# 4.10 NOISE

This section includes a description of acoustic fundamentals, a summary of applicable regulations related to noise and vibration, a description of existing ambient noise conditions, and an analysis of potential short-construction and long-term operational noise impacts associated with implementation of the project.

No comments related to noise were received during public review of the Notice of Preparation (NOP) for the proposed project

## 4.10.1 Terminology

Before discussing the noise setting for the project, background information about sound, noise, vibration, and common noise descriptors is needed to provide context and understanding of the technical terms referenced throughout this section.

### Sound, Noise, and Acoustics

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air) to a human ear. Noise is defined as loud, unexpected, annoying, or unwanted sound.

In the science of acoustics, the fundamental model consists of a sound (or noise) source, a receiver, and the propagation path between the two. The loudness of the noise source and obstructions or atmospheric factors affecting the propagation path to the receiver determines the sound level and characteristics of the noise perceived by the receiver. The field of acoustics deals primarily with the propagation and control of sound.

### Frequency

Continuous sound can be described by frequency (pitch) and amplitude (loudness). A low-frequency sound is perceived as low in pitch. Frequency is expressed in terms of cycles per second, or hertz (Hz) (e.g., a frequency of 250 cycles per second is referred to as 250 Hz). High frequencies are sometimes more conveniently expressed in kilohertz, or thousands of hertz. The audible frequency range for humans is generally between 20 Hz and 20,000 Hz.

### Sound Pressure Levels and Decibels

The amplitude of pressure waves generated by a sound source determines the loudness of that source. Sound pressure amplitude is measured in micro-Pascals (mPa). One mPa is approximately one hundred billionth (0.00000000001) of normal atmospheric pressure. Sound pressure amplitudes for different kinds of noise environments can range from less than 100 to 100,000,000 mPa. Because of this large range of values, sound is rarely expressed in terms of mPa. Instead, a logarithmic scale is used to describe sound pressure level (SPL) in terms of decibels (dB).

### Addition of Decibels

Because decibels are logarithmic units, SPLs cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3-dB increase in loudness. In other words, when two identical sources are each producing sound of the same loudness at the same time, the resulting sound level at a given distance would be 3 dB higher than if only one of the sound sources was producing sound under the same conditions. For example, if one idling truck generates an SPL of 70 dB, two trucks idling simultaneously would not produce 140 dB; rather, they would combine to produce 73 dB. Under the decibel scale, three sources of equal loudness together produce a sound level approximately 5 dB louder than one source.

## A-Weighted Decibels

The decibel scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness or human response is determined by the characteristics of the human ear.

Human hearing is limited in the range of audible frequencies as well as in the way it perceives the SPL in that range. In general, people are most sensitive to the frequency range of 1,000–8,000 Hz and perceive sounds within this range better than sounds of the same amplitude with frequencies outside of this range. To approximate the response of the human ear, sound levels of individual frequency bands are weighted, depending on the human sensitivity to those frequencies. Then, an "A-weighted" sound level (expressed in units of A-weighted decibels) can be computed based on this information.

The A-weighting network approximates the frequency response of the average young ear when listening to most ordinary sounds. When people make judgments of the relative loudness or annoyance of a sound, their judgment correlates well with the A-scale sound levels of those sounds. Thus, noise levels are typically reported in terms of A-weighted decibels. All sound levels discussed in this section are expressed in A-weighted decibels. Common sources of environmental noise and associated noise levels are presented in Table 4.10-1.

