# APPENDIX G:
# NOISE DATA

# Fundamentals of Noise

## NOISE

Noise is most often defined as unwanted sound; whether it is loud, unpleasant, unexpected, or otherwise undesirable. Although sound can be easily measured, the perception of noise and the physical response to sound complicate the analysis of its impact on people. People judge the relative magnitude of sound sensation in subjective terms such as "noisiness" or "loudness."

### Noise Descriptors

The following are brief definitions of terminology used in this chapter:

- **Sound.** A disturbance created by a vibrating object, which, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.

- **Noise.** Sound that is loud, unpleasant, unexpected, or otherwise undesirable.

- **Decibel (dB).** A unitless measure of sound, expressed on a logarithmic scale and with respect to a defined reference sound pressure. The standard reference pressure is 20 micropascals (20 μPa).

- **A-Weighted Decibel (dBA).** An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.

- **Equivalent Continuous Noise Level ($L_{eq}$); also called the Energy-Equivalent Noise Level.** The value of an equivalent, steady sound level which, in a stated time period (often over an hour) and at a stated location, has the same A-weighted sound energy as the time-varying sound. Thus, the $L_{eq}$ metric is a single numerical value that represents the equivalent amount of variable sound energy received by a receptor over the specified duration.

- **Statistical Sound Level ($L_n$).** The sound level that is exceeded "n" percent of time during a given sample period. For example, the $L_{50}$ level is the statistical indicator of the time-varying noise signal that is exceeded 50 percent of the time (during each sampling period); that is, half of the sampling time, the changing noise levels are above this value and half of the time they are below it. This is called the "median sound level." The $L_{10}$ level, likewise, is the value that is exceeded 10 percent of the time (i.e., near the maximum) and this is often known as the "intrusive sound level." The $L_{90}$ is the sound level exceeded 90 percent of the time and is often considered the "effective background level" or "residual noise level."

- **Maximum Sound Level ($L_{max}$)**. The highest RMS sound level measured during the measurement period.
- **Root Mean Square Sound Level (RMS).** The square root of the average of the square of the sound pressure over the measurement period.

- **Day-Night Sound Level ($L_{dn}$ or DNL).** The energy-average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the sound levels occurring during the period from 10:00 PM to 7:00 AM.

- **Community Noise Equivalent Level (CNEL).** The energy average of the A-weighted sound levels occurring during a 24-hour period, with 5 dB added from 7:00 PM to 10:00 PM and 10 dB from 10:00 PM to 7:00 AM. NOTE: For general community/environmental noise, CNEL and $L_{dn}$ values rarely differ by more than 1 dB (with the CNEL being only slightly more restrictive – that is, higher than the $L_{dn}$ value). As a matter of practice, $L_{dn}$ and CNEL values are interchangeable and are treated as equivalent in this assessment.

- **Peak Particle Velocity (PPV).** The peak rate of speed at which soil particles move (e.g., inches per second) due to ground vibration.

- **Sensitive Receptor.** Noise- and vibration-sensitive receptors include land uses where quiet environments are necessary for enjoyment and public health and safety. Residences, schools, motels and hotels, libraries, religious institutions, hospitals, and nursing homes are examples.

## Characteristics of Sound

When an object vibrates, it radiates part of its energy in the form of a pressure wave. Sound is that pressure wave transmitted through the air. Technically, airborne sound is a rapid fluctuation or oscillation of air pressure above and below atmospheric pressure that creates sound waves.

Sound can be described in terms of amplitude (loudness), frequency (pitch), or duration (time). Loudness or amplitude is measured in dB, frequency or pitch is measured in Hertz [Hz] or cycles per second, and duration or time variations is measured in seconds or minutes.

*Amplitude*

Unlike linear units such as inches or pounds, decibels are measured on a logarithmic scale. Because of the physical characteristics of noise transmission and perception, the relative loudness of sound does not closely match the actual amounts of sound energy. Table 1 presents the subjective effect of changes in sound pressure levels. Ambient sounds generally range from 30 dBA (very quiet) to 100 dBA (very loud). Changes of 1 to 3 dB are detectable under quiet, controlled conditions, and changes of less than 1 dB are usually not discernible (even under ideal conditions). A 3 dB change in noise levels is considered the minimum change that is detectable with human hearing in outside environments. A change of 5 dB is readily discernible to most people in an exterior environment, and a 10 dB change is perceived as a doubling (or halving) of the sound.

**Table 1 Noise Perceptibility**

| Change in dB | Noise Level |
|---|---|
| ± 3 dB | Barely perceptible increase |
| ± 5 dB | Readily perceptible increase |
| ± 10 dB | Twice or half as loud |
| ± 20 dB | Four times or one-quarter as loud |

Source: California Department of Transportation (Caltrans). 2013, September. Technical Noise Supplement ("TeNS").

*Frequency*

The human ear is not equally sensitive to all frequencies. Sound waves below 16 Hz are not heard at all, but are "felt" more as a vibration. Similarly, though people with extremely sensitive hearing can hear sounds as high as 20,000 Hz, most people cannot hear above 15,000 Hz. In all cases, hearing acuity falls off rapidly above about 10,000 Hz and below about 200 Hz.

When describing sound and its effect on a human population, A-weighted (dBA) sound levels are typically used to approximate the response of the human ear. The A-weighted noise level has been found to correlate well with people's judgments of the "noisiness" of different sounds and has been used for many years as a measure of community and industrial noise. Although the A-weighted scale and the energy-equivalent metric are commonly used to quantify the range of human response to individual events or general community sound levels, the degree of annoyance or other response also depends on several other perceptibility factors, including:

- Ambient (background) sound level
- General nature of the existing conditions (e.g., quiet rural or busy urban)
- Difference between the magnitude of the sound event level and the ambient condition
- Duration of the sound event
- Number of event occurrences and their repetitiveness
- Time of day that the event occurs

*Duration*

Time variation in noise exposure is typically expressed in terms of a steady-state energy level equal to the energy content of the time varying period (called $L_{eq}$), or alternately, as a statistical description of the sound level that is exceeded over some fraction of a given observation period. For example, the $L_{50}$ noise level represents the noise level that is exceeded 50 percent of the time; half the time the noise level exceeds this level and half the time the noise level is less than this level. This level is also representative of the level that is exceeded 30 minutes in an hour. Similarly, the $L_2$, $L_8$ and $L_{25}$ values represent the noise levels that are exceeded 2, 8, and 25 percent of the time or 1, 5, and 15 minutes per hour, respectively. These "n" values are typically used to demonstrate compliance for stationary noise sources with many cities' noise ordinances. Other values typically noted during a noise survey are the $L_{min}$ and $L_{max}$. These values represent the minimum and maximum root-mean-square noise levels obtained over the measurement period, respectively.

