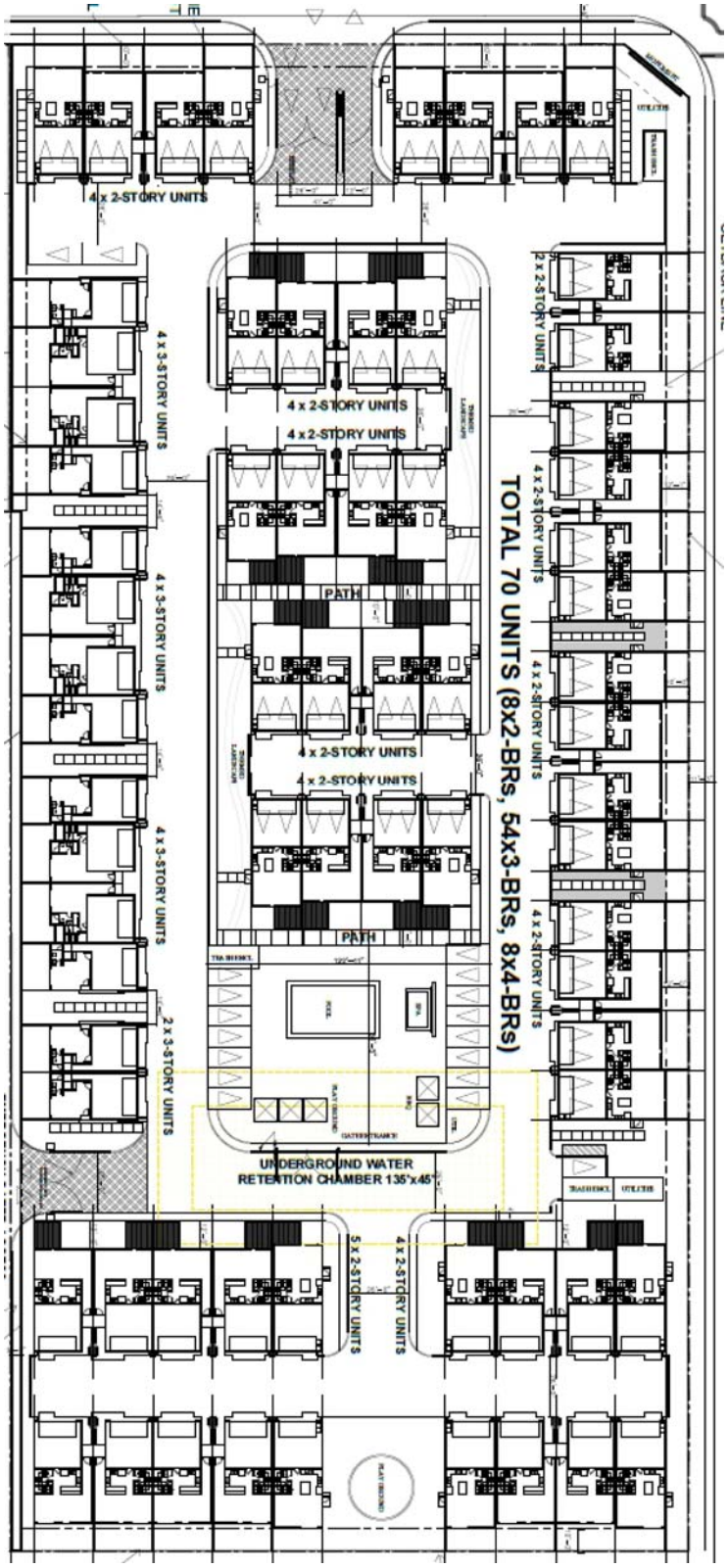
4 x 2-STORY UNITS
4 x 3-STORY UNITS
4 x 2-STORY UNITS
4 x 2-STORY UNITS
PATH
4 x 2-STORY UNITS
4 x 2-STORY UNITS
PATH
2 x 3-STORY UNITS
UNDERGROUND WATER
RETENTION CHAMBER 135'x45'
5 x 2-STORY UNITS
4 x 2-STORY UNITS
2 x 2-STORY UNITS
4 x 2-STORY UNITS
TOTAL 70 UNITS (8x2-BRs, 54x3-BRs, 8x4-BRs)

# FOOTHILL & LARCH RESIDENCES PROJECT
# NOISE IMPACT STUDY
# City of Rialto, California

**Prepared for:**

Mr. David Nguyen
KEYSTONE DCS, INC.
9140 Trask Avenue, Suite 202
Garden Grove, CA 92843

**Prepared by:**

RK ENGINEERING GROUP, INC.
4000 Westerly Place, Suite 280
Newport Beach, CA 92660

**Bryan Estrada, AICP**
**Darshan Shivaiah, M.S**

**May 5, 2020**

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## Appendices

# 1.0 Introduction

## 1.1 Purpose of Analysis and Study Objectives

The purpose of this report is to review the noise/land use compatibility for the proposed Foothill and Larch residences project and provide preliminary recommendations for building design and floor/wall/ceiling assemblies to meet the State of California and City of Rialto interior 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 and future noise environment
- Summary of preliminary recommendations and project design features to reduce interior noise impacts.

## 1.2 Site Location

The project site is located on the southeast corner of the Foothill Boulevard and North Larch Avenue intersection in the City of Rialto. The project site is located approximately 1,282 feet above sea level and the topography is relatively flat.

The project site is currently vacant and zoned for Residential High Density (R-HD) in the Foothill Boulevard Specific Plan Zoning Map. Land uses surrounding the proposed project site include existing vacant land use to the north and east, Single Family (SF) residential uses to the south, and existing parking lot to the west.

The primary sources of ambient noise at the project site include roadway noise from Foothill Boulevard and North Larch Avenue.

The project site location map is provided in Exhibit A.

## 1.3 Project Description

The proposed Foothill and Larch Residences Project consists of a seventy (70) multifamily residential dwelling units. The proposed project consists of all 3-bedroom units between two (2) and three (3) stories in height. The project site is approximately 4.5 acres and the overall density of the project is 15.4 dwelling units per acre.

The project is also proposing to build a six (6) foot noise barrier wall on all four sides of the project site.

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

## 1.4 Summary of Findings

The following summary provides a brief overview of the findings of this report. Please refer to Sections 5 for more details.

1. RK analyzed the future traffic noise levels along Foothill Boulevard and Larch Avenue based on roadway capacity standards from the City of Rialto Traffic Impact Analysis Report Guidelines and Requirements, December 2013.

2. Existing outdoor noise levels at the project site fall within the "Normally Acceptable to Normally Unacceptable" range for Residential-Multifamily uses, per the City of Rialto Noise/Land Use Compatibility standards.

3. With adequate building design and insulation, interior noise levels can be reduced to meet the State/City requirement of 45 dBA CNEL.

## 1.5 Recommendations

The following recommendations are provided to help ensure the proposed project meets the City of Rialto and State of California requirements for residential interior noise exposure:

1. A six (6) foot noise barrier wall should be provided to shield all habitable backyard areas fronting along Foothill boulevard and North Larch Avenue. The designed noise screening will only be accomplished if the barrier's weight is at least 3.5 pounds per square foot of face area without decorative cutouts or line-of-site openings between

the shielded areas and the project site. All gaps (except for weep holes) should be filled with grout or caulking to avoid flanking.

Noise control barrier may be constructed using one, or any combination of the following materials:

- Masonry block;
- Stucco veneer over wood framing (or foam core), or 1-inch thick tongue and groove wood of sufficient weight per square foot;
- Transparent glass (3/8 inch thick), acrylic, polycarbonate, or other transparent material with sufficient weight per square foot.

2. The project should incorporate building construction techniques and insulation that is consistent with California Title 24 Building Standards to achieve the minimum interior noise standard of 45 dBA CNEL for all residential units.

3. A "windows closed" condition is expected to be required for all residential units within the project site to meet the interior noise standard. To accommodate a windows closed conditions, all units shall be equipped with adequate fresh air ventilation, per the requirements of the California Uniform Building Code (UBC).

4. Based on the results of this analysis, upgraded windows and sliding glass doors will be required. Table 6 of this report summarizes the preliminary recommended window STC ratings.

5. Prior to issuance of building permits, the project proponent should demonstrate to the City building department that the proposed building shell and window assemblies will achieve exterior to interior noise exposure of 45 dBA CNEL or less.

6. The project should comply with California Title 24 building insulation requirements for exterior walls, roofs and common separating assemblies (e.g. floor/ceiling assemblies and demising walls).

    a. Party wall and floor-ceiling assembly designs must provide a minimum STC of 50, based on lab tests. Field tested assemblies must provide a minimum noise isolation class (NIC) of 45.

b. Floor-ceiling assembly designs must provide for a minimum impact insulation class (IIC) of 50, based on lab tests. Field tested assemblies must provide a minimum FIIC of 45.

c. Entry doors from interior corridors must provide an STC of 26 or more.

d. Penetrations or openings in sound rated assemblies must be treated to maintain required ratings.

e. Interior noise levels due to exterior sources must not exceed a community noise equivalent level (CNEL) or a day-night level (LDN) of 45 dBA, in any habitable room.

7. For proper acoustical performance, all exterior windows, doors, and sliding glass doors should have a positive seal and leaks/cracks must be kept to a minimum.

# 2.0 Fundamentals of Noise

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

## 2.1 Sound, Noise, and Acoustics

The sound is a disturbance created by a moving or vibrating source and is capable of being detected by the hearing organs. The 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 its 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 ($\mu$Pa). One $\mu$Pa 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 as 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 or 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 3dB 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 weighing is typically reported in terms of A-weighted decibel (dBA). Typically, the human ear can barely perceive the change in the noise level of 3 d B. A change in 5 dB is readily perceptible, and a change in 10 dB is perceived as being twice or half as loud. 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.

*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 in 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).

*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. The 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.

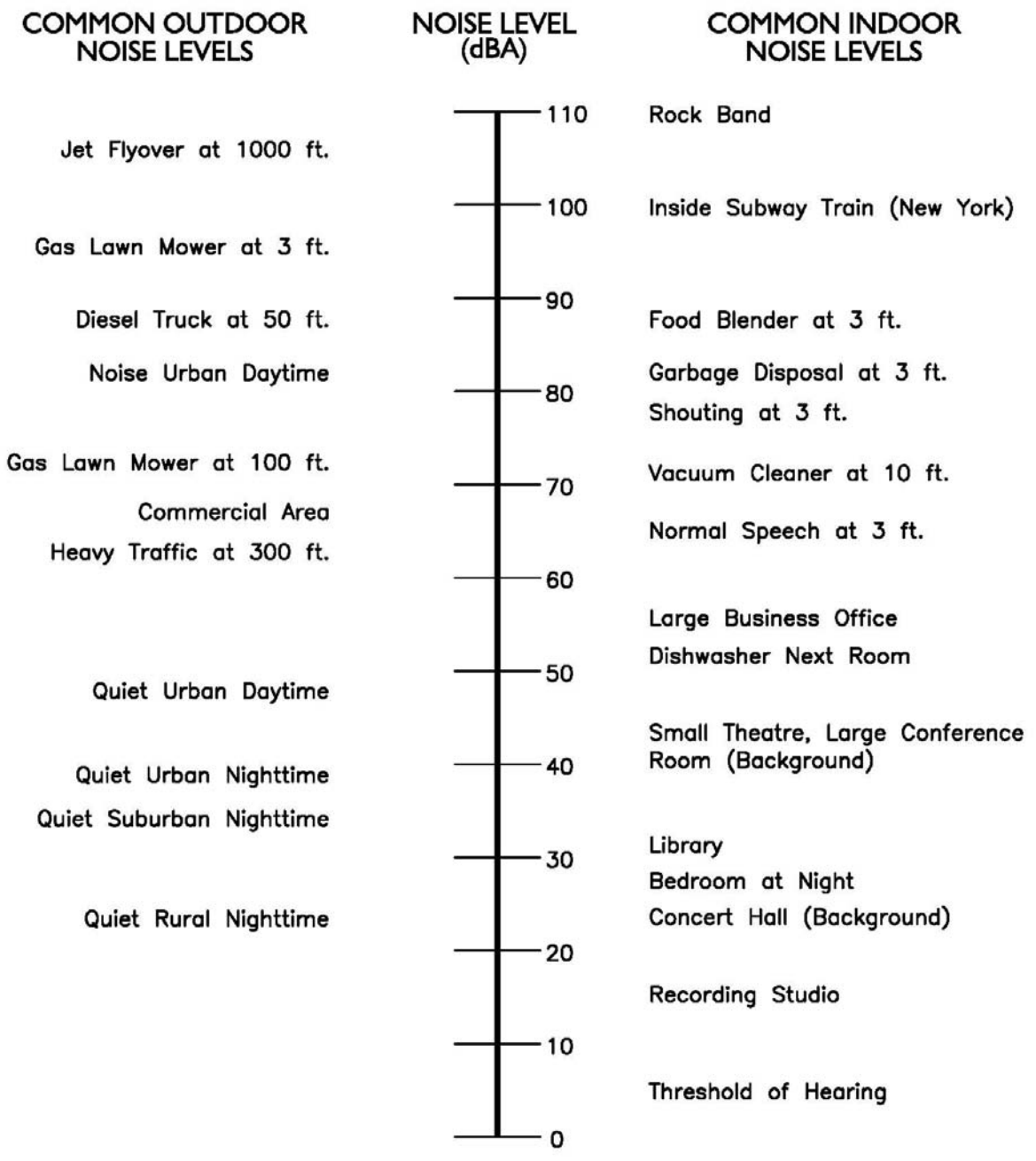
As noise propagates from the source, it is affected by the ground and atmosphere. Noise models use the hard site (reflective surfaces) and soft site (absorptive surfaces) to help calculate predicted noise levels. Hard site conditions assume no excessive ground absorption between the noise source and 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 4.5 dB per doubling of distance for a line source and 6.0 dB per doubling of distance for a point source.

Research has demonstrated that atmospheric conditions can have a significant effect on noise levels when noise receivers are located 200 feet from a noise source. Wind, temperature, air humidity, and turbulence can further impact how far sound can travel.

Figure 1 shows typical sound levels from indoor and outdoor noise sources.

## Figure 1

TYPICAL SOUND LEVELS FROM
INDOOR AND OUTDOOR NOISE SOURCES



# 3.0 Regulatory Setting

The proposed project is located in the City of Rialto and noise regulations are imposed by state and local government agencies. The applicable noise regulations are discussed below.

## 3.1 State of California Noise 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 a 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.

