

## F. NOISE

This section describes existing noise conditions in the vicinity of the site, criteria for determining the significance of noise impacts, and estimates the likely noise that would result from construction activities, vehicular traffic, operation of the project, and other noise sources. Where appropriate, mitigation measures are recommended to reduce project-related noise impacts to a less-than-significant level.

### 1. Setting

This setting section begins with an introduction to several key concepts and terms that are used in evaluating noise. It then explains the various agencies that regulate the noise environment in the City of Vallejo and summarizes key standards that are applied to proposed development. This setting section concludes with a description of current noise sources that affect the project site and the noise conditions that are experienced in the project site vicinity.

**a. Characteristics of Sound.** Noise is generally defined as unwanted sound. Noise consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, and sleep.

To the human ear, sound has two significant characteristics: *pitch* and *loudness*. Pitch is the number of complete vibrations or cycles per second of a wave that results in the range of tone from high to low. Loudness is the strength of a sound that describes a noisy or quiet environment, and it is measured by the amplitude of the sound wave. Loudness is determined by the intensity of the sound waves combined with the reception characteristics of the human ear. Sound intensity refers to how hard the sound wave strikes an object, which in turn produces the sound's effect. This characteristic of sound can be precisely measured with instruments. The analysis of a project defines the noise environment of the project area in terms of sound intensity and its effects on adjacent sensitive land uses.

**(1) Measurement of Sound.** Sound is characterized by various parameters that describe the rate of oscillation (frequency) of sound waves, the distance between successive troughs or crests in the wave, the speed that it travels, and the pressure level or energy content of a given sound. The sound pressure level has become the most common descriptor used to characterize the loudness (or amplitude) of an ambient sound, and the decibel (dB) scale is used to quantify sound intensity. A decibel (dB) is a unit of measurement which indicates the relative intensity of a sound. The 0 point on the dB scale is based on the lowest sound level that the healthy, unimpaired human ear can detect.

Because sound can vary in intensity by over one million times within the range of human hearing, a logarithmic loudness scale<sup>1</sup> is used to keep sound intensity numbers at a convenient and manageable level. Thus, a 10 dBA increase in the level of a continuous noise represents a perceived doubling of loudness, while a 20 dBA increase is 100 times more intense, and a 30 dBA increase is 1,000 times more intense. As noise spreads from a source, it loses energy so that the farther away the noise receiver is from the noise source, the lower the perceived noise level. Noise levels diminish or attenuate as distance from the source increases based on an inverse square rule, depending on how the noise

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<sup>1</sup> Unlike linear units such as inches or pounds, decibels are measured on a logarithmic scale, representing points on a sharply rising curve. The logarithmic decibel scale allows an extremely wide range of acoustic energy to be characterized in a manageable notation.

source is physically configured. Noise level from a single-point source, such as a single piece of construction equipment at ground level, attenuates at a rate of 6 dB for each doubling of distance (between the single-point source of noise and the noise-sensitive receptor of concern). Heavily traveled roads with few gaps in traffic behave as continuous line sources and attenuate roughly at a rate of 3 dB per doubling of distance.

Since the human ear is not equally sensitive to all pitches (sound frequencies) within the entire spectrum, a special frequency-dependent rating scale has been devised to relate noise to human sensitivity in a process called “A-weighting,” expressed as “dBA.” The dBA or A-weighted decibel refers to a scale of noise measurement that approximates the range of sensitivity of the human ear to sounds of different frequencies. Table IV.F-1 contains a list of typical acoustical terms and definitions. Table IV.F-2 shows some representative noise sources and their corresponding noise levels in dBA.

There are many ways to rate noise for various time periods, but an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. Equivalent continuous sound level ( $L_{eq}$ ) is the total sound energy of time varying noise over a sample period. However, the predominant rating scales for human communities in the State of California are the  $L_{eq}$ , the community noise equivalent level (CNEL), and the day-night average level ( $L_{dn}$ ) based on A-weighted decibels (dBA). CNEL is the time varying noise over a 24-hour period, with a 5 dBA weighting factor applied to the hourly  $L_{eq}$  for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as relaxation hours) and a 10 dBA weighting factor applied to noise occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours).  $L_{dn}$  is similar to the CNEL scale, but without the adjustment for events occurring during the evening relaxation hours. CNEL and  $L_{dn}$  are within one dBA of each other and are normally exchangeable. The noise adjustments are added to the noise events occurring during the more sensitive hours. Typical A-weighted sound levels from various sources are described in Table IV.F-2.

Other noise rating scales of importance, when assessing the annoyance factor, include the maximum noise level ( $L_{max}$ ), which is the highest exponential time averaged sound level that occurs during a stated time period. The noise environments discussed in this analysis are specified in terms of maximum levels denoted by  $L_{max}$  for short-term noise impacts.  $L_{max}$  reflects peak operating conditions, and addresses the annoying aspects of intermittent noise.

Noise impacts can be described in three categories. The first is audible impacts that refer to increases in noise levels noticeable to humans. Audible increases in noise levels generally refer to a change of 3.0 dBA or greater, since, as described earlier, this level has been found to be barely perceptible in exterior environments. The second category, potentially audible, refers to a change in the noise level between 1.0 and 3.0 dBA. This range of noise levels has been found to be noticeable only in laboratory environments. The last category is changes in noise level of less than 1.0 dBA that are inaudible to the human ear. Only audible changes in existing ambient or background noise levels are considered potentially significant.

**Table IV.F-1: Definitions of Acoustical Terms**

Term	Definitions
Decibel, dB	A unit of level that denotes the ratio between two quantities proportional to power; the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
Frequency, Hz	Of a function periodic in time, the number of times that the quantity repeats itself in one second (i.e., number of cycles per second).
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted, unless reported otherwise.
L <sub>01</sub> , L <sub>10</sub> , L <sub>50</sub> , L <sub>90</sub>	The fast A-weighted noise levels equaled or exceeded by a fluctuating sound level for 1 percent, 10 percent, 50 percent, and 90 percent of a stated time period.
Equivalent Continuous Noise Level, L <sub>eq</sub>	The level of a steady sound that, in a stated time period and at a stated location, has the same A-weighted sound energy as the time varying sound.
Community Noise Equivalent Level, CNEL	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of five decibels to sound levels occurring in the evening from 7:00 p.m. to 10:00 p.m. and after the addition of 10 decibels to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
Day/Night Noise Level, L <sub>dn</sub>	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 10 decibels to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
L <sub>max</sub> , L <sub>min</sub>	The maximum and minimum A-weighted sound levels measured on a sound level meter, during a designated time interval, using fast time averaging.
Ambient Noise Level	The all encompassing noise associated with a given environment at a specified time, usually a composite of sound from many sources at many directions, near and far; no particular sound is dominant.
Intrusive	The noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Source: Harris, C.M. 1998. *Handbook of Acoustical Measurements and Noise Control*.