Because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, state law and many local jurisdictions use an adjusted 24-hour noise descriptor called the Community Noise Equivalent Level (CNEL) or Day-Night Noise Level ($L_{dn}$). The CNEL descriptor requires that an artificial increment (or "penalty") of 5 dBA be added to the actual noise level for the hours from 7:00 PM to 10:00 PM and 10 dBA for the hours from 10:00 PM to 7:00 AM. The $L_{dn}$ descriptor uses the same methodology except that there is no artificial increment added to the hours between 7:00 PM and 10:00 PM. Both descriptors give roughly the same 24-hour level, with the CNEL being only slightly more restrictive (i.e., higher). The CNEL or $L_{dn}$ metrics are commonly applied to the assessment of roadway and airport-related noise sources.

## Sound Propagation

Sound dissipates exponentially with distance from the noise source. This phenomenon is known as "spreading loss." For a single-point source, sound levels decrease by approximately 6 dB for each doubling of distance from the source (conservatively neglecting ground attenuation effects, air absorption factors, and barrier shielding). For example, if a backhoe at 50 feet generates 84 dBA, at 100 feet the noise level would be 79 dBA, and at 200 feet it would be 73 dBA. This drop-off rate is appropriate for noise generated by on-site operations from stationary equipment or activity at a project site. If noise is produced by a line source, such as highway traffic, the sound decreases by 3 dB for each doubling of distance over a reflective ("hard site") surface such as concrete or asphalt. Line source noise in a relatively flat environment with ground-level absorptive vegetation decreases by an additional 1.5 dB for each doubling of distance.

## Psychological and Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Exposure to high noise levels affects the entire system, with prolonged noise exposure in excess of 75 dBA increasing body tensions, thereby affecting blood pressure and functions of the heart and the nervous system. Extended periods of noise exposure above 90 dBA results in permanent cell damage, which is the main driver for employee hearing protection regulations in the workplace. For community environments, the ambient or background noise problem is widespread, through generally worse in urban areas than in outlying, less-developed areas. Elevated ambient noise levels can result in noise interference (e.g., speech interruption/masking, sleep disturbance, disturbance of concentration) and cause annoyance. Since most people do not routinely work with decibels or A-weighted sound levels, it is often difficult to appreciate what a given sound pressure level number means. To help relate noise level values to common experience, Table 2 shows typical noise levels from familiar sources.

**Table 2 Typical Noise Levels**

| Common Outdoor Activities | Noise Level (dBA) | Common Indoor Activities |
|---|---|---|
| Onset of physical discomfort | 120+ | |
| | | |
| | 110 | Rock Band (near amplification system) |
| Jet Flyover at 1,000 feet | | |
| | 100 | |
| Gas Lawn Mower at three feet | | |
| | 90 | |
| Diesel Truck at 50 feet, at 50 mph | | Food Blender at 3 feet |
| | 80 | Garbage Disposal at 3 feet |
| Noisy Urban Area, Daytime | | |
| | 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 Next Room |
| | | |
| Quiet Urban Nighttime | 40 | Theater, Large Conference Room (background) |
| Quiet Suburban Nighttime | | |
| | 30 | Library |
| Quiet Rural Nighttime | | Bedroom at Night, Concert Hall (background) |
| | 20 | |
| | | Broadcast/Recording Studio |
| | 10 | |
| | | |
| Lowest Threshold of Human Hearing | 0 | Lowest Threshold of Human Hearing |
| | | |

Source: California Department of Transportation (Caltrans). 2013, September. Technical Noise Supplement ("TeNS").

## Vibration Fundamentals

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Vibration is normally associated with activities stemming from operations of railroads or vibration-intensive stationary sources, but can also be associated with construction equipment such as jackhammers, pile drivers, and hydraulic hammers. As with noise, vibration can be described by both its amplitude and frequency. Vibration displacement is the distance that a point on a surface moves away from its original static position; velocity is the instantaneous speed that a point on a surface moves; and acceleration is the rate of change of the speed. Each of these descriptors can be used to correlate vibration to human response, building damage, and acceptable equipment vibration levels. During construction, the operation of construction equipment can cause groundborne vibration. During the operational phase of a project, receptors may be subject to levels of vibration that can cause annoyance due to noise generated from vibration of a structure or items within a structure.

Vibration amplitudes are usually described in terms of either the peak particle velocity (PPV) or the root mean square (RMS) velocity. PPV is the maximum instantaneous peak of the vibration signal and RMS is the

square root of the average of the squared amplitude of the signal. PPV is more appropriate for evaluating potential building damage and RMS is typically more suitable for evaluating human response.

As with airborne sound, annoyance with vibrational energy is a subjective measure, depending on the level of activity and the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Persons accustomed to elevated ambient vibration levels, such as in an urban environment, may tolerate higher vibration levels. Table 3 displays the human response and the effects on buildings resulting from continuous vibration (in terms of various levels of PPV).

**Table 3 Human Reaction to Typical Vibration Levels**

| Vibration Level, PPV (in/sec) | Human Reaction | Effect on Buildings |
|---|---|---|
| 0.006–0.019 | Threshold of perception, possibility of intrusion | Vibrations unlikely to cause damage of any type |
| 0.08 | Vibrations readily perceptible | Recommended upper level of vibration to which ruins and ancient monuments should be subjected |
| 0.10 | Level at which continuous vibration begins to annoy people | Virtually no risk of "architectural" (i.e. not structural) damage to normal buildings |
| 0.20 | Vibrations annoying to people in buildings | Threshold at which there is a risk to "architectural" damage to normal dwelling – houses with plastered walls and ceilings |
| 0.4–0.6 | Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges | Vibrations at a greater level than normally expected from traffic, but would cause "architectural" damage and possibly minor structural damage |

Source: California Department of Transportation (Caltrans). 2020, April. *Transportation and Construction Vibration Guidance Manual*. Prepared by ICF International.

# LOCAL REGULATIONS AND STANDARDS

**PHS-7.9 Groundwater Recharge Projects.** The Town shall encourage the development of groundwater recharge projects of all scales to increase groundwater supplies.

**PHS-7.10 Rainwater Harvesting.** The Town shall encourage rainwater harvesting design options in new development and retrofitting in existing development.

**PHS-7.11 Water Retention During Droughts.** The Town shall encourage the use of low impact development (LID) techniques for both public and private sites to aid in groundwater retention and infiltration.

# Noise

Exposure to excessive noise can impact health and quality of life, potentially causing hearing loss, stress, hypertension, sleep disturbance, and fatigue. Roadway traffic is the most significant source of noise affecting residents in Windsor. Additional noise sources include aircraft from the Sonoma County Airport, trains, and industrial and commercial operations. The policies in this section are designed to minimize exposure to excessive noise by establishing development standards and implementing practices that reduce the potential for excessive noise exposure.

