4.11 NOISE

This section includes a description of the properties of sound and the human perception of noise, ambient noise conditions in the vicinity of the Downtown Roseville Specific Plan (Plan) area and a summary of applicable regulations. This section also provides an analysis of noise impacts associated with the implementation of the Plan including a discussion of short-term construction noise, long-term operational noise sources, and compatibility of surrounding land uses with on-site noise levels. Mitigation measures are recommended, as necessary, to reduce significant and potentially significant noise impacts.

This project DEIR has been prepared to meet the requirements of a project-level EIR. The City's intention in preparing this project EIR is that no further environmental review under CEQA would be required for subsequent projects which are consistent with the Specific Plan to provide for the streamlined approval of projects proposed within the Plan area that are consistent with land use designations, adhere to design guidelines (specifically prototype development), or fall within the scope of the Specific Plan and EIR.

4.11.1 EXISTING CONDITIONS

ACOUSTIC FUNDAMENTALS

Noise is generally defined as sound that is loud, disagreeable, unexpected, or unwanted. Sound, as described in more detail below, is mechanical energy transmitted in the form of a wave caused by a disturbance or vibration which results in variations of air pressure detectable by the human ear.

Sound Properties

A sound wave is introduced into a medium (air) by a vibrating object. The vibrating object (e.g., vocal chords, the string and sound board of a guitar, the diaphragm of a radio speaker) is the source of the disturbance that moves through the medium. Regardless of the type of source creating the sound wave, the particles of the medium through which the sound moves are vibrating in a back and forth motion at a given frequency (pitch).
The frequency of a wave refers to how often the particles vibrate when a wave passes through the medium. The frequency of a wave is measured as the number of complete back-and-forth vibrations of a particle per unit of time. If a particle of air undergoes 1,000 longitudinal vibrations in 2 seconds, then the frequency of the wave will be 500 vibrations per second. A commonly used unit for frequency is hertz (Hz).

Each particle vibrates due to the motion of its nearest neighbor. The first particle of the medium begins vibrating, for example at 500 Hz, and sets the second particle of the medium into motion at the same frequency (500 Hz). The second particle begins vibrating at 500 Hz and then sets the third particle into motion at 500 Hz. The process continues throughout the medium and hence each particle vibrates at the same frequency. Subsequently, a guitar string vibrating at 500 Hz will set the air particles in the room vibrating at the same frequency, thereby carrying a sound wave with a frequency of 500 Hz to the detector.

The back-and-forth vibration motion of the particles in the medium is not the only observable phenomenon occurring at a given frequency. Since a sound is a pressure wave, oscillations in pressure from a high pressure to a low pressure are also observable. Compression (high pressure) and rarefaction (low pressure) disturbances moving through a medium will reach the detector at a given frequency. For example, a compression will reach the detector 500 times per second if the frequency of the wave is 500 Hz. Similarly, a rarefaction will reach the detector 500 times per second if the frequency of the wave is 500 Hz. Therefore, the frequency of a sound wave not only refers to the number of back-and-forth vibrations of the particles per unit of time but also refers to the number of compression or rarefaction disturbances that pass a given point per unit of time. The frequency of these pressure oscillations over a given period of time can also be measured with a detector. The period of the sound wave can be found by measuring the time between successive high pressure points (corresponding to the compressions) or the time between successive low pressure points (corresponding to the rarefactions).

The frequency is the reciprocal of the period and, thus, an inverse relationship exists so that as frequency increases the period decreases.

Sound and the Human Ear

Directly measuring sound pressure fluctuations would require the use of a very large and cumbersome range of numbers. To avoid this and have a more useable numbering system the decibel scale was introduced. A sound level expressed in decibels is ten times the logarithm of the ratio of two like pressure quantities, with one pressure quantity being a reference sound pressure. For sound in air the standard reference quantity generally considered to be 20 micropascals (µPa), which directly corresponds to the threshold of human hearing. The use of the logarithmic decibel is a convenient way to handle the million-fold range of sound pressures the human ear is sensitive to. A sound level increase of 20 decibels (dB) equates to a 100 fold increase in acoustical energy.

The loudness of sound preserved by the human ear is dependent primarily on the overall sound pressure level and frequency content of the sound source. The human ear is not equally sensitive to loudness at all frequencies in the audible spectrum. To better relate overall sound levels and loudness to human perception frequency-dependent weighting networks were developed. The standard weighting networks are identified as A through E. There is a strong correlation between the way humans perceive sound and A-weighted sound levels, (abbreviated dBA). For this reason, the dBA can be used to predict community response to environmental and transportation noise sound levels. Sound levels expressed as dB in this section are A-weighted sound levels, unless noted otherwise. Typical indoor and outdoor noise levels are presented in Exhibit 4.11-1.

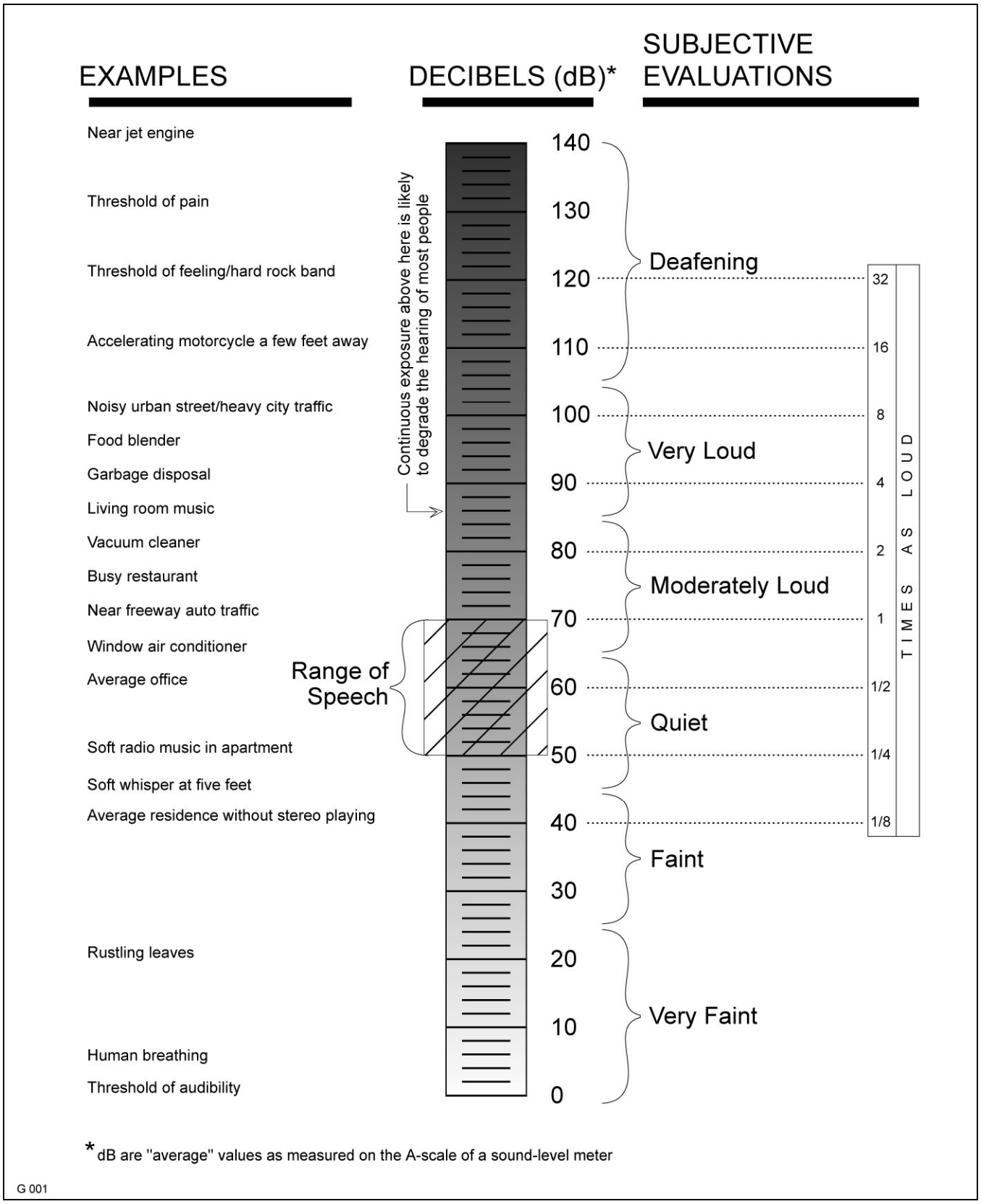
With regard to human perception of increases in sound levels expressed in dB, a change of 1 dB is generally not perceivable, excluding controlled conditions and pure tones. Outside of controlled laboratory conditions the average human ear barely perceives a change of 3 dB. A change of 5 dB generally fosters a noticeable change in human response, and an increase of 10 dB is subjectively heard as a doubling of loudness.

Sound Propagation

As sound (noise) propagates from the source to the receptor, the attenuation, or manner of noise reduction in relation to distance, is dependent on surface characteristics, atmospheric conditions and the presence of physical barriers. The inverse-square law describes the attenuation over distance in relation to the radiation pattern in which sound travels from the source to receptor. A point source generates sound uniformly outward in a spherical pattern with an attenuation rate of 6 dB per doubling of distance (dB/DD). Conversely, a line source generates sound uniformly outward in a cylindrical pattern with an attenuation rate of 3 dB/DD. The surface characteristics between the source and the receptor may result in additional sound absorption and/or reflection. Atmospheric conditions such as wind speed, temperature, and humidity also have a propensity to alter the propagation of the sound and affect noise levels at a receiver. Furthermore, the presence of a large object (i.e., barrier) between the source and the receptor can provide significant attenuation of noise levels at the receiver. The amount of attenuation or “shielding” provided by a barrier is dependent upon the size of the barrier, the location of the barrier in relation to the source and receivers, and the frequency spectra of the noise. Natural barriers such as berms, hills, or dense woods and manmade features such as buildings and walls can be used as noise barriers.

Noise Descriptors

The intensity of environmental noise changes over time, and several different descriptors of time-averaged noise levels are used. The selection of a proper noise descriptor for a specific source depends on the spatial and temporal distribution, duration, and fluctuation of both the noise source and the environment. The noise descriptors most often used to describe environmental noise are defined below:



Source: EDAW 2005

Typical Noise Levels **Exhibit 4.11-1**

- L_{max} (Maximum Noise Level): The highest A/B/C weighted integrated noise level occurring during a specific period of time.
- L_{min} (Minimum Noise Level): The lowest A/B/C weighted integrated noise level during a specific period of time.
- Peak: The highest weighted or un-weighted instantaneous peak to peak value occurring during a measurement period.
- L_n (Statistical Descriptor): The noise level exceeded n percent of a specific period of time, generally accepted as an hourly statistic. An L_{10} would be the noise level exceeded 10 % of the measurement period.
- L_{eq} (Equivalent Noise Level): The energy mean (average) noise level. The steady state sound level which, in a specified period of time contains the same acoustical energy as a varying sound level over the same time period.
- L_{dn} (Day-Night Noise Level): The 24-hour L_{eq} with a 10 dB "penalty" applied during nighttime noise-sensitive hours, 10:00 p.m. through 7:00 a.m. The L_{dn} attempts to account for the fact that noise during this specific period of time is a potential source of disturbance with respect to normal sleeping hours.
- CNEL (Community Noise Equivalent Level): The CNEL is similar to the L_{dn} described above, but with an additional 5 dB "penalty" for the noise-sensitive hours between 7:00 p.m. to 10:00 p.m., which are typically reserved for relaxation, conversation, reading, and television. If using the same 24-hour noise data, the CNEL is typically 0.5 dB higher than the L_{dn}.
- SEL (Sound Exposure Level): The SEL describes the cumulative exposure to sound energy over a stated period of time.
- SENEL (Single Event Noise Exposure Level): An SEL where, the measurement period is defined by the start and end times of a single noise event, such as an automobile passby, aircraft flyover, or individual industrial operations.