**Table 4.10-1 Typical Noise Levels**

| Common Outdoor Activities | Noise Level (dB) | Common Indoor Activities |
|---|---|---|
| | 110 | Rock band |
| Jet flyover at 1,000 feet | 100 | |
| Gas lawnmower at 3 feet | 90 | |
| Diesel truck moving at 50 mph at 50 feet | 80 | Food blender at 3 feet, Garbage disposal at 3 feet |
| Noisy urban area, Gas lawnmower at 100 feet | 70 | Vacuum cleaner at 10 feet, Normal speech at 3 feet |
| Commercial area, Heavy traffic at 300 feet | 60 | |
| Quiet urban daytime | 50 | Large business office, Dishwasher in next room |
| Quiet urban nighttime | 40 | Theater, Large conference room (background) |
| Quiet suburban nighttime | 30 | Library, Bedroom at night, Concert hall (background) |
| Quiet rural nighttime | 20 | Broadcast/Recording Studio |
| | 10 | |
| Threshold of Human Hearing | 0 | Threshold of Human Hearing |

Notes: dB = A-weighted decibels; mph= miles per hour

Source: Caltrans 2009

## Human Response to Changes in Noise Levels

The doubling of sound energy results in a 3-dB increase in the sound level. However, given a sound level change measured with precise instrumentation, the subjective human perception of a doubling of loudness will usually be different from what is measured.

Under controlled conditions in an acoustical laboratory, the trained, healthy human ear can discern 1-dB changes in sound levels when exposed to steady, single-frequency ("pure-tone") signals in the mid-frequency (1,000–8,000 Hz) range. In general, the healthy human ear is most sensitive to sounds between 1,000 and 5,000 Hz and perceives both higher and lower frequency sounds of the same magnitude with less intensity (Caltrans 2013a:2-18). In typical noisy environments, changes in noise of 1–2 dB are generally not perceptible. However, it is widely accepted that people can begin to detect sound level increases of 3 dB in typical noisy environments. Further, a 5-dB increase is generally perceived as a distinctly noticeable increase, and a 10-dB increase is generally perceived as a doubling of loudness (Caltrans 2013a:2-10). Therefore, a doubling of sound energy (e.g., doubling the volume of traffic on a highway) that would result in a 3-dB increase in sound would generally be perceived as barely detectable.

## Common Noise Descriptors

Noise in our daily environment fluctuates over time. Various noise descriptors have been developed to describe time-varying noise levels. The following are the noise descriptors used throughout this section.

**Equivalent Continuous Sound Level ($L_{eq}$):** $L_{eq}$ represents an average of the sound energy occurring over a specified period. In effect, $L_{eq}$ is the steady-state sound level containing the same acoustical energy as the time-varying sound level that occurs during the same period (Caltrans 2013a:2-48). For instance, the 1-hour equivalent sound level, also referred to as the hourly $L_{eq}$, is the energy average of sound levels occurring during a 1-hour period and is the basis for noise abatement criteria used by the California Department of Transportation (Caltrans) and FTA (Caltrans 2013a:2-47, FTA 2006:2-19).

**Maximum Sound Level ($L_{max}$):** $L_{max}$ is the highest instantaneous sound level measured during a specified period (Caltrans 2013a:2-48, FTA 2006:2-16).

**Day-Night Level ($L_{dn}$):** $L_{dn}$ is the energy average of A-weighted sound levels occurring over a 24-hour period, with a 10-dB "penalty" applied to sound levels occurring during nighttime hours between 10:00 p.m. and 7:00 a.m. (Caltrans 2013a:2-48, FTA 2006:2-22).

**Community Noise Equivalent Level (CNEL):** CNEL is the energy average of the A-weighted sound levels occurring over a 24-hour period, with a 10-dB penalty applied to sound levels occurring during the nighttime hours between 10:00 p.m. and 7:00 a.m. and a 5-dB penalty applied to the sound levels occurring during evening hours between 7:00 p.m. and 10:00 p.m. (Caltrans 2013a:2-48).

## Sound Propagation

When sound propagates over a distance, it changes in level and frequency content. The manner in which a noise level decreases with distance depends on the following factors.

### Geometric Spreading

Sound from a localized source (i.e., a point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (or decreases) at a rate of 6 dB for each doubling of distance from a point source. Roads and highways consist of several localized noise sources on a defined path and hence can be treated as a line source, which approximates the effect of several point sources, thus propagating at a slower rate in comparison to a point source. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source.

