

# Noise

*September 2022*

Noise

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# Responses to Community Feedback on Environmental Existing Conditions Reports

The following responses were drafted by the consultant team in response to extensive community feedback on topics that crosscut the seven Environmental Existing Conditions Reports.

**Trees and Urban Canopy:** Maintaining and expanding a robust urban forest is a priority for the City and will be incorporated into the updated General Plan goals, policies, and programs to further develop and maintain the urban forest and protect trees of aesthetic, cultural, and biological value to the community. The General Plan Update will capitalize on ways to build on and expand existing plans and programs through tools like tree inventories and tree preservation ordinances.

**River Enhancement Program:** The River Enhancement Plan will provide an existing foundation for goals, policies, and programs to be implemented as this plan will continue to be in effect and utilized after the General Plan Update. Throughout the General Plan Update process, this plan will be thoroughly reviewed and incorporated into the General Plan.

**Wildlife Corridors:** The information regarding the wildlife corridors discussion were a compiling of local resources that can be used to understand the stakeholders that the City can partner with in supporting efforts to conserve wildlife corridors, especially in support of efforts by the State, to preserve a statewide network of wildlife movement corridors. There will be opportunities in future steps of the General Plan Update process to include more detail of the wildlife corridors surrounding Petaluma using data from CDFW and other available sources.

**Climate Impacts Data:** The State of California requires local jurisdictions to use specified data sources for identified hazards such as FEMA for the flood hazards analysis and the Cal Adapt tool for climate change projections. These are the data sources used to conduct the analysis of climate and flood hazards, which will inform various aspects of the General Plan Update.

**Integration of Environmental Topics:** Environmental issues and considerations will be integrated throughout the General Plan Update process and additional information will be gathered and analyzed during future phases of the project. In particular, environmental analysis will be done during the alternatives and environmental review phases.

# Noise

## Purpose and Overview

*This section describes existing noise conditions, major noise sources, and the regulatory framework related to noise levels in Petaluma. Identifying the community's primary noise sources and areas with high noise levels allows the City to plan for new noise-sensitive uses and refine project requirements with the goal of reducing exposure to ambient noise.*

## Key Findings and Constraints

- The main source of noise for Petaluma is vehicle traffic along major roadways and arterial streets.
- The City of Petaluma has adopted rules and regulations to reduce noise levels in the community. These include specific hours to limit the use of power tools and other noise sources. Code compliance complaint forms are used for enforcement.
- The Petaluma Municipal Airport is located adjacent to a residential area and may generate noise during the take-off, landing, and taxiing of fly equipment. However, the airport sees a relatively low volume of air traffic and does not significantly impact to overall noise levels in the community.
- The existing Sonoma-Marin Area Rail Transit (SMART) train station (Downtown Station), and planned second station proposed at Corona Road, are both located in areas zoned for residential use. Noise impacts associated with the SMART train have the potential to be a nuisance for the surrounding noise-sensitive receptors.
- Future development within Petaluma is primarily limited to infill development, increasing the potential for noise sensitive receptors to be located in areas with higher ambient noise levels.

## Planning and Regulatory Setting

### California Code of Regulations

Interior noise levels for habitable rooms and non-residential space are regulated by Title 24 of the California Code of Regulations (CCR). Title 24, Part 2 (2019 California Building Code), Chapter 12, Section 1206.4 requires that interior noise levels attributable to exterior sources not exceed 45 Community Noise Equivalent Level (CNEL) in any habitable room within a residential structure. A habitable room is a space in a building for living, sleeping, eating or cooking. Bathrooms, toilet rooms, closets, halls, storage or utility spaces and similar areas are not considered habitable spaces. Title 24, Part 11 (2019 California Green Building Standards Code), Chapter 5, Section 5.507.4.2 requires that interior noise levels attributable to exterior sources not exceed 50 dBA Leq[1h] in occupied (actively in use) areas of non-residential spaces during any hour of operation when exposed to noise levels of 65 dBA Leq[1h] during any hour of operation or located within the 65 CNEL noise contour of an airport, freeway or expressway, railroad, industrial source or fixed-guideway source as determined by the Noise Element of the General Plan.

## City of Petaluma General Plan

California Government Code Section 65302(f) requires all General Plans to include a Noise Element that addresses noise-related impacts in the community. The City of Petaluma General Plan Noise Element is a summary of standards and regulations to maintain an environment that is free from excessive noise that could create unhealthy impacts. The Noise Element establishes land use compatibility standards for community noise exposure and outlines policies for protecting the noise environment in Petaluma.