## Goal PHS-8: Noise

***Minimize, control, and abate noise interference from indoor and outdoor noise sources and activities that exceed desirable sound levels.***

### Policies

**PHS-8.1 Ambient Sound Levels for New Development.** The Town shall encourage new development to maintain the current ambient sound environment as much as possible. All noise sources that cause the ambient sound levels to rise by more than 5 dBA should be required to incorporate conditions or design modifications to reduce the potential increase in the noise environment.

**PHS-8.2 Exterior Noise Standards for New Development.** The Town shall require new development to meet exterior noise level standards as established in the noise and land use compatibility guidelines contained in Figure PHS-4. For residential areas, these exterior noise guidelines apply to the primary usable outdoor area.

**PHS-8.3 Interior Noise Threshold for New Residential.** The Town shall require new residential projects to provide for an interior CNEL of 45 dB or less due to exterior noise sources. To accomplish this, all residential and other noise sensitive land uses within the 60 dB contours or greater as defined in (Figure PHS-5) should be reviewed to ensure that adequate noise attenuation has been incorporated into the design of the project.

**PHS-8.4 Residential Compatibility with the Airport.** The Town shall not permit residential development within the 2030 projected 60 dB noise contour of the Sonoma County Airport (Figure PHS-6).

**PHS-8.5 Noise Attenuation Techniques.** The Town shall encourage new development to identify alternatives to the use of sound walls to attenuate noise impacts. Other techniques that would be viewed more favorably by the Town include:

a. Modifications to site planning such as incorporating setbacks; and

b. Revisions to the architectural layout such as changing building orientation, providing noise attenuation for portions of outdoor yards, and construction modification (e.g., noise attenuating windows).

In the event that sound walls are the only practicable alternative, such walls shall be subject to development review to ensure that they are designed to be as aesthetically pleasing as possible, incorporating landscaping, variations in color and patterns, and/or changes in texture or building materials.

**PHS-8.6 Acoustical Reports.** The Town shall require that applications for development of residential or other noise-sensitive land uses in projected noise-impacted areas (greater than 55 dB CNEL) shall require an acoustical analysis, prepared at the applicant's expense. Recommendations contained in the acoustical reports shall be incorporated as conditions of any approval.

**PHS-8.7 Non-Vehicular Noise.** The Town shall continue to regulate non-vehicular noise sources that are not preempted by State and Federal regulations, to minimize disturbances to adjoining uses through the noise ordinance.

**PHS-8.8 Caltrans Noise Attenuation Requirements.** The Town should encourage Caltrans to provide sound attenuation devices that are aesthetically pleasing.

*For Policy PHS-8.9 see Implementation Program PHS-13: Truck Route Evaluation*

**PHS-8.9 Truck Route Noise Impacts.** The Town shall maintain its designated truck routes to limit the potential noise impacts to sensitive land uses.

**PHS-8.10 Construction Site Noise Restrictions.** The Town shall restrict construction working hours as designated in the Municipal Code, Title VII Building and Housing Section, to allow efficient construction mobilization and activities, while also protecting the noise environment of noise sensitive land uses.

**PHS-8.11 SMART Quiet Zones.** The Town shall encourage the designation of "quiet zones" along the SMART commuter rail corridor adjacent to land uses that are sensitive.

**PHS-8.12 Airport Noise.** The Town shall continue to cooperate with airport management to monitor noise impacts generated at the Sonoma County Airport and seek to reduce noise levels. The Town shall support the implementation of the policies, programs, and noise standards set forth in the Sonoma County Airport Land Use Compatibility Plan to reduce excessive noise impacts.

**PHS-8.13 Flight Approach and Flight Path Agreements**. The Town shall continue to support and actively monitor the adherence to and enforcement of flight approach and flight path agreements for the Sonoma County Airport.

**PHS-8.14 Airport Expansion and Potential Noise.** The Town shall coordinate with the Sonoma County Airport on any expansion of its facilities to limit additional potential noise impacts.

**PHS-8.15 Noise Enforcement of State and Federal Standards.** The Town shall continue to enforce State and Federal noise regulations regarding vehicle operation, equipment, and building insulation.

**PHS-8.16 Applicable Standards in the Building Code.** The Town shall continue to incorporate the most recent noise standards contained in Title 24 of the California Code of Regulations in Uniform Building Code into its own building code.

**PHS-8.17 Project and Environmental Review for Noise.** The Town shall consider as part of its discretionary review of proposed new development the potential for a proposed project to either generate significant new noise sources or be significantly impacted by existing noise sources as shown in Figure PHS-7. If the Town determines there may be a potential for significant noise effects related to a proposed new development, the Town shall require an acoustical study be conducted by a qualified acoustician and include appropriate mitigation measures for the proposed development based on that study.

| Table PHS-4<br>Maximum Noise Level by Receiving Land Use | | | |
|---|---|---|---|
| Type of Land Use | Maximum Allowable Noise Levels | | |
| | Time Interval | Exterior Noise dB(A) | Interior Nosie dB(A) |
| Single- or multi- family residential | 7 a.m. – 10 p.m. | 55 | 35 |
| | 10 p.m. to 7 a.m. | 50 | 45 |
| Commercial | 7 a.m. – 10 p.m. | 65 | 50 |
| | 10 p.m. to 7 a.m. | 55 | |
| Industrial or manufacturing | Any time | 70 | 55 |
| Public parks, public open space, and Civic Center | 7 a.m. – 10 p.m. | 55 | N/A |
| | 10 p.m. to 7 a.m. | 50 | |

Notes:

1. Each of the noise limits specified above shall be reduced by 5 dBA for impulse or simple tone noises, or for consisting of speech or music. If the ambient noise level exceeds the resulting standard, the ambient noise level shall be the standard.
2. It shall be unlawful for any person within a residentially zoned area of the town to operate any noise ampli device (e.g., bull horns, microphones, musical instruments, speakers, etc.), that exceeds a noise level of 45 dBA measured at the property line or cause loud excessive noise which disturbs the peace of the neighborhood.
3. In addition, Section 7-1-190 of the Town of Windsor Municipal Code restricts the timing of construction act authorized by a Town permit to the hours of 7 a.m. to 7 p.m. Monday through Friday and 8 a.m. to 7 p.m. on Sa