**Table IV.F-2: Typical A-Weighted Sound Levels**

Noise Source	A-Weighted Sound Level in Decibels	Noise Environments
Near Jet Engine	140	Deafening
Civil Defense Siren	130	Threshold of pain
Hard Rock Band	120	Threshold of feeling
Accelerating Motorcycle at a Few Feet Away	110	Very loud
Pile Driver; Noisy Urban Street/Heavy City Traffic	100	Very loud
Ambulance Siren; Food Blender	95	Very loud
Garbage Disposal	90	Very loud
Freight Cars; Living Room Music	85	Loud
Pneumatic Drill; Vacuum Cleaner	80	Loud
Busy Restaurant	75	Moderately loud
Near Freeway Auto Traffic	70	Moderately loud
Average Office	60	Moderate
Suburban Street	55	Moderate
Light Traffic; Soft Radio Music in Apartment	50	Quiet
Large Transformer	45	Quiet
Average Residence Without Stereo Playing	40	Faint
Soft Whisper	30	Faint
Rustling Leaves	20	Very faint
Human Breathing	10	Very faint

Source: Compiled by LSA Associates, Inc., 2008.

(2) **Physiological Effects of Noise.** According to the U.S. Department of Housing and Urban Development’s 1985 Noise Guidebook, permanent physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 to 90 dBA. Exposure to high noise levels affects our entire system, with prolonged noise exposure in excess of 75 dBA increasing body tensions, and thereby affecting blood pressure, functions of the ear, and the nervous system. In comparison, extended periods of noise exposure above 90 dBA would result in permanent cell damage. When the noise level reaches 120 dBA, a tickling sensation occurs in the human ear even with short-term exposure. This level of noise is called the threshold of feeling. For avoiding adverse effects on human physical and mental health in the workplace or in communities, the U.S. Department of Labor, Occupation Health and Safety Administration (OSHA) requires the protection of workers from hearing loss when the noise exposure equals or exceeds an 8-hour time-weighted average of 85 dBA.<sup>2</sup>

Unwanted community effects of noise occur at levels much lower than those that cause hearing loss and other health effects. Annoyance to noise occurs when it interferes with sleeping, conversation, noise-sensitive work, including learning or listening to radio, television, or music. According to the World Health Organization (WHO) noise studies, during daytime hours, few people are seriously annoyed by activities with noise levels below 55 dBA, or moderately annoyed with noise levels below 50 dBA.<sup>3</sup>

**b. Noise Regulatory Framework.** The following section summarizes the regulatory framework related to noise, including federal, State and City of Vallejo plans, policies and standards.

(1) **U.S. Environmental Protection Agency (EPA).** In 1972 Congress enacted the Noise Control Act. This act authorized the EPA to publish descriptive data on the effects of noise and establish levels of sound “requisite to protect the public welfare with an adequate margin of safety.” These levels are separated into health (hearing loss levels) and welfare (annoyance levels), as shown in Table IV.F-3. The EPA cautions that these identified levels are not standards because they do not take into account the cost or feasibility of the levels.

For protection against hearing loss, 96 percent of the population would be protected if sound levels are less than or equal to an  $L_{eq(24)}$  of 70 dBA. The “(24)” signifies an  $L_{eq}$  duration of 24 hours. The EPA activity and interference guidelines are designed to ensure reliable speech communication at about 5 feet in the outdoor environment. For

**Table IV.F-3: Summary of EPA Noise Levels**

Effect	Level	Area
Hearing loss	$L_{eq(24)} \leq 70$ dB	All areas.
Outdoor activity interference and annoyance	$L_{dn} \leq 55$ dB	Outdoors in residential areas and farms and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use.
	$L_{eq(24)} \leq 55$ dB	Outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, etc.
Indoor activity interference and annoyance	$L_{eq} \leq 45$ dB	Indoor residential areas.
	$L_{eq(24)} \leq 45$ dB	Other indoor areas with human activities such as schools, etc.

Source: U.S. Environmental Protection Agency, 1974. “Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.” March.

<sup>2</sup> Occupational Safety & Health Administration, 2010. Regulations, Standards 29 CFR, Occupational Noise Exposure 1910.95.

<sup>3</sup> World Health Organization, Guidelines for Community Noise, Geneva, 1999. Website: [www.who.int/docstore/peh/noise/guidelines2.html](http://www.who.int/docstore/peh/noise/guidelines2.html).

outdoor and indoor environments, interference with activity and annoyance should not occur if levels are below 55 dBA and 45 dBA, respectively.

The noise effects associated with an outdoor  $L_{dn}$  of 55 dBA are summarized in Table IV.F-4. At 55 dBA  $L_{dn}$ , 95 percent sentence clarity (intelligibility) may be expected at 11 feet, and no community reaction. However, 1 percent of the population may complain about noise at this level and 17 percent may indicate annoyance.

**(2) State of California.** The State of California has established regulations that help prevent adverse impacts to occupants of buildings located near noise sources. Referred to as the “State Noise Insulation Standard,” it requires buildings to meet performance standards through design and/or building materials that would offset any noise source in the vicinity of the receptor. State regulations include requirements for the construction of new hotels, motels, apartment houses, and dwellings other than detached single-family dwellings that are intended to limit the extent of noise transmitted into habitable spaces.

These requirements are found in the California Code of Regulations, Title 24 (known as the Building Standards Administrative Code), Part 2 (known as the California Building Code), Appendix Chapters 12 and 12A. For limiting noise transmitted between adjacent dwelling units, the noise insulation standards specify the extent to which walls, doors, and floor ceiling assemblies must block or absorb sound. For limiting noise from exterior noise sources, the noise insulation standards set an interior standard of 45 dBA CNEL in any habitable room with all doors and windows closed. In addition, the standards require preparation of an acoustical analysis demonstrating the manner in which dwelling units have been designed to meet this interior standard, where such units are proposed in an area with exterior noise levels greater than 60 dBA CNEL.

The Governor’s Office of Planning and Research (OPR) has established land use compatibility guidelines for determining acceptable noise levels for specified land uses. The City of Vallejo has adopted the OPR’s land use compatibility guidelines, as discussed below and shown in Table IV.F-5.

