4.7

Noise

This chapter evaluates the potential noise impacts of the proposed Specific Plan. It describes existing conditions in and around West Oakland and evaluates the impacts and mitigation needs of development allowed by the Specific Plan.

Physical Setting

Fundamentals of Environmental noise

Noise is defined as unwanted sound. Airborne sound is a rapid fluctuation of air pressure above and below atmospheric pressure. Sound levels are usually measured and expressed in decibels (dB) with 0 dB corresponding roughly to the threshold of hearing. Decibels and other technical terms are defined in **Table 4.7-1**.

Human Sensitivity to Noise

Most of the sounds that we hear in the environment do not consist of a single frequency, but rather a broad band of frequencies, with each frequency differing in sound level. The intensities of each frequency add together to generate a sound. The method commonly used to quantify environmental sounds consists of evaluating all of the frequencies of a sound in accordance with a weighting that reflects the facts that human hearing is less sensitive at low frequencies and extreme high frequencies than in the frequency mid-range. This measurement adjustment is called "A" weighting, and the decibel level so measured is called the A-weighted sound level (dBA).[1] Typical A-weighted levels measured in the environment and in industry are shown in **Table 4.7-2** for different types of noise.

[1]In practice, the level of a sound source is conveniently measured using a sound level meter that includes an electrical filter corresponding to the A-weighting curve.

Table 4.7-1
Definitions of Acoustical Terms

Term	Definitions
Decibel, dB	A unit describing, the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micro Pascals (or 20 micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e.g., 20 micro Pascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and Ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, Leq	The average A-weighted noise level during the measurement period. The hourly Leq used for this report is denoted as dBA Leq(h).
Lmax, Lmin	The maximum and minimum A-weighted noise level during the measurement period.
L01, L10, L50, L90	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day/Night Noise Level, Ldn or DNL	The equivalent noise level for a continuous 24-hour period with a 10-decibel penalty imposed during nighttime and morning hours. (10:00 pm to 7:00 am).
Community Noise Equivalent Level, CNEL	CNEL is the equivalent noise level for a continuous 24-hour period with a 5-decibel penalty imposed in the evening (7:00 pm to 10:00 pm) and a 10-decibel penalty imposed during nighttime and morning hours (10:00 pm to 7:00 am).
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

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

Table 4.7-2
Typical Noise Levels in the Environment

Common Outdoor Noise Source	Noise Level	Common Indoor Noise Source
	110 dBA	
Jet fly-over at 1,000 feet		
	100 dBA	
Gas lawn mower at 3 feet		
	90 dBA	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	80 dBA	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, 100 feet	70 dBA	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	60 dBA	
		Large business office
Quiet urban daytime	50 dBA	Dishwasher in next room
Suburban daytime		Active office environment
Quiet urban nighttime	40 dBA	Theater, large conference room
Quiet suburban nighttime		
	30 dBA	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	20 dBA	
Wilderness area		Broadcast/recording studio
Threshold of human hearing	10dBA	
	0 dBA	

Source: Caltrans, Technical Noise Supplement (TeNS), November 2009.

Note that example noise sources on the right and left line up to approximate noise levels along the scale in the center column.

Although the A-weighted noise level may adequately indicate the level of environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise includes a combination of noise from distant sources which create a relatively steady background noise in which no particular source is identifiable. To describe the time-varying character of environmental noise, the statistical noise descriptors L_{01}, L_{10}, L_{50}, and L_{90}, are commonly used. They are the A-weighted noise levels equaled or exceeded during 1, 10, 50, and 90 percent of a stated time period. A single number descriptor called the L_{eq} is also widely used. The L_{eq} is the average A-weighted noise level during a stated period of time.

In determining the daily level of environmental noise, it is important to account for the difference in response of people to daytime and nighttime noises. During the nighttime, exterior background noises are generally lower than the daytime levels. However, most household noise also decreases at night and exterior noise becomes very noticeable. Further, most people sleep at night and are more sensitive to noise intrusion. To account for human sensitivity to nighttime noise levels, a descriptor, DNL (day/night average sound level), was developed. The DNL divides the 24-hour day into the daytime of 7:00 AM to 10:00 PM and the nighttime of 10:00 PM to 7:00 AM. The nighttime noise level is weighted 10 dB higher than the daytime noise level. The Community Noise Equivalent Level (CNEL) is another 24-hour average that includes both an evening and nighttime weighting.

One way of anticipating a person's subjective reaction to a new noise is to compare the new noise with the existing noise environment to which the person has become adapted, i.e., the so-called "ambient" noise level. With regard to increases in A-weighted noise levels, knowledge of the following relationships will be helpful in understanding this EIR chapter:

- Under controlled conditions in an acoustics laboratory, the trained healthy human ear is able to discern changes in sound levels of 1 dBA.
- Outside these controlled conditions, the trained ear can detect changes of 2 dBA in normal environmental noise.
- It is widely accepted that the average healthy ear, however, can barely perceive changes in the noise level of 3 dBA.
- A change in noise level of at least 5 dBA is required before any noticeable change in community response would be expected.
- A 10 dBA increase is subjectively heard as approximately a doubling in loudness, and would almost certainly cause an adverse change in community response.

These relationships occur in part because of the logarithmic nature of sound and the decibel system. The human ear perceives sound in a non-linear fashion; hence the decibel scale was developed. Because the decibel scale is based on logarithms, two noise sources do not combine in a simple additive fashion, rather logarithmically. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA.

Noise Attenuation

Stationary “point” sources of noise, including stationary mobile sources such as idling vehicles, attenuate (lessen) at a rate of between 6 dBA for ‘hard sites” and 7.5 dBA for ‘soft sites” per doubling of distance from the source, depending on a number of additional variables such as the topography of the area and environmental conditions (i.e., atmospheric conditions and noise barriers, vegetative or manufactured, etc.). Hard sites are those with a reflective surface between the source and the receiver such as parking lots or smooth bodies of water. Soft sites have an absorptive ground surface such as soft dirt, grass, or scattered bushes and trees. In addition to geometric spreading, an excess ground attenuation value of 1.5 dB (per doubling of distance) is normally assumed for soft sites. Widely distributed noise, such as a large industrial facility spread over many acres or a street with moving vehicles (a “line” source), would typically attenuate at a lower rate, approximately 3 to 4.5 dBA each time the distance doubles from the source, also depending on environmental conditions. Noise from large construction sites will exhibit characteristics of both “point” and “line” sources and attenuation will therefore generally range between 4.5 and 7.5 dBA each time the distance doubles (Caltrans, 1998).

Atmospheric effects such as wind and temperature gradients can also influence noise attenuation rates from both line and point sources of noise. Unlike ground attenuation, atmospheric effects are constantly changing and difficult to predict. Trees and vegetation, buildings, and barriers reduce the noise level that would otherwise occur at a given receptor distance. However, for trees or a vegetative strip to have a noticeable effect on noise levels, it must be dense and wide. For example, a stand of trees must be at least 100 feet wide and dense enough to completely obstruct a visual path to the roadway to attenuate traffic noise by 5 dB (Caltrans, 1998).

Typical structural attenuation is 12-17 dBA with open windows. With closed windows in good condition, the noise attenuation is around 20 dBA for an older structure and 25 dBA for a newer dwelling. Sleep and speech interference is therefore possible when exterior noise levels are about 57-62 dBA Ldn with open windows and 65-70 dBA Ldn if the windows are closed.

Typical Noise Levels

Levels of 55-60 dBA are common along collector streets and secondary arterials, while 65-70 dBA is a typical value for a primary arterial. Levels of 75-80 dBA are normal noise levels at the first row of development outside a freeway right-of-way.

In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed; those facing major roadways and freeways typically need windows that have special glass with Sound Transmission Class (STC) ratings greater than 30 STC.

Sleep and Speech Interference

The thresholds for speech interference indoors are about45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noise of sufficient intensity (above 35 dBA) and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA Ldn. Typically, the highest steady traffic noise level during the daytime is about equal to the Ldn and nighttime levels are 10 dBA lower. The standard is designed for sleep and speech protection and most jurisdictions apply the same criterion for all residential uses.

Fundamentals of Groundborne Vibration

People's response to ground vibration has been correlated most effectively with the "vibration velocity" level. Like the noise level, the vibration velocity level is expressed on the decibel scale. Following common practice, the abbreviation "VdB" is used in this document to quantify vibration decibels. Background vibration levels in typical residential areas are usually 50 VdB or lower, well below the threshold of perception for most humans. Perceivable vibration levels inside residences are attributed to the operation of heating and air conditioning systems, door slams, and foot traffic.

Nearby construction activities (in particular, pile driving for taller buildings in certain soil conditions), train operations, and street traffic are some of the most common external sources of perceptible vibration inside residences. **Table 4.7-3** identifies some common sources of vibration, corresponding VdB levels at 50 feet, and associated human perception and potential for structural damage.

Table 4.7-3
Typical Levels of Groundborne Vibration

Human/Structural Response	Velocity Level (VdB)	Typical Events (at 50 feet)
Threshold, minor cosmetic damage	100	Blasting, pile driving, vibratory compaction equipment, heavy tracked vehicles (bulldozers, cranes, drill rigs)
Difficulty with tasks such as reading a video or computer screen	90	Commuter rail, upper range
Residential annoyance, frequent	80	Rapid transit, upper range
Residential annoyance, occasional	75	Commuter rail, typical bus or truck over bump or on rough roads
Residential annoyance, frequent	70	Rapid transit, typical
Approximate human threshold of perception to vibration	70	Buses, trucks and heavy street traffic
	60	Background vibration in residential settings in the absence of activity
Lower limit for equipment ultrasensitive to vibration	50	Background vibration in residential settings in the absence of activity

Existing Noise Environment

Existing Noise Sources

Transportation sources such as automobiles, trucks, and trains are the principal sources of noise in the Planning Area. The primary noise source is traffic on the I-880, I-980 and I-580 freeways, and on local arterial streets including Mandela Parkway, 14th Street, West Grand Avenue, 7th Street, Adeline Street, Peralta Street, Hollis Street, San Pablo Avenue, Market Street, 27th Street and Martin Luther King Jr. Way.

The elevated BART line is a major noise source affecting the southern part of the Planning Area.

The Union Pacific Railroad and BNSF Railroad and their associated railyards and Port of Oakland intermodal facilities that border West Oakland on the south and west are significant noise sources affecting those immediate areas.

Industrial and commercial equipment and operations also contribute to the ambient noise environment in local West Oakland industrial area vicinities. Other sources of noise include traffic helicopters in the morning reporting on freeway traffic and police helicopters at night.

Typical examples of transient noise sources include car horns, car alarms, loud vehicles or motorcycles, emergency sirens, loud music, mechanical equipment, trucks, and people talking or yelling. Many of these transient sources are common in the Planning Area. Although some of these transient sources may be annoying, they do not contribute substantially to the overall ambient noise level in any particular area.

There have been a number of efforts to mitigate traffic noise impacts in West Oakland, in particular noise from trucks associated with the Port of Oakland. Signs direct trucks to prescribed truck routes.