### Ground Absorption

The propagation path of noise from a source to a receiver is usually very close to the ground. Noise attenuation from ground absorption and reflective-wave canceling provides additional attenuation associated with geometric spreading. Traditionally, this additional attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is usually sufficiently accurate for distances of less than 200 feet. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receiver, such as a parking lot or body of water), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receiver, such as soft dirt, grass, or scattered bushes and trees), additional ground-attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to the attenuate rate associated with cylindrical spreading, the additional ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance. This would hold true for point sources, resulting in an overall drop-off rate of up to 7.5 dB per doubling of distance.

### Atmospheric Effects

Receivers located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels, as wind can carry sound. Sound levels can be increased over large distances (e.g., more than 500 feet) from the source because of atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also affect sound attenuation.

Shielding by Natural or Human-Made Features

A large object or barrier in the path between a noise source and a receiver attenuate noise levels at the receiver. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Natural terrain features (e.g., hills and dense woods) and human-made features (e.g., buildings and walls) can substantially reduce noise levels. A barrier that breaks the line of sight between a source and a receiver will typically result in at least 5 dB of noise reduction (Caltrans 2013a:2-41; FTA 2006:5-6, 6-25). Barriers higher than the line of sight provide increased noise reduction (FTA 2006:2-12). Vegetation between the source and receiver is rarely effective in reducing noise because it does not create a solid barrier unless there are multiple rows of vegetation (FTA 2006:2-11).

## VIBRATION

Vibration is the periodic oscillation of a medium or object with respect to a given reference point. Sources of vibration include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) and those introduced by human activity (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, (e.g., operating factory machinery or transient in nature). Vibration levels can be depicted in terms of amplitude and frequency, relative to displacement, velocity, or acceleration.

Vibration amplitudes are commonly expressed in peak particle velocity (PPV) or root-mean-square (RMS) vibration velocity. PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is typically used in the monitoring of transient and impact vibration and has been found to correlate well to the stresses experienced by buildings (FTA 2006; Caltrans 2013b). PPV and RMS vibration velocity are normally described in inches per second (in/sec).

Although PPV is appropriate for evaluating the potential for building damage, it is not always suitable for evaluating human response. It takes some time for the human body to respond to vibration signals. In a sense, the human body responds to average vibration amplitude. The RMS of a signal is the average of the squared amplitude of the signal, typically calculated over a 1-second period. As with airborne sound, the RMS velocity is often expressed in decibel notation as vibration decibels (VdB), which serves to compress the range of numbers required to describe vibration (FTA 2006). This is based on a reference value of 1 micro inch per second (μin/sec).

The typical background vibration-velocity level in residential areas is approximately 50 VdB. Ground vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels (FTA 2006).

Typical outdoor sources of perceptible ground vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the ground vibration is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration-velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings. Table 4.10-2 describes the general human response to different ground vibration-velocity levels.

**Table 4.10-2 Human Response to Different Levels of Ground Noise and Vibration**

| Vibration-Velocity Level | Human Reaction |
|---|---|
| 65 VdB | Approximate threshold of perception. |
| 75 VdB | Approximate dividing line between barely perceptible and distinctly perceptible. Many people find that transportation-related vibration at this level is unacceptable. |
| 85 VdB | Vibration acceptable only if there are an infrequent number of events per day. |

Notes: VdB = vibration decibels referenced to 1 μ inch/second and based on the root mean square velocity amplitude.

Source: FTA 2006:7-8

# 4.10.2 Regulatory Setting

Key federal, State, and local regulatory planning issues applicable to the project for noise-related impacts are discussed below. Background information on acoustical fundamentals, also described below, is required context for regulatory and planning issues.