Noise insulation design standards for residences have been established by the State of California Uniform Building Code (UBC) Chapter 12, Division II and by the Title 24 noise insulation standards of the California Administrative Code. The City is required by the State Housing Law to adopt these State codes as minimum performance standards. The City may enact stricter noise standards throughout the city or on a case-by-case basis if deemed necessary. In brief, the Title 24 noise standards require the following for multi-family dwellings:

1. Party wall and floor-ceiling assembly designs must provide a minimum STC of 50, based on lab tests. Field tested assemblies must provide a minimum noise isolation class (NIC) of 45.

2. Floor-ceiling assembly designs must provide for a minimum impact insulation class (IIC) of 50, based on lab tests. Field tested assemblies must provide a minimum FIIC of 45.

3. Entry doors from interior corridors must provide an STC of 26 or more.

4. Penetrations or openings in sound rated assemblies must be treated to maintain required ratings.

5. Interior noise levels due to exterior sources must not exceed a community noise equivalent level (CNEL) or a day-night level (LDN) of 45 dBA, in any habitable room.

Thus, the interior limit is 45 dBA CNEL between dwelling units and from exterior noise sources to interior living spaces. In addition, to provide a reasonable expectation that this standard can be met under normal conditions, the design of party walls and floor/ceiling assemblies for multi-family dwelling units must be based on laboratory-tested assemblies which test at a sound transmission class of 50 STC, or better.

## 3.2 City of Rialto Noise Regulations

The City of Rialto outlines their noise regulations and standards within the General Plan Chapter 5, The Safety and Noise Chapter and the Municipal Code, Ordinance No. 1417 Chapter 9.50, Noise Control.

For purposes of this analysis, the City of Rialto's General Plan is used to evaluate the project's noise/land use compatibility and ensure the project is consistent with the established plans, policies and programs for noise control within the City. The Rialto General Plan Safety and Noise Chapter is provided in Appendix A.

Noise/Land Use Compatibility

The City of Rialto Safety and Noise Chapter establishes planning criteria for determining a development's noise/land use compatibility based on the community noise equivalent level (CNEL). Table 1 summarizes the City's Noise/Land Use Compatibility guidelines for land uses applicable to this project:

**Table 1**
**Noise/Land Use Compatibility Guidelines**

| Land Use | Noise Limit (dBA CNEL) | | | |
|---|---|---|---|---|
| | Normally Acceptable | Conditionally Acceptable | Normally Unacceptable | Clearly Unacceptable |
| R21 - Residential 21 (Project Density: 15.4 du/ac) | <60 | 60-70 | 70-75 | >75 |

The City of Rialto defines the noise compatibility categories as follows:

| | |
|---|---|
| Normally Acceptable: | Specified land use is satisfactory, assuming buildings are of conventional construction. |
| Conditionally Acceptable: | New development should be undertaken only after detailed analysis of the noise reduction requirements are made. |
| 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. |
| Clearly Unacceptable: | New development should generally not be undertaken. |

# 4.0 Study Method and Procedures

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

## 4.1 Traffic Noise Modeling

Traffic noise from vehicular traffic was projected using a version of the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108). The FHWA model arrives at the predicted noise level through a series of adjustments to the key input parameters. The following outlines the key adjustments made to the computer model for the roadway inputs:

- Roadway classification – (e.g. freeway, major arterial, arterial, secondary, collector, etc),
- Roadway Active Width – (distance between the center of the outer most travel lanes on each side of the roadway)
- Average Daily Traffic (ADT) Volumes, Travel Speeds, Percentages of automobiles, medium trucks, and heavy trucks
- Roadway grade and angle of view
- Site Conditions (e.g. soft vs. hard)
- Percentage of total ADT which flows each hour throughout a 24-hour period

The following outlines key adjustments to the computer model for the project site parameter inputs:

- Vertical and horizontal distances (Sensitive receptor distance from noise source)
- Noise barrier vertical and horizontal distances (Noise barrier distance from sound source and receptor).
- Traffic noise source spectra
- Topography

RK projected traffic noise levels to the nearest building façades on the project site. Traffic noise levels were projected to all habitable exterior areas.

Table 3 indicates the roadway parameters utilized for this study.

**Table 2**
**Roadway Parameters**

| Roadway | Classification[1] | Lanes | Capacity (ADT)[1] | Speed (MPH) | Site Conditions |
|---|---|---|---|---|---|
| Foothill Boulevard | Modified Major Arterial-1 | 5 | 32,999 | 50 | Hard |
| North Larch Avenue | Collector | 2 | 12,499 | 25 | Hard |

[1] Source: City of Rialto Traffic Impact Analysis Report Guidelines and Requirements, December 2013.

Table 4 and 5 indicates the vehicle distribution and truck mix utilized for all roadways in this study area.

**Table 3**
**Vehicle Distribution (Truck Mix) for Foothill Boulevard[1]**

| Motor-Vehicle Type | Daytime % (7 AM - 7 PM) | Evening % (7 PM - 10 PM) | Night % (10 PM - 7 AM) | Total % of Traffic Flow |
|---|---|---|---|---|
| Automobiles | 69.50 | 12.90 | 9.60 | 79.90 |
| Medium Trucks | 1.44 | 0.06 | 1.50 | 14.00 |
| Heavy Trucks | 2.40 | 0.10 | 2.50 | 6.00 |

[1] Daily traffic flow is based on the Caltrans 2016 Daily Truck Traffic data for Route 66 Post Mile 21.37. Day/evening/night splits based on typical regional averages.

**Table 4**
**Vehicle Distribution (Truck Mix) for Collector Roadways[1]**

| Motor-Vehicle Type | Daytime % (7 AM - 7 PM) | Evening % (7 PM - 10 PM) | Night % (10 PM - 7 AM) | Total % of Traffic Flow |
|---|---|---|---|---|
| Automobiles | 73.60 | 13.60 | 10.22 | 97.42 |
| Medium Trucks | 0.90 | 0.04 | 0.90 | 1.84 |
| Heavy Trucks | 0.35 | 0.04 | 0.35 | 0.74 |

[1] Vehicle percentages are based on the regional average.

## 4.2 Interior Noise Modeling

The interior noise level is the difference between the projected exterior noise level at the structure's façade and the noise reduction provided by the structure itself. Typical building construction will provide a conservative 12 dBA noise level reduction with a "windows open" condition and a very conservative 20 dBA noise level reduction with "windows

closed". RK estimated the interior noise level by subtracting the building shell design from the estimated exterior noise level.

The interior noise analysis is based on industry standards for building noise reduction established by the Federal Highway Administration (FHWA), the 2013 Caltrans Technical Noise Supplement to the Traffic Noise Analysis Protocol (TeNS), the California Office of Noise Control Catalog of STC and IIC Ratings for Wall and Floor/Ceiling Assemblies, and the California Building Standards Code, Title 24.

The TeNS manual shows that the noise reduction due to building exteriors with ordinary sash windows (windows closed) is at least 20 decibels. By providing upgraded STC rated windows, the project design is considered adequate to meet interior noise standards. The building's exterior walls will be constructed per the latest building code insulation requirements and provide occupants with the most protection from exterior noise. Insulated exterior walls, designed per the latest California Building Standards, would provide a minimum of STC 35-40. Windows, on the other hand, are one of the acoustically weakest parts of the structure. Therefore, for a conservative estimate of preliminary interior noise, the building's noise reduction potential is limited to the STC of the windows.

# 5.0 Noise Analysis

A noise analysis has been performed to determine whether the proposed project can meet the City of Rialto and State of California requirements for residential exterior and interior noise exposure. The State of California requires that interior noise levels due to exterior sources must not exceed a community noise equivalent level (CNEL) or a day-night level (LDN) of 45 dBA, in any habitable room.

## 5.1 Future Exterior Noise Levels on the Project Site

Traffic noise impacts from Foothill Boulevard and North Larch Avenue are analyzed at the proposed project site and the results are compared to the City's Noise Standards. The analysis details the estimated exterior noise levels and mitigation measures.

### 5.1.1 Traffic Source Noise

Traffic noise along Foothill Boulevard and North Larch Avenue will be the main sources of noise impacting the project site and the surrounding area. The Project is proposing to construct a six (6) foot noise barrier wall surrounding the project site.

Based on the City of Rialto General Plan Noise/Land Use Compatibility Guidelines, the project site falls within the Normally Acceptable to Normally Unacceptable range for Residential – Multi Family development.

**Table 5**
**Future Exterior Roadway Noise Levels (dBA CNEL)**[1]

| Roadway | Exterior Façade Study Locations | Noise Level at Facade | Noise/Land Use Compatibility |
|---|---|---|---|
| Foothill Boulevard | First Floor Façade / Patio | 63.2 | Conditionally Acceptable |
| | Second Floor Façade / Patio | 71.9 | Normally Unacceptable |
| North Larch Avenue | First Floor Façade / Patio | 51.5 | Normally Acceptable |
| | Second Floor Façade / Patio | 60.9 | Conditionally Acceptable |

[1] Exterior noise levels calculated 5-feet above pad elevation, perpendicular to subject roadway.

Table 5 indicates the noise level projections to all habitable areas and facades of the residential units nearest the subject roadways. Future exterior noise levels on the project site range from 63.2 CNEL at the first floor and 71.9 dBA CNEL at the second floor along Foothill Boulevard and 51.5 CNEL at the first floor and 60.9 dBA CNEL at the second floor along North Larch Avenue.

The roadway calculation sheets are provided in Appendix B.

## 5.2 Future Interior Noise

A preliminary interior noise analysis has been performed for the first row of habitable dwellings facing adjacent roadways 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 6 indicates the future interior noise levels along the adjacent roadways.

**Table 6**
**Future Exterior Roadway Noise Levels (dBA CNEL)**

| Roadway | Exterior Façade Study Locations | Final Projected Exterior Noise Level | Interior Noise Reduction Required to Meet Interior Noise Standard of 45 dBA CNEL | Interior Noise Level w/Standard Windows (STC ~ 25) | | STC Required to Meet Interior Noise Level |
|---|---|---|---|---|---|---|
| | | | | "Windows Open" [1] | "Windows Closed" [2] | |
| Foothill Boulevard | First Floor Façade | 63.2 | 18.2 | 51.2 | 43.2 | 25 |
| | Second Floor Façade | 71.9 | 26.9 | 59.9 | 51.9 | 30 |
| North Larch Avenue | First Floor Façade | 51.5 | 6.5 | 39.5 | 31.5 | 25 |
| | Second Floor Façade | 60.3 | 15.3 | 48.3 | 40.3 | 25 |

[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.

In order to meet the 45 dBA CNEL interior noise level requirements, upgraded STC rated windows will be required on certain units. See table 6 for preliminary window STC ratings.

## 5.3 Recommendations

The following recommendations are provided to help ensure the proposed project meets the City of Rialto and State of California requirements for residential interior noise exposure:

1. A six (6) foot noise barrier wall should be provided to shield all habitable backyard areas fronting along Foothill boulevard and North Larch Avenue. The designed noise screening will only be accomplished if the barrier's weight is at least 3.5 pounds per square foot of face area without decorative cutouts or line-of-site openings between the shielded areas and the project site. All gaps (except for weep holes) should be filled with grout or caulking to avoid flanking.

   Noise control barrier may be constructed using one, or any combination of the following materials:

   - Masonry block;
   - Stucco veneer over wood framing (or foam core), or 1-inch thick tongue and groove wood of sufficient weight per square foot;
   - Transparent glass (3/8 inch thick), acrylic, polycarbonate, or other transparent material with sufficient weight per square foot.

2. The project should incorporate building construction techniques and insulation that is consistent with California Title 24 Building Standards to achieve the minimum interior noise standard of 45 dBA CNEL for all residential units.

3. A "windows closed" condition is expected to be required for all residential units within the project site to meet the interior noise standard. To accommodate a windows closed conditions, all units shall be equipped with adequate fresh air ventilation, per the requirements of the California Uniform Building Code (UBC).

4. Based on the results of this analysis, upgraded windows and sliding glass doors will be required. Table 6 of this report summarizes the preliminary recommended window STC ratings.

5. Prior to issuance of building permits, the project proponent should demonstrate to the City building department that the proposed building shell and window assemblies will achieve exterior to interior noise exposure of 45 dBA CNEL or less.

6. The project should comply with California Title 24 building insulation requirements for exterior walls, roofs and common separating assemblies (e.g. floor/ceiling assemblies and demising walls).

   a. Party wall and floor-ceiling assembly designs must provide a minimum STC of 50, based on lab tests. Field tested assemblies must provide a minimum noise isolation class (NIC) of 45.

   b. Floor-ceiling assembly designs must provide for a minimum impact insulation class (IIC) of 50, based on lab tests. Field tested assemblies must provide a minimum FIIC of 45.

   c. Entry doors from interior corridors must provide an STC of 26 or more.

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   e. Interior noise levels due to exterior sources must not exceed a community noise equivalent level (CNEL) or a day-night level (LDN) of 45 dBA, in any habitable room.

7. For proper acoustical performance, all exterior windows, doors, and sliding glass doors should have a positive seal and leaks/cracks must be kept to a minimum.