**(3) City of Vallejo.** The City of Vallejo addresses noise policies in the Noise Element of the General Plan<sup>4</sup> and in the zoning chapter of the Municipal Code.<sup>5</sup> The City’s land use compatibility standards for community noise environments are shown in Table IV.F-5. The noise policies of the General Plan limit construction, maintenance, and unloading and loading activities from operating in such a manner as to cause noise disturbance across residential real property boundaries except between the hours of 7:00 a.m. and 9:00 p.m. In addition, the City’s noise policy limits project-related

**Table IV.F-4: Summary of Human Effects in Areas Exposed to 55 dBA  $L_{dn}$**

Type of Effects	Magnitude of Effect
Speech – Indoors	100 percent sentence intelligibility (average) with a 5 dB margin of safety.
Speech – Outdoors	100 percent sentence intelligibility (average) at 0.35 meters. 99 percent sentence intelligibility (average) at 1.0 meters. 95 percent sentence intelligibility (average) at 3.5 meters.
Average Community Reaction	None evident; 7 dB below level of significant complaints and threats of legal action and at least 16 dB below “vigorous action.”
Complaints	1 percent dependent on attitude and other non-level related factors.
Annoyance	17 percent dependent on attitude and other non-level related factors.
Attitude Towards Area	Noise essentially the least important of various factors.

Source: U.S. Environmental Protection Agency, 1974.  
“Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.” March.

<sup>4</sup> Vallejo, City of, 1983. *City of Vallejo General Plan*. Amended through December 6, 2006.

<sup>5</sup> Vallejo, City of, 2008. *The Vallejo, California Municipal Code*. December 2.

**Table IV.F-5: Land Use Compatibility Standards for Community Noise Environments**

Land Use Category	Community Noise Exposure - $L_{dn}$ (dBA)					
	50	55	60	65	70	80
Residential—Low-Density Single-Family, Duplex, Multi-Family, Mobile Homes	Normally Acceptable	Normally Acceptable	Normally Acceptable	Normally Acceptable	Normally Unacceptable	Clearly Unacceptable
Transient Lodging—Motels, Hotels	Normally Acceptable	Normally Acceptable	Normally Acceptable	Normally Acceptable	Normally Unacceptable	Clearly Unacceptable
Schools, Libraries, Churches, Hospitals, Nursing Homes	Normally Acceptable	Normally Acceptable	Normally Acceptable	Normally Acceptable	Normally Unacceptable	Clearly Unacceptable
Auditoriums, Concert Halls, Amphitheaters	Normally Acceptable	Normally Acceptable	Normally Acceptable	Normally Acceptable	Normally Unacceptable	Clearly Unacceptable
Sports Arenas, Outdoor Spectator Sports	Normally Acceptable	Normally Acceptable	Normally Acceptable	Normally Acceptable	Normally Unacceptable	Clearly Unacceptable
Playgrounds, Neighborhood Parks	Normally Acceptable	Normally Acceptable	Normally Acceptable	Normally Acceptable	Normally Unacceptable	Clearly Unacceptable
Golf Courses, Riding Stables, Water Recreation, Cemeteries	Normally Acceptable	Normally Acceptable	Normally Acceptable	Normally Acceptable	Normally Unacceptable	Clearly Unacceptable
Office Buildings, Business Commercial and Professional	Normally Acceptable	Normally Acceptable	Normally Acceptable	Normally Acceptable	Normally Unacceptable	Clearly Unacceptable
Industrial, Manufacturing, and Utilities	Normally Acceptable	Normally Acceptable	Normally Acceptable	Normally Acceptable	Normally Unacceptable	Clearly Unacceptable

  

	<b>Normally Acceptable</b>	Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
	<b>Conditionally Acceptable</b>	New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features are included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning, will normally suffice.
	<b>Normally Unacceptable</b>	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.
	<b>Clearly Unacceptable</b>	New construction or development generally should not be undertaken.

Source: Vallejo, City of, 1983. *City of Vallejo General Plan*. Amended through December 6, 2006.

noise increases to no more than 10 dB in non-residential areas and 5 dB in residential areas where with-project noise level is less than the maximum “normally acceptable level” in Table IV.F-5.

The Noise Performance Standards Ordinance, of the City of Vallejo’s Municipal Code identifies maximum sound pressure levels by zoning district shown in Table IV.F-6. The City’s ordinance allows noise from temporary construction or demolition work, or sounds from transportation equipment used for the movement of goods or people to and from given premises to exceed the

maximum sound pressure levels listed in Table IV.F-6 upon compliance with State conditions. Section 7.84.020 of the City’s Municipal Code prohibits the loading, unloading, opening, closing, or other handling of boxes, crates, containers, building materials, or other similar objects between the hours of 9:00 p.m. and 7:00 a.m. in such a manner as to cause a noise disturbance across a residential real property boundary.

**Table IV.F-6: Noise Performance Standards**

Zoning District	Maximum Sound Pressure Levels, dB
Resource Conservation, Rural Residential, and Medical Districts	55
Low, Medium, and High Density Residential Districts	60
Professional Offices, Neighborhood, Pedestrian, and Waterfront Shopping and Services Districts	70
Freeway Shopping and Service, Linear Commercial and Intensive Use Districts	75

Source: Vallejo, City of, 2008. *The Vallejo, California Municipal Code*. December 2.

**c. Existing Noise Environment.** The project is located in a suburban area and is, therefore, influenced by several surrounding noise sources including traffic and stationary noise sources as discussed below.

**(1) Existing Ambient Noise Levels.** An LSA noise technician conducted short-term ambient noise monitoring on the project site on August 18, 2010 between the hours of 9:30 a.m. and 10:30 a.m. at two separate locations on the project site. The purpose of this noise monitoring was to document the existing noise environment and capture the noise levels associated with current operations and activities in the project vicinity. Table IV.F-7 lists the noise levels measured during the short-term 15-minute noise measurements. Maximum and minimum noise levels were recorded as well as the equivalent continuous noise level measure  $L_{eq}$ . The meteorological conditions at the time of each noise measurement are shown in Table IV.F-8. The noise monitoring locations are shown in Figure IV.F-1.

**Table IV.F-7: Short-Term Ambient Noise Monitoring Results, dBA, August 18, 2010**

Location Number	Location Description	Start Time	$L_{eq}$ <sup>a</sup>	$L_{max}$ <sup>b</sup>	$L_{min}$ <sup>c</sup>	Primary Noise Sources
1	Northeast corner of project site near residential/office/day care uses	9:35 a.m.	52.5	59.1	50.0	Traffic noise on Redwood Parkway
2	Southeast corner of project site adjacent to residential uses	10:15 a.m.	57.5	65.2	51.6	Traffic noise on Redwood Parkway

<sup>a</sup>  $L_{eq}$  represents the average of the sound energy occurring over the 15-minute time period.