## FEDERAL

### The Federal Noise Control Act of 1972

The primary motivating legislation for noise control in the United States was provided by the Federal Noise Control Act of 1972, which addressed the issue of noise as a threat to human health and welfare, particularly in urban areas. In response to the Noise Control Act, the U.S. Environmental Protection Agency (EPA) published *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety* (EPA 1974). In summary, EPA findings were that sleep, speech, and other types of essential activity interference could be avoided in residential areas if the $L_{dn}$ did not exceed 55 A-weighted sound levels (dB) outdoors and 45 dB indoors. EPA's intent was not that these findings necessarily be considered as mandatory standards, criteria, or regulatory goals, but as advisory exposure levels below which there is no reason to suspect that the general population would be at risk from any of the identified health or welfare effects of noise. EPA's *Levels* report also identified 5 dB as an adequate margin of safety before an increase in noise level would produce a significant increase in the severity of community reaction (i.e., increased complaint frequency, annoyance percentages, etc.) provided that the existing baseline noise exposure did not exceed 55 dB $L_{dn}$.

### U.S. Department of Transportation

To address the human response to ground vibration, FTA has set forth guidelines for maximum-acceptable vibration criteria for different types of land uses. These guidelines are presented in Table 4.10-3.

**Table 4.10-3 Ground-Borne Vibration (GBV) Impact Criteria for General Assessment**

| Land Use Category | GVB Impact Levels (VdB re 1 micro-inch/second) Frequent Events[1] | GVB Impact Levels (VdB re 1 micro-inch/second) Occasional Events[2] | GVB Impact Levels (VdB re 1 micro-inch/second) Infrequent Events[3] |
|---|---|---|---|
| Category 1: Buildings where vibration would interfere with interior operations. | 65 [4] | 65 [4] | 65 [4] |
| Category 2: Residences and buildings where people normally sleep. | 72 | 75 | 80 |
| Category 3: Institutional land uses with primarily daytime uses. | 75 | 78 | 83 |

Notes: VdB = vibration decibels referenced to 1 µ inch/second and based on the root mean square (RMS) velocity amplitude.

1. "Frequent Events" is defined as more than 70 vibration events of the same source per day.
2. "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day.
3. "Infrequent Events" is defined as fewer than 30 vibration events of the same source per day.
4. This criterion is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research would require detailed evaluation to define acceptable vibration levels.

Source: FTA 2006

## REGIONAL AND LOCAL PLANS, POLICIES, REGULATIONS AND ORDINANCES

### Solano County General Plan

Table 4.10-4 presents the transportation noise standards established in the Solano County General Plan. Table 4.10-5 presents the noise standards from the Solano County General Plan that apply to non-transportation noise sources.

**Table 4.10-4 Solano County Transportation Noise Standards**

| New Land Use | Sensitive Outdoor Area (dB Ldn) | Sensitive Interior[1] Area (dB Ldn) | County Notes |
|---|---|---|---|
| All Residential | 65 | 45 | 2 |
| Transient Lodging | 65 | 45 | 2, 3 |
| Hospitals and Nursing Homes | 65 | 45 | 2, 3, 4 |
| Theaters and Auditoriums | – | 35 | 3 |
| Churches, Meeting Halls, Schools, Libraries, etc. | 65 | 40 | 3 |
| Office Buildings | 65 | 45 | 3 |
| Commercial Buildings | – | 50 | 3 |
| Playgrounds, Parks, etc. | 70 | – | |
| Industry | 65 | 50 | 3 |
| All Residential | 65 | 45 | 2 |

Notes: dB = A-weighted decibels; $L_{dn}$ = day-night average noise level

1. Interior noise-level standards are applied within noise-sensitive areas of the various land uses, with windows and doors in the closed positions.
2. If these uses are affected by nighttime railroad passages, the potential for sleep disturbance shall be addressed.
3. Where there are no sensitive exterior spaces proposed for these uses, only the interior noise-level standard shall apply.
4. Hospitals are often noise-generating uses. The exterior noise-level standards for hospitals are applicable only at clearly identified areas designated for outdoor relaxation by either hospital staff or patients.

