Appendix 8.6
Noise Report

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ENVIRONMENTAL NOISE STUDY FOR:

Route 238 Bypass Land Use Study

Hayward, CA

RGDL Project #: 08-068-1

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A. Existing Setting

1. Environmental Noise Fundamentals

Noise can be defined as unwanted sound and is commonly measured with an instrument called a sound level meter. The sound level meter "captures" sound with a microphone and converts it into a number called a sound level. Sound levels are expressed in units of decibels (dB).

To correlate the microphone signal to a level that corresponds to the way humans perceive noise, the A-weighting filter is used. A-weighting de-emphasizes low-frequency and very high-frequency sound in a manner similar to human hearing. The use of A-weighting is required by most local agencies as well as other federal and state noise regulations (e.g. Caltrans, EPA, OSHA and HUD). The abbreviation dBA is often used when the A-weighted sound level is reported.

Because of the time-varying nature of environmental sound, there are many descriptors that are used to quantify the sound level. Although one individual descriptor alone does not fully describe a particular noise environment, taken together, they can more accurately represent the noise environment. There are four descriptors that are commonly used in environmental studies; the L_{max}, L_{eq}, L_{90} and DNL (or CNEL).

The maximum instantaneous noise level (L_{max}) is often used to identify the loudness of a single event such as a car pass-by or airplane flyover. To express the average noise level, the L_{eq} (equivalent noise level) is used. The L_{eq} can be measured over any length of time but is typically reported for periods of 15 minutes to 1 hour. The background noise level (or residual noise level) is the sound level during the quietest moments. It is usually generated by steady sources such as distant freeway traffic. It can be quantified with a descriptor called the L_{90} which is the sound level exceeded 90 percent of the time.

To quantify the noise level over a 24-hour period, the Day/Night Average Sound Level (L_{dn}/DNL) or Community Noise Equivalent Level (CNEL) is used. These descriptors are averages like the L_{eq} except they include a 10 dBA penalty for noises that occur during nighttime hours (and a 5 dBA penalty during evening hours in the CNEL) to account for peoples increased sensitivity during these hours.

In environmental noise, a change in the noise level of 3 dBA is considered a just noticeable difference. A 5 dBA change is clearly noticeable, but not dramatic. A 10 dBA change is perceived as a halving or doubling in loudness.

2. Regulatory Setting

a. State of California

i. California Environmental Quality Act (CEQA)

The California Environmental Quality Act (CEQA) requires the analysis of potential noise impacts from certain projects. The noise impacts are to be assessed with respect to applicable standards and significant noise increases.

ii. California Building Code (Title 24, Part 2)

The California Building Code requires that new multi-family housing exposed to noise levels in excess of an L_{dn} of 60 dBA have an acoustical study prepared to show how indoor levels will achieve an L_{dn} of 45 dBA. A ventilation or air-conditioning system will be required to provide a habitable indoor environment if windows must be closed to meet the indoor noise requirement.

b. City of Hayward

i. Noise Element

The Noise Element of the City of Hayward General Plan contains guidelines to promote land uses that are compatible with the local noise environment. Table 1 summarizes land use compatibility ratings for various land uses within the City of Hayward.

The Noise Element also contains maximum acceptable exterior noise levels for residential land uses. For single family housing, the maximum acceptable exterior noise level is L_{dn} 55 dBA. For multi-family development, the maximum acceptable exterior noise level is L_{dn} 60 dBA. This standard applies to any "useable open space" including backyards, decks, balconies, etc. The maximum interior noise level for new housing is L_{dn} 45 dBA.

If aircraft or railroad cars generate an exterior noise level in excess of L_{dn} 60 dBA, then the interior L_{max} for residential development should not exceed 55 dBA during the daytime and should not exceed 50 dBA in bedrooms at night.