The following policies related to noise are included within the existing City of Petaluma General Plan.

- 2-P-35 Through site planning techniques, protect residential units from visual and noise impacts from Highway 101.
- 2-P-52 Prohibit the use of sound/noise-attenuation walls along Petaluma Boulevard North.
- 10-P-3 Protect public health and welfare by eliminating or minimizing the effects of existing noise problems, and by minimizing the increase of noise levels in the future.
  - A. Continue efforts to incorporate noise considerations into land use planning decisions, and guide the location and design of transportation facilities to minimize the effects of noise on adjacent land uses.
  - B: Discourage location of new noise-sensitive uses, primarily homes, in areas with projected noise levels greater than 65 dB CNEL. Where such uses are permitted, require incorporation of mitigation measures to ensure that interior noise levels do not exceed 45 dB CNEL
  - C: Ensure that the City's Noise Ordinance and other regulations:
    - Require that applicants for new noise sensitive development in areas subject to noise levels greater than 65 dB CNEL obtain the services of a professional acoustical engineer to provide a technical analysis and design of mitigation measures.
    - Require placement of fixed equipment, such as air conditioning units and condensers, inside or in the walls of new buildings or on roof-tops of central units in order to reduce noise impacts on any nearby sensitive receptors.
    - Establish appropriate noise-emission standards to be used in connection with the purchase, use, and maintenance of City vehicles.
  - D: Continue to require control of noise or mitigation measures for any noise-emitting construction equipment or activity. The City's Noise Ordinance establishes controls on construction-related noise.
  - E: As part of development review, use Figure 10-2: Land Use Compatibility Standards to determine acceptable uses and installation requirements in noise-impacted areas.
  - F: Discourage the use of sound walls anywhere except along Highway 101 and/or along the NWPRA corridor, without findings that such walls will not be detrimental to community character. When sound walls are deemed necessary, integrate them into the streetscape.
  - G: In making a determination of impact under the California Environmental Quality Act (CEQA), consider an increase of four or more dBA to be "significant" if the resulting noise level would exceed that described as normally acceptable for the affected land use in Figure 10-2.



## City of Petaluma Municipal Code

The City of Petaluma Municipal Code Section 21.040(A) includes the City's noise regulations and limits exterior noise levels in the late and early morning hours. Specific activities and use of specific equipment, such as construction equipment, are limited to certain times of day to limit noise exposure for sensitive receivers. The noise limits outlined in Section 21.040(A) of the Petaluma Municipal Code are defined below in **Table 1**.

**Table 1: Maximum Exterior Noise Limits (Leq, dBA)**

	<b>10p.m. to 7 a.m. Mon - Fri</b>	<b>7 a.m. to 10 p.m. Mon - Fri</b>
	<b>10 p.m. to 8 a.m. Sat, Sun, and Holidays</b>	<b>8 a.m. to 10 p.m. Sat, Sun, and Holidays</b>
General Plan Ambient	60	60
Cumulative period of 15 minutes or more in one hour	65	70
Cumulative period of more than 15 minutes in one hour	70	75
Cumulative period of 1 minute or more in one hour	75	80
<i>Source: Table 21.1, Section 21.040(A) of the City of Petaluma Municipal Code</i>		

## Noise Background

Noise is defined as loud, unpleasant, unexpected, or undesired sound. A typical environment consists of steady background ambient noise made up of many distant and indistinguishable noise sources.

Superimposed on this background noise is the sound from individual local sources. These can vary from an occasional aircraft or train passing by to virtually continuous noise from traffic on a major highway.

**Table 2** illustrates representative noise levels for the urban environment. The effects of noise on people can range from general annoyance, interference with speech, sleep disturbance, and in extreme circumstances, hearing impairment.