Source: Solano County General Plan 2015

**Table 4.10-5 Solano County Non-Transportation Noise Standards**

| Noise Level Descriptor | Outdoor Area Average (dB $L_{eq}$)/Maximum (dB $L_{max}$) Daytime | Outdoor Area Average (dB $L_{eq}$)/Maximum (dB $L_{max}$) Nighttime | Interior[2] Average (dB $L_{eq}$)/Maximum (dB $L_{max}$) Day and Night | County Notes |
|---|---|---|---|---|
| All Residential | 55/70 | 50/65 | 35/55 | |
| Transient Lodging | 55/75 | – | 35/55 | 3 |
| Hospitals and Nursing Homes | 55/75 | – | 35/55 | 4,5 |
| Theaters and Auditoriums | – | – | 30/50 | 5 |
| Churches, Meeting Halls, Schools, Libraries, etc. | 55/75 | – | 35/60 | 5 |
| Office Buildings | 60/75 | – | 45/65 | 5 |
| Commercial Buildings | 55/75 | – | 45/65 | 5 |
| Playgrounds, Parks, etc. | 65/75 | – | – | 5 |
| Industry | 60/80 | – | 50/70 | 5 |

Notes: $L_{eq}$ = equivalent or energy-averaged sound level; $L_{max}$ = Highest root-mean-square sound level measured over a given period of time; dB = A-weighted decibels; Daytime = 7:00 a.m. to 10:00 p.m.; Nighttime = 10:00 p.m. to 7:00 a.m.

1. The standards shall be reduced by 5 dB for sounds consisting primarily of speech or music, and for recurring impulsive sounds. If the existing ambient noise level exceeds the standards, then the noise level standards shall be increased at 5-dB increments to encompass the ambient.
2. Interior noise-level standards are applied within noise-sensitive areas of the various land uses, with windows and doors in the closed positions.
3. Outdoor activity areas of transient lodging facilities are not commonly used during nighttime hours.
4. Hospitals are often noise-generating uses. The exterior-noise-level standards for hospitals are applicable only at clearly identified areas designated for outdoor relaxation by either hospital staff or patients.
5. The outdoor activity areas of these uses (if any), are not typically utilized during nighttime hours.

Source: Solano County General Plan 2015

The Solano County General Plan also includes the following policies relevant to the project:

- Policy HS.P-48: Consider and promote land use compatibility between noise-sensitive and noise-generating land uses when reviewing new development proposals.
- Policy HS.P-51: Develop strategies with residents and businesses to reduce noise conflicts.
- Policy HS.P-52: Minimize noise conflicts between current and proposed land uses and transportation networks by encouraging compatible land uses around critical areas with higher noise potential.

### Solano County Code

The Solano County Code, Chapter 28, Land Use Regulations, includes standards to control excessive noise and vibration in the unincorporated County.

County Code 28.70.10 General Development Standards Applicable to All Uses in Every Zoning District

B. Performance Standards. Except as provided in Chapter 2.2, any use of land or buildings must meet the applicable performance standards listed below:

  1b. All uses of land and buildings shall be conducted in a manner, and provide adequate controls and operational management to prevent … noise that exceeds 65 dB $L_{dn}$ at any property line.

# 4.10.3 Environmental Setting

## SENSITIVE LAND USES

Noise-sensitive land uses are generally considered to include those uses to which noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise. Parks, schools, historic sites, cemeteries, and recreation areas are also generally considered sensitive to increases in exterior noise levels. Places of worship, transit lodging, and other places where low interior noise levels are essential are also considered noise-sensitive.

Existing noise- and vibration- sensitive land uses in the vicinity of the project site include single-family residences. The nearest sensitive receptors are a group of single-family residences located to the west of the project site, to the north of Hay Road, and east of Dally Road. The closest sensitive receptor is a single-family residence on the north side of Hay Road approximately 4,020 feet west of the project site and 9,650 feet northwest of where project construction would occur. The project site is directly surrounded to north, south, east, and west by agricultural land uses and open space areas.

## EXISTING NOISE LEVELS

The existing noise environment in the project area is primarily influenced by transportation noise from vehicle traffic on the nearby transportation network (e.g., State Route 113, Hay Road). Other noise sources include existing Recology Hay Road (RHR) Landfill activities, seasonal harvesting activities in adjacent farmland, birds, and livestock. In addition, and to a lesser extent, occasional aircraft noise associated with the operation of Travis Air Force Base (approximately 3.3 miles southwest of the project site) may influence the existing noise environment. Those noise sources noted above are also considered sources of vibration in the project area.