Table 2 contains noise and land use compatibility guidelines for the generation of industrial and commercial noise. The guidelines are defined by the ambient noise level at the adjacent properties. After determining the duration of the noise produced by the commercial or

industrial land use, the appropriate adjustment from Table 2 is added to the ambient at the adjacent property. The resulting sum is the maximum allowable noise level that can be generated by the industrial or commercial activity at that property line. Residential development will not be allowed where noise generated by commercial or industrial land use exceeds the levels set forth in Table 2.

For commercial, industrial or office land uses, interior noise levels should not exceed an hourly L_{eq} of 52 dBA.

If a residential area is currently below the standards of Table 1, development generating noise up to the standard should not necessarily be allowed. The impact of the proposed project should be evaluated for adverse community response based upon the possibility of a significant increase in existing noise levels, in which case mitigation measures should be evaluated. A significant increase is defined as an increase of 3 dBA or greater.

Noise generating land uses should not be located near noise sensitive land uses such as schools, hospitals, libraries, churches and convalescent homes.

Table 1: Land Use Compatibility Standards for Community Noise Environments

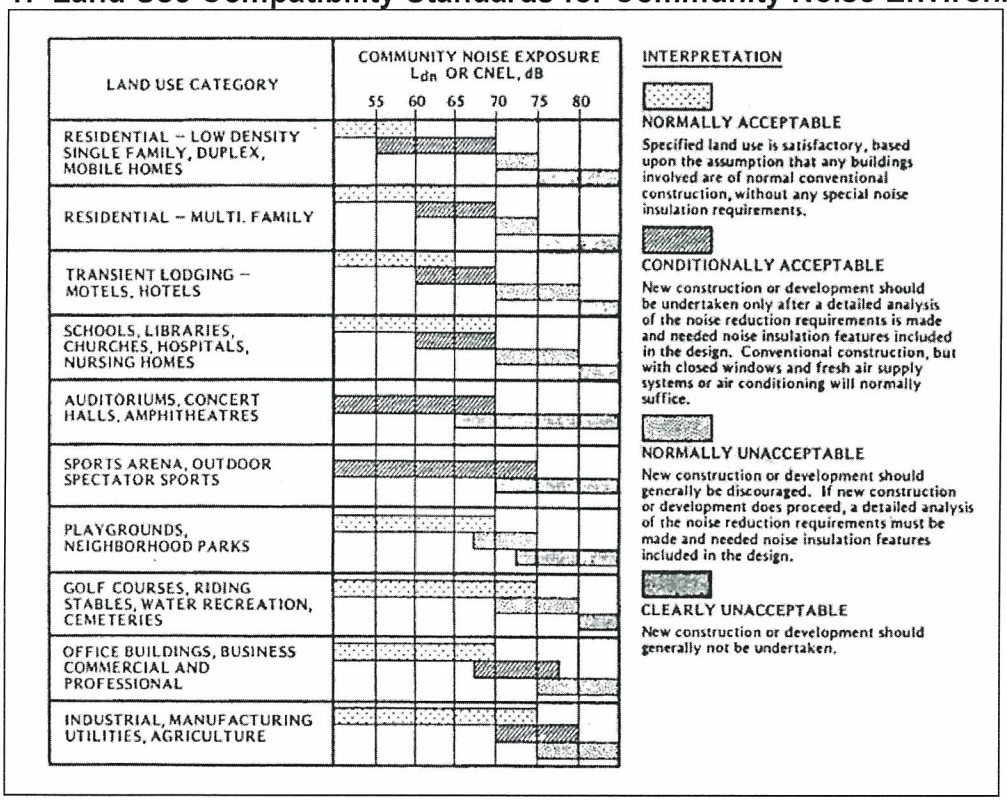


Table 2: Noise and Land Use Compatibility Standards for Industrial and Commercial Noise

Adjustments to Ambient Noise Levels for Periodic Noise Events		
Maximum Cumulative Duration of Noise Event in Any One-Hour Period	**Residential Exterior Noise Level Standards dB(A)**	
	Daytime (7 AM-10PM)	**Nighttime (10PM-7AM)**
30 Minutes+	+5	0
15 Minutes+	+10	+5
5 Minutes+	+15	+10
1 Minute+	+20	+15
0-1 Minute	+25	+20

