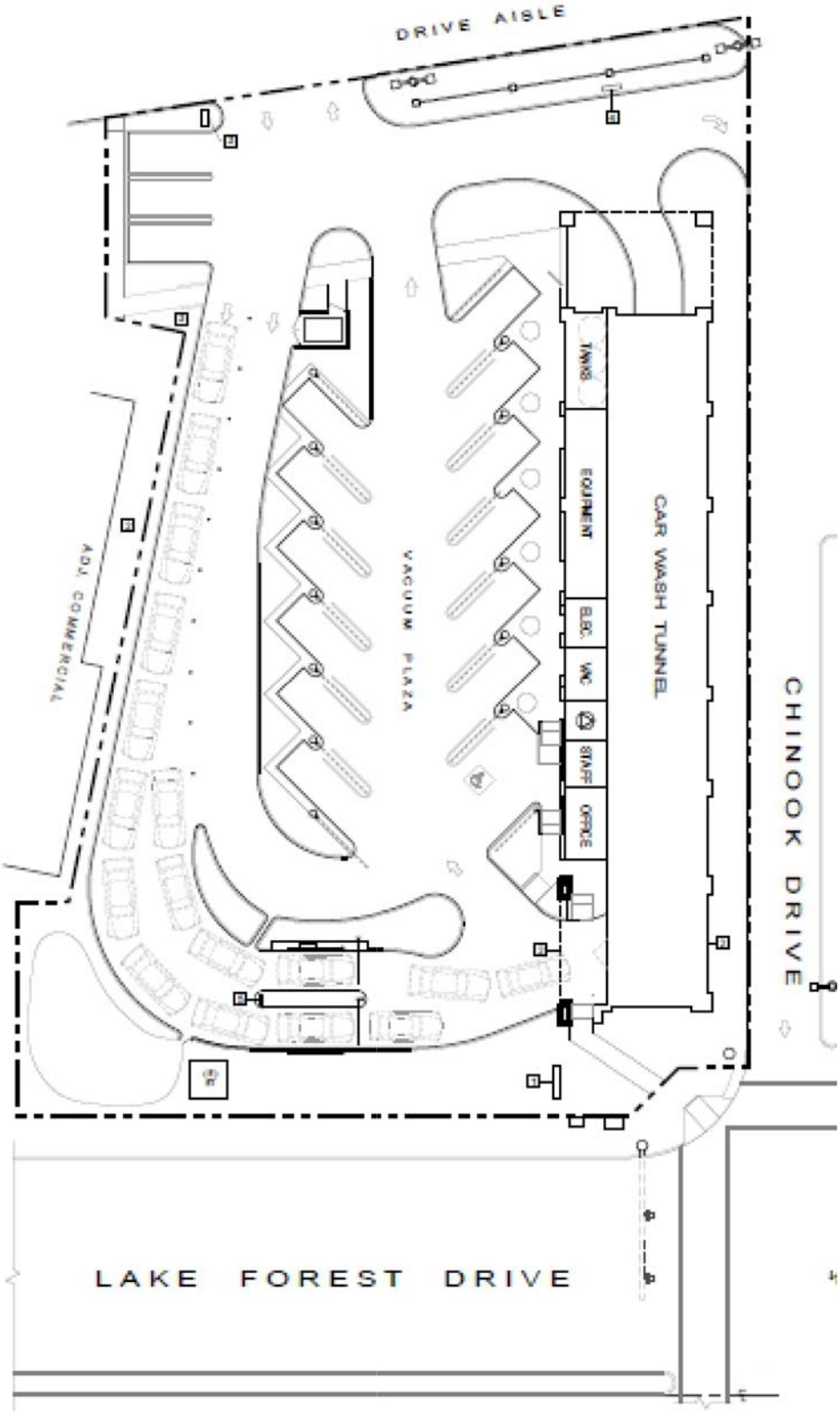
PC Attachment 4

21781 LAKE FOREST DRIVE
H2GO EXPRESS CAR WASH
NOISE IMPACT STUDY
City of Lake Forest, California



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May 18, 2020

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1.0 Introduction

1.1 Purpose of Analysis and Study Objectives

The purpose of this report is to evaluate the potential noise impacts from the proposed 21781 Lake Forest Drive H2GO Express Car Wash (project) and provide recommendations, if necessary, to minimize any project noise impacts. The assessment was conducted within the context of the City of Lake Forest Municipal Code and General Plan noise standards.

The following is provided in this report:

- A description of the study area and the proposed project
- Information regarding the fundamentals of noise
- Identification of the regulatory setting and applicable noise standards
- Analysis of the existing noise environment
- Analysis of the project's noise/land use compatibility
- Analysis of the project's operational noise impact to adjacent sensitive receptors
- Summary of recommended mitigation measures and project design features to reduce noise level impacts.

The project is utilizing a Class 3 CEQA Exemption, thus vibration and off-site traffic noise assessments are not provided in this report.

1.2 Site Location

The proposed project is located at 21781 Lake Forest Drive, in the City of Lake Forest. The project site is located within the existing Heritage Hill Plaza, in the City of Lake Forest. The project site is located approximately 482 feet above sea level and the topography is relatively flat, sloping downward at approximately 1% from north to south.

The project is zoned for Community Commercial (CC) uses in the City of Lake Forest Zoning Map and is within the Lake Forest Planned Community. It is designated for Commercial uses in the City of Lake Forest General Plan Land Use Plan. Existing land uses surrounding the proposed project site include; commercial/retail uses to the north and east, general office uses to the west, and residential uses to the south.

The nearest noise-sensitive land uses are considered the residential property located approximately 135 feet south of the project site, across Lake Forest Drive. For purposes of

this analysis, the existing commercial/retail uses and general office building have been analyzed for potential noise impacts as well.

The City of Lake Forest has requested that noise impacts to the outdoor sidewalk dining areas for the Bagels & Brew coffee shop and Brizio's Pizza restaurant should be included in this analysis.

The project site location map is provided in Exhibit A.

1.3 Project Description

The project would consist of constructing and operating of an automated self-serve drive-thru car wash with a 148.5 foot tunnel and 13 self-service vacuum parking spaces. The project would include the demolition of an existing vacant building, previously occupied by U.S. Bank. The project is proposing to have a 12 foot sound barrier wall along the right side of the car wash exit tunnel.

The site plan used for this analysis, provided by TEAM DESIGN is illustrated in Exhibit B.

The primary source of stationary noise impacting adjacent land uses would be noise generated by the car wash equipment, dryers/blowers and self-service vacuums.

1.4 Summary of Recommendations

The following recommendations are provided to help reduce the potential project noise impacts to the surrounding land uses and community.

Construction

1. Construction-related noise activities are exempted from the requirements set forth in the City of Lake Forest Municipal Code Section 11.16.060, provided complies with the following day/time restrictions.

    a. Noise sources associated with construction, repair, remodeling, or grading of any real property shall not take place between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a Federal holiday.

2. During construction, the contractor shall ensure all construction equipment is equipped with appropriate noise attenuating devices and equipment shall be maintained so that vehicles and their loads are secured from rattling and banging. Idling equipment should be turned off when not in use.

3. Locate staging area, generators and stationary construction equipment as far from western property line, adjacent to the office building, as reasonably feasible.

Operation

4. The project should not operate during nighttime hours (10 p.m. to 7 a.m.)

5. Install signage near vacuum stalls requiring patrons to turn off engines and stereos while utilizing vacuums.

6. Install signage along the car wash tunnel queue to require patrons to turn off stereos while waiting in the queue.

7. In order to provide additional noise shielding to the outdoor dining areas of the restaurant and café, a six (6) foot sound barrier wall can be provided perpendicular to the car wash tunnel exit, (refer Exhibit F – Recommendations for more details).

8. Should noise complaints arise from the office building, the project should provide a follow-up interior noise assessment to determine the noise level impact from the car wash to habitable workspaces within the office building. If a substantial increase in noise is identified as a result of car wash operations, the project should provide upgraded windows at the building façade to better shield the affected interior areas. The necessary window STC rating will be determined based on the interior noise assessment.

2.0 Fundamentals of Noise and Vibration

This section of the report provides basic information about noise and presents some of the terms used within the report.

2.1 Sound, Noise and Acoustics

Sound is a disturbance created by a moving or vibrating source and is capable of being detected by the hearing organs. Sound may be thought of as mechanical energy of a moving object transmitted by pressure waves through a medium to a human ear. For traffic, or stationary noise, the medium of concern is air. *Noise* is defined as sound that is loud, unpleasant, unexpected, or unwanted.

2.2 Frequency and Hertz

A continuous sound is described by its *frequency* (pitch) and its *amplitude* (loudness). Frequency relates to the number of pressure oscillations per second. Low-frequency sounds are low in pitch (bass sounding) and high-frequency sounds are high in pitch (squeak). These oscillations per second (cycles) are commonly referred to as Hertz (Hz). The human ear can hear from the bass pitch starting out at 20 Hz all the way to the high pitch of 20,000 Hz.

2.3 Sound Pressure Levels and Decibels

The *amplitude* of a sound determines it loudness. The loudness of sound increases or decreases, as the amplitude increases or decreases. Sound pressure amplitude is measured in units of micro-Newton per square inch meter (N/m2), also called micro-Pascal (μPa). One μPa is approximately one hundred billionths (0.00000000001) of normal atmospheric pressure. Sound pressure level (SPL or L_p) is used to describe in logarithmic units the ratio of actual sound pressures to a reference pressure squared. These units are called decibels and abbreviated dB.

2.4 Addition of Decibels

Because decibels are on a logarithmic scale, sound pressure levels cannot be added or subtracted by simple plus or minus addition. When two (2) sounds of equal SPL are combined, they will produce an SPL 3 dB greater than the original single SPL. In other words, sound energy must be doubled to produce a 3 dB increase.

If two (2) sounds differ by approximately 10 dB the higher sound level is the predominant sound.

2.5 Human Response to Changes in Noise Levels

In general, the healthy human ear is most sensitive to sounds between 1,000 Hz and 5,000 Hz, (A-weighted scale) and it perceives a sound within that range as being more intense than a sound with a higher or lower frequency with the same magnitude. For purposes of this report as well as with most environmental documents, the A-scale weighting is typically reported in terms of A-weighted decibel (dBA). Typically, the human ear can barely perceive the change in noise level of 3 dB. A change in 5 dB is readily perceptible, and a change in 10 dB is perceived as being twice or half as loud[1]. As previously discussed, a doubling of sound energy results in a 3 dB increase in sound, which means that a doubling of sound energy (e.g. doubling the volume of traffic on a highway), would result in a barely perceptible change in sound level.

2.6 Noise Descriptors

Noise in our daily environment fluctuates over time. Some noise levels occur in regular patterns, others are random. Some noise levels are constant, while others are sporadic. Noise descriptors were created to describe the different time-varying noise levels. Following are the most commonly used noise descriptors along with brief definitions.

A-Weighted Sound Level

The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the response of the human ear. A numerical method of rating human judgment of loudness.

Ambient Noise Level

The composite of noise from all sources, near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

[1] Source: U.S. DOT Federal Highway Administration. Dec. 2011. Highway Traffic Noise: Analysis and Abatement Guidance.

Community Noise Equivalent Level (CNEL)

The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of five (5) decibels to sound levels in the evening from 7:00 to 10:00 PM and after addition of ten (10) decibels to sound levels in the night before 7:00 AM and after 10:00 PM.

Decibel (dB)

A unit for measuring the amplitude of a sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micro-pascals.

dB(A)

A-weighted sound level (see definition above).

Equivalent Sound Level (LEQ)

The sound level corresponding to a steady noise level over a given sample period with the same amount of acoustic energy as the actual time varying noise level. The energy average noise level during the sample period.

Habitable Room

Any room meeting the requirements of the Uniform Building Code or other applicable regulations which is intended to be used for sleeping, living, cooking or dining purposes, excluding such enclosed spaces as closets, pantries, bath or toilet rooms, service rooms, connecting corridors, laundries, unfinished attics, foyers, storage spaces, cellars, utility rooms, and similar spaces.

L(n)

The A-weighted sound level exceeded during a certain percentage of the sample time. For example, L10 is the sound level exceeded 10 percent of the sample time. Similarly L50, L90 and L99, etc.

Noise

Any unwanted sound or sound which is undesirable because it interferes with speech and hearing, or is intense enough to damage hearing, or is otherwise annoying. The State Noise Control Act defines noise as "...excessive undesirable sound...".

Outdoor Living Area

Outdoor spaces that are associated with residential land uses typically used for passive recreational activities or other noise-sensitive uses. Such spaces include patio areas, barbecue areas, jacuzzi areas, etc. associated with residential uses; outdoor patient recovery or resting areas associated with hospitals, convalescent hospitals, or rest homes; outdoor areas associated with places of worship which have a significant role in services or other noise-sensitive activities; and outdoor school facilities routinely used for educational purposes which may be adversely impacted by noise. Outdoor areas usually not included in this definition are: front yard areas, driveways, greenbelts, maintenance areas and storage areas associated with residential land uses; exterior areas at hospitals that are not used for patient activities; outdoor areas associated with places of worship and principally used for short-term social gatherings; and, outdoor areas associated with school facilities that are not typically associated with educational uses prone to adverse noise impacts (for example, school play yard areas).

Percent Noise Levels

See L(n).

Sound Level (Noise Level)

The weighted sound pressure level obtained by use of a sound level meter having a standard frequency-filter for attenuating part of the sound spectrum.

Sound Level Meter

An instrument, including a microphone, an amplifier, an output meter, and frequency weighting networks for the measurement and determination of noise and sound levels.

Single Event Noise Exposure Level (SENEL)

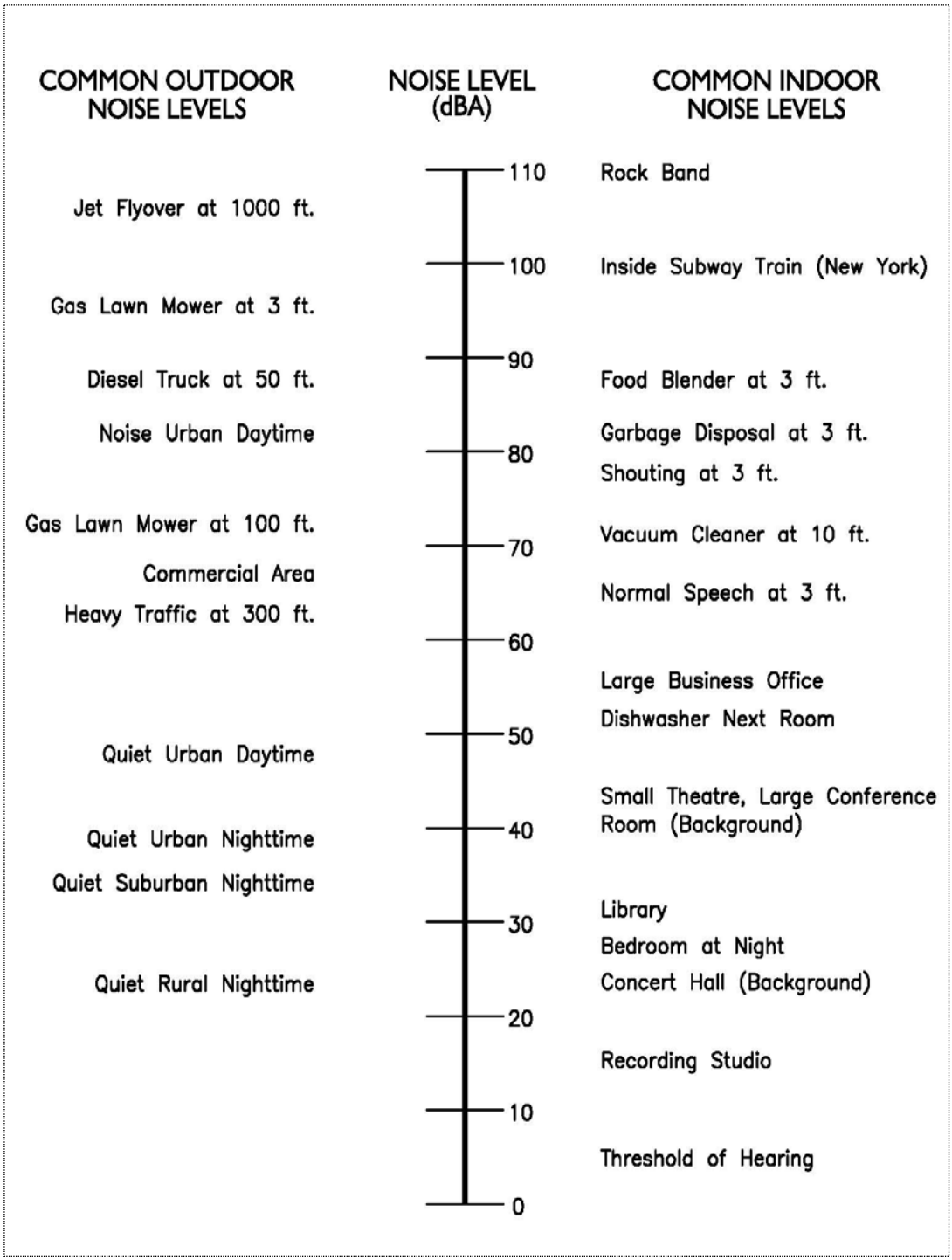
The dBA level which, if it lasted for one (1) second, would produce the same A-weighted sound energy as the actual event.

2.7 Sound Propagation

As sound propagates from a source it spreads geometrically. Sound from a small, localized source (i.e., a point source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates at a rate of 6 dB per doubling of distance. The movement of vehicles down a roadway makes the source of the sound appear to propagate from a line (i.e., line source) rather than a point source. This line source results in the noise propagating from a roadway in a cylindrical spreading versus a spherical spreading that results from a point source. The sound level attenuates for a line source at a rate of 3 dB per doubling of distance.

As noise propagates from the source, it is affected by the ground and atmosphere. Noise models use hard site (reflective surfaces) and soft site (absorptive surfaces) to help calculate predicted noise levels. Hard site conditions assume no excessive ground absorption between the noise source and the receiver. Soft site conditions such as grass, soft dirt or landscaping attenuate noise at an additional rate of 1.5 dB per doubling of distance. When added to the geometric spreading, the excess ground attenuation results in an overall noise attenuation of 3 dB per doubling of distance for a line source and 6.0 dB per doubling of distance for a point source.

Figure 1
Typical Sound Levels from Indoor and Outdoor Noise Sources[2]



[2] Source: AAHSTO. 1993. Guide on Evaluation and Abatement of Traffic Noise

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3.0 Regulatory Setting

The proposed project is located in the City of Lake Forest and noise regulations are addressed through the various federal, state, and local government agencies. The agencies responsible for regulating noise are discussed below.

3.1 Federal Regulations

The adverse impact of noise was officially recognized by the federal government in the Noise Control Act of 1972, which serves three (3) purposes:

- Publicize noise emission standards for interstate commerce
- Assist state and local abatement efforts
- Promote noise education and research

The Federal Office of Noise Abatement and Control (ONAC) was originally tasked with implementing the Noise Control Act. However, it was eventually eliminated leaving other federal agencies and committees to develop noise policies and programs. Some examples of these agencies are as follows: The Department of Transportation (DOT) assumed a significant role in noise control through its various agencies. The Federal Aviation Agency (FAA) is responsible to regulate noise from aircraft and airports. The Federal Highway Administration (FHWA) is responsible to regulate noise from the interstate highway system. The Occupational Safety and Health Administration (OSHA) is responsible for the prohibition of excessive noise exposure to workers.