Negative Effects of Noise on Humans

Excessive and chronic exposure to elevated noise levels can result in both psychological and physiological effects in humans. Physiologically, exposure to excessive noise may result in damage to the auditory system, leading to gradual or traumatic hearing loss. Gradual and traumatic hearing loss both have a potential to result in permanent hearing damage. Gradual hearing loss can result from sustained exposure to moderately high noise levels over a period of time compared to traumatic hearing loss which results from sudden exposure to extremely high noise levels over a short time period. Furthermore, noise along with a number of environmental and physical variables may lead to interference with or interruption of sleep, relaxation, recreation, and communication. These interferences can result in varying degrees of annoyance. Although most interference may be classified as annoying, the inability to hear a warning signal may be considered dangerous. Noise can also be a contributor to diseases associated with stress (i.e., hypertension, anxiety, heart disease). The degree to which noise contributes to such both physiological and psychological effects on humans depends on the noise frequency, bandwidth, level, and exposure time.

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, such as operating factory machinery, or transient in nature, such as explosions. Vibration levels can be depicted in terms of amplitude and frequency, relative to displacement, velocity, and 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 (Federal Transit Administration (FTA) 2006, California Department of Transportation (Caltrans) 2004). 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. The response of the human body to vibration relates well to average vibration amplitude; therefore, vibration impacts on humans are evaluated in terms of RMS vibration velocity. Similar to airborne sound, vibration velocity can be expressed in decibel notation as vibration decibels (VdB). The logarithmic nature of the decibel serves to compress the broad range of numbers required to describe vibration.

Typical outdoor sources of perceptible ground-borne vibration include construction equipment, steel-wheeled trains, and traffic on rough roads. Although the effects of vibration may be imperceptible at low levels, effects may result in detectable vibrations and slight damage to nearby structures at moderate and high levels, respectively. At the highest levels of vibration, damage to structures is primarily architectural (e.g., loosening and cracking of plaster or stucco coatings) and rarely results in damage to structural components. The range of vibration important to the proposed project occurs 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 (FTA 2006).

EXISTING NOISE ENVIRONMENT

Existing Noise-Sensitive Land Uses

Noise-sensitive land uses generally include those uses where exposure to noise would result in adverse effects, as well as uses where quiet is an essential element of the 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 levels.

The area comprising the proposed project consists of residential, mixed-use, general commercial, service commercial, and light industrial land uses. Noise-sensitive land uses located in the vicinity of the Plan area consist of residential dwellings, Royer Park, Saugstad Park, multiple churches, and Woodbridge Elementary School. Existing land uses are identified further in Chapter 3, "Description of the Proposed Project," of this document.

Ambient Noise Survey

An ambient noise survey was conducted from November 7th through 9th, 2007 to document the existing noise environment at various locations, specifically at noise-sensitive receptors within the project area. Dominant noise sources identified during the ambient noise survey originated from vehicle traffic and railroad operations. Short-term noise level measurements were taken in accordance with American National Standards Institute (ANSI) standards at eight locations using a Larson Davis Laboratories (LDL) Model 824 precision integrating sound level meter (SLM). Long-term continuous noise level monitoring was conducted at two locations within the Plan area using an LDL Model 820 SLM. The SLMs were calibrated before and after use with an LDL Model CAL200 acoustical calibrator to ensure that the measurements would be accurate. The equipment used meets all pertinent specifications of the ANSI for Type 1 SLMs (ANSI S1.4-1983[R2006]).

Ambient noise survey locations are shown in Exhibit 4.11-2. The L_{eq}, L_{max}, and L_{50} values taken at each ambient noise measurement location are presented in Table 4.11-1. During the survey, average daytime hourly noise levels within the Plan area ranged from approximately 50 dB to 69 dB L_{eq}, with maximum noise levels that ranged from 63 dB to 82 dB $L_{max.}$ Ambient noise levels depended on the relative distance from nearby roadways, railroad lines, and the rail yard to noise measurement locations; and shielding provided by nearby existing structures.

Source: City of Roseville 2008

Ambient Noise Survey Locations **Exhibit 4.11-2**

Table 4.11-1
Ambient Noise Survey Measurements

Site	Location		L_{dn}	Average Measured Hourly Noise Levels, dB					
				Daytime (7 a.m.–10 p.m.)			Nighttime (10 p.m.–7 a.m.)		
				L_{eq}	L_{50}	L_{max}	L_{eq}	L_{50}	L_{max}
A	Washington Corridor –	North Grant Street, South of Church Street	71.8	65.0	57.1	82.1	65.4	57.7	82.9
B	Washington Corridor –	Washington Blvd., South of Grove Street	71.7	69.3	67.5	82.1	64.0	57.8	78.0
1	Washington Corridor –	Hill Avenue, South of Elefa Street	—	54.0	—	67.9		—	
2	Old Town Bungalows –	Papaya Street, East of Placer Street	—	50.2	46.3	70.7		—	
3	Old Town Commercial –	Between Main Street and Church Street	—	58.2	53.5	76.9		—	
4	Vernon Street –	Vernon Street, South of Jefferson Street	—	66.7	57.5	82.0		—	
5	Dry Creek Mixed-Use –	North of Lincoln and Oak Streets	—	54.3	53.2	63.2		—	
6	Royer Park –	Park Drive and Dietrich Drive	—	56.4	54.4	73.5		—	
7	Vernon Street –	Vernon Street and South Grant Street	—	66.3	63.7	80.8		—	
8	Vernon Bungalow/ Dry Creek Mixed Use –	Gopher Gulch Alley, North of Judah Street	—	51.0	49.8	64.1		—	

Notes: dB = A-weighted decibels; L_{dn} = day-night average noise level; L_{eq} = the equivalent hourly average noise level; L_{50} = the noise level exceeded 50% of a specific period of time; L_{max} = maximum noise level.
Source: Data collected by EDAW 2007

Existing Noise Sources

The existing noise conditions in the Plan area are influenced primarily by surface transportation noise emanating from vehicle traffic on area roadways (e.g., Vernon Street, Washington Boulevard, Douglas Boulevard) and railroad operations in the vicinity (i.e., Union Pacific Railroad (UPRR), and the J. R. Davis Rail Yard [rail yard]). Noise from UPRR lines and the rail yard occur primarily in the central portion of the Plan area. Noise from interspersed industrial and commercial land uses and noise from outdoor neighborhood activities (e.g., people talking, dogs barking, and operation of landscaping equipment) contribute to the existing noise environment to a lesser extent. Existing noise levels from roadway vehicle traffic and railroad operations are described in greater detail below. The UPRR line and operational activities at the rail yard are also considered a potentially significant source of ground-borne vibrations at sensitive receptors in the immediate vicinity. The Plan area is located approximately 5 miles southeast of the nearest airstrip (Fiddyment Fields private airstrip) and this facility was not found to contribute to the existing noise environment.

In addition to vehicle traffic and railroad operation noise, the All American Speedway is another potential existing noise source in the vicinity of downtown Roseville. The All American Speedway is located at the intersection of Washington Boulevard and All America Boulevard and holds auto races on Saturday evenings from April through

the first week in October. Noise generated by races held at the All American Speedway is considered intermittent and seasonal and, therefore, is not assumed in the calculation of overall noise levels.

Traffic Noise

One of the dominant noise sources in the Plan area is vehicle traffic on major area roadways. Existing vehicle traffic noise levels in vicinity of the Plan area were modeled using the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA-RD-77-108) and traffic data provided by the project traffic consultant (Pack, pers. comm., 2008). The FHWA model is based on CALVENO reference noise factors for automobiles, medium trucks, and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and ground attenuation factors. Truck usage and vehicle speeds on study area roadways were estimated from field observations and Caltrans data where available (Caltrans 2007).

Table 4.11-2 summarizes the modeled traffic noise levels, provides noise levels at 100 feet from the centerline of each major roadway in the immediate area of the Plan area and lists distances from the roadway centerlines to the 60 dB, 65 dB, and 70 dB L_{dn} traffic noise contours. These traffic noise modeling results are based on existing average daily traffic (ADT) volumes. As shown in Table 4.11-2, the location of the 60 dB L_{dn} contour ranges from 17 to 324 feet from the centerline of the modeled roadways. The extent to which existing land uses in the Plan area are affected by existing traffic noise depends on their respective proximity to the roadways and their individual sensitivity to noise. Refer to Appendix G of this DEIR for complete modeling inputs and results.

Table 4.11-2
Summary of Modeled Existing Traffic Noise Levels in the SPA

Roadway	Segment Location	L_{dn}, 100 feet from Roadway Centerline	Distance (feet) from Roadway Centerline to L_{dn} Contour		
			70 dB	65 dB	60 dB
Washington Boulevard	North of Junction	65.3 dB	49	106	227
Washington Boulevard	South of Junction	66.2 dB	56	120	259
Washington Boulevard	North of Main	66.4 dB	57	123	265
Washington Boulevard	South of Main	67.1 dB	65	139	300
Washington Boulevard	North of Oak	67.7 dB	70	151	324
Main Street	West of Washington	58.8 dB	18	39	83
Main Street	East of Washington	56.2 dB	12	26	56
Vernon Street	North of Douglas	61.2 dB	26	56	120
Vernon Street	West of Judah	61.3 dB	26	56	121
Vernon Street	East of Judah	61.3 dB	26	57	123
Vernon Street	West of Grant	61.1 dB	25	55	118
Vernon Street	East of Grant	60.3 dB	23	49	105
Vernon Street	West of Lincoln	60.3 dB	22	48	104
Vernon Street	East of Lincoln	62.0 dB	29	63	136
Oak Street	West of Washington	59.2 dB	19	41	89
Oak Street	East of Washington	60.2 dB	22	48	103
Lincoln Street	North of Vernon	48.3 dB	4	8	17
Lincoln Street	South of Vernon	56.1 dB	12	26	55
Judah Street	South of Vernon	50.7 dB	5	11	24
Grant Street	South of Vernon	55.0 dB	10	22	47

Notes: dB = A-weighted decibels; L_{dn} = day-night average noise level
Source: Modeled by EDAW 2008

Railroad Operations

Railroad operations in the City of Roseville include freight and passenger train operations on the UPRR tracks and activities at the rail yard. The UPRR tracks and rail yard are centrally located in downtown Roseville, bisecting the Old Town and Vernon Street Districts of the Plan area. Noise levels associated with the rail yard include master and group retarder noise, recurring impulsive noises, and train pass-bys. Retarders are mechanized rail braking systems used to slow rail cars; retarder noise is a distinct "squeal" which occurs primarily at the southern end of the Rail Yard as a result of rail cars passing through retarders at the head of the classification area. The recurring impulsive noise generally occurs at the north and central portions of the rail yard as a result of rail cars coupling and decoupling. Additional stationary source noise is generated from the maintenance and repair of locomotives and rail cars; maintenance activities typically occur on the northern portion of the rail yard. Noise generated by maintenance activities includes impact tools, power tools, coupling and decoupling of cars, idling locomotives, and engine load testing.