**Table 2: Representative Noise Levels**

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	—110—	Rock concert
Jet fly-over at 100 feet	—105—	
	—100—	
Gas lawnmower at 3 feet	—95—	
	—90—	
	—85—	Food blender at 3 feet
Diesel truck going 50 mph at 50 feet	—80—	Garbage disposal at 3 feet
Noisy urban area at daytime	—75—	
Gas lawnmower at 100 feet	—70—	Vacuum cleaner at 10 feet
Commercial area	—65—	Normal speech at 3 feet
Heavy traffic at 300 feet	—60—	
	—55—	Large business office
Quiet urban area during daytime	—50—	Dishwasher in next room
	—45—	
Quiet urban area during nighttime	—40—	Theater, large conference room (background)
	—35—	
	—30—	Library
Quiet rural area during nighttime	—25—	Bedroom at night, concert hall (background)
	—20—	
	—15—	Broadcast/recording studio
	—10—	
	—5—	
Lowest threshold of human hearing	—0—	Lowest threshold of human hearing

*Source: Caltrans Technical Noise Supplement to the Traffic Noise Analysis Protocol, 2013*

Noise level (or volume) is generally measured in decibels (dB) using the A-weighted sound pressure level (dBA). The A-weighting scale is an adjustment to the actual sound pressure levels to be consistent with that of human hearing response, which is most sensitive to frequencies around 4,000 Hertz (about the highest note on a piano) and less sensitive to low frequencies (below 100 Hertz). When people make relative judgments of the loudness or annoyance of a sound, their judgments correlate well with the “A-weighted” levels of those sounds. Therefore, the A-weighted noise scale is used for measurements and standards involving the human perception of noise.

Decibels are measured on a logarithmic scale that quantifies sound intensity in a manner similar to the Richter scale used for earthquake magnitudes. A 10 dB increase represents a 10-fold increase in sound intensity; a 20 dB increase represents a 100-fold difference; a 30 dB increase represents a 1,000-fold difference, etc. Thus, a doubling of the energy of a noise source, such as a doubling of traffic volume, would increase the noise level by 3 dB, and a halving of the energy would result in a 3 dB decrease.

In addition to the instantaneous measurement of sound levels, the duration and time of noise occurring is important. Scales that take the length and time of day into account include:

- **L<sub>eq</sub>**, the equivalent noise level is the average acoustic energy content noise over a specified period of time. Typically, L<sub>eq</sub> is averaged over a one-hour period. Thus, the L<sub>eq</sub> of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.
- **L<sub>dn</sub>**, the Day-Night Average Level, is the 24-hour average L<sub>eq</sub> with a 10 dBA “weighting” added for noise occurring during nighttime hours (10:00 p.m. to 7:00 a.m.) to account for noise sensitivity during the nighttime. The logarithmic effect of these additions is that a 60 dBA 24-hour L<sub>eq</sub> would result in a measurement of 66.4 dBA L<sub>dn</sub>.
- **CNEL**, the Community Noise Equivalent Level, is the 24-hour average L<sub>eq</sub> with a 5 dBA weighting for noise occurring from 7:00 p.m. to 10:00 p.m. and a 10 dBA weighting for noise occurring from 10:00 p.m. to 7:00 a.m. to account for noise sensitivity during the evening and nighttime. The logarithmic effect of these additions is that a 60 dBA 24-hour L<sub>eq</sub> would result in a measurement of 66.7 dBA CNEL.
- **L<sub>min</sub>** is the minimum instantaneous A-weighted noise levels that are exceeded during a given period of time.
- **L<sub>max</sub>** is the maximum instantaneous A-weighted noise levels that are exceeded 1 percent, 10 percent, 50 percent, and 90 percent (L<sub>01</sub>, L<sub>10</sub>, L<sub>50</sub>, L<sub>90</sub>, respectively) of the time during the measurement period.

## Human Reaction to Noise

Human perception of noise has no simple correlation with acoustical energy. The perception of noise is not linear in terms of dB or in terms of acoustical energy. Two equivalent noise sources do not sound twice as loud as one source. It is widely accepted that the average healthy ear can barely perceive increases or decreases of 3 dB; that a change of 5 dB is readily perceptible; and that an increase (or decrease) of 10 dB sounds twice (half) as loud or quiet, respectively.

Human tolerance to noise depends on a variety of acoustical characteristics and individual tolerances to noise. What some may consider to be a barely perceptible background noise, others may perceive as annoying, disruptive, or a mental or physical health hazard. Generally, most individuals will tolerate higher levels of noise in urbanized residential, commercial, and industrial areas more than they will in lower density residential areas. Noise levels from a particular source also decline as distance from the receptor increases, and factors such as weather, reflecting, or shielding can intensify or reduce the noise level at a given location.

## Noise Sensitive Land Uses

Noise sensitive land uses are those that are associated with activities that may be more subject to stress or disruption due to noise.

Noise exposure goals for various types of land uses reflect the varying noise sensitivities associated with each of these uses. The existing General Plan defines noise-sensitive land uses as residential uses, schools, community buildings, parks/open space, and hospitals. The general locations of noise-sensitive receivers in Petaluma are shown in **Figure 1**.