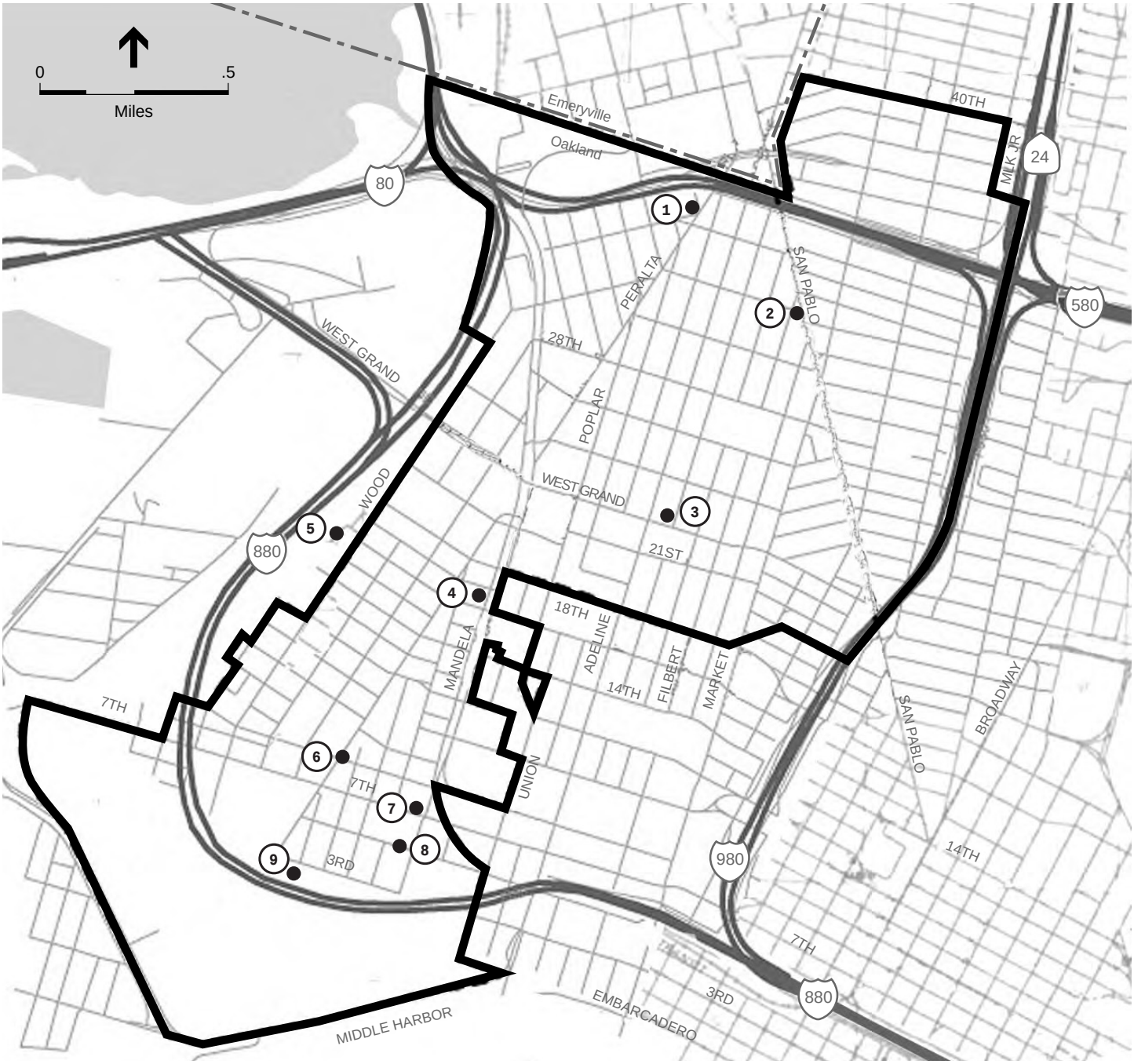
However, trucks still deviate from these prescribed routes and documented traffic counts indicate numerous trucks in mixed industrial and residential parts of West Oakland. Sound walls have been constructed along portions of I-880 adjacent to the Prescott and South Prescott neighborhoods.

Existing Noise Levels

There are numerous sources of noise measurements that have been taken in and around West Oakland over the past several years. Some of these sources are as much as ten years old, while other sources are quite recent. In general, the noise levels measured from each of these sources are compatible to each other, indicating that noise levels have not changes substantially within West Oakland in recent times. A summary of West Oakland noise measurements and results is presented below.

2003 West Oakland Redevelopment Plan EIR

Short-term noise measurements were collected at seven locations within West Oakland (see **Figure 4.7-1**) in 2003 for the West Oakland Redevelopment Plan EIR for purposes of characterizing the existing noise environment. The measured noise levels collected for the West Oakland Redevelopment Plan EIR are presented in **Table 4.7-4**.



Source: City of Oakland, West Oakland Redevelopment Plan EIR, 2003

Figure 4.7-1
West Oakland Redevelopment Plan, Noise Monitoring Locations

Table 4.7-4
West Oakland Noise Levels as Measured for the 2002 West Oakland Redevelopment Plan EIR

Noise Measurement Locations	Measured Noise Level[1] Daytime Leq (dBA)	Measured Noise Level[1] CNEL (dBA)[2]	Distance to Centerline or Noise Source (feet)
1. I-580 Freeway (at Peralta Street and 34th Street)	66	71	400
2. San Pablo Avenue (at 32nd Street)	66	69	50
3. West Grand Avenue (at Chestnut Street)	68	71	50
4. Mandela Parkway (at 17th Street)	62	64	50
5. 16th Street (west of Wood Street)	64	66	not available
6. Peralta Street (at 8th Street)	66	69	50
7. 7th Street (at Mandela Parkway)	68	72	50
8. Mandela Parkway (at 5th Street at BART parking lot)	70[3]	74	50
9. I-880 Freeway (near 3rd and Lewis Streets)	54	59	400

Source: West Oakland Redevelopment Plan EIR, 2003.

[1] Noise measurements were taken using a Larson-Davis modified 700b meter.

[2] CNEL levels were estimated for Locations 1-4 and 6-8 based on 15-minute noise measurements taken on Tuesday, January 21, 2003, as well as measured 2-5 dBA differences between the daytime Leq and CNEL at other Oakland locations, including Locations 5 and 9. Location 5 is a long-term measurement collected at 16th Street near an elevated segment of I-880 on January 13, 1999. Location 9 is a long-term measurement collected on September 23-25, 1997 at the I-880 Freeway near 3rd and Lewis streets, and there is a sound wall along this section of I-880. It is estimated that CNELs are approximately 5 dBA higher than the daytime Leq where the freeways or port activities influence the noise environment, and 2-3 dBA higher in neighborhoods where there is less nighttime activity.

[3] Noise sources include buses and cars in the BART parking lot, BART trains, and equipment operation in other adjacent industrial uses.

2003 Jack London Square Redevelopment Project EIR[2]

Although not specifically within the West Oakland Planning Area, the Jack London Redevelopment Project EIR conducted noise monitoring of Amtrak and freight trains, as well as traffic circulation on the local roadway network that is nearby to the West Oakland 3rd Street Opportunity Area, and provides relevant noise information from those noise sources.

Amtrak trains operate at speeds of up to 60 miles per hour; however, the trains slow down as they approach the Oakland station. Noise from approaching trains could be as high as 90 dBA at 100 feet (without horn). Sounding of train horns could generate noise levels of up to 95 dBA at 100 feet.

[2] Environmental Science Associates, 2003

Noise measurements conducted at the Jack London site indicate that noise from train activity form an important component of the ambient noise environment, in addition to traffic circulation on adjacent roadways and activities associated with the commercial businesses nearby. The noise monitoring conducted for that EIR indicates that noise levels on 3rd Street, west of Franklin, was 67.1 dBA Leq during the PM peak-hour.

2004 Noise Element of the City of Oakland General Plan

Noise measurements conducted for the Noise Element of the City of Oakland General Plan were conducted in all areas of Oakland and were intended to provide representative sampling of the important noise sources and receptors in the City. These measurements were taken in mid-2004, and were considered adequate to characterize noise levels in the vicinity of the measurement locations.

Table 4.7-5
West Oakland Noise Levels as Presented in the 2004 Noise Element

Location	Noise Level (CNEL)	Primary Noise Sources
San Pablo Avenue (at 32nd Street)	69 CNEL	Traffic on San Pablo Ave
West Grand Avenue (at Chestnut St)	71 CNEL	Traffic on West Grand Ave
Mandela Parkway (at 17th Street)	64 CNEL	Traffic on Mandela Parkway
16th Street (West of Wood Street)	66 CNEL	traffic on 16th Street
Peralta Street (at 8th Street)	69 CNEL	Traffic on Peralta Street
7th Street (at Mandela Parkway)	72 CNEL	Traffic on 7th Street , BART

Source; City of Oakland, 2004 Noise Element of the General Plan, technical studies by Illingworth and Rodkin

The 2004 Noise Element also found that industrial noise sources in West Oakland generate noise levels above their surroundings, but none sufficient to affect the overall noise environment.

2009 Housing Element EIR[3]

To verify of the applicability of the General Plan Noise Element noise data, new short-term noise measurements were conducted at selected locations near both the General Plan measurement sites and the Housing Sites selected in the Housing Element. These short-term noise measurements were taken in July of 2009. The 2009 noise measurement conducted in West Oakland was located on 7th Street, west of Mandela Parkway. Results indicate that the average sound level at this location is 68.0 dBA Leq, with a maximum instantaneous sound of 83.8 dBA Lmax representative of traffic along 7th Street and BART train pass-by. In general, the 2009 measurements conducted for the Housing Element found that 2009 noise levels were compatible with values measured for and presented in the 2003 Noise Element at similar locations and exposure circumstances.

[3] PBS&J, 2009

Other City of Oakland EIRs at or near BART Stations

According to the Gateway Community Development Project EIR (at the Fruitvale BART station), a typical BART train produces an 85 dBA noise level at a distance of 100 feet from the tracks.[4]

Noise levels are lower in the immediate vicinity of the station due to the slower speeds of approaching and departing trains. At the long-term noise monitoring locations, where noise from BART activity was a prominent component of the ambient noise environment, baseline noise levels were found to be 76 to 79 dBA DNL at distance of between 30 and 120 feet from the elevated tracks.

The Acadia Park Residential Project EIR (near the BART tracks at 98th Avenue and San Leandro Street in East Oakland), found the maximum measured DNL levels to be 82 dBA at approximately 100 feet from the elevated BART tracks.[5]

The MacArthur BART Transit Village EIR conducted an assessment of noise generated by BART train pass-by.[6] The study was prepared in accordance with the U.S. Department of Transportation Federal Transit Administration (FTA) recommended methodology obtained from chapter six of Transit Noise and Vibration Impact Assessment. The calculated train noise level at 50 feet from the BART track centerline was found to be approximately 69 dBA Ldn, including warning horns. Average hourly daytime noise levels from BART trains near the MacArthur BART site can reach 71 dBA Leq at 50 feet (with warning horns), and average hourly nighttime noise levels can reach 69 dBA Leq at 50 feet (with warning horns).

BART Studies

According to BART press release information, when BART train wheels pass over the rails, they cause microscopic ripples to form on the rails' surface. These ripples, called corrugation, change the pitch of the noise BART trains make. According to spokesman Mike Healy, BART has recently run a rail grinding machine at several locations along the BART route, and has found the following improvements:

- Noise levels along ballasted straight track dropped two dB (decibels), from 70 to 68 dB,
- Noise levels at elevated curves dropped 8 dBs, from 80 to 72 dBs

2010 Port of Oakland Health Impact Assessment[7]

A 2010 Health Impact Assessment (HIA) for the Port of Oakland used models to determine how the various sources of noise contribute to noise levels in the West Oakland community. Under existing conditions (year 2005), the study found high levels of noise in West Oakland, particularly near the freeways and rail/BART lines. Their results are generally consistent with noise projections found in the City's Noise Element, which only considered freeway and highways, yet reveals that these sources have the potential for substantially elevated noise along these major roadways (see **Figure 4.7-3**).