Existing traffic noise levels along affected roadways are shown in Table 4.10-6. Vehicles enter the project site from Hay Road along the northside of the project site including bulldozers, scrapers, loaders, graders, and water trucks that are part of existing landfill operations. Based on noise modeling of existing operations at the project site, noise levels generated by project operations at the nearest sensitive receptor attenuate to 38.5 $L_{eq}$ dB and 42.4 $L_{max}$ dB.

## 4.10.4 Environmental Impacts and Mitigation Measures

### SIGNIFICANCE CRITERIA

Based on Appendix G of the State CEQA Guidelines, the project would result in a potentially significant impact related to noise if it would:

- generate a substantial permanent increase (i.e., 3 dB or more) in ambient noise levels from non-transportation noise source in the project vicinity above levels existing without the project (e.g., long-term exposure of nearby sensitive receptors to increased noise levels that exceed Solano County's non-transportation noise standards in Table 4.10-5, or State Noise Insulation of 45 dB CNEL for interior spaces in residential units);
- generate a substantial permanent increase (i.e., 3 dB or more) in ambient noise levels from transportation noise source in the project vicinity above levels existing without the project (e.g., long-term exposure of nearby sensitive receptors to increased noise levels that exceed Solano County's transportation noise standards in Table 4.10-4 or State Noise Insulation of 45 dB CNEL for interior spaces in residential units);
- generate a substantial temporary or periodic increase (i.e., 3 dB or more) in ambient noise levels in the project vicinity above levels established in Solano County's transportation noise standards in Table 4.10-4 or non-transportation noise standards in Table 4.10-5 during the more sensitive times of the day (i.e., 10:00 p.m. to 7:00 a.m.).
- generate excessive groundborne vibration or groundborne noise levels (e.g., levels that exceed Caltrans' recommended level of 0.2 in/sec PPV with respect to the prevention of structural damage for normal buildings or FTA's maximum acceptable level of 80 VdB with respect to human response for residential uses [i.e., annoyance] at nearby vibration-sensitive land uses); or
- for a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, the exposure of people residing or working in the project area to excessive noise levels.

### METHODS AND ASSUMPTIONS

To assess potential short-term (construction-related) noise impacts and onsite (operation-related) noise impacts from changes to onsite operations from the project, sensitive receptors and their relative exposure were identified. Information regarding the number and types of equipment to be used during project construction as well as during onsite operations were taken from the project's Air Quality Impact Assessment report (See Appendix D) to ensure consistency with other modeling assumptions (e.g., air quality modeling and greenhouse gas emissions modeling) conducted for this project. Project-generated construction- and onsite operation-related noise levels were estimated based on methodologies, reference emission levels, and usage factors from FTA's Guide on Transit Noise and Vibration Impact Assessment methodology (FTA 2006) and the Federal Highway Administration's Roadway Construction Noise Model User's Guide (FHWA 2006).

To assess long-term (operation-related) noise impacts due to project-generated increases in traffic, modeling was conducted for affected roadway segments based on Caltrans' Traffic Noise Analysis Protocol (Caltrans 2006) and the Technical Noise Supplement (Caltrans 2009) and project-specific traffic data. Refer to Appendix J of this Draft SEIR for the noise modeling details. The analysis is based on the reference noise emission levels for automobiles, medium trucks, and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and ground attenuation factors. Data regarding increases in heavy truck volume on area roadways as a result of the project were provided by the traffic report conducted for the project (See Appendix G, "Traffic Impact Analysis", of this Draft SEIR). The percentage of heavy-duty vehicles on area roadways under existing and existing-plus project conditions is provided in the appendix of the traffic report. The traffic noise modeling conducted does not account for any natural or human-made shielding (e.g., the presence of vegetation, berms, walls, or buildings) and; consequently, represents worst-case traffic noise levels.