The sensitive land uses shown in **Figure 1** generally include designations for residential, education, and parks/open space uses. These sensitive land uses sit adjacent to many of the high traffic roadways, depicted in **Figure 2**, Existing Noise Contours, which have noise levels calculated up to 75 dBA based on existing traffic data. The U.S. Environmental Protection Agency (EPA) and the World Health Organization (WHO) recommend maintaining environmental noises below 70 dBA over 24-hours (75 dBA over 8-hours) to prevent noise-induced hearing loss. The sensitive receivers located along the high traffic roadways may be at a risk for hearing loss if individuals spend a significant amount of time outside at these locations and there are no mitigation measures put in place to reduce noise impacts, considering no mitigation measure is in place.

## Noise Sources and Contours

### Vehicle Traffic Noise

Vehicle Traffic is the primary source of noise in Petaluma. The highest noise levels occur along high traffic volume roadways, including freeways, highways, and arterials. As shown in **Figure 2** below, roadways in Petaluma with noise contour levels reaching 75 dBA include the following:

- Northern segment of Petaluma Boulevard
- E. Washington Street
- Northern segment of South McDowell Boulevard
- Frates Road
- Corona Road

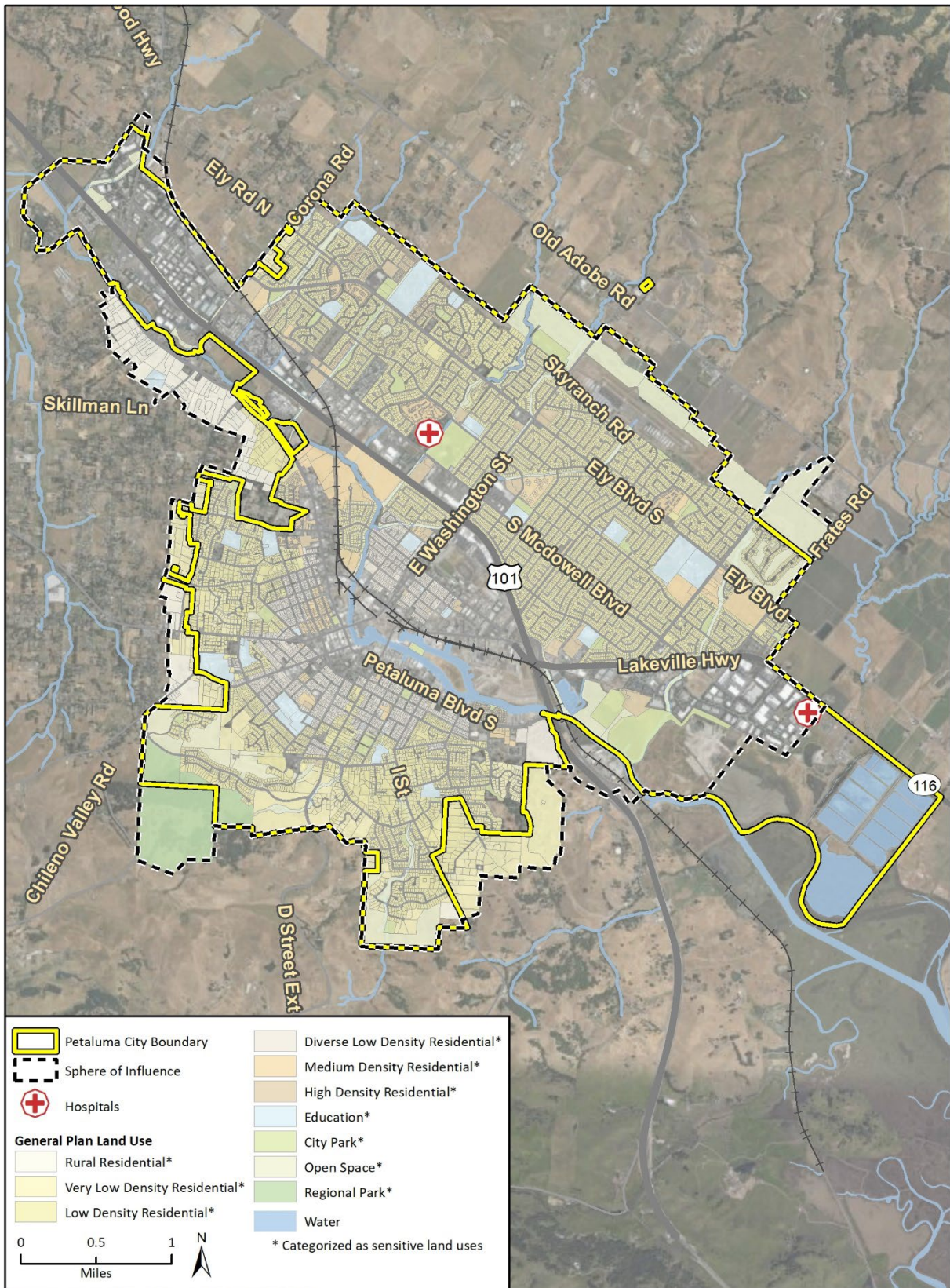
There are no existing roadways in Petaluma with noise contours up to 80 dBA. **Figure 2** shows the existing noise contours in 2019 for the major transportation routes in Petaluma. Although U.S. Route 101 is a known noise source in Petaluma, complete noise contour data is not provided by Caltrans. To prevent inconsistent data in the general plan documents, noise contours for U.S. Route 101 are not included in **Figure 2**; however, noise data will be analyzed using other methodologies as part of the project.