The Federal government and the State advocate that local jurisdiction use their land use regulatory authority to arrange new development in such a way that "noise sensitive" uses are either prohibited from being constructed adjacent to a highway or, or alternatively that the developments are planned and constructed in such a manner that potential noise impacts are minimized.

3.2 State Regulations

Established in 1973, the California Department of Health Services Office of Noise Control (ONC) was instrumental in developing regularity tools to control and abate noise for use by local agencies. One significant model is the "Land Use Compatibility for Community Noise Environments Matrix." The matrix allows the local jurisdiction to clearly delineate compatibility of sensitive uses with various incremental levels of noise.

The State of California has established noise insulation standards as outlined in Title 24 and the Uniform Building Code (UBC) which in some cases requires acoustical analyses to outline exterior noise levels and to ensure interior noise levels do not exceed the interior threshold. The State mandates that the legislative body of each county and city adopt a noise element as part of its comprehensive general plan. The local noise element must recognize the land use compatibility guidelines published by the State Department of Health Services. The guidelines rank noise land use compatibility in terms of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable.

3.3 City of Lake Forest Noise Regulations

The project is required to comply with the noise standards and thresholds established in the City of Lake Forest General Plan Safety and Noise Element and the City of Lake Forest Municipal Code.

The City of Lake Forest follows the State of California (CA) Office of Planning and Research (OPR) Noise and Land Use Compatibility Guidelines (Guidelines) for recommended interior and exterior noise level standards. The Guidelines help identify and prevent the creation of incompatible land uses due to noise. The noise standards from the General Plan and Municipal code are provided in Appendix A.

3.3.1 General Plan Noise Standards

Table 2 shows the interior and exterior noise standards from the City of Lake Forest General Plan Safety and Noise Element for the project site and surrounding land uses.

Table 1
City of Lake Forest General Plan Noise Standards

Land Use	Noise Standards[1]	
	Interior[2] [3]	Exterior
Residential - Single Family, Multifamily, Duplex, Mobile Homes	CNEL 45 dB	CNEL 65 dB[4]
Retail Store, Restaurant, etc.	Leq(12) 55 dB	--
General Offices	Leq(12) 50 dB	--

[1] CNEL = Community Noise Equivalent Level; Leq(12) = The A-weighted equivalent sound level averaged over a 12-hour period (usually the hours of operation).

[2.] Noise standards with windows closed. Mechanical ventilation shall be provided per the Uniform Building Code (UBC) requirements to provide a habitable environment.

[3.] Indoor environment excluding bathrooms, toilets, closets and corridors.

[4.] Outdoor environment limited to rear yard single family homes, multifamily patios and balconies (with a depth of 6 feet or more) and common recreation areas.

3.3.2 Municipal Code Noise Standards

The Lake Forest Municipal Code Noise Ordinance, requires that a project shall not create loud, unnecessary, or unusual noise that disturbs the peace or quiet of any neighborhood, or that causes discomfort or annoyance to any person of normal sensitiveness. Noise standards are defined in Section 11.16.040 of the Municipal Code and are applicable to the project site and surrounding noise sensitive uses.

Table 3 shows the exterior noise standards from the City of Lake Forest Municipal Code Section 11.16.040 for the project site and surrounding residential land uses.

Table 2
City of Lake Forest Municipal Code Exterior Noise Standards

Exterior Residential Noise Standard	Time Period
55 dB (A)	7:00 AM – 10:00 PM
50 dB (A)	10:00 PM – 7:00 AM

It shall be unlawful for any person at any location to create any noise, or to allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, when the foregoing causes the noise level:

1. The noise standard for a cumulative period of more than 30 minutes in any hour;

2. The noise standard plus 5 dB for a cumulative period of more than 15 minutes in any hour;

3. The noise standard plus 10 dB for a cumulative period of more than 5 minutes in any hour;

4. The noise standard plus 15 dB for a cumulative period of more than 1 minute in any hour;

5. The noise standard plus 20 dB for any period of time.

Construction Noise Regulation

Section 11.16.060 of the City's municipal code indicates the following activities shall be exempted from the provisions of the noise ordinance:

1. Noise sources associated with construction, repair, remodeling, or grading of any real property, provided said activities do not take place between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a Federal holiday are exempt from the provisions of Section 11.16 Noise Control.

4.0 Study Method and Procedures

The following section describes the measurement procedures, measurement locations, and noise modeling procedures and assumptions used in the noise analysis.

4.1 Measurement Procedures and Criteria

Noise measurements are taken to determine the existing noise levels. A noise receiver or receptor is any location in the noise analysis in which noise might produce an impact. The following criteria are used to select measurement locations and receptors:

- Locations expected to receive the highest noise impacts, such as the first row of houses
- Locations that are acoustically representative and equivalent of the area of concern
- Human land usage
- Sites clear of major obstruction and contamination

RK conducted the sound level measurements in accordance with Caltrans technical noise specifications. All measurement equipment meets American National Standards Institute (ANSI) specifications for sound level meters (S1.4-1983 identified in Chapter 19.68.020.AA).

A Piccolo-II Type 2 sound level meter was used to conduct short-term (10-minute) noise measurements.

The Leq, Lmin, Lmax, L2, L8, L25, and L50 statistical data were recorded over the measurement time period intervals and the information was utilized to define the noise characteristics for the project. The following gives a brief description of the Caltrans Technical Noise Supplement procedures for sound level measurements:

- Microphones for sound level meters were placed five (5) feet above the ground for all short-term noise measurements
- Sound level meters were calibrated before and after each measurement
- Following the calibration of equipment, a windscreen was placed over the microphone
- Frequency weighting was set on “A” and slow response
- Results of the short-term noise measurements were recorded on field data sheets

- During any short-term noise measurements, any noise contaminations such as barking dogs, local traffic, lawn mowers, or aircraft fly-overs were noted
- Temperature and sky conditions were observed and documented

Appendix B includes photos, field sheets, and measured noise data.

4.2 Stationary Noise Modeling

On-site stationary noise sources were analyzed using SoundPLAN™ noise modeling software. SoundPLAN™ is a standards-based program that incorporates more than twenty national and international noise modeling guidelines. This project consists of parking lot noise and stationary noise sources which are classified under industrial sources. The following noise prediction standards were used during the performance of this project:

- ISO 9613-2: 1996

Projected noise levels from SoundPLAN™ are based on the following key parameters:

- Developing three-dimensional noise models of the project,
- Predicting the project noise levels at the selected community locations and
- Comparing the predicted noise with the existing community ambient noise levels at the receptor locations.

The sides of the residential buildings, walls, etc. were modeled as reflective surfaces and also as diffractive bodies. The noise sources are shown as red spheres (point sources) and red surfaces (area sources). A light blue line outlines the perimeter of each operation. The surrounding roads are displayed as grey surfaces.

Most of the ground within the project site and adjacent areas are covered with paved surfaces and modeled as a hard site (Ground Factor=0). The Effective Flow Resistivity for paved area is SoundPLAN default. The elevation profile for the project site is derived from Google Earth and all noise receptors are placed at 5 foot above the floor level.

Reference Spectrum

SoundPLAN provides over 500 sound source spectra in third octaves and octaves from an open source library. These spectra were compiled from various sources (handbooks, literature, etc.). All referenced noise levels provided in SoundPLAN are in sound power level. RK utilized the following referenced source spectra for project generated noise.

- Vacuum Cleaner (Coin Vacuum Cleaner).
- Washing (Car wash Tunnel).

Sound Power Level and Sound Pressure Level

Sound power level is the acoustic energy emitted by a source which produces a sound pressure level at some distance. While the sound power level of a source is fixed, the sound pressure level depends upon the distance from the source and the acoustic characteristics of the area in which it is located.

SoundPLAN requires that the source noise level be input using sound power level and which must be back calculated based on a measured sound pressure level. The sound power level is calculated using SoundPLAN software by calibrating the source noise level to equal the sound pressure level at an equal distance from the source in which the referenced measurement was taken.

The main sources of potential on-site stationary noise impacts to adjacent land uses would include noise from the car wash tunnel and thirteen (13) vacuum stalls.

4.2.1 Automated Car Wash Tunnel Noise

Automated car wash equipment and facilities have several potential noise generating sources associated with their general operation; including pumps, compressors, high-pressure applicators and spray nozzles, scrubbers, and dryers. The car wash mechanical equipment (pumps, compressors, blowers, etc.) can generate a substantial amount of noise. The façade of the car wash tunnel is located at approximately 157 feet from the nearest residential property (backyard wall) to the south and 110 feet from the office use to the west. The car wash tunnel will be enclosed with an opening on the tunnel entrance and tunnel exit. Therefore, the noise from the car wash tunnel is expected to radiate from the opening of the tunnel entrance and tunnel exit.

Car Wash Tunnel Entry Noise Levels

The projected noise level at the car wash tunnel entry is 84.6 dBA and is referenced from SoundPLAN and the open source library from the Regional Institute for Environment, Hessen Technical Report No. L4054 Investigation of noise emission and emission at petrol stations.

Car Wash Exit Tunnel

Noise levels at the car wash exit tunnel are louder compared to car wash tunnel entry mainly because of the placement of the blowers. Based on the information provided by the operators of H2GO, the car wash is proposing to use the Pro-Vest Silencer Package blowers. The noise levels from the proposed blowers are approximately 76.9 dBA at 10 feet (96.1 dBA sound power level at the source).

The proposed blowers are expected to be tucked inside the tunnel and are not expected to be within the line of sight from the nearest noise sensitive receptors. Hence, some shielding of noise would be expected and the noise levels at the car wash exit have been adjusted to have a sound power level of 94.6 dBA at the car wash tunnel exit façade, a few feet away from the blowers.

Table 3 shows the referenced noise level for car wash tunnel exit. Manufacture specification sheet for the blower is provided in Appendix C.

4.2.2 Vacuum Noise

There will be a total of 13 vacuum stalls on the site. The nearest vacuum stall to the residential property (backyard wall) to the south is approximately 190 feet and 40 feet to the adjacent office building to the west. Typically, throughout the day vacuum stalls are used intermittently, however, in order to be conservative and analyze worst-case noise levels impacts, the noise analysis assumes all vacuum stalls to be in operation at a single time. When not in use, the vacuums are placed in a holster that suppress suction to help conserve energy and reduce noise levels.

The referenced noise levels for the vacuum stalls are based on reference noise levels within the SoundPLAN emissions library which incorporates information from the Regional Institute for Environment, Hessen Technical Report No. L4054 Investigation of Noise Emissions at Petrol Stations.

4.2.3 Referenced Stationary Noise Sources

To estimate noise level impacts from on-site noise sources, reference noise levels are utilized. Table 3 indicates the referenced noise levels for on-site stationary noise sources.

Table 3
Referenced Noise Levels[1]

Location	Noise Levels (dBA) L_w (Sound Power Level)
Car Wash Tunnel Exit	94.6
Car Wash Tunnel Entry	84.6
Vacuum Stall	82.8

To estimate the future noise levels during typical operational conditions, referenced noise levels are input into SoundPLAN and projected to the nearest sensitive receptor locations.

5.0 Existing Noise Environment

The existing noise environment for the project site and surrounding areas has been established based on noise measurement data collected by RK. Noise measurement data indicates that traffic noise propagating from the adjacent roadways, as well as activities from the existing commercial land use and surrounding properties are the main sources of ambient noise at the project site and surrounding area.

5.1 Short-Term (10-Minute) Noise Measurement Results

Using a Piccolo-II Type 2 integrating-averaging sound level meter, five (5) 10-minute noise measurements were recorded at adjacent property lines near to the site. Short term noise measurements are conducted during normal daytime hours and considered samples of typical ambient conditions. The Leq, Lmin, Lmax, L2, L8, L25, and L50, statistical data were reported over the 10-minute period. The information was utilized to define the noise characteristics for the project.

The following details and observations are provided for the short-term noise measurements. The results of the short-term (ST) measurements are presented in Table 4.

Table 4
Short-Term Noise Measurement Results[1]

Site No.	Time Started	Leq	Lmin	Lmax	L_2	L_8	L_{25}	L_{50}
ST-1	9:50 AM	55.9	49.0	66.0	62.1	59.4	56.6	54.2
ST-2	9:49 AM	56.9	44.6	67.2	63.8	61.1	58.6	54.1
ST-3	10:02 AM	66.0	49.5	74.5	72.6	70.6	66.6	63.6
ST-4	10:26 AM	71.0	51.3	84.4	78.0	75.8	71.8	67.6
ST-5	10:20 AM	69.9	49.8	82.9	77.1	74.6	70.8	66.4

[1] Noise measurements conducted for 10-minute intervals during normal daytime conditions.

ST-1 Measurement taken at approximately 10ft from the commercial uses to the north of the project site on the side walk in front of the building. Ambient noise includes parking lot noise and traffic noise from Lake Forest Drive.

ST-2 Measurement taken at the western property line of the project, adjacent to the office building. Ambient noise includes parking lot noise and traffic noise from Lake Forest Drive.

ST-3 Measurement taken at the second floor of the office building. Ambient noise includes traffic noise from Lake Forest Drive.

ST-4 Measurement taken at the property wall of the residential homes located to the southeast of the site, approximately 170 feet from the project site, 45 feet from the centerline of Chinook Drive and 65 feet from the centerline of Lake Forest Drive. Ambient noise includes traffic noise from adjacent roadways.

ST-5 Measurement taken at the property wall of the residential homes located to the south of the site, approximately 155 feet from the project site, 45 feet from the centerline of Chinook Drive and 65 feet from the centerline of Lake Forest Drive. Ambient noise includes traffic noise from adjacent roadways.

Exhibit C shows the noise measurement locations. Appendix C includes photos, field sheets, and measured noise data.

6.0 Project Noise Impacts

This assessment analyzes the change in the ambient environment as a result of operational noise impacts generated by the project. The main sources of noise generated by the project would include on-site operational activities from the car wash tunnel, including blowers/dryers, and vacuum stalls. Noise level impacts are compared to the City of Lake Forest noise standards and mitigation measures are provided, as needed, to reduce the project's noise impact.

6.1 Stationary Source Noise Impacts

On-site stationary noise impacts are assessed at the adjacent land uses, which include residential uses to the south of the site, the office building located to the west of the site and the commercial/retail building located to the north of the site. The results of the on-site operational noise analysis are shown graphically on Exhibits D and E. Appendix E contains the stationary noise calculation worksheets.

6.1.1 Residential Uses to the South

On-site stationary noise impacts are assessed at the residential uses to the south of the site (approximately 120 feet away from the project's property line to the nearest residential property line) and on the opposite side of Lake Forest Drive. There is an existing 7.5-foot wall along the southeastern residential uses and a 5-foot wall along the southwestern residential uses.

The results of the noise impact analysis are shown in the Table 6. The noise analysis considers all project noise sources operating simultaneously during daytime hours (7 a.m. to 10 p.m.) at the nearest residential sensitive receptors to the south of the project site. The result is worst case assessment of future noise levels, as not all vacuum stalls would typically be in use at the same time.

As shown in Table 5, the noise levels generated by the project are not expected to exceed the City's daytime exterior noise standard for residential uses at the property line. The noise standard for the residential is 55 dBA from 7:00 a.m. to 10:00 p.m.

The change in existing noise levels as a result of the project would be approximately 0.1 dBA at the residential property line. The FHWA Highway Traffic Noise Analysis and Abatement Policy and Guidance indicate that a change in noise level of 3 dBA is considered barely perceptible and a change in noise level of 5 dBA is considered readily perceptible to

the human ear. Therefore, the project noise level impact to the homes is considered to be less than barely perceptible to most people.

6.1.2 Office Building to the West

Table 6 shows the results of the noise impact analysis for the office building. The noise analysis considers all project noise sources operating simultaneously during daytime hours (7 a.m. to 10 p.m.) at the adjacent office building to the west of the project site. The result is worst case assessment of future noise levels, as not all vacuum stalls would typically be in use at the same time.

The City of Lake Forest General Plan Noise Element and the City's Municipal Code do not contain exterior noise standards for office uses, as exterior areas are not typically considered noise sensitive locations for an office use. Therefore, noise impacts are further estimated at interior receptor locations.

A preliminary interior noise analysis has been performed for the adjacent office building to the west using a typical "windows open" and "windows closed" condition. A "windows open" condition assumes 12 dBA of noise attenuation from the exterior noise level. A "windows closed" condition" assumes 20 dBA of noise attenuation from the exterior noise level.

Table 7 shows the estimated future interior noise levels within the office building during project operation. The interior noise standard identified in the Lake Forest General Plan is 50 dBA Leq (12). As shown in Table 7, the future interior noise levels at the adjacent office building are not expected to exceed the City of Lake Forest interior noise standards for general office uses.

Should noise complaints arise from the office building, the project should provide a follow-up interior noise assessment to determine the noise level impact from the car wash to habitable workspaces within the office building. If a substantial increase in noise is identified as a result of car wash operations, the project should provide upgraded windows at the building façade to better shield the affected interior areas. The necessary window STC rating will be determined based on the interior noise assessment.

6.1.3 Outdoor Dining Areas for the Commercial/Retail Building to the North

Table 8 shows the results of the noise impact analysis for the outdoor patio areas of the Brizio's restaurant and Bagels & Brew coffee shop located approximately 50 feet from the

project site. The noise analysis considers all project noise sources operating simultaneously during daytime hours (7 a.m. to 10 p.m.) at the outdoor patio areas of the restaurant and café located to the northeast side of the project site. The result is worst case assessment of future noise levels, as not all vacuum stalls would typically be in use at the same time.

The City of Lake Forest General Plan Noise Element and the City's Municipal Code do not contain exterior noise standards for commercial/retail uses, as the exterior areas are not typically considered noise sensitive locations.

As shown in Table 8, the unmitigated noise levels generated by the project have the potential to increase ambient noise levels at the outdoor patio areas by as much as 6.3 dBA.

The FHWA Highway Traffic Noise Analysis and Abatement Policy and Guidance indicate that a change in noise level of 3 dBA is considered barely perceptible and a change in noise level of 5 dBA is considered readily perceptible to the human ear. Therefore, the unmitigated project noise level impact to the outdoor dining areas is considered to be more than readily perceptible to most people.

To help reduce noise levels at the outdoor patio areas, a six (6) foot sound barrier wall is recommended to be installed opposite of the car wash tunnel exit and a twelve (12) foot sound barrier wall is recommended to be installed along the left side of the car wash exit tunnel.

As shown in Table 9, with the recommended sound walls in place, noise levels at the outdoor patio areas can reduced and the change in ambient conditions would be approximately 4.5 dBA with the project.

6.2 Recommended Noise Reduction Measures

The following recommendations are provided to help reduce the potential project noise impacts to the surrounding land uses and community.

Construction

1. Construction-related noise activities are exempted from the requirements set forth in the City of Lake Forest Municipal Code Section 11.16.060, provided complies with the following day/time restrictions.

a. Noise sources associated with construction, repair, remodeling, or grading of any real property shall not take place between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a Federal holiday.

2. During construction, the contractor shall ensure all construction equipment is equipped with appropriate noise attenuating devices and equipment shall be maintained so that vehicles and their loads are secured from rattling and banging. Idling equipment should be turned off when not in use.

