

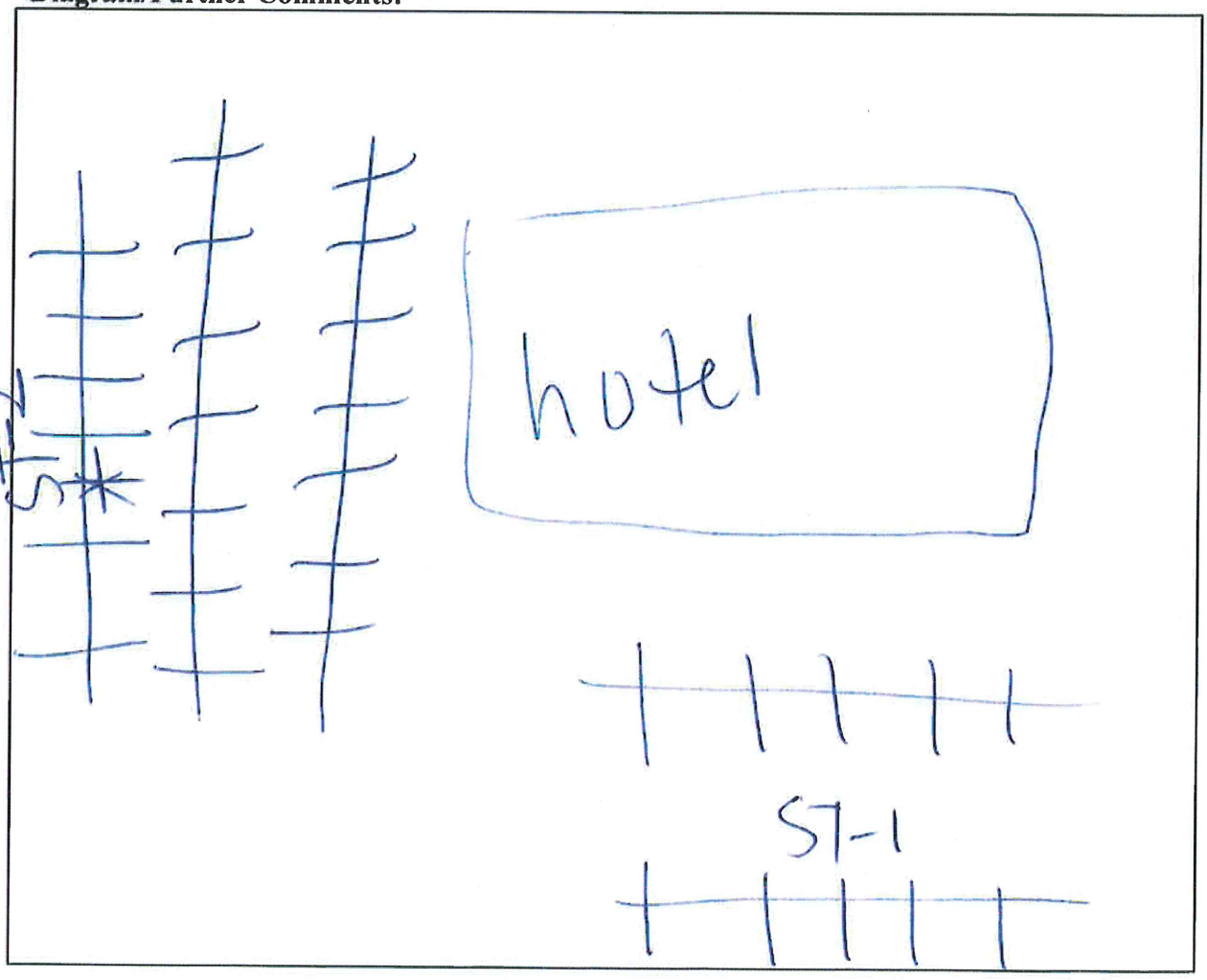
Photos Taken:

Photo Number	Location/Description

Traffic Description:

Roadway	# Lanes	Posted Speed	Average Speed	NB/EB Counts	SB/WB Counts

Diagram/Further Comments:



cars ||||

trucks ||

|||||| = parkin

HMB_1512.040

Project Number: EMPISOIA
Project Name: Northgate Drive
Test Personnel: Cara Canucci

Sheet ___ of ___

Noise Measurement Survey

Site Number: ST-3 Date: 12/14/15 Time: From 11:37 To 11:52

Site Location: 1005 Northgate Drive

Primary Noise Sources: traffic, cars starting, people talking, trucks loading/unloading, car doors

Measurement Results

	dBA
Leq	74.7
Lmax	102.2
Lmin	59.5
Lpeak	122.7
~~L2~~	
L8	
L25	
L50	
SEL	

Observed Noise Sources/Events

Time	Noise Source/Event	dBA
11:45	music playing	

Comments: traffic from Northgate Drive & M.T. Freitas

Equipment: Larson Davis Sound Track LXT
Settings: A-Weighted☐ Other☐ _____

Calibration Offset: _____dBA
Slow☐ Fast☐ Windscreen☐

Atmospheric Conditions:

