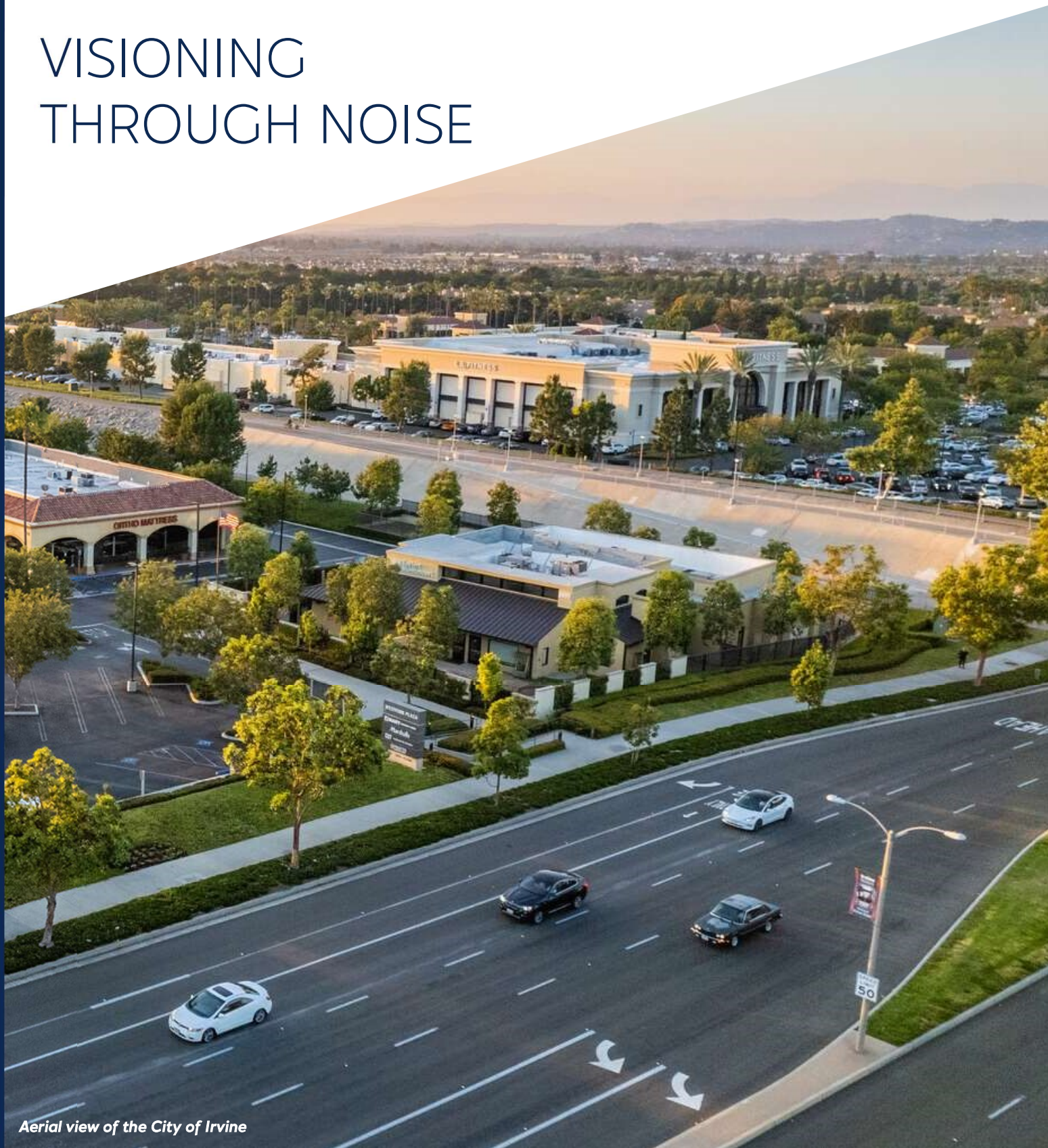
# NOISE ELEMENT

# CONTENTS

The Noise Element contributes to a healthy and safe environment by minimizing noise impacts in the City and is a crucial component of fostering a high quality of life for residents. This element describes the existing noise environment in the City and establishes goals and policies to promote compatible growth and minimize noise exposure.

*Aerial view of the City of Irvine*

# VISIONING THROUGH NOISE



*Aerial view of the City of Irvine*

The Noise Element plays a crucial role in improving the environment and quality of life for residents in Irvine. Its importance and how the City utilizes this document to better the environment occurs in the following ways:

## Protecting Public Health

Excessive noise pollution can have significant negative impacts on public health, including increased stress levels, sleep disturbances, and hearing loss. By addressing noise pollution through the Noise Element, Irvine protects the health and well-being of its residents.

## Enhancing Quality of Life

Excessive noise can diminish the overall quality of life for residents by disrupting peaceful living environments and reducing enjoyment of outdoor spaces. Implementing measures to reduce noise pollution creates a more pleasant and enjoyable environment for Irvine residents to live, work, and play.

## Promoting Economic Development

Noise pollution can deter businesses, residents, and tourists from investing in or visiting a city. By addressing noise pollution and creating quieter, more attractive urban environments, Irvine furthers economic development and attracts new businesses, residents, and visitors.

## Preserving Natural Habitats

Noise pollution can also have adverse effects on wildlife and natural habitats, disrupting animal communication, breeding, and feeding behaviors. By reducing noise pollution in urban areas, Irvine helps preserve natural ecosystems and promote biodiversity.

With the 2045 General Plan Noise Element, Irvine seeks to protect and enhance the environment for residents by:

- Implementing and enforcing noise ordinances to regulate noise levels from various sources, including transportation, construction, and industrial activities.
- Exploring the use of noise-reducing infrastructure, such as sound barriers, green spaces, and noise-absorbing materials, to reduce noise pollution in urban areas.
- Educating the public about the health and environmental impacts of noise pollution and providing resources for residents to report noise disturbances and seek assistance.
- Incorporating noise considerations into urban planning and development processes to ensure that new developments are designed with noise reduction in mind and that existing neighborhoods are protected from excessive noise levels.

Through the Noise Element, the City aims to ensure residents are well-informed on issues related to noise and the City's efforts to address them successfully, experience reduced exposure to excess mobile and stationary noise levels, and benefit from effective regulations that can help support and encourage a healthy noise environment.

*Residents enjoying the park*

# GENERAL PLAN AND REGULATORY FRAMEWORK

*Irvine City Hall*

The following sections outline the applicable state requirements related to Noise Element preparation and existing City regulations for minimizing noise exposure.

## STATE GENERAL PLAN REQUIREMENTS

This element has been prepared in alignment with the State's General Plan Guidelines. The Governor's Office of Planning and Research has established detailed guidelines for the preparation of Noise Elements in Appendix D to the General Plan Guidelines, Noise Element Guidelines. Appendix D outlines Noise Element requirements based on four fundamental goals:

To provide sufficient information concerning the community noise environment so that noise may be effectively considered in the land use planning process. In so doing, the necessary groundwork will have been developed so that a community noise ordinance may be utilized to resolve noise complaints.

To utilize the definition of the community noise environment in the form of CNEL or Ldn noise contours as provided in the noise element for local compliance with the State Noise Insulation Standards. These standards require specified levels of outdoor to indoor noise reduction for new multifamily residential construction in areas where the outdoor noise exposure exceeds CNEL (or Ldn) 60 dB.

To protect those existing regions of the planning area whose noise environments are deemed acceptable and also those locations throughout the community deemed "noise sensitive."

To develop strategies for abating excessive noise exposure through cost-effective reduction/attenuation measures in combination with zoning, as appropriate, to avoid incompatible land uses.

# FEDERAL REGULATIONS

**Occupational Safety and Health Administration (OSHA)** – OSHA's noise exposure standard identifies the threshold for potential hearing loss, with prolonged exposure to levels over 85 dBA causing physical damage. Noise exceeding 75 dBA can impact the body's functions, with a maximum permissible level of 90 dBA over eight hours. Exposure beyond this limit risks permanent hearing damage.

**Federal Transit Administration (FTA) Vibration Impact Criteria** – The FTA issues a manual for evaluating noise and vibration impacts in federally funded mass transit projects, offering criteria for measuring adverse effects and suggesting effective attenuation measures and design features. While Irvine's current transit relies on local funding, future federally funded projects would adhere to FTA guidelines to meet the requirements of the National Environmental Policy Act.

**Department of Housing and Urban Development (HUD)** – HUD's noise abatement and control standards, detailed in Title 24, Part 51 of the Code of Federal Regulations, are akin to FTA guidelines and pertain to projects funded or initiated by HUD. They prioritize reducing noise in "high noise areas," where environments have 24-hour noise level averages exceeding 65 dB.

**Federal Highway Administration (FHWA)** – FHWA's regulations, found in Title 23, Part 772 of the Code of Federal Regulations, control highway-related traffic and construction noise, mandating adherence to FHWA's traffic noise model for federally funded projects and providing guidelines for financing, building, and monitoring noise reduction measures. Additionally, FHWA created a national database in January 2006, containing noise emission levels for construction equipment, aiding in estimating noise levels at varying distances from construction sites, with measurements ranging from 70 dBA to over 100 dBA at a distance of 50 feet.