### Sonoma-Marin Area Rail Transit (SMART) Noise

SMART train runs north-south through the city, traveling through developed areas within much of the Petaluma City limits. While the City has instituted “Quiet Zones” that prohibit SMART trains from using horns at railroad crossings within certain designated areas except in the case of emergencies, the train travels through residential neighborhoods in the north near the Payran Street crossing. Freight services



**Figure 1: Noise Sensitive Land Uses**

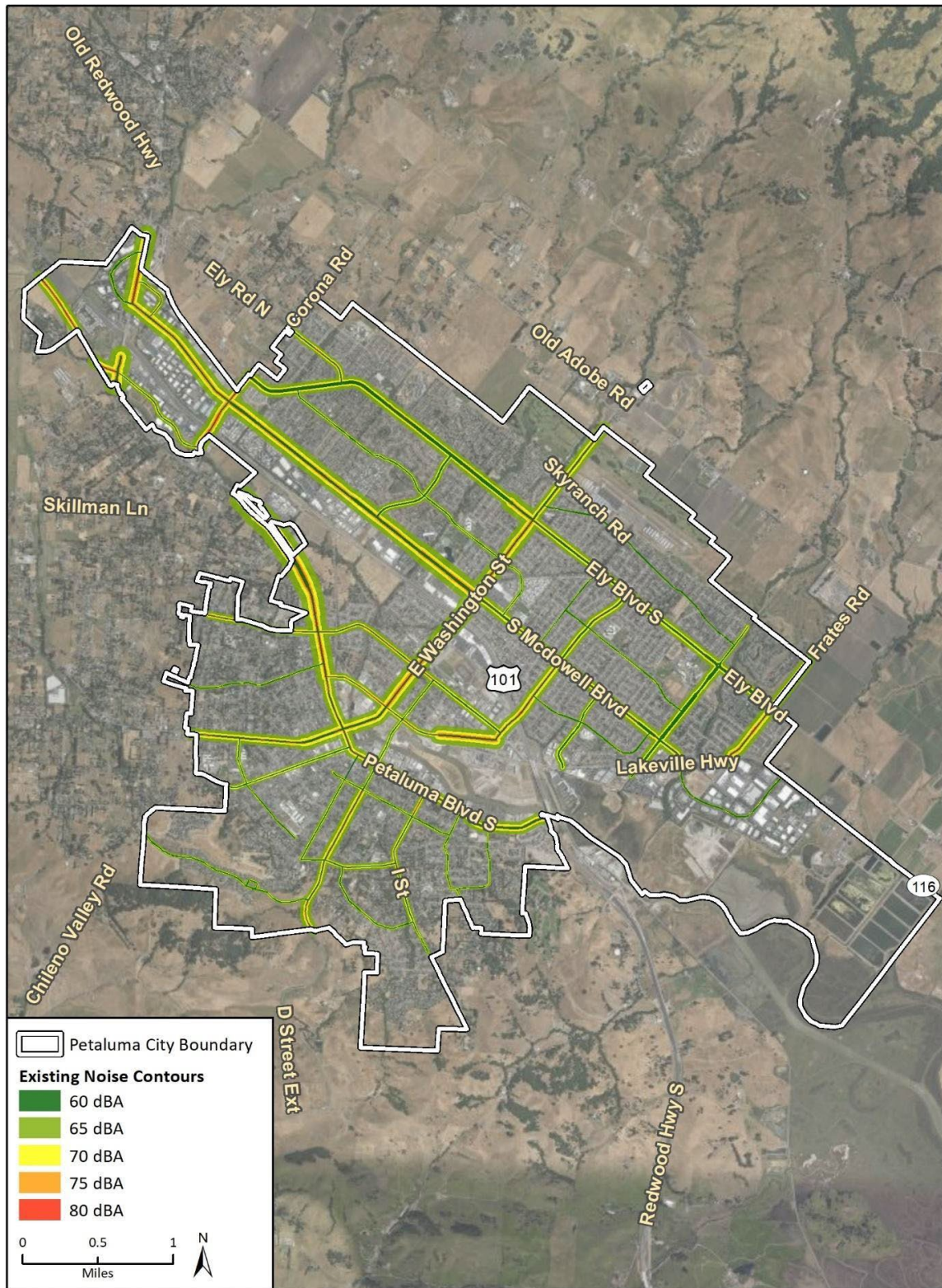


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Additional data provided by City of Petaluma, 2021.

Fig 01 Noise Sensitive Receivers in Petaluma



**Figure 2: Existing Noise Contours (2019)**



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Fig 2 Existing Noise Contours - Single Page

Source: Fehr & Peers (2019)

also operate on the Northwestern Pacific Railroad corridor in which the SMART train runs. However, freight service on the corridor has continued to decrease significantly throughout the years. Noise contours for the train tracks were not available at the time of writing.