Noise associated with train pass-bys along the UPRR railroad line occurs throughout the Plan area, but is more distinguishable near the northern and southern ends of the rail yard. Operations along the UPRR main line result in stationary- and transportation-source related noise from warning horns/wayside horns, at-grade crossing bells, as well as locomotive engine and rail car noise.

Railroad noise contours are reflected in the *City of Roseville General Plan Noise Element* (City of Roseville 2004). According to the UPRR, railroad operations within the Roseville area are not anticipated to change substantially in the future. Therefore, significant modifications to the existing noise contours documented in the *City of Roseville General Plan* are not anticipated (City of Roseville 2004).

4.11.2 REGULATORY BACKGROUND

Various private and public agencies have established noise guidelines and standards to protect citizens from potential hearing damage and various other adverse physiological and social effects associated with noise. Applicable standards and guidelines are discussed below.

FEDERAL PLANS, POLICIES, REGULATIONS, AND LAWS

The U.S. Environmental Protection Agency (EPA) Office of Noise Abatement and Control was originally established to coordinate federal noise control activities. After its inception the EPA's Office of Noise Abatement and Control issued the Federal Noise Control Act of 1972, establishing programs and guidelines to identify and address the effects of noise on public health and welfare, and the environment. Administrators of the EPA determined in 1981 that subjective issues such as noise would be better addressed at lower levels of government. Consequently, in 1982 responsibilities for regulating noise control policies were transferred to state and local governments. However, noise control guidelines and regulations contained in the rulings of the EPA in prior years remain upheld by designated federal agencies, allowing more individualized control for specific issues by designated federal, state, and local government agencies.

STATE PLANS, POLICIES, REGULATIONS, AND LAWS

The State of California has adopted noise standards in areas of regulation not preempted by the federal government. State standards regulate noise levels of motor vehicles, sound transmission through buildings, occupational noise control, and noise insulation.

Title 24 of the California Code of Regulations establishes standards governing interior noise levels that apply to all new multi-family residential units in California. These standards require that acoustical studies be performed before construction at building locations where the existing exceeds 60 dB L_{dn}. Acoustical studies are required to establish mitigation measures that will limit maximum levels to 45 dB L_{dn} in any habitable room. Although there

are no generally applicable interior noise standards pertinent to all uses, many communities in California have adopted 45 dB L_{dn} as an upper limit for interior noise in all residential units.

The State of California General Plan Guidelines (Governor's Office of Planning and Research 2003), published by the state Governor's Office of Planning and Research (OPR), provides guidance for the acceptability of projects within areas of specific noise exposure. Table 4.11-3 presents acceptable and unacceptable community noise exposure limits for various land use categories. The guidelines also present adjustment factors that may be used to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution.

Table 4.11-3
OPR Land Use Noise Compatibility Guidelines

Land Use Category	Community Noise Exposure (L_{dn} or CNEL, dB)			
	Normally Acceptable[1]	Conditionally Acceptable[2]	Normally Unacceptable[3]	Clearly Unacceptable[4]
Residential-Low Density Single Family, Duplex, Mobile Home	<60	55–70	70–75	75+
Residential-Multiple Family	<65	60–70	70–75	75+
Transient Lodging, Motel, Hotel	<65	60–70	70–80	80+
School, Library, Church, Hospital, Nursing Home	<70	60–70	70–80	80+
Auditorium, Concert Hall, Amphitheater		<70	65+	
Sports Arenas, Outdoor Spectator Sports		<75	70+	
Playground, Neighborhood Park	<70		67.5–75	72.5+
Golf Courses, Stable, Water Recreation, Cemetery	<75		70-80	80+
Office Building, Business Commercial and Professional	<70	67.5–77.5	75+	
Industrial, Manufacturing, Utilities, Agriculture	<75	70–80	75+	

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

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

[3] 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. Outdoor areas must be shielded.

[4] New construction or development should generally not be undertaken.

Notes: dB = A-weighted decibels; L_{dn} = day-night average noise level; CNEL = Community Noise Equivalent Level.

Source: Governor's Office of Planning and Research 2003

LOCAL PLANS, POLICIES, REGULATIONS, AND ORDINANCES

City of Roseville General Plan

The *City of Roseville General Plan Noise Element* contains goals and policies to protect citizens from exposure to excessive noise. The Noise Element establishes standards for various land use categories with respect to transportation and non-transportation noise sources. According to the Noise Element, transportation noise sources are defined as traffic on public roadways, railroad line operations and aircraft in flight. Non-transportation noise sources may include industrial operations; outdoor recreation facilities; heating, ventilating, and air conditioning

(HVAC) units; loading docks; construction equipment; and others. The standards provide the basis for decisions on determining noise mitigation requirements. The following policies are applicable to the proposed project:

- **Transportation Noise Sources Policy 1:** Allow the development of new noise-sensitive land uses (which include but are not limited to residential, schools, and hospitals) only in areas exposed to existing or projected levels of noise from transportation noise sources which satisfy the levels specified in Table 4.11-4. Noise mitigation measures may be required to reduce noise levels at outdoor activity areas and interior spaces.

- **Transportation Noise Sources Policy 2:** Require new roadway improvement projects to be mitigated so as not to exceed the noise levels specified in Table 4.11-4 at outdoor activity areas or interior spaces of existing noise-sensitive land uses.

- **Transportation Noise Sources Policy 3:** Evaluate new transportation projects, such as light and heavy rail, using the standards contained in Table 4.11-4. However, noise from these projects may be allowed to exceed the standards if the City Council finds that there are special overriding circumstances.

- **Transportation Noise Sources Policy 4:** Require and acoustical analysis where:

    - Noise-sensitive land uses are proposed in areas exposed to existing or projected noise levels exceeding the levels specified in Table 4.11-4.

    - Proposed transportation noise source projects are likely to produce noise levels exceeding the levels specified in Table 4.11-4 at existing or planned noise-sensitive uses.

Table 4.11-4
Maximum Allowable Noise Exposure Transportation Noise Sources

Land Use	Outdoor Activity Areas[1]	Interior Spaces	
	L_{dn}/CNEL, dB	L_{dn}/CNEL, dB	L_{eq}, dB[2]
Residential	60[3]	45	–
Transient Lodging	60[3]	45	–
Hospitals, Nursing Homes	60[3]	45	–
Theaters, Auditoriums, Music Halls	–	–	35
Churches, Meeting Halls	60[3]	–	40
Office Buildings	65	–	45
Schools, Libraries, Museums	–	–	45
Playground, Neighborhood Parks	70	–	–

[1] Outdoor activity areas for residential developments are considered to be the back yard patios of decks of single family dwelling, and the patios or common areas where people generally congregate for multi-family development.
Outdoor activity areas for non-residential developments are considered to be those common areas where people generally congregate, including pedestrian plazas, seating areas and outside lunch facilities.
Where the location of outdoor activity areas is unknown, the exterior noise level standard shall be applied to the property line of the receiving land use.

[2] As determined for a typical worst-case hour during periods of use.

[3] Where it is not possible to reduce noise in outdoor activity areas to 60 dB L_{dn}/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dB L_{dn}/CNEL may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance with this table.

[4] Where a proposed use is not specifically listed on this table, the use shall comply with the noise exposure standards for the nearest similar use as determined by the Planning Department. Commercial and industrial uses have not been listed because such uses are not considered to be particularly sensitive to noise exposure.

Notes: dB = A-weighted decibels; L_{dn} = day-night average noise level; L_{eq} = the equivalent hourly average noise level.
Source: City of Roseville General Plan Noise Element 2004, Table IX-1

An acoustical analysis shall be required as part of the environmental review process so that noise mitigation may be considered in the project design (Table 4.11-5).

Table 4.11-5
Requirements for an Acoustical Analysis

An acoustical analysis prepared pursuant to the Noise Element shall:

A. Be the financial responsibility of the applicant.

B. Be prepared by a qualified person experienced in the fields of environmental noise assessment and architectural acoustics.

C. Include representative noise level measurements with sufficient sampling periods and locations to adequately describe local conditions and the predominant noise sources.

D. Estimate existing and projected cumulative (20 years) noise in terms of L_{dn}/CNEL and/or standards of Table 4.11-4, and compare those levels to the adopted policies of the Noise Element.

E. Recommend appropriate mitigation to achieve compliance with the adopted policies and standards of the Noise Element. Where the noise source in question consists of intermittent single events, the repot must address the effects of maximum nose levels in sleeping rooms in terms of possible sleep disturbance.

F. Estimate noise exposure after the prescribed mitigation measures have been implemented.

G. Describe a post-project assessment program which could be used to evaluate the effectiveness of the proposed mitigation measures.

Source: City of Roseville General Plan Noise Element 2004, Table IX-2.

- **Transportation Noise Sources Policy 5:** Work in cooperation the Caltrans and the Union Pacific Transportation Company to maintain noise level standards for both new and existing projects in compliance with Table 4.11-4.

- **Transportation Noise Sources Policy 6:** Allow the development of new noise-sensitive uses only where the noise level due to fixed (non-transportation) noise sources satisfies the noise level standards of Table 4.11-6. Noise mitigation may be required to meet Table 4.11-6 performance standards.

- **Transportation Noise Sources Policy 7:** Require proposed fixed noise sources adjacent to noise-sensitive uses to be mitigated so as not to exceed the noise level performance standards of Table 4.11-6.

Table 4.11-6
Performance Standards For Non-Transportation Noise Sources or Projects Affected by Non-Transportation Noise Sources (As Measured at the Property Line of Noise-Sensitive Uses)

Noise Level Descriptor	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
Hourly L_{eq}, dB	50	45
Maximum level, dB	70	65

Each of the noise levels specified above should be lowered by five dB for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises. Such noises are generally considered by residents to be particularly annoying and are a primary source of noise complaints. These noise level standards do not apply to residential units established in conjunction with industrial or commercial uses (e.g., caretaker dwellings).

No standards have been included for interior noise levels. Standard construction practices should, with exterior noise levels identified, result in acceptable interior noise levels.