3. Locate staging area, generators and stationary construction equipment as far from western property line, adjacent to the office building, as reasonably feasible.

Operation

4. The project should not operate during nighttime hours (10 p.m. to 7 a.m.)

5. Install signage near vacuum stalls requiring patrons to turn off engines and stereos while utilizing vacuums.

6. Install signage along the car wash tunnel queue to require patrons to turn off stereos while waiting in the queue.

7. In order to provide additional noise shielding to the outdoor dining areas of the restaurant and café, a six (6) foot sound barrier wall can be provided perpendicular to the car wash tunnel exit, (refer Exhibit F – Recommendations for more details).

8. Should noise complaints arise from the office building, the project should provide a follow-up interior noise assessment to determine the noise level impact from the car wash to habitable workspaces within the office building. If a substantial increase in noise is identified as a result of car wash operations, the project should provide upgraded windows at the building façade to better shield the affected interior areas. The necessary window STC rating will be determined based on the interior noise assessment.

TABLE 5
Exterior Noise Impact Analysis at Residential Properties

Land Use	Receptor Location	Floor	Daytime Exterior Noise Level dBA					
			Project Noise Contribution (Leq)	Lake Forest Daytime Noise Standard (Leq)	Noise Level Exceeds Standard (?)	Existing Ambient Measurement (Leq)	Combined Noise Level Existing Plus Project (Leq)	Change in Noise Level as a Result of Project
Residential	Property Line in front of Wall-1	1st Floor	49.3	55.0	No	71.0	71.0	0.0
	Property Line in front of Wall-2	1st Floor	53.5		No	69.9	70.0	0.1
	Property Line in front of Wall-3	1st Floor	52.1		No	69.9	70.0	0.1
	Property Line in front of Wall-4	1st Floor	52.7		No	69.9	70.0	0.1
	Property Line Behind Wall-1	1st Floor	40.9		No	71.0	71.0	0.0
	Property Line Behind Wall-2	1st Floor	49.9		No	69.9	69.9	0.0
	Property Line Behind Wall-3	1st Floor	49.4		No	69.9	69.9	0.0
	Property Line Behind Wall-4	1st Floor	48.1		No	69.9	69.9	0.0

TABLE 6
Exterior Noise Impact Analysis at Office Building

Land Use	Receptor Location	Floor	Daytime Exterior Noise Level dBA					
			Project Noise Contribution (Leq)	Lake Forest Daytime Noise Standard (Leq)	Noise Level Exceeds Standard (?)	Existing Ambient Measurement (Leq)	Combined Noise Level Existing Plus Project (Leq)	Change in Noise Level as a Result of Project
Office Building	Building Façade	1st Floor	61.0	--	--	56.9	62.4	5.5
		2nd Floor	61.0	--	--	56.9	62.4	5.5

TABLE 7

Interior Noise Impact Analysis at Office Building

Land Use	Receptor Location	Exterior Noise Level (Leq)	Interior Noise Level w/Standard Windows (STC ~ 25)		Lake Forest Interior Noise Standard (Leq12)	Noise Level Exceeds Standard (?)
			"Windows Open" [1]	"Windows Closed" [2]		
Office Building	1st Floor Façade	61.1	49.1	41.1	50.0	No
	2nd Floor Façade	61.0	49.0	41.0		

[1] A minimum of 12 dBA noise reduction is assumed with the "windows open" condition.

[2] A minimum of 20 dBA noise reduction is assumed with the "windows closed" condition.

TABLE 8
Exterior Noise Impact Analysis at Commecial/Retail Building - Unimitigated

Land Use	Receptor Location	Floor	Daytime Exterior Noise Level dBA					
			Project Noise Contribution (Leq)	Lake Forest Daytime Noise Standard (Leq)	Noise Level Exceeds Standard (?)	Existing Ambient Measurement (Leq)	Combined Noise Level Existing Plus Project (Leq)	Change in Noise Level as a Result of Project
Commercial Building	Outside Patio - Restaurant	1st Floor	61.0	--	--	55.9	62.2	6.3
Commercial Building	Outside Patio - Café	1st Floor	60.8	--	--	55.9	62.0	6.1

TABLE 9
Exterior Noise Impact Analysis at Commecial/Retail Building - Mitigated

Land Use	Receptor Location	Floor	Daytime Exterior Noise Level dBA					
			Project Noise Contribution (Leq)	Lake Forest Daytime Noise Standard (Leq)	Noise Level Exceeds Standard (?)	Existing Ambient Measurement (Leq)	Combined Noise Level Existing Plus Project (Leq)	Change in Noise Level as a Result of Project
Commercial Building	Outside Patio - Restaurant	1st Floor	56.6	--	--	55.9	59.3	3.4
Commercial Building	Outside Patio - Café	1st Floor	58.5	--	--	55.9	60.4	4.5

Exhibits

Exhibit A

Location Map

Legend:

= Project Site Boundary

N

Exhibit B
Site Plan

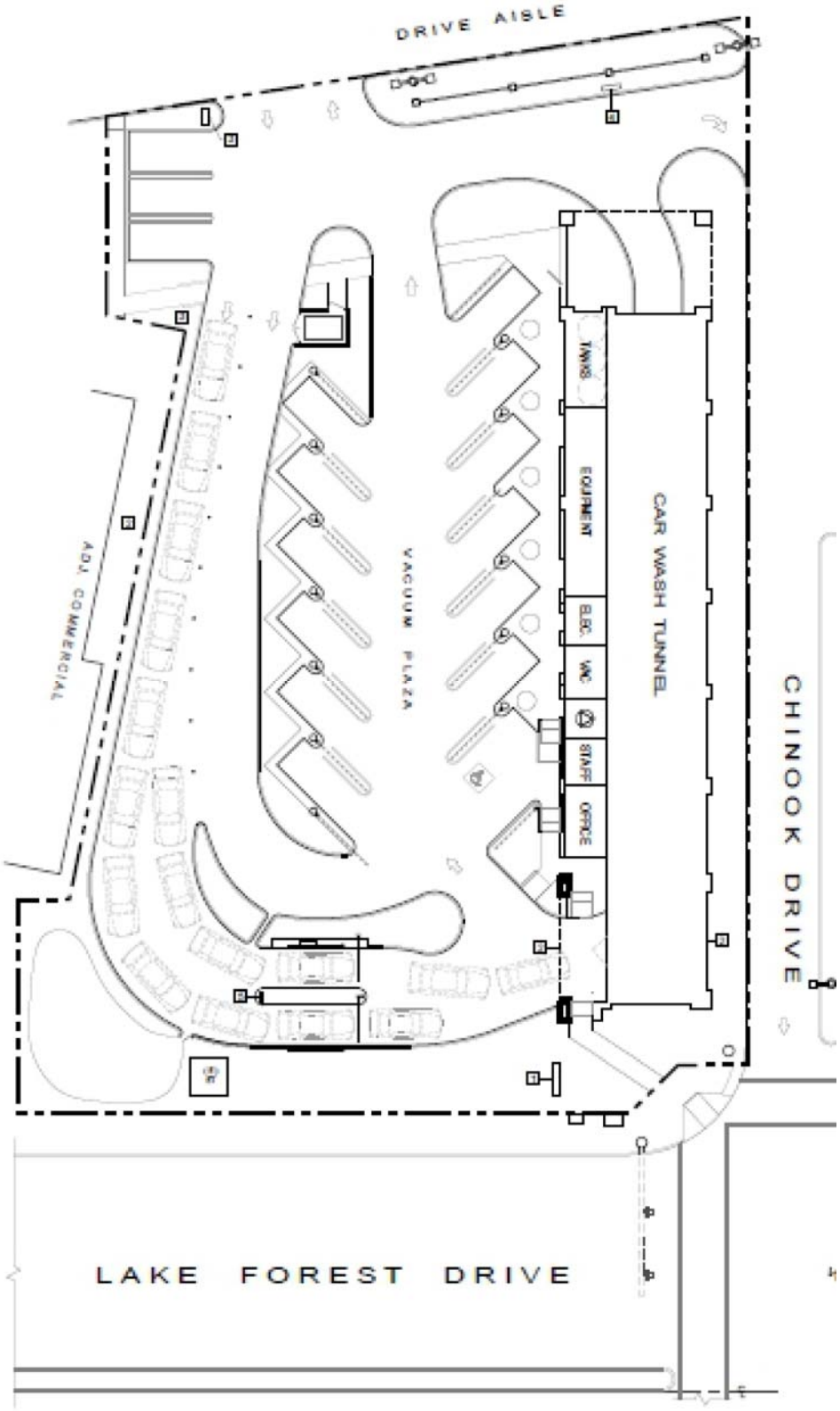

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Exhibit C

Monitoring Locations

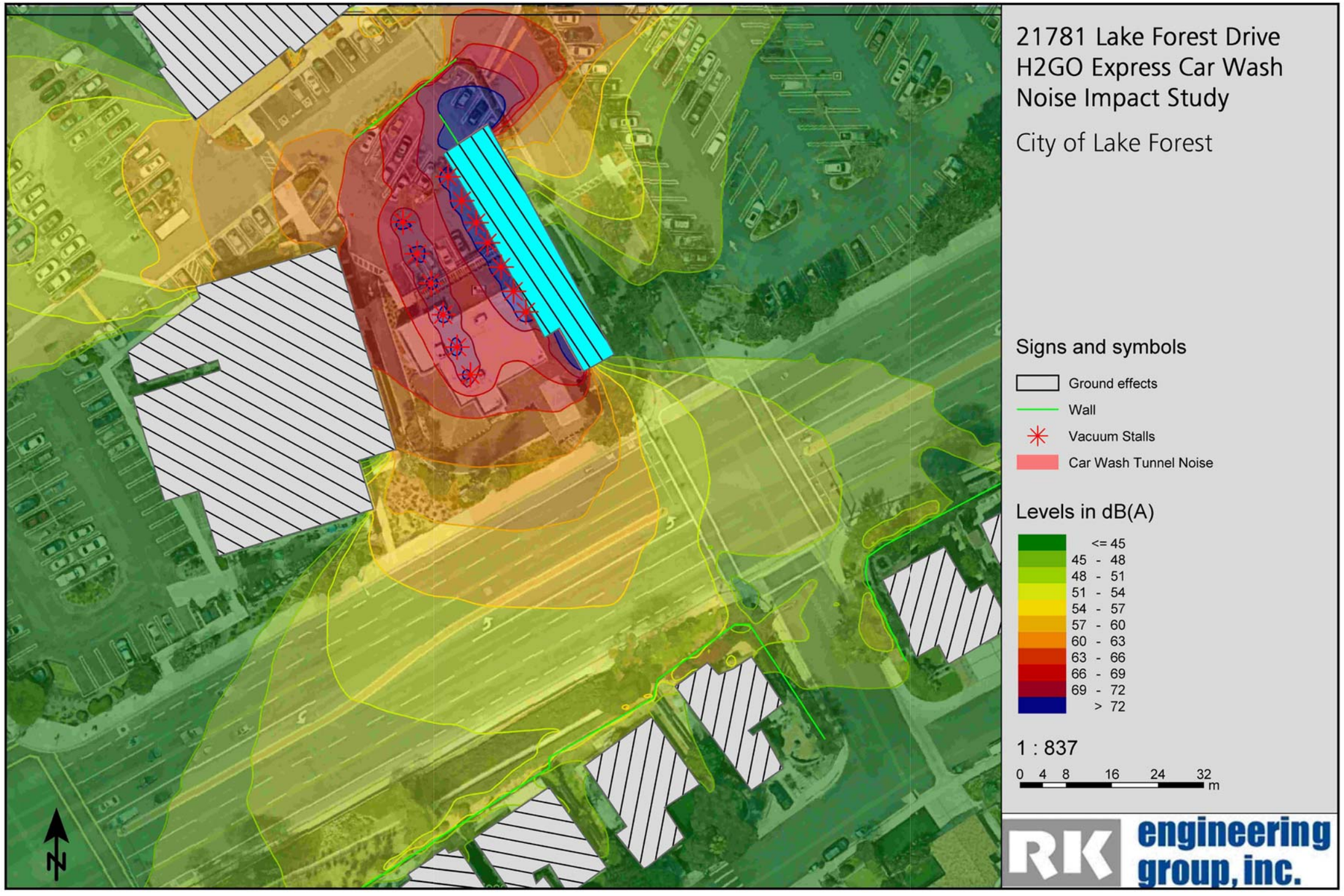
Legend:

1 = Short Term (10-min) Noise Monitoring Location

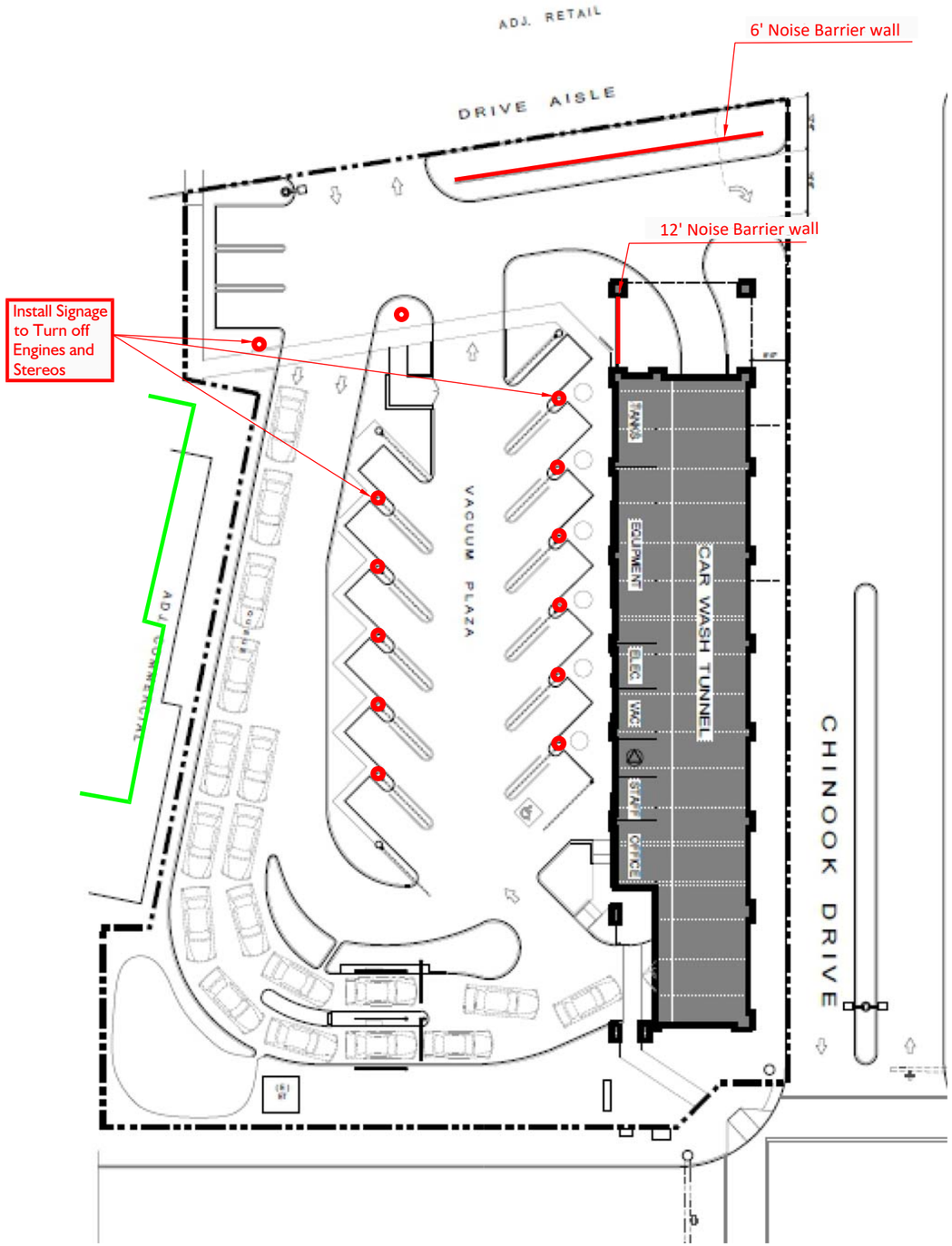
N

SoundPLAN Project Noise Level Results

Project Noise Level Contours - Daytime



Recommendations



RECOMMENDATIONS:

1. Provide upgraded windows for the façade of the adjacent office building facing the project site.
2. The project should not operate during nighttime hours (10 p.m. to 7 a.m.)
3. Install signage near vacuum stalls requiring patrons to turn off engines and stereos while utilizing vacuums.
4. Install signage near car was tunnel queue to require patrons to turn off stereos while waiting in the queue.
5. In order to provide the maximum noise shielding to the outdoor patio area of the restaurant and café, a six (6) foot sound barrier wall can be provided perpendicular to the car wash tunnel exit.

Legend:

= Noise Barrier Wall

= Install Signage Requiring Patrons to Turn-off Engines and Stereos

= Upgrade Windows for the Facade of the Adjacent Office Building

N

Appendices

Appendix A

City of Lake Forest Noise Element and Noise Ordinance

Chapter 11.16 NOISE CONTROL

11.16.010 Declaration of policy.

In order to control unnecessary, excessive and annoying sounds, it is hereby declared to be the policy of the City to prohibit such sounds generated from all sources as specified in this chapter.

It is determined that certain sound levels are detrimental to the public health, welfare and safety, and contrary to public interest. (Ord. 171 § 1, 2007)

11.16.020 Definitions.

The following words, phrases and terms as used in this chapter shall have the meaning as indicated below:

"Ambient noise level" shall mean the all-encompassing noise level associated with a given environment, being a composite of sounds from all sources, excluding the alleged offensive noise, at the location and approximate time at which a comparison with the alleged offensive noise is to be made.

"Cumulative period" shall mean an additive period of time composed of individual time segments which may be continuous or interrupted.

"Decibel (dB)" shall mean a unit which denotes the ratio between two (2) quantities which are proportional to power: the number of decibels corresponding to the ratio of two (2) amounts of power is ten (10) times the logarithm to the base ten (10) of this ratio.

"Dwelling unit" shall have the same meaning as in Section 9.04.030(D).

"Emergency machinery, vehicle or work" shall mean any machinery, vehicle or work used, employed or performed in an effort to protect, provide or restore safe conditions in the community or for the citizenry, or work by private or public utilities when restoring utility service.

"Fixed noise source" shall mean a stationary device which creates sounds while fixed or motionless, including but not limited to industrial and commercial machinery and equipment, pumps, fans, compressors, generators, air conditioners and refrigeration equipment.

"Grading" shall mean any excavating or filling of earth material, or any combination thereof, conducted at a site to prepare said site for construction or other improvements thereon.

"Impact noise" shall mean the noise produced by the collision of one (1) mass in motion with a second mass which may be either in motion or at rest.

"Mobile noise source" shall mean any noise source other than a fixed noise source.

"Noise level" shall mean the "A" weighted sound pressure level in decibels obtained by using a sound level meter at slow response with a reference pressure of twenty (20) micronewtons per square meter. The unit of measurement shall be designated as dBa.

"Person" shall mean a person, firm, association, copartnership, joint venture, corporation or any entity, public or private in nature.

"Residential property" shall mean a parcel of real property that is developed and used either in part or in whole for residential purposes, other than transient uses such as hotels and transitory lodgings.