## Airport Noise

The Petaluma Municipal Airport is a reliever airport located within the City limits on the eastern edge. Reliever airports are airports designed to supplement existing major airport facilities, and thus have fewer noise impacts relative to major airport facilities. The airport is owned and operated by the City of Petaluma, which has designated the land to the immediate north and south of the airport as open space. Residential uses immediately about the Petaluma Municipal airport to the west and southwest. These residential uses are primarily zoned for Residential 2 (R2), which is the low-density residential zone.

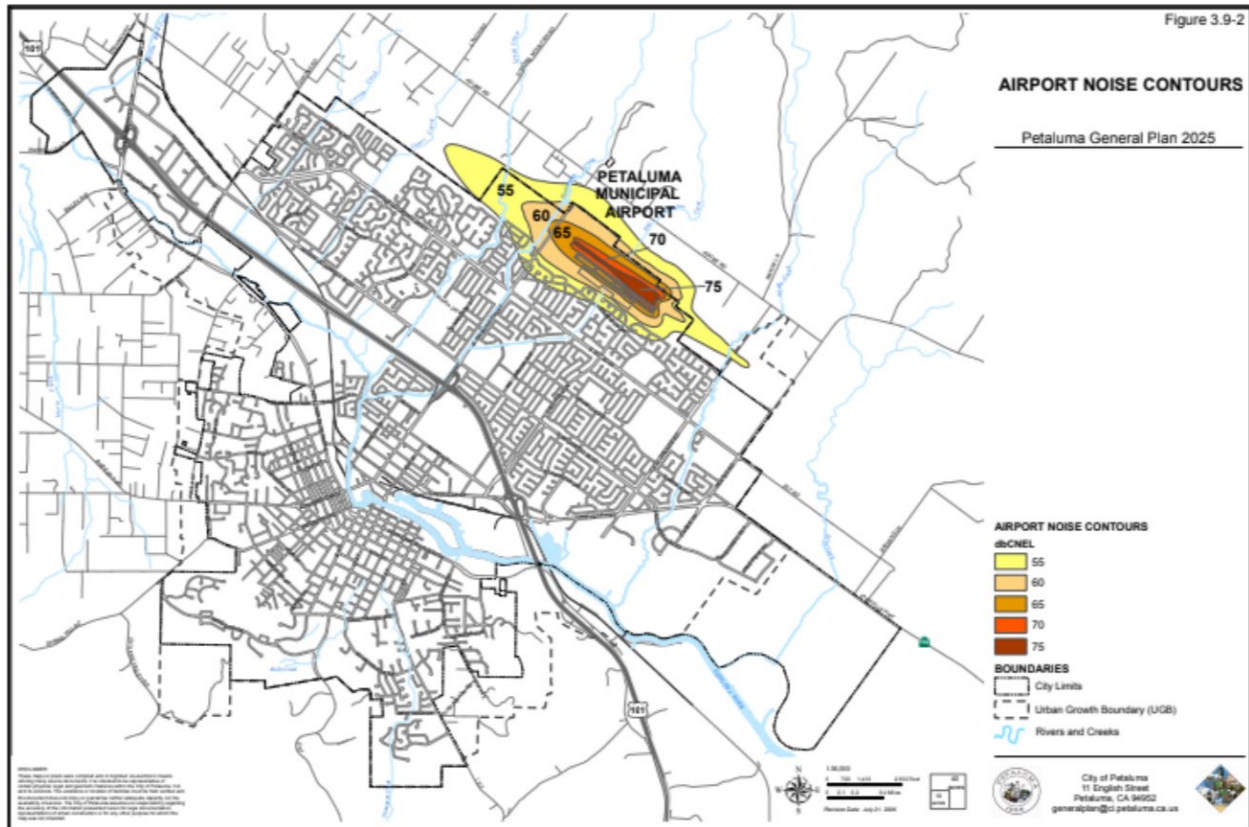
In order to reduce airport related impacts to adjacent uses, the County of Sonoma adopted a Comprehensive Airport Land Use Plan in 2001. The plan identifies standards for airport noise within its jurisdiction. The established noise standard for airport-related impacts on residential uses, prohibits noise levels above 65 CNEL, and conditionally accepts levels between 55 and 65 CNEL.