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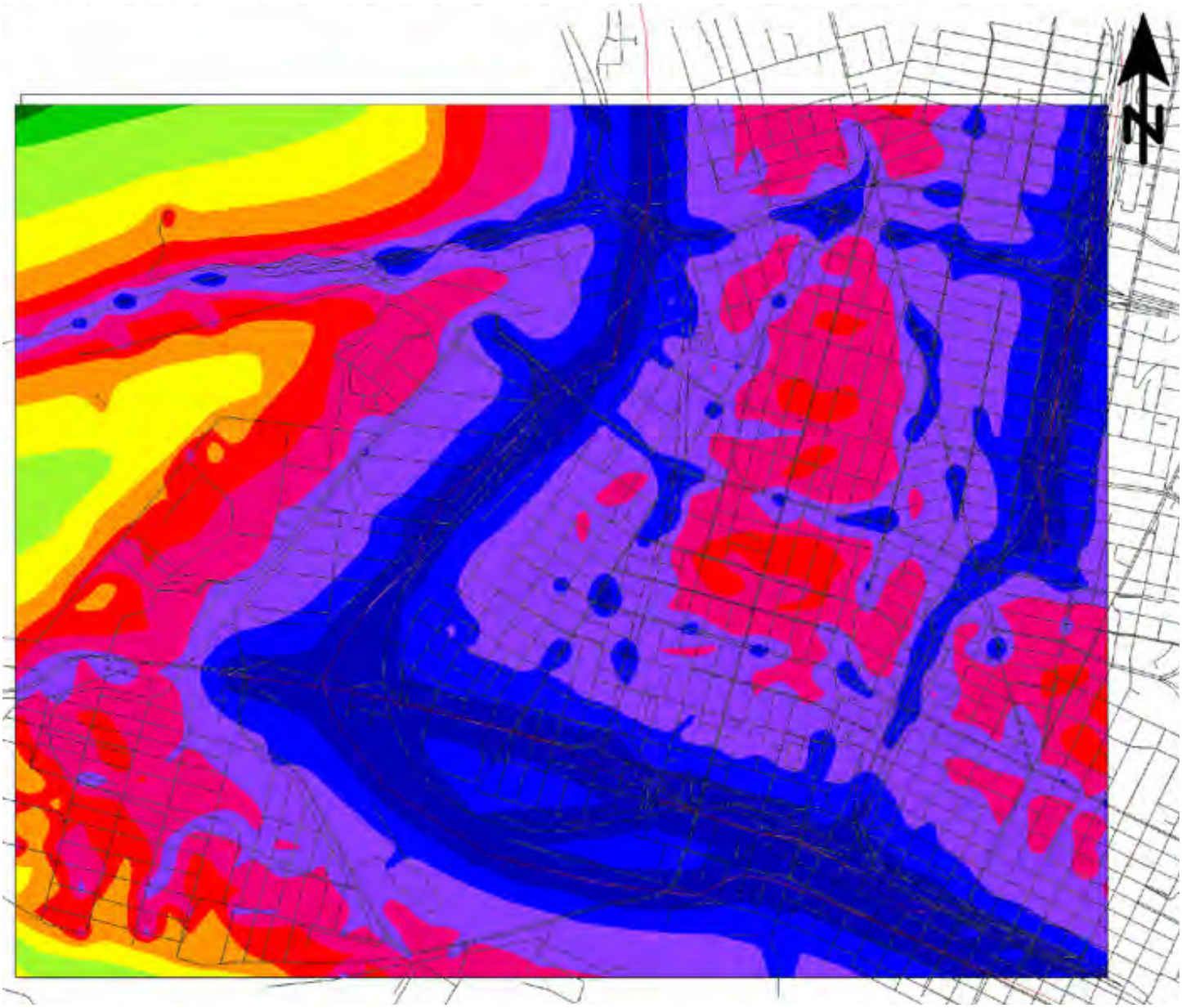
4 City of Oakland, Gateway Community Development Project Draft EIR, ESA, August 2007, with technical studies by Illingworth & Rodkin, 2004

5 City of Oakland, Acadia Park Residential Project Draft EIR, CirclePoint, July 2005, with technical studies by Charles Salter Associates, March 2005

6 City of Oakland, MacArthur BART Transit Village Draft EIR, LSA Associates, 2007

7 Port of Oakland, Health Impact Assessment, conducted by the UC Berkeley Health Impact Group, 2010



Noise levels
Lden
in dB(A)

	< 45
	45 - 50
	50 - 55
	55 - 60
	60 - 65
	65 - 70
	70 - 75
	75 - 80
	80 - 85
	>= 85

Source: UC Berkeley School of Public Health

Figure 4.7-2
Estimate of Future (2020) Noise Conditions

This study also estimated current and future health impacts associated with existing and projected future noise levels. The year 2000 block-level census data was overlain over the noise contours derived from the Noise Element. The numbers of population at the block-level that are exposed to various levels of noise are shown below in **Table 4.7-6**.

Table 4.7-6
West Oakland Population Exposure to Various Noise Levels

dB	Population Exposed	Percent of Total Population
60	247	1%
65	2,110	9%
70	6,169	25%
75	9,696	40%
80	4,707	19%
85+	1,520	6%
Total	24449	

Source: UC Berkeley Health Impact Group (UCBHIG), *Health Impact Assessment of the Port of Oakland*, University of California, Berkeley, CA, March 2010.

Conclusions

In general, the noise levels measured for the 2003 West Oakland Redevelopment Plan EIR are comparable to other, more recent noise measurements taken within West Oakland and at other BART station locations with similar locations and exposure circumstances. The conclusions that can be reached form all of these noise studies indicate that:

- Noise levels are generally highest along the elevated sections of the I-580 and I-880 freeways, with CNEL noise levels estimated at 68 to 71 dBA at 400 feet from both freeway centerlines; freeway noise levels are lower in areas protected by sound walls (less than 60 dBA at 400 feet from the I-880 freeway centerline).
- Noise levels reach in excess of 67 dBA (Leq) during the day in the southeastern portion of the West Oakland BART Station south parking lot. Noise levels at the northern edge of the BART station on 7th Street reach in excess of 68 dBA (Leq) during the day.
- Along major arterial streets such as Mandela Parkway, San Pablo Avenue, 7th Street, and West Grand Avenue daytime noise levels are mostly between 66 to 68 dBA (Leq) and CNEL levels were mostly between 68 and 72 dBA at 50 feet from roadway centerlines.
- In areas away from arterials, freeways, and BART (where there are no adjacent major noise sources), noise levels are generally less than 65 dBA CNEL.

When measured noise levels are compared to City noise and land use compatibility guidelines, they indicate that the existing noise environments near the elevated segments of I-580 and I-880 (unprotected by sound walls) and near the elevated BART tracks and West Oakland BART Station are generally incompatible with residential and other noise-sensitive uses. Noise levels along many major

arterial streets generally meet the threshold for conditionally acceptable noise levels for residential uses.

Existing Sensitive Receptors

Human response to noise varies considerably from one individual to another. Effects of noise at various levels can include interference with sleep, concentration, and communication, physiological and psychological stress, and hearing loss. Consequently, the noise standards for sensitive land uses (i.e., homes, schools, childcare centers, hospitals, and nursing homes) are more stringent than for those at less sensitive uses.

Health Impacts of Noise

Community noise is associated with a variety of health impacts, including increased annoyance and stress, increased risk of heart attacks, and effects on children's mental health, reading comprehension, and school performance. Noise can make it difficult to fall asleep and maintain sleep, leading to fatigue, impaired endocrine and immune system function, deterioration of performance, reduced attention and motivation, and lowered mental concentration and intellectual capacity. Sleep disorders have an impact on quality of life, and on professional and personal behavior, education, absenteeism, and risk of motor vehicle, work and domestic accidents. Noise exposure induces stress hormones, which are risk factors for cardiovascular disease. Noise affects reading, recall, recognition, and attention, and may affect the cognitive development of children. Moreover, noise disproportionately impacts the health of lower income and minority populations.[8]

A 2010 Health Impact Assessment (HIA) for the Port of Oakland conducted by the UC Berkeley Health Impact Group[9] estimated that the majority of West Oakland residents are exposed to ambient noise levels of 75 dB Ldn. Based on these exposures and established noise-health relationships, the report estimated that currently greater than one in three residents are likely to be highly annoyed by noise, which has considerable bearing on stress and its associated health impacts. The 2010 HIA also estimated that currently 8 myocardial infarction deaths (15 percent of all myocardial infarction deaths) per year may be associated with noise exposure. Approximately one third of residents may be at risk of sleep disturbance. In terms of cognitive impairment, the 2010 HIA estimated that West Oakland residents experience a 29 percent impairment in recall and reading, and a 4 percent impairment in recognition and attention over a typical 60 dB residential environment, which may have considerable consequences on the cognitive development of West Oakland children.

[8] UC Berkeley Health Impact Group (UCBHIG), *Health Impact Assessment of the Port of Oakland*, University of California, Berkeley, CA, March 2010.

[9] UC Berkeley Health Impact Group, March 2010.

Regulatory Setting

Federal

Federal Transit Administration Groundborne Vibration Impact Criteria

The Federal Transit Administration (FTA) has developed extensive methodologies and significance criteria for the evaluation of vibration impacts from surface transportation modes. Since the FTA has explained the rationale behind its methodologies and significance criteria, they have applicability to the general assessment of vibration from a variety of sources and not just to those over which the FTA has approval and review authority. The FTA criteria for judging the significance of vibration to sensitive receptors and structures are shown in **Table 4.7-5**, and are based on average vibration levels calculated over a one second period to relate to average, maximum vibration levels experienced by humans. Note that there are criteria for frequent events (more than 70 events per day), occasional events (between 30 and 70 events per day) and infrequent events (less than 30 events per day).

Table 4.7-7
FTA Groundborne Vibration Impact Criteria

Land Use Category	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
Category I: Buildings where vibration would interfere with interior operations	65 VdB[4]	65 VdB[4]	65 VdB[4]
Category II: Residences and buildings where people normally sleep	72 VdB	75 VdB	80 VdB
Category III: Institutional land uses with primarily daytime use	75 VdB	78 VdB	83 VdB

Notes: [1] More than 70 vibration events of the same source per day.

[2] Between 30 and 70 vibration events of the same source per day.

[3] Less than 30 vibration events of the same source per day.

[4] This criterion is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration sensitive manufacturing or research should always require detailed evaluation to define the acceptable vibration levels. Ensuring low vibration levels in a building requires special design of HVAC systems and stiffened floors.

Federal Truck Noise Standards

Federal regulations establish noise limits for medium and heavy trucks (more than 4.5 tons, gross vehicle weight rating) under Title 40 Code of Federal Regulations (CFR) Part 205, Subpart B. The federal truck pass-by noise standard is 80 dB at 15 meters from the centerline of the vehicle pathway. These standards are implemented through regulatory controls on truck manufacturers.

State

General Plan Guidelines

The California *General Plan Guidelines 2003* promotes the use of the L_{dn} or CNEL descriptors for evaluating land use and noise compatibility. Identification of a land use as "normally acceptable" implies that the highest noise level in that range is the maximum desirable for existing or conventional construction that does not incorporate any special acoustic treatment. The guidelines also provide an interpretation as to the suitability of various types of land uses with respect to the range of outdoor noise exposure. The objective of the guidelines is to provide the local community with a means of judging the noise environment it deems to be generally acceptable while recognizing the variability in perceptions of environmental noise that exist between communities and within a given community.

California Building Code

Title 25 of the California Code of Regulations codifies requirements for uniform minimum noise insulation performance standards for new hotels, motels, dormitories, apartment houses, and dwellings other than detached single-family dwellings. Specifically, Title 25 states that interior noise levels attributable to exterior sources shall not exceed 45 dBA CNEL in any habitable room of new multi-family dwellings. Dwellings are to be designed so that interior noise levels would meet this standard for at least ten years from the time of building permit application. Interior noise levels can be reduced using noise-insulating windows and by using sound-isolation materials when constructing walls and ceilings.

State Automobile Noise Standards

The State of California establishes noise limits for vehicles licensed to operate on public roads. State noise standards for on-road motor vehicles are contained in the Motor Vehicle Code. The pass-by standard for heavy trucks is consistent with the federal limit of 80 dB. The pass-by standard for light trucks and passenger cars (less than 4.5 tons, gross vehicle rating) is also 80 dB at 15 meters from the centerline. These standards are implemented through controls on vehicle manufacturers and by legal sanctions on vehicle operators by state and local law enforcement officials.

City of Oakland

General Plan

Land Use and Transportation Element

The following City of Oakland General Plan Land Use and Transportation Element policies are among those relevant to the noise impacts of the Specific Plan.