<sup>b</sup>  $L_{max}$  is the highest instantaneous sound level measured during the 15-minute time period.

<sup>c</sup>  $L_{min}$  is the lowest instantaneous sound level measured during the 15-minute time period.

Source: LSA Associates, Inc., September 2010.

**Table IV.F-8: Meteorological Conditions During Ambient Noise Monitoring**

Location Number	Maximum Wind Speed (mph)	Average Wind Speed (mph)	Temperature (F)	Percent Relative Humidity
1	2.2	0.7	62	83
2	6.2	2.4	61	81

Source: LSA Associates, Inc., September 2010.

Traffic on Redwood Parkway is the primary noise source affecting the existing noise levels in the project vicinity. Other noise sources in the project vicinity include operational noise from adjacent retail and commercial land uses, including noise from truck loading and unloading operations and parking lot activities such as cars doors slamming and people conversing.

**(2) Existing Traffic Noise Levels.** Existing traffic noise levels were calculated using the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model. Traffic data used in the model was obtained from the traffic impact analysis prepared by Kimley-Horn and Associates, Inc.<sup>6</sup> for this project which is included in Appendix C of this EIR. Table IV.F-9 lists the calculated traffic noise levels along roadway segments in the project vicinity under existing conditions.

Existing traffic noise levels along roadway segments in the project site vicinity range from 64.0 dBA to 64.8 dBA  $L_{dn}$  at 50 feet from the centerline of the outermost travel lane. Interstate 80 (I-80) is located less than ¼ mile west of the project site and is not a major contributor to ambient noise levels at the project site.

**Table IV.F-9: Existing Traffic Noise Levels**

Roadway Segment	Average Daily Trips	Centerline to 70 dBA $L_{dn}$ (feet)	Centerline to 65 dBA $L_{dn}$ (feet)	Centerline to 60 dBA $L_{dn}$ (feet)	$L_{dn}$ (dBA) 50 Feet From Outermost Lane
Redwood Parkway - Admiral Callaghan Lane (west) to Project Driveway B	18,000	< 50	72	148	64.8
Redwood Parkway - Project Driveway B to Project Driveway C	15,000	< 50	65	132	64.0
Redwood Parkway - Project Driveway C to Foothill Drive	15,000	< 50	65	132	64.0

<sup>a</sup> Traffic noise within 50 feet of roadway centerline requires site specific analysis.  
Source: LSA Associates, Inc., September 2010.

**(3) Existing Aircraft Noise Levels.** The closest airport to the project site is Napa County Airport, located approximately 6.5 miles north of the project site. Travis Air Force Base is located approximately 16 miles to the northeast of the project site. Buchanan Field Airport is located approximately 12.5 miles southeast of the project site. Due to the distance of the project from these airports, the project site lies well beyond the 55 dBA CNEL noise contours of each of these airports. Thus, aircraft activities are not a significant noise source in the project vicinity.

**(4) Existing Railroad Noise Levels.** The closest railroad line is located approximately 1.25 miles to the west of the project site. At this distance, the project site lies well beyond the 55 dBA  $L_{dn}$  noise contour of the railroad. Thus, railroad activities are not a significant noise source in the project vicinity.

<sup>6</sup> Kimley-Horn and Associates, Inc., 2011. *Traffic Impact Study – Final Report, WinCo Project, Vallejo, California.* February 10.



FIGURE IV.F-1

LSA



Project Site



Noise Monitoring Locations

SOURCES: GOOGLE EARTH, SEPT. 2009; LSA ASSOCIATES, INC., 2010.

Vallejo WinCo Foods Project EIR  
Noise Monitoring Locations

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(5) **Existing Noise Sensitive Land Uses in the Project Vicinity.** Land uses surrounding the project site consist of both residential development, day care, commercial uses, and office land uses. The closest sensitive receptors to the project site are the multi-family residential land uses on Cadloni Lane whose rear property lines abut the project's eastern border. A day care facility and office land use abut the project site's northern property line. Redwood Parkway borders the project site to the south, and multi-family residential homes are located on the south side of the roadway across from the project site. The construction and operation of the proposed WinCo Foods project could generate noise that would affect these surrounding land uses.

## 2. Impacts and Mitigation Measures

This section analyzes the potential noise impacts that could result from implementation of the proposed WinCo Foods development project. This section begins with a listing of criteria of significance, which establish the thresholds for determining whether a project impact is significant. The latter part of this section presents the potential noise impacts associated with the proposed project. Mitigation measures are recommended, as appropriate.

a. **Criteria of Significance.** A project will normally have a significant effect on the environment related to noise if it will substantially increase the ambient noise levels for adjoining areas or conflict with adopted environmental plans and goals of the community in which it is located. For the purposes of this project, a noise impact is considered significant if the project would:

- Expose persons to or generate noise levels in excess of standards established in the City of Vallejo General Plan or noise ordinance, or applicable standards of other agencies;
- Result in a permanent increase in ambient noise levels by more than 5 dBA over existing levels without the project for noise sensitive uses in the project vicinity;
- Cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project; or
- Expose persons to or generate excessive groundborne vibration or groundborne noise levels.

b. **Less-Than-Significant Noise Impacts.** The following noise sources would produce less-than-significant effects on sensitive receptors in the project area.

(1) **Aircraft Noise Impacts.** The proposed project site is not located within an airport land use plan nor within the 55 dBA CNEL noise contour of any airport. Napa County Airport is the closest airport to the project site and is located approximately 6.5 miles northwest of the project site. Therefore, implementation of the project would not expose persons residing or working in the project area to excessive noise levels from aircraft noise sources.

(2) **Railroad Noise Impacts.** The closest railroad line is located on the west side of I-80, approximately 1.25 miles west of the project site. At this distance, the project site lies well beyond the 55 dBA  $L_{dn}$  noise contour of the railroad. Therefore, implementation of the project would not expose persons residing or working in the project area to excessive noise levels from railroad noise sources.

(3) **Traffic Noise Impacts.** Implementation of the proposed project would result in increased traffic noise levels in the project vicinity.

The FHWA highway traffic noise prediction model (FHWA RD-77-108) was used to evaluate traffic-related noise conditions in the vicinity of the project site. The resultant noise levels were weighed and summed over a 24-hour period in order to determine the  $L_{dn}$  values. The existing, near-term (2011), and long-term (year 2030) traffic volumes for roadway segments in the project vicinity were used in the traffic noise impact analysis. Table IV.F-10 shows the existing, near-term (2011), and long-term (2030) traffic noise levels without and with the project.