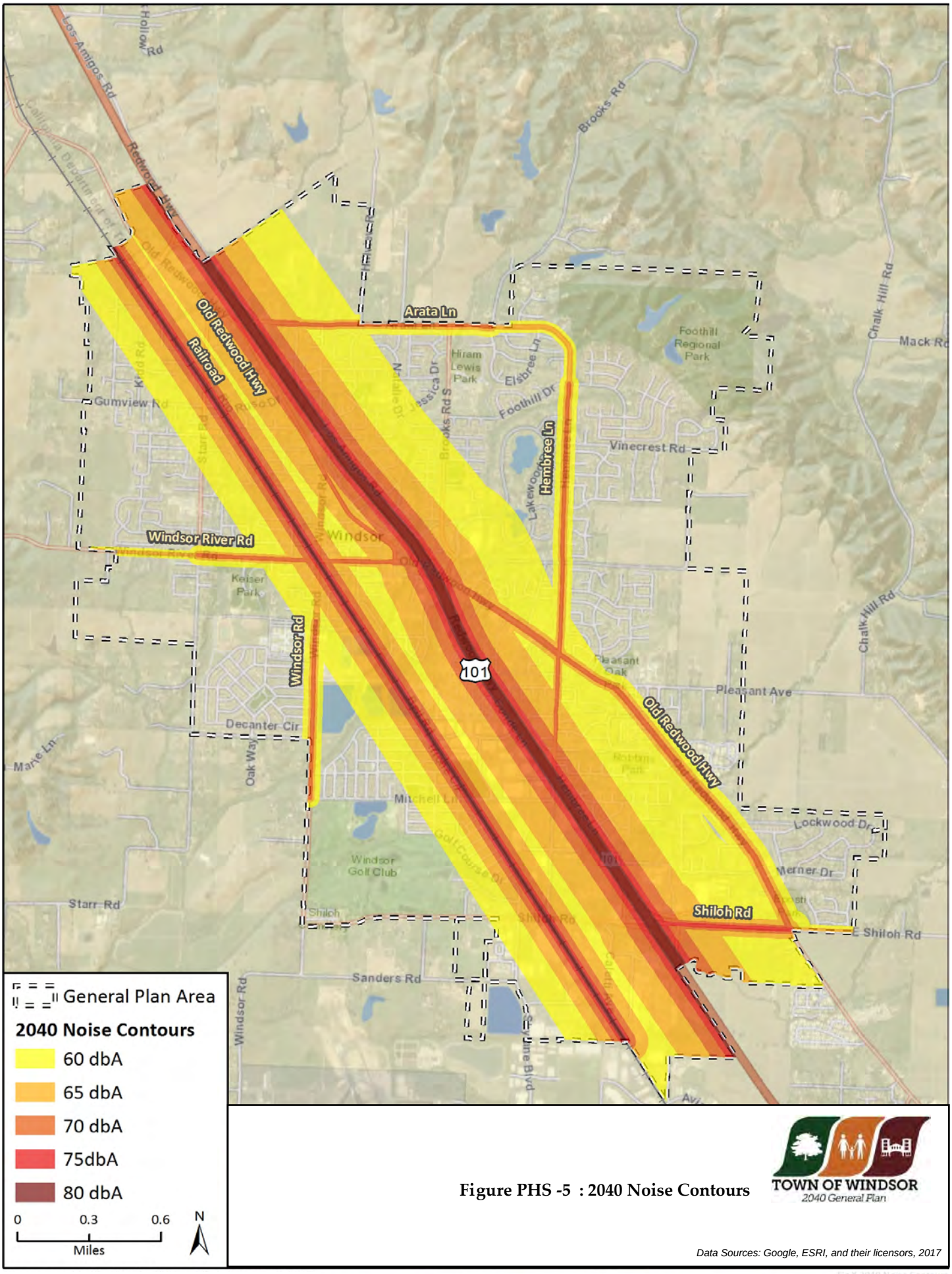
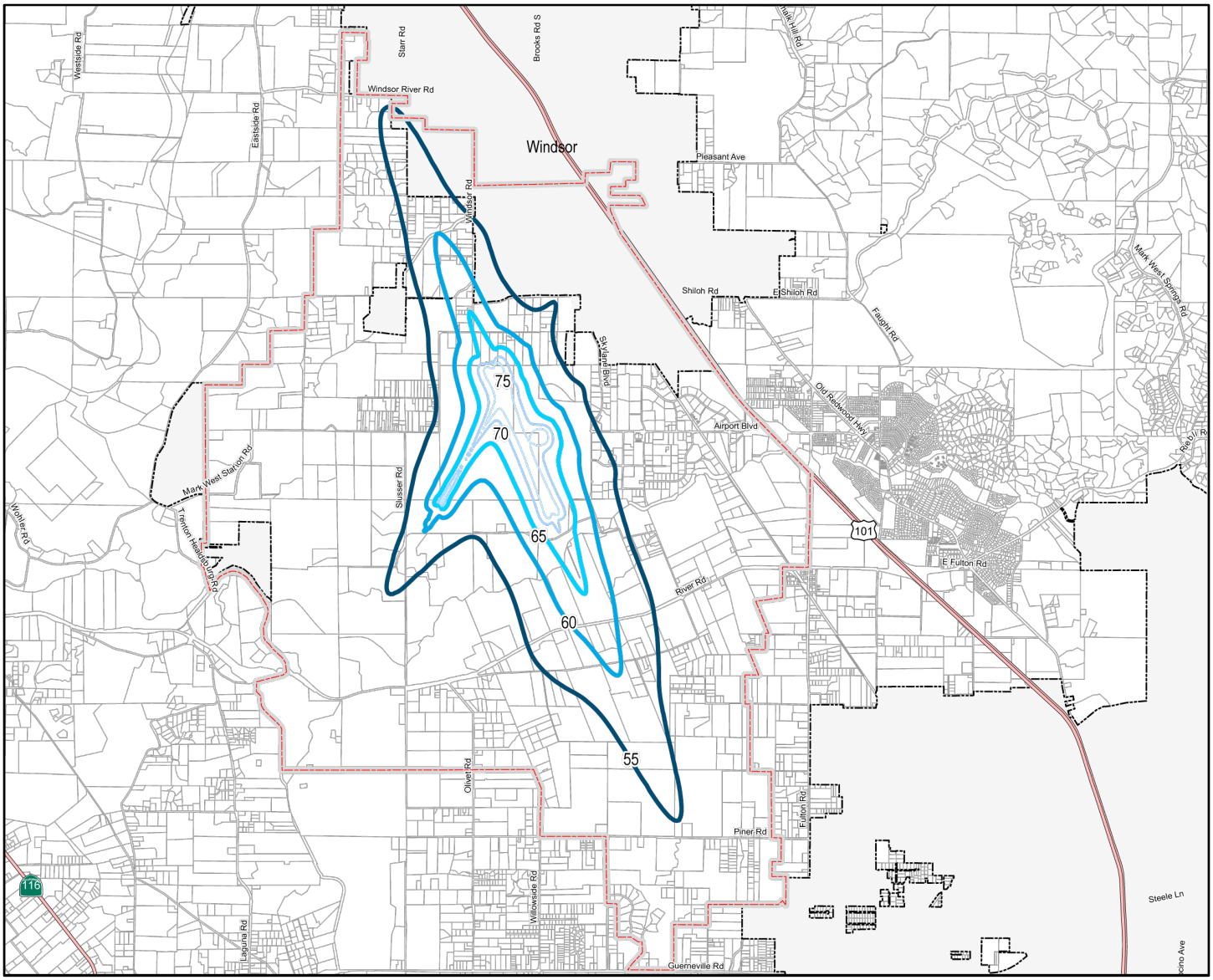