> *Policy W1.3: Reducing land use conflicts.* Land uses and impacts generated from Port or neighborhood activities should be buffered, protecting adjacent residential areas from the impacts of seaport, airport, or other industrial uses. Appropriate siting of industrial activities, buffering (e.g., landscaping, fencing, transitional uses, etc.), truck traffic management efforts, and other mitigations should be used to minimize the impact of incompatible uses.
>
> *Policy N3.9: Orienting Residential Development.* Residential developments should be encouraged to face the street and to orient their units to desirable sunlight and views , while avoiding unreasonably blocking sunlight and views for neighboring buildings, respecting the

privacy needs of residents of the development and surrounding properties, providing for sufficient conveniently located onsite open space, and avoiding undue noise exposure.

Policy N5.2: Buffering Residential Areas. Residential areas should be buffered and reinforced from conflicting uses through the establishment of performance-based regulations, the removal of nonconforming uses, and other tools.

Policy N11.4: Alleviating Public Nuisances. The City should strive to alleviate public nuisances and unsafe and illegal activities. Code Enforcement efforts should be given as high a priority as facilitating the development process. Public nuisance regulations should be designed to allow community members to use City codes to facilitate nuisance abatement in their neighborhood.

Noise Element

The Noise Element analyzes and quantifies, to the extent practicable, current and projected noise levels from major noise sources throughout the city. Noise levels for these sources are shown on noise contour maps, which establish the locational relationship between existing and projected land uses and noise sources. The Noise Element also includes land use policies to reduce noise impacts, especially to sensitive receptors, and to implement measures that address existing and foreseeable noise issues. The Noise Element formulates two goals, and associated policies and actions:

Goal 1: To protect Oakland's quality of life and the physical and mental well-being of residents and others in the City by reducing the community's exposure to noise.

Goal 2: To safeguard Oakland's economic welfare by mitigating noise incompatibilities among commercial, industrial and residential land uses.

Policy 1: Ensure the compatibility of existing and, especially, of proposed development projects not only with neighboring land uses but also with their surrounding noise environment.

Action 1.1:Use the noise-land use compatibility matrix in conjunction with the noise contour maps (especially for roadway traffic) to evaluate the acceptability of residential and other proposed land uses and also the need for any mitigation or abatement measures to achieve the desired degree of acceptability.

Action 1.2: Continue using the City's zoning regulations and permit processes to limit the hours of operation of noise-producing activities which create conflicts with residential uses and to attach noise-abatement requirements to such activities.

Policy 2: Protect the noise environment by controlling the generation of noise by both stationary and mobile noise sources.

Action 2.2: As resources permit, increase enforcement of noise-related complaints and also of vehicle speed limits and of operational noise from cars, trucks and motorcycles.

Policy 3: Reduce the community's exposure to noise by minimizing the noise levels that are *received* by Oakland residents and others in the City. (This policy addresses the *reception* of noise whereas Policy 2 addresses the *generation* of noise.)[10]

[10] City of Oakland, Noise Element City of Oakland General Plan, June 2005, pp. 23-25.

Action 3.1: Continue to use the building-permit application process to enforce the California Noise Insulation Standards regulating the maximum allowable interior noise level in new multi-unit buildings.

The Noise Element identifies noise and land use compatibility standards for various land uses, as shown in **Table 4.7-8**.[11] These land use compatibility standards were derived from the California Department of Health Services receiver-based noise-compatibility guidelines matrix. The matrix illustrates the degree of acceptability of exposing specified land uses to a range of ambient noise levels. The matrix is used by the City when considering a proposed project in order to gauge its compatibility with noise levels at the project site.

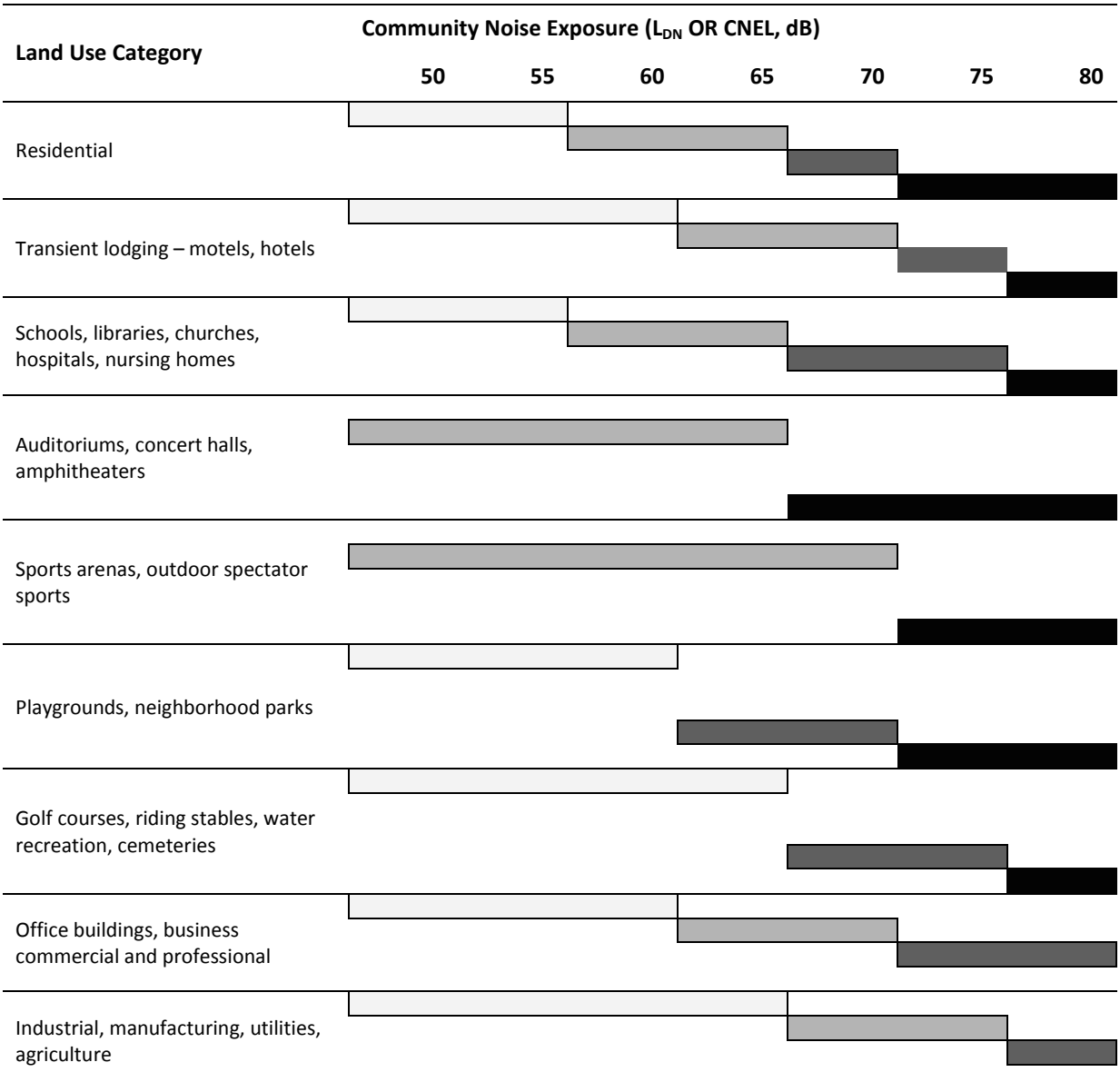
The following are the maximum interior noise levels generally considered acceptable for various common land uses:

- 45 dB: residential, hotels, motels, transient lodging, institutional (churches, hospitals, classrooms, libraries), movie theaters
- 50 dB: professional offices, research and development, auditoria, meeting halls
- 55 dB: retail, banks, restaurants, sports clubs
- 65 dB: manufacturing, warehousing

Taking residential uses as an example, the matrix indicates that an ambient noise level of 60 dB is the threshold of a "normally acceptable" environment for residences. This assumes a maximum interior noise level of 45 dB, plus an average noise mitigation of 15 dB for use of conventional contemporary construction methods and materials. "Conditionally acceptable" areas with higher ambient noise levels would require detailed noise analyses, sound-rated construction methods or materials, mechanical ventilation systems (so that windows may be kept closed), or noise shielding features such as sound walls, street setbacks, and thoughtful site planning and building orientation.

[11] City of Oakland, Noise Element City of Oakland General Plan, June 2005, p. 21.

Table 4.7-8
Land Use Compatibility Guidelines



NA	NORMALLY ACCEPTABLE: Development may occur without an analysis of potential noise impacts *to the proposed development* (though it might still be necessary to analyze noise impacts that the project might have *on its surroundings*).
CA	CONDITIONALLY ACCEPTABLE: Development should be undertaken only after an analysis of noise-reduction requirements is conducted and if necessary noise-mitigating features are included.
NU	NORMALLY UNACCEPTABLE: Development should generally be discouraged; it may be undertaken only if a detailed analysis of the noise-reduction requirements is conducted, and if highly effective noise mitigation features are included.
CU	CLEARLY UNACCEPTABLE: Development should not be undertaken.

Land Use and Transportation Element

Policy I/C4.2: Minimizing nuisances. The potential for new or existing industrial or commercial uses, including seaport and airport activities, to create nuisance impacts on surrounding residential land uses should be minimized through appropriate siting and efficient implementation and enforcement of environmental and development controls (p. 42).

Policy T1.5: Locating truck services. Truck services should be concentrated in areas adjacent to freeways and near the seaport and airport, while ensuring the attractiveness of the environment for visitors, local business, and nearby neighborhoods (p. 51).

Policy T1.6: Designating truck routes. An adequate system of roads connecting port terminals, warehouses, freeways and regional arterials, and other important truck destinations should be designated. This system should rely upon arterial streets away from residential neighborhoods (p. 51). **Figure 4.7-3** illustrates designated truck routes and truck prohibitions in West Oakland.

Policy T1.8: Re-routing and enforcing truck routes. The City should make efforts to re-route traffic away from neighborhoods, wherever possible, and enforce truck route controls (p. 51).

Policy T6.1: Posting maximum speeds. Collector streets shall be posted at the lowest possible speed (usually a maximum speed of 25 miles per hour), except where a lower speed is dictated by safety and allowable by law (p. 60).

Policy D12.3: Locating entertainment activities. Large scale entertainment uses should be encouraged to concentrate in the Jack London Waterfront and within the Broadway corridor area. However, existing large scale facilities in the Downtown should be utilized to the fullest extent possible (p. 73).

Policy D12.4: Locating smaller scale entertainment activities. Small scale entertainment uses, such as small clubs, should be allowed to locate in the Jack London Waterfront area and to be dispersed throughout downtown districts, provided that the City works with area residents and businesses to manage the impacts of such uses (p. 73).

Policy W1.3: Reducing land use conflicts. Land uses and impacts generated from Port or neighborhood activities should be buffered, protecting adjacent residential areas from the impacts of seaport, airport, or other industrial uses. Appropriate siting of industrial activities, buffering (e.g., landscaping, fencing, transitional uses, etc.), truck traffic management efforts, and other mitigations should be used to minimize the impact of incompatible uses (p. 78).

Policy W2.2: Buffering of heavy industrial uses. Appropriate buffering measures for heavy industrial uses and transportation uses on adjacent residential neighborhoods should be developed and implemented (p. 78).

Policy W7.1: Developing lands in the vicinity of the seaport/airport. Outside the seaport and airport, land should be developed with a variety of uses that benefit from the close proximity to the seaport and airport and that enhance the unique characteristics of the seaport and airport. These lands should be developed with uses which can buffer adjacent neighborhoods from impacts related to such activities (p. 88).

Policy N1.4: Locating large-scale commercial activities. Commercial uses which serve long term retail needs or regional consumers and which primarily offer high volume goods should be located in areas visible or amenable to high volumes of traffic. Traffic generated by large scale commercial developments should be directed to arterial streets and freeways and not adversely affect nearby residential streets (p. 104).