A significant impact would occur if the project would permanently increase ambient exterior noise levels by 5 dBA or greater over existing levels without the project for noise sensitive uses in the project vicinity. The segment of Redwood Parkway from Admiral Callaghan Lane (west) to the proposed project Driveway B, would experience the highest increase in traffic noise levels of up to 1.9 dBA under long-term (2030) plus project conditions compared to existing traffic noise levels. Therefore, based on the significance criteria for this project, a significant impact would not occur since project-related traffic noise levels would not result in a permanent increase in traffic noise levels in the project vicinity by 5 dBA or greater compared to existing levels without the project.

It should be noted that only the traffic noise levels along the roadway segments nearest the project site were analyzed since all other roadway segments analyzed in the traffic report would contain 10 percent or less of the total project trips and therefore would not result in an increase of traffic noise levels by any perceptible amount along those roadway segments.

A significant cumulative impact would occur if the project would result in any increase in ambient noise levels above normally acceptable levels with the addition of additional, foreseeable projects that would be constructed by 2030. As shown in Table IV.F-5, the City considers environments with ambient noise levels of up to 60 dBA  $L_{dn}$  to be normally acceptable for new residential development, while environments with ambient noise levels of up to 70 dBA  $L_{dn}$  are considered normally acceptable for commercial development. No modeled roadway segment within the project vicinity would experience project-related traffic noise levels in excess of 70 dBA  $L_{dn}$ . However, traffic noise levels along portions of Redwood Parkway that are adjacent to residential land uses, would range up to 65.8 dBA  $L_{dn}$  under long-term (2030) plus project cumulative conditions. These resulting traffic noise levels represent an increase of 0.3 dBA under long-term (2030) plus project cumulative conditions compared to long-term (2030) conditions without the project. However, based on the City's land use compatibility standards for community noise environments, environments with noise levels of up to 70 dBA  $L_{dn}$  are considered conditionally acceptable for residential land uses if noise insulation features, such as fresh air supply systems or air conditioning allowing windows to remain closed for prolonged periods of time, are included. LSA technicians observed during site visits, that all residential land uses in the project vicinity along Redwood Parkway already have mechanical ventilation systems that would permit windows to remain closed for prolonged periods. Therefore, these cumulative traffic noise levels would not result in an exceedance of the City's land use compatibility standards and all project-related and cumulative traffic noise impacts on off-site sensitive land uses would be less-than-significant.

The significance criteria also states that a significant impact would occur if the project would generate noise levels in excess of standards established in the City's General Plan and Municipal Code, or applicable standards of other agencies. The portions of Redwood Parkway adjacent to the project site would experience traffic noise levels under the long-term (2030) plus project conditions of up to 65.7

**Table IV.F-10: Modeled Traffic Noise Levels at 50 feet from Centerline of Outermost Travel Lane, dBA**

Roadway Segment	Existing (L <sub>dn</sub> )	Existing Plus Project (L <sub>dn</sub> )	Difference Between Existing and Near- term Plus Project	Near- term (2011) (L <sub>dn</sub> )	Near- term (2011) Plus Project (L <sub>dn</sub> )	Difference Between Existing and Near- term Plus Project	Difference Between Near-term and Near- term Plus Project	Significant Project Contribution to Cumulative Impact?	Long- term (2030) No Project (L <sub>dn</sub> )	Long- term (2030) Plus Project (L <sub>dn</sub> )	Difference Between Long-term and Long- term Plus Project	Difference Between Long-term and Long- term Plus Project	Significant Project Contribution to Cumulative Impact?
Redwood Parkway - Admiral Callaghan Lane (west) to Project Driveway B	64.8	65.2	0.4	64.9	65.1	0.3	0.2	No	66.4	66.7	1.9	0.3	No
Redwood Parkway - Project Driveway B to Project Driveway C	64.0	64.5	0.5	64.3	64.5	0.5	0.2	No	65.5	65.7	1.7	0.2	No
Redwood Parkway - Project Driveway C to Skyline Drive	64.0	64.6	0.6	64.3	64.7	0.7	0.4	No	65.5	65.8	1.8	0.3	No

Source: LSA Associates, September 2010.

dB<sub>A</sub> L<sub>dn</sub>. These noise levels are below the City's "normally acceptable" standard of 70 dB<sub>A</sub> L<sub>dn</sub> for new commercial development. Therefore, project-related traffic noise impacts on all proposed on-site uses would also be considered less-than-significant.

**c. Significant Noise Impacts.** Noise impacts related to the following sources would result in potentially significant impacts.

**(1) Construction Noise Impacts.** Implementation of the proposed project could result in noise levels from demolition and construction activities that would expose sensitive receptors to excessive noise levels.

**Impact NOISE-1: Noise levels from construction activities may range up to 91 dB<sub>A</sub> L<sub>max</sub> at the nearest sensitive land uses to the project site resulting in a substantial temporary increase in ambient noise levels in the project vicinity above levels existing without the project. (S)**

Two types of short-term noise impacts would occur during site preparation and project construction. The first type would result from the increase in traffic flow on local streets, associated with the transport of workers, equipment, and materials to and from the project site. The transport of workers and construction equipment and materials to the project site would incrementally increase noise levels on access roads leading to the site. Because workers and construction equipment would use existing routes, noise from passing trucks (85 dB<sub>A</sub> L<sub>max</sub> at 50 feet) would be similar to existing vehicle-generated noise. For this reason, short-term intermittent noise from trucks would be minor when averaged over a longer time period. In addition, according to the City's noise ordinance, noise from temporary transportation of goods or people to and from a given premises is exempt from the City's noise standards. It should also be noted that noise emission levels from vehicles themselves (such as muffler requirements) are regulated by federal and State governments and are exempt from local government regulations. Therefore, short-term construction-related noise associated with worker and equipment transport to the proposed project site would result in a less-than-significant impact on receptors along the access routes leading to the proposed project site.

The second type of short-term noise impact is related to the noise generated by heavy construction equipment operating on the project site. Noise generated during demolition, excavation, grading, site preparation, and building erection on the project site would result in potential noise impacts on off-site uses. Existing receptors in the vicinity, such as the multi-family residential land uses on Cadloni Lane (along the project site's eastern property boundary) and the day care and office land uses north of the project site on Rotary Way, would be subject to short-term noise generated by construction equipment and activities on the project site when construction occurs near the project boundary.