"Simple tone noise" shall mean a noise characterized by a predominant frequency or frequencies so that other frequencies cannot be readily distinguished.

"Sound level meter" shall mean an instrument meeting American National Standard Institute's Standard S1.4-1971 for Type 1 or Type 2 sound level meters or an instrument and the associated recording and analyzing equipment which will provide equivalent data.

"Sound pressure level" of a sound, in decibels, shall mean twenty (20) times the logarithm to the base ten (10) of the ratio of the pressure of the sound to a reference pressure, which reference pressure shall be explicitly stated. (Ord. 297 § 14, 2017; Ord. 171 § 1, 2007)

11.16.025 Measurement of noise levels.

Any noise level measurements made pursuant to the provisions of this chapter shall be performed using a sound level meter as defined in Section 11.16.020. The location selected for measuring exterior noise levels shall be at any point on the affected property. Interior noise measurements shall be made within the affected dwelling unit. The measurement shall be made at a point at least four (4) feet from the wall, ceiling, or floor nearest the alleged offensive noise source and may be made with the windows of the affected unit open. (Ord. 171 § 1, 2007)

11.16.030 Designated noise zone.

The entire territory of the City of Lake Forest is hereby designated as "Noise Zone 1." (Ord. 171 § 1, 2007)

11.16.040 Exterior noise standards.

A. The following noise standards, unless otherwise specifically indicated, shall apply to all residential property within a designated noise zone:

NOISE STANDARDS

Noise Zone	Noise Level	Time Period
1	55 dBa	7:00 a.m.—10.00 p.m.
1	50 dBa	10:00 p.m.—7:00 a.m.

In the event the alleged offensive noise consists entirely of impact noise, simple tone noise, speech, music, or any combination thereof, each of the above noise levels shall be reduced by five (5) dBa.

B. It shall be unlawful for any person at any location to create any noise, or to allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, when the foregoing causes the noise level, when measured on any other residential property, to exceed:

1. The noise standard for a cumulative period of more than thirty (30) minutes in any hour; or

2. The noise standard plus five (5) dBa for a cumulative period of more than fifteen (15) minutes in any hour; or

3. The noise standard plus ten (10) dBa for a cumulative period of more than five (5) minutes in any hour; or

4. The noise standard plus fifteen (15) dBa for a cumulative period of more than one (1) minute in any hour; or

5. The noise standard plus twenty (20) dBa for any period of time.

C. In the event the ambient noise level exceeds any of the first four (4) noise limit categories above, the cumulative period applicable to said category shall be increased to reflect said ambient noise level. In the event the ambient noise level exceeds the fifth (5th) noise limit category, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level. (Ord. 171 § 1, 2007)

11.16.050 Interior noise standards.

A. The following interior noise standards, unless otherwise specifically indicated, shall apply to all residential property within a designated noise zone:

INTERIOR NOISE STANDARDS

Noise Zone	Noise Level	Time Period

1	55 dBa	7:00 a.m.—10:00 p.m.
1	45 dBa	10:00 p.m.—7:00 a.m.

In the event the alleged offensive noise consists entirely of impact noise, simple tone noise, speech, music, or any combination thereof, each of the above noise levels shall be reduced by five (5) dBa.

B. It shall be unlawful for any person at any location to create any noise, or to allow the creation of any noise, on property owned, leased, occupied, or otherwise controlled by such person, when the foregoing causes the noise level, when measured within any other dwelling unit on any residential property, to exceed:

1. The interior noise standard for a cumulative period of more than five (5) minutes in any hour; or

2. The interior noise standard plus five (5) dBa for a cumulative period of more than one (1) minute in any hour; or

3. The interior noise standard plus ten (10) dBa for any period of time.

C. In the event the ambient noise level exceeds either of the first two (2) noise limit categories above, the cumulative period applicable to said category shall be increased to reflect said ambient noise level. In the event the ambient noise level exceeds the third (3rd) noise limit category the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level. (Ord. 171 § 1, 2007)

11.16.060 Exemptions.

The following activities shall be exempted from the provisions of this chapter:

A. Activities not constituting "special events" conducted on the grounds of any public or private nursery, elementary, intermediate or secondary school or college.

B. "Special events" as defined in Section 5.05.020 provided said events are conducted pursuant to a special event permit issued as described in Chapter 5.05. However, this exemption shall not preclude use of the standards set forth in Section 11.16.040 ("Exterior noise standards") or Section 11.16.050 ("Interior noise standards") as a guide for the application, review, or issuance of a special event permit.

C. Any mechanical device, apparatus or equipment used, related to or connected with emergency machinery, vehicle or work.

D. Noise sources associated with construction, repair, remodeling, or grading of any real property, provided said activities do not take place between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a Federal holiday.

E. All mechanical devices, apparatus or equipment which are utilized for the protection or salvage of agricultural crops during periods of potential or actual frost damage or other adverse weather conditions.

F. Mobile noise sources associated with agricultural operations, provided such operations do not take place between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a Federal holiday.

G. Mobile noise sources associated with agricultural pest control through pesticide application, provided that the application is made in accordance with restricted material permits issued by or regulations enforced by the Agricultural Commissioner.

H. Noise sources associated with the maintenance of real property, provided said activities take place between 7:00 a.m. and 8:00 p.m. on any day except Sunday or a Federal holiday, or between the hours of 9:00 a.m. and 8:00 p.m. on Sunday or a Federal holiday.

I. Any activity to the extent regulation thereof has been preempted by State or Federal law.

J. Noise sources associated with solid waste collection and removal, provided such activities take place between 6:00 a.m. and 6:00 p.m. Monday through Friday where audible in residential areas; or between 7:00 a.m. and 6:00 p.m. on Saturdays where audible in residential areas; or between 5:00 a.m. and 9:00 p.m. any day where such activity is not audible in residential areas; or as otherwise provided in an approved franchise agreement between a waste hauler and the City. (Ord. 300 § 7, 2017; Ord. 171 § 1, 2007)

11.16.070 Schools, hospitals and churches—Special provisions.

It is unlawful for any person to create any noise which causes the noise level at any school, hospital or church while the same is in use to exceed the noise limits as specified in Section 11.16.040 prescribed for the assigned noise zone in which the school, hospital or church is located, or which noise level unreasonably interferes with the use of such institutions or which unreasonably disturbs or annoys patients in the hospital, provided conspicuous signs are displayed in three (3) separate locations within one-tenth (1/10) of a mile of the institution indicating the presence of a school, church or hospital. (Ord. 171 § 1, 2007)

11.16.080 Motor vehicle racing.

It is unlawful to conduct motor vehicle racing, testing, timing or similar noise-producing activities at raceways, speedways, off-road vehicle courses, drag strips or other similar places, including, but not limited to, the operation of midget race cars, drag cars, motorcycles, off-road vehicles, and specialty automobiles, between the hours of eleven-thirty p.m. and eight a.m. (Ord. 171 § 1, 2007)

11.16.090 Enforcement.

The City's law enforcement personnel, the County Health Officer and their duly authorized representatives are authorized, pursuant to Penal Code Section 836.5, to arrest any person without a warrant when they have reasonable cause to believe that such person has committed a misdemeanor in their presence.

No person shall interfere with, oppose or resist any authorized person charged with the enforcement of this chapter while such person is engaged in the performance of his duty. (Ord. 171 § 1, 2007)

11.16.100 Variance procedure.

The owner or operator of a noise source which violates any of the provisions of this chapter may file an application with the Health Officer for a variance from the provisions thereof wherein said owner or operator shall set forth all actions taken to comply with said provisions, the reasons why immediate compliance cannot be achieved, a proposed method of achieving compliance, and a proposed time schedule for its accomplishment. Said application shall be accompanied by a fee in the amount of seventy-five dollars ($75.00). A separate application shall be filed for each noise source; provided, however, that several mobile sources under common ownership, or several fixed sources on a single property may be combined into one (1) application. Upon receipt of said application and fee, the Health Officer shall refer it with his recommendation thereon within thirty (30) days to the Noise Variance Board for action thereon in accordance with the provisions of this chapter.

An applicant for a variance shall remain subject to prosecution under the terms of this chapter until a variance is granted. (Ord. 171 § 1, 2007)

11.16.110 Noise Variance Board.

The City Council shall, by resolution, appoint the Noise Variance Board, which may be composed of the City Council, Planning Commission, or any other members the City Council may select. The City Council may adopt reasonable rules and regulations for procedures to be used by the Board in carrying out its functions under the provisions of this chapter, or may allow the Board to establish such rules and regulations.

The Noise Variance Board shall evaluate all applications for variance from the requirements of this chapter and may grant said variances with respect to time for compliance, subject to such terms, conditions and requirements as it may deem reasonable to achieve maximum compliance with the provisions of this chapter. Said terms, conditions, and requirements may include but shall not be limited to limitations on noise levels and operating hours. Each such variance shall set forth in detail the approved method of achieving maximum compliance and a time schedule for its accomplishment. In its determinations said Board shall consider the magnitude of nuisance caused by the offensive noise; the uses of property within the area of impingement by the noise; the time factors related to study, design, financing and construction of remedial work; the economic factors related to age and useful life of equipment; and the general public interest and welfare. Any variance granted by said Board shall be by resolution and shall be transmitted to the Development Services Department and the Health Officer for enforcement. Any violation of the terms of said variance shall be unlawful.

Meetings of the Noise Variance Board shall be held at such times and locations as said Board shall determine. All such meetings shall be open to the public.

Traveling and other expenses incurred by each Board member in the performance of his or her official duties shall be reimbursed at a rate determined by resolution of the City Council. (Ord. 171 § 1, 2007)

View the mobile version.

Safety and Noise Element

Lake Forest

General Plan

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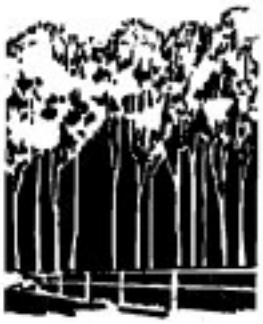
INTRODUCTION



The Safety and Noise Element addresses public safety and quality of life issues. Natural events such as flooding and earthquakes can endanger property and human life while hazardous material use, crime and other human activities can impact community security. High noise levels can cause stress and irritation and must be controlled to preserve community quality. Residents can be protected from potential hazards by identifying threatening situations and taking steps to limit such situations in populated areas. Developing effective strategies to reduce excessive noise is essential for a safe and harmonious living and working environment.

PURPOSE OF THE SAFETY AND NOISE ELEMENT

The Safety and Noise Element is a comprehensive program to identify and temper environmental factors that potentially threaten community health and safety. Noise and public safety are key factors in the quality of life in a community. By addressing safety and noise early in the planning process, the City can avoid the creation of critical situations. The Safety and Noise Element contains policies and programs to regulate existing and proposed development located in hazard-prone areas. Education of City staff and residents about emergency preparedness is also addressed. Guidelines are established to protect residents from excessive noise and ensure that noise-generating uses will be separated from uses where quiet conditions are valued.

SCOPE AND CONTENT OF THE SAFETY AND NOISE ELEMENT

The noise and safety components of this Element satisfy the requirements of state planning law. The safety component complies with the requirements for the General Plan public safety element mandated in Government Code Section 65302(g). According to the state requirements, the safety element must address the following hazards if they pertain to Lake Forest:

- Seismically induced conditions, including surface rupture, ground shaking, ground failure, tsunami and seiche;
- Slope instability leading to mudslides and landslides;
- Subsidence and other geologic hazards;
- Flooding;
- Wildland/urban interface fires; and
- Evacuation routes.

Additional public safety hazards are identified in the Master Environmental Assessment. Consequently, hazardous materials, crime and aircraft overflight are also addressed in the Safety and Noise Element.

The noise component complies with the revised state guidelines for the General Plan noise element mandated by the State of California Government Code Section 65301(f) and Health and Safety Code Section 46050.1. Future noise conditions from short- and long-term growth are quantified as noise exposure contours. This noise information serves as the basis to develop guidelines for compatible land uses.

The Safety and Noise Element is comprised of three sections: 1) Introduction; 2) Issues,

Goals and Policies; and 3) the Safety and Noise Plan. In the Issues, Goals and Policies section, major issues pertaining to noise sources and hazardous conditions are identified, and related goals and policies are established. The goals are overall statements of the City's desires and are comprised of broad statements of purpose and direction. The policies serve as guides for reducing the threat from natural and human activity hazards; maximizing community emergency preparedness; and diminishing or avoiding adverse noise effects on residents. The Plan explains how the goals and policies will be achieved and implemented. Specific implementation programs for the Safety and Noise Element are contained in the General Plan Implementation Program.

RELATED PLANS AND PROGRAMS

There are a number of existing plans and programs that directly relate to the goals of the Safety and Noise Element. These plans and programs have been enacted through state and local legislation and are administered by agencies with powers to enforce state and local laws.

California Environmental Quality Act (CEQA) and Guidelines

The California Environmental Quality Act was adopted by the state legislature in response to a public mandate for a thorough environmental analysis of projects that might adversely affect the environment. The provisions of the law, review procedure and any subsequent analysis are described in the CEQA Law and Guidelines as amended in 1998. Both excessive noise and public safety hazards are recognized as environmental impacts under CEQA. Continued implementation of CEQA will ensure that City officials and the general public assess and mitigate potentially significant noise and public safety impacts from private and public development projects.

California Noise Insulation Standards (Title 24)

The California Commission of Housing and Community Development officially adopted noise insulation standards in 1974. In 1988, the Building Standards Commission approved revisions to the standards (Title 24, Part 2, California Code of Regulations). As revised, Title 24 establishes an interior noise standard of 45 dB for residential space (CNEL or Ldn). Acoustical studies must be prepared for residential structures to be located within noise contours of 60 dB or greater (CNEL or Ldn) from freeways, expressways, parkways, major streets, thoroughfares, rail lines, rapid transit lines, or industrial noise sources. The studies must demonstrate that the building is designed to reduce interior noise to 45 dB or lower (CNEL or Ldn). New residential structures constructed in the Planning Area are subject to Title 24 standards.

Alquist-Priolo Special Studies Zones Act

Pursuant to the Alquist-Priolo Special Studies Zones Act, the state Geologist delineates special study zones along traces of potentially and recently active major faults. Affected cities and counties must inform the public of the special studies zones, which usually are one-quarter mile or less in width. Information about special studies zones can be referenced in local General Plans and on other local maps. Proposed development plans within these zones must be accompanied by a report that describes possible surface rupture from a registered geologist.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act requires the state Geologist to compile maps identifying seismic hazard zones. The state Mining and Geology Board established policies and criteria identifying the responsibilities of state and local agencies for development in seismic hazard areas. Approval of development on a site within

seismic hazard zones requires the preparation of a geotechnical report and local agency consideration of the policies and criteria established by the Mining and Geology Board (Public Resources Code Section 2690 et. seq.). Seismic safety maps were considered during the preparation of this element.

Landslide Hazard Identification Program

Under the Landslide Hazard Identification Program, the state Geologist is required to prepare maps of landslide hazards within urban and urbanizing areas. Public agencies are encouraged to use these maps in land use planning and decisions about building, grading and development permits (Public Resources Code Section 2687 (a)). Landslide hazards were considered during the preparation of this element.

Cobey-Alquist Flood Plain Management Act

The Cobey-Alquist Flood Plain Management Act encourages local governments to plan, adopt and enforce land use regulations for flood plain management, as well as to identify requirements for receiving state financial assistance for flood control. The Safety and Noise Element identifies flood zones and methods to avoid flood hazards.

Hazardous Waste Management Plan

The Orange County Fire Department, which responds to all hazardous or toxic spill incidents in the Planning Area, is presently preparing a Hazardous Materials Area Plan. The Plan will guide all emergency response procedures for hazardous materials incidents. All facilities and personnel of the County and affected cities are organized in the Plan to effectively respond to hazardous material emergencies. Hazardous materials and emergency preparedness are discussed in this element.

San Onofre Nuclear Generating Station (SONGS)

The San Onofre Nuclear Generating Station is located near the southern boundary of Orange County. The federal and state governments have created three levels of emergency zones surrounding nuclear facilities:

- Emergency Planning Zone: Planning efforts within this zone include emergency sheltering or evacuation;
- Public Education Zone: Lake Forest is located within this zone and educational programs are focused in this zone to ensure that residents are prepared for any problems with the facility; and
- Ingestion Pathway Zone: This zone is created to avoid the ingestion of deposited radioactive materials by humans and livestock.

Southern California Edison, which operates SONGS, will provide notification to all off-site jurisdictions within 15 minutes of declaration of any emergency. At this point, the City will implement procedures established in the Emergency Preparedness Plan (which is described below).[1]

City of Lake Forest Noise Ordinance

The City has adopted the County of Orange Noise Control Ordinance, which establishes interior and exterior noise standards for residential areas. The ordinance provides controls for excessive and annoying noise from stationary sources such as industrial plants, pumps, compressors and refrigeration units. In addition, specific noise standards for daytime and nighttime hours are provided. Certain noise sources are prohibited and the ordinance establishes an enforcement process.

[1]General Plan Amendment 00-01, dated May 2, 2000.

Noise ordinance requirements are identified in this element. The City Noise Ordinance does not apply to railroad activities occurring within the OCTA right-of-way (operation, maintenance, construction) or permitted hours for such activities.

City of Lake Forest Emergency Preparedness Plan

The City is presently preparing an Emergency Preparedness Plan. Until the Plan is approved, the City has adopted the County of Orange Plan for interim use. Additionally, an emergency information guide that identifies City personnel, equipment and facilities to effectively deal with emergency situations is being utilized. An integral component of this element is emergency preparedness planning.

City of Lake Forest Codes

The City has adopted the 1991 Uniform Building Code, 1991 Uniform Mechanical Code and 1991 National Electrical Code which contain structural requirements for existing and new buildings. The codes are designed to insure structural integrity during seismic and other hazardous events and prevent personal injury, loss of life and substantial structural damage. To protect public safety, planned development in Lake Forest will be subject to these structural codes.

RELATIONSHIP TO OTHER GENERAL PLAN ELEMENTS

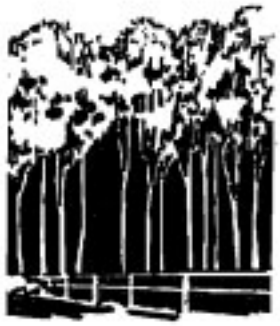
The Safety and Noise Element must be consistent with the other General Plan elements. Each element is independent and all the elements comprise the General Plan. All elements of the General Plan are interrelated to a degree, and certain goals and policies of each element may also address issues that are the primary subjects of other elements. The integration of overlapping issues throughout the General Plan elements provides a strong basis for implementation of plans and programs and achievement of community goals. The Safety and Noise Element relates most closely to the Land Use and Circulation Elements.

Policies and plans in the Safety and Noise Element are designed to protect existing and planned land uses identified in the Land Use Element from public safety hazards and excessive noise. Potential hazards and noise sources are identified in the Safety and Noise Element, and the programs are established to avoid or mitigate public safety and noise impacts from planned development. Concurrently, the Land Use Element contains policy to ensure that environmental conditions, including hazards and noise, are considered in all land use decisions. The distribution of residential and other sensitive land uses on the Land Use Policy Map is designed to avoid areas where hazardous or noisy conditions have been identified.