The City of Hayward also enforces the interior noise requirements of the State for multi-family residential development.

ii. Noise Ordinance

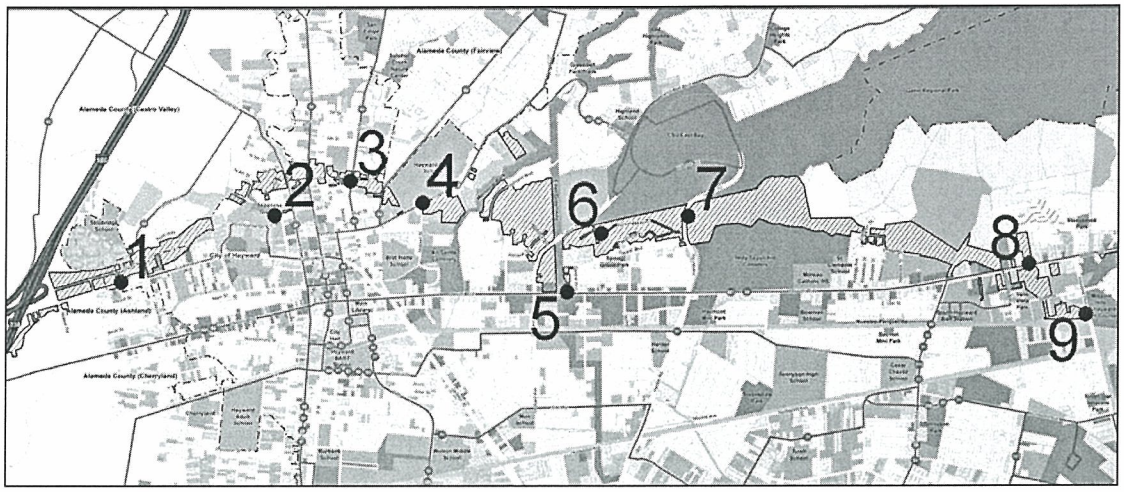
The Municipal Code for the City of Hayward contains restrictions on construction noise at residential properties. The Noise Ordinance states that construction noise levels should not exceed a "level 6 dB above the local ambient level at any point outside the property plane before the hour of 7:00 AM or after the hour of 7:00 PM daily except on Sundays and holidays. On Sundays and holidays, the restrictions of this subsection shall apply before 10:00 AM and after 6:00 PM."

3. Existing Noise Environment

The project site consists of a series of parcels that stretch between Interstate 580 to the north and Industrial Parkway to the south. Most of the parcels are east of Mission and Foothill Boulevards. The existing noise environment varies across the study area. The primary noise source in the project area is vehicular traffic on roadways but other sources include BART and occasional aircraft flyovers.

To quantify the existing noise environment, five long-term, 24 hour noise measurements and nine, short-term, 15–minute measurements were made throughout the study area. Figure 1 provides an overview of the measurement locations. Figures 2a through 2f show the measurement locations on enlarged maps that follow a discussion of each measurement.