# STATE REGULATIONS

**California Building Code –** California's noise insulation standards, outlined in Title 24 of the California Building Code, are enforced statewide for new construction projects to ensure interior noise compatibility with external sources. Acoustical studies are mandated for noise-sensitive structures near major transportation noise sources, showing compliance with acceptable noise levels in habitable rooms. Interior noise levels attributable to exterior sources shall not exceed an annual CNEL of 45 dB in any habitable room. The noise metric must align with either the day-night average sound level (Ldn) or the community noise equivalent level (CNEL), as specified in the Noise Element of the General Plan.

**California Penal Code –** The Irvine Police Department enforces California Penal Code, Section 415, which prohibits loud and unreasonable noise that maliciously disturbs others. Complaints from neighbors often prompt enforcement, and there is no distinction between daytime and nighttime; instead, the noise must be proven unreasonable to be considered a violation.

**Airport Noise Regulations –** Per California Public Resources Code, Section 21096, public agencies must consult the California Airport Land Use Planning Handbook when preparing an environmental impact report for a project within an airport influence area. This handbook offers guidance on addressing airport noise and safety compatibility issues, with compatibility zones determined using CNEL contours from the Federal Aviation Administration Integrated Noise Model for both private and public airports.

**Caltrans Construction Vibration Guidance –** Caltrans provides a manual to state and local agencies addressing vibration concerns associated with Caltrans projects. It includes guidance and procedures, including screening tools, to assess potential adverse effects on human perception and structural integrity.

# LOCAL REGULATIONS

**City of Irvine Noise Ordinance** – The Noise Element outlines a plan to reduce overall ambient noise exposure in the City at the planning level. The City has adopted a Noise Ordinance that supports plan implementation by outlining regulations and enforcement for short-term environmental exposure from sources such as nuisance noise, operation of equipment, or construction. The City's Noise Ordinance establishes hourly noise level standards for various land use categories affected by stationary noise sources. The ordinance also regulates the timing of construction activities and establishes noise performance standards for other sources, such as commercial deliveries and landscape equipment.

Table 1. City of Irvine Municipal Code Noise Standards

| Zone[1] | Time of Day | Location | Noise Level dBA – Not to be exceeded for: | | | | |
|---|---|---|---|---|---|---|---|
| | | | 30 Min. | 15 Min. | 5 Min. | 1 Min. | Any Time |
| 1 | 7 a.m. to 10 p.m. | Exterior | 55 | 60 | 65 | 70 | 75 |
| | | Interior | --- | --- | 55 | 60 | 65 |
| | 10 p.m. to 7 a.m. | Exterior | 50 | 55 | 60 | 65 | 70 |
| | | Interior | --- | --- | 45 | 50 | 55 |
| 2 | Anytime | Exterior | 55 | 60 | 65 | 70 | 75 |
| | | Interior | --- | --- | 55 | 60 | 65 |
| 3 | Anytime | Exterior | 60 | 65 | 70 | 75 | 80 |
| | | Interior | --- | --- | 55 | 60 | 65 |
| 4 | Anytime | Exterior | 70 | 75 | 80 | 85 | 90 |
| | | Interior | --- | --- | 55 | 60 | 65 |

Source: Irvine Municipal Code, Title 6, Division 8, Chapter 2, Sec. 6-8-204

Land Use Zones
Zone 1 – All hospitals, libraries, churches, schools, and residential properties
Zone 2 – All professional office and public institutional properties
Zone 3 – All commercial properties excluding professional office properties
Zone 4 – All industrial properties

*Aerial view of Irvine*

## RELATIONSHIP TO OTHER ELEMENTS

The Noise Element is related to the Land Use, Housing, Circulation, Conservation and Open Space Elements, as discussed below.

**Land Use Element** – A key objective of the Noise Element is to provide noise exposure information for use in the Land Use Element. When integrated with the Noise Element, the Land Use Element can establish acceptable land uses in relation to existing and projected noise sources.

**Housing Element** – The Housing Element considers the provision of adequate sites for new housing and standards for housing stock. Since residential land use is among the most noise-sensitive, the noise exposure information provided in the Noise Element influences the location of new housing. In some cases, the noise environment may be a constraint on housing opportunities, as state law establishes minimum standards for interior noise exposure.

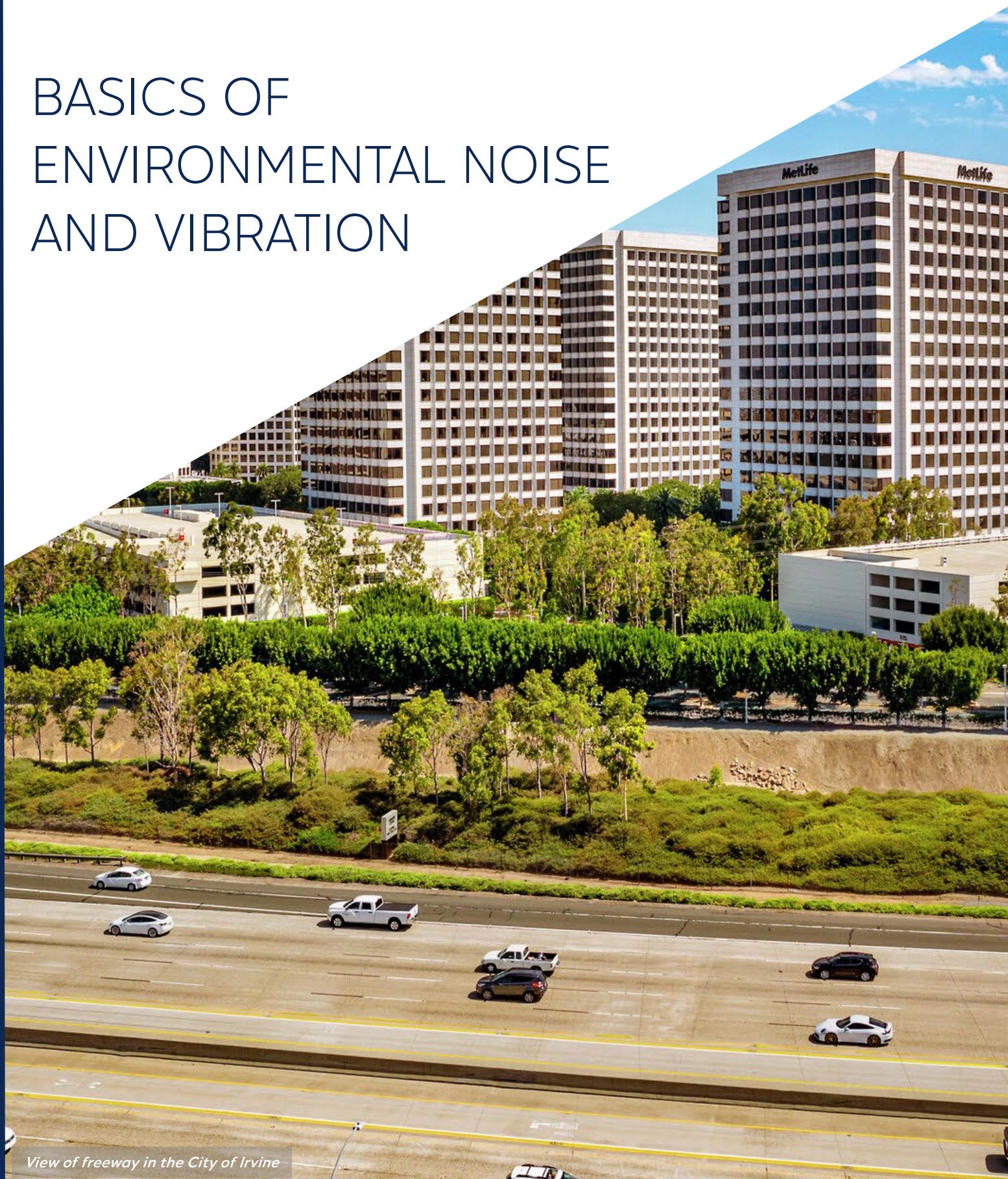
**Circulation Element** – As a major noise contributor in the City, the circulation system must be correlated with the Noise and Land Use Elements. Potential noise exposure also influences the location and design of new transportation facilities, and the consideration of installation of new noise reduction strategies for existing facilities in relation to existing and planned land uses.

**Conservation and Open Space Element** – Noise exposure can interfere with the enjoyment of some recreational pursuits in designated open space and should be considered when planning for this kind of open-space use. However, open space can also be used to buffer sensitive land uses from noise sources through setbacks and landscaping or provide community amenities in a space that would be incompatible with other land uses.

General Plan Element objectives related to the Noise Element are as follows:

| | |
|---|---|
| **Circulation Element: C-1, C-2, C-7, C-15** | **Safety Element: N/A** |
| **Housing Element: HE-A, HE-C** | **EPCA Element: EPCA-2** |
| **Conservation and Open Space Element: COS-9** | **Land Use Element: LU-6** |

# BASICS OF ENVIRONMENTAL NOISE AND VIBRATION




*View of freeway in the City of Irvine*

Noise, as defined in this element, is generally unwanted sound that is considered unpleasant and bothersome. Typical noise levels are shown in **Table 2. Typical A-Weighted Noise Levels.** Unwanted noise can affect people both physically and psychologically. People are usually more sensitive to noise during the evening and nighttime than during the day because of reduced activities, fewer noise emitting sources, and the need for rest. Land uses in which people are especially sensitive to noise include residential, convalescent, and rest homes, in-patient medical facilities such as hospitals, libraries, churches, daycares, and schools.