Maximum Wind Velocity (mph)	Average Wind Velocity (mph)	Temperature (F)	Relative Humidity (%)	
7.9	1.4	60.4	39	
Comments:	sunny			

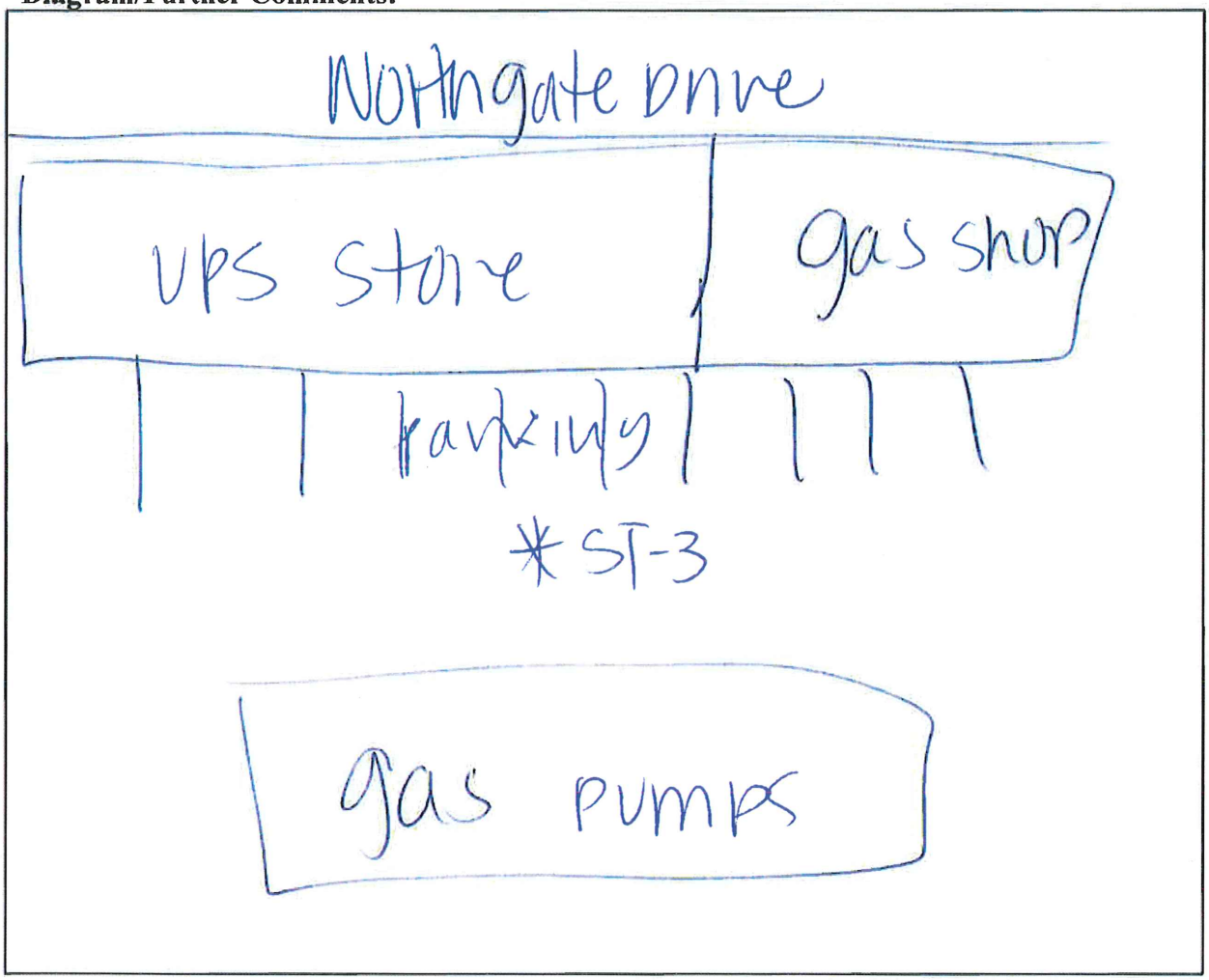
Photos Taken:

Photo Number	Location/Description

Traffic Description:

Roadway	# Lanes	Posted Speed	Average Speed	NB/EB Counts	SB/WB Counts

Diagram/Further Comments:



cars
|||| |||| |||| |||

trucks
||

|||||||| = parking

HMB-1512.041

Project Number: EMPISOIA
Project Name: Northgate Drive
Test Personnel: Cara Canuel