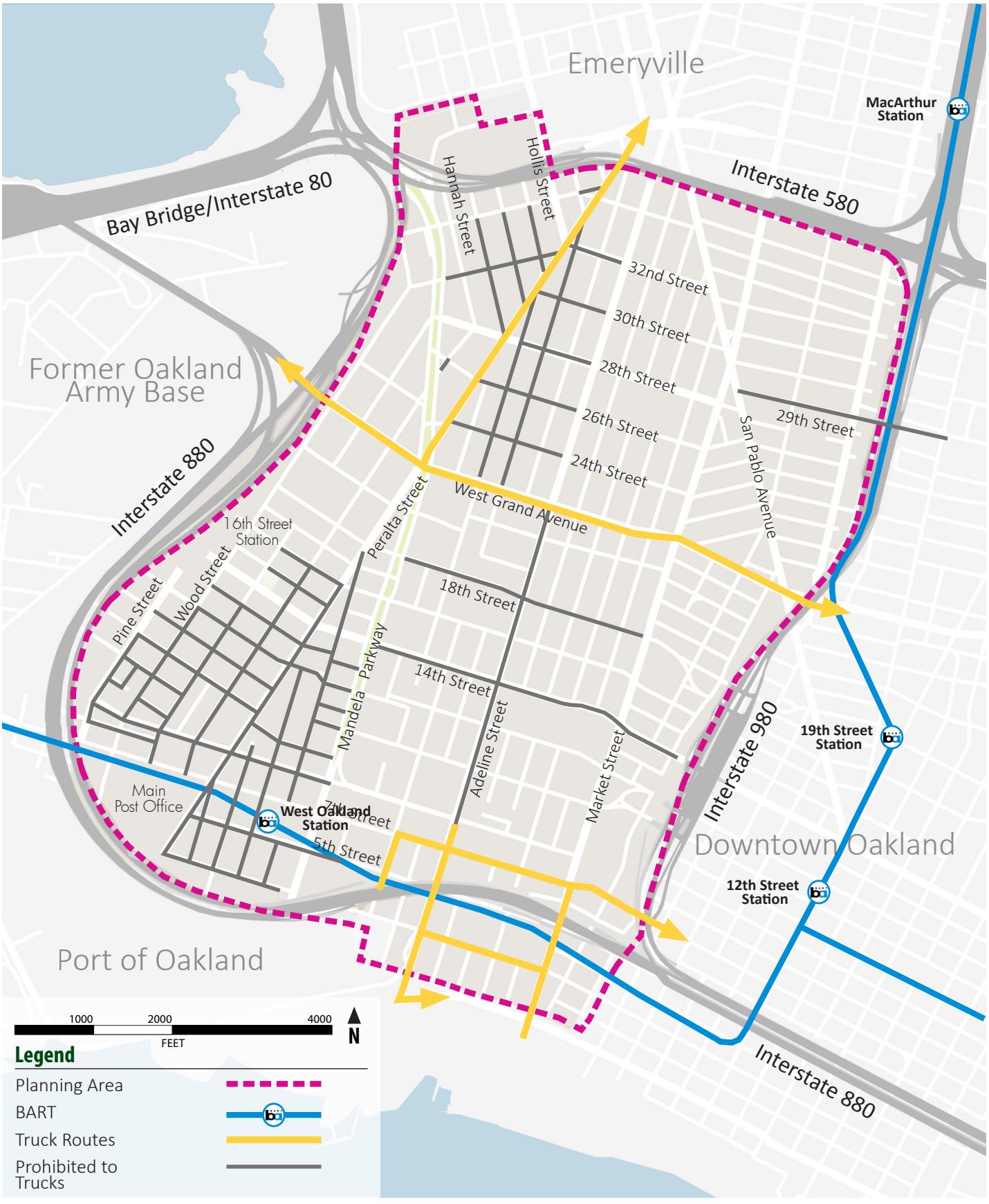


Figure 4.7-3
Truck Routes and Prohibitions

Source: Kittleson & Associates

Policy N1.6: Reviewing potential nuisance activities. The City should closely review any proposed new commercial activities that have the potential to create public nuisance or crime problems, and should monitor those that are existing. These may include isolated commercial or industrial establishments located within residential areas, alcoholic beverage sales activities (excluding restaurants), adult entertainment, or other entertainment activities (p. 104).

Policy N3.9: Orienting residential development. Residential developments should be encouraged to face the street and to orient their units to desirable sunlight and views, while avoiding unreasonably blocking sunlight and views for neighboring buildings, respecting the privacy needs of residents of the development and surrounding properties, providing for sufficient conveniently located on-site open space, and avoiding undue noise exposure (p. 107).

Policy N5.2: Buffering residential areas. Residential areas should be buffered and reinforced from conflicting uses through the establishment of performance-based regulations, the removal of non-conforming uses, and other tools (p. 109).

Policy N11.4: Alleviating Public Nuisances. The City should strive to alleviate public nuisances and unsafe and illegal activities. Code Enforcement efforts should be given as high a priority as facilitating the development process. Public nuisance regulations should be designed to allow community members to use City codes to facilitate nuisance abatement in their neighborhood (p. 114).

Open Space, Conservation and Recreation Element

Policy OS-3.6: Open Space Buffers along Freeways. Maintain existing open space buffers along Oakland's freeways to absorb noise and emissions (p. 2-29).

Action OS-3.6.1: Landscape Screening Along Freeways. Require retention of existing landscape screening as a condition of development approval for any property adjacent to Highway 13, Highway 580 (east of Grand), or Highway 24 (above Broadway). Encourage Caltrans to include landscape screening for any sound wall project in these areas (p. 2-30).

Action Os-3.6.3: Freeway Buffers. Encourage Caltrans to plant and maintain additional landscaping along Oakland's freeways, particularly those stretches of Interstate 880 adjacent to residential neighborhoods and other sensitive receptors (p. 2- 30).

Oakland Noise Ordinance

The City of Oakland regulates noise levels through enforcement of its Noise Ordinance (Chapters 8.18 and 17.120 of the Oakland Municipal Code). Section 8.18.020 states the following:

"The persistent maintenance or emission of any noise or sound produced by human, animal or mechanical means, between the hours of 9:00 p.m. and 7:00 a.m., which shall disturb the peace or comfort or be injurious to the health of any person, shall constitute a nuisance. Failure to comply with the following provisions shall constitute a nuisance.

a. All construction equipment powered by internal combustion engines shall be properly muffled and maintained.

b. Unnecessary idling of internal combustion engines is prohibited.

c. All stationery noise-generating construction equipment such as tree grinders and air compressors are to be located as far as is practical from existing residences.

d. Quiet construction equipment, particularly air compressors, is to be selected whenever possible.

e. Use of pile drivers and jack hammers shall be prohibited on Sundays and holidays, except for emergencies and as approved in advance by the Building Official."

Section 17.120.050 of the Oakland Planning Code regulates operational noise from stationary sources. **Table 4.7-9**presents the maximum allowable receiving noise standards applicable to long-term exposure for residential and civic land uses, for noise from stationary noise sources (not transportation noise). During construction, noise from a stationary source would be limited by the standards in **Table 4.7-10.**

Table 4.7-9
City of Oakland Operational Noise Standards at Receiving Property Line (dBA)[1]

Receiving Land Use	Cumulative No. of Minutes in a 1-Hr Period[2]	Maximum Allowable Noise Level (dBA) Daytime 7 a.m.-10 p.m.	Maximum Allowable Noise Level (dBA) Nighttime 10 p.m.-7 a.m.
Residential and Civic[3]	20 (L_{33})	60	45
	10 ($L_{16.7}$)	65	50
	5 ($L_{8.3}$)	70	55
	1 ($L_{1.7}$)	75	60
	0 (L_{max})	80	65
			Anytime
Commercial	20 (L_{33})		65
	10 ($L_{16.7}$)		70
	5 ($L_{8.3}$)		75
	1 ($L_{1.7}$)		80
	0 (L_{max})		85
Manufacturing, Mining, and Quarrying	20 (L_{33})		70
	10 ($L_{16.7}$)		75
	5 ($L_{8.3}$)		80
	1 ($L_{1.7}$)		85
	0 (L_{max})		90

Source: OMC Section 17.120.050.

Notes:

1 These standards are reduced 5 dBA for simple tone noise, noise consisting primarily of speech or music, or recurring impact noise. If the ambient noise level exceeds these standards, the standard shall be adjusted to equal the ambient noise level.

2 Lx represents the noise level that is exceeded X percent of a given period. L max is the maximum instantaneous noise level.

3 Legal residences, schools and childcare facilities, health care or nursing home, public open space, or similarly sensitive land uses.

Table 4.7-10
City of Oakland Construction Noise Standards at Receiving Property Line (dBA[1]

	Maximum Allowable Noise Level (dBA)	
	Weekdays	**Weekends**
Receiving Land Use	**7 a.m.-7 p.m.**	**9 a.m.-8 p.m.**
	Less than 10 days	
Residential	80	65
Commercial, Industrial	85	70
	More than 10 Days	
Residential	65	55
Commercial, Industrial	70	60

Source: OMC Section 17.120.050.

Notes:

1 If the ambient noise level exceeds these standards, the standard shall be adjusted to equal the ambient noise level.

Section 17.120.060 of the Oakland Planning Code regulates vibration, "All activities, except those located within the IG or the M-40 zone, or in the IG or M-30 zone more than four hundred (400) feet from any residential zone boundary, shall be so operated as not to create a vibration which is perceptible without instruments by the average person at or beyond any lot line of the lot containing such activities. Ground vibration caused by motor vehicles, trains, and temporary construction or demolition work is exempted from this standard."

Standard Conditions of Approval

The City's Standard Conditions of Approval relevant to noise impacts are listed below. These Standard Conditions of Approval would be adopted as mandatory requirements of each individual future project within the Planning Area when it is approved by the City and would avoid or reduce significant noise impacts. The Standard Conditions and Approval are incorporated and required as part of development in accordance with the Specific Plan, so they are not listed as mitigation measures. Where there are impacts associated with development in accordance with the Specific Plan that would result in significant environmental impacts despite implementation of the Standard Conditions of Approval, additional mitigation measures are recommended.

> **SCA 28: Days/Hours of Construction Operation** (*Ongoing throughout demolition, grading, and/or construction*). The project applicant shall require construction contractors to limit standard construction activities as follows:
>
> a. Construction activities are limited to between 7:00 AM and 7:00 PM Monday through Friday, except that pile driving and/or other extreme noise generating activities greater than 90 dBA shall be limited to between 8:00 a.m. and 4:00 p.m. Monday through Friday.
>
> b. Any construction activity proposed to occur outside of the standard hours of 7:00 am to 7:00 pm Monday through Friday for special activities (such as concrete pouring which may require more continuous amounts of time) shall be evaluated on a case by case basis, with criteria including the proximity of residential uses and a consideration of resident's preferences for whether the activity is

acceptable if the overall duration of construction is shortened and such construction activities shall only be allowed with the prior written authorization of the Building Services Division.

c. Construction activity shall not occur on Saturdays, with the following possible exceptions:

    i. Prior to the building being enclosed, requests for Saturday construction for special activities (such as concrete pouring which may require more continuous amounts of time), shall be evaluated on a case by case basis, with criteria including the proximity of residential uses and a consideration of resident's preferences for whether the activity is acceptable if the overall duration of construction is shortened. Such construction activities shall only be allowed on Saturdays with the prior written authorization of the Building Services Division.

    ii. After the building is enclosed, requests for Saturday construction activities shall only be allowed on Saturdays with the prior written authorization of the Building Services Division, and only then within the interior of the building with the doors and windows closed.

d. No extreme noise generating activities (greater than 90 dBA) shall be allowed on Saturdays, with no exceptions.

e. No construction activity shall take place on Sundays or Federal holidays.

f. Construction activities include but are not limited to: truck idling, moving equipment (including trucks, elevators, etc.) or materials, deliveries, and construction meetings held on-site in a non-enclosed area.

g. Applicant shall use temporary power poles instead of generators where feasible.