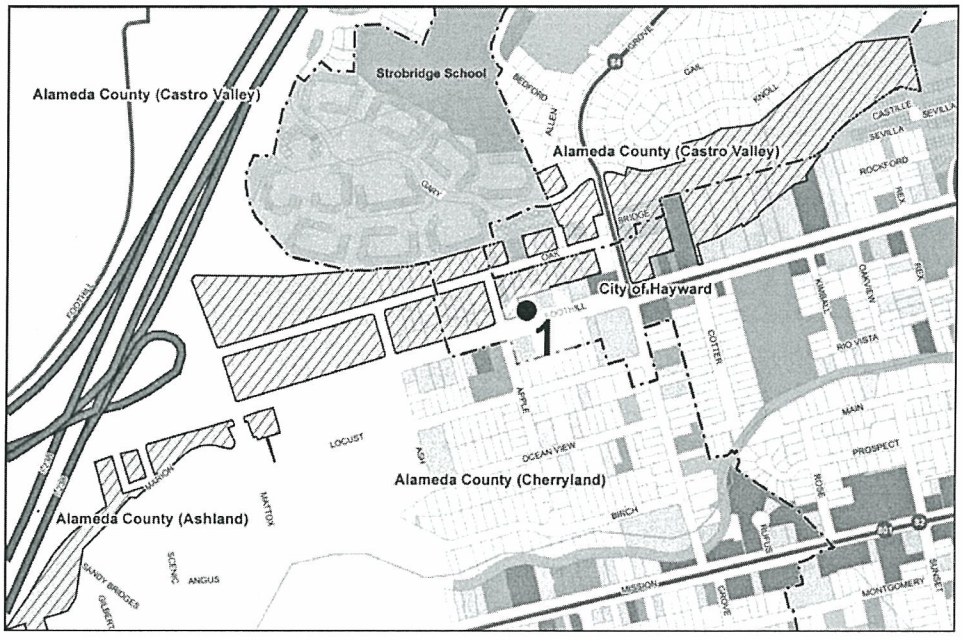
Figure 1: Overview of Noise Measurement Locations



The following discusses each of the measurement locations in greater detail:

Long-term and Short-term Measurement Location 1: The long-term measurement was made along the north side of Foothill Boulevard, between Apple Avenue and Grove Way. The dominant noise source was traffic on Foothill Boulevard, especially traffic utilizing the on-ramp to Interstate 580. The short-term measurement was adjacent to the long-term measurement, 20 feet from the centerline of the near lane of Foothill Boulevard.

Figure 2a: Noise Measurement Location 1



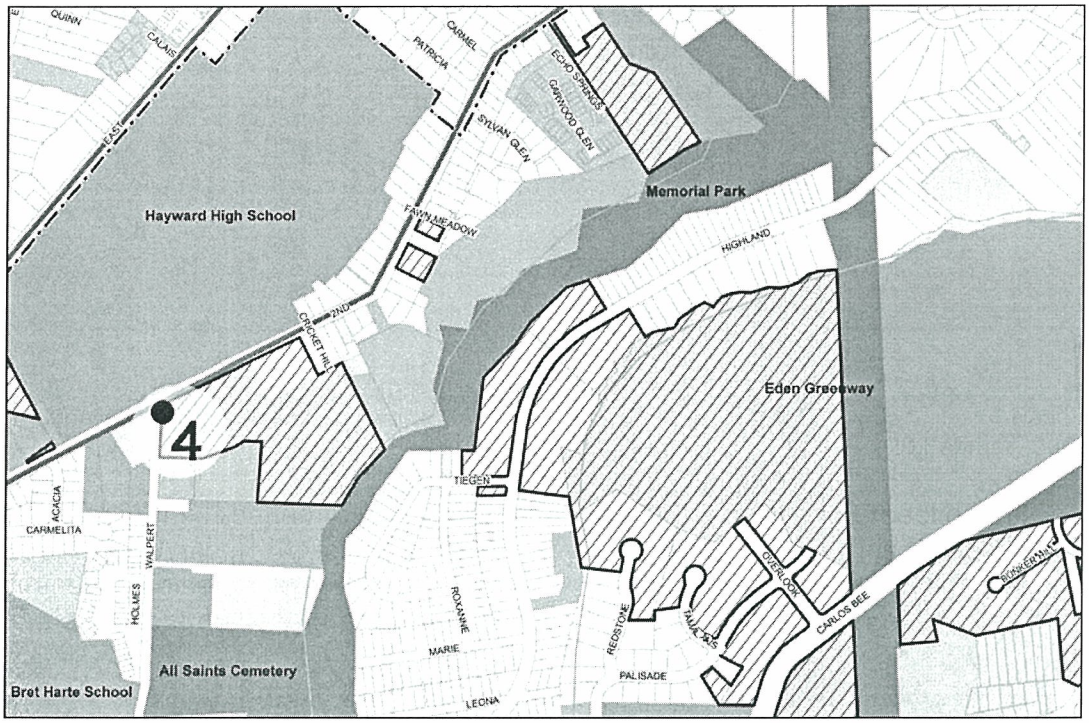
Measurement Location 2: The measurement was made inside the Japanese Tea Gardens, near the intersection of Crescent Avenue and 3rd Street. This location represents a quieter area of the City. The dominant noise sources at this location were distant traffic, airplanes, birds and wind noise.