Notes: dB = A-weighted decibels; L_{eq} = the equivalent hourly average noise level; L_{max} = maximum noise level.

Source: City of Roseville General Plan Noise Element 2004, Table IX-3

- **Transportation Noise Sources Policy 8:** Require an acoustical analysis where proposed non-residential or other fixed noise sources are likely to produce noise levels exceeding the performance standards of Table 4.11-6 at existing or planned noise-sensitive uses.

  An acoustical analysis shall be required as part of the environmental review process so that noise mitigation may be considered during project design (see Table 4.11-5).

- **Transportation Noise Sources Policy 9:** Where noise mitigation measures are required to achieve the standards of Tables 4.11-4 and 4.11-6, the emphasis of such measures should be placed on site planning and project design. These measures may include, but are not limited to, building orientation, setbacks, landscaping, and building construction practices. The use of noise barriers, such as soundwalls, should be considered as a means of achieving the noise standards only after all other practical design-related noise mitigation measures have been integrated into the project.

- **Transportation Noise Sources Policy 10:** Regulate construction-related noise to reduce impacts on adjacent uses consistent with the City's Noise Ordinance.

City of Roseville Municipal Code Noise Ordinance

The *City of Roseville Municipal Code* contains performance standards for the purpose of preventing unnecessary, excessive and annoying sound levels from all sources and includes noise standards for non-transportation sources and railroad sources. Non-transportation noise levels are not allowed to exceed 3 dB above ambient sound levels or exceed the hourly performance standards presented in Tables 4.11-6 by 3 dB, which ever is greater. The Code specifically prohibits excessive noise from train horns and whistles between the hours of 10:00 pm and 7:00 am to less than 89 dB L_{max}, at a distance of 300 feet or greater from the source.

Section 9.24.30 of the *City of Roseville Municipal Code* establishes conditions which are considered exempt from the provisions of the Code. The following exemptions are applicable to the proposed project:

A. Sound sources typically associated with residential uses (e.g., children at play, air conditioning and similar equipment, but not including barking dogs).

B. Sound sources associated with property maintenance (e.g., lawn mowers, edgers, blowers, pool pumps, power tools, etc.) provided such activities take place between the hours of eight a.m. and nine p.m.

C. Safety, warning and alarm devices, including house and car alarms, and other warning devices that are designed to protect the health, safety and welfare, provided such devices are not negligently maintained or operated.

D. The normal operation of public and private schools typically consisting of classes and other school-sponsored activities.

E. Maintenance (e.g., lawn mowers, edgers, aerators, blowers, etc.) of golf courses, provided such activities take place between the hours of 5 a.m. and 9 p.m. May through September, and 6 a.m. and 9 p.m. October through April.

F. Emergencies, involving the execution of the duties of duly authorized governmental personnel and others providing emergency response to the general public, including but not limited to sworn peace officers, emergency personnel, utility personnel, and the operation of emergency response vehicles and equipment.

G. Private construction (e.g., construction, alteration or repair activities) between the hours of seven a.m. and seven p.m. Monday through Friday, and between the hours of eight a.m. and eight p.m. Saturday and Sunday. Provided, that all construction equipment shall be fitted with factory installed muffling devices and that all construction equipment shall be maintained in good working order.

COMMUNITY AMBIENT NOISE DEGRADATION

In addition to the criteria discussed above, another consideration in defining impact criteria is based on the degradation of the existing noise environment. In community noise assessments, it is "generally not significant" if no noise-sensitive sites are located within the Plan area, or if increases in community noise levels associated with implementation of the project would not exceed 3 dB at noise-sensitive locations in the project vicinity (Caltrans 1998).

VIBRATION CRITERIA

The California Environmental Quality Act (CEQA) states that the potential for any excessive ground-borne noise and vibration levels must be analyzed, however, it does not define the term "excessive" vibration. Numerous public and private organizations and governing bodies have provided guidelines to assist in the analysis of ground-borne noise and vibration; however, the federal, state, and local governments have yet to establish specific ground-borne noise and vibration requirements. Publications of the FTA and Caltrans are two of the seminal works for the analysis of ground-borne noise and vibration relating to transportation and construction induced vibration. Caltrans guidelines recommend a standard of 0.2 inches per second (in/sec) PPV not be exceeded for the protection of normal residential buildings and 0.08 in/sec PPV not be exceeded for the protection of old or historically significant structures (Caltrans 2004). With respect to human response within residential uses (i.e., annoyance), the FTA recommends a maximum acceptable vibration standard of 80 VdB (FTA 2006).

4.11.3 ENVIRONMENTAL IMPACTS

ANALYSIS METHODOLOGY

Noise-sensitive land uses and major noise sources in the vicinity of the project area were identified based on existing documentation (e.g., equipment noise levels and attenuation rates) and site reconnaissance data.

To assess potential short-term construction noise impacts, sensitive receptors and their relative exposure (considering topographic barriers and distance) were identified. Noise levels of specific construction equipment were determined and resultant noise levels at those receptors were calculated.

With respect to traffic noise, EDAW conducted traffic noise modeling based on ADT traffic volumes obtained from the traffic analysis prepared for this project (Pack, pers. comm., 2008). The FHWA Highway Traffic Noise Prediction Model (FHWA RD 77-108) was used to calculate traffic noise levels along affected roadways and based on the trip distribution estimates obtained from the project traffic consultant (Pack, pers. comm., 2008). The project's contribution to the existing traffic noise levels along area roadways was determined by comparing the predicted noise levels at 100 feet from the roadway centerline, with and without project-generated traffic.

Potential long-term (operational) stationary source noise impacts were assessed based on existing documentation (e.g., equipment noise levels) and site reconnaissance data. This analysis also included an evaluation of the proposed noise-generating uses that could affect noise-sensitive receptors in the vicinity of the Plan area.

To assess the land use compatibility of the proposed project with on-site noise levels, predicted traffic noise contours, and documented railroad noise contours from the *City of Roseville General Plan Noise Element* were used to determine if development of the proposed land uses would exceed the applicable noise criteria for those land uses.

Predicted noise levels were compared with applicable standards for determination of significance. Mitigation measures were developed for significant and potentially significant noise impacts.

Ground-borne vibration impacts were qualitatively assessed based on existing documentation (e.g., vibration levels produced by specific construction equipment and railroad locomotive operations) and the distance of sensitive receptors from the given source.

The project includes a proposed General Plan Amendment to Transportation Noise Source Policy 1 to address the railyard as a noise source within the Plan area. Recognizing that in increasingly urban areas it is difficult to maintain rural noise standards, and in order to facilitate the City's goals to encourage reinvestment and economic development in the Downtown, Riverside, and Historic District Specific Plan areas, the proposed amendment would allow the City to elect to allow new noise-sensitive land uses on a case by case basis in proximity to sources of transportation noise. Noise mitigation, including an acoustical analysis, would be required to reduce interior space noise levels to the standards specified in Table IX-1 of the City's General Plan (refer to 4.11-4). Exterior noise levels would require mitigation to the extent feasible using building orientation, construction, and design features; however ultimately, exterior noise levels may exceed the outdoor activity area noise standards identified in Table IX-1 of the City's General Plan (refer to Table 4.11-4).

THRESHOLDS OF SIGNIFICANCE

For the purpose of this analysis, the following applicable thresholds of significance, as identified in the *City of Roseville General Plan Noise Element* and *City of Roseville Noise Ordinance* have been used. Implementation of the proposed project would result in a significant noise impact if it would result in any of the following:

- Expose persons to or generate noise levels in excess of applicable standards (e.g., *City of Roseville General Plan* and *City of Roseville Municipal Code* exterior and interior noise levels as shown in Tables 4.11-4 through 4.11-6;

- Result in a substantial permanent increase in ambient noise levels in the project vicinity above the City's noise standard. Where existing noise levels currently exceed the City's noise standards, where the project would substantially contribute to noise levels (3 dB or greater);

- Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above the City's noise standards;

- Expose people residing or working in the area to excessive noise levels, for a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport;

- Expose people residing or working in the project area to excessive noise levels, for a project within the vicinity of a private airstrip; or

- Expose persons to or generate excessive ground-borne vibration or ground-borne noise levels. Specifically, vibration impacts would be significant if levels exceed the Caltrans recommended standard of 0.2 in/sec PPV with respect to the prevention of structural damage for normal buildings or FTA's maximum acceptable vibration standard of 80 VdB with respect to human response (i.e., annoyance) at nearby vibration-sensitive land uses (i.e., residential).

Generally, a project may have a significant effect on the environment if it would substantially increase the ambient noise levels for adjoining areas or expose people to severe noise levels. In practice, more specific professional standards have been developed. These standards state that a noise impact may be considered significant if it would generate noise that would conflict with local planning criteria or ordinances, or substantially increase noise levels at noise-sensitive land uses.

For the proposed project, the significance of anticipated noise effects is based on a comparison between predicted noise levels and noise criteria defined by the City of Roseville. For this project, noise impacts are considered

significant if existing or proposed noise-sensitive land uses would be exposed to noise levels in excess of the *City of Roseville General Plan Noise Element* and *City of Roseville Municipal Code* standards as described above (see Section 4.11.2, "Regulatory Background,") or if implementation of the proposed project would result in an increase in the traffic noise level of 3 dB or more. The Plan area is not located within 2 miles of a public or private airstrip; therefore, it is not discussed further in this DEIR.

IMPACT ANALYSIS

IMPACT 4.11-1 Short-Term Construction-Generated Noise Levels. *Implementation of the proposed project would result in short-term construction activities associated with individual development projects in the Plan area. These construction activities could potentially expose sensitive receptors to noise levels in excess of the applicable noise standards and/or result in a noticeable increase in ambient noise levels. Therefore, this impact is considered* ***potentially significant.***

Construction noise levels in the project vicinity would fluctuate depending on the particular type, number, and duration of usage for various types of equipment. The effects of construction noise largely depends on the type of construction activities occurring on any given day, noise levels generated by those activities, distances to noise sensitive receptors, and the existing ambient noise environment in the receiver's vicinity. Construction generally occurs in several discrete stages, with each operation varying the equipment mix, and the associated noise characteristics. These stages alter the characteristics of the noise environment generated on a project site and in the surrounding community for the duration of the construction process.

The site preparation phase typically generates the most substantial noise levels due to on-site equipment grading, compacting, and excavating the site which often utilizes the noisiest construction equipment. Specific site preparation equipment can include: backhoes, bulldozers, loaders; excavation equipment such as, graders and scrapers; and compaction equipment. Erection of large structural elements and mechanical systems could require the use of a crane for placement and assembly tasks which may also generate a substantial noise levels. Although a detailed construction equipment list is not currently available for the proposed project, it is anticipated that the primary sources of noise would include backhoes, compressors, bulldozers, excavators, and other related equipment. Table 4.11-7 shows the noise levels generated by various types of construction equipment.