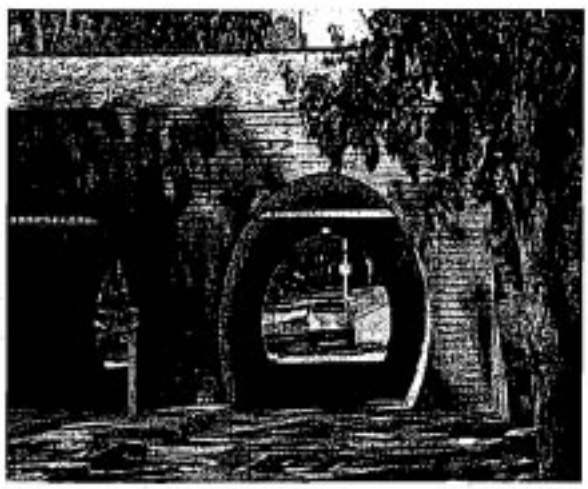
The noise component of the Safety and Noise Element is inextricably linked to the transportation policies in the Circulation Element. Transportation noise is largely responsible for excessive noise levels in certain locations in urban environments. The projected noise distribution identified in the Safety and Noise Element directly corresponds to the Circulation Plan. Both the Safety and Noise and Circulation Elements contain policies and plans to minimize the effects of transportation noise on existing and planned land uses. Noise exposure will be a key consideration when locating and designing new arterials.

The noise component of the Safety and Noise Element also relates to the Recreation and Resources Element. Excessive noise can diminish enjoyment of parks and open space, and noise information should be considered in planning new recreational areas. Open space areas can be used to buffer noise-sensitive land uses from noise producers.

ISSUES, GOALS AND POLICIES



Five major issues are addressed by the goals, policies and implementing actions of the Safety and Noise Element. The issues include: (1) reducing risks associated with natural hazardous conditions, such as geologic conditions, seismic activity and flooding and reducing risks attributable to human-related hazardous conditions, such as aircraft overflights, hazardous materials, fire, and criminal activity; (2) preparedness for emergencies conditions to minimize impacts and reduce recovery time; (3) avoidance of the effects of noise through proper planning and correction of existing noise problems; (4) minimizing the effects of transportation- related noise; and (5) minimizing the effects of non-transportation noise. Each issue and the related goals, policies and implementation actions are identified and discussed in the following section.



NATURAL HAZARDS AND HUMAN ACTIVITY HAZARDS

The risk associated with certain natural hazards, such as geologic conditions, seismic activity, fire and flooding can be minimized through appropriate planning and preparedness actions. The risk of exposure to such hazards can be reduced to acceptable levels through proper development engineering and building practices.

Certain human activities, such as flying, use of hazardous or toxic materials, use of combustibles, and criminal actions can expose the population risk. The risk of exposure to hazards associated with human activity can be reduced to acceptable levels through proper planning and regulation of human activities.

GOAL 1.0: Reduction in the risk to the community from hazards associated with geologic conditions, seismic activity and flooding.

Policy 1.1: Reduce the risk of impacts from geologic and seismic hazards.

Policy 1.2: Protect the community from flooding hazards.

GOAL 2.0: Protection of the community from hazards associated with aircraft overflights, hazardous materials use, fire, and ground transportation.

Policy 2.1: Reduce the risk to the community from aircraft overflights.

Policy 2.2: Reduce the risk to the community from the use and transport of hazardous materials.

Policy 2.3: Reduce the per capita production of household hazardous waste in Lake Forest in concert with the County of Orange plans for reducing hazardous waste.

Policy 2.4: Reduce the risk to the community from fire.

Policy 2.5: Reduce the risk from ground transportation hazards, such as rail and roadway systems.

GOAL 3.0 Protection of citizens and businesses from criminal activity.

Policy 3.1: Provide substantive levels of police protection.

Policy 3.2: Improve public awareness of ways to reduce criminal activity and Orange County Sheriff's Department responsiveness (Neighborhood Watch, improved communication and education methods).

Policy 3.3: Provide an effective approach to reduce graffiti.

EMERGENCY PREPAREDNESS

Proper preparation for major emergencies is an essential action to minimize the disruption, personal injury, and property damage associated with such events. Preventative measures and preparatory responses before an emergency occurs will hasten recovery from these emergencies.

GOAL 4.0: Improved ability of the City to respond to natural and human-related emergencies.

Policy 4.1: Support the development of local preparedness plans and multi-jurisdictional cooperation and communication for emergency situations.

Policy 4.2: Educate residents and businesses regarding appropriate actions to safeguard life and property during and immediately after emergencies.

NOISE AND LAND USE PLANNING

Certain portions of the planning area are subject to high noise levels. The consideration of the sources and recipients of noise early in the land use planning process is an effective method of minimizing the impacts of noise on the community's population. Areas already impacted by noise can also have noise reduced through rehabilitative improvements.

GOAL 5.0: Consideration of the effects of noise in land use planning.

Policy 5.1: Utilize noise/land use compatibility standards as a guide for future planning and development decisions.

Policy 5.2: Provide noise control measures, such as berms, walls, and sound attenuating construction in areas of new construction or rehabilitation.

TRANSPORTATION NOISE

Transportation-related noise is a primary factor affecting the overall quality of life for much of Lake Forest. Reduction of transportation-related noise is an effective approach to dealing with the detrimental effects attributable to excessive noise levels.

GOAL 6.0: Reduction in the impact of transportation-related noise.

Policy 6.1: Reduce noise impacts to sensitive land uses from transportation noise sources.

NON-TRANSPORTATION NOISE

Noise sources that are not directly related to transportation include construction noise, manufacturing noise, and property maintenance activities. Such noise sources may be controlled to minimize any exposure to excessive noise levels.

GOAL 7.0: Reduction in non-transportation noise impacts.

Policy 7.1: Minimize the impacts of noise-producing land uses and activities on noise-sensitive land uses.

RELATED GOALS AND POLICIES

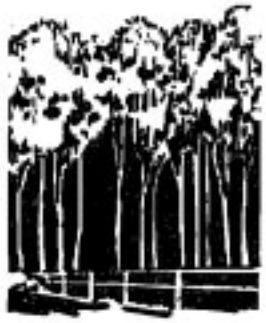
The goals and policies described in the Safety and Noise Element are related to and support subjects included within other General Plan elements. In turn, many goals and policies from the other elements directly or indirectly support the goals and policies of the Safety and Noise Element. These supporting goals and policies are identified in Table SN-1.

TABLE SN-1
SAFETY AND NOISE
RELATED GOALS AND POLICIES BY ELEMENT

Safety and Noise Issue Area	Related Goals and Policies by Element					
	Land Use	Housing	Circulation	Recreation and Resources	Safety and Noise	Public Facilities/ Growth Management
Natural Hazards and Human Activity Hazards	3.1, 4,2, 6.1, 6.2	2.1	2.1	2.1, 2.4		3.1, 3.2, 4.1
Emergency Preparedness			1.1, 1.2, 1.3, 2.1	5.3		
Noise and Land Use Planning	3.1, 3.5, 4.1, 4.2, 5.6	1.3	2.1, 2.3			
Transportation Noise			1.1, 1.2, 1.3, 2.1, 2.3			7.1
Non-Transportation Noise	3.2					

[1]General Plan Amendment 96-01, dated October 29, 1996.

SAFETY AND NOISE PLAN



As in most urban settings, natural conditions and human activities occur in Lake Forest which can impact the quality of life. The goals and policies in the previous section establish an aggressive agenda to safeguard community health from natural and human activity hazards and excessive noise. The Safety and Noise Plan defines the City approach for achieving the agenda and generally outlines action programs. The Safety and Noise Element Implementation Program, which is part of the General Plan Implementation Program, is an extension of the Safety and Noise Plan and contains specific programs that the City will enact to protect community well-being.

NATURAL HAZARDS AND HUMAN ACTIVITY HAZARDS

Risk reduction is essential for creating an attractive and healthful urban environment for residents and businesses. The Lake Forest Planning Area is characterized by diverse topographic features and development patterns. The western portion of the Planning Area is relatively flat and urbanized while the northeastern portion contains steep slopes and is primarily in a natural state. The diverse character of the Planning Area results in a mix of natural conditions and conditions created by humans that could pose hazards to public safety. In addition, the juxtaposition of Lake Forest with Cleveland National Forest pose other hazards.[1] There are many steps the City can take to minimize hazards and protect public health and private property.

[1]General Plan Amendment 00-01, dated May 2, 2000.

This section of the Safety and Noise Plan identifies the City approach for reducing potential hazards from natural conditions and human activities. Natural hazards include geologic conditions, seismic activity and flooding. Human activity hazards include aircraft overflights, hazardous materials, fire and crime.

Geologic Hazards

The Planning Area is located in a region with active seismic faults and is therefore subject to risks and hazards associated with earthquakes. Seismic activity poses two types of hazards: primary and secondary. Primary hazards include ground shaking, ground displacement, and subsidence and uplift from earth movement. Primary hazards can induce secondary hazards, including ground failure (lurch cracking, lateral spreading and slope failure), liquefaction, water waves (tsunamis and seiche), movement on nearby faults (sympathetic fault movement), and dam failure. Large earthquakes of magnitude 7.0 and greater on the Richter scale are expected to occur along at least one of the active faults in the region within a time period equivalent to the historic record.

No known active fault exists within the Planning Area. Consequently, the potential for ground rupture is low and no Alquist-Priolo Special Study Zone has been established by the state. In addition, the potential for liquefaction from seismic activity is low. While seiche could occur in the created lakes, the Planning Area will not be subject to inundation from dam failure. Slope failure from ground shaking could occur on some of the hillsides in the Planning Area. Ground settlement could occur on sites within a short distance of alluvial valleys or where a site is partially on bedrock formation, or partially on fill with inadequate internal compaction or consolidation of unsuitable soils. These geologic hazards, combined with

ground shaking, can result in substantial structural damage and related loss of life and personal injury.

The City will enact programs to reduce geologic hazards to protect public safety. To minimize hazards from earthquakes and other geologic hazards, the most recent state seismic guidelines and guidelines for other geologic hazards will be implemented for structural design. The stability of residential structures, critical structures and vital emergency facilities will be given particular attention. During the review of development proposals involving slopes, grading, unstable soils and other hazardous conditions, surveys of soil and geologic conditions by a state-licensed engineering geologist will be required. Based on the results of the survey, design measures will be incorporated into projects to minimize geologic hazards. Open space easements will be considered to avoid geologic hazards.

Earthquake preparedness is one of the best methods to minimize human suffering and property damage and accelerate recovery. The City will promote earthquake preparedness in the community with periodic earthquake awareness programs. The programs will be coordinated with emergency service providers and school districts to maximize public participation and effectiveness.

Flood Hazards

Five surface water streams traverse the Planning Area: Also Creek, Serrano Creek, Borrego Canyon Wash and two smaller creeks.[1] Floods along any watercourse are inevitable. The potential for flooding in semi-arid environments such as Orange County is increased due to the variation and unpredictability in the amount and intensity of rainfall. While floods are generally perceived as potential hazards, the degree of hazard associated with a flood is related to the type of land uses in the Floodplain. For instance, periodic flooding can benefit agricultural land, and parks can withstand occasional inundation. Floods in residential areas are considered hazardous due to the potential for injury and property damage. Business and commercial activities can be impeded by floods due to facility damage and access problems.

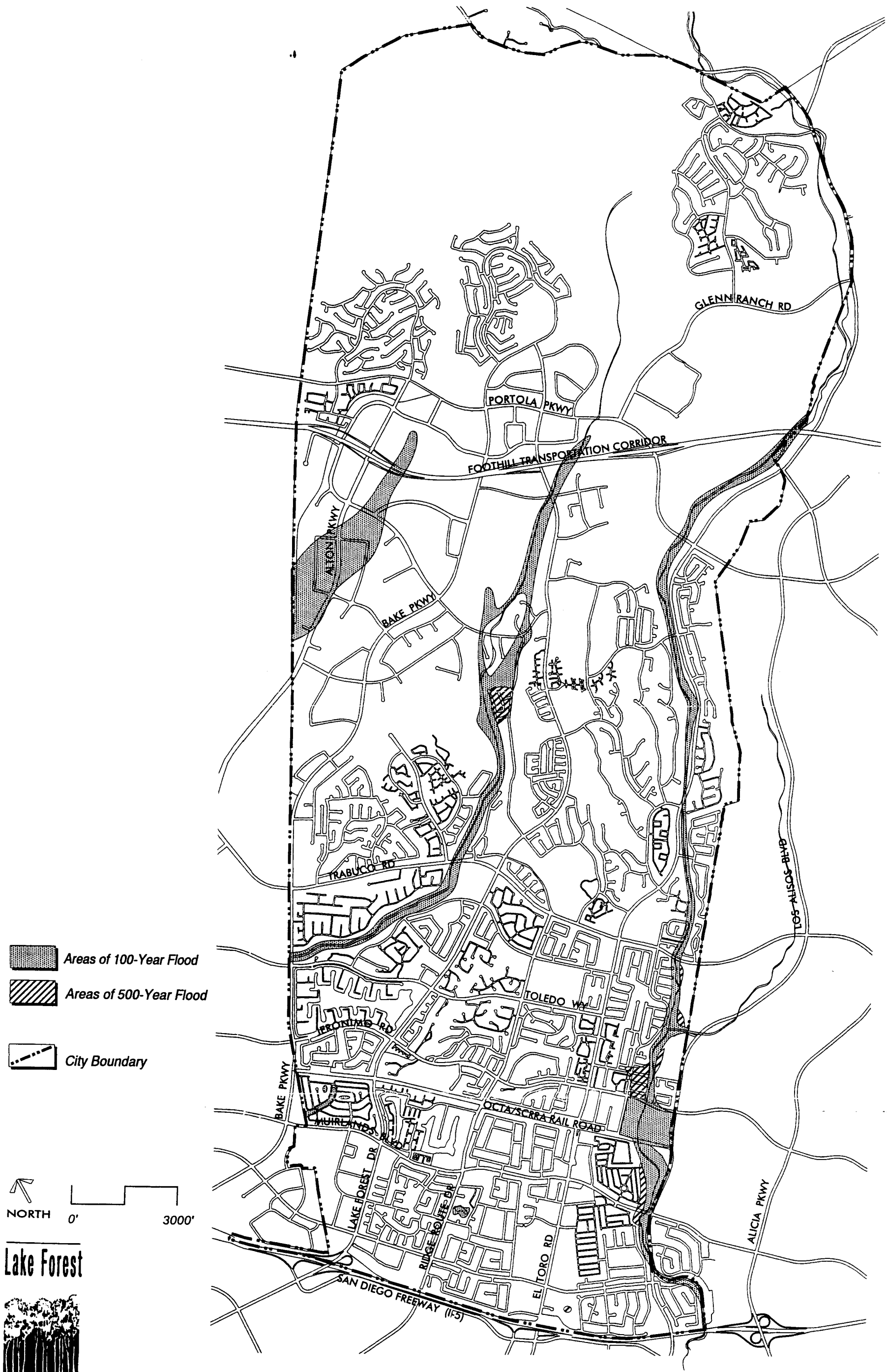
Lake Forest participates in the National Flood Insurance Administration (NFIA) program, which is administered by the Federal Emergency Management Agency (FEMA). The NFIA program provides federal flood insurance subsidies and federally-financed loans for property owners in flood-prone areas. To qualify for federal flood insurance, the City must identify flood hazard areas and implement a system of protective controls. Flood-prone areas in the Planning Area have been mapped by FEMA. Figure SN-1 shows the inundation areas for 100-year and 500-year floods. A 100-year flood means that a flood of this size has a one percent chance of occurring in a given year, and a 500-year flood means that a flood of this size has a 0.2 percent chance of occurring in a given year.

The City will continue to control development in the floodway and floodway fringe. Figure SN-2 shows the schematic diagram of the floodplain including the floodway and floodway fringe. Development will be prohibited in the floodway unless encroachment will not obstruct flows and increase flood levels.

In the floodway fringe, development encroachment will be permitted if the lowest floor of the structure is one foot above the highest estimated flood elevation.

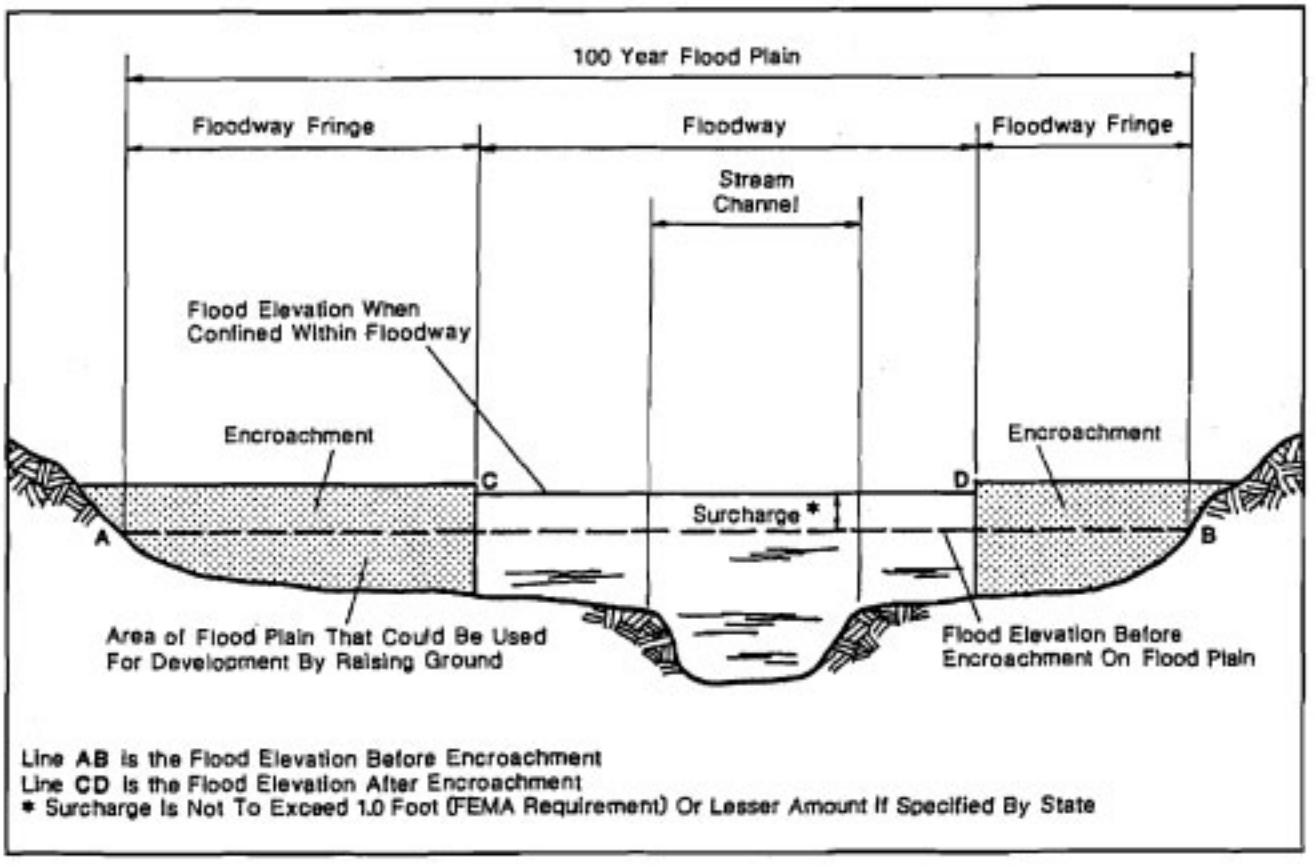
A flood control system has been constructed to direct runoff away from developed areas and prevent flooding. Flood control deficiencies have been identified and improvements have been proposed. The Orange County Flood Control District (OCFCD) is the agency responsible for the

[1] General Plan Amendment 01-01A, dated July 17, 2001.