Measurement Location 3: The measurement was located on a utility pole at the intersection of Clay Street and D Street. This location quantifies a typical noise environment in the downtown area of Hayward. The dominant noise source was traffic along D Street. Short-term Measurement 3 was located further south on Clay Street and 50 feet from the centerline of the near lane of D Street.

Figure 2b: Measurement Locations 2 and 3

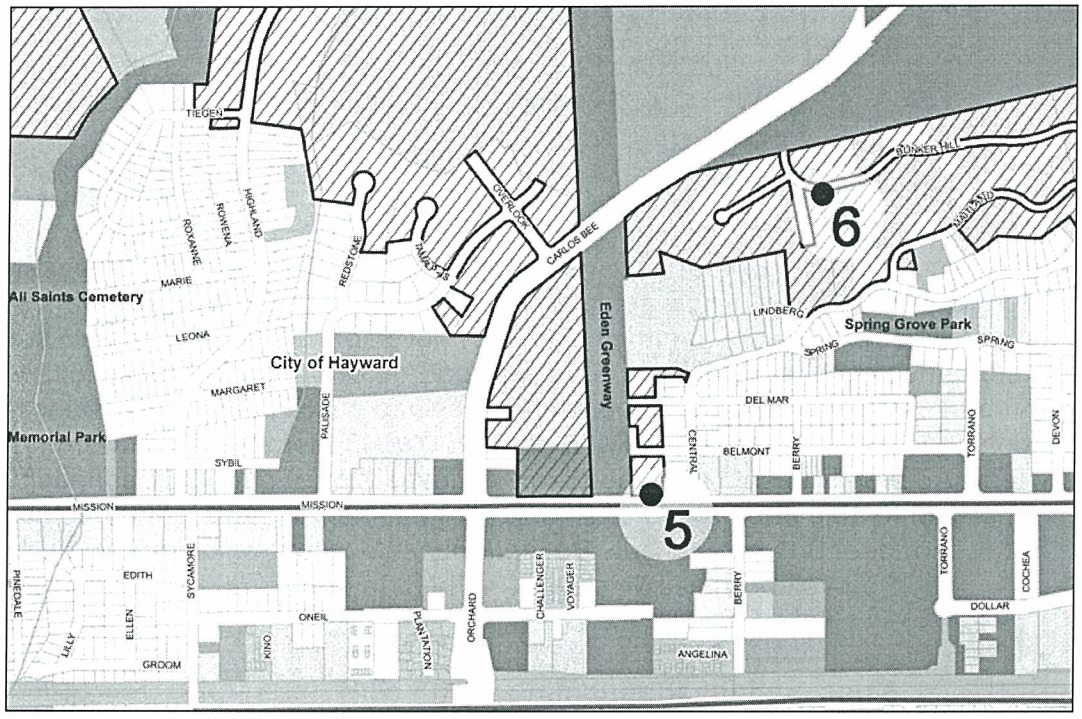
Measurement Location 4: Measurement was located at the intersection of 2nd Street and Walpert Street, adjacent to Hayward High School. This location quantifies noise generated by traffic on 2nd Street and by Hayward High School. The dominant noise source at this location was traffic on 2nd Street.

Figure 2c: Noise Measurement Location 4



Measurement Location 5: The measurement was made on a utility pole 12 feet east of the centerline of the near lane of Mission Boulevard, between Carlos Bee Boulevard and Central Boulevard. The dominant noise source at this location was traffic on Mission Boulevard. An automobile service center that generated intermittent loud noises was located across Mission Boulevard from Long-term Measurement 5. Two Short-term Measurements were conducted adjacent to the Long-term Measurement: Short-term Measurement 5A was located 50 feet from centerline of the near lane of the north side of Mission Boulevard and Short-term Measurement 5B was located 100 feet from centerline of the near lane of the north side of Mission Boulevard.