This element provides guidelines for minimizing noise impacts from various sources.

## DEFINITIONS

The following technical terms provided by the State Office of Planning and Research (OPR) are used throughout this analysis:

**Decibel, dB:** A unit of measurement describing the amplitude of 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 micropascals (20 micronewtons per square meter). This describes a unit called a decibel (dB), which measures how loud a sound is. It uses a comparison to a standard pressure level of 20 micropascals, with the measurement scaled logarithmically.

**Leq**: Equivalent energy level. The sound level corresponding to a steady-state sound level containing the same total energy as a time-varying signal over a given sample period. Leq is typically computed over 1-, 8-, and 24-hour sample periods. Equivalent energy level refers to the sound level that represents the same amount of energy as a fluctuating sound over a specific time. It's often calculated over periods of 1, 8, and 24 hours to provide a standardized measure of sound exposure.

**CNEL**: Community Noise Equivalent Level. The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of five decibels to sound levels in the evening from 7 p.m. to 10 p.m. and after addition of 10 decibels to sound levels in the night from 10 p.m. to 7 a.m. This refers to the average noise level over a 24-hour period, with adjustments for increased sound levels in the evening and at night. Five decibels are added for sound levels from 7 p.m. to 10 p.m., and ten decibels are added for sound levels from 10 p.m. to 7 a.m.

*Housing construction in the City of Irvine*

**A-Weighted Level (dBA):** The sound level in decibels as measured on a sound level meter using the A-weighting 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 and gives good correlation with subjective reactions to noise. This is the noise level measured in decibels using a sound level meter with an A-weighting filter. The filter reduces low and high-frequency sounds to match how our ears perceive noise, giving a more accurate measure of how loud it sounds to us. **Please note the City will use dBA to discuss decibels as it pertains to noise sources, standards, and policies specific to the City.**

**Noise Contours**: Lines drawn about a noise source indicating equal levels of noise exposure. CNEL and Ldn are the metrics utilized herein to describe annoyance due to noise and to establish land use planning criteria for noise. *These are lines drawn around a noise source to show areas with the same level of noise exposure. CNEL and Ldn are used to measure how annoying noise is and to set rules for where different types of activities can happen based on noise levels.*

**Ambient Noise**: 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. *This refers to all the noise from nearby and distant sources combined. Ambient noise level is the usual or typical noise level in a specific area.*

**Ground-borne vibration** is human-made noise caused by oscillations of the ground. Typical sources of ground-borne vibration include explosions, construction, or railway and transit movement.


*Example sources of noise (from top left): Public transportation, construction, Irvine Train Station (Source: Spectrumotion), and traffic*

**Vibration energy** spreads out as it travels through the ground, causing the vibration amplitude to decrease as the distance from the noise source increases. The vibration levels inside a building depend on the vibration energy that reaches the building foundation and the characteristics of the building that affect the propagation of the vibration through the building.

The most common impact associated with vibration in buildings is annoyance resulting from the effects of vibration such as building movement, rattling of windows, shaking of items on shelves or walls, and rumbling sounds. In more extreme cases, building damage may occur. Vibration levels are typically expressed in terms of the peak particle velocity (PPV) and root mean square (rms) amplitude, both in inches per second.

Table 2. Typical A-Weighted Noise Levels

| COMMON OUTDOOR ACTIVITIES | NOISE LEVEL (dBA) | COMMON INDOOR ACTIVITIES |
|---|---|---|
| | – 110 – | Rock band |
| Jet flyover at 1,000 feet | | |
| | – 100 – | |
| Gas lawn mower at 3 feet | | |
| | – 90 – | |
| Diesel truck at 50 feet at 50 miles per hour | | Food blender at 3 feet |
| | – 80 – | Garbage disposal at 3 feet |
| Noisy urban area, daytime<br>*Highways and Freeways | | |
| Gas lawn mower, 100 feet | – 70 – | Vacuum cleaner at 10 feet |
| Commercial area | | Normal speech at 3 feet |
| Heavy traffic at 300 feet | – 60 – | |
| | | Large business office |
| Quiet urban daytime | – 50 – | Dishwasher in next room |
| | | |
| Quiet urban nighttime | – 40 – | Theater or large conference room (background) |
| Quiet suburban nighttime | | |
| | – 30 – | Library |
| Quiet rural nighttime | | Bedroom at night |
| | – 20 – | |
| | | Broadcast/recording studio |
| | – 10 – | |
| | | |
| Lowest threshold of human hearing | – 0 – | Lowest threshold of human hearing |

Source: California Department of Transportation. 2013. Technical Noise Supplement to the Traffic Noise Analysis Protocol. September. Page 2–20.

**Notes:** dBA = A-weighted decibel

* Noise contours from the freeways in many cases overlap with and encompass the noise contours from local roadways, with existing CNEL ranging from 60 – 80.

# AMBIENT NOISE STANDARDS

*City of Irvine movies on the lawn*

The City's noise compatibility standards are shown in Table 3. Interior and Exterior Noise Standards Energy Average (CNEL). Table 3 identifies the maximum interior and exterior noise levels for each land use category. The standards assume the incorporation of California State Law requirements into all projects.

Table 3. Interior and Exterior Noise Standards Energy Average (CNEL)

| LAND USE CATEGORIES | | ENERGY AVERAGE (CNEL) | |
|---|---|---|---|
| Categories | Uses | Interior[1] | Exterior[2] |
| Residential | Single-Family, Multiple Family | 45[3] 55[4] | 65[7] |
| | Mobile Home | ---- | 65[5] |
| Commercial/ Industrial | Hotel, Motel, Transient Lodging | 45 | 65[6] |
| | Commercial, Retail, Bank, Restaurant | 55 | ---- |
| | Office Building, Professional Office, Research & Development | 50 | ---- |
| | Amphitheater, Concert Hall, Auditorium, Meeting Hall | 45 | ---- |
| | Gymnasiums (Multipurpose) | 50 | ---- |
| | Health Clubs | 55 | ---- |
| | Manufacturing, Warehousing, Wholesale, Utilities | 65 | ---- |
| | Movie Theatre | 45 | ---- |
| Institutional | Hospital, School /Classroom | 45 | 65 |
| | Church, Library | 45 | ---- |
| Open Space | Parks | ---- | 65 |

Source: City of Irvine, 2015

Notes:
1. Interior environment excludes bathrooms, toilets, closets, and corridors; 2. Outdoor environment limited to private yard of single-family or multi-family residences private patio which is accessed by a means of exit from inside the unit; mobile home park; hospital patio; park picnic area; school playground; and hotel and motel recreation area.; 3. Noise level requirement with closed windows. Mechanical ventilating system or other means of natural ventilation shall be provided pursuant to Appendix Chapter 12, Section 1208 of Uniform Building Code.; 4. Noise level requirement with open windows if they are used to meet natural ventilation requirement. 5. Exterior noise level shall be such that interior noise level will not exceed 45 CNEL.; 6. Except for those areas affected by aircraft noise. 7. Multi-family developments with balconies that do not meet the 65 CNEL are required to provide occupancy disclosure notices to all future tenants regarding potential noise impacts.

**Land Use Noise Compatibility: Table 4. Land Use/Noise Compatibility** identifies the compatibility of proposed projects and future noise levels. The diagram is used in evaluating new development projects, including General Plan amendments, zone changes, tentative maps, conditional use permits, and master plans.

Table 4. Land Use/Noise Compatibility

| LAND USE CATEGORIES | | ENERGY AVERAGE (CNEL) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| **RESIDENTIAL** | Single-Family | A | A | B | B | C | D | D |
| **RESIDENTIAL** | Mobile Home | A | A | B | B | C | D | D |
| **COMMERCIAL** Regional | Hotel, Motel, Transient Lodging | A | A | B | B | C | C | D |
| **COMMERCIAL** Regional Community | Commercial Retail, Bank, Restaurant, Movie Theatre | A | A | A | A | B | B | C |
| **COMMERCIAL** Community **INDUSTRIAL & INSTITUTIONAL** | Office Building, Research & Development, Professional Office, City Office Building | A | A | A | B | B | C | D |
| **COMMERCIAL** Recreation **INSTITUTIONAL** General | Amphitheatre, Concert Hall, Auditorium, Meeting Hall | B | B | C | C | D | D | D |
| **COMMERCIAL** Recreation | Children's Amusement Park, Miniature Golf, Go-Cart Track, Health Club, Equestrian Center | A | A | A | B | B | D | D |
| **COMMERCIAL** Community **INDUSTRIAL** General | Automobile service station, Auto Dealer, Manufacturing, Warehousing, Wholesale, Utilities | A | A | A | A | B | B | B |
| **INSTITUTIONAL** General | Hospital, Church, Library, School/Classrooms | A | A | B | C | C | D | D |
| **OPEN SPACE** | Parks | A | A | A | B | C | D | D |
| **OPEN SPACE** | Golf Courses, Nature Centers, Cemeteries, Wildlife Reserves, Wildlife Habitat | A | A | A | A | B | C | C |
| **AGRICULTURAL** | Agriculture | A | A | A | A | A | A | A |