Sheet ___ of ___

Noise Measurement Survey

Site Number: ST-4 Date: 12/14/15 Time: From 11:58 To 12:13

Site Location: Northern area of site - north of hotel's horn tower

Primary Noise Sources: traffic from 101

Measurement Results

	dBA
Leq	69.8
Lmax	79.1
Lmin	64.0
Lpeak	115.1
L2	
L8	
L25	
L50	
SEL	

Observed Noise Sources/Events

Time	Noise Source/Event	dBA

Comments: _____

Equipment: Larson Davis Sound Track LXT
Settings: A-Weighted☐ Other☐_____

Calibration Offset: _____dBA
Slow☐ Fast☐ Windscreen☐

Atmospheric Conditions:

Maximum Wind Velocity (mph)	Average Wind Velocity (mph)	Temperature (F)	Relative Humidity (%)	
4.7	1.7	61.5	40	
Comments:	sunny			

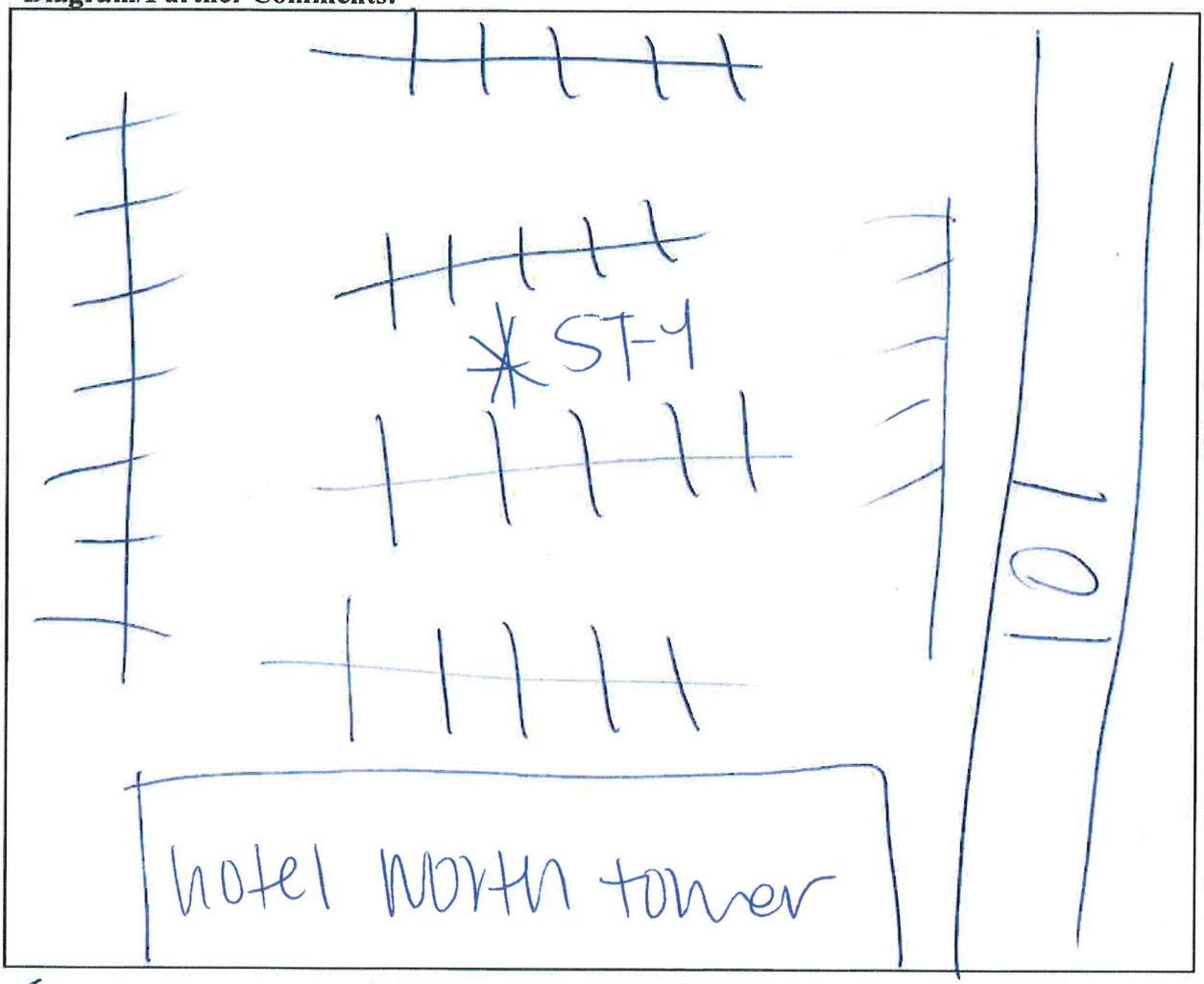
Photos Taken:

Photo Number	Location/Description

Traffic Description:

Roadway	# Lanes	Posted Speed	Average Speed	NB/EB Counts	SB/WB Counts

Diagram/Further Comments:



cars
!

trucks
!

HHH = parking