SOURCE: Federal Emergency Management Agency, Flood Insurance Rate Map, 1989

Figure SN-1
Flood Zones



Lake Forest General Plan

SOURCE: Federal Emergency Management Agency, 1986

Figure SN-2
Floodplain Schematic

regional drainage facilities while the City controls local facilities. The City will coordinate with OCFCD to ensure regularly scheduled maintenance of flood control channels and completion of necessary repairs. The City will also work with the district to identify needed improvements for new development projects.

Aircraft Overflight

The former MCAS El Toro, which is located north-west of Lake Forest, supported intense military aircraft activity while it was in operation. The flight pattern included air space above the central portion of the Planning Area.

The County of Orange is in the process of planning for commercial airport reuse of the former base which the City of Lake Forest opposes. No airport plan has been adopted by the County.[1]

Hazardous Materials

Hazardous materials are used in Lake Forest for a variety of purposes including manufacturing, service industries, small businesses, agriculture, medical clinics, schools and households. Many chemicals used in household cleaning, construction, dry cleaning, film processing, landscaping, and automotive maintenance and repair are considered hazardous. The production of common items such as television sets, newspapers, plastic cups and computers generate some hazardous waste. Accidents can occur in the production, transport, use and disposal of hazardous materials and threaten human and environmental health.

The City will work to minimize the accident and health risk from hazardous materials with the following approaches:

- Cooperate with federal, state and local agencies to effectively regulate the management of hazardous materials and hazardous waste;
- Cooperate with the County of Orange to implement applicable portions of the County Hazardous Waste Management Plan;
- Establish defined roadway transportation routes for the conveyance of hazardous materials (the City does not exercise jurisdiction over transportation of freight along railroad right-of-way); and
- Develop an emergency response plan for accidents involving hazardous materials.

In addition, a Household Hazardous Waste Program will be prepared. The purpose of the program is to protect residents from the use, transport and disposal of hazardous materials used in the home. The program will include public education about health and environmental hazards of household hazardous materials, and a program to periodically collect household hazardous wastes.

Fire

The Planning Area is subject to both wild and urban fires. The eastern portion of the Planning Area is contiguous with the Cleveland National Forest.[2] The regional natural vegetation is highly prone to wild fire. A fire in the national forest could spread to developed areas of Figure SN-3 illustrates the high fire hazard area. The urbanized portion of the Planning Area is also subject to structural fires.

The City will reduce the potential for dangerous fires by coordinating with the Orange County Fire Department (OCFD) to

[1] General Plan Amendment 00-01, dated May 2, 2000.

[2] General Plan Amendment 01-01A, dated July 17, 2001.

implement fire hazard education, fire protection and fuel modification programs. The current Uniform Fire Code will be used to reduce structural fire hazards. In addition, the City will work closely with the local water districts and the OCFD to ensure that water pressure is adequate for fire fighting purposes.

Ground Transportation

Lake Forest is traversed by a variety of transportation systems including Interstate 5, Foothill Transportation Corridor, major arterials and roadways and Orange County Transportation Authority (OCTA) rail line. The OCTA transit system provides bus service. The preponderance of ground transportation systems is an asset to local economic development but poses several potential hazards including automobile accidents, rail accidents and pedestrian accidents. Accidents can be avoided by properly maintaining the transportation infrastructure and correcting deficiencies. The City will work with the Orange County Sheriff's Department and California Highway Patrol to monitor the ground transportation system for hazardous situations. When safety problems are identified, the City will request the appropriate agency, (i.e., Caltrans, OCTA, SCRRA or City Public Works Department), to take corrective measures.

Crime Control

Criminal activity in Lake Forest is lower than in some other parts of Orange County, but has increased during recent years as more people have moved into the City. Burglary and petty theft are the most frequent crimes. The frequency of violent crimes, such as homicide, rape and robbery, is relatively low. Protecting citizens and businesses from criminal activity is a priority in Lake Forest. Crime prevention techniques include substantive levels of police protection, educating the public about methods to reduce criminal activity, and continuing the graffiti removal program.

Police protection is provided by the Orange County Sheriff's Department. The City will ensure that contracted staffing levels correspond to the City population and needs, and will monitor mutual aid agreements between the Orange County Sheriff's Department and the police departments of surrounding jurisdictions. Crime prevention programs will be implemented through Neighborhood Watch for both residential and business communities in conjunction with the Sheriff's Department. When property owners present development proposals, the City will encourage the use of defensible space and lighting concepts to deter on-site crime. Crime control techniques can also be built into new development projects.

The City graffiti removal and avoidance program has been very effective. The City will continue to administer the program to maintain aesthetic quality and deter gang activity.

New Development

Public safety hazards can be most effectively reduced during the development process. Much of the vacant land in the Planning Area is governed by a Planned Community and related Development Agreement. Prior environmental documentation for the Planned Communities may require mitigation measures for potential hazards. To ensure that the mitigation measures are properly implemented, development proposals and amendments within Planned Communities will be reviewed for consistency with the prior environmental documentation.

SOURCE: Cotton/Beland/Associates, Inc., 1994

Figure SN-3
Area of Fire Hazard

Development proposals for sites outside of Planned Communities will be reviewed for potential hazards pursuant to the California Environmental Quality Act. The following conditions will be assessed and mitigation measures will be required to ensure public safety:

- Steep slopes, unstable geologic materials and faulting;
- Flooding;
- Brush and structural fires, water pressure for fire fighting purposes;
- Aircraft overflights;
- Hazardous materials use, transport, storage and disposal; and
- Ground transportation hazards (rail and roadway system).

EMERGENCY PREPAREDNESS

While the City will aggressively implement programs to protect public safety, a modest potential for a catastrophic event will still exist. The best strategy to minimize human suffering and property damage is to establish and maintain an Emergency Preparedness Plan. The purpose of the Emergency Preparedness Plan is to respond to emergency situations with a coordinated system of emergency service providers and facilities. Local Emergency Preparedness Plans serve as extensions of the California Emergency Plan and Emergency Resource Management Plan.

The City of Lake Forest will prepare and maintain an Emergency Preparedness Plan. The Plan will identify resources available for emergency response and establish coordinated actions plans for specific emergency situations and disasters including earthquake, fire, major rail and roadway accident, flooding, hazardous materials incident, civil disturbance, nuclear attack and accident at San Onofre Nuclear Generating Station.

To support the Emergency Preparedness Plan, the City will support a high level of multi-jurisdictional cooperation and communication for emergency planning and response management. Private individuals and organizations will be solicited to enhance local communication and response with cellular telephones, ham radios, AM/FM radio and cable television. Effective emergency response also requires vital facilities such as hospitals, fire stations and communication centers to be functional during disasters. The City will work with emergency providers to ensure that vital facilities are designed and operated to remain functional.

Educating residents and businesses about potential disasters and the Emergency Preparedness Plan can increase the effectiveness of emergency response efforts. An educated public will know how to prevent injury and property damage during and after emergency episodes and know how to find help. The City will work to educate residents and businesses about appropriate actions to safeguard life and property during and immediately after emergencies. Education about emergency preparedness can occur through the distribution of brochures, presentations to civic groups and homeowner associations, and instruction in local schools.

NOISE AND LAND USE PLANNING

Noise in the Planning Area is the cumulative effect of noise from transportation activities and stationary sources. Transportation noise refers to noise from automobile use, trucking, airport operations and rail operations. Non-transportation noise typically refers to noise from stationary sources such as commercial establishments, machinery, air conditioning systems, compressors and landscape maintenance equipment. Regardless of the type of noise, the noise levels are highest near the source and decrease with distance. Noise is problematic when noise sensitive land uses

are affected. Noise sensitive land uses, defined as activities that are interrupted by noise, include residences, schools, hospitals, religious meetings and recreation areas. Most noise impacts can be avoided when noise sources, sensitive land uses and information about the future noise environment are considered in land use planning and development decisions.

The noise environment for the Planning Area can be described with noise contours based on the major noise sources. Noise contours define areas of equal noise exposure. Future noise contours have been estimated with information about existing and projected development and transportation activity. Figure SN-4 shows the projected noise contours for the Lake Forest Planning Area.[1] The assumptions and methods used to develop the contours are explained in detail in the City Master Environmental Assessment.

Noise Standards and Land Use Compatibility Guidelines

To ensure that noise producers do not adversely affect sensitive receptors, the City will use land use compatibility standards when making planning and development decisions. Table SN-2 summarizes City noise standards for various types of land uses. The standards represent the maximum allowable noise level and will be used to determine noise impacts. The noise standards act as City policy for acceptable noise levels for development.

The noise standards are the basis for the development of land use compatibility guidelines, which are presented in a matrix in Table SN-3. The primary purpose of the noise/land use potential conflicts between proposed land uses and the existing and future noise environment. If the noise level of a project falls within Zone A or Zone B, the project is considered compatible with the noise environment. Zone A implies that no mitigation will be needed. Zone B implies that minor soundproofing of the structure may be needed to meet the City noise standards. The project proponent will be required to demonstrate that the noise standards will be met prior to project approval.

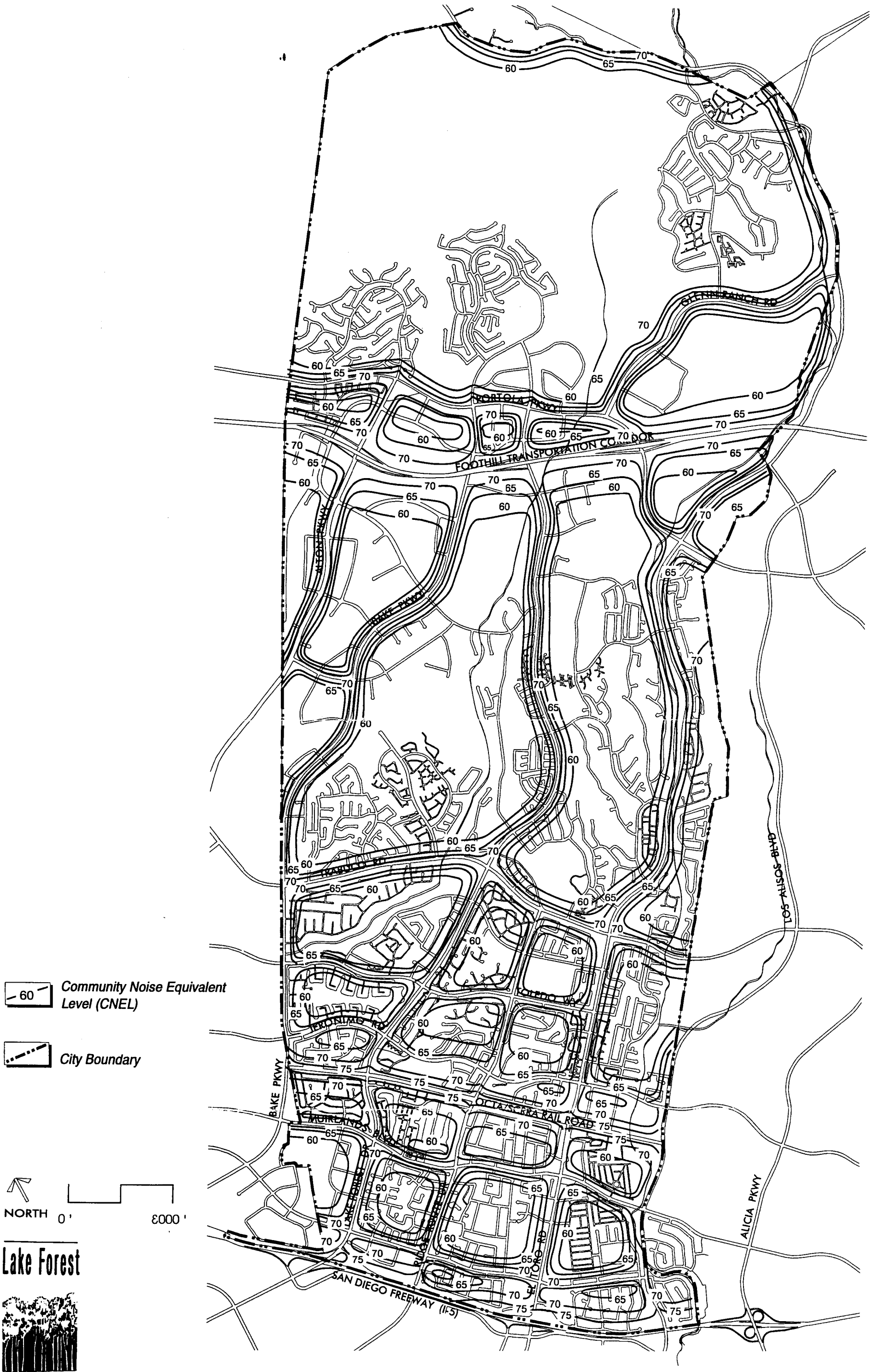
If the noise level of a project falls within Zone C, substantial noise mitigation will be necessary to meet the noise standards. Mitigation may involve construction of noise barriers and substantial building sound insulation. However, projects in Zone C can be successfully mitigated. The project proponent must demonstrate that the noise standards will be met prior to issuance of a building permit. If the noise levels falls outside of Zones A, B and C, the project is considered clearly incompatible with the noise environment and should not be approved.

The City Community Development Department will act as the noise control coordinator. This delegation of responsibility will allow consistent and continued enforcement of the established noise standards.

Noise Impact Areas

The noise contours will be used as a guide for land use and development decisions. The 60 dB CNEL defines Noise Impact Areas. When noise-sensitive land uses are proposed within the 60 dB CNEL or greater contour, an acoustical analysis must be prepared. For the project to be approved, the analysis must demonstrate that the project is designed to attenuate noise to meet the City noise standards, as defined in Table SN-2. If the project is not designed to meet the noise standards, mitigation measures can be recommended in the analysis. If the analysis demonstrates that the noise standards can be met with implementation of the mitigation measures, the project can be approved with the mitigation measures required as conditions of project approval.

[1] General Plan Amendment 00-01, dated May 2, 2000.



Lake Forest

General Plan

SOURCE: J.J. Van Houten and Associates, October 1993

Figure SN-4
Future Noise Contours

TABLE SN-2
INTERIOR AND EXTERIOR NOISE STANDARDS

Land Use	Noise Standards[1]	
	Interior[2,3]	Exterior
Residential - Single family, multifamily, duplex, mobile home	CNEL 45 dB	CNEL 65 dB[4]
Residential - Transient lodging, hotels, motels, nursing homes, hospitals	CNEL 45 dB	CNEL 65 dB[4]
Private offices, church sanctuaries, libraries, board rooms, conference rooms, theaters, auditoriums, concert halls, meeting halls, etc.	Leq(12) 45 dB(A)[6][2]	-
Schools	Leq(12) 45 dB(A)	Leq(12) 67 dB(A)[5]
General offices, reception, clerical, etc.	Leq(12) 50 dB(A)	-
Bank lobby, retail store, restaurant, typing pool, etc.	Leq(12) 55 dB(A)	-
Manufacturing, kitchen, warehousing, etc.	Leq(12) 65 dB(A)	-
Parks, playgrounds	-	CNEL 65 dB[5]
Golf courses, outdoor spectator sports, amusement parks	-	CNEL 70 dB[5]

NOTES

(1) CNEL: Community Noise Equivalent Level.
Leq(12): The A-weighted equivalent sound level averaged over a 12-hour period (usually the hours of operation).

(2) Noise standard with windows closed. Mechanical ventilation shall be provided per UBC requirements to provide a habitable environment.

(3) Indoor environment excluding bathrooms, toilets, closets and corridors.

(4) Outdoor environment limited to rear yard of single family homes, multifamily patios and balconies (with a depth of 6' or more) and common recreation areas.

(5) Outdoor environment limited to playground areas, picnic areas, and other areas of frequent human use.

(6) Religious institutions (Churches, temples, and other places of worship) of a small size (occupancy) of 100 persons or less) may occupy existing buildings within areas of exterior noise levels ranging from 65 to 75 dB CNEL without providing additional noise insulation for the building.

Source: J.J. Van Houten & Associates.

[1] General Plan Amendment 94-01 - dated July 11, 1995.

TABLE SN-3
NOISE/LAND USE COMPATIBILITY MATRIX

LAND USE CATEGORIES	COMMUNITY NOISE EQUIVALENT LEVEL CNEL						
	55	60	65	70	75	80	
Residential - Single Family, Multi-family, duplex	A	A	B	C[1]	C		
Residential - Mobile homes	A	A	B	C	C		
Transient Lodging - Motels, Hotels	A	A	B	B	C	C	
Schools, Libraries, Churches, Hospitals, Nursing/Convalescent Homes, Preschools, Day Care Centers(1)[2]	A	A	B	C	C		
Auditoriums, Concert Halls, Amphitheaters, Meeting Halls	B	B	C	C			
Sports Arenas, Outdoor Spectator Sport, Amusement Parks	A	A	A	B	B		
Playgrounds, Neighborhood Parks	A	A	A	B	C		
Golf Courses, Riding Stables, Cemeteries	A	A	A	A	B	C	C
Office and Professional Buildings	A	A	A	B	B	C	
Commercial Retail, Banks, Restaurants, Theaters	A	A	A	A	B	B	C
Industrial, Manufacturing, Utilities, Wholesale, Service Stations	A	A	A	A	B	B	B
Agriculture	A	A	A	A	A	A	A

Zone 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.[1]

Zone B - Conditionally Acceptable - New construction or development should be undertaken only after detailed analysis of the noise reduction requirement is made and needed noise insulation features in the design are determined. Conventional construction, with closed windows and fresh air supply systems or air conditioning, will normally suffice.

Zone C - Normally Unacceptable - New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of noise reduction requirements must be made and needed noise insulation features included in the design.[1]

Notes: (1) Religious institutions (Churches, synagogues, temples and other places of worship) of a small size (occupancy of 100 persons or less) may occupy existing buildings within areas of exterior noise levels ranging from 65 to 75 dB CNEL without providing additional noise insulation for the building.
(2) Shaded areas indicate new construction or development should generally not be undertaken.
Source: J.J. Van Houten & Associates

[1] General Plan Amendment 95-01 - dated May 16, 1995.

[2] General Plan Amendment 94-01 - dated July 11, 1995.

Construction Standards

The provisions of the state Noise Insulation Standards (Title 24) will be enforced in Lake Forest. Title 24 specifies that combined indoor noise for multi-family living spaces shall not exceed 45 dB CNEL. This standard must be implemented when the outdoor noise level exceeds 60 dB CNEL. The noise contour map (Figure SN-4) can be used to determine when to implement the standard. Title 24 requires that the standard be applied to all new hotels, motels, apartment houses and multi-family projects. The City will also apply the standard to new single-family development and condominium conversion projects as a matter of policy.[1]

TRANSPORTATION NOISE

Noise from transportation activity is the primary component of the noise environment in Lake Forest. Transportation noise is related to the transportation corridors that traverse the Planning Area, such as Interstate 5, Foothill Transportation Corridor, major arterials and collector roadways, and the Orange County Transportation Authority (OCTA) railroad.[2] The most efficient and effective means of controlling noise from transportation systems is to reduce the noise at the source.