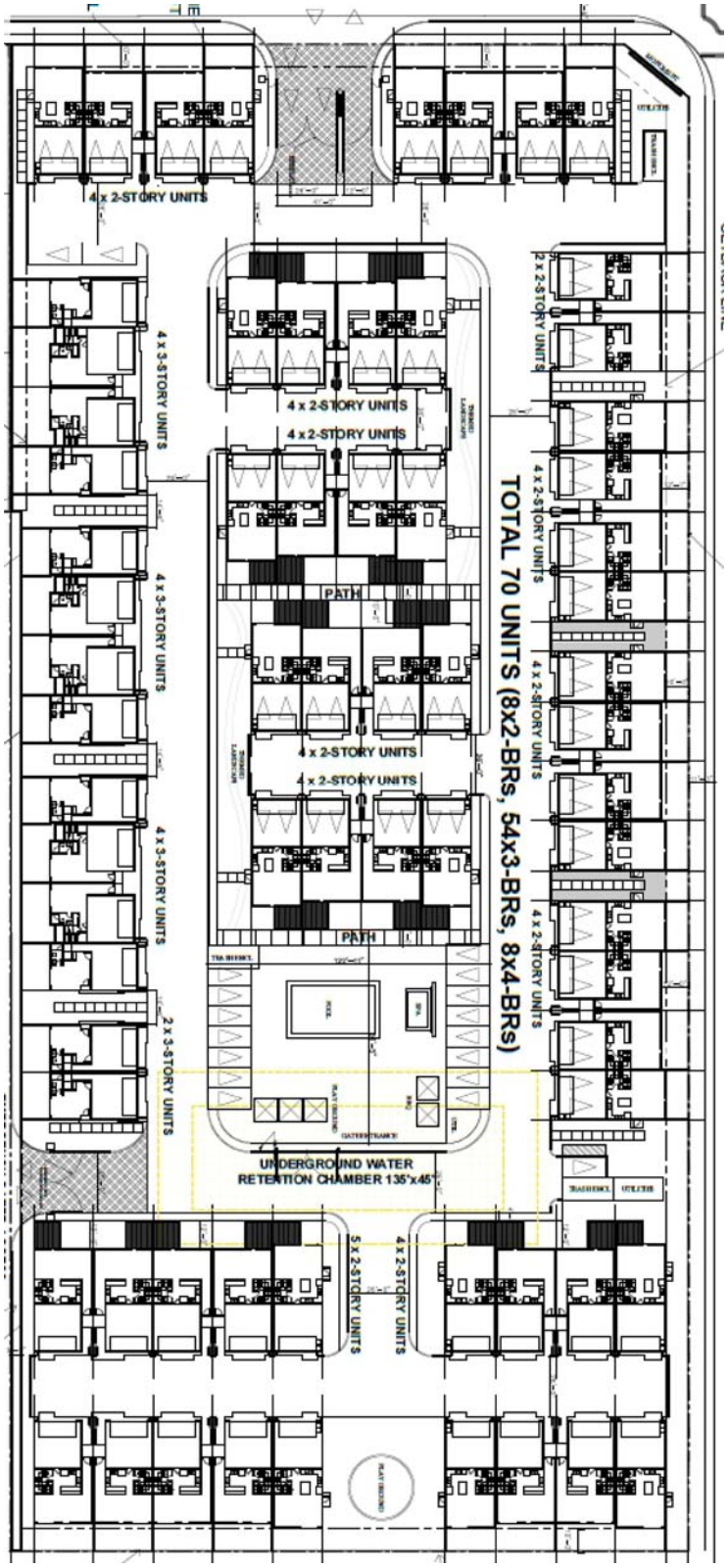
# Exhibits

Exhibit A

# Location Map


N

# Exhibit B
# Site Plan

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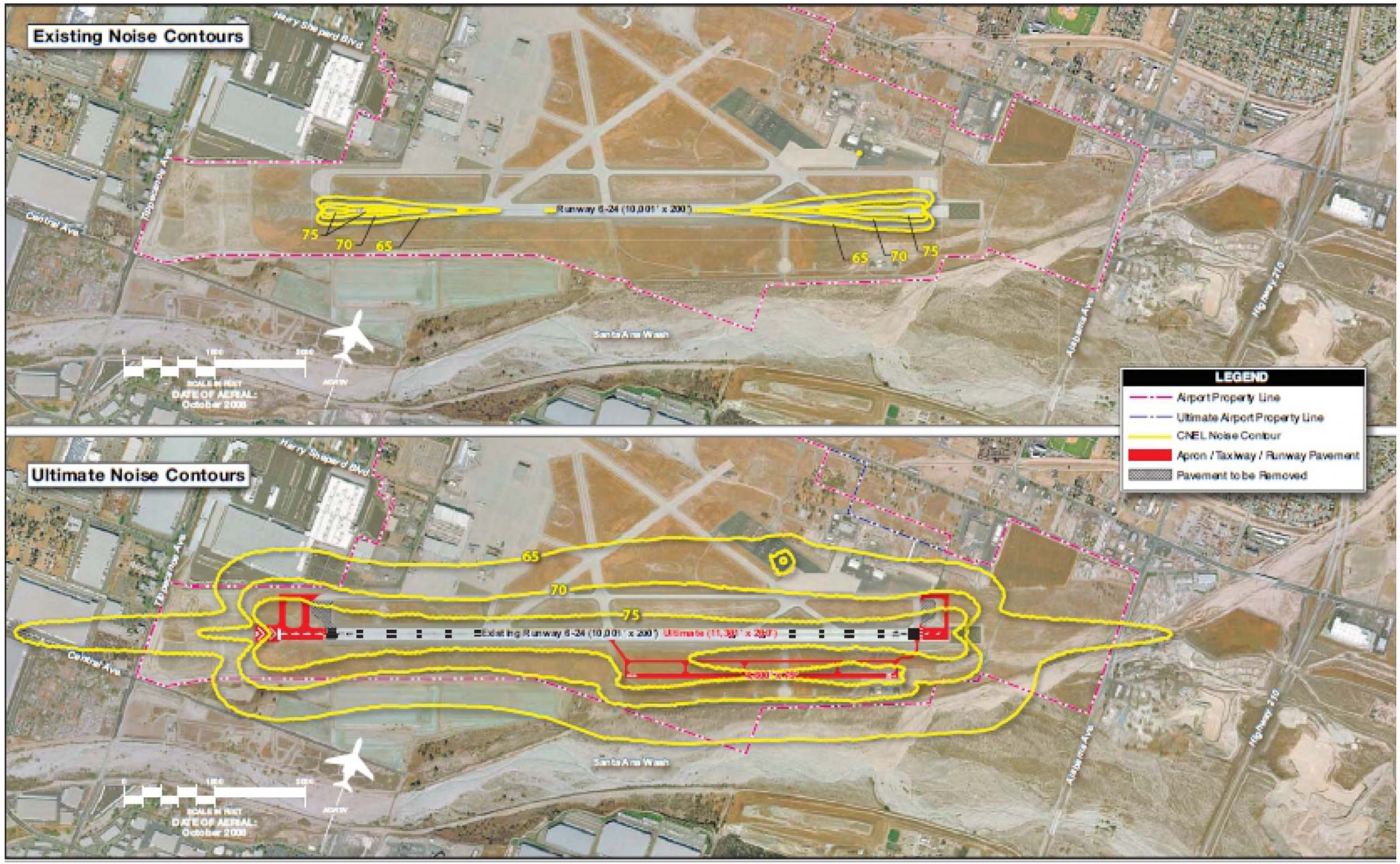
# San Bernardino International Airport Noise Contour



# Appendices

# Appendix A

City of Rialto Noise Standards

# Chapter 5

## The Safety and Noise Chapter

- Seismic Hazards
- Flooding Hazards
- Fire Hazards
- Hazardous Materials
- Emergency Response
- Gangs
- Noise
- Wind Hazards


**Safety and Noise**

# Introduction

Rialto emphasizes a proactive approach to planning which involves mitigating hazards present in the environment that may adversely affect property and threaten lives. Government Code Sections 65302(g) and 65302(f) and California Health and Safety Code Section 56050.1 identify hazards that this element must address if conditions are present in the City. Hazards of concern in Rialto are:

- Seismic and Geologic Hazards
- Flood Hazards
- Fire Hazards
- Hazardous Materials
- Gangs
- Emergency Response
- Wind Hazards

Rialto recognizes the importance of providing a safe living environment for its residents. While the City may not be able to prevent most of these hazards, it can set forth policies that can help minimize their effects. By addressing issues of crime, hazardous materials use, and other human-caused conditions, and preparing a response to uncontrollable natural hazards, such as earthquakes and fires, Rialto can be better prepared to deal with emergency situations and adverse conditions and events that threaten the community.

# Seismic and Geologic Hazards

Rialto is located in a region with sharp contrasts in terrain. The gently sloping lands in south Rialto abruptly confront the rise of the San Gabriel Mountains to the north – a result of tectonic movement of the San Andreas Fault and its subsidiary faults. The poorly consolidated alluvium underlying virtually all properties in the City can result in devastating effects in the event of an earthquake. Seismic and geologic hazards have the greatest potential for causing devastating damage citywide.

Earthquakes can affect widespread areas, trigger many secondary effects, and overwhelm the ability of local jurisdictions to respond. Although it is impossible to predict the timing of seismic events, sound planning practices and public education can help minimize the associated effects.

## Surface Fault Rupture

Surface fault rupture refers to the physical displacement of the ground during an earthquake. Although ground rupture usually results in minimal damage, structures located close to a rupturing fault may be severely damaged. The State Alquist-Priolo Fault Zoning Act was enacted with the purpose of

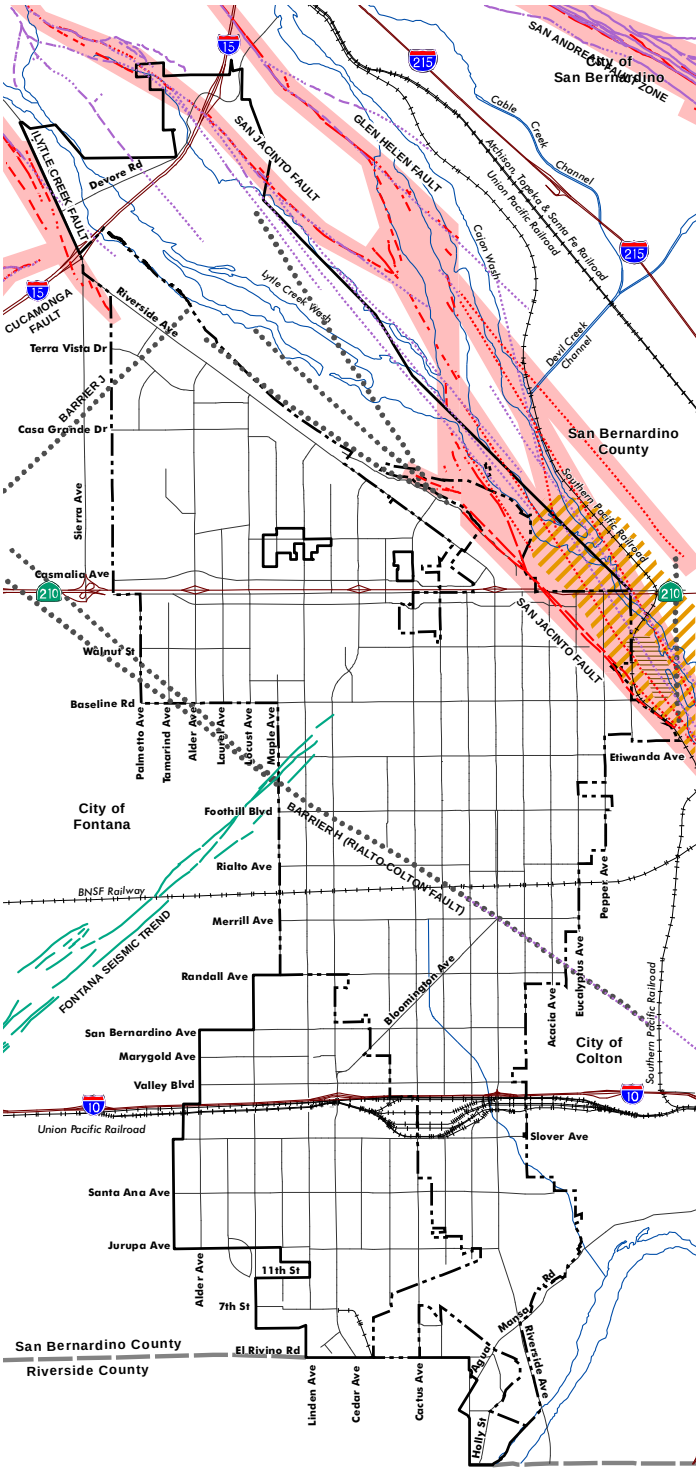
mitigating the hazard of fault rupture by prohibiting buildings along all active fault lines. Current Alquist-Priolo Earthquake Fault Zones in and near Rialto area are shown on **Exhibit 5.1**.

As Exhibit 5.1 indicates, significant faulting occurs along the Lytle Creek Wash. The San Andreas fault — the feature that defines the coming together of the Pacific and North American tectonic plates — crosses just to the northeast, through the city of San Bernardino. Rialto sits atop the Pacific Plate, which is moving north relative to San Bernardino. In about 15 million years — a short time in the context of Earth's history, but not significant regarding real estate purchases — Rialto will be hundreds of miles north of San Francisco.

## Ground Shaking

The greatest source of earthquake damage is caused by ground shaking. Rialto is susceptible to ground shaking caused by the several local fault systems. Historically, Rialto has experienced moderate to strong ground shaking associated with such events as the 1812 Wrightwood earthquake (estimated 7.5 magnitude), 1899 Cajon Pass earthquake (estimated 5.7 magnitude), 1933 Long Beach earthquake (6.4 magnitude), 1971 Sylmar earthquake (6.6 magnitude), and 1994 Northridge earthquake (6.7 magnitude). Several earthquakes were associated with the San Jacinto, San Andreas, and Cucamonga faults (see Exhibit 5-1).

The San Jacinto, San Andreas, and Cucamonga faults have the potential of generating earthquakes of maximum magnitudes ranging from 6.7 to 8.0. Shaking at these levels would cause even moderate damage to buildings constructed with the latest building codes.




## Seismic and Geologic Hazards

(Faults: Solid where location is known, dashed where approximate, dotted where inferred.)

- Fault (Morton and Miller, 2003)
- Alquist-Priolo Earthquake Fault (CGS, 2002)
- Alquist-Priolo Earthquake Fault Zone (CGS, 2002)
- Lineaments identified in aerial photos
- Groundwater barrier (Dutcher and Garrett, 1963) by F. Jordan (personal communication, 2002)
- Moderate liquefaction susceptibility. Sediment are young (less than 10,000 years old), unconsolidated, with fine-grained layers, and there has been artesian well activity historically.
- Approximate bog, swap, or marsh land area in the early 1900s

## Base Map Features

- Rialto Incorporated Area
- Rialto Sphere of Influence
- County Boundary
- Freeway/Highway
- Local Road
- Railroad
- Hydrological Feature

Notes:
This map is intended for general land use planning only. Information on this map is not sufficent to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

Sources:
Earth Consultants International (ECI);
Morton and Miller (2003); Alquist-Priolo Earthquake Fault Zones in San Bernardino South (1977), San Bernardino North (1974), and Devore (1995) Quads. [reproduced with permission CGS CD-ROM 2001-05 (2002)]; Jennings (1994) [reproduced with permission CDMG, CD-ROM (2000)]; Dutcher and Garrett (1963); Jordan, F. (personal communications (2002); USGS 7.5-minute Digital Elevation Model and W.C. Mendenhall (1904)