Construction is performed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. These phases would change the character of the noise generated on the project site and, therefore, the noise levels surrounding the site as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction related noise ranges to be categorized by work phase. Table IV.F-11 lists typical construction equipment noise levels recommended for noise impact assessments, based on a distance of 50 feet between the equipment and a noise receptor. Typical noise levels range up to 91 dB<sub>A</sub> L<sub>max</sub> at 50 feet during the noisiest construction phases. The site preparation phase, which includes excavation and grading of the site, tends to generate the highest noise levels,

because the noisiest construction equipment is earthmoving equipment. Earthmoving equipment includes excavating machinery such as backhoes, bulldozers, draglines, and front loaders. Earthmoving and compacting equipment includes compactors, scrapers, and graders. Typical operating cycles for these types of construction equipment may involve one or two minutes of full-power operation followed by three or four minutes at lower power settings.

Demolition of existing structures and construction of the proposed project is expected to require the use of earthmovers such as bulldozers and scrapers, loaders and graders, water trucks, and pickup trucks. As shown in Table IV.F-11, the typical maximum noise level generated by backhoes on the proposed project site is assumed to be 86 dBA  $L_{max}$  at 50 feet from the operating equipment. The maximum noise level generated by bulldozers is approximately 85 dBA  $L_{max}$  at 50 feet. The maximum noise level generated by water and other trucks is approximately 86 dBA  $L_{max}$  at 50 feet from these vehicles. Each doubling of the sound sources with equal strength would increase the noise level by 3 dBA. Assuming each piece of construction equipment operates at some distance apart from the other equipment, the worst-case combined noise level during this phase of construction would be 91 dBA  $L_{max}$  at a distance of 50 feet from an active construction area.

The closest noise sensitive land uses to the project construction areas are the day care and office land uses on Rotary Way whose rear property line borders the project site, and the multi-family residential land uses on Cadloni Lane whose rear property line borders the project site. These properties are located approximately 50 feet from the nearest façade of the proposed project building. At this distance, maximum noise levels from construction activities at the building site could range up to 91 dBA  $L_{max}$  at the property line of the office and day care land uses. When site preparation and pavement construction activities occur adjacent to the project border, these off-site sensitive land uses could be exposed to equipment noise levels in excess of 100 dBA  $L_{max}$  during full-power operation cycles. However, in addition to implementing best management practices and restricting the hours of noise producing construction activities, the construction of a sound wall along the northern project property line bordering the office and day care land uses would reduce the impact from temporary construction noise sources to a less-than-significant level. A sound wall of solid block, or equivalent material, constructed at the height of 8 feet above the proposed finished pad elevation would reduce both temporary construction activity noise levels as well as the project operational noise levels at these sensitive land uses by at least 8 dBA. Sound walls over 6 feet in height require approval of the Planning Manager.

**Table IV.F-11: Typical Construction Equipment Maximum Noise Levels,  $L_{max}$**

Type of Equipment	Range of Maximum Sound Levels (dBA at 50 feet)	Suggested Maximum Sound Levels for Analysis (dBA at 50 feet)
Pile Drivers	81 to 96	93
Rock Drills	83 to 99	96
Jackhammers	75 to 85	82
Pneumatic Tools	78 to 88	85
Pumps	74 to 84	80
Scrapers	83 to 91	87
Haul Trucks	83 to 94	88
Cranes	79 to 86	82
Portable Generators	71 to 87	80
Rollers	75 to 82	80
Dozers	77 to 90	85
Tractors	77 to 82	80
Front-End Loaders	77 to 90	86
Hydraulic Backhoe	81 to 90	86
Hydraulic Excavators	81 to 90	86
Graders	79 to 89	86
Air Compressors	76 to 89	86
Trucks	81 to 87	86

Source: Bolt, Beranek & Newman, 1987. *Noise Control for Buildings and Manufacturing Plants*.

Implementation of the following multi-part mitigation measure would reduce potential construction period noise impacts.

Mitigation Measure NOISE-1a: The project applicant shall construct a sound wall along the northern project property line prior to commencing any demolition or construction activities. With approval of the Planning Manager, this sound wall shall be constructed of solid block, or equivalent, materials at a minimum height of 8 feet above the finished pad elevation of both the proposed and adjacent properties.

Mitigation Measure NOISE-1b: All construction equipment must have appropriate sound muffling devices, which shall be properly maintained and used at all times such equipment is in operation.

Mitigation Measure NOISE-1c: Where feasible, the project contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site.

Mitigation Measure NOISE-1d: The construction contractor shall locate on-site equipment staging areas so as to maximize the distance between construction-related noise sources and noise-sensitive receptors nearest the project site.

Mitigation Measure NOISE-1e: Except as otherwise permitted, construction activities shall be restricted to the hours of 7:00 a.m. to 9:00 p.m. daily. (LTS)

**(2) Groundborne Vibration Impacts.** Implementation of the proposed project could result in groundborne vibration or noise levels that could be perceptible at adjacent land uses when heavy earthmoving equipment operates near the project boundaries.

**Impact NOISE-2: Construction activities could expose persons in the project vicinity to excessive groundborne vibration or noise levels. (S)**

Vibrating objects in contact with the ground radiate vibration waves through various soil and rock strata to the foundations of nearby buildings. As the vibration propagates from the foundation throughout the remainder of the building, the vibration of floors and walls may cause perceptible vibration from the rattling of windows or a rumbling noise. The rumbling sound caused by the vibration of room surfaces is called groundborne noise. When assessing annoyance from groundborne noise, vibration is typically expressed as root mean square (rms) velocity in units of decibels of 1 micro-inch per second. To distinguish vibration levels from noise levels, the unit is written as "VdB." Human perception to vibration starts at levels as low as 67 VdB and sometimes lower. Annoyance due to vibration in residential settings starts at approximately 70 VdB. Groundborne vibration is almost never annoying to people who are outdoors. Although the motion of the ground may be perceived, without the effects associated with the shaking of the building, the motion does not provoke the same adverse human reaction.

In extreme cases, excessive groundborne vibration has the potential to cause structural damage to buildings. Common sources of groundborne vibration include trains and construction activities such as blasting, pile driving and operating heavy earthmoving equipment.

No permanent noise sources that would expose persons to excessive groundborne vibration or noise levels are proposed as part of the project. Therefore, implementation of the proposed project would not permanently expose persons within or around the project site to excessive groundborne vibration. However, construction activities associated with implementation of the proposed project could temporarily expose persons in the vicinity of the project site to excessive groundborne vibration or groundborne noise levels. Typical vibration source levels for construction equipment are shown in Table IV.F-12. Typical groundborne vibration levels measured at a distance of 25 feet from heavy construction equipment in full operation, such as vibratory rollers, range up to approximately 94 VdB. Based on the preliminary plans available at the time of this analysis, the use of pile driving is not proposed for construction.