The City has little direct control over noise produced by transportation sources because state and federal noise regulations preempt local regulations. The state regulates motor vehicle noise.[3] Because the City cannot control noise at the source, City noise programs focus on reducing the impact of transportation noise on the community. Cost effective strategies to control noise impacts are an essential component of this element.

The most effective method for mitigating transportation noise impacts on the community is by utilizing the site design review process and CEQA. During these stages of the development process, potential impacts from transportation noise will be identified and mitigation measures will be required as needed to meet City noise standards. Site planning, landscaping, topography and the design and construction of noise barriers (walls, berms or combination of walls/berms) are the most common method of alleviating traffic and train noise impacts. Setbacks and buffers can also be used to achieve small noise reductions.

Noise attenuating barriers are commonly incorporated into projects and can be extremely effective in reducing noise levels. The effectiveness of the barrier depends on the relative height and materials of the barrier, the noise source, the affected area, the horizontal distance between the source and the barrier, and the horizontal distance between the barrier and affected area. Although noise barriers can be extremely effective, the aesthetic effect of barriers on neighborhoods should be considered.

Noise barriers should be included in the design of roadway, freeway and rail improvements. The City will support efforts by Caltrans, Orange County Transportation Authority, SCRRA and other transportation providers to provide acoustical protection for noise-sensitive development. In addition, the City will request that barriers are constructed as part of freeway, roadway and rail improvement projects to mitigate significant noise impacts. In particular, Interstate 5 and the Foothill Transportation Corridor are prime candidates for barriers to protect the community from excessive transportation noise. Although the City does not have jurisdiction over railroad operation, maintenance, and construction activities

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[1] General Plan Amendment 00-01, dated May 2, 2000.

[2] General Plan Amendment 00-01, dated May 2, 2000.

[3] General Plan Amendment 00-01, dated May 2, 2000.

occurring within the OCTA right-of-way, SCRRA will also be requested to construct noise barriers adjacent to existing unprotected residential areas adjacent to the railroad.

Noise Control at the Source

The California Vehicle Code contains noise regulations pertaining to the operation of all vehicles on public roads. These noise standards for cars, trucks and motorcycles will be enforced through coordination with the California Highway Patrol and Orange County Sheriff's Department. The City will also regulate traffic flow and coordinate with the Orange County Sheriff's Department to enforce speed limits to reduce traffic noise. Truck and bus noise will be minimized by periodically evaluating and continually enforcing established routes to avoid noise impacts on sensitive receptors. To reduce the production of rail noise, the City will encourage SCRRA to continue to use welded track in good repair within the Planning Area.[1]

NON-TRANSPORTATION NOISE

Sensitive receptors must also be protected from excessive noise generated by non-transportation sources such as commercial and industrial centers, restaurants and bars, religious institutions and civic centers. Application of the City Noise Ordinance is the best means to control noise from existing noise sources. Noise generated by new development will be effectively controlled through the site design review process and CEQA, and compliance with the City Noise Ordinance. During these preliminary stages in the development process, potential noise impacts will be identified and mitigation measures can be imposed.

When reviewing proposed non-residential projects, noise generation and potential impacts to surrounding development will be considered. Acoustical analyses will be required for projects that will generate noise potentially affecting sensitive receptors. Where significant impacts are identified, mitigation measures will be required. The following mitigation measures could be applied when reviewing proposed projects:

- **Furnaces** - Acoustically treat natural draft and/or forced draft units and combustion air intake plena. Insulation of firing walls and damped and lined ducting are but a few of the treatments that could be considered.

- **Fans** - Air cooled heat exchangers can be provided with silencers where effective (i.e., primarily on small, high-speed air fans). For larger coolers, quieter equipment can be installed.

- **Motors** - Quiet-design motors can be employed and located to minimize impacts on nearby properties.

- **Centrifugal Compressors** - Centrifugal compressors can be equipped with inlet and discharge silencers. Acoustical enclosures may also be considered.

- **Centrifugal Pumps** - Centrifugal pumps may be equipped with suction and discharge piping that has been acoustically treated. Acoustical enclosures may be considered.

- **Steam and Gas Generators** - Acoustical enclosures for turbines may be effective in reducing noise. Inlet and discharge piping may be acoustically treated and expansion joints added or comparable attenuative modifications made to minimize structure-borne vibrations.

- **Control Valves** - Quiet valves should be used whenever available. In other circumstances, in-line silencers can be employed.

[1]General Plan Amendment 00-01, dated May 2, 2000.

- **Atmospheric Vents, Exhaust and Intakes** - Noise vents should be equipped with silencers. Where safety is not an overriding concern, vents should be positioned close to the ground or below grade.

- **Paging Systems** - Loudspeaker paging systems shall be regulated pursuant to the City's noise ordinance. Whenever possible suitable alternatives such as radio or visual paging systems should be utilized.

- **Delivery/Loading Areas** - Limit delivery hours for stores with loading areas or docks fronting, bordering, or gaining access in driveways next to noise sensitive uses.

- **Operating Hours** - Restrict operation hours at night to minimize impacts to adjacent residential uses.

In addition, all City departments must comply with state and federal OSHA noise standards. Any new equipment or vehicle purchased by the City will comply with local, state and federal noise standards.

Noise Ordinance

The City Noise Ordinance is designed to protect people from non-transportation noise sources such as music, construction activity, machinery and pumps, and air conditioners. Enforcement of the ordinance ensures that adjacent properties are not exposed to excessive noise from stationary sources. Enforcing the Noise Ordinance includes requiring proposed development projects to show compliance with the ordinance, and requiring construction activity to comply with established work schedule limits. The Noise Ordinance does not apply to railroad operation, maintenance and construction activities occurring with the OCTA right-of-way or the permitted hours for such activities. The ordinance will be reviewed periodically for adequacy and amended as needed to address community needs and development patterns.

Appendix B

Noise Measurement, Field Data and Photos

Field Sheet

Project: 21781 Lake Forest H2GO Express Car Wash Noise Impact Study	**Engineer:** D. Shivaiah	**Date:** 10/9/2019	
		JN: 2737-2019-02	
Measurement Address: 21781 Lake Forest Drive	**City:** Lake Forest	**Site No.:** 1	

Sound Level Meter:
Piccolo II
Serial # P0218042101
Serial # P0218092808

Calibrator:
CA114 Sound Calibrator
Serial # 500732

Calibration Record:

	Input, dB/	Reading, dB/	Offset, dB/	Time
1	94.0			9:47 AM
2	94.0			9:48 AM
3				
4				
5				

Notes:

Temp:	70
Windspeed:	5 MPH
Direction:	ENE
Skies:	Clear
Camera:	
Photo Nos.	

Meter Settings:

☒ A-WTD ☐ LINEAR ☒ SLOW ☐ 1/1 OCT ☒ INTERVALS ___10____- MINUTE
☐ C-WTD ☐ IMPULSE ☐ FAST ☐ 1/3 OCT ☒ L_N PERCENTILE VALUES

Notes:

Measurement Type:
Long-term
Short-term X

		Start Time	Stop Time	Leq	Lmin	Lmax	L2	L8	L25	L50
Locations	1	9:50 AM	10:00 AM	55.9	49	66.0	62.1	59.4	56.6	54.2
		Noise meter was placed on the sidewalk near the commercial use to the north of the project site. Ambient noise includes parking lot noise and traffic noise from Lake Forest Drive.								
	2	9:49 AM	9:59 AM	56.9	44.6	67.2	63.8	61.1	58.6	54.1
		Noise meter was placed on the western property line of the project site near office buildings. Ambient noise includes parking lot noise and traffic noise from Lake Forest Drive.								
	3	10:02 AM	10:12 AM	66.0	49.5	74.5	72.6	70.6	66.6	63.6
		Noise meter was placed on the 2nd floor of the western office buildings. Ambient noise includes traffic noise from Lake Forest Drive.								
	4	10:26 AM	10:36 AM	71.0	51.3	84.4	78.0	75.8	71.8	67.6
		Noise meter was placed at the southeastern residential property line at approximately 170 feet from the project site and 45 feet from the Chinook Drive Center Line. Ambient noise includes traffic noise from Lake Forest Drive.								
	5	10:20 AM	10:30 AM	69.9	49.8	82.9	77.1	74.6	70.8	66.4
		Noise meter was placed at the southwestern residential property line at approximately 65 feet from the Lake Forest Drive and 45 feet from the Chinook Drive Center Line. Ambient noise includes traffic noise from Lake Forest Drive.								

RK engineering group, inc.

Field Sheet - ST1 Location Photos		
Project: 21781 Lake Forest H2GO Express Car Wash Noise Impact Study	**Engineer:** D. Shivaiah	**Date:** 10/9/2019 **JN:** 2737-2019-02
Measurement Address: 21781 Lake Forest Drive	**City:** Lake Forest	**Site No.:** 1

RK engineering group, inc.

Field Sheet - ST1 Location Photos			
Project: 21781 Lake Forest H2GO Express Car Wash Noise Impact Study	**Engineer:** D. Shivaiah	**Date:**	10/9/2019
		JN:	2737-2019-02
Measurement Address: 21781 Lake Forest Drive	**City:** Lake Forest	**Site No.:**	2

RK engineering group, inc.

Field Sheet - ST3 Location Photos			
Project: 21781 Lake Forest H2GO Express Car Wash Noise Impact Study	**Engineer:** D. Shivaiah	**Date:**	10/9/2019
		JN:	2737-2019-02
Measurement Address: 21781 Lake Forest Drive	**City:** Lake Forest	**Site No.:**	3

RK engineering group, inc.

Field Sheet - ST4 Location Photos			
Project: 21781 Lake Forest H2GO Express Car Wash Noise Impact Study	**Engineer:** D. Shivaiah	**Date:**	10/9/2019
		JN:	2737-2019-02
Measurement Address: 21781 Lake Forest Drive	**City:** Lake Forest	**Site No.:**	4

RK engineering group, inc.

Field Sheet - ST1 Location Photos			
Project: 21781 Lake Forest H2GO Express Car Wash Noise Impact Study	**Engineer:** D. Shivaiah	**Date:**	10/9/2019
		JN:	2737-2019-02
Measurement Address: 21781 Lake Forest Drive	**City:** Lake Forest	**Site No.:**	5

RK engineering group, inc.

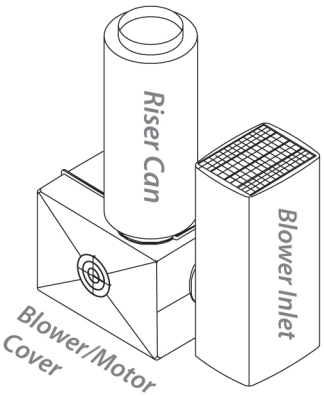
Appendix C

Blower Manufacture Specification Sheet

The Proto-Vest Silencer Package

"How Much Quieter Is It?"

The Silencer Package was developed by Proto-Vest, Inc. to enable its dryers to meet OSHA, federal, state and local noise reduction standards. All Proto-Vest drying systems can be equipped with the Silencer Package as an option.



Using state of the art materials which require virtually no maintenance, Proto-Vest has designed three components to comprise the Silencer Package.

- Blower Inlet: Reduces the noise generated by rapidly moving air being drawn into the blower assembly.

- Blower/Motor Cover: Houses the blower and motor completely, absorbing noise from the motor and impeller as well as protecting them.

- Riser Can: Muffles the noise created by the blower and impeller and the movement of the air as it leaves the blower and advances through the dryer's plenum.

But how much quieter is it?

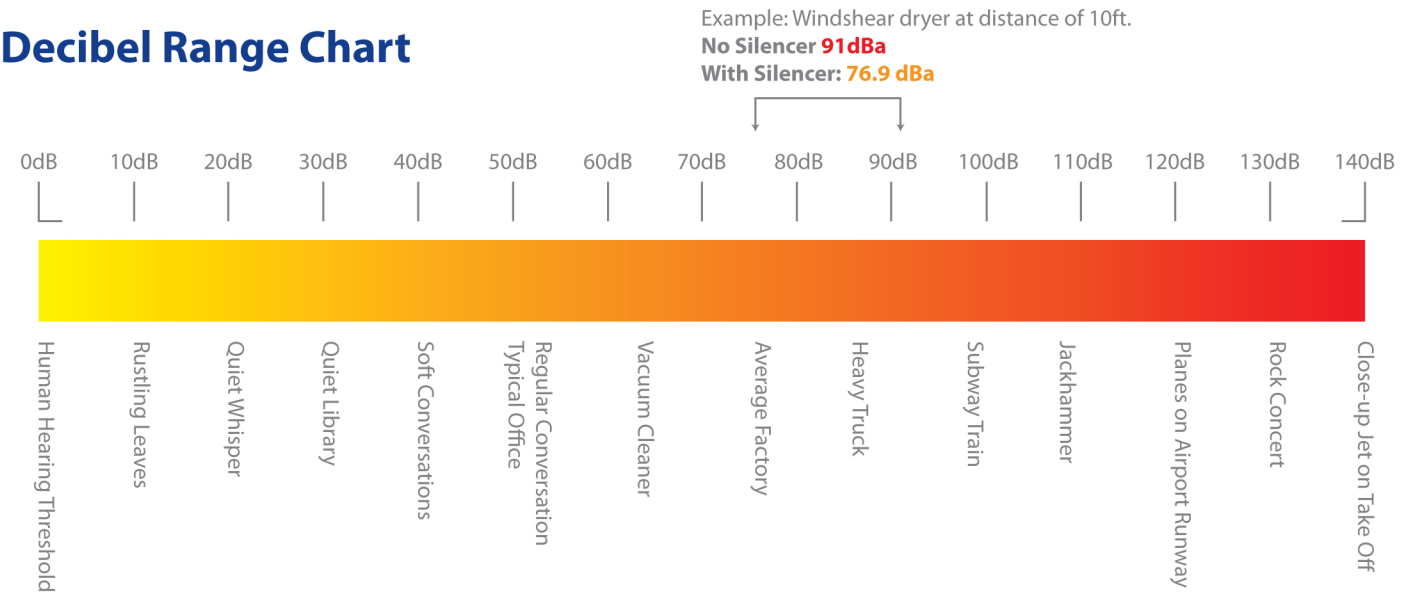
First, you should understand a few things about sound levels. A decibel is the smallest single unit of loudness difference in sound pressure that the human ear can detect. It was conceived by a scientist who noticed that two church bells were louder than one and three were louder than two. He called the difference in loudness one "Bell". As more accurate measurements were needed, the bel unit was further divided into decibels or one tenth of a bel.
It's important to understand that ten decibels are ten times more intense than one decibel, 20 decibels are 100 times more intense (10x10) and 30 decibels are 1,000 times more intense (10x10x10).

The Silencer Package reduces the noise decibel levels on Proto-Vest dryers an average of 10 decibels.

What this means to you is the Silenced Proto-Vest dryer is approximately 10 times quieter than an unsilenced model!

The OSHA permissible noise exposure is 85dB for an 8 hour shift. By reducing noise levels into the 70 and 80dB range, you can be assured of a pleasant environment for both your employees and customers.

Decibel Range Chart



Appendix D

Stationary Noise Calculation Worksheets

21781 Lake Forest Drive H2GO Express Car Wash Noise Impact Study, City of Lake Forest
Noise emissions of industry sources

Source name	Referenc	Level		Frequency spectrum [dB(A)]										Corrections		
				31	63	125	250	500	1	2	4	8	16	Cwall	CI	CT
			dB(A)	Hz	Hz	Hz	Hz	Hz	kHz	kHz	kHz	kHz	kHz	dB(A)	dB(A)	dB(A)
Car Wash Tunnel Entry	Lw/unit	Day	84.6	43.5	55.9	63.5	70.3	75.6	78.8	78.5	77.3	74.8	66.9	3.0	-	-
		Night	-	-	-	-	-	-	-	-	-	-	-	3.0	-	-
Car Wash Tunnel Exit	Lw/unit	Day	94.6	53.5	65.9	73.5	80.3	85.6	88.8	88.5	87.3	84.8	76.9	3.0	-	-
		Night	-	-	-	-	-	-	-	-	-	-	-	3.0	-	-
Vacuum Stalls1	Lw/unit	Day	82.8	41.5	64.9	61.1	73.2	73.8	76.7	77.9	74.4	65.8	53.7	-	-	-
		Night	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vacuum Stalls2	Lw/unit	Day	82.8	41.5	64.9	61.1	73.2	73.8	76.7	77.9	74.4	65.8	53.7	-	-	-
		Night	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vacuum Stalls3	Lw/unit	Day	82.8	41.5	64.9	61.1	73.2	73.8	76.7	77.9	74.4	65.8	53.7	-	-	-
		Night	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vacuum Stalls4	Lw/unit	Day	82.8	41.5	64.9	61.1	73.2	73.8	76.7	77.9	74.4	65.8	53.7	-	-	-
		Night	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vacuum Stalls5	Lw/unit	Day	82.8	41.5	64.9	61.1	73.2	73.8	76.7	77.9	74.4	65.8	53.7	-	-	-
		Night	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vacuum Stalls6	Lw/unit	Day	82.8	41.5	64.9	61.1	73.2	73.8	76.7	77.9	74.4	65.8	53.7	-	-	-
		Night	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vacuum Stalls7	Lw/unit	Day	82.8	41.5	64.9	61.1	73.2	73.8	76.7	77.9	74.4	65.8	53.7	-	-	-
		Night	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vacuum Stalls8	Lw/unit	Day	82.8	41.5	64.9	61.1	73.2	73.8	76.7	77.9	74.4	65.8	53.7	-	-	-
		Night	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vacuum Stalls9	Lw/unit	Day	82.8	41.5	64.9	61.1	73.2	73.8	76.7	77.9	74.4	65.8	53.7	-	-	-
		Night	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vacuum Stalls10	Lw/unit	Day	82.8	41.5	64.9	61.1	73.2	73.8	76.7	77.9	74.4	65.8	53.7	-	-	-
		Night	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vacuum Stalls11	Lw/unit	Day	82.8	41.5	64.9	61.1	73.2	73.8	76.7	77.9	74.4	65.8	53.7	-	-	-
		Night	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vacuum Stalls12	Lw/unit	Day	82.8	41.5	64.9	61.1	73.2	73.8	76.7	77.9	74.4	65.8	53.7	-	-	-
		Night	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vacuum Stalls13	Lw/unit	Day	82.8	41.5	64.9	61.1	73.2	73.8	76.7	77.9	74.4	65.8	53.7	-	-	-
		Night	-	-	-	-	-	-	-	-	-	-	-	-	-	-