**Figure PHS -5 : 2040 Noise Contours**

TOWN OF WINDSOR
2040 General Plan

*Data Sources: Google, ESRI, and their licensors, 2017*

Fig X 2040 Noise Contours




## 2030 Projected Noise Contours

Community Noise Equivalent (CNEL)
measured in decibels (dB)

- 55
- 60
- 65
- 70
- 75
- ALUC Referral Area

## Base Map Data

- Highways
- Town Limits

TOWN OF WINDSOR
2040 General Plan

**Figure PHS-6: Airport Noise Contours**

0 2,000 4,000 Feet
1:48,000

Note: Map scale and reproduction methods limit precision.
For illustrative purposes only.
Source: Sonoma County General Plan 2020 Air Transportation Element
Permit and Resource Management Department

Figure PHS-7
Acceptable Exposure Levels for Community Noise Environments

| Land Use Category | Community Noise Exposure Ldn/CNEL, dB | | | | | | |
|---|---|---|---|---|---|---|---|
| | 50-55 | 55-60 | 60-65 | 65-70 | 70-75 | 75-80 | 80-85 |
| Residential – Low Density Single Family, Duplex, Mobile Homes | | | | | | | |
| Residential – Multifamily | | | | | | | |
| Transient Lodging – Motels, Hotels | | | | | | | |
| Schools, Libraries, Churches, Hospitals, Nursing Homes | | | | | | | |
| Auditoriums, Concert Halls, Amphitheaters | | | | | | | |
| Sports Arenas, Outdoor Spectator Sports | | | | | | | |
| Playgrounds, Neighborhood Parks | | | | | | | |
| Golf Course, Riding Stables, Water Recreation, Cemeteries | | | | | | | |
| Office Buildings, Business Commercial and Professional | | | | | | | |
| Industrial, Manufacturing Utilities, Agriculture | | | | | | | |

NORMALLY ACCEPTABLE

Specified land use is satisfactory based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

CONDITIONALLY ACCEPTABLE

New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

NORMALLY UNACCEPTABLE

New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

CLEARLY UNACCEPTABLE

New construction or development should generally not be undertaken.

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TOWN OF
WINDSOR

# Town of Windsor

# Zoning Ordinance

**Planning & Building Department**
**9291 Old Redwood Highway**
**P.O. Box 100**
**Windsor, CA 95492**
**(707) 838-1021**
**townofwindsor.com**

**Adopted: July 5, 2000**
**Town Council Ordinance No. 2000-133**

**Revised 08/20/18**

**TABLE 3-A**
**OUTDOOR ILLUMINATION REQUIREMENTS BY USE**
**(AVERAGE FOOT CANDLES)**

| USE | ILLUMINATION (AVERAGE) |
|---|---|
| Financial Institution/Bank Parking Lot | 1 foot candle |
| Bar/Restaurant | 0.50 foot candle |
| Condo/Apartment/Mixed Use Residential | 0.50 foot candle |
| Meeting Centers | 1 foot candle |
| Convenience Stores | 1 foot candle |
| Car Wash | 1 foot candle |
| Drive Thru Business | 1 foot candle |
| Gas Stations | 1 foot candle |
| Hotels | 1 to 2 foot candle |
| Laundromat | 0.50 foot candle |
| Mini Storage+ | 0.50 foot candle |
| Office/Warehouse | 0.50 to 1 foot candle |
| Retail/Commercial | 1 foot candle |
| Fast Food | 1 foot candle |
| Mixed Use Commercial/Residential | 0.75 foot candle |

(Revised 01/2/02, ORD. 2002-152)

**E. Liquid waste.** No liquid shall be discharged into a public or private body of water, sewage system, watercourse, or into the ground, except in compliance with applicable regulations of the North Coast Regional Water Quality Control Board.

**F. Noise.** No use, activity, or process shall exceed the maximum allowable noise standards identified in Table 3-1.

**1. Noise measurement criteria.** Exterior noise levels shall be measured at the property line of the noise source. Noise measurement shall be made with a sound level meter using the 'A' weighted scale at slow meter response. Fast meter response shall be used only for an impulsive noise.

**TABLE 3-1**
**MAXIMUM NOISE LEVEL BY RECEIVING LAND USE**

| Type of Land Use | Maximum Allowable Noise Levels | | |
|---|---|---|---|
| | Time Interval | Exterior Noise | Interior Noise |
| Single- or multi-family residential | 10 p.m. to 7 a.m. | 50 dB(A) | 45 dB(A) |
| | 7 a.m. to 10 p.m. | 55 dB(A) | 35 dB(A) |
| Commercial | 10 p.m. to 7 a.m. | 55 dB(A) | 50 dB(A) |
| | 7 a.m. to 10 p.m. | 65 dB(A) | |
| Industrial or manufacturing | Any time | 70 dB(A) | 55 dB(A) |
| Public parks, public open space, and Civic Center | 10 p.m. to 7 a.m. | 50 dB(A) | N.A. |
| | 7 a.m. to 10 p.m. | 55 dB(A) | |

**Notes:**

(1) Each of the noise limits specified in Table 3-1, above shall be reduced by 5 dB(A) for impulse or simple tone noises, or for noise consisting of speech or music. If the ambient noise level exceeds the resulting standard, the ambient noise level shall be the standard.

(2) It shall be unlawful for any person within a residentially zoned area of the Town to operate any noise amplified device (e.g., bull horns, microphones, musical instruments, speakers, etc.), that exceeds a noise level of 45 dB(A) measured at the property line or cause loud excessive noise which disturbs the peace of the neighborhood.

**2. Exterior noise standards.** Exterior noise levels, when measured at any receiving property, shall conform to the noise level standards identified in Table 3-1, above.

**a.** If the measured ambient noise level exceeds the applicable noise level standard in any category above, the applicable standards shall be adjusted to equal the ambient noise level.

**b.** If the intruding noise source is continuous and cannot reasonably be discontinued or stopped to allow measurement of the ambient noise level, the noise level measured while the source is in operation shall be compared directly to the applicable noise level standards identified in Table 3-1, above.

**3. Conflicts with late night, early morning, or 24-hour operations.** Nonresidential activities shall not impact surrounding residential land uses (e.g., single-, multi-family, and mobile home parks).