SCA 29: Noise Control (*Ongoing throughout demolition, grading, and/or construction*). To reduce noise impacts due to construction, the project applicant shall require construction contractors to implement a site-specific noise reduction program, subject to the Planning and Zoning Division and the Building Services Division review and approval, which includes the following measures:

a. Equipment and trucks used for project construction shall utilize the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures and acoustically-attenuating shields or shrouds, wherever feasible).

b. Impact tools (e.g., jack hammers, pavement breakers, and rock drills) used for project construction shall be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. However, where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used; this muffler can lower noise levels from the exhaust by up to about 10 dBA. External jackets on the tools themselves shall be used where feasible, and this could achieve a reduction of 5 dBA. Quieter procedures shall be used, such as drills rather than impact equipment, whenever feasible.

c. Stationary noise sources shall be located as far from adjacent receptors as possible, and they shall be muffled and enclosed within temporary sheds, incorporate insulation barriers, or other measures to the extent feasible.

d. If feasible, the noisiest phases of construction shall be limited to less than 10 days at a time.

SCA 30: Noise Complaint Procedures (*Ongoing throughout demolition, grading, and/or construction*). Prior to the issuance of each building permit, along with the submission of construction documents, the project applicant shall submit to the Building Services Division a list of measures to respond to and track complaints pertaining to construction noise. These measures shall include:

a. A procedure and phone numbers for notifying the Building Services Division staff and Oakland Police Department; (during regular construction hours and off-hours);

b. A sign posted on-site pertaining with permitted construction days and hours and complaint procedures and who to notify in the event of a problem. The sign shall also include a listing of both the City and construction contractor's telephone numbers (during regular construction hours and off-hours);

c. The designation of an on-site construction complaint and enforcement manager for the project;

d. Notification of neighbors and occupants within 300 feet of the project construction area at least 30 days in advance of extreme noise generating activities about the estimated duration of the activity; and

e. A preconstruction meeting shall be held with the job inspectors and the general contractor/on-site project manager to confirm that noise measures and practices (including construction hours, neighborhood notification, posted signs, etc.) are completed.

SCA 31: Interior Noise (*Prior to issuance of a building permit* and Certificate of Occupancy). If necessary to comply with the interior noise requirements of the City of Oakland's General Plan Noise Element and achieve an acceptable interior noise level, noise reduction in the form of sound-rated assemblies (i.e., windows, exterior doors, and walls), and/or other appropriate features/measures, shall be incorporated into project building design, based upon recommendations of a qualified acoustical engineer and submitted to the Building Services Division for review and approval prior to issuance of building permit. Final recommendations for sound-rated assemblies, and/or other appropriate features/measures, will depend on the specific building designs and layout of buildings on the site and shall be determined during the design phases. Written confirmation by the acoustical consultant, HVAC or HERS specialist, shall be submitted for City review and approval, prior to Certificate of Occupancy (or equivalent) that:

a. Quality control was exercised during construction to ensure all air-gaps and penetrations of the building shell are controlled and sealed; and

b. Demonstrates compliance with interior noise standards based upon performance testing of a sample unit.

c. Inclusion of a Statement of Disclosure Notice in the CC&R's on the lease or title to all new tenants or owners of the units acknowledging the noise generating activity and the single event noise occurrences. Potential features/measures to reduce interior noise could include, but are not limited to, the following:

    i. Installation of an alternative form of ventilation in all units identified in the acoustical analysis as not being able to meet the interior noise requirements due to adjacency to a noise generating activity, filtration of ambient make-up air in each unit and analysis of ventilation noise if ventilation is included in the recommendations by the acoustical analysis**.**

    ii. Prohibition of Z-duct construction.

SCA 32: Operational Noise – General *(Ongoing).* Noise levels from the activity, property, or any mechanical equipment on site shall comply with the performance standards of Section 17.120 of the Oakland Planning Code and Section 8.18 of the Oakland Municipal Code. If noise levels exceed these standards, the activity causing the noise shall be abated until appropriate noise reduction measures have been installed and compliance verified by the Planning and Zoning Division and Building Services.

SCA 38: Vibration. A qualified acoustical consultant shall be retained by the project applicant during the design phase of the project to comment on structural design as it relates to reducing groundborne vibration at the project site. If required in order to reduce groundborne vibration to acceptable levels, the project applicant shall incorporate special building methods to reduce groundborne vibration being transmitted into project structures. The City shall review and approve the recommendations of the acoustical consultant and the plans implementing such recommendations. Applicant shall implement the approved plans. Potential methods include the following:

a. Isolation of foundation and footings using resilient elements such as rubber bearing pads or springs, such as a "spring isolation" system that consists of resilient spring supports that can support the podium or residential foundations. The specific system shall be selected so that it can properly support the structural loads, and provide adequate filtering of ground-borne vibration to the residences above.

b. Trenching, which involves excavating soil between the railway/freeway and the project so that the vibration path is interrupted, thereby reducing the vibration levels before they enter the project's structures. Since the reduction in vibration level is based on a ratio between trench depth and vibration wavelength, additional measurements shall be conducted to determine the vibration wavelengths affecting the project. Based on the resulting measurement findings, an adequate trench depth and, if required, suitable fill shall be identified (such as foamed styrene packing pellets (i.e., Styrofoam) or low-density polyethylene).

SCA 39: Pile Driving and Other Extreme Noise Generators (*Ongoing throughout demolition, grading, and/or construction*). To further reduce potential pier drilling, pile driving and/or other extreme noise generating construction impacts greater than 90dBA, a set of site-specific noise attenuation measures shall be completed under the supervision of a qualified acoustical consultant. Prior to commencing construction, a plan for such measures shall be submitted for review and approval by the Planning and Zoning Division and the Building Services Division to ensure that maximum feasible noise attenuation will be achieved. This plan shall be based on the final design of the project. A third-party peer review, paid for by the project applicant, may be required to assist the City in evaluating the feasibility and effectiveness of the noise reduction plan submitted by the project applicant. A special inspection deposit is required to ensure compliance with the noise reduction plan. The amount of the deposit shall be determined by the Building Official, and the deposit shall be submitted by the project applicant concurrent with submittal of the noise reduction plan. The noise reduction plan shall include, but not be limited to, an evaluation of the following measures. These attenuation measures shall include as many of the following control strategies as feasible:

a. Erect temporary plywood noise barriers around the construction site, particularly along on sites adjacent to residential buildings;

b. Implement "quiet" pile driving technology (such as pre-drilling of piles, the use of more than one pile driver to shorten the total pile driving duration), where feasible, in consideration of geotechnical and structural requirements and conditions;

c. Utilize noise control blankets on the building structure as the building is erected to reduce noise emission from the site;

d. Evaluate the feasibility of noise control at the receivers by temporarily improving the noise reduction capability of adjacent buildings by the use of sound blankets for example; and

e. Monitor the effectiveness of noise attenuation measures by taking noise measurements.

SCA 57: Vibrations Adjacent to Historic Structures (*Prior to issuance of a demolition, grading or building permit*). The project applicant shall retain a structural engineer or other appropriate professional to determine threshold levels of vibration and cracking that could damage nearby historic structures, and design means and methods of construction that shall be utilized to not exceed the thresholds. The engineer's analysis shall be submitted to the City of Oakland for review and approval. The applicant shall implement the approved plan.

Impacts, Standard Conditions of Approval and Mitigation Measures

Significance Criteria

According to the City's Thresholds of Significance, the Specific Plan would have a significant impact related to noise if it would:

1. Generate noise in violation of the City of Oakland Noise Ordinance (Oakland Planning Code section 17.120.050) regarding construction noise, except if an acoustical analysis is performed that identifies recommend measures to reduce potential impacts: During the hours of 7 p.m. to 7 a.m. on weekdays and 8 p.m. to 9 a.m. on weekends and federal holidays, noise levels received by any land use from construction or demolition shall not exceed the applicable nighttime operational noise level standard (see Table 4.7-7);
2. Generate noise in violation of the City of Oakland nuisance standards (Oakland Municipal Code section 8.18.020) regarding persistent construction-related noise;
3. Generate noise in violation of the City of Oakland Noise Ordinance (Oakland Planning Code section 17.120.050) regarding operational noise: (See Table 4.7-9);
4. Generate noise resulting in a 5 dBA permanent increase in ambient noise levels in the project vicinity above levels existing without the project; or, if under a cumulative scenario where the cumulative increase results in a 5 dBA permanent increase in ambient noise levels in the project vicinity without the project (i.e., the cumulative condition including the project compared to the existing conditions) and a 3 dBA permanent increase is attributable to the project (i.e., the cumulative condition including the project compared to the cumulative baseline condition without the project) [NOTE: Outside of a laboratory, a 3 dBA change is considered a just-perceivable difference. Therefore, 3 dBA is used to determine if the project-related noise increases are cumulative considerable.];
5. Expose persons to interior L_{dn} or CNEL greater than 45 dBA for multi-family dwellings, hotels, motels, dormitories and long-term care facilities (and may be extended by local legislative action to include single-family dwellings) per California Noise Insulation Standards (CCR Part 2, Title 24);
6. Expose the project to community noise in conflict with the land use compatibility guidelines of the Oakland General Plan after incorporation of all applicable Standard Conditions of Approval[12]: (See Table 4.7-8);

[12] The evaluation of land use compatibility should consider the following factors: type of noise source; the sensitivity of the noise receptor; the noise reduction likely to be provided by structures; the degree to which the noise source may interfere with speech, sleep or other activities characteristic of the land use; seasonal variations in noise source levels; existing outdoor ambient levels; general societal attitudes towards the noise source; prior history of the noise source; and tonal characteristics of the noise source. To the extent that any of these factors can be evaluated, the measured or computed noise exposure values may be adjusted in order to more accurately assess local sentiments towards acceptable noise exposure.

7. Expose persons to or generate noise levels in excess of applicable standards established by a regulatory agency (e.g., occupational noise standards of the Occupational Safety and Health Administration [OSHA]);
8. During either project construction or project operation expose persons to or generate groundborne vibration that exceeds the criteria established by the Federal Transit Administration (FTA): (See Table 4.7-7);
9. Be located within an airport land use plan and would expose people residing or working in the project area to excessive noise levels; or
10. Be located within the vicinity of a private airstrip, and would expose people residing or working in the project area to excessive noise levels.

Construction Noise

Impact Noise-1: Construction activities related to the Specific Plan, including pile drilling and other extreme noise generating construction activities would temporarily increase noise levels in the vicinity of individual project sites. With implementation of City of Oakland Standard Conditions of Approval, construction noise would not violate the City of Oakland Noise Ordinance or the City of Oakland nuisance standards regarding persistent construction-related noise, and construction noise impacts would be less than significant. (**LTS with SCA)**

Construction activities related to the Specific Plan would temporarily increase noise levels in the vicinity of individual project sites for the duration of construction. There would be variations in construction noise levels on a day-to-day basis depending on the actual activities occurring at the site. Noise levels and potential annoyance also depends upon the number and condition of the equipment, the type of operation, its duration and the time of day, the distance between noise source and receptor, and the presence or absence of barriers between the noise source and receptor. Significant noise impacts do not normally result when standard construction noise control measures are enforced and when the duration of the noise generating construction period (when community noise levels would be elevated) is limited to one construction season, typically one year or less. **Table 4.7-11** presents the typical range of hourly average noise levels generated by different phases of construction measured at a distance of 50 feet.

Table 4.7-11
Typical Noise Level Range at 50 Feet from Construction Sites
(dBA L_{eq})

	Domestic Housing		Office Building, Hotel, Hospital, School, Public Works		Industrial, Parking Garage, Religious Amusement & Recreations, Store, Service Station		Public Works Roads & Highways, Sewers, and Trenches	
	I	II	I	II	I	II	I	II
Ground Clearing	83	83	84	84	84	83	84	84
Excavation	88	75	89	79	89	71	88	78
Foundations	81	81	78	78	77	77	88	88
Erection	81	65	87	75	84	72	79	78
Finishing	88	72	89	75	89	74	84	84

Source: U.S. EPA, Legal Compilation on Noise, Vol. 1, 1973, p. 2-104.