To assess noise levels associated with the various equipment types and operations, construction equipment can be considered to operate in two modes including mobile and stationary. Mobile equipment sources move around a construction site performing tasks in a recurring manner (e.g., loaders, graders, dozers). Stationary equipment operates in a given location for an extended period of time to perform continuous or periodic operations. Therefore, determining the location of stationary sources during specific phases, or the effective acoustical center of operations for mobile equipment during various phases of the construction process is necessary. Operational characteristics of heavy construction equipment are additionally typified by short periods of full power operation followed by extended periods of operation at lower power, idling, or powered off conditions.

As indicated in Table 4.11-7, operational noise levels for typical construction activities would generate noise levels ranging from 74 dB to 90 dB at a distance of 50 feet. Continuous combined noise levels generated by the simultaneous operation of the loudest pieces of equipment would result in noise levels of 93 dB at 50 feet. Accounting for the usage factor of individual pieces of equipment, topographical shielding and absorption effects, construction activities on a project site are expected to result in hourly average noise levels of 88 dB L_{eq}, at a distance of 50 feet. Maximum noise levels generated by construction activities are not anticipated to exceed 93 dB L_{max} at 50 feet.

Table 4.11-7
Construction Equipment Noise Emission Levels

Equipment Type	Typical Noise Level (dB) @ 50 feet
Air Compressor	78
Asphalt Paver	77
Backhoe	78
Compactor	83
Concrete Breaker	82
Concrete Pump	81
Concrete Saw	90
Crane, Mobile	81
Dozer	82
Front-end Loader	79
Generator	81
Grader	85
Hoe Ram Extension	90
Jack Hammer	89
Pneumatic Tools	85
Scraper	84
Trucks	74–81
Water Pump	81

Notes: dB = A-weighted decibels
*All equipment fitted with properly maintained and operational noise control device, per manufacturer specifications.
Source: Bolt Beranek, and Newman 1981, FTA 2006; Data Compiled by EDAW 2008.

Noise from localized point sources (e.g., construction sites) typically decreases by 6 dB to 7.5 dB with each doubling of distance from source to receptor. Conservatively assuming an attenuation rate of 6 dB per doubling of distance, construction operations and related activities would have the potential to generate exterior hourly noise levels exceeding 55 dB L_{eq} at receptors located within approximately 4,000 feet of the acoustical center for construction operations.

The *City of Roseville Municipal Code* exempts construction-generated noise that occurs between the hours of 7 a.m. to 7 p.m. Monday through Friday, and 8 a.m. and 8 p.m. Saturday and Sunday from the applicable noise standards, provided that all construction equipment is fitted with factory installed muffling devices and maintained in good working order. In addition, the City's Noise Ordinance would be enforced to restrict construction activities to occur between the hours of 7 a.m. to 7 p.m. Monday through Friday, and 8 a.m. to 8 p.m. Saturday and Sunday. Because construction activities would occur only during hours that are exempt from applicable noise standards, this impact is considered less than significant.

IMPACT 4.11-2 Long-Term Traffic Noise Levels at Existing Noise-Sensitive Receivers. *Implementation of the proposed project would result in an increase of average daily vehicle trips in the Plan area. In some locations, the increased traffic volumes would result in a noticeable (3 dB or greater) increase in traffic noise along roadways, however, impacts from the project would not exceed the city's General Plan noise standards (see Table 4.11-4); or, in areas where existing noise levels exceed those standards, the estimated increase in noise levels would be considered less than perceptible (less than 3dB). Therefore, this impact is considered less than significant.*

Long-term operation of the proposed project would result in an increase in ADT volumes on the local roadway network and, consequently, an increase in noise levels from traffic sources along affected segments. To examine the affect of project-generated traffic increases, traffic noise levels associated with the proposed project were calculated for roadway segments in the project study area using the FHWA Highway Noise Prediction Model (FHWA-RD-77-108). Traffic noise levels were modeled under existing and cumulative (2020) conditions, with and without the implementation of the Specific Plan. ADT volumes and the distribution thereof were obtained from the project traffic consultant (Pack, pers. comm., 2008). Vehicle speeds and truck volumes on local area roadways were determined based on field observations and vehicle counts conducted by EDAW. Tables 4.11-8 and 4.11-9 summarize the modeled traffic noise levels at 100 feet from the centerline of affected roadway segments in the Plan vicinity. Additional input data included day/night percentages of autos, medium and heavy trucks, vehicle speeds, ground attenuation factors, and roadway widths. Refer to Appendix G of this DEIR for complete modeling inputs and results.

Based on the modeling conducted, implementation of the proposed project in addition to existing conditions would result in traffic noise level increases ranging from +0.5 dB to +5.8 dB L_{dn}, compared to noise levels without the project. Implementation of the proposed project in addition to cumulative (2020) conditions would result in a net change in traffic noise levels ranging from -0.1 to +2.9 dB L_{dn}, compared to noise levels without the project. Therefore, long-term noise levels from project-generated traffic sources would result in permanent increase in ambient noise levels (3 dB or greater) in certain locations under current conditions.

Significant traffic noise impacts at existing noise-sensitive areas due to community growth are generally difficult to mitigate, particularly within a developed community such as Downtown Roseville. Existing noise-sensitive land uses may contain previously constructed noise barriers may not sufficiently buffer the additional increases in traffic noise levels. The construction of new noise barriers could be infeasible from a cost standpoint and would require openings in the barrier for existing roadways and driveways. Gaps in noise barriers would substantially limit the effectiveness of mitigating project-related traffic noise levels at existing noise-sensitive uses. Additionally, inclusion of noise barriers in this area would not be consistent with the City's planning strategy which encourages improvement projects that would revitalize the area's physical, economic, and commercial segments including entertainment and eating/drinking establishments within a pedestrian-friendly environment. However, impacts from implementation of the Plan would not exceed the city's General Plan noise standards (see Table 4.11-4); or, in areas where existing noise levels exceed those standards, the estimated increase in noise levels would be considered less than perceptible (less than 3dB). Therefore, this impact is considered less than significant.

Table 4.11-8
Predicted Traffic Noise Levels, Existing Conditions

Roadway	Segment Location	L_{dn} at 100 Feet, dB			
		No Project	Plus Project	Net Change	Significant Impact?
Washington Boulevard	North of Junction	65.3	65.8	+0.5	No
Washington Boulevard	South of Junction	66.2	67.1	+0.9	No
Washington Boulevard	North of Main	66.4	67.3	+0.9	No
Washington Boulevard	South of Main	67.1	68.1	+1.0	No
Washington Boulevard	North of Oak	67.7	68.7	+1.0	No
Main Street	West of Washington	58.8	59.6	+0.8	No
Main Street	East of Washington	56.2	58.2	+2.1	No
Vernon Street	North of Douglas	61.2	63.2	+2.0	No
Vernon Street	West of Judah	61.3	63.2	+2.0	No
Vernon Street	East of Judah	61.3	62.7	+1.4	No
Vernon Street	West of Grant	61.1	62.6	+1.5	No
Vernon Street	East of Grant	60.3	61.9	+1.6	No
Vernon Street	West of Lincoln	60.3	61.9	+1.6	No
Vernon Street	East of Lincoln	62.0	62.8	+0.8	No
Oak Street	West of Washington	59.2	60.8	+1.6	No
Oak Street	East of Washington	60.2	60.8	+0.6	No
Lincoln Street	North of Vernon	48.3	54.1	+5.8	**No**
Lincoln Street	South of Vernon	56.1	57.8	+1.7	No
Judah Street	South of Vernon	50.7	54.9	+4.2	**No**
Grant Street	South of Vernon	55.0	57.9	+2.8	No

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

*Traffic noise levels are predicted at a standard distance of 100 feet from the roadway centerline and do not account for shielding from existing noise barriers or intervening structures. Traffic noise levels may vary depending on actual setback distances and localized shielding.

Source: Data modeled by EDAW 2008

Table 4.11-9
Predicted Traffic Noise Levels, Cumulative (2020) Conditions

Roadway	Segment Location	L_{dn} at 100 Feet, dB			
		No Project	Plus Project	Net Change	Significant Impact?
Washington Boulevard	North of Junction	67.8	67.8	0.0	No
Washington Boulevard	South of Junction	68.0	68.1	+0.1	No
Washington Boulevard	North of Main	68.1	68.3	+0.2	No
Washington Boulevard	South of Main	69.3	69.4	+0.1	No
Washington Boulevard	North of Oak	69.5	69.7	+0.2	No
Main Street	West of Washington	59.8	60.1	+0.3	No
Main Street	East of Washington	57.9	58.4	+0.5	No
Vernon Street	North of Douglas	63.8	63.9	+0.1	No
Vernon Street	West of Judah	64.0	64.1	+0.1	No
Vernon Street	East of Judah	64.4	64.4	0.0	No
Vernon Street	West of Grant	64.1	64.2	+0.1	No
Vernon Street	East of Grant	62.1	62.4	+0.3	No
Vernon Street	West of Lincoln	62.2	62.5	+0.3	No
Vernon Street	East of Lincoln	64.0	64.0	0.0	No
Oak Street	West of Washington	60.8	61.1	+0.3	No
Oak Street	East of Washington	62.2	62.2	0.0	No
Lincoln Street	North of Vernon	52.4	55.3	+2.9	No
Lincoln Street	South of Vernon	58.6	58.7	+0.1	No
Judah Street	South of Vernon	53.2	53.8	+0.7	No
Grant Street	South of Vernon	58.6	58.4	-0.1	No

Notes: dB = A-weighted decibels; L_{dn} = day-night average noise level
*Traffic noise levels are predicted at a standard distance of 100 feet from the roadway centerline and do not account for shielding from existing noise barriers or intervening structures. Traffic noise levels may vary depending on actual setback distances and localized shielding.
Source: Data modeled by EDAW 2008

IMPACT 4.11-3 Long-Term Operational Stationary Source Noise Levels. *Implementation of the proposed project would result in increases in stationary source noise associated with the proposed residential and commercial land uses. These stationary noise sources could potentially exceed the City's noise standards (hourly and maximum) and result in a noticeable increase in ambient noise levels. Therefore, this impact is considered potentially significant.*

A variety of noise sources are associated with future development within the Plan area which have the potential to create noise levels that exceed applicable City noise standards or result in annoyance at existing and future noise-sensitive developments within the Plan area. Specific land uses with the potential to result in annoyance at existing and future noise-sensitive developments include commercial, retail, and construction of infrastructure (e.g., parking lots, water distribution system) as discussed below.

Because specific uses are not yet known and detailed site and grading plans have not yet been developed for the Plan area, it is not feasible to identify specific noise impacts associated with development at individual project sites. However, a general discussion and assessment of impacts is provided based on the possible types of uses associated with envisioned land uses of the Specific Plan.

Commercial/Office Uses

The specific types of commercial and office uses that would be developed in the Plan area have not yet been determined and the potential sources of noise associated with these types of uses can vary substantially. Stationary noise sources associated with these operations can be periodic or continuous and may contain tonal components which commonly result in annoyance at lower levels. Primary noise sources typically would include mechanical building equipment (e.g., HVAC), property maintenance, landscaping, parking lots, trash collection, on-site truck circulation, commercial deliveries. Potential noise sources are discussed separately below.