0 0.5 1 1.5 2 Miles

# Exhibit 5.1 – Seismic and Geologic Hazards

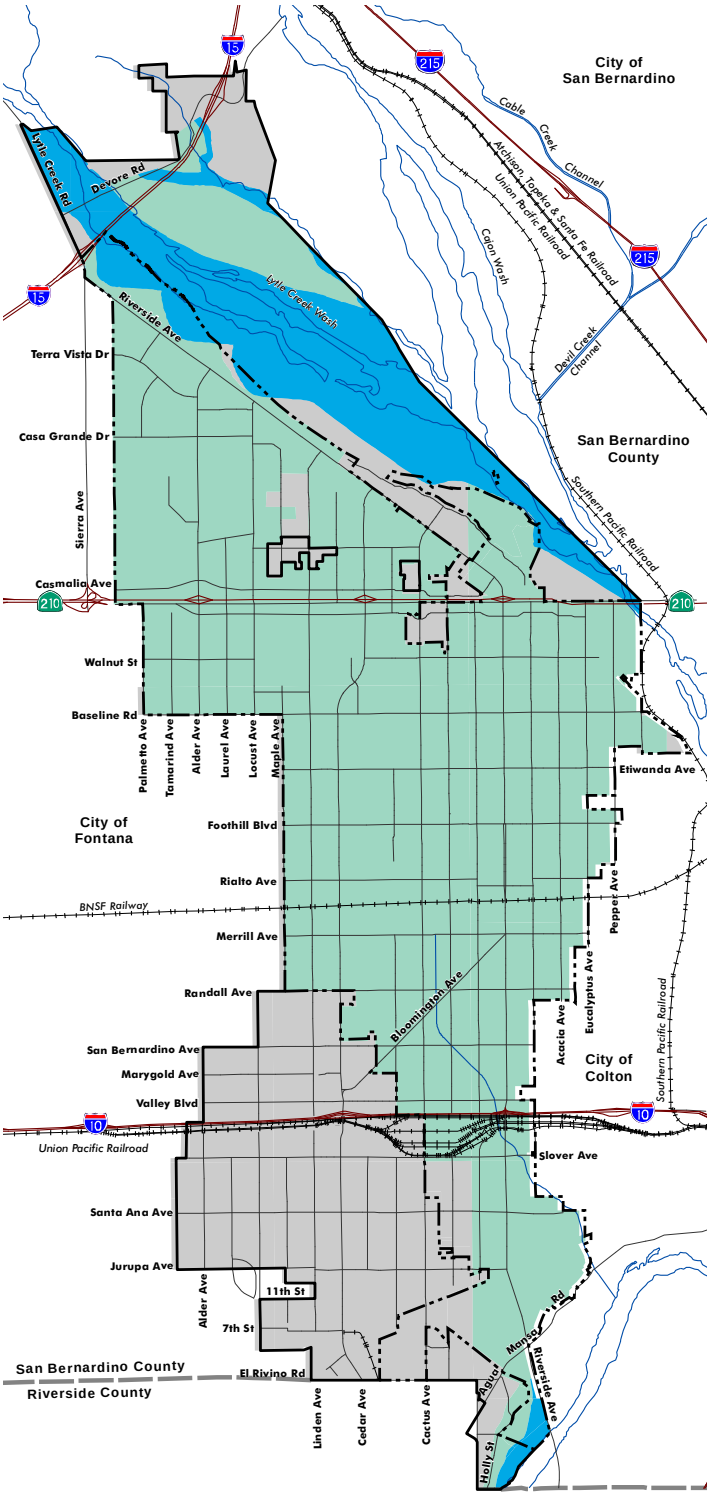
## Flooding Hazards

Rialto and surrounding areas are subject to unpredictable seasonal rainfall. During intense rainfall, the geographic and geologic characteristics typical of the Upper Santa Ana River Valley, where Rialto is located, make this area especially vulnerable to flood hazards. The gently sloping alluvial fan upon which Rialto sits emanates from a deep canyon within the San Gabriel Mountains; this contributes to the City's vulnerability to flood hazards.

In the early 1900s, the region was subjected to episodes of severe flooding. In response, the Army Corps of Engineers, the San Bernardino County Flood Control District (SBCFCD), and the City built numerous structures to control flood hazards. The first line of defense against flooding is a series of eight levees constructed along the western edge of Lytle Creek (see Exhibit 5.2). Next, a regional storm drain system was built and is maintained by the SBCFCD. Within Rialto, this system includes three buried pipelines (the East Fontana Storm Drain, the East Rialto Storm Drain, and the Rialto-Baseline Storm Drain). The region's most significant and largest drainage facility is the Rialto Channel, a mostly open, earthen and concrete-lined channel that extends from the Cactus Basins in the central part of the City south to the Santa Ana River. The County system also includes several retention basins that not only provide flood control but also serve as recharge basins.

The developed portions of Rialto are served by an extensive municipal storm drain network that is maintained by the City and designed to collect all urban runoff. These drain eventually to the Santa Ana River. While existing flood control structures have provided significant protection from uncontrolled flooding, inadequacies in the local drainage system have caused occasional localized flooding.

**Exhibit 5.2** shows that portions of Rialto are still vulnerable to inundation from 100-year flood events associated with Lytle Creek and in a low-lying area of Sycamore Flat. In the event of a major storm, several roadways could flood over, including Glen Helen Parkway, Sycamore Creek Road, and Clearwater Parkway.




## FEMA Flood Zones

- Areas of 100-year floodplain; no base flood elvation determined
- Areas outside 500-year floodplain
- Area where flood hazards are undetermined

## Base Map Features

- Rialto Incorporated Area
- Rialto Sphere of Influence
- County Boundary
- Freeway/Highway
- Local Road
- Railroad
- Hydrological Feature

Notes:
This map is intended for general land use planning only. Information on this map is not sufficent to serve as a substitute for detailed geologic investigations of individual sites, nor does it satisfy the evaluation requirements set forth in geologic hazard regulations.

Sources:
Earth Consultants International (ECI);
Federal Emergency Management Agency (1996), Flood Insurance Rate Map (Panel Numbers: 7920F, 7940F, 8676F, 8677F, 8678F, 8686F, 8688F)

0 0.5 1 1.5 2 Miles

# Exhibit 5.2 – Flooding Hazards

# Fire Hazards

## Wildland Fires

Wildland fire hazards are of concern where development is adjacent to wildland areas, particularly in north Rialto. Fires starting in the foothill areas can easily spread south and consume urban development, especially if pushed by the Santa Ana winds that blow from the Cajon Pass.

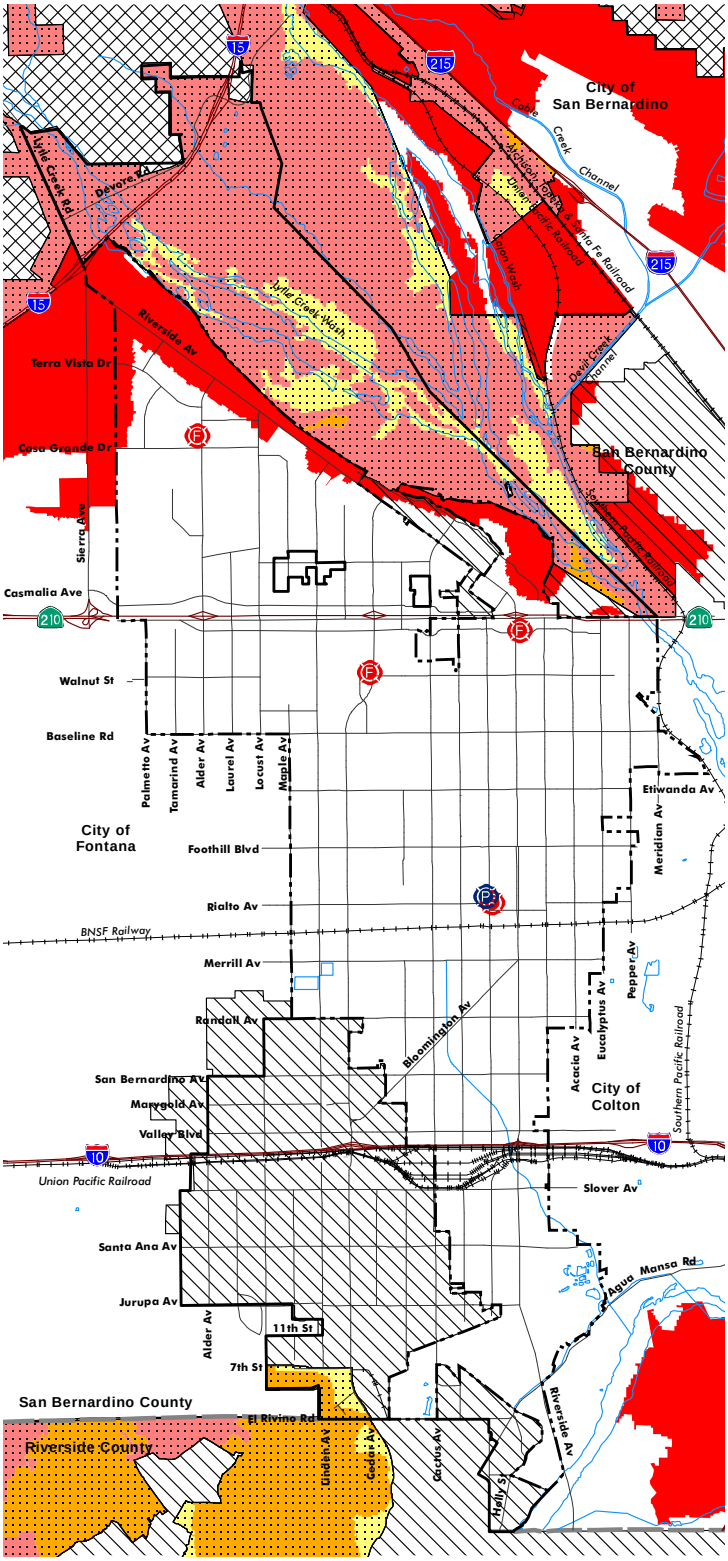
In areas identified as susceptible to wildland fire, land development is governed by special State, County, and local codes, and property owners are required to follow maintenance guidelines aimed at reducing the amount and continuity of the fuel (vegetation) available. Starting in 2008, CAL Fire identified areas as Fire Hazard Severity Zones. Within those areas, the local government has the financial responsibility for wildland fire protection, known as Local Responsibility Areas (LRA). Only lands zoned very high are identified within the LRA. **Exhibit 5.3** identifies the high fire hazard areas and the local responsibility coverage areas

The Fire Hazard Severity Zone maps were developed using a science-based and field-tested computer model that assigns a hazard score based on the factors that influence fire likelihood and fire behavior. Many factors are considered such as fire history, existing and potential fuel (natural vegetation), flame length, blowing embers, terrain, and typical weather for the area. Urban and wildland areas are treated differently in the model, but the model does recognize the influence of burning embers traveling into urban areas, which is a major cause of fire spread.

With the devastating wildfires of 2003 that affected mountain/urban interface areas in San Bernardino County (and other areas throughout Southern California), fire codes have become much more restrictive. Also, Rialto will look critically at any development proposal for foothill areas to ensure appropriate safeguards are integrated into subdivision design, including ample buffers and many access points.

## Urban Fires

Structural fires, although less than one percentage of the incidents that the Fire Department responds to on an annual basis, account for 55 to 60 percentage of the yearly property losses in Rialto. To reduce these losses, the City requires development to include protections. For example, structures exceeding 5,000 square feet must have fire and life safety systems in place, including automatic fire sprinklers and smoke detectors. In newer structures, these safety requirements help confine structural fires to the building or property of origin. But in the older areas of Rialto, where building materials




## Legend

- Rialto Incorporated Area
- Rialto Sphere of Influence
- County Boundary
- Freeway/Highway
- Local Road
- Railroad
- Hydrological Feature

**Fire Hazards Severity Zones**

State Responsibility Areas (SRA)
- Moderate
- High
- Very High

Local Responsibility Areas (LRA)
- Very High

**Fire Protection Responsibility**
- Federal Responsibility Area
- State Responsibility Area
- Local Responsibility Area - Incorporated
- Local Responsibility Area - Unincorporated

**Emergency Response Facilities**
- Police Station
- Fire Station

Sources:
Fire and Resources Assesment Program, California Department of Forestry and Fire Protection (2007 and 2008).

Miles
0 0.5 1 1.5 2

# Exhibit 5.3 – Fire Hazards

may not be fire rated and structures are not fitted with fire sprinklers, the probability of structural fires spreading to adjacent buildings is much higher.

Structural fires are of particular concern in high-density areas, where the potential for fire to spread from one building to the next is greater. Additionally, Rialto's commercial and industrial districts have many uses with a high potential for chemical fires, which could impact nearby residential areas.


# Hazardous Materials

The primary concern associated with hazardous material release is the short- and long-term effects on the public. The United States Environmental Protection Agency (EPA) has defined a hazardous material as any material which, due to quantity, concentration, and physical or chemical characteristics, poses a significant potential hazard to human health or the environment. The best way to reduce the possibility for a hazardous material release is by implementing and enforcing stringent regulations governing the storage, use, manufacturing, and handling of hazardous materials. Federal, State, and local agencies enforce regulations for hazardous waste generators and users, these regulations help prevent and mitigate pollution of hazardous waste.

## Contaminated Sites and Generators of Hazardous Materials

Historically, some areas of Rialto were used for the manufacturing of rocket fuel and fireworks. U.S. Department of Defense contractors began making rockets locally in the 1950s, and fuel residue has since leaked into the region's underground water basin. The seepage has created a massive plume of perchlorate in the groundwater that in 2007 was approximately six miles long and two miles wide. The City has a zero-tolerance policy, meaning it will not tolerate any detectable levels of perchlorate in drinking water.

Since Rialto has a significant industrial land use base, many businesses use, store, transport and handle hazardous materials (see **Exhibit 5.4**). These include several *Large-Quantity Generators* and a handful of *Small-Quantity Generators*, including several in the unincorporated area of Bloomington. There are also over a dozen registered transporters of hazardous waste within the planning area.[1]

## Leaking Underground Fuel Tanks

According to the State Water Quality Control Board, nearly four dozens leaking underground fuel tank (LUFT) facilities have been reported in the Rialto. Most have been remediated. The California Regional Water Quality Control Board, in cooperation with the Office of Emergency Services, provides oversight and conducts inspections of all underground tank removals and installation of new ones. Consistent with State laws, the City will continue to pursue remediation of LUFT sites.