Source: City of Irvine, 2015

Interpretation:

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

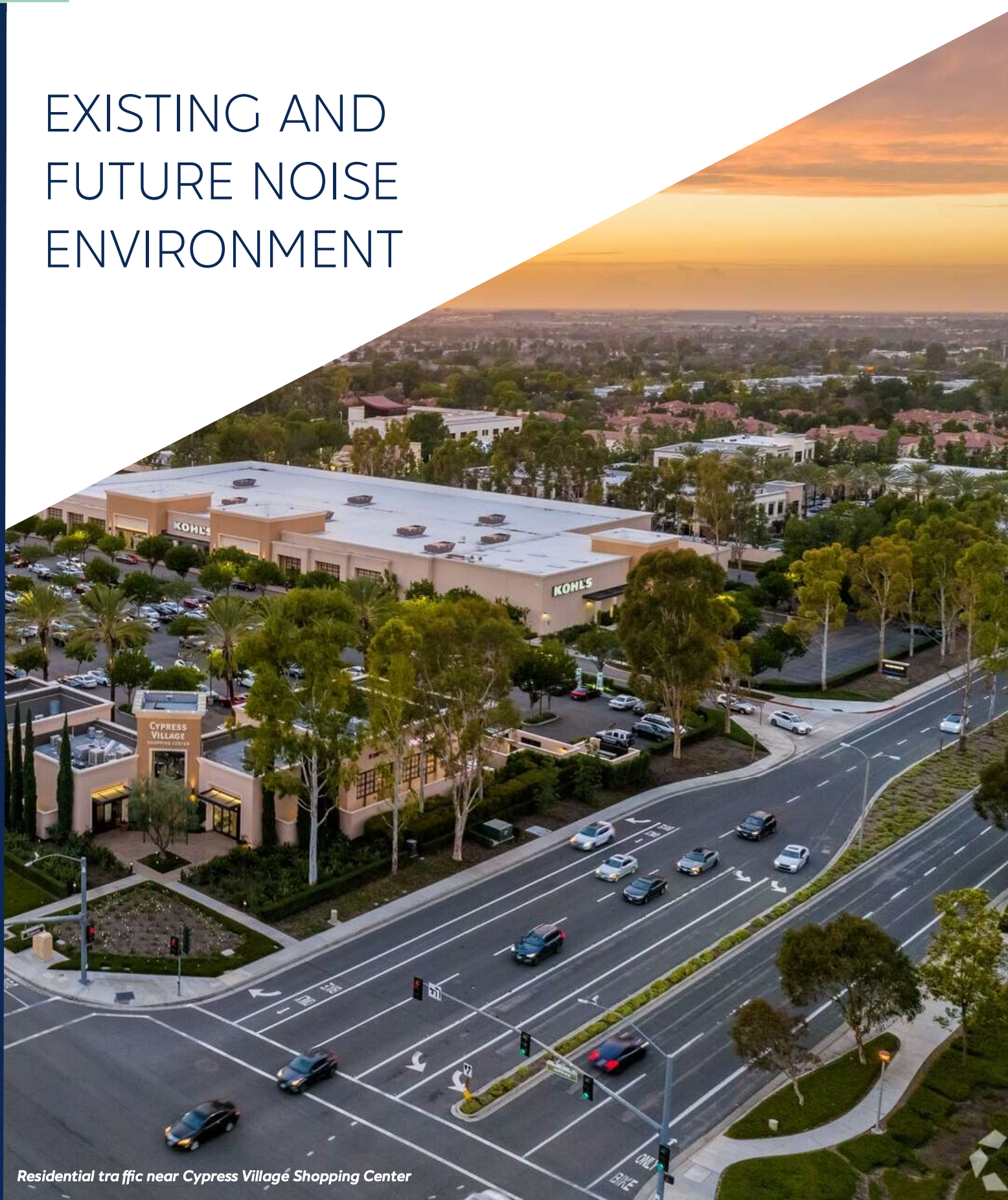
**Single Event Noise Standard:** The maximum interior noise levels of the loudest 10% of single noise events [Lmax(10)] for noise-sensitive land uses within the 60 CNEL of aircraft and railroad noise sources shall not exceed 65 dBA between 7 a.m. and 7 p.m. nor 55 dBA between 7 p.m. and 7 a.m. for typical occupancy.

(Note: The samples for single event noise measurement must include representative aircraft operation.)

*Pacific Surfliner: Source: Amtrack CA*

*John Wayne Airport. Source: The Toidi/Shutterstock*

# EXISTING AND FUTURE NOISE ENVIRONMENT




*Residential tra ffic near Cypress Village Shopping Center*

The most pervasive noise in Irvine currently comes from mobile noise sources such as motor vehicles, railroads, and aircraft. The City is also exposed to noise emanating from sources such as industrial, commercial, and construction activities. These sources are anticipated to continue to be the major noise contributors in the City. Unwanted noise is divided into two major categories of noise sources – mobile and stationary. Existing noise sources are described below.

## MOBILE NOISE SOURCES

Mobile sources are transportation-related (non-fixed) including motor vehicles, railroad, and aircraft. Motor vehicle noise is characterized by a high frequency of events, short duration, and proximity to areas sensitive to noise exposure. Rail transit and aircraft operations frequently generate extremely high noise levels which are disruptive to human activity. These mobile sources are described individually below.

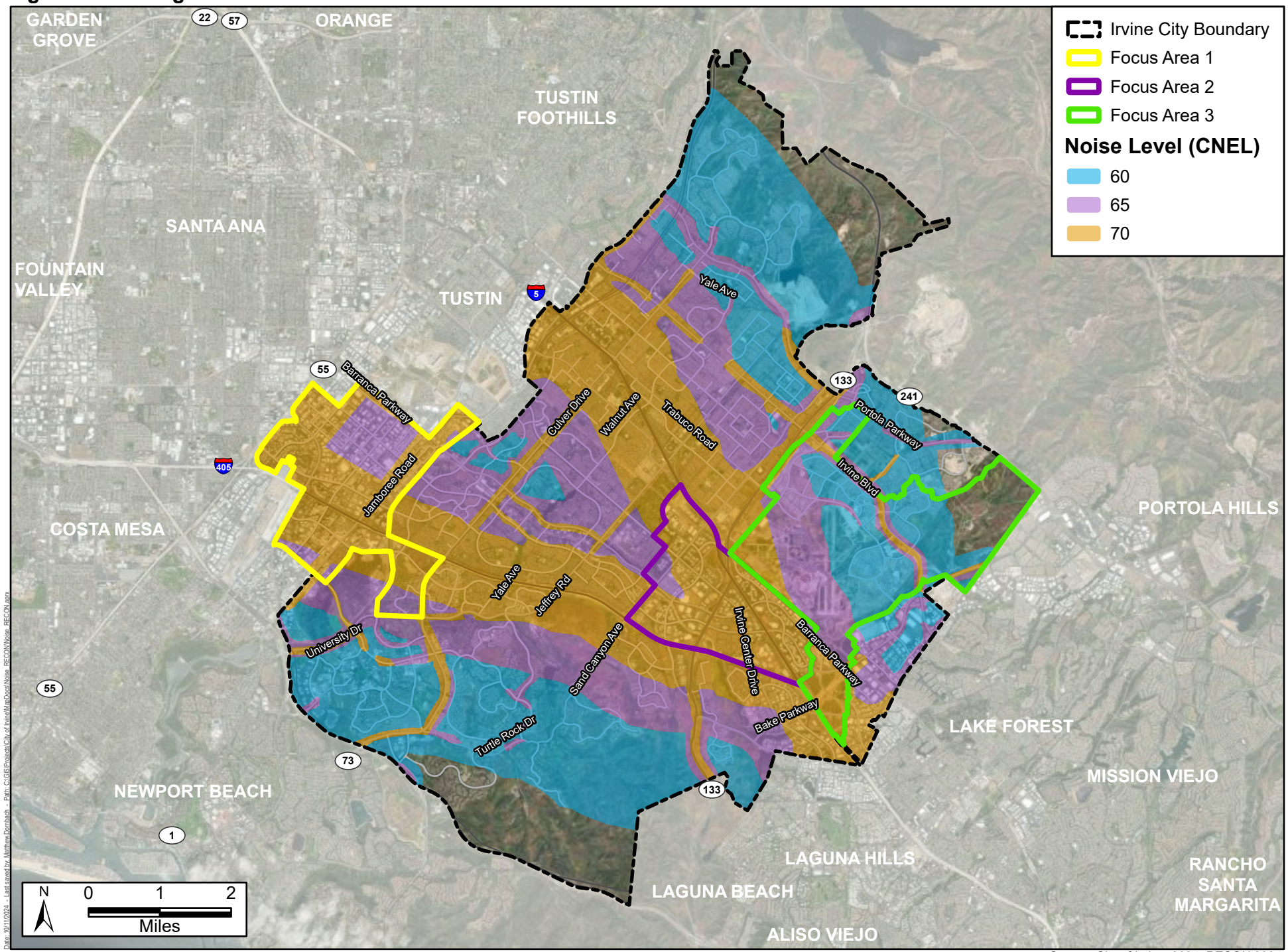
### MOTOR VEHICLES

Sources of vehicular traffic noise are automobiles, buses, trucks, and motorcycles. Noise is generated by engines, exhaust systems, transmissions, fans, tires, and air movement. The noise level is relatively constant on major roads where traffic is heavy and intermittent on neighborhood streets where traffic is lighter. The freeways traversing Irvine like the Santa Ana (I-5), San Diego (I-405), and Eastern Transportation Corridor toll roads (SR-133 and SR-261) generate significant traffic noise, particularly during peak commute hours. In addition to its freeways, the City also features large arterial roads that run through extensive residential areas, moving significant amounts of traffic across the City.