**Table IV.F-12: Typical Vibration Source Levels for Construction Equipment**

Equipment		Approximate VdB at 25 feet
Pile Driver (impact)	Upper range	112
	Typical	104
Pile Driver (sonic)	Upper range	105
	Typical	93
Clam shovel drop (slurry wall)		94
Hydromill (slurry wall)	In soil	66
	In rock	75
Vibratory roller		94
Hoe ram		87
Large bulldozer		87
Caisson drilling		87
Loaded trucks		86
Jackhammer		79
Small bulldozer		58

Source: Federal Transit Administration, 2006. *Transit Noise and Vibration Impact Assessment*. May.

The City's vibration performance standards<sup>7</sup> restrict any land use from producing vibration levels that are discernible without instruments at any point on the property line on which the use is located. Groundborne vibration levels from the operation of heavy construction equipment that will be used in demolition or construction of the proposed project would not be expected to cause damage to residential buildings of normal northern California construction. However, the simultaneous operation of multiple pieces of these types of heavy construction equipment near the northern project property line by the day care and office land uses, could result in perceptible groundborne vibration levels at these adjacent land uses. Therefore, the following three-part mitigation measure would be required to reduce this impact to a less-than-significant level for all sensitive receptors in the project vicinity.

Mitigation Measure NOISE-2a: The contractor shall ensure implementation of multi-part Mitigation Measure NOISE-1.

Mitigation Measure NOISE-2b: Pile driving shall not be used in construction of the proposed structure unless a detailed vibration impact analysis is performed that determines potential impacts and outlines mitigation measures to reduce such impacts to a less-than-significant level.

Mitigation Measure NOISE-2c: The contractor shall ensure that no two or more pieces of heavy construction equipment operate simultaneously within 25 feet of any single point along the northern project property line. (LTS)

**(3) Operational Noise Impacts.** Operations on the project site that would generate high noise levels are the loading/unloading activities at the proposed loading docks, trucks maneuvering on the driveway leading to the loading docks, mechanical system operations including commercial trash compactors, and typical parking lot activities such as doors slamming and people conversing.

<sup>7</sup> Vallejo, City of, 2008. *The Vallejo, California Municipal Code*. Section 16.72.080. December 2.

**Impact NOISE-3: Operational noise would result in a permanent increase of more than 5 dBA in ambient noise levels over existing levels without the project for noise sensitive uses in the project vicinity. (S)**

**Loading/Unloading Operations.** The City has established operational noise performance standards according to type of land use as shown in Table IV.F-6. However, certain noise sources, including transportation equipment used exclusively in the movement of goods and people to and from a given premises, are exempt from these performance standards. Section 7.84.020 of the City's Municipal Code prohibits the loading, unloading, opening, closing, or other handling of boxes, crates, containers, building materials, or other similar objects between the hours of 9:00 p.m. and 7:00 a.m. in such a manner as to cause a noise disturbance across a residential real property boundary.

Of the on-site operational noise sources that would result from implementation of the proposed project, noise generated by delivery truck activity would generate the highest maximum noise levels. Delivery truck loading and unloading activities can result in maximum noise levels from 75 dBA to 85 dBA  $L_{max}$  at 50 feet. There are generally two types of loading that will occur on the site: small deliveries like parcels and packages, and large deliveries of pallets of grocery items. The former are typically made via passenger car, van, or single-unit truck.

According to the project applicant, truck deliveries would take place between the hours of 4:30 a.m. and 12:30 p.m. It is expected that the store would have approximately 150 to 160 truck deliveries per week consisting of all truck types. Specifically, it is expected that these would consist of approximately 45 semi-tractor and trailers and about 105 other small delivery trucks. Because of the 24-hour operation, seven days per week, these trucks would arrive at various times throughout the restricted delivery hours of the early to late morning. About 8 semi-tractor and trailers and 17 other small delivery trucks would access the site on heavy days, with 5 semi-tractor trailers and 8 other delivery trucks on light days. Generally, all deliveries would arrive in the early morning in order to avoid peak traffic on adjacent streets. Dwell time would typically be less than 90 minutes, but could reach up to 120 minutes. The smaller delivery trucks may occasionally arrive on demand, but would generally be limited to the restricted morning delivery hours. All trucks would be required to deliver to the rear of the store as it is company policy to prohibit truck traffic at the front of the store. While this is an estimation of truck delivery times, frequency, and volume, deliveries may be subject to schedule factors such as holidays, weather, traffic patterns, and distance and may vary somewhat from store to store.

For the proposed project, two truck loading docks would be located below grade (recessed wells) at the rear of the store. The closest existing noise sensitive receptors to the proposed loading docks are the day care and office land uses bordering the northern project property line and the multi-family residential properties bordering the eastern project property line. The proposed loading dock facilities would be located approximately 50 feet from the existing office and day care property lines and approximately 140 feet from the nearest residential property line. At these distances, unobstructed maximum noise levels from large delivery truck activities would range up to 85 dBA  $L_{max}$  and up to 76 dBA  $L_{max}$  respectively. These noise level would be less than 20 dBA higher than the highest measured maximum noise level (65.2 dBA  $L_{max}$ ) that was recorded in the project vicinity during the ambient noise monitoring effort (see Table IV.F-7).

However, the project proposes to include loading bay doors that would be equipped with sealed gaskets to mitigate the impact of noise from off-loading trailers of large delivery vehicles since all loading/unloading activities occur within the enclosed building area. In addition, WinCo delivery trucks, utilizing the recessed wells, would drop off loaded trailers and immediately depart with an empty trailer to minimize truck idling time. These proposed sealed gasket loading bay doors would be expected to reduce off-loading activity noise levels by at least 15 dBA, effectively reducing loading and unloading noise levels to below the maximum noise levels currently experienced in the project vicinity and, thus, reducing impacts on nearby residential land uses to a less-than-significant level.

However, noise from smaller delivery vehicles that will not be using the sealed gasket loading bays would still result in a noise disturbance across the residential property line along the eastern boundary of the project site when these deliveries occur between the hours of 9:00 pm. and 7:00 a.m. Maximum noise levels from smaller delivery vehicles would be expected to range up to 75 dBA  $L_{max}$  at 50 feet. While smaller delivery vehicles will be required to deliver to the rear (north side) of the building, unloading activities could occur at any point in this area, including near the northern or eastern project property lines. The construction of the 8-foot high sound wall along the northern project property line, as required in Mitigation Measure NOISE-1a, would help reduce these impacts to a degree. However, an additional sound wall should be constructed along the eastern project property line at such a height that would block the line of sight from the outdoor active use areas of adjacent residential properties to the loading/unloading areas that smaller delivery trucks would be using.