**Figure 3**, Airport Noise Contours illustrates the calculated airport noise levels from the Municipal Airport. As shown in the figure, there are no residential uses located within the 65+ CNEL contours. Within the 55 CNEL contour, there are a range of residential uses that may be exposed to airport related noise. According to the County plan, development falling within the 55 CNEL contour are at an acceptable level of noise for residential uses. However, any housing built after the development of the Comprehensive Airport Land Use Plan and located within the 55 and 65 CNEL noise impact contour would be required to implement fair disclosure agreements and aviation easements.

With regard to sensitive receivers, there is one senior housing facility located within the 55 CNEL noise contour of the airport. Sensitive receivers may be especially sensitive to noise levels and often require more stringent noise considerations. The Comprehensive Airport Land Use Plan allows sensitive residential units within impact contours of 55-65 CNEL to be conditionally accepted.

The City of Petaluma General Plan does not define noise limitations or guidelines for airport surrounding land uses beyond what is outlined in the Comprehensive Airport Land Use Plan. Similarly, the Petaluma Municipal Code does not provide sound limits on airport adjacent uses. If the Petaluma Municipal Airport or adjacent land uses are expanded, the City may choose to adopt additional noise policies to ensure that all City regulations are consistent with the Airport Land Use Plan.



**Figure 3: Airport Noise Contours**

Source: *Petaluma General Plan (2003)*

## Agricultural Noise

Petaluma contains active agricultural uses within and adjacent to the City. Agricultural and resource uses are permitted within the AG (Agriculture) zone, OSP (Open Space and Park) zone, RR (Rural Residential) zone, and R1 (Residential 1) zone. Agricultural operations produce noise associated with equipment such as tractors, aerial application aircrafts (crop dusters), bird frightening devices (i.e., speaker with amplified sounds), and harvesting equipment.

Due to the seasonal nature of the agricultural industry, there are often extended periods of time when no noise is generated on properties which are otherwise actively being farmed, followed by short-term periods of intensive mechanical equipment usage and corresponding noise generation. Due to this high degree of variability of agricultural activities, it is not feasible to reliably quantify the noise generation of agricultural uses in terms of noise standards commonly used to assess impacts of other noise sources. However, these uses generate short-term periods of elevated noise during all hours of the day and night and possess the potential to generate adverse reactions from nearby residents during intensive farm-related activities. Agricultural activity within Petaluma is primarily limited to the outskirts of the city, with agricultural zoning existing along the northeastern, northwestern, and southern city boundaries. Areas zoned for agriculture in Petaluma are primarily surrounded by open space, parks, and residential uses. The zoning limitations on agricultural uses can serve to remediate noise disturbance as a result of agricultural noise generation. Where an agricultural use is adjacent to a sensitive receiver, the agricultural



use is subject to noise limitations per Section 21.040(A) of the Petaluma Municipal Code. The identified exterior noise limits are defined above in **Table 1: Maximum Exterior Noise Limits**.