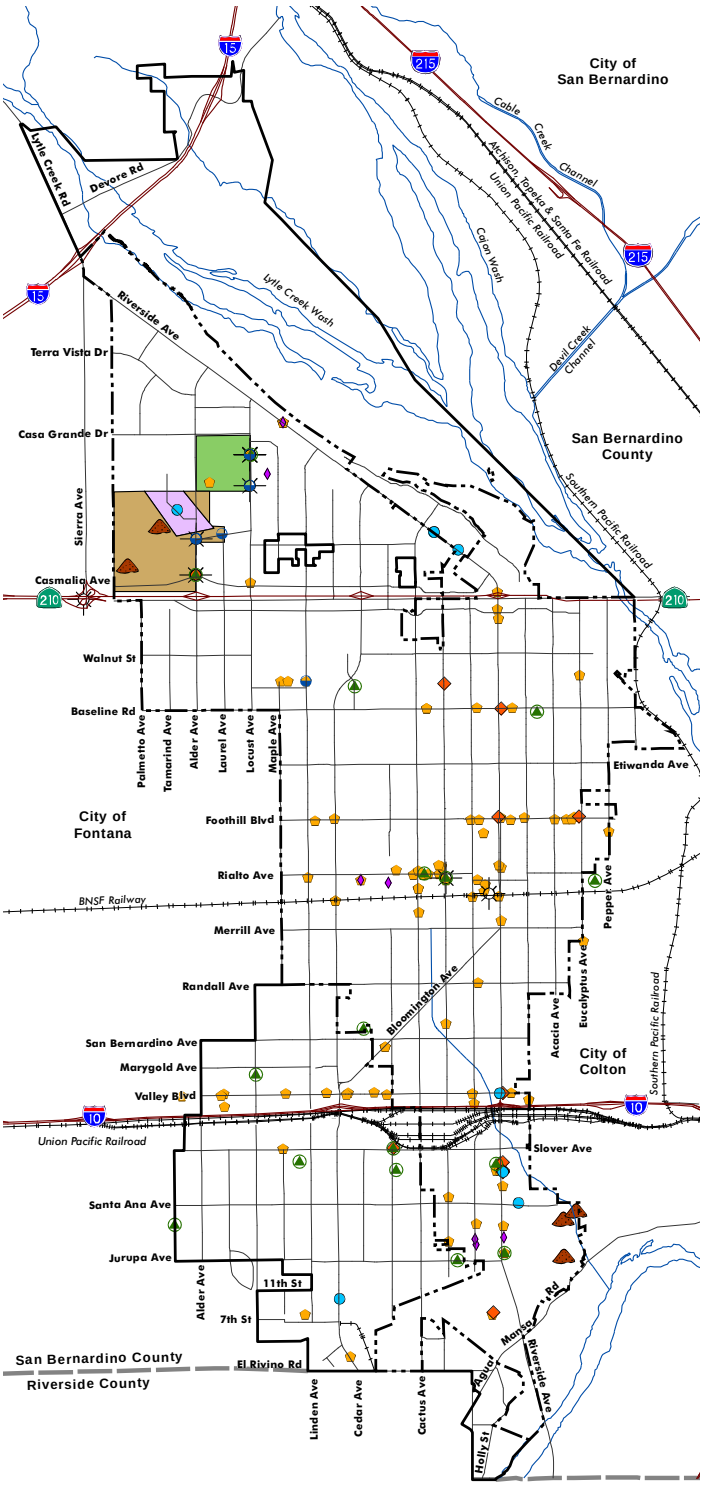
## Hazardous Materials Transportation Routes

Hazardous materials are transported through or near Rialto along I-15 and I-10, SR-210, and local roads and railroad lines. Releases of hazardous materials from trucks or trains can occur during an accident. The California Highway Patrol is the responding agency in the event of a spill on the freeways, but local emergency response agencies, such as police and fire departments, are responsible for additional enforcement and routing assistance. Per federal and State laws, all transportation of hazardous materials is conducted under strict protocol. Material data sheets for each substance being transported are carried by the conductor. These data sheets are designed to help emergency response personnel identify the most appropriate action to contain the specific substances involved in the spill.

# Emergency Response

The possibility of a major disaster impacting Rialto is constant, given the City's exposure to a multitude of hazards: wildfires, floods, windstorms, hazardous materials releases, civil disturbance, and earthquakes. Procedures for mitigating such events are outlined in the City's Standard Emergency Management System (SEMS) Multi-Hazard Functional Plan (MHFP). The MHFP incorporates and coordinates all the facilities and personnel of the City into an efficient organization capable of responding to any emergency.

[1] Large Quantity Generators (LQG) generate 1,000 kilograms per month or more of hazardous waste, or more than 1 kilogram per month of acutely hazardous waste. Small Quantity Generators (SQG) generate more than 100 kilograms, but less than 1,000 kilograms, of hazardous waste per month.




**Hazardous Materials Sites**

- CERCLIS Sites
- Toxic Release Inventory Facility
- Small-Quantity Hazardous Waste Generator Facility
- Large-Quantity Hazardous Waste Generators Facility
- Active Leaking Underground Fuel Tank Site
- Spills, Leaks, Investigations, and Cleanup Sites
- Transporter of Hazardous Materials
- Landfill Site
- 160-Acre Site
- Former Bunker Area
- Mid-Valley Sanitary Landfill

**Base Map Features**

- Rialto Incorporated Area
- Rialto Sphere of Influence
- County Boundary
- Freeway/Highway
- Local Road
- Railroad
- Hydrological Feature

Sources:
Earth Consultants International (ECI)
United States Environmental Protection Agency (2007, at http://www.epa.gov/); and Geotracker, (2007 at http// geotracker.swrcb.ca.gov/), San Bernardino County Fire Department, Hazardous Materials Division (http://www.sbcfire.org), and City of Rialto

Miles
0 0.5 1 1.5 2

# Exhibit 5.4 –Hazardous Materials

## Evacuation Routes and Emergency Shelters

Pre-planning for evacuation in response to a disaster is difficult. The nature, size, and location of a disaster cannot be predicted, so it is impractical to tell people where they should evacuate prior to an event. The decision to evacuate an area will be determined by the appropriate emergency response agencies. However, in the event of a disaster, actual evacuation route movement is conducted by the Rialto law enforcement agencies. A public notice utilizing California's Emergency Alert System (EAS) is broadcast over local radios and television stations to alert the community of disaster-related events. Evacuation warning information includes:

- Evacuation type (voluntary or mandatory)
- Routes available out of area
- Location of evacuation centers
- Duration of emergency (anticipated)
- Time remaining before the situation becomes critical

In the event of a disaster and subsequent evacuation order, affected persons are directed to the most appropriate emergency shelter. Rialto City staff works closely with the Red Cross and the Rialto Unified School District to coordinate the availability of shelters.

## Fire Department

Rialto Fire Department is an all-risk fire agency providing fire suppression, emergency medical, technical rescue, hazardous material, and other related emergency services. The Fire Department also conducts public education programs and investigates and mitigates hazardous situations. The Department activity practices hazards mitigation and fire prevention. Fire-fighting resources in Rialto include four fire station (see Exhibit 5.3 for fire station locations), emergency response personnel, firefighters/paramedics, and a Hazardous Materials Response Team. The Department is continually looking at its ability to meet the needs of the community and to make sure the Department has adequate and appropriate levels of personnel and equipment. The Department tries to adhere to standards recommended by the National Fire Insurance organization as well as the National Fire Protection Association. Those standards allow one minute alarm time, one minute turnout time (time it takes personnel to put on their turnout gear), and first units to respond to a fire or medical emergency within four (4) minutes; the remaining equipment must respond within eight (8) minutes.

## Police Department

The Rialto Police Department provides a full range of law enforcement and community safety programs, including field patrol, K-9, School Resource Officer (SRO), Drug Abuse Resistance Education (DARE), Street Crime Attack Team, investigations, traffic, narcotics, training/backgrounds, Strategic

Weapons and Tactics, and crisis negotiations. The Police Department encourages innovation, use, and implementation of technology.

# Gangs

Rialto historically has had recurring problems with gangs; gangs threaten the safety of neighborhoods and create an unfavorable image of the City that may discourage investment in the community. Gangs are differentiated from other youth groups by their frequent and intentional involvement in illegal activities and a more developed leadership structure. Many street gang activities in Rialto come from gangs located in the City, with several loosely knit Rialto gangs dating back several generations. Gangs that have originated in Los Angeles and other areas of Southern California have also infiltrated the community. The City recognizes that gangs present a significant safety concern.

As part of its operational plan, the Police Department has established the Multiple Enforcement Team (MET). The MET investigates gang, narcotics, and career criminal cases. The team also addresses specific problems and crime trends by using innovative investigative techniques and available resources until the problem are solved or controlled. The team is highly trained and motivated. In addition, Department personnel routinely attend gang training, participate in gang-related enforcement efforts in surrounding communities, and are members of various gang intelligence and training groups.

The City will continue to provide diverse after-school programs for the City's youth and families to discourage youth involvement with gangs. Such programs will engage youth in volunteer and recreational programs that strengthen family and healthy and safe social networks. Job placements and internship programs will help Rialto youth gain job skills and spark positive interests.

# Noise

Excessive noise can disrupt our lives. Noise can interrupt our conversations, thoughts, and leisure activities. Noise sensitivity varies depending on the time of day, its duration and pitch, and preferences of individuals. Despite this variability, most residents agree that too much noise or the wrong type of noise can be irritating and interfere with sleep, speech, recreation, and tasks that require concentration or coordination. Therefore, noise not only decreases environmental quality but can also adversely affect our physical and mental health.

In Rialto, street and freeway traffic represent the primary source of noise. The SR-210 freeway, which traverses the northern portion of the City, and I-10, which runs through the southern portion, present concerns where they run adjacent to residential neighborhoods. Other significant sources of noise include arterial roadways and intersections, as well as the Union Pacific Railroad lines running adjacent to I-10 and Metrolink, which runs directly through the City's downtown.

Because Rialto is largely built out and the street system well established, the City faces challenges in separating noise-sensitive land uses from primary noise sources. Thus, the Noise Element establishes policies to guard against creation of any new noise/land use conflicts and to minimize the impact of existing noise sources on the community.

## Noise Metrics

Sound intensity is measured and expressed by decibels (dB), with an adjustment referred to as the A-weighted measure (dBA) to correct for the relative frequency response of the human ear. Decibels are measured on a logarithmic scale, representing points on a sharply rising curve. For example, a noise level of 10 decibels is 10 times more intense than one decibel, 20 decibels represents a noise 100 times more intense, and 30 decibels reflects a noise condition 1,000 times more intense. A sound as soft as human breathing is about 10 times greater than a zero decibel level.

The decibel system of measuring sound gives a rough connection between the physical intensity of sound and its perceived loudness to the human ear. A 10-decibel increase in sound level is perceived by the human ear as only doubling of the loudness of the sound. Ambient sounds in the urban environment generally range from 30 dBA (very quiet) to 100 dBA (very loud), as indicated in the Typical Sound Levels table.

Because people generally are more sensitive to noise intrusions during the evening and night hours, State law requires, for planning purposes, use of such metrics as the Community Noise Equivalent Level (CNEL) or Day-Night Noise Level (Ldn). These metrics add an artificial decibel increment to quiet time noise levels in a 24-hour noise descriptor to account for increased sensitivity during late hours. The CNEL descriptor requires that an artificial increment of 5 dBA be added to the actual noise level for the hours from 7:00 a.m. to 10:00 p.m., and 10 dBA for the 10:00 p.m. to 7:00 a.m. period. The Ldn descriptor uses the same methodology, except that no artificial increment is added to the hours between 7:00 a.m. and 10:00 p.m. Both descriptors yield roughly the same 24-hour level, with the CNEL being only slightly more restrictive (that is, higher).

**Table 5-1**
**Typical Sound Levels**

| Noise Source at a Given Distance | A-Weighted Sound Level in Decibels | Example Noise Environment | Perception |
|---|---|---|---|
| Shotgun (at shooter's ear) | 140 | Aircraft carrier flight deck | Painfully Loud |
| Civil defense siren (100 ft) | 130 | | |
| Jet takeoff (200 ft) | 120 | | Threshold of Pain |
| Loud rock music | 110 | Rock music concert | |
| Pile driver (50 ft) | 100 | | Very Loud |
| Ambulance siren (100 ft) | 90 | Boiler room | |
| Pneumatic drill (50 ft) | 80 | Noisy restaurant | |
| Busy traffic; hair dryer | 70 | | Moderately Loud |
| Normal conversation (5 ft) | 60 | Data processing center | |
| Light traffic (100 ft); rainfall | 50 | Private business office | |
| Bird calls (distant) | 40 | Average living room/library | Quiet |
| Soft whisper (5 ft); rustling leaves | 30 | Quiet bedroom | Very Quiet |
| | 20 | Recording studio | |
| Normal breathing | 10 | | Threshold of Hearing |

Source: Beranek, L.L. 1998. Noise and Vibration Control. Institute of Noise Control Engineering.

## Effect of Noise on People

In general, noise may affect the average individual in the following ways:

- **General Hearing Loss or Damage**
  Sound levels which exceed 85 dBA, when experienced for long durations during each working day, may result in severe temporary or even permanent hearing loss. State and Federal safety and health regulations currently protect workers at levels of exposure that exceed 90 dBA for each eight-hour workday.

- **Interference with Oral Communication**
  Speech intelligibility is impaired when sound levels exceed 60 dBA. The amount of interference increases with sound level, and with distance between speaker and the listener.

- **Sleep Interference**
  Sound levels that exceed 40 to 45 dBA are generally considered excessive for sleeping areas within a residence.

## Regulatory Environment

The intent of this Noise section is to set goals to limit and reduce the effects of noise intrusion on sensitive land uses and to set acceptable noise levels for varying types of land uses. To this end, the City has the authority to set land use noise standards and place restrictions on private activities that generate excessive or intrusive noise. However, it should be recognized that the City, and that various agencies, such as the Federal Highway Administration, the U.S. Department of Housing and Urban Development, and the California Department of Health Services, may supersede City authority as discussed below.

### California Administrative Code Section 65302(f)

California Government Code Section 65302(f) requires that all General Plans include a Noise Element to address noise concerns in the community. State law also requires that current and future noise level contours be developed for the following sources:

- Highway and freeways
- Primary arterials and major local streets
- Passenger and freight on-line railroad operations and ground rapid transit systems
- Commercial, general aviation, heliport, and military airport operations, aircraft flyovers, jet engine test stands and all other ground facilities and maintenance functions related to airport operation
- Local industrial plants, including, but not limited to, railroad classification yards
- Other stationary ground noise sources identified by local agencies as contributing to the community noise environment

### City of Rialto Municipal Code

The City's Municipal Code provides a basis for controlling excessive and annoying noise. Some of the more pertinent chapters of the Municipal Code are:

- Chapter 9.50.030, Prohibited Acts
- Chapter 9.50.040, Excessive Noise and Vibration emanating from a Motor Vehicle
- Chapter 9.50.050, Controlled Hours of Operation

- Chapter 9.50.060, Exemptions
- Chapter 9.50.070, Disturbances from Construction Activity

## Federal Highway Administration

The freeways and State routes that run through the City (I-10/SR-210/I-15) are subject to Federal funding and so are under the purview of the Federal Highway Administration (FHWA). The FHWA has developed noise standards that are typically used for Federally funded roadway projects or projects that require either Federal or Caltrans review.