The significance of noise impacts from the project on sensitive receptors were determined based on comparisons to applicable regulations and guidance provided by the noise standards included in Section 4.10.1, "Regulatory Settings".

## ISSUES OR POTENTIAL IMPACTS NOT DISCUSSED FURTHER

Construction and operation of the project would not result in activities or equipment that generate noticeable levels of ground vibration, such as pile driving, drilling, or blasting. Furthermore, nearby receptors would be located no less than one mile from project-related, onsite activities. Therefore, the potential for ground vibration–related impacts is not anticipated, and this issue is not discussed further.

The project would not result in new sensitive receptors or changes to aircraft activity in the area. Changes in aircraft-related noise are not anticipated, and this issue is not discussed further.

## PROJECT IMPACTS AND MITIGATION MEASURES

### Impact 4.10-1: Short-Term Construction Noise

Project implementation would result in construction activity associated with the expansion of the existing landfill capacity. However, construction-generated noise levels would not exceed the applicable daytime or nighttime noise exposure standards established by the County for non-transportation noise sources at any sensitive receptors. Therefore, this impact would be **less than significant**.

Project implementation would include a series of changes to the existing project site including a lateral expansion of the existing landfill capacity, resulting in construction activity in the southeast portion of the project site as shown in Exhibit 3-2 in Chapter 3, "Project Description". Construction activities would include the installation of a base liner containment system and excavation for the realignment of a drainage ditch for the expanded landfill area. The project would be constructed in three phases, one phase of initial site preparation work, and two phases of base liner construction, each of which would be approximately 10-acres in size. Construction activity would involve the use of heavy-duty construction equipment including excavators, dozers, graders, scrapers, crawler tractors, cranes, and forklifts. It is assumed that construction activity would occur during daytime hours (i.e., 7:00 a.m. to 10:00 p.m.). Based on construction noise modeling, which included six of the loudest pieces of construction equipment (i.e., dozers, scrapers, graders) operating simultaneously near each other, construction-generated noise levels at the nearest sensitive receptor would attenuate to 29 $L_{eq}$ dB and 39 $L_{max}$ dB. Therefore, construction activity would not expose offsite noise-sensitive receptors to levels of noise that exceed Solano County's non-transportation daytime residential noise standards of 55 $L_{eq}$ dB and 70 $L_{max}$ dB (Table 4.10-5). Even if construction activity were to occur during nighttime hours (i.e., 10:00 p.m. to 8:00 a.m.), construction-generated noise would not exceed the non-transportation nighttime residential noise standard of 50 $L_{eq}$ dB and 65 $L_{max}$ dB (Table 4.10-5). Therefore, this impact would be **less than significant**.

### Mitigation Measures

No mitigation measures required.

### Impact 4.10-2: On-Site Operational Noise

Project implementation would result in the expansion of the existing landfill capacity as well as other modifications to the landfill. The expansion of the existing landfill capacity and other modifications would not result in changes in daily operations at the landfill and would not result in an increase in the number of facility employees. The project would also incorporate the processing of construction and demolition materials. Based on noise modeling conducted, noise levels generated by project-related operational activity would not increase and would not expose offsite receptors to noise levels that exceed applicable noise standards. This impact would be **less than significant**.

As a result of project implementation, the disposal capacity of the landfill would increase from 37 million cubic yards to 45.8 million cubic yards and extend the potential life of the compost facility by at least four years. However, as noted in Section 3, "Project Description," the increase in disposal capacity of the landfill would be incorporated into the current daily operation and maintenance at the landfill. Aside from the increase in daily trips to the project site, the project is not anticipated to result in an increase in the daily operational activity on the project site or result in an increase in the number of facility employees. Existing landfill operations includes daily use of heavy equipment including three bulldozers, two scrapers, two refuse compactors, four loaders, a grader, and two water trucks.