**4. Construction hours allowed.** In order to allow construction schedules to take advantage of the weather, normal day light hours, to allow construction to proceed in an efficient manner, and to ensure that nearby residents as well as nonresidential activities are not disturbed by the early morning or late night activities, the Town has adopted, in the Municipal Code of the Town of Windsor, Title VII Building and

Housing Section 7-1-190 which establishes construction working hours related to the days and hours in which construction activity can occur. In addition, the Municipal Code has established procedures for seeking relief from the restrictions. Construction hours and days and any relief sought shall comply with the Municipal Code of the Town of Windsor. (rev 3/7/12 Ord 2012-274)

**5. Prohibited acts.** The following acts shall be a violation of this Section:

**a. Places of public entertainment.** Operating or allowing to be operated, any loudspeaker, musical instrument, or other source of sound in any place of public entertainment that exceed 95 dB(A) at any point normally occupied by a customer;

**b. Alarms.** Sounding of any exterior burglar or fire alarm or any motor vehicle burglar alarm that run continuously for a sufficient time to become a nuisance; and

**c. Residential air conditioning, refrigeration, and heating.** A residential air conditioning or refrigeration system, heating system, or associated equipment installed after the effective date of this Section shall comply with the requirements in Table 3-1.

**6. Exempt activities.** The following are not subject to the noise limitations of this Section.

**a. Emergencies.** Sound for alerting persons to the existence of an emergency or in the performance of authorized emergency work;

**b. Warning devices.** Warning devices, necessary for the protection of public safety (e.g., ambulance, fire, and police sirens);

**c. State or Federal preempted activities.** Any activity regulated by State or Federal law;

**d. Public health, safety, and welfare activities.** Construction or maintenance and repair operations conducted by public agencies and/or utility companies or their contractors which are deemed necessary to serve the best interests of the public and to protect the public health, safety, and welfare;

**e. Town Code provisions.** Where noise standards are specified elsewhere in the Town Code;

**f. Town parks.** Public agency sanctioned recreational activities and programs conducted in public parks; or

**g. Solid waste collection.** Noise sources associated with the authorized collection of solid waste (e.g., refuse and garbage).

**G. Odor.** No obnoxious odor or fumes shall be emitted that are perceptible without instruments by a reasonable person at the property line of the site.

**H. Radioactivity, electrical disturbance or electromagnetic interference.** None of the following shall be emitted:

**1.** Radioactivity, in a manner that does not comply with all applicable State and Federal regulations; or

**2.** Electrical disturbance or electromagnetic interference that interferes with normal radio or television reception or with the function of other electronic equipment beyond the property line of the site; or that does not comply with all applicable Federal Communications Commission (FCC) and other applicable State and Federal regulations.

## 27.20.040 - Creekside Development

**A. Purpose.** This Section provides for adequate buffer areas between creek corridors and adjacent development, to protect the creek corridors as valuable natural, scenic, and recreational amenities.

**B. Applicability.** The provisions of this Section apply to proposed development, other than public works or infrastructure, on any site adjacent to or crossed by a creek or stream.

**C. Streambed analysis required.** The project permit application shall include a site-specific streambed analysis prepared by a hydrologist, civil engineer, or other qualified professional to determine the precise boundary/top of bank of the waterway. The Director may waive this requirement if it is determined that the project, because of its size, location, or design will not have a significant impact on the waterway, or that sufficient information already exists and further analysis is not necessary. A required streambed analysis shall include all information and materials required by the Department.

**D. Development standards.**

**1.** A building setback line along the waterway shall be measured from the toe of the stream bank outward a distance of 2.5 times the height of the stream bank plus 30 feet, or 30 feet outward from the stream bank, whichever distance is greater. Additional setbacks may be required for "Riparian Woodlands" as designated in the General Plan, or to preserve existing vegetation or other environmental resources along any waterway. Setbacks adjacent to creekside paths or open spaces shall be measured from the outside boundary of the path or open space.

# CONSTRUCTION NOISE MODELING

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 11/10/2022
Case Description: TWIN-03.3

**** Receptor #1 ****

| Description | Land Use | Baselines (dBA) Daytime | Evening | Night |
|---|---|---|---|---|
| Site Prep | Residential | 60.0 | 55.0 | 50.0 |

Equipment

| Description | Impact Device | Usage (%) | Spec Lmax (dBA) | Actual Lmax (dBA) | Receptor Distance (feet) | Estimated Shielding (dBA) |
|---|---|---|---|---|---|---|
| Dozer | No | 40 | | 81.7 | 50.0 | 0.0 |
| Tractor | No | 40 | 84.0 | | 50.0 | 0.0 |
| Front End Loader | No | 40 | | 79.1 | 50.0 | 0.0 |

Results

| | Calculated (dBA) | | Noise Limits (dBA) Day | | Evening | | Night | | Noise Limit Exceedance (dBA) Day | | Evening | | Night | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Equipment | Lmax | Leq | Lmax | Leq | Lmax | Leq | Lmax | Leq | Lmax | Leq | Lmax | Leq | Lmax | Leq |
| Dozer | 81.7 | 77.7 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Tractor | 84.0 | 80.0 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Front End Loader | 79.1 | 75.1 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Total | 84.0 | 82.8 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 11/10/2022
Case Description: TWIN-03.3

**** Receptor #1 ****

Baselines (dBA)

| Description | Land Use | Daytime | Evening | Night |
|---|---|---|---|---|
| Rough Grading | Residential | 60.0 | 55.0 | 50.0 |

Equipment

| Description | Impact Device | Spec Usage (%) | Actual Lmax (dBA) | Receptor Lmax (dBA) | Estimated Distance (feet) | Shielding (dBA) |
|---|---|---|---|---|---|---|
| Grader | No | 40 | 85.0 | 50.0 | | 0.0 |
| Dozer | No | 40 | 81.7 | 50.0 | | 0.0 |
| Tractor | No | 40 | 84.0 | 50.0 | | 0.0 |

Results

| | Calculated (dBA) | | Noise Limits (dBA) | | | | Noise Limit Exceedance (dBA) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Day | | Evening | | Night | | Day | | Evening | | Night | |
| Equipment | Lmax | Leq | Lmax | Leq | Lmax | Leq | Lmax | Leq | Lmax | Leq | Lmax | Leq | Lmax | Leq |
| Grader | 85.0 | 81.0 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Dozer | 81.7 | 77.7 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Tractor | 84.0 | 80.0 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Total | 85.0 | 84.6 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 11/10/2022
Case Description: TWIN-03.3

**** Receptor #1 ****

| Description | Land Use | Baselines (dBA) Daytime | Evening | Night |
|---|---|---|---|---|
| Building Construction | Residential | 60.0 | 55.0 | 50.0 |