## U.S. Department of Housing and Urban Development

The Department of Housing and Urban Development (HUD) issues formal requirements related specifically to standards for exterior noise levels along with policies for approving HUD-supported or assisted housing projects in high noise areas. In general, these requirements established three zones:

- 65 dBA $l_{dn}$ or less: An acceptable zone where all projects could be approved
- Exceeding 65 dBA $l_{dn}$ but not exceeding 75 dBA $l_{dn}$: A normally unacceptable zone where mitigation measures would be required and each project would have to be individually evaluated for approval or denial. These measures must provide 5 dBA of attenuation above the attenuation provided by standard construction required in a 65 to 70 dBA $l_{dn}$ area and 10 dBA of attenuation in a 70 to 75 dBA $l_{dn}$: area.
- Exceeding 75 dBA $l_{dn}$. An unacceptable zone, in which projects would not, as a rule, be approved

## Federal Railroad Administration

The Environmental Protection Agency (EPA) is charged with the regulation of railroad noise under the Noise Control Act. The Federal Railroad Administration (FRA) is responsible for enforcement of EPA regulations related to railroad noise developed as part of the Noise Control Act. FRA's Office of Safety is responsible for enforcing the Railroad Noise Emissions Compliance Regulation that set maximum sound levels from railroad equipment and for regulating locomotive horns. The Union Pacific rail corridor that follows I-10 in the southern portion of Rialto falls under the regulation described above.

## California Department of Health Services

The California Department of Health Services (DHS), Office of Noise Control studied the correlation of noise levels and their effects on various land uses. As a result, the DHS established four categories for judging the severity of noise intrusion on specified land uses. DHS standards suggest "normally acceptable," "conditionally acceptable," "normally unacceptable," and "clearly unacceptable" exterior noise levels for various land uses. A "conditionally acceptable" designation implies new construction or

development should be undertaken only after a detailed analysis of the noise reduction requirements for each land use is made and needed noise insulation features are incorporated in the design. By comparison, a "normally acceptable" designation indicates that standard construction can occur with no special noise reduction requirements.

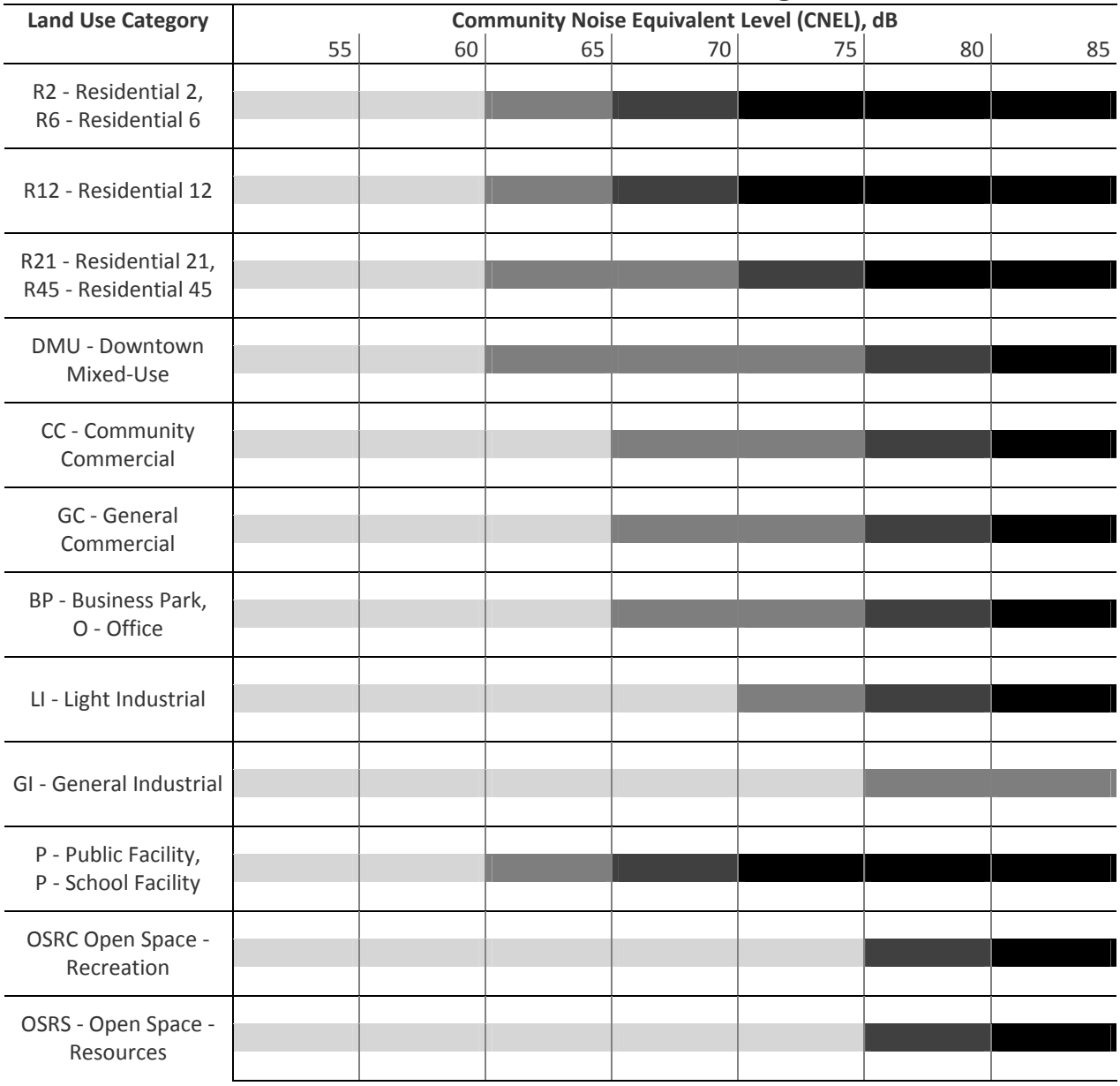
## Noise/Land Use Compatibility

Most cities and counties in California have adopted noise/land use compatibility criteria that reflect DHS standards and based on the general assumption that higher noise levels are acceptable in business districts and industrial areas. However, the introduction of mixed-use development principles into traditionally suburban environments has changed thinking with regard to acceptable noise levels. People who choose to live in vibrant mixed-use districts know that the excitement and activity levels bring with them a noise environment distinctly different than that of traditional residential-only neighborhoods. For example, music played in outdoor dining areas or bars can extend into late-night hours. Garbage collection early in the morning and the noise from heating, ventilation, and air conditioning equipment also occur with greater frequency and intensity in an urban setting.

In addition, at locations along major roadways, greater traffic volumes contribute to ambient noise conditions. Projected noise levels throughout most of the Downtown, including the area designated for new mixed-use development, are expected to exceed traditionally accepted noise/land use compatibility guidelines for residential uses. **Exhibit 5.5** shows Rialto's noise guidelines for land use planning that incorporate these principles.

This General Plan encourages mixed-use development to achieve several objectives: to work toward more sustainable development approaches, to increase access to affordable housing for more people, to create a lively Downtown, and to allow people to live closer to their jobs. To meet these objectives, Rialto has adopted the flexible noise guidelines for mixed-use districts set forth in **Exhibit 5.5**.

## Exhibit 5.5: Rialto Noise Guidelines for Land Use Planning




| **Normally Acceptable** | **Conditionally Acceptable** | **Normally Unacceptable** | **Clearly Unacceptable** |
|---|---|---|---|
| Specified land use is satisfactory, assuming buildings are of conventional construction | New development should be undertaken only after detailed analysis of noise reduction requirements are made. | New development should be generally discouraged, if not, a detailed analysis of noise reduction requirements must be made. | New development should generally not be undertaken |

Coupled with these guidelines are regulations for noise control contained in Chapter 9 (Noise Regulations) of the Municipal Code and State standards for interior noise control for residential uses. Specifically, Title 24 of the California Health and Safety Code stipulates a maximum of 45 dBA CNEL for interior residential noise levels. In loud environments, insulation, double- or triple-pane windows, and special ventilation systems are among the tools used to achieve acceptable interior noise levels.

## Existing and Future Noise Environments

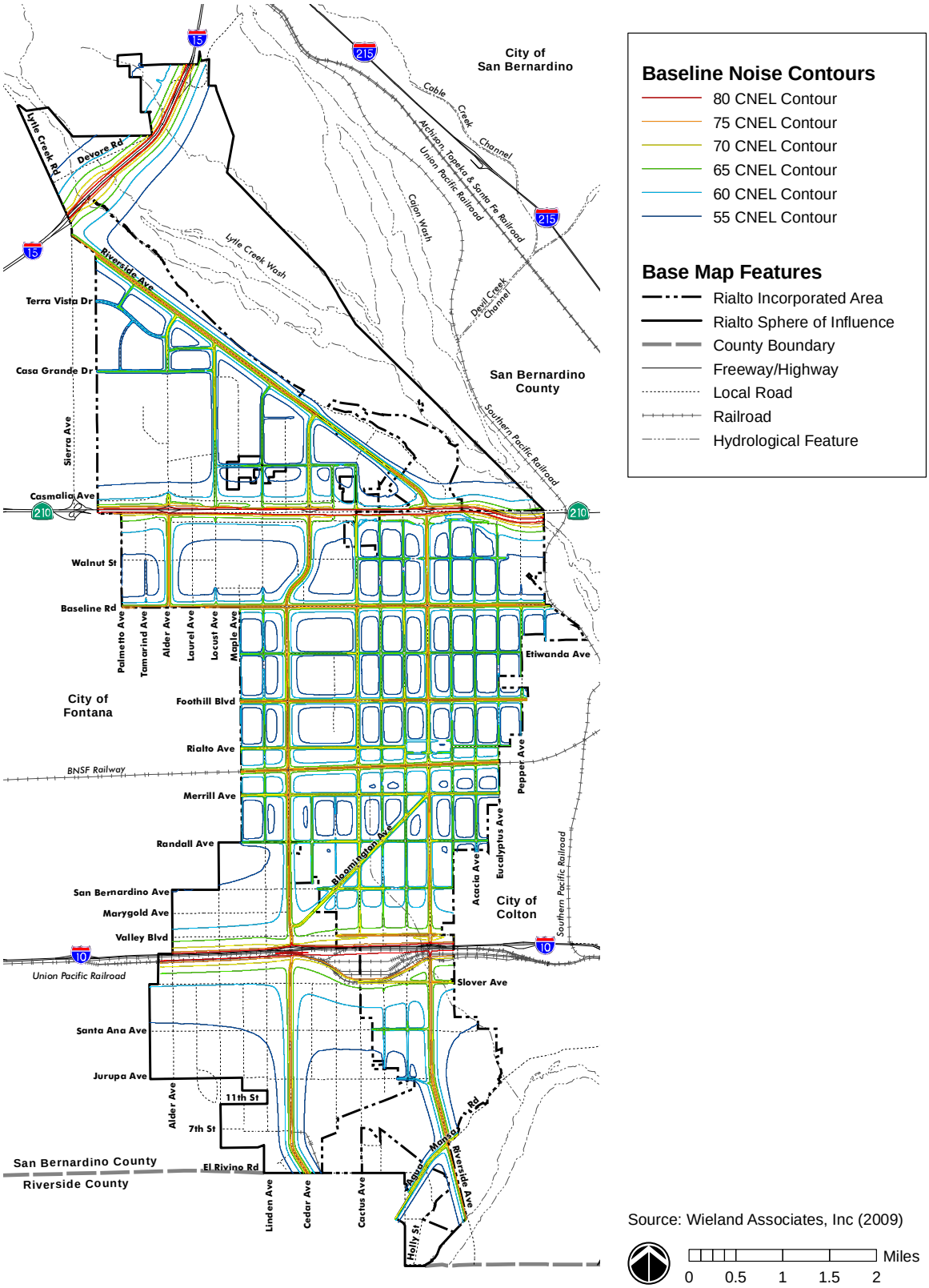
The most significant noise - producing activity within the City of Rialto is transportation. Transportation noise consists of several elements: 1) arterial traffic; 2) traffic on aircraft operations at Rialto Municipal Airport (which are scheduled to cease in 2010); 4) rail movements on two lines; and 5) activities at a railroad classification yard. Activities at commercial/industrial properties also contribute to the noise environment in Rialto.

Using measurement sites located along Rialto's streets, highways, and railroads, the City has developed noise contours for year 2008 baseline conditions. Future condition noise contours have been generated based on projected traffic levels.

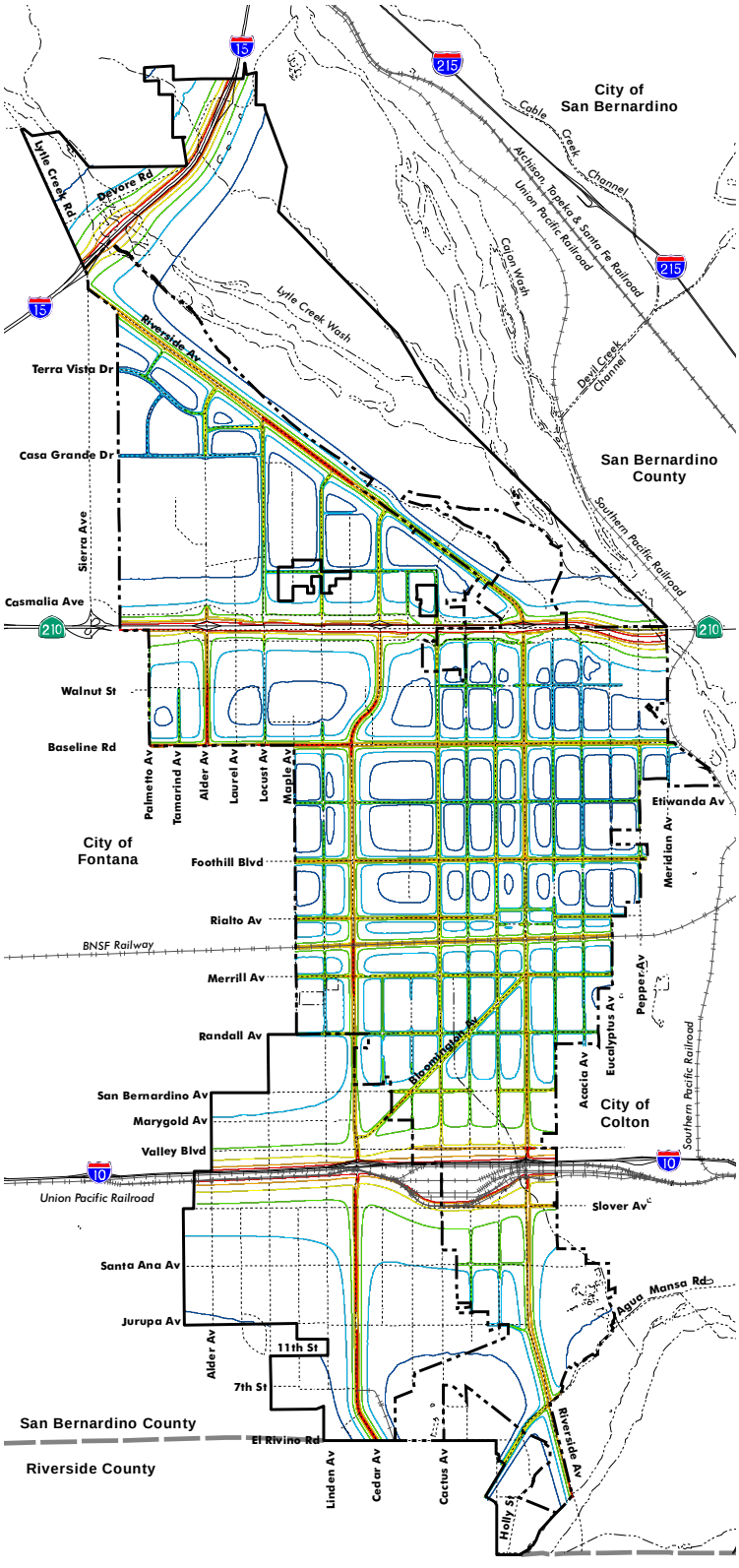
The noise contours represent the average measurements of noise exposure and are used to provide a general visualization of sound levels in the City. As an example, a person in an area located within a 60 dBA noise contour would hear a constant noise level roughly equivalent to 60 dBA, although unique events would generate noise levels both below and above 60 dBA. The noise contours do not reflect possible noise attenuation that could occur from structural or geographical barriers, and acoustical analysis should be conducted for each individual site in the case of a specific project.