The project would result in modifications to existing onsite operations to include portable equipment to be used within the permitted landfill boundary for the sorting, separation, and processing of construction and demolition materials. Incoming construction and demolition waste streams would be processed using portable equipment, primarily screens, sort lines, and a shredder, which could be moved around the site as the disposal area shifts within the landfill. The exact type and models of equipment that would be used in the sorting, separation, and processing of construction and demolition materials are not known at this time. However, operation of this equipment is anticipated to generate noise levels similar to those generated by other similar pieces of heavy-duty construction equipment used in existing facility operations (i.e., 85 $L_{max}$ dB at 50 feet).

Noise modeling was conducted to analyze potential operational noise impacts on nearby sensitive receptors. Noise modeling included four of the loudest pieces of heavy-duty equipment (i.e., dozers, scrapers, graders) used in facility operations, heavy-duty trucks, and the new use of demolition and construction material processing equipment. Based on the noise modeling, noise levels generated from facility operations under the project would attenuate to 38.5 $L_{eq}$ dB and 42.4 $L_{max}$ dB at the nearest offsite noise sensitive receptors. Thus, which is approximately the same as current levels as discussed above in Section 4.10.2. The RHR Landfill is currently permitted to operate seven days per week, 365 days per year, on a 24-hour basis. The landfill is open to commercial and contract haulers 24 hours per day and is open to the public from 8:00 a.m. to 4:00 p.m. The delivery of asbestos-containing waste and all designated wastes is limited to the hours of 7:00 a.m. to 4:00 p.m., Monday through Saturday. Based on modeled noise levels, operational activity would not expose offsite noise-sensitive receptors to noise levels that exceed the County's non-transportation nighttime residential noise standard of 50 $L_{eq}$ dB and 65 $L_{max}$ dB (Table 4.10-5). Therefore, this impact would be **less than significant.**

### Mitigation Measures

No mitigation measures required.

## Impact 4.10-3: Traffic-Related Noise

Project implementation would result in an estimated 195 additional daily trips to the landfill facility. Project-generated traffic volume increases along affected roadways would result in an increase in traffic noise levels along these roadways. However, based on traffic noise modeling conducted for the project, traffic noise levels along affected roadways would not exceed the County's transportation noise standards at any noise-sensitive receptors. As a result, this impact would be **less than significant**.

The project would result in additional vehicle trips to and from the project site. Based on estimates included in the project traffic report, the project would result in an estimated 195 additional daily round trips to the project site by 91 new semi-trailer trips, 23 additional packer trucks, and 81 new self-haul vehicles. These increases in traffic volumes would result in traffic noise level increases along affected roadways. Table 4.10-6 summarizes the roadside noise levels under existing conditions and existing-plus project conditions.

**Table 4.10-6 Summary of Modeled Traffic Noise Levels under Existing No Project and Existing Plus Project Conditions**

| Roadway Segment | $L_{dn}$ (dB) at 100 feet from Roadway Centerline Existing Conditions | $L_{dn}$ (dB) at 100 feet from Roadway Centerline Existing-Plus-Project Conditions |
|---|---|---|
| Hay Road between Lewis Road and Project Site Entrance | 58.2[1] | 58.6 |
| SR 113 between SR 12 and Hay Road | 61.3 | 61.6 |
| SR 113 between Midway Road and Hay Road | 59.3 | 60.0 |
| Midway Road between Porter Road and SR 113 | 60.4 | 60.6 |

Notes: SR = State Route; dB = A-weighted decibels; $L_{dn}$ = day-night average noise level

1. Traffic noise levels along the segment of Hay Road between Lewis Road and the project site entrance were estimated at a distance of 70 feet from the roadway centerline because this is the distance to the nearest noise-sensitive receptor.

Source: Modeled by Ascent Environmental 2019

As shown in Table 4.10-6, traffic noise levels under existing-plus project conditions would not exceed the County's most stringent transportation noise standard of 65 $L_{eq}$ dB (Table 4.10-4). Moreover, none of the traffic noise increases would be noticeable (i.e., 3 dB or greater). For these reasons, this impact would be **less than significant.**

## Mitigation Measures

No mitigation measures required.

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