Equipment

| Description | Impact Device | Usage (%) | Spec Lmax (dBA) | Actual Lmax (dBA) | Receptor Distance (feet) | Estimated Shielding (dBA) |
|---|---|---|---|---|---|---|
| Crane | No | 16 | | 80.6 | 50.0 | 0.0 |
| Generator | No | 50 | | 80.6 | 50.0 | 0.0 |
| Tractor | No | 40 | 84.0 | | 50.0 | 0.0 |

Results

| Equipment | Calculated (dBA) Lmax | Leq | Noise Limits (dBA) Day Lmax | Leq | Evening Lmax | Leq | Night Lmax | Leq | Noise Limit Exceedance (dBA) Day Lmax | Leq | Evening Lmax | Leq | Night Lmax | Leq |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Crane | 80.6 | 72.6 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Generator | 80.6 | 77.6 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Tractor | 84.0 | 80.0 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Total | 84.0 | 82.5 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 11/10/2022
Case Description: TWIN-03.3

**** Receptor #1 ****

Baselines (dBA)

| Description | Land Use | Daytime | Evening | Night |
|---|---|---|---|---|
| Asphalt Paving | Residential | 60.0 | 55.0 | 50.0 |

Equipment

| Description | Impact Device | Usage (%) | Spec Lmax (dBA) | Actual Lmax (dBA) | Receptor Distance (feet) | Estimated Shielding (dBA) |
|---|---|---|---|---|---|---|
| Drum Mixer | No | 50 | | 80.0 | 50.0 | 0.0 |
| Pavement Scarafier | No | 20 | | 89.5 | 50.0 | 0.0 |
| Tractor | No | 40 | | 84.0 | 50.0 | 0.0 |

Results

| | Noise Limits (dBA) | | | | | | Noise Limit Exceedance (dBA) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Calculated (dBA) | | Day | | Evening | | Night | | Day | | Evening | | Night | |
| Equipment | Lmax | Leq | Lmax | Leq | Lmax | Leq | Lmax | Leq | Lmax | Leq | Lmax | Leq | Lmax | Leq |
| Drum Mixer | 80.0 | 77.0 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Pavement Scarafier | 89.5 | 82.5 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Tractor | 84.0 | 80.0 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Total | 89.5 | 85.2 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 11/10/2022
Case Description: TWIN-03.3

**** Receptor #1 ****

| Description | Land Use | Baselines (dBA) Daytime | Evening | Night |
|---|---|---|---|---|
| Architectural Coating | Residential | 60.0 | 55.0 | 50.0 |

Equipment

| Description | Impact Device | Usage (%) | Spec Lmax (dBA) | Actual Lmax (dBA) | Receptor Distance (feet) | Estimated Shielding (dBA) |
|---|---|---|---|---|---|---|
| Compressor (air) | No | 40 | | 77.7 | 50.0 | 0.0 |

Results

| Equipment | Calculated (dBA) Lmax | Leq | Noise Limits (dBA) Day Lmax | Leq | Evening Lmax | Leq | Night Lmax | Leq | Noise Limit Exceedance (dBA) Day Lmax | Leq | Evening Lmax | Leq | Night Lmax | Leq |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Compressor (air) | 77.7 | 73.7 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Total | 77.7 | 73.7 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

## TWIN-03.3 Construction Noise Modeling Attenuation Calculations

**Levels in dBA Leq**

| Phase | RCNM Reference Noise Level | Residences within 50 feet north and south | Residences within 100 to west | Mother Earth's Children Preschool within 350 feet north | Robins Park within 600 feet south |
|---|---|---|---|---|---|
| *Distance in feet* | *50* | *50* | *75* | *350* | *600* |
| Site Preparation | 83 | 83 | 79 | 66 | 61 |
| Rough Grading | 85 | 85 | 81 | 68 | 63 |
| Building Construction | 83 | 83 | 79 | 66 | 61 |
| Asphalt Paving | 85 | 85 | 82 | 68 | 64 |
| Paving | 74 | 74 | 70 | 57 | 52 |

*Attenuation calculated through Inverse Square Law: Lp(R2) = Lp(R1) - 20Log(R2/R1)*

## COI-56 Vibration Annoyance Attenuation Calculations

**Levels in in/sec PPV**

| *Distance in feet* | **Vibration Reference Level at *25 feet*** | **Residence to South** *5* | **Residence to north** *50* |
|---|---|---|---|
| Vibratory Roller | 0.21 | NA | 0.074 |
| Large Bulldozer | 0.089 | 0.995 | 0.031 |
| Loaded Trucks | 0.076 | NA | 0.027 |
| Jackhammer | 0.035 | NA | 0.012 |
| Small Bulldozer | 0.003 | 0.034 | 0.001 |