Noise contours for year 2008 are shown in **Exhibit 5.6**, and projected contours for the year 2040 are shown in **Exhibit 5.7**.

Noise level increases are projected to occur along the Metrolink Rail Line corridor; I-10, I-15, and SR-210 freeways; Riverside Avenue; Foothill Boulevard; western Baseline Road; Rialto Avenue; and Cedar Avenue.




# Exhibit 5.6 –Baseline Noise Contours (2008)




## Legend

- Rialto Incorporated Area
- Rialto Sphere of Influence
- County Boundary
- Freeway/Highway
- Local Road
- Railroad
- Hydrological Feature

**Future Noise Contours**

- 80 db Contour
- 75 db Contour
- 70 db Contour
- 65 db Contour
- 60 db Contour
- 55 db Contour

Source:
City of Rialto (2007),
Bernardino County (2006).

0 0.5 1 1.5 2 Miles

# Exhibit 5.7 –Future Noise Contours (2040)

# Wind Hazards

The City of Rialto has a history of extensive windstorms, often related to Santa Ana winds that push through the Cajon Pass. The Santa Ana winds are strong, extremely dry offshore winds that characteristically sweep through the area in late fall and early winter. High winds can also result from thunderstorm inflow and outflow or high and low pressure systems moving through the region. High winds have speeds reaching at least 50 miles per hour, and gusts can exceed 100 miles per hour. Wind events constitute one of the most frequent major hazards in the City. Not only do windstorms happen frequently, they can be costly in terms of property damage and can cause injury to people.

The winds sometimes reach gale-force strength. As a result, there are usually high wind advisories, particularly along the I-15 and SR-210 freeways with signs posted throughout the area. It is not uncommon to see overturned trucks during windy events.

The winds affecting Rialto can damage structures, uproot small trees, and create dust storms in the City where the soil type is susceptible to wind erosion. Winds can also push wildland fires in the Lytle Creek area. Additionally, as the northern part of the City has shifted to developed lands, the severity and frequency of high winds has been reduced moderately.

# Goals and Policies

## Seismic Hazards

**Goal 5-1:** **Minimize hazards to public health, safety, and welfare associated with geotechnical hazards.**

Policy 5-1.1: Require geotechnical investigations by certified engineering geologist or other qualified professionals for all grading and construction projects subject to geologic hazards, including fault rupture, severe ground shaking, liquefaction, landslides, and collapsible or expansive soils. Particular attention should be paid to areas within Alquist-Priolo Earthquake Fault Zones.

Policy 5-1.2: Require all construction to be in conformance with the Uniform Building Code (UBC) and the California Building Code (CBC), and to be consistent with the Municipal Code as it provides for earthquake resistant design, excavation, and grading.

## Flood Hazards

**Goal 5-2:** **Minimize the risk and damage from flood hazards.**

Policy 5-2.1: For properties located within designated 100-year flood zones, require the submittal of information prepared by qualified specialists which certifies compliance with development standards established for 100-year flood zones.

Policy 5-2.2: Require the implementation of adequate erosion control measures for development projects to minimize sedimentation damage to drainage facilities.

Policy 5-2.3: Continue to consult with the San Bernardino County Flood Control District regarding the establishment and maintenance of regional flood control facilities located within the City.

Policy 5-2.4: Require water retention devices in new developments to minimize flooding of the surface drainage system by peak flows.

Policy 5-2.5: Require that any structure proposed within an officially designated 100-year floodplain, or other floodplain as determined through geotechnical investigation, be designed in a manner that does not negatively impede or redirect floodwaters or raise anticipated flood heights.

## Fire Hazards

**Goal 5-3:** **Increase the City's fire protection capabilities, and implement fire prevention regulations and standards that minimize potential fire hazards and fire losses.**

Policy 5-3.1: Provide for fire personnel, equipment, and fire stations to have adequate and appropriate resources to meet the needs and serve all areas of Rialto.

Policy 5-3.2: Develop the specifications and designs for an emergency response vehicle-operated traffic control system.

Policy 5-3.3: Require that development be phased in relation to the City's ability to provide an adequate level of fire protection, as per the City standards.

Policy 5-3.4: Require that all site plans, subdivision plans, and building plans be reviewed by the Fire Department to ensure compliance with appropriate fire regulations.

Policy 5-3.5: Develop new and expand existing public fire safety education programs, including teaching fire and life safety information in Rialto schools, the Rialto Senior Center, civic organizations, and businesses.

Policy 5-3.6: Establish a fire station south of I-10, and improve fire coverage capabilities of this area.

Policy 5-3.7: Add service level capability and infrastructure to meet increasing demand of new development.

Policy 5-3.8: Ensure that a defensible perimeter is maintained around residential located in high or very high wildfire hazards zones, as per Fire Department guidelines.

## Hazardous Materials

**Goal 5-4:** **Protect the health and welfare of the public, environment, and economy by providing for the safe and responsible management of hazardous materials and wastes.**

Policy 5-4.1: Continue to identify hazardous material users and generators within the City through the use of field surveys, inspection programs, and licensing requirements.

Policy 5-4.2: Coordinate City enforcement efforts with San Bernardino County, the California Department of Health Services, the Regional Water Quality Control Boards, and the Air Quality Management District, for the management and disposal of hazardous wastes.

Policy 5-4.3: Identify and establish specific travel routes for the transport of hazardous materials and wastes, with key considerations being capacity to safely accommodate additional truck traffic, avoidance of residential areas, and use of interstate or State divided highways as preferred routes.

Policy 5-4.4: Require all hazardous waste generators and hazardous materials handlers to report to City officials, including the Fire Department any equipment malfunction or upset which may cause hazardous waste to be emitted

**Goal 5-5: Minimize the generation of hazardous waste in Rialto.**

Policy 5-5.1: Prohibit unauthorized disposal of household hazardous waste in the Midvalley County Landfill.

Policy 5-5.2: Encourage and promote practices that will reduce the use of hazardous materials and the generation of hazardous waste at their source, recycle the remaining hazardous wastes for reuse, and treat those wastes which cannot be reduced at the source or recycled.

Policy 5-5.3: Prohibit businesses from storing hazardous materials for commercial use or commercially generated hazardous wastes in residential areas.

**Goal 5-6: Educate the public and private businesses about proper disposal of hazardous waste.**

Policy 5-6.1: Conduct regularly scheduled household hazardous waste roundup and disposal events.

Policy 5-6.2: Support education programs for hazardous waste generators. This program shall include information on proper labeling, placarding, and manifesting requirements.

## Emergency Response and Preparation

**Goal 5-7:** **Maintain a high level of emergency response capability.**

Policy 5-7.1: Update, on a regular basis, the City Hazard Mitigation Plan.

Policy 5-7.2: Provide training to all City employees on their roles and responsibilities in times of disasters and local emergencies. Training should include comprehensive and realistic disaster exercises.

Policy 5-7.3: Increase the City's ability to coordinate and control its resources in an emergency situation by improving the operational capacity of the Emergency Operating Center, by identifying local resources available, and by developing contracts and agreements for utilizing these resources in an emergency.

Policy 5-7.4: Distribute and/or publicize established emergency preparedness plans to increase public awareness.

**Goal 5-8:** **Provide effective and comprehensive policing services that meet the safety needs of Rialto.**

Policy 5-8.1: Provide timely responses to emergency and non-emergency call for service 24 hours a day, per the City standards.

Policy 5-8.2: Establish the satellite Police Department in the northwest neighborhood.

Policy 5-8.3: Continue to encourage design concepts that inhibit and discourage criminal behavior, such as Crime Prevention Through Environmental Design (CPTED) techniques.

Policy 5-8.4: Initiate proactive crime suppression and prevention strategies throughout the community.

## Gangs

**Goal 5-9:** **Reduce criminal gang activity and discourage gang involvement in the City of Rialto.**

Policy 5-9.1: Identify specific high crime areas in the City and when feasible, create plans/strategies to improve these areas.

Policy 5-9.2: Provide immediate consequences for minor criminal behavior.

Policy 5-9.3: Continue to work with law enforcement agencies, San Bernardino County Probation, State Parole, and the District Attorney's Office in their endeavors to arrest and prosecute violent gang members.

Policy 5-9.4: Work with State parole officials to identify gang members recently released from prison, and develop orientation programs that inform them of services available in the community to help them get back on their feet.

Policy 5-9.4: Continue to work with the San Bernardino Movement Against Street Hoodlums (SMASH) to identify and clean up street gangs.

Policy 5-9.5: Enforce gang injunctions where needed to address neighborhood gang problems before they reach a level of felony crime activity.

Policy 5-9.6: Support Neighborhood Watch Programs.

Policy 5-9.7: Encourage street and graffiti cleanup.

Policy 5-9.8: Continue to provide community programs that develop positive relationships between the Rialto Police Department and community members, such as the Area Commander Program and Crime Free Multi-Housing Program, which provide a safe and secure environment for the community to discuss gang-related issues and effective solutions to help reduce crime and provide a safer living environment.

Policy 5-9.9: Provide youth and family programs such as after-school recreational programs, volunteer programs, and job placements or internship programs that will help spark positive interests and discourage youth from participating in gang-related activities.

## Noise

**Goal 5-10: Minimize the impact of point source and ambient noise levels throughout the community.**

Policy 5-10.1: Revise the City's noise ordinance to address ongoing noise issues by using quantitative noise limits where appropriate and establishing comprehensive noise control measures.

Policy 5-10.2: Consider noise impacts as part of the development review process, particularly the location of parking, ingress/egress/loading, and refuse collection areas relative to surrounding residential development and other noise-sensitive land uses.

Policy 5-10.3: Ensure that acceptable noise levels are maintained near schools, hospitals, and other noise sensitive areas in accordance with the Municipal Code and noise standards contained in **Exhibit 5-5**.

Policy 5-10.4: Limit the hours of operation at all noise generation sources that are adjacent to noise-sensitive areas.

Policy 5-10.5: Require all exterior noise sources (construction operations, air compressors, pumps, fans and leaf blowers) to use available noise suppression devices and techniques to reduce exterior noise to acceptable levels that are compatible with adjacent land uses.

**Goal 5-11: Minimize the impacts of transportation-related noise.**

Policy 5-11.1: Work with responsible Federal and State agencies to minimize the impact of transportation-related noise, including noise associated with freeways, major arterials, and Metrolink and other rail lines.

Policy 5-11.2: Require development which is, or will be, affected by railroad noise to include appropriate measures to minimize adverse noise effects on residents and business persons.

Policy 5-11.3: Require development of truck-intensive uses to minimize noise impacts on adjacent uses through appropriate site design.

Policy 5-11.4: Develop a program for monitoring noise levels and investigating complaints.

Policy 5-11.5: Provide education to the community at large about the importance of maintaining a healthy noise environment, and identify ways residents can assist in noise abatement efforts.

## Wind Hazards

**Goal 5-12:** **Minimize the risks associated with wind hazards.**

Policy 5-12.1: Notify all developers, particularly those of multi-story or critical structures, of potential impacts resulting from Santa Ana Winds, and require appropriate structural and design treatment.

# Appendix B

Roadway Calculations

# FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO)

| | | | |
|---|---|---|---|
| PROJECT: | Foothill and Larch Residences Project Noise Impact Study | JOB #: | 2717-2020-02 |
| ROADWAY: | Foothill Boulevard | DATE: | 29-Apr-20 |
| LOCATION: | Residential Building First Floor Façade Facing Foothill Avenue | ENGINEER: | D. Shivaiah |

## NOISE INPUT DATA

### ROADWAY CONDITIONS

| | | |
|---|---|---|
| ADT = | 32,999 | |
| SPEED = | 50 | |
| PK HR % = | 10 | |
| NEAR LANE/FAR LANE DIST | 72 | |
| ROAD ELEVATION = | 0.0 | |
| GRADE = | 0.0 | % |
| PK HR VOL = | 3,300 | |

### RECEIVER INPUT DATA

| | | |
|---|---|---|
| RECEIVER DISTANCE = | | 80 |
| DIST C/L TO WALL = | | 60 |
| RECEIVER HEIGHT = | | 5.0 |
| WALL DISTANCE FROM RECEIVER = | | 20 |
| PAD ELEVATION = | | 0.0 |
| ROADWAY VIEW: | LF ANGLE= | -90 |
| | RT ANGLE= | 90 |
| | DF ANGLE= | 180 |

### SITE CONDITIONS

| | | |
|---|---|---|
| AUTOMOBILES = | 10 | (10 = HARD SITE, 15 = SOFT SITE) |
| MEDIUM TRUCKS = | 10 | |
| HEAVY TRUCKS = | 10 | |

### WALL INFORMATION

| | | |
|---|---|---|
| HTH WALL= | 6.0 | |
| AMBIENT= | 0.0 | |
| BARRIER = | 1 | (0 = WALL, 1 = BERM) |

### VEHICLE MIX DATA

| VEHICLE TYPE | DAY | EVENING | NIGHT | DAILY |
|---|---|---|---|---|
| AUTOMOBILES | 0.695 | 0.129 | 0.096 | 0.7990 |
| MEDIUM TRUCKS | 0.014 | 0.001 | 0.015 | 0.1400 |
| HEAVY TRUCKS | 0.024 | 0.010 | 0.025 | 0.0600 |

### MISC. VEHICLE INFO

| VEHICLE TYPE | HEIGHT | SLE DISTANCE | GRADE ADJUSTMENT |
|---|---|---|---|
| AUTOMOBILES | 2.0 | 68.19 | - - |
| MEDIUM TRUCKS | 4.0 | 68.07 | - - |
| HEAVY TRUCKS | 8.0 | 68.07 | 0.00 |