21781 Lake Forest Drive H2GO Express Car Wash Noise Impact Study, City of Lake Forest
Receiver list

No.	Receiver name	Building side	Floor	Limit		Level w/o NP		Level w NP		Difference		Conflict	
				Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
				dB(A)		dB(A)		dB(A)		dB		dB	
1	Office Building Facade	East	GF	-	-	61.2	0.0	61.1	0.0	-0.1	0.0	-	-
			1.Fl	-	-	61.2	0.0	61.0	0.0	-0.1	0.0	-	-
2	Outside Patio - Cafe	-	GF	-	-	60.8	0.0	58.5	0.0	-2.3	0.0	-	-
3	Outside Patio - Restaurant	-	GF	-	-	61.0	0.0	56.6	0.0	-4.4	0.0	-	-
4	Receptor Behind the Wall-1	-	GF	-	-	48.2	0.0	40.9	0.0	-7.2	0.0	-	-
5	Receptor Behind the Wall-2	-	GF	-	-	53.1	0.0	49.9	0.0	-3.2	0.0	-	-
6	Receptor Behind the Wall-3	-	GF	-	-	53.8	0.0	49.4	0.0	-4.4	0.0	-	-
7	Receptor Behind the Wall-4	-	GF	-	-	52.9	0.0	48.1	0.0	-4.8	0.0	-	-
8	Receptor in front of Wall-1	-	GF	-	-	47.5	0.0	49.3	0.0	1.8	0.0	-	-
9	Receptor in front of Wall-2	-	GF	-	-	52.6	0.0	53.5	0.0	0.9	0.0	-	-
10	Receptor in front of Wall-3	-	GF	-	-	53.8	0.0	52.0	0.0	-1.7	0.0	-	-
11	Receptor in front of Wall-4	-	GF	-	-	52.7	0.0	52.7	0.0	0.0	0.0	-	-

21781 Lake Forest Drive H2GO Express Car Wash Noise Impact Study, City of Lake Forest
Contribution levels of the receivers

Source name		Traffic lane	Level w/o NP Day	Level w/o NP Night	Level w NP Day	Level w NP Night
			dB(A)		dB(A)	
Office Building Facade	GF		61.2	0.0	61.1	0.0
Car Wash Tunnel Entry		-	46.4	-	46.4	-
Car Wash Tunnel Exit		-	48.4	-	46.6	-
Vacuum Stalls-1		-	48.0	-	48.0	-
Vacuum Stalls-2		-	48.5	-	48.5	-
Vacuum Stalls-3		-	48.8	-	48.8	-
Vacuum Stalls-4		-	48.9	-	48.9	-
Vacuum Stalls-5		-	48.7	-	48.7	-
Vacuum Stalls-6		-	48.2	-	48.2	-
Vacuum Stalls-7		-	47.7	-	47.7	-
Vacuum Stalls-8		-	48.7	-	48.7	-
Vacuum Stalls-9		-	50.2	-	50.2	-
Vacuum Stalls-10		-	51.6	-	51.6	-
Vacuum Stalls-11		-	52.1	-	52.1	-
Vacuum Stalls-12		-	51.5	-	51.5	-
Vacuum Stalls-13		-	49.8	-	49.8	-
Office Building Facade	1.Fl		61.2	0.0	61.0	0.0
Car Wash Tunnel Entry		-	46.4	-	46.4	-
Car Wash Tunnel Exit		-	48.4	-	45.2	-
Vacuum Stalls-1		-	48.0	-	48.0	-
Vacuum Stalls-2		-	48.5	-	48.5	-
Vacuum Stalls-3		-	48.8	-	48.8	-
Vacuum Stalls-4		-	48.8	-	48.8	-
Vacuum Stalls-5		-	48.7	-	48.7	-
Vacuum Stalls-6		-	48.2	-	48.2	-
Vacuum Stalls-7		-	47.7	-	47.7	-
Vacuum Stalls-8		-	48.7	-	48.7	-
Vacuum Stalls-9		-	50.2	-	50.2	-
Vacuum Stalls-10		-	51.5	-	51.5	-
Vacuum Stalls-11		-	52.0	-	52.0	-
Vacuum Stalls-12		-	51.4	-	51.4	-
Vacuum Stalls-13		-	49.8	-	49.8	-
Outside Patio - Cafe	GF		60.8	0.0	58.5	0.0
Car Wash Tunnel Entry		-	39.1	-	39.1	-
Car Wash Tunnel Exit		-	58.7	-	53.7	-
Vacuum Stalls-1		-	44.0	-	44.0	-
Vacuum Stalls-2		-	44.5	-	44.5	-
Vacuum Stalls-3		-	45.1	-	45.1	-
Vacuum Stalls-4		-	45.7	-	45.7	-
Vacuum Stalls-5		-	46.2	-	46.2	-
Vacuum Stalls-6		-	46.8	-	46.8	-
Vacuum Stalls-7		-	47.5	-	47.4	-
Vacuum Stalls-8		-	43.1	-	43.1	-
Vacuum Stalls-9		-	43.8	-	43.8	-
Vacuum Stalls-10		-	45.8	-	45.8	-
Vacuum Stalls-11		-	45.4	-	45.4	-
Vacuum Stalls-12		-	45.7	-	45.7	-
Vacuum Stalls-13		-	45.8	-	45.8	-
Outside Patio - Restaurant	GF		61.0	0.0	56.6	0.0
Car Wash Tunnel Entry		-	29.9	-	27.5	-
Car Wash Tunnel Exit		-	58.9	-	53.3	-
Vacuum Stalls-1		-	44.5	-	40.1	-
Vacuum Stalls-2		-	45.1	-	40.5	-
Vacuum Stalls-3		-	45.8	-	41.0	-
Vacuum Stalls-4		-	46.6	-	41.6	-
Vacuum Stalls-5		-	47.4	-	41.8	-
Vacuum Stalls-6		-	48.1	-	42.2	-
Vacuum Stalls-7		-	48.2	-	41.8	-
Vacuum Stalls-8		-	42.4	-	41.6	-
Vacuum Stalls-9		-	42.0	-	42.0	-
Vacuum Stalls-10		-	43.0	-	43.0	-
Vacuum Stalls-11		-	44.0	-	44.0	-

21781 Lake Forest Drive H2GO Express Car Wash Noise Impact Study, City of Lake Forest
Contribution levels of the receivers

Source name	Traffic lane	Level w/o NP Day	Level w/o NP Night	Level w NP Day	Level w NP Night
		dB(A)		dB(A)	
Vacuum Stalls-12	-	45.1	-	45.1	-
Vacuum Stalls-13	-	46.4	-	46.4	-
Receptor Behind the Wall-1 GF		48.2	0.0	40.9	0.0
Car Wash Tunnel Entry	-	33.3	-	25.4	-
Car Wash Tunnel Exit	-	34.3	-	27.8	-
Vacuum Stalls-1	-	32.8	-	25.7	-
Vacuum Stalls-2	-	35.0	-	27.9	-
Vacuum Stalls-3	-	34.9	-	27.8	-
Vacuum Stalls-4	-	34.7	-	27.4	-
Vacuum Stalls-5	-	34.5	-	27.2	-
Vacuum Stalls-6	-	34.4	-	27.0	-
Vacuum Stalls-7	-	34.3	-	26.8	-
Vacuum Stalls-8	-	39.0	-	31.8	-
Vacuum Stalls-9	-	39.6	-	32.4	-
Vacuum Stalls-10	-	39.4	-	32.1	-
Vacuum Stalls-11	-	39.1	-	31.8	-
Vacuum Stalls-12	-	35.6	-	27.6	-
Vacuum Stalls-13	-	36.1	-	29.1	-
Receptor Behind the Wall-2 GF		53.1	0.0	49.9	0.0
Car Wash Tunnel Entry	-	44.5	-	41.6	-
Car Wash Tunnel Exit	-	45.9	-	41.7	-
Vacuum Stalls-1	-	39.1	-	36.0	-
Vacuum Stalls-2	-	40.3	-	37.1	-
Vacuum Stalls-3	-	39.3	-	36.0	-
Vacuum Stalls-4	-	40.2	-	37.0	-
Vacuum Stalls-5	-	39.3	-	36.6	-
Vacuum Stalls-6	-	40.2	-	37.2	-
Vacuum Stalls-7	-	40.1	-	37.1	-
Vacuum Stalls-8	-	40.3	-	37.1	-
Vacuum Stalls-9	-	39.9	-	36.9	-
Vacuum Stalls-10	-	40.7	-	37.7	-
Vacuum Stalls-11	-	41.4	-	38.4	-
Vacuum Stalls-12	-	40.9	-	37.9	-
Vacuum Stalls-13	-	40.5	-	37.5	-
Receptor Behind the Wall-3 GF		53.8	0.0	49.4	0.0
Car Wash Tunnel Entry	-	46.2	-	42.1	-
Car Wash Tunnel Exit	-	46.8	-	42.3	-
Vacuum Stalls-1	-	42.5	-	38.6	-
Vacuum Stalls-2	-	42.2	-	37.5	-
Vacuum Stalls-3	-	41.9	-	37.1	-
Vacuum Stalls-4	-	41.1	-	36.4	-
Vacuum Stalls-5	-	40.6	-	36.0	-
Vacuum Stalls-6	-	40.3	-	35.7	-
Vacuum Stalls-7	-	41.6	-	37.0	-
Vacuum Stalls-8	-	39.9	-	36.5	-
Vacuum Stalls-9	-	39.3	-	34.7	-
Vacuum Stalls-10	-	38.9	-	34.5	-
Vacuum Stalls-11	-	38.5	-	34.2	-
Vacuum Stalls-12	-	38.8	-	34.1	-
Vacuum Stalls-13	-	40.2	-	35.5	-
Receptor Behind the Wall-4 GF		52.9	0.0	48.1	0.0
Car Wash Tunnel Entry	-	44.1	-	39.2	-
Car Wash Tunnel Exit	-	45.9	-	41.0	-
Vacuum Stalls-1	-	41.3	-	36.3	-
Vacuum Stalls-2	-	41.1	-	36.1	-
Vacuum Stalls-3	-	40.8	-	36.0	-
Vacuum Stalls-4	-	40.5	-	35.7	-
Vacuum Stalls-5	-	40.3	-	35.5	-
Vacuum Stalls-6	-	40.3	-	35.5	-
Vacuum Stalls-7	-	40.1	-	35.4	-
Vacuum Stalls-8	-	39.1	-	34.1	-
Vacuum Stalls-9	-	38.7	-	33.9	-

21781 Lake Forest Drive H2GO Express Car Wash Noise Impact Study, City of Lake Forest
Contribution levels of the receivers

Source name	Traffic lane	Level w/o NP Day	Level w/o NP Night	Level w NP Day	Level w NP Night
		dB(A)		dB(A)	
Vacuum Stalls-10	-	38.4	-	33.8	-
Vacuum Stalls-11	-	38.9	-	34.2	-
Vacuum Stalls-12	-	40.1	-	35.4	-
Vacuum Stalls-13	-	39.6	-	35.0	-
Receptor in front of Wall-1	GF	47.5	0.0	49.3	0.0
Car Wash Tunnel Entry	-	33.8	-	35.5	-
Car Wash Tunnel Exit	-	33.1	-	34.6	-
Vacuum Stalls-1	-	35.1	-	36.6	-
Vacuum Stalls-2	-	35.0	-	36.5	-
Vacuum Stalls-3	-	34.9	-	36.4	-
Vacuum Stalls-4	-	34.6	-	36.1	-
Vacuum Stalls-5	-	34.5	-	36.0	-
Vacuum Stalls-6	-	34.4	-	35.9	-
Vacuum Stalls-7	-	34.2	-	35.8	-
Vacuum Stalls-8	-	37.2	-	39.4	-
Vacuum Stalls-9	-	38.3	-	40.5	-
Vacuum Stalls-10	-	38.1	-	40.3	-
Vacuum Stalls-11	-	37.9	-	40.1	-
Vacuum Stalls-12	-	35.2	-	36.7	-
Vacuum Stalls-13	-	34.5	-	36.2	-
Receptor in front of Wall-2	GF	52.6	0.0	53.5	0.0
Car Wash Tunnel Entry	-	44.7	-	46.3	-
Car Wash Tunnel Exit	-	44.2	-	41.6	-
Vacuum Stalls-1	-	39.3	-	40.5	-
Vacuum Stalls-2	-	40.3	-	41.6	-
Vacuum Stalls-3	-	39.1	-	39.8	-
Vacuum Stalls-4	-	40.3	-	41.4	-
Vacuum Stalls-5	-	40.4	-	41.2	-
Vacuum Stalls-6	-	39.9	-	41.0	-
Vacuum Stalls-7	-	39.3	-	40.6	-
Vacuum Stalls-8	-	40.6	-	42.3	-
Vacuum Stalls-9	-	39.2	-	40.6	-
Vacuum Stalls-10	-	39.9	-	41.6	-
Vacuum Stalls-11	-	40.1	-	41.6	-
Vacuum Stalls-12	-	39.3	-	41.0	-
Vacuum Stalls-13	-	38.9	-	40.4	-
Receptor in front of Wall-3	GF	53.8	0.0	52.0	0.0
Car Wash Tunnel Entry	-	46.2	-	44.7	-
Car Wash Tunnel Exit	-	46.8	-	42.4	-
Vacuum Stalls-1	-	42.3	-	41.1	-
Vacuum Stalls-2	-	42.2	-	40.8	-
Vacuum Stalls-3	-	41.8	-	40.3	-
Vacuum Stalls-4	-	40.8	-	39.6	-
Vacuum Stalls-5	-	40.6	-	39.3	-
Vacuum Stalls-6	-	40.3	-	39.0	-
Vacuum Stalls-7	-	41.7	-	40.4	-
Vacuum Stalls-8	-	39.9	-	39.1	-
Vacuum Stalls-9	-	39.3	-	38.5	-
Vacuum Stalls-10	-	38.8	-	38.0	-
Vacuum Stalls-11	-	38.4	-	37.6	-
Vacuum Stalls-12	-	38.8	-	37.8	-
Vacuum Stalls-13	-	40.2	-	39.1	-
Receptor in front of Wall-4	GF	52.7	0.0	52.7	0.0
Car Wash Tunnel Entry	-	43.7	-	44.5	-
Car Wash Tunnel Exit	-	45.8	-	41.6	-
Vacuum Stalls-1	-	40.9	-	41.7	-
Vacuum Stalls-2	-	40.7	-	41.4	-
Vacuum Stalls-3	-	40.5	-	41.2	-
Vacuum Stalls-4	-	40.3	-	40.8	-
Vacuum Stalls-5	-	40.0	-	40.6	-
Vacuum Stalls-6	-	40.1	-	40.3	-
Vacuum Stalls-7	-	39.6	-	40.0	-

21781 Lake Forest Drive H2GO Express Car Wash Noise Impact Study, City of Lake Forest
Contribution levels of the receivers

Source name	Traffic lane	Level w/o NP		Level w NP	
		Day	Night	Day	Night
		dB(A)		dB(A)	
Vacuum Stalls-8	-	38.8	-	39.5	-
Vacuum Stalls-9	-	38.4	-	39.0	-
Vacuum Stalls-10	-	39.6	-	40.8	-
Vacuum Stalls-11	-	38.6	-	38.4	-
Vacuum Stalls-12	-	39.8	-	40.4	-
Vacuum Stalls-13	-	39.5	-	40.1	-

21781 Lake Forest Drive H2GO Express Car Wash Noise Impact Study

City of Lake Forest

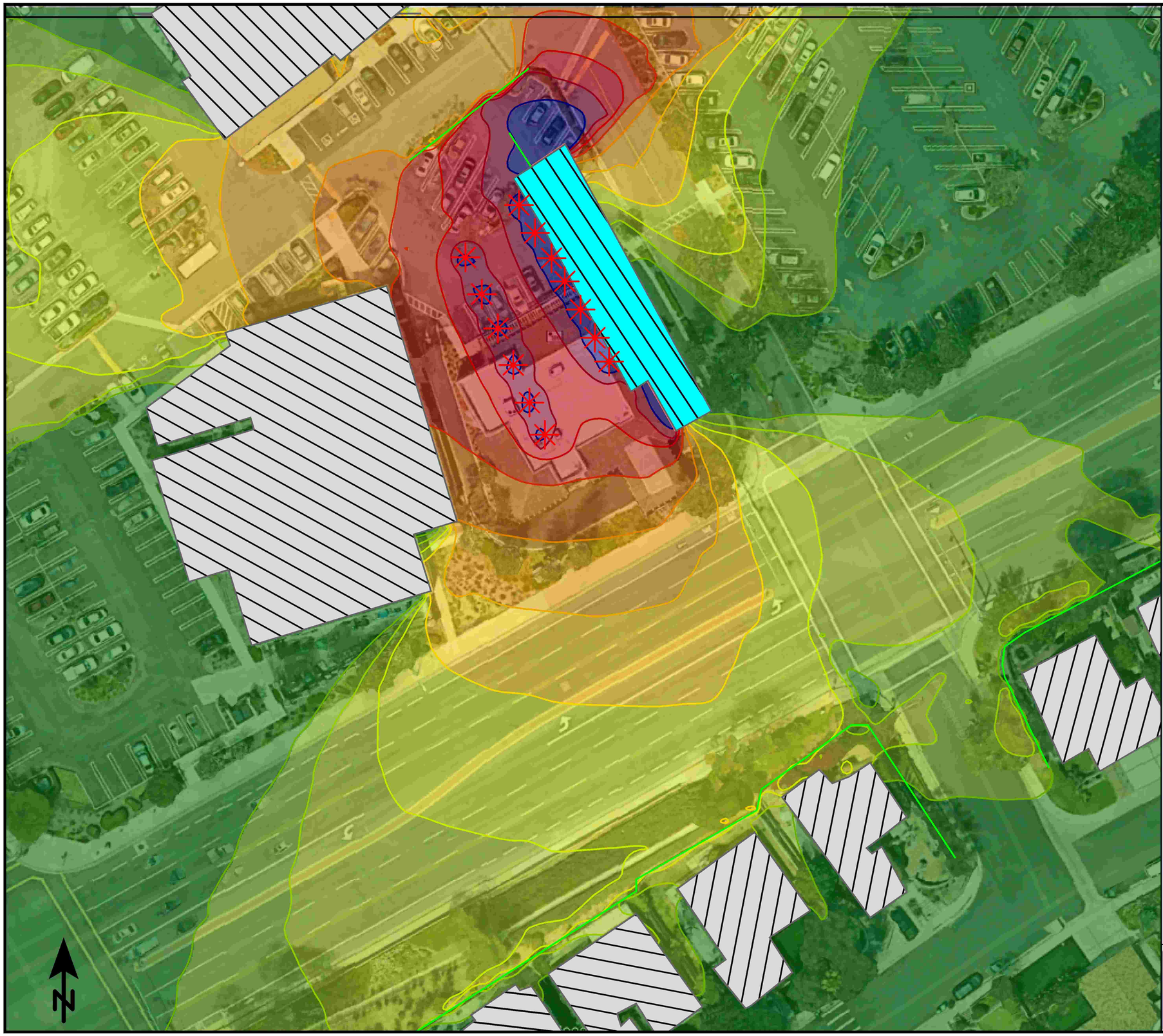
Signs and symbols

- Ground effects
- Wall
- Receiver
- Receiver at building
- Vacuum Stalls
- Car Wash Tunnel Noise

1 : 837

0 4 8 16 24 32 m

RK engineering group, inc.



21781 Lake Forest Drive H2GO Express Car Wash Noise Impact Study

City of Lake Forest

Signs and symbols

- Ground effects
- Wall
- Vacuum Stalls
- Car Wash Tunnel Noise

Levels in dB(A)

	<= 45
	45 - 48
	48 - 51
	51 - 54
	54 - 57
	57 - 60
	60 - 63
	63 - 66
	66 - 69
	69 - 72
	> 72

1 : 837

0 4 8 16 24 32 m

RK engineering group, inc.