**Figure 1. Existing Traffic Contours** illustrates the existing noise contours for major roadways in the City. **Figure 2. Future Traffic Noise Contours** illustrates noise contours from anticipated future operations.

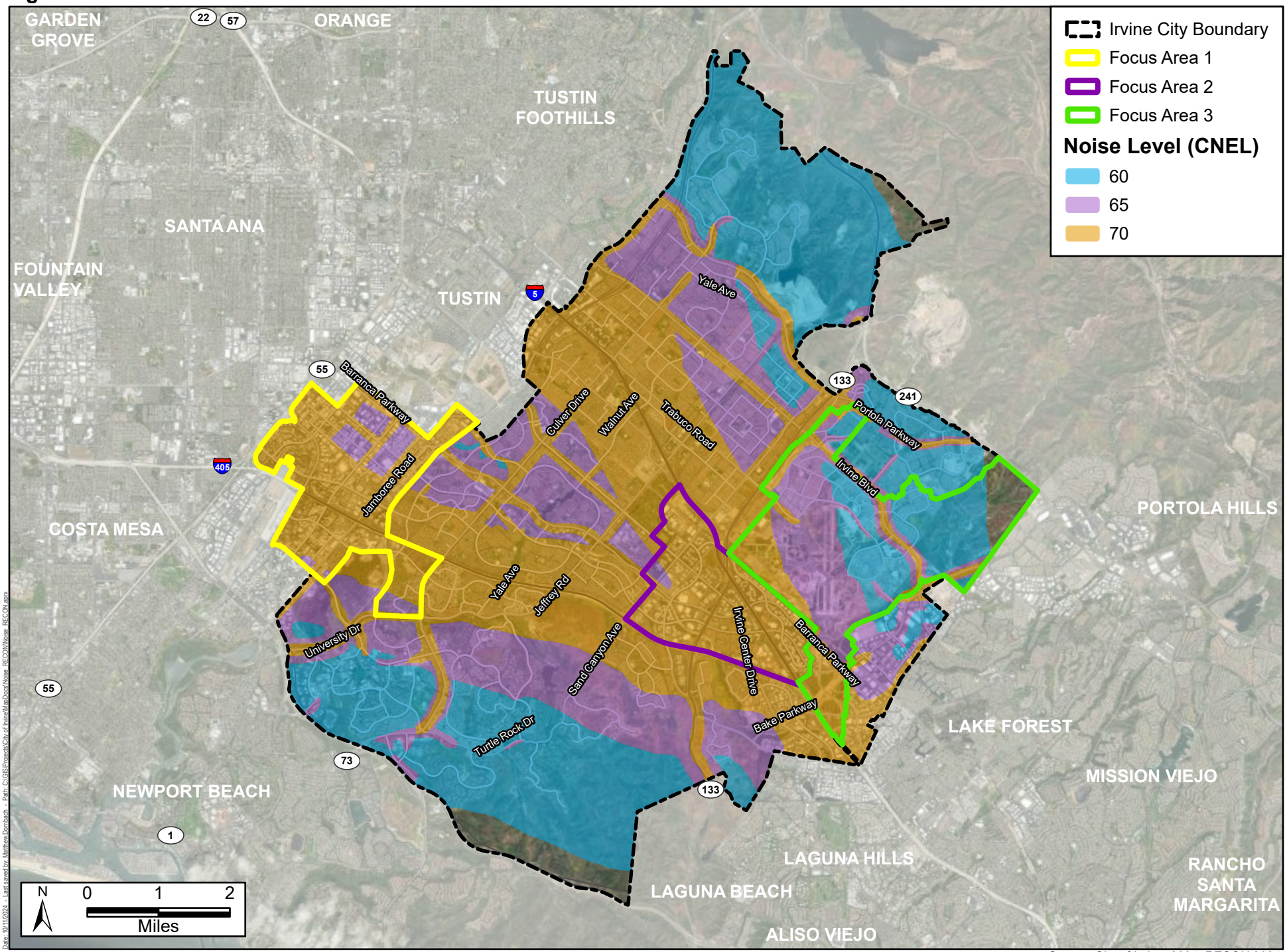
*Aerial view of the Irvine Spectrum*

## Figure 1. Existing Traffic Noise Contours




Source: City of Irvine, 2024; RECON 2024.

## Figure 2. Future Traffic Noise Contours




Source: City of Irvine, 2024; RECON 2024.

## RAILROADS

Railroad noise is the result of the mechanical processes of the engine, the interaction of the wheels with the track, and the use of the whistle. The amount of noise generated is dependent upon the speed of the train and the number of cars. In Irvine, there are regular passenger rail services provided by Amtrak and Metrolink, with a station stop named Irvine Station located near the Spectrum Center in the southeastern part of the City. Irvine Station holds the distinction of being the busiest station in Orange County, catering to more than one million commuters each year. The railway facilitating these operations runs through the central area of the City. **Figure 3. Railroad Noise Contours** illustrates the existing noise contours for railroad operations in the City.

## AIRCRAFT

There is a varied nature of aviation activities, including general aviation, commuter, military, and commercial operations, with distinct characteristics and intensity levels associated with each. General aviation activities typically entail smaller aircraft movements characterized by lower noise levels compared to larger commercial aircraft. Commuter flights, often involving regional carriers, contribute to a moderate level of noise due to their frequency and proximity to residential areas.

Military operations, while sporadic, may produce significant noise disturbances during training exercises and aircraft maneuvers. Commercial flights, representing the bulk of airport activity, generate considerable noise, particularly during takeoff and landing phases.


*The Irvine Station*

By addressing these nuanced sources of noise, the Noise Element aims to devise comprehensive strategies to reduce impacts and foster a harmonious coexistence between airport operations and surrounding communities.

Ground facilities and maintenance functions also contribute to airport-related noise impacts. Ground facilities, including maintenance hangars, fueling stations, and cargo handling areas, are integral components of airport infrastructure but also serve as sources of noise emissions. Activities such as aircraft maintenance, refueling operations, and ground vehicle movements generate varying levels of noise, which can impact adjacent communities and sensitive receptors.

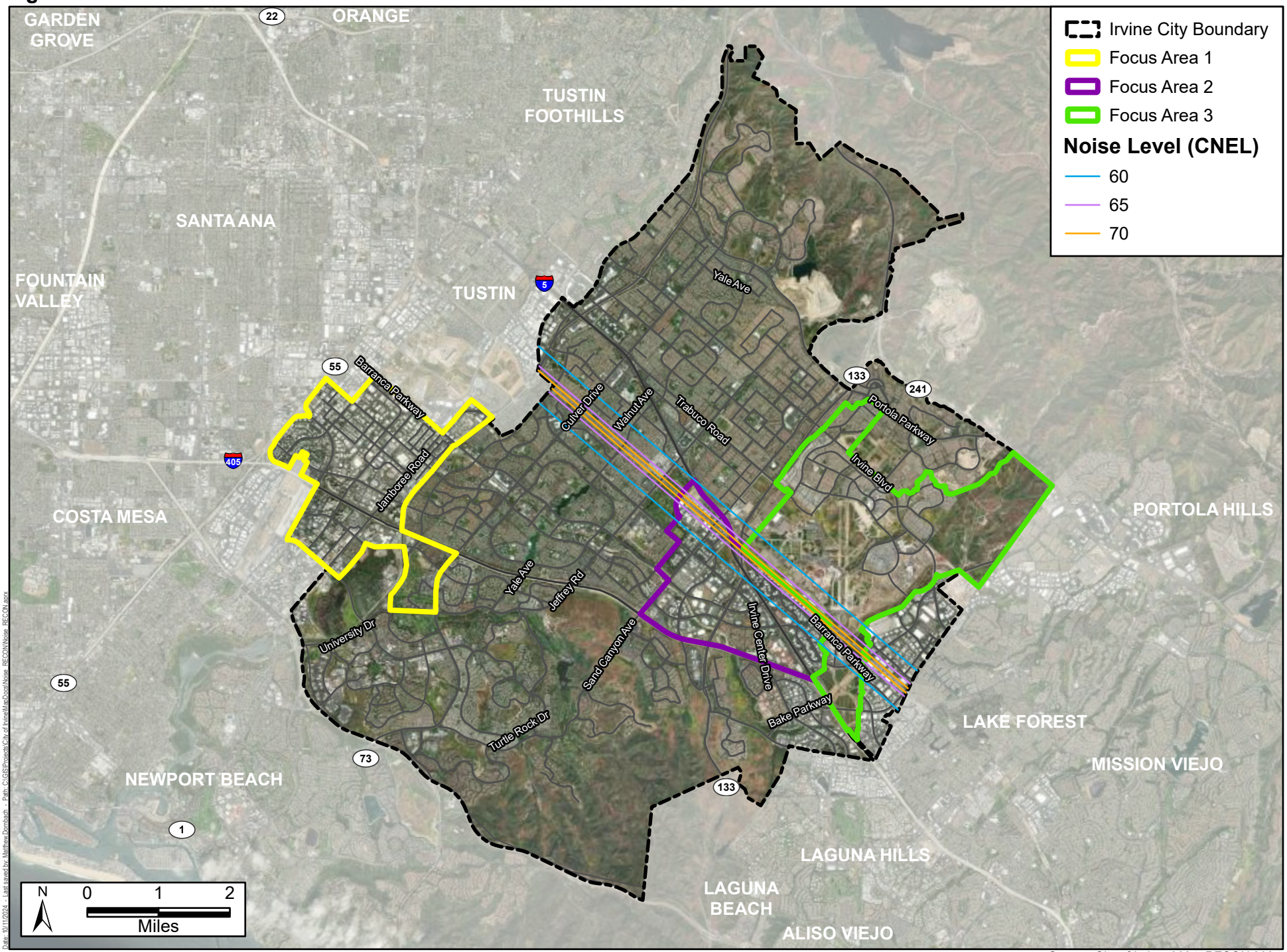
Aircraft noise generally affects areas within the airport vicinity during takeoffs and landings, and areas located around the flight tracks. In 2022, John Wayne Airport reported 303,970 flights with 202,366 attributed to general aviation, 95,260 to commercial, 5,878 to commuter, and 466 to Military.