Agricultural uses outside of City boundaries are subject to the Sonoma County Right to Farm Ordinance, which protects agricultural uses located on unincorporated areas of Sonoma County by limiting the circumstances under which agricultural operations may be considered a nuisance.

## Construction Noise

Construction activity generates temporary increases in ambient noise in the vicinity of construction sites, which can be disruptive to nearby noise-sensitive receivers. Each phase of demolition and construction has its own noise characteristics, depending on the type and number of equipment used. Typical construction noise levels range from 73 dBA to 110 dBA at a distance of 50 feet.

Within the City of Petaluma, construction related noise is considered a public nuisance and is prohibited under the Petaluma Municipal Code Section 21.040(A). In order for construction to occur within the City, it must meet the exceptions defined within the Municipal Code Section 21.040(A)(3)(a). Considering the construction regulation defined within the Municipal Code, construction noise within the City is limited by a number of control factors to inhibit disruption to noise-sensitive receivers. Exemptions from the limitations on construction noise include any uses established through the discretionary review process containing specific noise conditions of approval and/or mitigation measures. Additionally, further exemptions can be granted by the Noise Control Officer, subject to the limitations of proximity to noise sensitive uses, noise levels, time limits and other terms. Exemptions are granted based on application to the City. When exemptions apply, construction noise must meet the Maximum Exterior Noise Exposure thresholds and hours of operation limitations defined within **Table 1** of this report.

## Vibration Background

Ground-borne vibration consists of the oscillatory waves that move from a source through the ground to adjacent structures. It is typically measured in peak particle velocity (PPV) or vibration decibels (VdB). Vibration in buildings may cause windows, items on shelves, and pictures on walls to rattle. Vibration of building components can also take the form of an audible low-frequency rumbling noise, referred to as ground-borne noise.<sup>2</sup> The primary concern from vibration is that it can be intrusive and annoying to vibration-sensitive land uses and potentially cause structural damage. Maximum vibration limits recommended by the American Association of State Highway and Transportation Officials (AASHTO) for preventing damage to structures are identified in **Table 3** and Caltrans-identified vibration thresholds for human annoyance are listed in **Table 4**.

**Table 3: AASHTO Max Vibration Levels for Preventing Damage**

Type of Situation	Limiting Velocity (in/sec)
Historic sites or other critical location	0.1
Residential buildings, plastered walls	0.2-0.3
Residential buildings in good repair with gypsum board walls	0.4-0.5
Engineered structures, without plaster	1.0-1.5
<i>Source: CalTrans, 2020</i>	

**Table 4: Human Response to Transient Vibration**

Human Response	PPV (in/sec)
Severe	2.0
Strongly perceptible	0.9
Distinctly perceptible	0.24
Barely perceptible	0.035
<i>Source: CalTrans, 2020</i>	

## Existing Vibration Levels

Typical vibration sources include construction activities and railroad operations. Within Petaluma, the SMART train runs through the City and currently stops at one location within the City boundaries, located at 220 Lakeville Street. There are currently plans for a second SMART station to be located at Corona Road and North McDowell Boulevard. Vibration from train activities may impact some residential areas, including residences within the Mixed Use 1A (MU1A) Zone and Residential 3 (R3) zones adjacent to the Petaluma Downtown SMART station, as well as any residential uses that sit adjacent to the SMART route that runs through Central Petaluma.

Construction vibration occurs and is associated with specific vibratory equipment, like vibratory rollers, impact-driven equipment like pile drivers, and equipment carrying heavy loads, like large, burdened heavy duty trucks. Vibration is also generated by heavy manufacturing, but no heavy manufacturing activities currently occur in the city that would be expected to generate substantial levels of vibration.

## Vibration Sensitive Receivers

Vibration-sensitive receivers include residences and institutions such as schools, churches, and hospitals. Vibration-sensitive receivers also include buildings where vibrations may interfere with vibration-sensitive equipment that is affected by vibration levels that may be well below those associated with human annoyance (e.g., recording studios or medical facilities with sensitive equipment).

There are a range of vibration-sensitive receivers within the City of Petaluma. These sensitive receivers include, but are not limited to, Kaiser Permanente Petaluma Medical Offices, Petaluma Valley Hospital, McKinley School, McDowell Elementary School, Petaluma High School, and Petaluma Christian Church. There are no churches, schools, or hospitals located immediately abutting the SMART train route

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within Petaluma. However, a more detailed assessment of the vibration impact of the SMART train on surrounding uses may be warranted.