# TRAFFIC NOISE MODELING

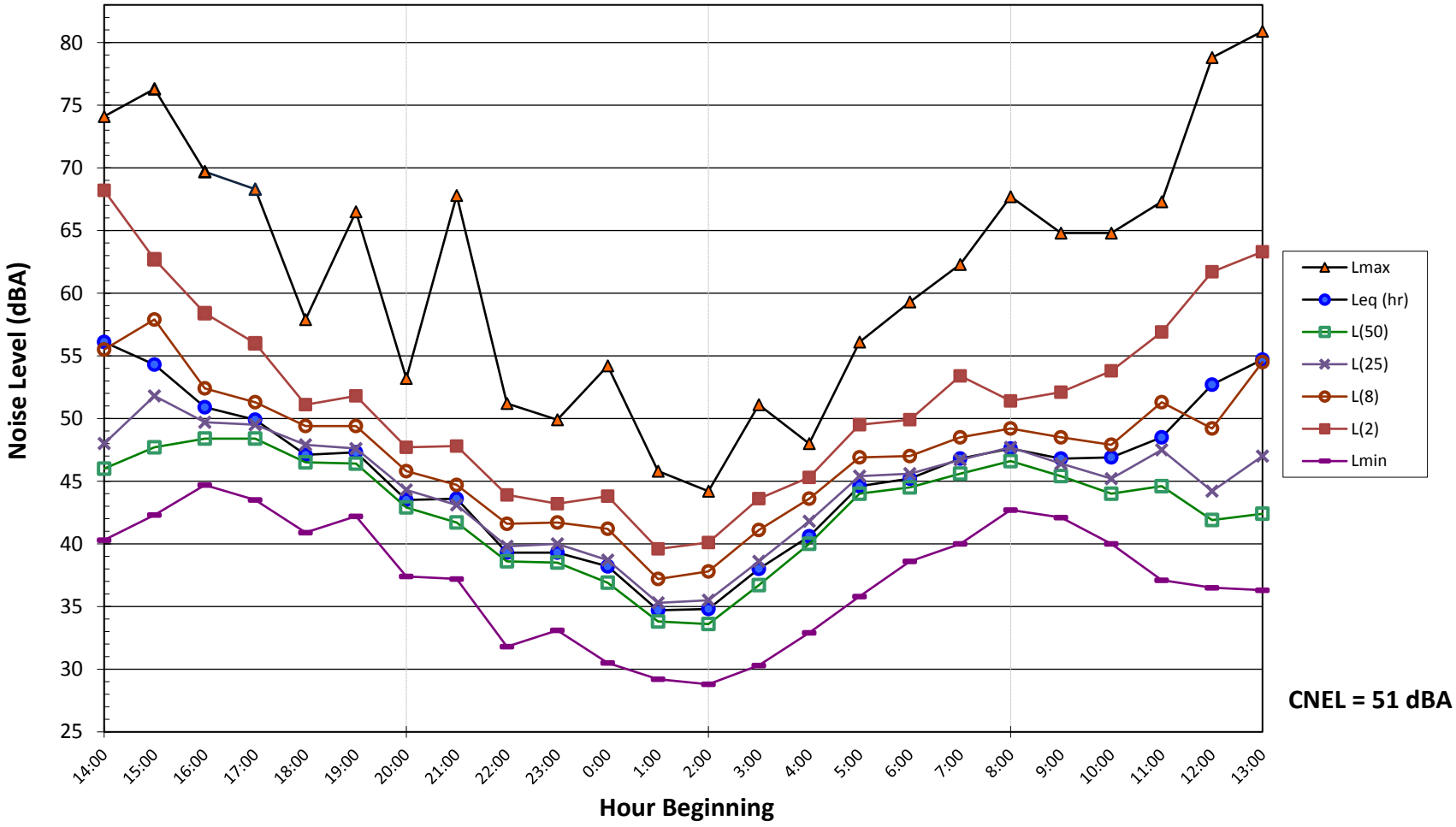
**TWIN-03.3**

**Traffic Noise Calculations**

| | ADT Volumes | | | | dBA CNEL Increae | | |
|---|---|---|---|---|---|---|---|
| Roadway Segment | Existing No Project | Existing Plus Project | Future No Project | Future Plus Project | Project Noise Increase | Cumulative Increase | Project Cumulative Contribution |
| Hembree Lane (n/o Cornell St) | 5,380 | 5,538 | 7,834 | 7,993 | 0.1 | 1.7 | 0.1 |
| Cornell Street (e/o Hembree Ln) | 340 | 498 | 495 | 653 | 1.7 | 2.8 | 1.2 |

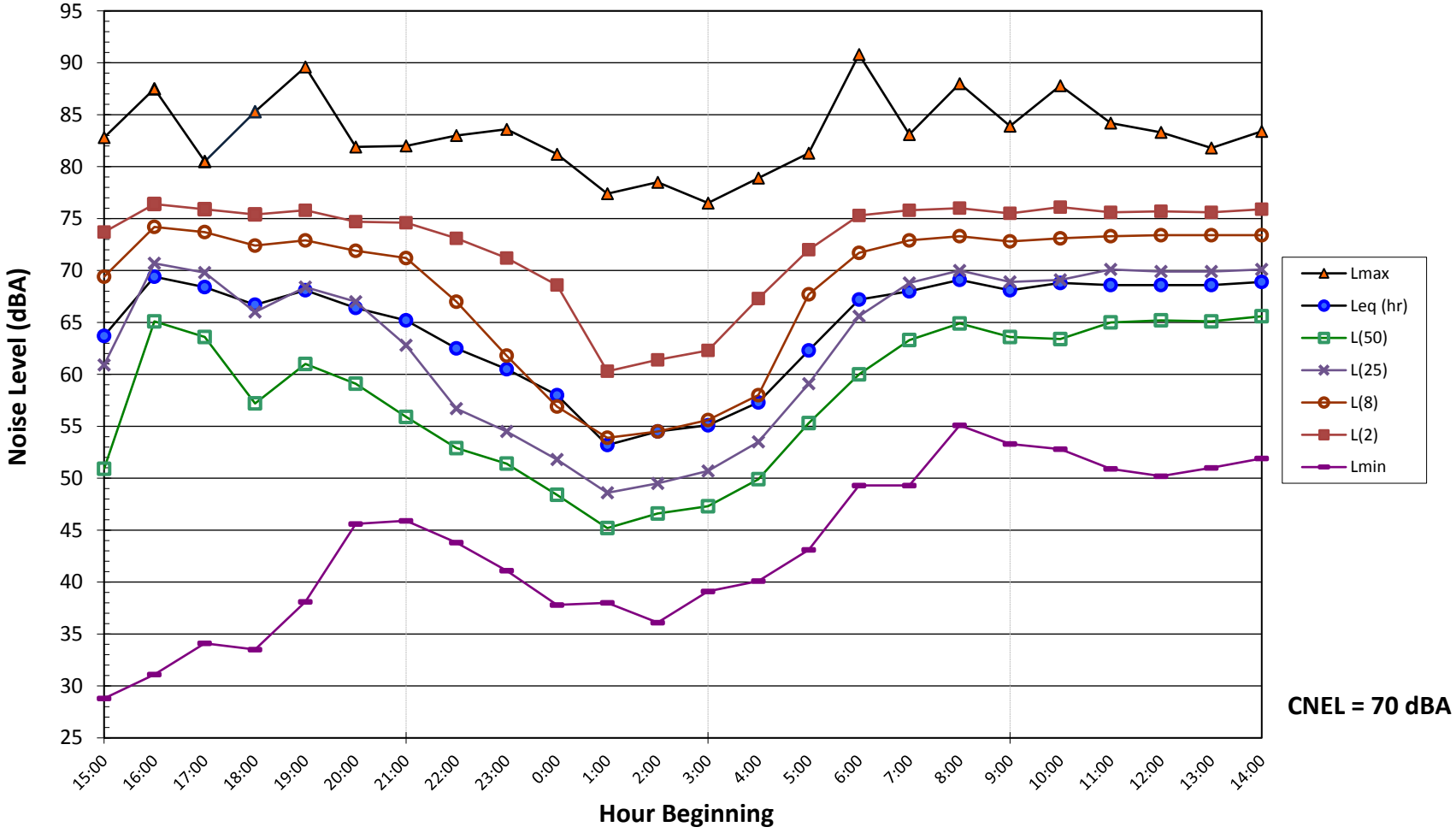
# NOISE MONITORING LONG-TERM GRAPHS

# Noise Levels at LT-1
## Cornell Street east of Hembree Lane, Windsor, CA
## Monday, April 25 through Tuesday, April 26, 2022




**CNEL = 51 dBA**

**Noise Levels at LT-1**
**Along Cornell Street between Hembree Land and Shira Street Windsor, CA**
**Monday, April 25 through Tuesday, April 26, 2022**




**CNEL = 70 dBA**