HVAC equipment could be a primary noise source associated with commercial or industrial uses. Equipment is often mounted on rooftops, located on the ground, or located within mechanical rooms. Associated noise sources could take the form of fans, pumps, air compressors, chillers, or cooling towers. Noise levels from HVAC equipment vary significantly depending on unit efficiency, size, and location, but generally range from 45 dB to 70 dB L_{eq} at a distance of 50 feet (EPA 1971). Therefore, operation of HVAC equipment could result in the exposure of existing and future noise-sensitive receptors to noise levels exceeding the City of Roseville daytime and nighttime hourly noise standards for residential uses.

According to the EPA, noise attributable to property maintenance equipment in use at proposed commercial uses could result in levels that range from approximately 80 dB to 90 dB L_{eq}, 3 feet from the source (EPA 1971). Although maintenance activities would be intermittent and of limited duration, these activities could result in exterior noise levels of 65 dB L_{eq} or greater at a distance of 50 feet. The *City of Roseville Municipal Code* provides an exemption for noise generated by property maintenance equipment, if operation occurs between 8 a.m. and 9 p.m. However, if property maintenance activities occur during more noise-sensitive hours (e.g., evening, nighttime, and early morning), noise levels from these sources could exceed the applicable standards at nearby noise-sensitive receptors or result in a substantial temporary increase in the ambient noise environment.

Noise sources from the proposed commercial uses could also include occasional parking lot related noise (e.g., opening and closing of vehicle doors, people talking, car alarms), commercial delivery activities (e.g., use of forklifts, hydraulic lifts), trash compactors, and air compressors. Noise from such equipment can reach intermittent levels of approximately 90 dB, 50 feet from the source (EPA 1971). Early morning truck deliveries also may be a source of elevated noise levels at nearby noise-sensitive receptors.

Overall, stationary source noise levels associated with commercial and retail operations in the Plan area could potentially exceed the City of Roseville noise standards at nearby existing and future noise-sensitive receptors. Therefore, impacts from commercial/retail land uses are considered significant.

Parking Structure Uses

Future development in the Plan area would include the construction of several parking garages incorporated with proposed mixed-use catalyst projects and one stand alone parking structure. The City Hall Annex/Post Office site would include a parking garage providing 132 parking stalls. The proposed mixed-use project at the corner of Grant and Vernon Streets would contain a subterranean parking garage of unknown size. A four-level public parking structure would be constructed at Pacific and Church Streets and would provide approximately 385 parking stalls.

Previously conducted reference noise level measurements of parking lot activities indicate that average sound exposure levels (SEL) associated with a single parking event are approximately 71 dB at 50 feet from the center

of activity. Activities making up a single parking event include vehicle arrival, limited idling, occupants exiting the vehicle, door closures, conversations among passengers, occupants entering the vehicle, startup, and departure of the vehicle. Assuming that peak operation would result in each parking stall filling and emptying twice per hour, each parking stall would have four associated parking events per hour. Table 4.11-10 summarizes modeled noise levels associated with each of the proposed parking structures.

Table 4.11-10
Predicted Peak Hour Parking Structure Noise Levels

Structure/Location	Parking Stalls	One-Way Vehicle Trips	*Peak Hour L_{eq}	Distance (feet) to L_{eq} Noise Contour	
				55 dB	45 dB
City Hall Annex/Post Office	132	528	56.6 dB	120	380
Corner of Grant and Vernon Streets	Unknown	—	—	—	—
Pacific/Church Streets	385	1,540	61.3 dB	207	653

Notes: dB = A-weighted decibels; L_{eq} = equivalent hourly noise level
* Noise levels are predicted at a standard distance of 100 feet from the acoustical center of the structure and do not account for shielding from existing noise barriers or intervening structures. Noise levels may vary depending on actual setback distances and localized shielding.
Source: Data modeled by EDAW 2008

Specific construction details for parking structures, such as site design and orientation are not yet known; therefore, the specific noise impact of each proposed parking structure can not be fully analyzed. However, based on the modeling results shown in Table 4.11-10 and assuming a standard attenuation rate of 6 dB/DD, noise-sensitive uses located within 653 feet of the Pacific/Church Street parking structure and 380 feet of the City Hall Annex/Post Office parking garage have the potential to be exposed to noise levels exceeding 45 dB L_{eq}. As a result, stationary source noise levels associated with the proposed parking structures could potentially exceed the City of Roseville daytime and nighttime hourly noise level standards for residential land uses. Therefore, noise impacts generated by parking garage activities are considered potentially significant.

Impact 4.11-4 **Land Use Compatibility of On-site Sensitive Receptors with Future Traffic Noise Levels.** *Implementation of the proposed project would result in future traffic noise that could expose proposed new land uses to levels that exceed the City's standards. This traffic noise could result in annoyance and/or sleep disruption to nearby noise-sensitive receptors. Therefore, this impact is considered* ***potentially significant****.*

To determine the land use compatibility of on-site noise-sensitive receptors with noise levels from future vehicle traffic sources, the FHWA Traffic Noise Prediction Model was used. Traffic noise contours for roadways in the Plan area were modeled under cumulative (2020) plus project conditions (Table 4.11-11). Future traffic noise contours were modeled in the same manner as discussed in Impact 4.11-2 for project-generated traffic noise levels at existing uses. ADT volumes and the distribution thereof were obtained from the project traffic consultant (Pack, pers. comm., 2008). Table 4.11-11 summarizes the traffic noise level at 100 feet from the centerline of affected roadways and distances to the 60 dB, 65 dB, and 70 dB L_{dn} traffic noise contours for cumulative (2020) plus project conditions. The predicted noise contour distances do not take into account shielding or reflection of noise from existing structures. In addition, actual noise levels could vary from day to day depending on factors such as local traffic volumes, shielding from existing structures, intervening topography, landscaping, and meteorological conditions.

Table 4.11-11
Summary of Modeled Cumulative 2020 Plus Project Traffic Noise Levels in the Plan Area

Roadway	Segment Location	L_{dn}, 100 feet from Roadway Centerline	Distance (feet) from Roadway Centerline to L_{dn} Contour		
			70 dB	65 dB	60 dB
Washington Boulevard	North of Junction	67.8 dB	72	155	333
Washington Boulevard	South of Junction	68.1 dB	75	162	349
Washington Boulevard	North of Main	68.3 dB	77	166	358
Washington Boulevard	South of Main	69.4 dB	91	197	424
Washington Boulevard	North of Oak	69.7 dB	95	205	442
Main Street	West of Washington	60.1 dB	22	47	102
Main Street	East of Washington	58.4 dB	17	36	78
Vernon Street	North of Douglas	63.9 dB	39	84	181
Vernon Street	West of Judah	64.1 dB	40	86	186
Vernon Street	East of Judah	64.4 dB	42	91	196
Vernon Street	West of Grant	64.2 dB	41	89	191
Vernon Street	East of Grant	62.4 dB	31	67	145
Vernon Street	West of Lincoln	62.5 dB	31	68	146
Vernon Street	East of Lincoln	64.0 dB	40	86	185
Oak Street	West of Washington	61.1 dB	25	55	118
Oak Street	East of Washington	62.2 dB	30	65	140
Lincoln Street	North of Vernon	55.3 dB	11	23	49
Lincoln Street	South of Vernon	58.7 dB	18	38	82
Judah Street	South of Vernon	53.8 dB	8	18	39
Grant Street	South of Vernon	58.4 dB	17	36	78

Notes: dB = A-weighted decibels; L_{dn} = day-night average noise level
Source: Modeled by EDAW 2008

Noise-sensitive receptors in the Plan area are proposed at two of the five mixed-use development prototype projects (i.e., catalyst sites). The approximately two-acre catalyst site on the corner of Washington Boulevard and Lincoln Street would include residential uses on the 2nd and 3rd floors of a three-story building. The Dry Creek Frontage catalyst site accessed from Oak Street would include 48 residential units in one building and up to 14 two-story and three-story attached town homes. Construction details, site plans and building orientations are not yet available; therefore, future traffic noise levels can not specifically be addressed for each proposed residential land use. However, noise-sensitive receptors located within the 60 dB L_{dn} noise contour, as shown in Table 4.11-11, could be exposed to noise levels exceeding the *City of Roseville General Plan Noise Element* standard of 60 dB L_{dn} for residential uses affected by transportation noise sources. Therefore, impacts related to land use compatibility are considered potentially significant.

IMPACT 4.11-5 **Land Use Compatibility of On-site Sensitive Receptors with Future Railroad Noise Levels.** *Implementation of the proposed project would result in locating new noise-sensitive land uses within 60 dB L_{dn} railroad noise contours. Therefore, this impact is considered* ***potentially significant****.*

Noise contours for railroad operations are reflected in the *City of Roseville General Plan Noise Element* (City of Roseville 2004). Railroad operations within the Roseville area are not anticipated to change substantially in the near future. Therefore, significant modifications to the reflected noise contours presented in the *City of Roseville General Plan Noise Element* are not anticipated.

Noise-sensitive residential uses envisioned as part of the Specific Plan would be located at the corner of Washington Boulevard and Lincoln Street and at the Dry Creek Frontage site on Oak Street. According to the railroad noise contours depicted in the *City of Roseville Noise Element*, the 60 dB L_{dn} noise contour from railroad operations fully encompasses the Washington/Lincoln site. Specifically, the 60 dB L_{dn} railroad noise contour extends 500 feet from the centerline of the UPRR tracks. Assuming a standard transportation-source attenuation rate of 4.5 dB/DD, noise-sensitive land uses located on the eastern portion of the Washington/Lincoln site could be exposed to railroad noise levels above 73 dB L_{dn}. As a result, implementation of the proposed project would result in exposing noise-sensitive receptors (e.g., residential units) to daily railroad-generated noise levels exceeding the City of Roseville's exterior noise level standard of 60 dB L_{dn} for residential land uses (Table 4.11-4). Therefore, this impact is considered potentially significant.

IMPACT 4.11-6 Future Interior Noise Levels at On-site Sensitive Receptors. *Implementation of the proposed project would result in exposing new noise-sensitive receptors to interior noise levels that exceed the City's noise standards. This would result in annoyance and/or sleep disruption to noise-sensitive receptors. Therefore, this impact is considered* ***potentially significant****.*

Modern residential construction consistent with the universal building code (UBC) typically provides an exterior-to-interior noise level reduction of 25 dB to 30 dB with all exterior openings sealed. The City of Roseville establishes a maximum allowable noise level of 45 dB L_{dn} for interior spaces of noise-sensitive uses. Thus, noise-sensitive receptors with exposure to exterior noise levels greater than 70 dB L_{dn} could experience interior noise levels exceeding the City of Roseville's 45 dB L_{dn} standard.