I - All pertinent equipment present at site.

II - Minimum required equipment present at site.

Table 4.7-12 presents typical construction equipment maximum noise levels. The dominant construction equipment noise source is usually a diesel engine without sufficient muffling. Stationary equipment generates noise from one general area and includes items such as pumps, generators, compressors, etc. These types of equipment operate at a constant noise level under normal operation and are classified as non-impact equipment. Stationary equipment such as pile drivers, jackhammers, and pavement breakers, etc., produces variable and sporadic noise levels and often produces impact-type noises. Impact equipment is equipment that generates impulsive noise, where impulsive noise is defined as noise of short duration (generally less than one second), high intensity, abrupt onset, rapid decay, and often rapidly changing spectral composition. For impact equipment, the noise is produced by the impact of a mass on a surface, typically repeating over time. Mobile equipment such as dozers, scrapers, graders, etc., may operate with power applied in a cyclic fashion in which a period of full power is followed by a period of reduced power. Other equipment such as compressors, although generally considered to be stationary when operating, can be readily relocated to another location for the next operation.

Table 4.7-12
Typical Construction Equipment Maximum Noise Levels, Lmax

Type of Equipment	Range of Maximum Sound Levels (dBA at 50 feet)	Suggested Maximum Sound Levels for Analysis (dBA at 50 Feet)
Rock Drills	83-99	96
Jackhammers	75-85	82
Pneumatic Tools	78-88	85
Pumps	68-80	77
Scrapers	83-91	87
Haul Trucks	83-94	88
Electric Saws	66-72	70
Portable Generators	71-87	80
Rollers	75-82	80
Dozers	85-90	88
Tractors	77-82	80
Front-End Loaders	86-90	88
Hydraulic Backhoe	81-90	86
Hydraulic Excavators	81-90	86
Graders	79-89	85
Air Compressors	76-89	85
Trucks	81-87	85

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

Noise from construction activity would diminish rapidly with distance from the construction site, generally at a rate of 6 dBA per doubling of distance. For example, a noise level of 86 dBA measured at 50 feet from the noise source would decrease to 80 dBA at 100 feet, and 74 dBA at 200 feet. Depending on the relative distance to noise-sensitive land uses, construction activities associated with construction activity could generate noise levels above the city's Noise Ordinance standard of 65 dBA for residential land uses and Section 8.18 Excessive Noise, Nuisances, of the Municipal Code.

Standard Conditions of Approval

Implementation of SCA 28, *Days/Hours of Construction Operation*, SCA 29, *Noise Control,* SCA 30, *Noise Complaint Procedures,* and SCA 39, *Pile Driving and Other Extreme Noise Generators,* would reduce construction noise levels. SCA 28 provides reasonable regulation of the hours of construction. SCA 29 requires preparation of a Noise Reduction Program to address the design, use, location and shielding of construction vehicles and equipment. SCA 30 requires measures to respond to and track complaints. SCA 39 requires further measures to reduce noise from construction activities, if any, that generates "extreme noise" exceeding 90 dBA. These SCAs are comprehensive in their content and for practical purposes represent all feasible measures available to mitigate construction noise. With implementation of the City of Oakland's Standard Conditions of Approval, construction noise impacts would be less than significant.

Mitigation Measures

None needed

Operational Noise

Impact Noise-2: Ongoing operational noise generated by stationary sources could generate noise in violation of the City of Oakland Noise Ordinance regarding operational noise. However, with required implementation of the City's Standard Conditions of Approval, operational noise impacts would be less than significant. (**LTS with SCA**)

Ongoing operational noise generated by stationary sources, such as every-day industrial and commercial operations, and roof-top mechanical ventilation equipment, could generate noise in violation of the City of Oakland Noise Ordinance (Oakland Planning Code Section 17.120.050) regarding operational noise. Stationary noise sources may include roof-top mechanical equipment typically includes heating, ventilating, air conditioning, and refrigeration equipment. Noise from large roof-mounted equipment typically generates noise levels from 60 to 75 dBA at 50 feet. Assuming the noise levels attenuate at 6 dBA per doubling of distance between the noise source and receptors (the rule of thumb for stationary noise sources), maximum sound levels of about 69 dBA could be experienced at a distance of up to 100 feet.

Standard Conditions of Approval

The City's Standard Condition of Approval SCA 32, *Operational Noise – General (Ongoing),* requires that noise levels from any activity, property, or any mechanical equipment on site comply with the performance standards of Section 17.120 of the Oakland Planning Code and Section 8.18 of the Oakland Municipal Code. Under these Code provisions, the maximum allowable receiving noise recognizes varying degrees of sensitivity associated with different land uses. In other words, the SCA and Section 17.120 set forth different (more stringent) maximum allowable noise levels for residential and civic uses (including parks/open space areas) than for commercial or industrial uses deemed to have lower noise sensitivity. If noise levels exceed the proscribed standards, the SCA stipulates that the activity causing the noise shall be abated until appropriate noise reduction measures have been installed, and compliance verified by the Planning and Zoning Division and Building Services. With required implementation of the City's Standard Condition of Approval SCA 32, operational noise impacts would be less than significant.

Mitigation Measures

None required.

Traffic Noise

Impact Noise-3: New development pursuant to the Specific Plan would not generate traffic noise resulting in a 5 dBA permanent increase in ambient noise levels in the project vicinity above levels existing without the Plan.(**LTS**)

Increasing volumes of traffic that will result from new growth and development within the West Oakland Specific Plan's Opportunity Areas will result in higher traffic noise along streets within West Oakland. This increased traffic noise will mix with noise from all other existing ambient noise sources (i.e., trains, BART operation, existing freeway noise, etc.).

Based on the City of Oakland's CEQA Thresholds, a project would generate a significant impact if it resulted in a 5 dBA permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

Trips associated with development under the Specific Plan would be distributed over the local street network and would affect roadside noise levels. Noise level increases related to increased traffic volumes can be estimated using the logarithmic relationship between changes in the number of noise sources (in this case vehicle sources) and increases in ambient noise volumes.[13]

Traffic Peak hour (evening) intersection turning data from the traffic study were utilized to estimate resulting traffic-generated noise increases on roadway links most affected by Project-related traffic. Noise levels at other times would be lower. The segments analyzed and the results of the traffic (and corresponding noise) increases are shown in **Table 4.7-13** below.

[13] Utilizing the following formula: dBA increase = 10 * log (base 10) of (future volume / existing volume)

Table 4.7-13: Projected Traffic / Noise Increase, Selected Roadway Segments (PM Peak Hour)

Segment	Existing Traffic Volumes (vehicles)	Existing plus Project Traffic Volumes (vehicles)	Estimated Increase in Noise Volumes (dBA)
Mandela Parkway, north of Grand	1,070	2065	2.86
Mandela Parkway, north of 7th Street	623	755	0.83
Adeline, north of Grand	623	648	0.17
Adeline, north of 14th Street	563	690	0.88
Adeline, north of 7th Street	329	461	1.47
Market, north of Grand	414	774	2.72
Market, north of 14th Street	675	1,172	2.40
Market, north of 7th Street	488	962	2.95
Grand, west of Mandela	1,202	2,372	2.95
Grand, west of Adeline	1,242	2,585	3.18
Grand, west of Market	1,308	2,651	3.07
Grand, west of San Pablo	1,255	2,023	2.07
14th, west of Adeline	542	551	0.07
14th Street, east of Adeline	670	672	0.01
7th Street, west of Mandela	645	1,602	3.95
7th Street, west of Adeline	994	1,956	2.94
7th Street, west of Market	1,593	2,598	2.12
7th Street, east of Market	1,177	1,576	1.27
San Pablo Avenue, south of 40th	2,090	2,514	0.80
San Pablo, north of Grand	1,136	1,289	0.55

Source: Kittleson Associates and Lamphier-Gregory

As can be seen in the table above, the greatest increases in traffic and associated traffic noise would occur along the Mandela Parkway, Grand Avenue and 7th Street corridors, where the greatest amount of new development is projected to occur under the Specific Plan. Traffic-related noise volume increases are estimated between 0.01 dBA and 3.95 dBA over existing conditions.

Traffic noise increases over existing levels due to the Project are estimated to remain below Oakland's threshold of 5 dBA and would therefore be less than significant.

Mitigation Measures

None required

Construction Vibration

Impact Noise-4: Construction activities could generate excessive ground-borne vibration during the construction period. With required implementation of the City's Standard Conditions of Approval, construction vibration impacts would be less than significant. (**LTS**)

Ground-borne vibration levels rarely affect human health. Instead, most people consider ground-borne vibration to be an annoyance that may affect concentration or disturb sleep. As shown in Table 4.7-5 in Regulatory Setting above, the human response to vibration levels of 85 VdB are typically acceptable if vibration occurs infrequently. Construction activities can result in varying degrees of ground vibration, depending on the equipment and methods employed. Operation of construction equipment causes ground vibrations that spread through the ground and diminish in strength with distance. Ground vibrations from construction activities (other than pile driving) rarely reach the levels that can damage structures, but they can be perceptible in buildings very close to a construction site.

Ground-borne vibration related to human annoyance is generally related to velocity levels expressed in vibration decibels (VdB). Depending on the construction equipment used, ground-borne vibrations can be perceptible within 100 feet of a source. The vibration velocity levels for the typical construction equipment are shown below in **Table 4.7-14**. Construction vibration has the potential to cause structural damage.

The damage thresholds, in terms of peak particle velocity (PPV) indicate that for buildings not extremely sensitive to vibration, a damage threshold of between 0.2 in/sec to 0.5 in/sec would apply depending on the type of building. As shown in Table 4.7-12, vibration levels from construction, including pile driving, would diminish quickly with distance and would be below 0.2 in/sec at a distance of 100 feet. Therefore, most buildings in the project vicinity would be exposed to vibration below the damage criteria. Structural damage from pile driving typically does not occur in buildings more than 50 feet from the location of the activity. However, these vibrations could result in cosmetic or structural damage within 50 feet of a project site and construction area.

Table 4.7-14: Vibration Source Levels for Construction Equipment

	At 25 feet		At 100 feet	
Construction Equipment	**Approximate VdB**	**Peak Particle Velocity (in/sec)**	**Approximate VdB**	**Peak Particle Velocity (in/sec)**
Large Bulldozer	87	0.089	69	0.011
Truck	86	0.076	68	0.010
Jackhammer	79	0.035	61	0.004
Small Bulldozer	58	0.003	40	<0.001
Caisson Drilling	87	0.089	69	0.011
Pile Driver (impact, upper range)	112	1.518	94	0.190
Pile Driver (sonic, upper range)	105	0.734	87	0.092

Source: *Transit Noise and Vibration Impact Assessment,* Chapter 12 Noise and Vibration During Construction, May 2006; PBS&J, 2008.

Standard Conditions of Approval

All projects in accordance with the Specific Plan would be required to incorporate the City's Standard Conditions of Approval SCA 38, *Vibration*, and SCA 57, *Vibrations Adjacent to Historic Structures*, to address the potential effects of ground-borne vibration. SCA 38 requires a qualified acoustical consultant be retained by the project applicant during the design phase of the project to comment on structural design as it relates to reducing ground-borne vibration at the project site. SCA 57 requires that a project applicant retain a structural engineer or other appropriate professional to determine threshold levels of vibration and cracking that could affect portions of adjacent structures and design means and methods of construction that shall be utilized to avoid potential impacts.

Implementation of the City of Oakland's Standard Conditions of Approval related to construction period noise would also address construction period vibration. Implementation of SCA 28, *Days/Hours of Construction Operation*, SCA 29, *Noise Control,* SCA 30, *Noise Complaint Procedures,* and SCA 39, *Pile Driving and Other Extreme Noise Generators,* would reduce construction noise levels. SCA 28 provides reasonable regulation of the hours of construction. SCA 29 requires preparation of a Noise Reduction Program for the Project that addresses the design, use, location and shielding of construction vehicles and equipment. SCA 30 requires measures to respond to and track complaints. SCA 39 requires further measures to reduce noise from construction activities, if any, generating extreme noise exceeding 90 dBA.