It should be noted that some of the residential land uses are located at an elevation that is above that of the project site. In addition, there may be barriers to construction of a sound wall in this location due to utility easements. Therefore, the feasibility and exact height of this sound wall shall be determined based on the final engineering drawings detailing the final proposed pad elevation. The sound wall shall extend from the northeast corner of the project site southward to a point that ensures the line of sight to the proposed loading/unloading areas is blocked from all outdoor active use areas of adjacent residential land uses. A sound wall that completely blocks the line of sight to adjacent outdoor active use areas would be expected to reduce the noise levels from loading/unloading activities of smaller delivery vehicles by 10 dBA. Construction of a wall would effectively reduce these operational noise levels at the receiving residential properties to levels below the maximum noise levels currently experienced in the project vicinity; therefore reducing potential noise disturbances across residential real property boundaries to a less-than-significant level.

Implementation of the following two-part mitigation measure would be required to reduce noise impacts on residential land uses from proposed delivery activities to a less-than-significant level.

Mitigation Measure NOISE-3a: The project applicant shall ensure implementation of Mitigation Measure NOISE-1a.

Mitigation Measure NOISE-3b: A sound wall shall be constructed along the eastern project property line at a height and length that blocks the line of sight to the outdoor active use areas of residential land uses east of the project site. This sound wall shall be constructed on solid block or equivalent sound reflecting or sound absorbing material. The feasibility and exact height of this sound wall shall be determined based on the final engineering drawings detailing the final proposed pad elevation. If it is determined that a sound wall is infeasible at this

location, the applicant shall work with the City to identify and implement alternative measures which block the line of site and effectively reduce operational noise impacts. (LTS)

**Truck Movements on Service Driveway.** To serve the proposed WinCo Foods store, delivery trucks would enter the site from the eastbound direction of Redwood Parkway, at the signalized driveway. Trucks would continue west of the building to access the loading dock at the rear. Delivery trucks would maneuver at the northeast corner of the site to back into one of the two below-grade, three-bay loading docks. Truck egress would continue east of the building and out of the driveway at the southeast corner of the site. The nearest edge of this egress driveway path is approximately 50 feet from the nearest residences to the east.

Slow-moving trucks, at 5 to 10 mph would generate up to 75 dBA  $L_{max}$  at 50 feet when traveling and braking. With the noise attenuation provided by the sound barrier (required under Mitigation Measure NOISE-3) along the residential property line, truck passing noise would be reduced to below 65 dBA  $L_{max}$  in the backyard of the nearest residences. This would be below the maximum noise levels currently experienced in the project vicinity.

In addition, these single daytime or nighttime by-passing events, would not cause the  $L_{dn}$  to exceed the City's normally acceptable land use compatibility standard of 60 dBA  $L_{dn}$  for adjacent residential land uses. Also, as outlined previously, according to the City's Municipal Code, sounds associated with the transportation of goods or people to and from a given premises are exempt from the City's noise performance standards. Therefore, noise impacts on adjacent sensitive land uses from the ingress and egress of delivery vehicles to the project site would be considered less-than-significant with the implementation of Mitigation Measures NOISE-1, NOISE-2 and NOISE-3.

**Parking Lot Activities.** Representative parking activities, such as vehicles cruising at slow speeds, door slamming, cars starting, would generate approximately 60 dBA to 70 dBA  $L_{max}$  at 50 feet. Conversation between two persons at a distance of 3 to 5 feet apart would generate a noise level of 60 dBA  $L_{eq}$  at 5 feet. At 50 feet, this noise would be reduced to approximately 40 dBA  $L_{eq}$ . However, single daytime or nighttime events, even with relatively high noise-generating activities such as periodic car doors slamming, cars starting, or people talking would not cause the  $L_{dn}$  to exceed the City's normally acceptable land use compatibility standard of 60 dBA  $L_{dn}$  for adjacent residential land uses nor result in a substantial permanent increase of more than 5 dBA compared to levels existing without the project.

**Rooftop Noise-Generating Equipment.** The proposed project would have rooftop heating, ventilating, and air conditioning (HVAC) mechanical equipment. Although no final design is available at this time for the type and location of the rooftop mechanical units, based on noise measurements conducted at a Waremart Foods Inc. (now WinCo Foods) in Salem, Oregon,<sup>8</sup> rooftop HVAC units generate noise levels of approximately 62 dBA  $L_{eq}$  at 50 feet. The minimum distance between the residences to the east and feasible rooftop equipment location is 150 feet, which would provide approximately 10 dBA in noise attenuation by distance divergence when compared to the noise level measured at 50 feet. Depending on the actual location of the rooftop units, the edge of the building roof may provide a certain degree of noise reduction for the nearest residences to the east. Therefore, noise levels at the nearest residences to the east, attributable to the rooftop mechanical

<sup>8</sup> Albert G. Duble, 1994. Noise Study for Waremart Foods Inc. (now WinCo Foods), in Salem, Oregon.

equipment, would be below 52 dBA  $L_{eq}$ . This range of noise levels is lower than the measured ambient noise levels (52.5 and 57.5 dBA  $L_{eq}$ ) in the project vicinity (see Table IV.F-7). Therefore, no significant noise impacts are anticipated from the operation of rooftop mechanical equipment.

**Compactor Noise.** Based on noise measurements conducted at a WinCo Foods store in Vancouver, Washington,<sup>9</sup> noise associated with garbage compactors was measured to be 51.9 dBA  $L_{eq}$  at 100 feet. Three garbage compactors would be located on the north side of the project building. The compactors would be connected to an opening in the building wall so that all trash is loaded from inside the building directly into the compactor. The compactors themselves are not enclosed with a fence. The closest off-site sensitive land use to where the compactors would be located would be the office and day care land use located north of the project site. The compactors would be approximately 80 feet from the office building and 160 feet from the day care outdoor use areas. At these distances, noise levels from the operation of these compactors would range up to 53.9 dBA and 47.9 dBA  $L_{eq}$  at the office and day care land uses respectively. However, the noise attenuation provided by the eight-foot-high sound barrier required in Mitigation Measure 2d, would reduce the noise associated with the garbage compactor by at least 8 dBA to below 45.9 dBA  $L_{eq}$  at the office, and to below 39.9 dBA  $L_{eq}$  at the day care outdoor use areas. These noise levels are much lower than those currently experienced in the project vicinity and well below the City's normally acceptable noise level standard of 70 dBA  $L_{dn}$  for office and commercial land uses. Therefore, no significant noise impacts on off-site sensitive land uses from the operation of garbage compactors would occur and no mitigation measures are required.

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<sup>9</sup> TW Environmental, Inc., 2005. WinCo (Vancouver, Washington) Compactor Noise Measurement Data,

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