Residential units envisioned as part of the Specific Plan at the Washington/Lincoln catalyst site are anticipated to be exposed to exterior noise levels of 73 dB L_{dn} from vehicular traffic along Washington Boulevard located to the west and 73 dB L_{dn} from UPRR train operations located to the east. Therefore, an exterior-to-interior noise level reduction of 28 dB would be required to comply with the City of Roseville interior noise level standard of 45 dB L_{dn}. Because implementation of the proposed project has a potential to expose noise-sensitive receptors to interior noise levels that exceed the City of Roseville maximum allowable interior noise levels standard of 45 dB L_{dn} for residential land uses, this impact is considered potentially significant.

IMPACT 4.11-7 Ground-Borne Noise and Vibration Levels at Sensitive Receptors. *Implementation of the proposed project would result in exposing new sensitive noise-receptors to ground-borne noise and vibration levels that exceed the FTA and Caltrans guidelines. These ground-borne noise and vibration levels could result in annoyance or architectural/structural damage. Therefore, this impact is considered* ***potentially significant****.*

The Plan area is an urban environment with existing ground-borne vibration generated by light industrial operations, traffic, and railroad operations. In addition, short-term intermittent ground-borne noise and vibration may be generated by construction activities. Ground-borne vibration levels associated with light-rail transit and roadway traffic rarely exceed criteria established for evaluation of building damage or human annoyance (Caltrans 2004). Specific ground-borne noise and vibration sources located in the Plan vicinity are discussed below.

Railroad-Induced Vibration

Railroad operations (e.g., heavy-rail trains) have a potential to generate excessive ground-borne vibration levels depending on train speed, load, condition of track and wheels, amount of ballast used to support the track, and soil conditions. The FTA generalized ground surface vibration curves and parametric modeling of locomotive powered trains indicate that ground-borne vibration levels would exceed 80 VdB at distances less than 100 feet could potentially result in human annoyance (Busch et al. 2005). Assuming a crest factor of 4, 80 VdB RMS is approximately equivalent to 0.04 in/sec PPV, which is substantially less than the Caltrans recommended guideline of 0.2 in/sec PPV pertaining to the prevention of structural damage. The eastern project boundary of the Washington/Lincoln catalyst is located approximately 75 feet from the UPRR centerline. Because this catalyst site

is located within 100 feet of a ground-borne vibration source (i.e., UPRR), implementation of the proposed project could result in the exposure of sensitive noise-receptors to excessive ground-borne vibration levels. Therefore, impacts from railroad-induced vibration are considered potentially significant.

Construction-Induced Vibration

Construction activities in the Plan area have the potential to result in varying degrees of temporary ground vibration depending on the specific construction equipment used and operations involved. Ground vibration levels associated with various types of construction equipment are summarized in Table 4.11-12. Based on the representative vibration levels identified for various construction equipment types, sensitive receptors located in close proximity to construction activities could be exposed to ground-borne vibration levels exceeding the recommended FTA and Caltrans guidelines of 80 VdB and 0.2 in/sec PPV, respectively. However, three future parking garages would be constructed in the Plan area and would require the use of construction equipment that has the potential to create temporary ground vibrations. Exhibit 4.11-3 shows the location of the known, future parking garages in the Plan area and the extent of vibration levels that could be experienced during construction activities. Therefore, impacts from construction-induced vibration are considered potentially significant.

Table 4.11-12
Representative Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 feet (in/sec)[1]	Approximate L_v (VdB) at 25 feet[2]
Pile Driver (impact)	Upper range	1.518	112
	Typical	0.644	104
Pile Driver (sonic)	Upper range	0.734	105
	Typical	0.170	93
Large Bulldozer		0.089	87
Caisson Drilling		0.089	87
Trucks		0.076	86
Jackhammer		0.035	79
Small Bulldozer		0.003	58

[1] Where PPV is the peak particle velocity

[2] Where L_v is the RMS velocity expressed in vibration decibels (VdB), assuming a crest factor of 4.

Source: Federal Transit Administration 2006

4.11.4 MITIGATION MEASURES

No mitigation measures are necessary for the following less-than-significant impact:

Mitigation Measure 4.11-2: Long-Term Project-Generated Traffic Noise Levels at Existing Noise-Sensitive Receivers

The following mitigation measures are provided for significant or potentially significant impacts relating to noise:

Mitigation Measure 4.11-1: Short-Term Construction-Generated Noise Levels:

Although impacts related to short-term construction-generated noise were considered to be less than significant with implementation of the project, the following mitigation is provided to ensure impacts remain at a less-than-significant level. Construction contractors shall implement the following measures during construction activities.

- Construction equipment shall be properly maintained per manufacturers' specifications and fitted with the best available noise suppression devices (i.e., mufflers, silencers, wraps, etc). Shroud or shield all impact tools, and muffle or shield all intake and exhaust ports on power equipment.

- Construction operations and related activities associated with the proposed project shall comply with the operational hours outlined in the City of Roseville Municipal Code Noise Ordinance; construction operations shall be limited to between the hours of 7 a.m. and 7 p.m. Monday through Friday and between 8 a.m. and 8 p.m. Saturday and Sunday.

- Construction equipment should not be idled for extended periods of time in the vicinity of noise-sensitive receptors.

- Locate fixed and/or stationary equipment as far as possible from noise sensitive receptors (e.g., generators, compressors, rock crushers, cement mixers). Shroud or shield all impact tools, and muffle or shield all intake and exhaust ports on powered construction equipment.

- Where feasible, temporary barriers shall be placed as close to the noise source or as close to the receptor as possible and break the line of sight between the source and receptor where modeled levels exceed applicable standards. Acoustical barriers shall be constructed material having a minimum surface weight of 2 pounds per square foot or greater, and a demonstrated Sound Transmission Class (STC) rating of 25 or greater as defined by American Society for Testing and Materials (ASTM) Test Method E90. Placement, orientation, size, and density of acoustical barriers shall be specified by a qualified acoustical consultant.

Implementation of the above mitigation measure and compliance with requirements identified in *City of Roseville Municipal Code* would reduce construction-generated noise levels by 15 dB to 25 dB at noise-sensitive receptors in the Plan vicinity. Therefore, short-term construction-generated noise levels would remain less than significant.

Mitigation Measure 4.11-3: Long-Term Operational Stationary Source Noise Levels:

Project applicant(s) for industrial and commercial/office land uses shall implement the following measures to reduce exposure of sensitive receptors to excessive noise levels from future stationary sources.

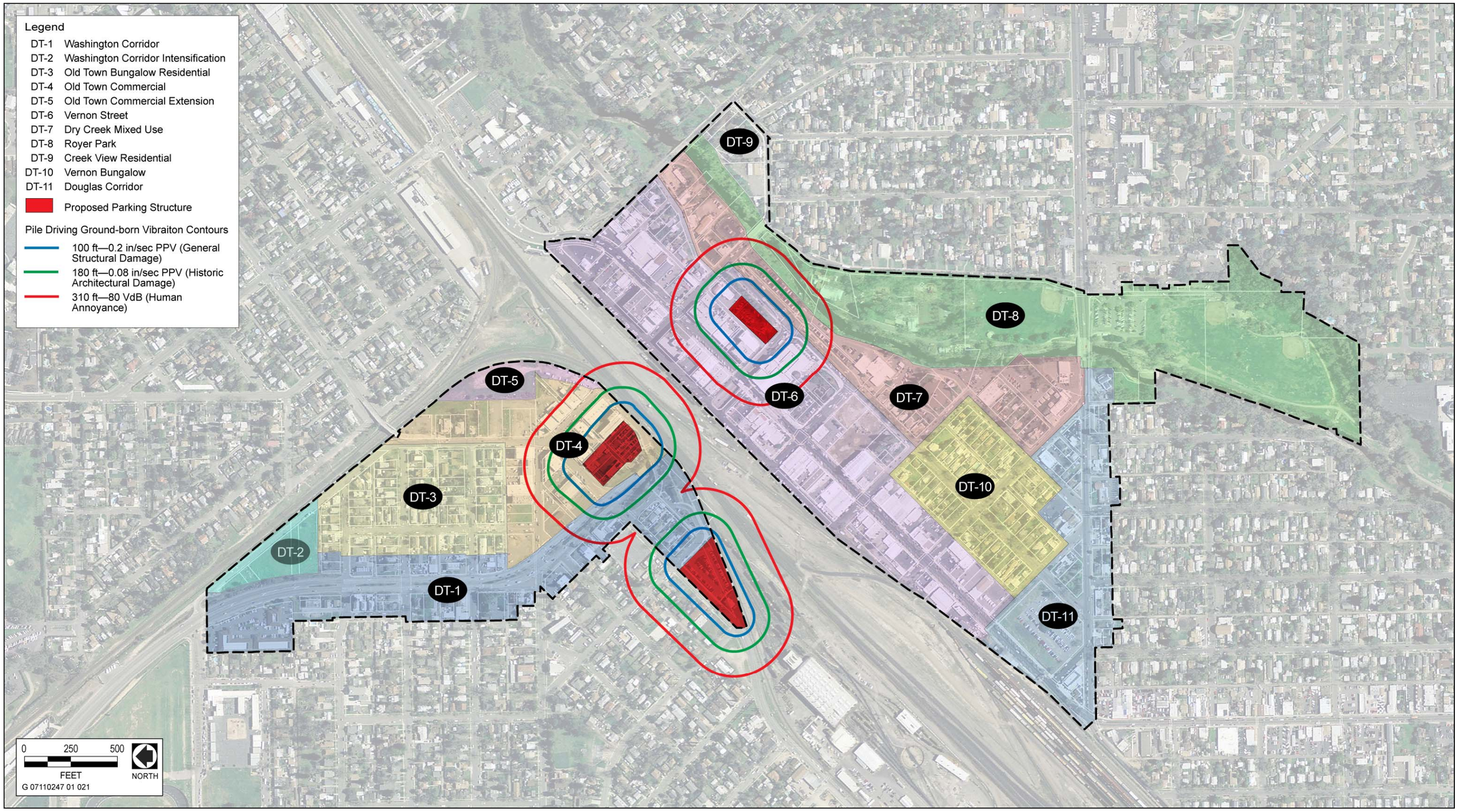
1. Industrial and Commercial/Office Land Uses. Where these land uses adjoin common property lines with noise-sensitive uses, the following mitigation measures shall be incorporated into the project design to reduce noise exposure from future stationary sources.

    a. During project review the City's Planning Department shall determine if the proposed use would likely generate noise levels adversely affecting the adjacent noise-sensitive uses. If a proposed project has the potential to generate or expose noise-sensitive uses to noise levels exceeding the City of Roseville noise standards (Tables 4.11-4 through 4.11-6) or result in a substantial (3 dB or greater) permanent increase in ambient noise levels, the project applicant shall prepare a site-specific acoustical analysis. The acoustical analysis shall be conducted in accordance with the City of Roseville General Plan requirements shown in Table 4.11-5.

    b. Loading and unloading areas shall be located so that commercial buildings shield nearby residential land uses from noise generated by loading dock and delivery activities. If necessary, additional sound barriers shall be constructed on the commercial sites to protect nearby noise-sensitive uses.

    c. Loading dock activity and delivery truck activity at the commercial uses developed on the project site shall only occur during the daytime hours of 7 a.m. to 10 p.m., in order to prevent evening and nighttime sleep disturbance at nearby residential land uses.

    d. All commercial HVAC machinery shall be located within mechanical equipment rooms wherever possible. Equipment manufacturer's specifications for venting and access to outside air shall be maintained.