Current airborne noise sources in Irvine result from civil air operations at the John Wayne Airport (SNA). It is expected that over the years, noise impacts to the City from aircraft operations at John Wayne Airport will not increase due to agreements in place restricting the number of flights, hours of noise, and aggregate noise. As a civil airport, John Wayne Airport is subject to State Airport Noise Regulation (Title 21), requiring efforts to reduce airport noise impact on existing communities.

**Figure 4. John Wayne Airport Noise Contours** illustrates the existing noise contours for John Wayne Airport.

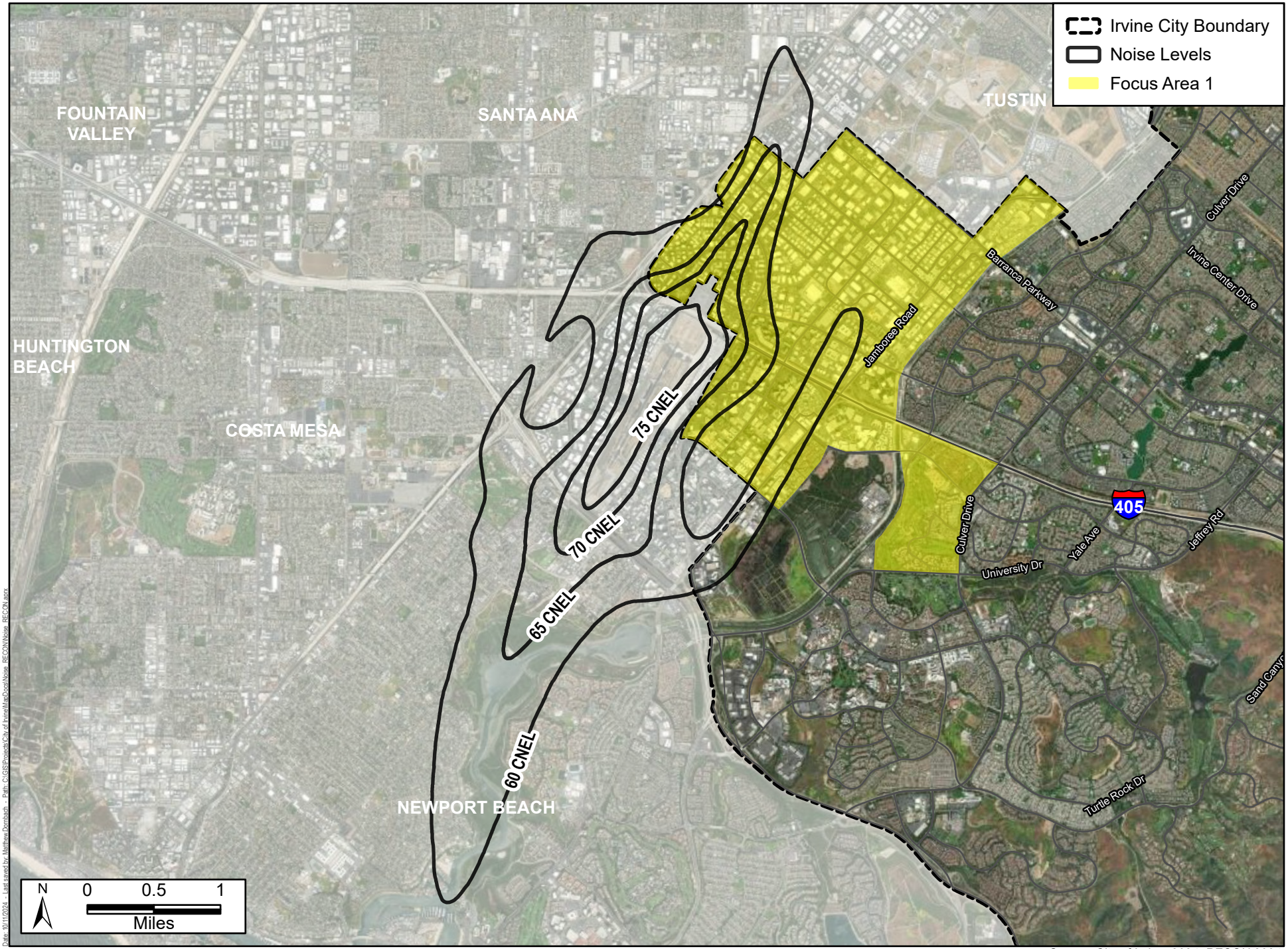
*Freeway near John Wayne Airport*

## Figure 3. Railroad Noise Contours




Source: City of Irvine, 2024; RECON 2024.

**Figure 4. John Wayne Airport Noise Contours**




Source: City of Irvine, 2024; RECON 2024.

## STATIONARY NOISE SOURCES

Stationary noise sources are the noise sources in the community such as industrial and mechanical equipment, which are often referred to as "fixed sources." Industrial noise generated by processing and operation is usually of long duration at relatively low frequencies. Construction sources generate high noise levels for temporary, but sometimes extended periods of time from operation of heavy equipment. Other land uses such as commercial development may result in generally nuisance noise exposure from high amounts of activity, maintenance activities, and mechanical noise. Examples of stationary sources within the City include:

- University of California, Irvine (special events)
- Frank R. Bowerman Landfill (hauling and operational activities)
- Heating
- Ventilation and air conditioning (HVAC) units
- Various power tools such as lawnmowers or leaf blowers; mechanical equipment required for operation such as car wash facilities
- Animal noise
- Human-related activities such as loud parties, loud music, radio, T.V., or children playing
- Event spaces and amphitheaters result in periodic noise exposure from amplified noise and crowd activity.

## VIBRATION

Vibration refers to the oscillating movement of the earth, transmitted through waves like noise, but through solid objects or the ground. Unlike noise, vibration is often felt rather than heard due to the frequency of sound waves. It can arise naturally from phenomena like earthquakes or be caused by human activities such as explosions, heavy machinery operations, or heavy vehicles, all of which can have continuous and transient effects similar to noise, potentially impacting human well-being. Railroad operations are a typical source of ground-borne vibration with trains producing significant amounts of vibration via their engines, steel wheels, heavy loads, and interactions between wheels and rails. Construction operations are also another source of vibration in which the blasting and demolition of structures produce the most intense vibrations, while vibratory compactors or rollers, pile drivers, and pavement breakers can also cause notable ground-borne vibration.

*Frank R. Bowerman Landfill*

# GOALS, OBJECTIVES, POLICIES, AND IMPLEMENTATION MEASURES

*Sunset view of Irvine neighborhood*

*Residents at Beacon Park*

The City is dedicated to ensuring a healthy noise environment for its residents, recognizing the importance of peace and tranquility in urban living. As part of the City's commitment to maintaining a healthy noise environment, attention has been directed towards addressing the following noise-related considerations:

**How can the City ensure that residents are not exposed to excess mobile noise levels?**

**How can the City ensure that residents are not exposed to excess stationary noise levels?**

**How can these regulations be coordinated to provide a healthy noise environment?**

**How can public awareness in this area be increased?**

As the City develops further, it is expected that noise levels will increase. However, these noise impacts can be reduced and addressed proactively through the employment of goals, objectives, policies, and implementation measures that follow.