## NOISE OUTPUT DATA

### *NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)*

| VEHICLE TYPE | PK HR LEQ | DAY LEQ | EVEN LEQ | NIGHT LEQ | LDN | CNEL |
|---|---|---|---|---|---|---|
| AUTOMOBILES | 71.6 | 69.2 | 68.0 | 61.9 | 70.3 | 71.0 |
| MEDIUM TRUCKS | 71.7 | 52.5 | 44.7 | 54.0 | 60.1 | 60.1 |
| HEAVY TRUCKS | 72.3 | 55.3 | 57.5 | 56.7 | 63.0 | 63.3 |
| | | | | | | |
| NOISE LEVELS (dBA) | 76.7 | 69.5 | 68.3 | 63.6 | 71.4 | 71.9 |

### *NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)*

| VEHICLE TYPE | PK HR LEQ | DAY LEQ | EVEN LEQ | NIGHT LEQ | LDN | CNEL |
|---|---|---|---|---|---|---|
| AUTOMOBILES | 62.7 | 60.3 | 59.1 | 53.0 | 61.4 | 62.1 |
| MEDIUM TRUCKS | 63.2 | 44.0 | 36.2 | 45.4 | 51.6 | 51.6 |
| HEAVY TRUCKS | 64.3 | 47.3 | 49.6 | 48.8 | 55.1 | 55.4 |
| | | | | | | |
| NOISE LEVELS (dBA) | 67.9 | 60.8 | 59.6 | 54.8 | 62.7 | 63.2 |

| NOISE CONTOUR (FT) | | | | |
|---|---|---|---|---|
| NOISE LEVELS | 70 dBA | 65 dBA | 60 dBA | 55 dBA |
| CNEL | 125 | 396 | 1253 | 3963 |
| LDN | 111 | 350 | 1105 | 3496 |

# FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO)

| | | | |
|---|---|---|---|
| PROJECT: | Foothill and Larch Residences Project Noise Impact Study | JOB #: | 2717-2020-02 |
| ROADWAY: | Foothill Boulevard | DATE: | 29-Apr-20 |
| LOCATION: | Residential Building Second Floor Patio/Façade Facing Foothill Avenue | ENGINEER: | D. Shivaiah |

## NOISE INPUT DATA

### ROADWAY CONDITIONS

| | | |
|---|---|---|
| ADT = | 32,999 | |
| SPEED = | 50 | |
| PK HR % = | 10 | |
| NEAR LANE/FAR LANE DIST | 72 | |
| ROAD ELEVATION = | 0.0 | |
| GRADE = | 0.0 | % |
| PK HR VOL = | 3,300 | |

### RECEIVER INPUT DATA

| | | |
|---|---|---|
| RECEIVER DISTANCE = | | 75 |
| DIST C/L TO WALL = | | 60 |
| RECEIVER HEIGHT = | | 14.0 |
| WALL DISTANCE FROM RECEIVER = | | 15 |
| PAD ELEVATION = | | 0.0 |
| ROADWAY VIEW: | LF ANGLE= | -90 |
| | RT ANGLE= | 90 |
| | DF ANGLE= | 180 |

### SITE CONDITIONS

| | | |
|---|---|---|
| AUTOMOBILES = | 10 | (10 = HARD SITE, 15 = SOFT SITE) |
| MEDIUM TRUCKS = | 10 | |
| HEAVY TRUCKS = | 10 | |

### WALL INFORMATION

| | | |
|---|---|---|
| HTH WALL= | 6.0 | |
| AMBIENT= | 0.0 | |
| BARRIER = | 1 | (0 = WALL, 1 = BERM) |

### VEHICLE MIX DATA

| VEHICLE TYPE | DAY | EVENING | NIGHT | DAILY |
|---|---|---|---|---|
| AUTOMOBILES | 0.695 | 0.129 | 0.096 | 0.7990 |
| MEDIUM TRUCKS | 0.014 | 0.001 | 0.015 | 0.1400 |
| HEAVY TRUCKS | 0.024 | 0.010 | 0.025 | 0.0600 |

### MISC. VEHICLE INFO

| VEHICLE TYPE | HEIGHT | SLE DISTANCE | GRADE ADJUSTMENT |
|---|---|---|---|
| AUTOMOBILES | 2.0 | 66.88 | - - |
| MEDIUM TRUCKS | 4.0 | 66.55 | - - |
| HEAVY TRUCKS | 8.0 | 66.07 | 0.00 |

## NOISE OUTPUT DATA

### *NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)*

| VEHICLE TYPE | PK HR LEQ | DAY LEQ | EVEN LEQ | NIGHT LEQ | LDN | CNEL |
|---|---|---|---|---|---|---|
| AUTOMOBILES | 71.7 | 69.3 | 68.0 | 62.0 | 70.4 | 71.0 |
| MEDIUM TRUCKS | 71.8 | 52.6 | 44.8 | 54.1 | 60.2 | 60.2 |
| HEAVY TRUCKS | 72.4 | 55.4 | 57.6 | 56.8 | 63.1 | 63.5 |
| | | | | | | |
| NOISE LEVELS (dBA) | 76.8 | 69.6 | 68.4 | 63.6 | 71.5 | 72.0 |

### *NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)*

| VEHICLE TYPE | PK HR LEQ | DAY LEQ | EVEN LEQ | NIGHT LEQ | LDN | CNEL |
|---|---|---|---|---|---|---|
| AUTOMOBILES | 71.7 | 69.3 | 68.0 | 62.0 | 70.4 | 71.0 |
| MEDIUM TRUCKS | 71.8 | 52.6 | 44.8 | 54.1 | 60.2 | 60.2 |
| HEAVY TRUCKS | 72.4 | 55.4 | 57.6 | 56.8 | 63.1 | 63.5 |
| | | | | | | |
| NOISE LEVELS (dBA) | 76.8 | 69.6 | 68.4 | 63.6 | 71.5 | 72.0 |

| NOISE CONTOUR (FT) | | | | |
|---|---|---|---|---|
| NOISE LEVELS | 70 dBA | 65 dBA | 60 dBA | 55 dBA |
| CNEL | 120 | 379 | 1200 | 3795 |
| LDN | 106 | 335 | 1059 | 3347 |

# FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO)

| | | | |
|---|---|---|---|
| PROJECT: | Foothill and Larch Residences Project Noise Impact Study | JOB #: | 2717-2020-02 |
| ROADWAY: | Larch Avenue | DATE: | 29-Apr-20 |
| LOCATION: | Residential Building First Floor Façade Facing Foothill Avenue | ENGINEER: | D. Shivaiah |

## NOISE INPUT DATA

### ROADWAY CONDITIONS

| | | |
|---|---|---|
| ADT = | 12,500 | |
| SPEED = | 25 | |
| PK HR % = | 10 | |
| NEAR LANE/FAR LANE DIST | 27 | |
| ROAD ELEVATION = | 0.0 | |
| GRADE = | 0.0 | % |
| PK HR VOL = | 1,250 | |

### RECEIVER INPUT DATA

| | | |
|---|---|---|
| RECEIVER DISTANCE = | | 48 |
| DIST C/L TO WALL = | | 33 |
| RECEIVER HEIGHT = | | 5.0 |
| WALL DISTANCE FROM RECEIVER = | | 15 |
| PAD ELEVATION = | | 0.0 |
| ROADWAY VIEW: | LF ANGLE= | -90 |
| | RT ANGLE= | 90 |
| | DF ANGLE= | 180 |

### SITE CONDITIONS

| | | |
|---|---|---|
| AUTOMOBILES = | 10 | (10 = HARD SITE, 15 = SOFT SITE) |
| MEDIUM TRUCKS = | 10 | |
| HEAVY TRUCKS = | 10 | |

### WALL INFORMATION

| | | |
|---|---|---|
| HTH WALL= | 6.0 | |
| AMBIENT= | 0.0 | |
| BARRIER = | 1 | (0 = WALL, 1 = BERM) |

### VEHICLE MIX DATA

| VEHICLE TYPE | DAY | EVENING | NIGHT | DAILY |
|---|---|---|---|---|
| AUTOMOBILES | 0.736 | 0.136 | 0.102 | 0.9742 |
| MEDIUM TRUCKS | 0.009 | 0.000 | 0.009 | 0.0184 |
| HEAVY TRUCKS | 0.004 | 0.000 | 0.004 | 0.0074 |

### MISC. VEHICLE INFO

| VEHICLE TYPE | HEIGHT | SLE DISTANCE | GRADE ADJUSTMENT |
|---|---|---|---|
| AUTOMOBILES | 2.0 | 44.87 | - - |
| MEDIUM TRUCKS | 4.0 | 44.66 | - - |
| HEAVY TRUCKS | 8.0 | 44.66 | 0.00 |

## NOISE OUTPUT DATA

### *NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)*

| VEHICLE TYPE | PK HR LEQ | DAY LEQ | EVEN LEQ | NIGHT LEQ | LDN | CNEL |
|---|---|---|---|---|---|---|
| AUTOMOBILES | 61.4 | 59.3 | 58.0 | 52.0 | 60.4 | 61.0 |
| MEDIUM TRUCKS | 55.8 | 34.6 | 27.1 | 35.8 | 42.0 | 42.1 |
| HEAVY TRUCKS | 58.0 | 32.7 | 29.3 | 33.9 | 40.1 | 40.2 |
| | | | | | | |
| NOISE LEVELS (dBA) | 63.8 | 59.3 | 58.0 | 52.1 | 60.5 | 61.1 |

### *NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)*

| VEHICLE TYPE | PK HR LEQ | DAY LEQ | EVEN LEQ | NIGHT LEQ | LDN | CNEL |
|---|---|---|---|---|---|---|
| AUTOMOBILES | 51.8 | 49.7 | 48.4 | 42.4 | 50.8 | 51.4 |
| MEDIUM TRUCKS | 47.0 | 25.8 | 18.3 | 27.0 | 33.2 | 33.3 |
| HEAVY TRUCKS | 50.1 | 24.7 | 21.3 | 26.0 | 32.2 | 32.3 |
| | | | | | | |
| NOISE LEVELS (dBA) | 54.2 | 49.7 | 48.4 | 42.6 | 50.9 | 51.5 |

| NOISE CONTOUR (FT) | | | | |
|---|---|---|---|---|
| NOISE LEVELS | 70 dBA | 65 dBA | 60 dBA | 55 dBA |
| CNEL | 6 | 19 | 61 | 193 |
| LDN | 5 | 17 | 53 | 168 |

# FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO)

| | | | |
|---|---|---|---|
| PROJECT: | Foothill and Larch Residences Project Noise Impact Study | JOB #: | 2717-2020-02 |
| ROADWAY: | Larch Avenue | DATE: | 29-Apr-20 |
| LOCATION: | Residential Building Second Floor Patio/Façade Facing Foothill Avenue | ENGINEER: | D. Shivaiah |

## NOISE INPUT DATA

### ROADWAY CONDITIONS

| | |
|---|---|
| ADT = | 12,500 |
| SPEED = | 25 |
| PK HR % = | 10 |
| NEAR LANE/FAR LANE DIST | 27 |
| ROAD ELEVATION = | 0.0 |
| GRADE = | 0.0 % |
| PK HR VOL = | 1,250 |

### RECEIVER INPUT DATA

| | | |
|---|---|---|
| RECEIVER DISTANCE = | | 48 |
| DIST C/L TO WALL = | | 33 |
| RECEIVER HEIGHT = | | 14.0 |
| WALL DISTANCE FROM RECEIVER = | | 15 |
| PAD ELEVATION = | | 0.0 |
| ROADWAY VIEW: | LF ANGLE= | -90 |
| | RT ANGLE= | 90 |
| | DF ANGLE= | 180 |

### SITE CONDITIONS

| | | |
|---|---|---|
| AUTOMOBILES = | 10 | (10 = HARD SITE, 15 = SOFT SITE) |
| MEDIUM TRUCKS = | 10 | |
| HEAVY TRUCKS = | 10 | |

### WALL INFORMATION

| | | |
|---|---|---|
| HTH WALL= | 6.0 | |
| AMBIENT= | 0.0 | |
| BARRIER = | 1 | (0 = WALL, 1 = BERM) |

### VEHICLE MIX DATA

| VEHICLE TYPE | DAY | EVENING | NIGHT | DAILY |
|---|---|---|---|---|
| AUTOMOBILES | 0.736 | 0.136 | 0.102 | 0.9742 |
| MEDIUM TRUCKS | 0.009 | 0.000 | 0.009 | 0.0184 |
| HEAVY TRUCKS | 0.004 | 0.000 | 0.004 | 0.0074 |

### MISC. VEHICLE INFO

| VEHICLE TYPE | HEIGHT | SLE DISTANCE | GRADE ADJUSTMENT |
|---|---|---|---|
| AUTOMOBILES | 2.0 | 47.10 | - - |
| MEDIUM TRUCKS | 4.0 | 46.63 | - - |
| HEAVY TRUCKS | 8.0 | 45.93 | 0.00 |

## NOISE OUTPUT DATA

### *NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)*

| VEHICLE TYPE | PK HR LEQ | DAY LEQ | EVEN LEQ | NIGHT LEQ | LDN | CNEL |
|---|---|---|---|---|---|---|
| AUTOMOBILES | 61.2 | 59.1 | 57.8 | 51.7 | 60.2 | 60.8 |
| MEDIUM TRUCKS | 55.7 | 34.4 | 26.9 | 35.7 | 41.8 | 41.9 |
| HEAVY TRUCKS | 57.9 | 32.6 | 29.2 | 33.8 | 40.0 | 40.1 |
| | | | | | | |
| NOISE LEVELS (dBA) | 63.6 | 59.1 | 57.8 | 51.9 | 60.3 | 60.9 |

### *NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)*

| VEHICLE TYPE | PK HR LEQ | DAY LEQ | EVEN LEQ | NIGHT LEQ | LDN | CNEL |
|---|---|---|---|---|---|---|
| AUTOMOBILES | 61.2 | 59.1 | 57.8 | 51.7 | 60.2 | 60.8 |
| MEDIUM TRUCKS | 55.7 | 34.4 | 26.9 | 35.7 | 41.8 | 41.9 |
| HEAVY TRUCKS | 57.9 | 32.6 | 29.2 | 33.8 | 40.0 | 40.1 |
| | | | | | | |
| NOISE LEVELS (dBA) | 63.6 | 59.1 | 57.8 | 51.9 | 60.3 | 60.9 |

| NOISE CONTOUR (FT) | | | | |
|---|---|---|---|---|
| NOISE LEVELS | 70 dBA | 65 dBA | 60 dBA | 55 dBA |
| CNEL | 6 | 18 | 58 | 184 |
| LDN | 5 | 16 | 51 | 160 |