With implementation of the City of Oakland's Standard Conditions of Approval construction vibration impacts would be less than significant.

Mitigation Measures

None required.

Operational Vibration

Impact Noise-5: Development in accordance with the Specific Plan may generate operational ground-borne vibration at levels that would be perceptible beyond the property boundary, which would violate City of Oakland standards for operational vibration. However, compliance with City of

Oakland Standard Conditions of Approval and Section 17.120.060 of the Oakland Planning Code would ensure that operational vibration impacts remain less than significant. (**LTS with SCA**)

SCA 32 Section 17.120.060 of the Oakland Planning Code regulates vibration, requiring that activities shall be so operated as not to create a vibration which is perceptible without instruments by the average person at or beyond any lot line of the lot containing such activities. Ground vibration caused by motor vehicles and temporary construction or demolition work is exempted from this standard. Operational groundborne vibration would be generated by additional vehicular travel on local roadways. The FTA has stated that rubber-tired vehicles do not typically generate perceptible groundborne vibration. Compliance with Section 17.120.060 of the Oakland Planning Code would ensure that operational vibration impacts remain less than significant.

Mitigation Measures

None required.

Cumulative Noise Impacts

Cumulative Impact Noise-6: Traffic-related noise under anticipated future conditions including development under the Specific Plan would increase as area traffic volumes increase. Where future traffic-related noise levels are anticipated to substantially increase (by 5 dBA or more), the contribution from development under the Specific Plan would not be cumulatively considerable (less than 3 dBA to increases over other cumulative traffic noise levels). **(LTS)**

The geographic context for cumulative impacts from localized construction and stationary source noise includes areas immediately surrounding the development sites. For cumulative vehicular noise impacts, the cumulative context is based on the cumulative context for the traffic analysis, which includes past, present and reasonably foreseeable future developments in Oakland and all surrounding cities' General Plans, as well as growth outside of Alameda County as forecast by the Association of Bay Area Governments (ABAG).

Increasing volumes of traffic from both development under the Specific Plan and other cumulative area growth will result in higher traffic noise along streets within West Oakland. Based on the City of Oakland's CEQA Thresholds, a project contribution to cumulative increases would be considered to generate a significant impact if the total future noise level would increase by 5 dBA or more and the project contributes 3dBA or more over levels assumed with other cumulative growth.

Noise level increases related to increases in traffic volume were estimated using the same method as for project-specific traffic-related nose impacts with cumulative Pm Peak Hour traffic volume inputs from the traffic study. Noise levels at other times would be lower. The segments analyzed and the results of the cumulative traffic (and corresponding noise) increases are shown in **Table 4.7-15** below.

Table 4.7-15: Projected Traffic /Noise Increase, Selected Roadway Segments (PM Peak Hour)

	Traffic Volumes (vehicles)				Increase in Noise Volumes (dBA)	
			Cumulative			
Segment	Existing	Project	without Project	plus Project	Cumulative over Existing	Project Portion of Cumulative
Mandela Parkway, north of 7th Street	623	132	1224	1356	3.38	0.44
Adeline, north of Grand	623	25	859	884	1.52	0.12
Adeline, north of 14th Street	563	127	1044	1171	3.18	0.50
Adeline, north of 7th Street	329	132	648	780	3.75	0.81
Market, north of Grand	414	360	352	712	2.35	3.06
Market, north of 14th Street	675	497	787	1284	2.79	2.13
Market, north of 7th Street	488	474	458	932	*	3.09
Grand, west of Mandela	1,202	1170	2303	3473	4.61	1.78
Grand, west of Adeline	1,242	1343	2577	3920	4.99	1.82
Grand, west of Market	1,308	1343	2170	3513	4.29	2.09
Grand, west of San Pablo	1,255	768	2300	3068	3.88	1.25
14th, west of Adeline	542	9	649	658	0.84	0.06
14th Street, east of Adeline	670	2	758	760	0.55	0.01
7th Street, west of Mandela	645	957	703	1660	4.11	3.73
7th Street, west of Adeline	994	962	2506	3468	5.43	1.41
7th Street, west of Market	1,593	1005	2601	3606	3.55	1.42
7th Street, east of Market	1,177	399	2423	2822	3.80	0.66
San Pablo Avenue, south of 40th	2,090	424	3265	3689	2.47	0.53
San Pablo, north of Grand	1,136	153	2078	2231	2.93	0.31

Source: Kittleson Associates and Lamphier-Gregory

Note that, per City of Oakland CEQA thresholds, the project portion of cumulative increases was calculated as the increase from cumulative without project levels to cumulative plus project levels.

* Due to changing traffic patterns, the cumulative traffic volumes are predicted to be slightly lower at this intersection in the future, without development under the Specific Plan. All traffic and traffic-related noise increases at this intersection are attributable to development under the Specific Plan.

As can be seen in the table above, the greatest increases in traffic and associated traffic noise would occur along the Mandela Parkway, Grand Avenue and 7th Street corridors, where the greatest amount of new development is projected to occur under the Specific Plan. Traffic-related noise volume increases are estimated between 0.55 dBA and 5.43 dBA over existing conditions. Only one street section would increase by 5dBA or more under cumulative conditions with Plan development, 7th Street, west of Adeline, so that is the only location with a significant cumulative impact. However, development under the Specific Plan would only contribute an estimated 1.41 dBA to that cumulative increase, which, being

less than 3dBA, and so the Plan's contribution is not considered cumulatively considerable according to Oakland's thresholds.

Mitigation Measures

None required

Airport Noise

Noise-8: The Planning Area is located more than two miles outside of the Oakland International Airport 65 dBA Ldn/CNEL noise contour, which the Federal Aviation Administration regards as a significance threshold for noise-sensitive land uses. Therefore, the impacts of the Specific Plan related to airport noise would be less than significant.

Mitigation Measures

None required pursuant to CEQA

Noise Exposure / Land Use Compatibility

Noise-9: The occupants of new residential and other noise-sensitive development facilitated by the Specific Plan could be exposed to community noise in conflict with the Land Use Compatibility Guidelines of the Oakland General Plan, and to interior noise exceeding California Noise Insulation Standards. However, with required implementation of the City's Standard Conditions of Approval, land use compatibility and noise exposure impacts would be reduced to level that are considered acceptable for interior residential areas. (**LTS**)

CEQA requires the analysis of potential adverse effects of a project on the environment. Potential effects of the environment on a project are legally not required to be analyzed or mitigated under CEQA. However, this EIR nevertheless analyzes the following potential effects of the environment on the project (i.e., ambient noise conditions that could potentially affect new development pursuant to the Specific Plan). This analysis has been prepared to provide information to the public and decision-makers that is relevant to the Project, but is not considered a CEQA threshold impact. City Standard Conditions of Approval and/or project-specific non-CEQA recommendations are also identified to address this issue.

New residential and other noise-sensitive land uses within the Planning Area would be exposed to various existing and anticipated future noise sources, including freeway traffic, BART and railroad operations, and traffic on local arterial roadways. Where projected future exterior noise levels exceed 60 dBA CNEL, interior noise levels may exceed the California Building Code standard of 45 dBA CNEL. Future noise levels throughout much of the West Oakland would exceed 60 dBA CNEL.

7th Street Opportunity Area

Primary noise sources in the 7th Street Opportunity Area include traffic noise on I-880, activity along the BART tracks and at the West Oakland BART station, and vehicular traffic on local roadways. Noise from retail, commercial and business establishments is secondary.

The West Oakland BART Station TOD is proposed to be located immediately adjacent to the West Oakland BART Station and the I-880 freeway. As a transit village, the primary concern for noise exposure is proximity of new residents to noise from the BART train line and station. Associated noise from living

next to the BART station potentially includes noise associated with train braking, acceleration, and wheel-track noise, as well as noise associated with train announcements and horns, and associated vehicular traffic for commuter drop-offs, parking and public transport stops (buses, shuttles, etc.). On a typical weekday, as many as 285 northbound and 285 southbound BART trains arrive and depart from this station to other stations in the BART system. A typical BART train produces an instantaneous 85 dBA noise level at a distance of 100 feet from the tracks (Illingworth & Rodkin, 2004). Noise levels are generally lower in the immediate vicinity of the West Oakland Station due to the slower speeds of approaching and departing trains, but still exceed the 65 dBA Land Use Compatibility standard. The site is also adjacent to the I-880 freeway, which has main travel lanes on an elevated structure that is immediately adjacent to the proposed TOD.

Noise levels from BART and the I-880 freeway exceed 70 dBA Leq/CNEL in the vicinity of the BART station and elevated sections of the BART tracks, which would be considered "normally unacceptable" for residential uses, and "conditionally acceptable" for business commercial uses at the TOD site. New residences within the TOD would be subject to Title 24 of the California Code of Regulations, which requires an interior noise standard of 45 dBA DNL in any habitable room, and requires an acoustical analysis demonstrating how dwelling units have been designed to meet this interior standard. To meet the interior standard of DNL 45 dBA, a noise level reduction of up nearly 35 dBA would be required from the exterior façades of the buildings facing towards the I-880 freeway and BART tracks and station.

The West Oakland BART TOD would also place noise-sensitive publicly-accessible outdoor uses in a noise environment characterized as "clearly unacceptable" for such uses, as established by the Noise Element of the Oakland General Plan. Oakland's consideration of General Plan land use compatibility criteria (noise impacts of the environment on the proposed project occupants) considers outdoor noise exposure. While the TOD project (which is not fully designed) is expected to provide a mix of private and common usable open space areas for future residents and tenants, it would also likely include usable open space areas that would be accessible to the public. Given the high ambient noise level at the West Oakland BART TOD site, noise levels at grade-level open space areas could be expected to exceed the maximum allowable receiving noise standards for open space areas, established as up to 70 dBA. To meet this level, outdoor noise level reductions would be required. Noise reduction by as much as 15 dBA could occur with the proposed site design, if buildings are effectively designed to act as noise barriers and break the line of sight (primarily from I-880 and the BART tracks) between the noise sources and publicly-accessible open space.

West Oakland Specific Plan Recommendations and Other Strategies

The West Oakland Specific Plan includes strategies specifically seeking to reduce noise from BART trains. These strategies include:

- Developing an agreement with BART for regularly scheduled rail grinding in the West Oakland area. The agreement should include a monitoring and reporting mechanism similar to actions taken by BART in other parts of its service area.
- Implement a noise baffle structure and/or a completely enclosed noise mitigation "tube" on the BART overhead structure along 7th Street, as shown in the Seventh Street Concept and Urban Design Plan (2004).

Both the rail grinding and the noise baffle/enclosed tube strategies would substantially reduce BART-related noise in the area. However, there is no currently identified source of funding for these strategies and they are not part of any currently proposed implementation project. Accounting for these noise attenuation strategies in the CEQA document would not be consistent with CEQA Guidelines, even

though their implementation could potentially result in significant reductions in BART-related noise exposure at both the West Oakland BART TOD, as well as within the surrounding community.

Additionally, BART has recently awarded a contract to Bombardier Transit Corporation to design and construct new train cars. BART and Bombardier engineers have begun a multi-year collaboration to work out the details of the future vehicle design, but BART indicates that it will be requiring the car builder to meet the highest standards in the United States regarding train car noise and noise absorption.

Standard Conditions of Approval

New residential development throughout the West Oakland Opportunity Areas would be required to comply with the city's SCA 31: Interior Noise and SCA 38: Vibration. These standard conditions of approval require the inclusion of design measures to reduce interior noise to acceptable levels within the buildings. With required implementation of the City's Standard Conditions of Approval, land use compatibility impacts would be **less than significant**. Furthermore, implementation of the City's General Plan policies related to land use compatibility, and codes that specify noise standards for commercial and industrial operations would ensure that the noise environment within the Specific Plan's proposed new residential areas, both indoors and outdoors, does not increase in a manner that worsens existing land use compatibility and exposes noise-sensitive land uses to "unacceptable" noise levels.

Mitigation Measures

None required.