City of Irvine Inspection Team

## Goal 1. Noise Control Through Land Use Planning and Design

**Objective N-1. Maintain healthy and safe noise environments consistent with the standards in Table 1 through site design and location.**

### POLICIES:

**Policy (a):** Require all plans submitted for development review to demonstrate whether the plan area is located within an existing or future Noise Element noise contour, including vehicle, rail, and aircraft noise contours.

**Policy (b):** Avoid new residential development within the 65 dBA CNEL contour for aircraft, roadway, or rail noise unless "normally compatible" exterior noise standards can be maintained in private open spaces, and interior noise standards can be achieved through building design.

**Policy (c):** Require noise studies to be prepared in accordance with the City's environmental review procedure for all projects that are not "clearly compatible" with the future noise level at the site. Require proposed development projects located in areas that are not "clearly compatible" to demonstrate the incorporation of adequate noise attenuation techniques to achieve compatible interior noise levels.

**Policy (d):** Require noise attenuation for private usable outdoor spaces (backyards and single-family housing developments, and balconies or recreation areas in multifamily housing developments) in all developments where projected exterior noise levels exceed "normally compatible" exterior noise standards.

**Policy (e):** Require the following Single Event Noise Standard for noise-sensitive land uses within the 60 CNEL of aircraft and railroad noise sources:

- The maximum interior noise levels of the loudest 10% of single noise events [Lmax(10)] shall not exceed 65 dBA between 7 a.m. and 7 p.m. nor 55 dBA between 7 p.m. and 7 a.m. for typical occupancy. Noise monitoring conducted to determine maximum single-event noise must include representative aircraft operation.

**Policy (f):** Require noise studies conducted per Policy (c) to identify all the measures necessary to reduce noise levels to meet the interior and exterior noise compatibility standards (Table 1) and Single Event Noise Standard (Objective N -1, Policy e), as applicable.

**Policy (g):** Consider conditioning noise-sensitive land uses such as hospitals, libraries, churches, and schools located in areas not "clearly compatible" to demonstrate how exterior noise exposure would be minimized, such as building orientation, shielding, or limiting outdoor programs.

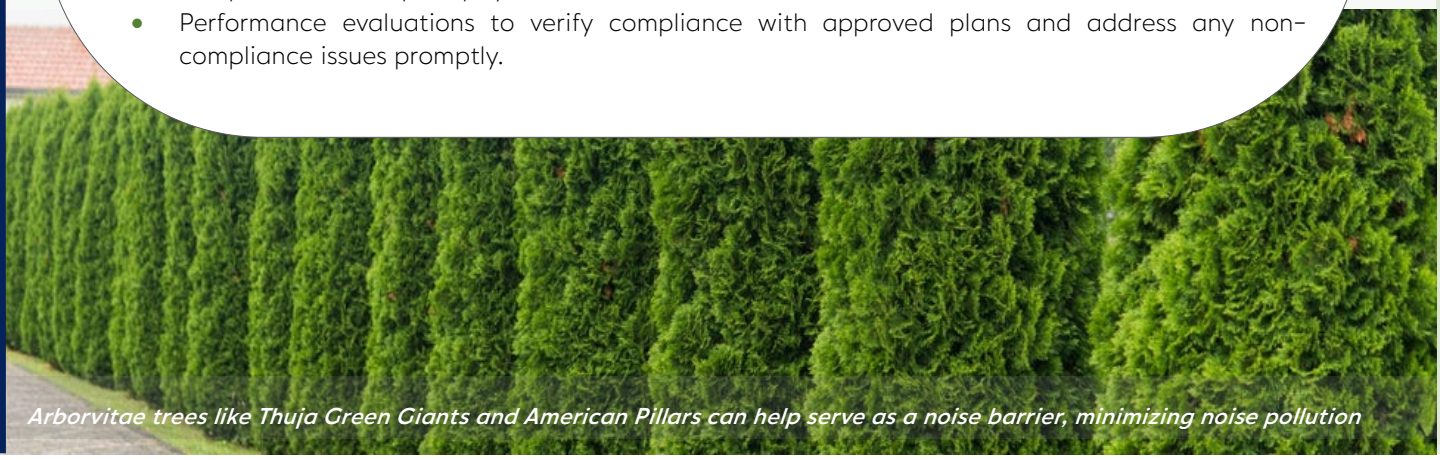
**Policy (h):** Require that mixed-use and multi-family residential developments demonstrate noise compatibility between uses. Structures will adequately isolate noise between adjacent uses through features such as orientation, window, and building insulation, or separation of common walls. Nuisance noise areas such as loading areas, parking lots, driveways, trash enclosures, mechanical equipment, and other noise sources will be located away from the residential portion of the development when physically feasible.

**Policy (i):** Require that new development plans demonstrate that implementation would maintain clearly or normally compatible noise levels at existing receptors. In areas where existing ambient noise levels exceed acceptable noise criteria, require that the project demonstrates that implementation would not result in a more than 3 dBA CNEL change in ambient conditions, including from project-generated vehicle noise sources.

*City of Irvine Building and Safety Inspection Services*

## IMPLEMENTATION MEASURES

- Conduct comprehensive noise impact assessments for proposed development projects to evaluate potential noise sources and their impact on surrounding areas. Use predictive modeling and noise mapping techniques to assess noise levels at different locations and identify attenuation measures to ensure compliance with noise standards.
- Prioritize site selection for new development projects in areas with lower ambient noise levels and minimal exposure to noise sources, such as heavy traffic or industrial activities. Consider proximity to noise-sensitive land uses, such as residential areas, schools, hospitals, and parks, when siting new developments.
- Establish noise buffer zones or green spaces between noise-generating activities and noise-sensitive land uses to reduce the transmission of noise and protect vulnerable populations. Designate setbacks or open space corridors to create natural barriers that absorb or deflect noise away from sensitive receptors.
- Orient buildings and structures to minimize exposure to noise sources and maximize natural sound attenuation. Design building layouts and configurations to create quiet zones or shield noise-sensitive areas from adjacent noise sources, such as roads, railways, or industrial facilities.
- Incorporate sound-absorbing materials, insulation, and architectural features into building design and construction to reduce indoor noise levels and enhance occupant comfort. Utilize noise-reducing technologies, such as double-glazed windows, soundproofing walls, and resilient flooring, to reduce noise intrusion from external sources.
- Implement traffic calming measures, such as speed limits, traffic calming devices, and road design modifications, to reduce vehicle-related noise emissions and enhance pedestrian safety. Design access routes and circulation patterns to minimize noise impacts on adjacent properties and improve traffic flow efficiency.
- Utilize landscaping and vegetation strategies to create natural barriers and absorb sound waves, reducing the transmission of noise between land uses. Plant trees, shrubs, and hedges strategically to create green buffers and enhance visual screening while providing habitat and aesthetic benefits.
- Engage with local communities, stakeholders, and residents early in the planning and design process to solicit input, address concerns, and build consensus around noise reduction strategies.
- Implement monitoring programs to assess compliance with noise standards and evaluate the effectiveness of noise reduction measures over time. Conduct regular inspections, noise surveys, and performance evaluations to verify compliance with approved plans and address any non-compliance issues promptly.
- Performance evaluations to verify compliance with approved plans and address any non-compliance issues promptly.



*Arborvitae trees like Thuja Green Giants and American Pillars can help serve as a noise barrier, minimizing noise pollution*

## Goal 2. Stationary Noise Sources

**Objective N-2. Reduce noise from non-transportation sources such that City residents are not exposed to stationary noise levels that exceed City Noise Ordinance standards.**

*Children playing at a community park in Irvine*

**POLICIES:**

**Policy (a):** Require any new construction to meet the City Noise Ordinance standards. The project applicant will be required to submit construction-related noise reduction strategies for review and approval prior to the issuance of grading permits.

**Policy (b):** Require project applicants to depict, on any appropriate development application review (including, but not limited to, zone change, subdivisions, conditional use permit, site plan, and building plans), any potential noise sources known at the time of submittal and reduction measures that ensure these noise sources meet the City Noise Ordinance standards. Such sources include, but are not limited to, the following:

- Truck pickup and loading areas.
- Mechanical and electrical equipment such as air conditioning, swimming
- Pool pumps and filters, and spa pumps.
- Exterior nuisances such as speaker boxes and outdoor public address systems.

**Policy (c):** Limit the hours of operation for portions of parks and active recreation uses adjacent to residential areas to daytime hours to minimize disturbance to residents.

**Policy (d):** Require outdoor events with amplified noise to implement best management practices to reduce nuisance noise exposure.