Source: City of Roseville 2008, EDAW 2008

Pile Driving Ground-born Vibration Contours **Exhibit 4.11-3**

e. Localized noise barriers or rooftop parapets shall be constructed around the HVAC, cooling towers, and mechanical equipment so that line-of-site to the noise source from the property line of the noise-sensitive receptors is blocked. Equipment manufacturer's specifications for venting and access to outside air shall be maintained.

f. Property maintenance activities at commercial and office uses shall be restricted to daytime hours between 8 a.m. and 9 p.m.

Project applicant(s) for parking structures shall implement the following measures to reduce exposure of sensitive receptors to excessive noise levels from future stationary sources.

2. **Parking Structures.** Parking structures located in the immediate vicinity of noise-sensitive land uses shall include the following mitigation measures.

   a. Orientate parking structures so that nearby noise-sensitive receptors would be shielded from all on-site circulation routes (entrances, exits, and internal routes). If maintaining visibility is required transparent acoustical screens shall be installed on openings with direct line-of-sight to noise-sensitive receptors.

   b. Parking structures driveways and entrances shall be located so that the structure serves as a barrier to nearby noise-sensitive receptors.

   c. Interior reflective surfaces (i.e., ceilings), exposing nearby noise-sensitive receptors to elevated noise levels shall have an acoustically absorptive treatment, such as spray-in cellulose applied.

   d. Parking structure capacity shall be limited during more sensitive evening and nighttime hours (7 p.m. to 7 a.m.). (i.e., 50% capacity from 7 p.m. to 10 p.m., 30% capacity from 10 p.m. to 7 a.m.).

   e. To ensure compliance, further analysis of on-site noise generation from the proposed parking structures shall be conducted when tentative maps become available.

   Implementation of the above mitigation measures and compliance with *City of Roseville Municipal Code* requirements would substantially reduce long-term stationary-source noise associated with the development of industrial land uses, commercial/office land uses, and parking structures to comply of the *City of Roseville General Plan* noise standards. Therefore, long-term operational stationary source noise levels would be reduced to a less-than-significant level.

Mitigation Measure 4.11-4: Land Use Compatibility of On-site Sensitive Receptors with Future Traffic Noise Levels

Project applicant(s) shall implement the following measures to substantially reduce the exposure of sensitive receptors to excessive roadway traffic noise levels.

- During project review, the City's planning staff shall determine if the proposed land use would potentially be exposed to noise levels exceeding the City's noise level standards. If a proposed project has the potential to generate or be exposed to noise levels exceeding the City of Roseville noise standards (refer to Tables 4.11-4 through 4.11-6) or result in a substantial permanent increase in ambient noise levels (3 dB or greater), the project applicant shall prepare a site-specific acoustical analysis. The acoustical analysis shall be conducted in accordance with the *City of Roseville General Plan* requirements shown in Table 4.11-5.

- Disclose all transportation noise (i.e., roadway, railway, race track), vibration levels, and their meanings to purchasers and/or renters prior to contract or title transfer for residential property within the Plan area.

- Incorporate site specific design considerations to reduce exterior noise exposure levels. Site design shall include the following measures as applicable to the project-specific site and when feasible:

- Common outdoor activity areas, such as play structures, swimming pools, or other outdoor congregation areas included in multi-family residential and/or mixed-use developments shall be located such that the building(s) serve as a sound barrier to the nearest predominant noise source.

- Distances between noise sources and noise-sensitive uses shall be maximized through the use of noise buffers/setbacks. Setback areas can take the form of open space, frontage roads, recreational areas, storage yards, or other City approved setback.

- Noise barriers shall be constructed to provide shielding of noise-sensitive uses and outdoor activity areas. Barriers may include manmade walls, earthen berms, a combination of walls and berms, and other structures breaking line of sight from noise source to receptor. Barriers shall be located in close proximity to either the noise source or the sensitive receptor.

- A site specific acoustical analysis shall be performed consistent with Table 4.11-5, and determine effectiveness of various site design measures based on specific construction plans.

Implementation of the above mitigation measure may not always be considered feasible due to the urban nature of the Plan area. As an example, it may not be feasible to provide adequate noise buffers or other noise abatement/ reduction improvements between existing noise sources and sensitive receptors because of the existing urban nature of the Plan area. In addition, noise barriers in the Plan area may not be consistent with strategies or envisioned as part of the Downtown Roseville Specific Plan. An amendment to the Noise Element of the General Plan is proposed concurrent with the Downtown Specific Plan project. The amendment recognizes that in increasingly urban areas it is difficult to maintain suburban noise standards, and in order to facilitate the City's goals to encourage reinvestment and economic development in the Downtown, Riverside, and Historic District Specific Plan areas, the proposed amendment would allow the City to elect to allow new noise-sensitive land uses on a case-by-case basis in proximity to sources of transportation noise. Noise mitigation, including an acoustical analysis, would be required to reduce interior space noise levels to the standards specified in Table IX-1 of the City's General Plan. Exterior noise levels would require mitigation to the extent feasible using building orientation, construction, and design features; however ultimately, exterior noise levels may exceed the outdoor activity area noise standards identified in Table IX-1 of the City's General Plan.

With approval of the amendment to the Noise Element of the General Plan and implementation of noise-reduction measures, impacts related to land use compatibility of on-site sensitive receptors with future traffic noise levels would be reduced to a less-than-significant level.

Mitigation Measure 4.11-5: Land Use Compatibility of On-site Sensitive Receptors with Future Railroad Noise Levels:

Implement mitigation measure 4.11-4 to reduce the exposure of sensitive receptors (i.e., residential, mixed-use development) to significant noise associated with future railroad and rail yard operations.

Implementation of mitigation measure 4.11-4 may not always be considered feasible due to the urban nature of the Plan area. As an example, it may not be feasible to provide adequate noise buffers or other noise abatement/reduction improvements between existing noise sources and sensitive receptors because of the existing urban nature of the Plan area. In addition, noise barriers in the Plan area may not be consistent with strategies or envisioned as part of the Downtown Roseville Specific Plan.

With implementation of measures listed above (see Mitigation Measure 4.11-4) by project applicant(s) and enforcement of noise standards for interior spaces, projected noise levels would not have the potential to exceed applicable interior noise standards adopted by the City with respect to land use compatibility. However, due to the potential for noise associated with the railyard to exceed the General Plan standards for exterior noise, this impact would be significant and unavoidable.

Mitigation Measure 4.11-6: Future Interior Noise Levels at On-site Sensitive Receptors:

Project applicant(s) shall implement the following measures for all noise-sensitive land uses with direct exposure to roadways, parking areas, and railways and exterior noise levels greater than 70 dB L_{dn}:

- All residential uses shall be constructed with air conditioning and mechanical ventilation systems that allow for windows and doors to remain closed and achieve acoustical isolation from traffic and railroad noise. The systems shall allow for the introduction of fresh outside air, without the requirement of open windows. Access to outside air shall be automatically controlled to prevent unintentionally flowing seasonally hot or cold into conditioned space.

- Attic vents direct exposure to elevated noise levels shall be acoustically baffled, containing at least one 90 degree obstruction to the flow of air. The baffle shall be fitted with an acoustically absorbent liner.

- Exterior walls shall be constructed of a three-coat stucco or wood siding with an exterior underlayment or sound board.

- All residential windows and doors with direct exposure to elevated noise levels shall be required to meet a minimum STC rating of 34.

- Windows and sliding glass doors shall be mounted in low infiltration rate frames (0.5 cubic feet per minute or less, per ANSI specifications).

- Exterior doors shall be solid core with perimeter weather-stripping and threshold seals.

- The City shall require project applicants to submit an acoustical analysis which verifies compliance with the City of Roseville interior noise level standard of 45 dB L_{dn}. The analysis shall be based on detailed construction plans and site configuration details, and be conducted by a qualified acoustical consultant.

Implementation of the above mitigation measure would reduce exposure of noise-sensitive uses to interior noise levels exceeding the City of Roseville 45 dB L_{dn} standard. As a result this impact would be reduced to a less-than-significant level.

Mitigation Measure 4.11-7: Ground-Borne Noise and Vibration Levels at Sensitive Receptors:

Project applicant(s) shall implement the following measures to reduce the potential for human annoyance and achitectural/structural damage resulting from elevated ground-borne noise and vibration levels.

- Construction-Induced Vibration:

    - Pile driving required within a 50-foot radius of historic structures should utilize alternative installation methods were possible (e.g., pile cushioning, jetting, pre-drilling, cast-in-place systems, resonance-free vibratory pile drivers). Specifically, geo pier style cast in place systems shall be used where feasible as an alternative to pile driving to reduce the number and amplitude of impacts required for seating the pile.

    - The pre-existing condition of all buildings within a 50-foot radius, and historical buildings within the immediate vicinity of proposed construction activities shall be recorded in the form of a preconstruction survey. The preconstruction survey shall determine conditions that exist before construction begins for use in evaluating damage caused by construction activities. Fixtures and finishes within a 50-foot radius of construction activities susceptible to damage shall be documented (photographically and in writing) prior to construction. All damage will be repaired back to its pre-existing condition.

- Vibration monitoring shall be conducted prior to and during pile driving operations occurring within 100 feet of the historic structures. Every attempt shall be made to limit construction generated vibration levels in accordance with Caltrans recommendations during pile driving and impact activities in the vicinity of the historic structures.

- Provide protective coverings or temporary shoring of on-site or adjacent historic features as necessary, in consultation with the Preservation Director.

► Railroad Induced Vibration:

- Vibration sensitive uses shall be located a minimum of 100 feet from the UPRR centerline. To ensure compliance with FTA and Caltrans recommended guidelines, and site specific ground-borne noise and vibration assesment should be conducted.

- A ground-borne vibration assessment shall be conducted at proposed building pad locations within 200 feet of UPRR right of ways, prior to project approval. Vibration monitoring and assessment shall be conducted by a qualified noise and vibration control engineer.

Implementation of the above mitigation measure would substantially limit the effects of ground-borne vibration on sensitive receptors and as a result, project-generated ground-borne noise and vibration levels would be reduced to a less-than-significant level.

4.11.5 RESIDUAL SIGNIFICANT IMPACTS

With implementation of measures to substantially reduce the exposure of sensitive receptors to excessive roadway traffic noise levels (see Mitigation Measure 4.11-4) by project applicant(s) and enforcement of noise standards for interior spaces, projected noise levels would not have the potential to exceed applicable interior noise standards adopted by the City with respect to land use compatibility. However, due to the potential for noise associated with the railyard to exceed the General Plan standards for exterior noise, this impact would be significant and unavoidable.