*Mid-Autumn Festival 2024*

*City of Irvine Circulation Workshop*

*City of Irvine Land Use Workshop*

*I5 Sound Wall in Santa Ana*
*Source: OC Register*

## IMPLEMENTATION MEASURES

- Review and, if necessary, revise existing City noise ordinances to ensure they are comprehensive, up-to-date, and aligned with current noise standards and best practices.
- Regularly monitor sources of excessive noise and ensure compliance with noise ordinance standards. Deploy noise monitoring equipment strategically in areas with high noise levels and prioritize enforcement efforts based on complaints, noise hotspots, and potential health impacts.
- Launch public awareness campaigns to educate residents, businesses, and property owners about the importance of reducing noise pollution and complying with noise ordinance regulations. Provide information on common sources of noise, the health effects of excessive noise exposure, and tips for reducing noise at the source.
- Encourage the adoption of noise reduction measures by businesses, industries, and construction sites to reduce noise emissions. This may include installing sound barriers, acoustic insulation, noise-reducing equipment, or implementing noise control measures during construction activities.
- Integrate noise considerations into land use planning and zoning regulations to prevent incompatible land uses and minimize potential conflicts between noise-sensitive and noise-generating activities. Designate quiet zones or buffer areas between residential neighborhoods and noise-generating facilities, such as industrial zones or entertainment venues.
- Engage with local communities, neighborhood associations, businesses, and other stakeholders to gather input and feedback on noise concerns and potential reduction measures. Foster dialogue and collaboration to develop tailored solutions that address specific community needs and preferences.
- Invest in research and development of innovative technologies for noise reduction, such as noise-absorbing materials, quiet machinery, and noise-canceling devices. Provide incentives or grants to encourage the adoption of these technologies by businesses and industries.
- Collect and analyze data on noise levels, complaints, and enforcement actions to track progress toward noise reduction goals and identify emerging trends or areas requiring additional attention. Use this information to refine noise management strategies and allocate resources effectively.
- Collaborate with other governmental agencies, non-profit organizations, academic institutions, and industry stakeholders to leverage resources, expertise, and best practices in noise abatement efforts.

## Goal 3. Noise Abatement

**Objective N-3. Achieve maximum efficiency in noise abatement efforts through establishing minimum standards, intergovernmental coordination, and public information programs.**

*City of Irvine Health and Wellness Steering Committee*

### POLICIES:

**Policy (a):** Coordinate efforts to reduce noise impacts with appropriate public and government agencies, such as aircraft and transit regulatory agencies.

**Policy (b):** Monitor federal and state legislation and programs that will reduce noise in Irvine.

**Policy (c):** Use appropriate enforcement agencies to enforce the appropriate noise standards in the state's motor vehicle code and other state and federal legislation for mobile noise sources, including regulation of illegal or faulty exhaust systems, and excessive speed laws.

**Policy (d):** Update highway/railroad noise levels (Table 2) whenever the City's Irvine Traffic Analysis Model (ITAM) has been significantly changed.

**Policy (e):** Seek the cooperation of aircraft regulatory agencies in the modification and selection of flight paths that will reduce noise impacts on residential and other noise-sensitive areas.

**Policy (f):** Ensure that any proposal to update aircraft noise contours used by the City of Irvine for planning analysis is submitted, before adoption by the City, to the Airport Land Use Commission.

**Policy (g):** Minimize the use of noise barriers to reduce noise exposure. Consider other attenuation strategies, such as alternative development siting, soundproofing sensitive receptors, building orientation and setbacks, providing buffer areas or landscape berms, modifying source operating hours, modifying roadway design, or utilizing quieter pavement strategies, as applicable, prior to proposing noise barrier installation.

**Policy (h):** Consider the following in the design of new highways and streets to minimize noise exposure:

- Alignment: The three-dimensional position of the road, as it relates to distance from sensitive receptors.
- Barriers: Any solid material that shields a receiver from a given source of noise. Types of barriers include walls, berms, hills, and intervening structures.
- Lateral separation: The horizontal distance between the road and a receiver, which may position an alignment to maximize the distance to the receiver.
- Vertical profile: The path of a roadway in the vertical direction, either below-grade (depressed), above-grade (elevated), or at-grade relative to areas adjacent to the road. Generally, traffic noise levels along depressed roadways are substantially lower than those along roadways that are at grade.

**Policy (i):** Examine the existing and projected future noise environment when considering amendments to the City's circulation system. Conduct a noise study to determine whether the project would increase ambient noise levels by more than 3 dBA or cause noise levels to exceed acceptable noise standards for adjacent designated land use categories. If so, implement project features, such as the installation of upgraded windows, to achieve acceptable interior noise standards (Table 1) at affected receptors. For federally funded roadway construction projects, the applicable sound limits shall be the Federal Highway Administration Standards.

**Policy (j):** Reduce noise impacts from mobile sources by encouraging the use of alternative modes of transportation. (See Circulation Element)

**Policy (k):** Participate in cooperative efforts with transit authorities, including the Orange County Transit Authority, to fund and construct grade separations through residential areas of the City, considering all potential funding sources.

**Policy (l):** Disseminate public information regarding City noise regulations and programs, the health effects of high noise levels, and means of reducing such levels.

**Policy (m):** Reduce community noise levels by continuing to maintain roadways so that the paving is in good condition to reduce noise-generating cracks, bumps, and potholes.

**Policy (n):** Encourage rail operators to minimize the level of noise produced by train movements and whistle noise within the City by reducing the number of nighttime operations and improving vehicle system technology.

**Policy (o):** Limit "through truck traffic" to designated routes to minimize noise impacts to residential neighborhoods and other noise-sensitive uses (See Circulation Element).

*Street traffic in Orange County*

*Amtrak Pacific Surfliner Train Source: OC Register*

*Sand Canyon Undercrossing Source: OCTA*

## IMPLEMENTATION MEASURES

- Update existing and develop new comprehensive noise regulations or standards as needed to ensure efficacy with the limits set for various sources of noise, including industrial, transportation, and recreational activities. These standards will be based on scientific research and best practices to ensure effective noise abatement.
- Foster collaboration and coordination among different levels of government (local, regional, and national) to address noise issues comprehensively. This may involve creating interagency task forces, establishing joint planning initiatives, and sharing resources for noise monitoring and enforcement.
- Launch public information campaigns to raise awareness about the impacts of noise pollution on health and well-being. Provide information on how individuals can reduce their own noise emissions and advocate for quieter communities. Utilize various communication channels such as social media, websites, community events, and educational materials to reach a broad audience.
- Conduct comprehensive noise mapping and assessment studies to identify areas with high noise exposure levels and prioritize interventions. Use advanced technologies such as Geographic Information Systems (GIS) to visualize noise data and support evidence-based decision-making.
- Engage with local communities, residents, businesses, and advocacy groups to solicit input and feedback on noise abatement priorities and strategies. Foster dialogue and collaboration to develop tailored solutions that address specific concerns and needs of different stakeholders.
- Invest in research and development of innovative noise reduction technologies and solutions for various sectors, including transportation, construction, manufacturing, and urban planning.
- Strengthen enforcement mechanisms to ensure compliance with noise regulations and standards. Implement regular monitoring programs, conduct inspections, and impose penalties for violations. Provide training and resources to enforcement agencies to enhance their capacity to address noise complaints effectively.
- Establish incentive programs to encourage businesses, industries, and individuals to invest in noise reduction measures voluntarily. Offer tax incentives, grants, or subsidies for noise abatement projects, retrofitting of noisy equipment, or adoption of sound insulation measures in buildings.
- Implement robust monitoring and evaluation systems to assess the effectiveness of noise abatement efforts over time. Track key performance indicators, such as noise levels, complaint rates, and public satisfaction, to measure progress and identify areas for improvement.

## Goal 4. Ground-Borne Vibration

**Objective N-4. Minimize exposure to ground-borne vibration such that City residents are not exposed to nuisance vibration or potential building damage.**

### POLICIES:

**Policy (a):** Coordinate with rail operators to minimize vibration exposure through routine maintenance of wheel and rail surfaces.

**Policy (b):** Require all plans submitted for development review that include the use of pile-driving and blasting during construction to consider alternative methods to minimize the potential for building damage and temporary nuisance exposure.

**Policy (c):** Require all plans submitted for development review to utilize vibration standards published by the Federal Transit Administration to evaluate the potential effects of vibration exposure from new vibration sources, such as construction, or siting of new receptors near existing vibration sources, such as rail operations.

### IMPLEMENTATION MEASURES

- Develop and enforce regulations or guidelines specifying acceptable levels of ground-borne vibration. These regulations will be based on standards set by relevant authorities or industry best practices.
- Explore the utilization of vibration monitoring equipment at strategic locations throughout the City to continuously measure ground-borne vibration levels. This data can be used to identify problem areas and assess the effectiveness of reduction measures.
- Identify and assess sources of ground-borne vibration, such as construction activities, heavy traffic, industrial operations, or public transportation systems. Determine which sources contribute most significantly to the problem and prioritize reduction efforts accordingly.
- Implement construction techniques that minimize ground-borne vibration, such as using vibration-dampening materials, vibration isolation measures, or scheduling noisy activities during off-peak hours.
- Implement traffic management strategies to reduce vehicle-induced vibration, such as traffic calming measures, route optimization, or restrictions on heavy vehicles in sensitive areas.
- Explore the use of quieter vehicles, buses, and/or trains or consider retrofitting existing infrastructure with noise-reducing technologies.
- Promote building designs that incorporate measures to reduce the transmission of ground-borne vibration, such as adequate building separation, resilient building materials, or structural isolation systems.
- Raise awareness among residents, businesses, and construction companies about the impacts of ground-borne vibration and the importance of implementing reduction measures. Provide resources and guidance on how to minimize vibration emissions and protect buildings from damage.
- Invest in research and development of new technologies, materials, and techniques for reducing ground-borne vibration. Encourage innovation through grants, partnerships with academic institutions, or industry collaborations.