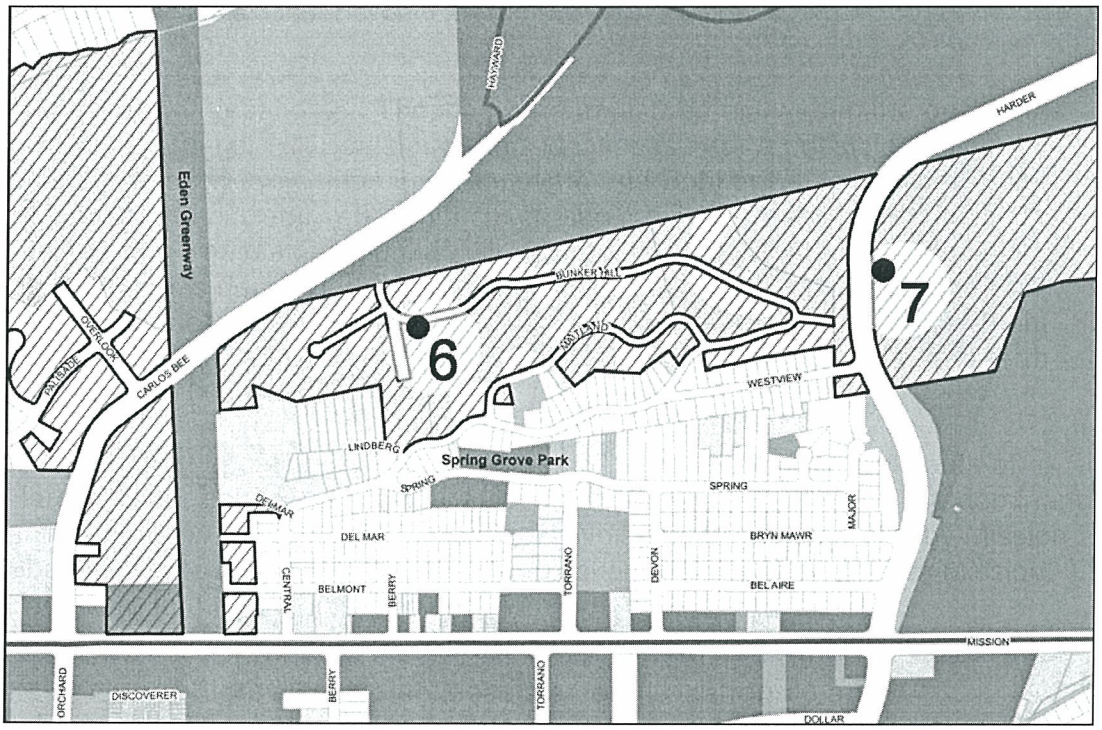
Figure 2d: Noise Measurement Locations 5 and 6



Measurement Location 6: The long-term measurement was made on a utility pole along Bunker Hill Boulevard. This location is near a possible vehicular connection between Carlos Bee Boulevard and Bunker Hill Boulevard. Bunker Hill Boulevard currently ends in a cul-de-sac near the measurement location. The existing traffic along Bunker Hill Boulevard is very light and the local noise environment is dominated by noise from traffic on Mission Boulevard to the west since there is a clear view of Mission Boulevard from the measurement location. Short-term Measurement 6 was located directly beneath Long-term Measurement 6.

Measurement Location 7: The measurement was located 50 feet south of Harder Road, between Mission Boulevard and West Loop Road. The dominant noise source was traffic on Harder Road. Noise from traffic on nearby Mission Boulevard was reduced by terrain that blocked the line-of-sight from Mission Boulevard to the measurement location.

Figure 2e: Noise Measurement Locations 6 and 7

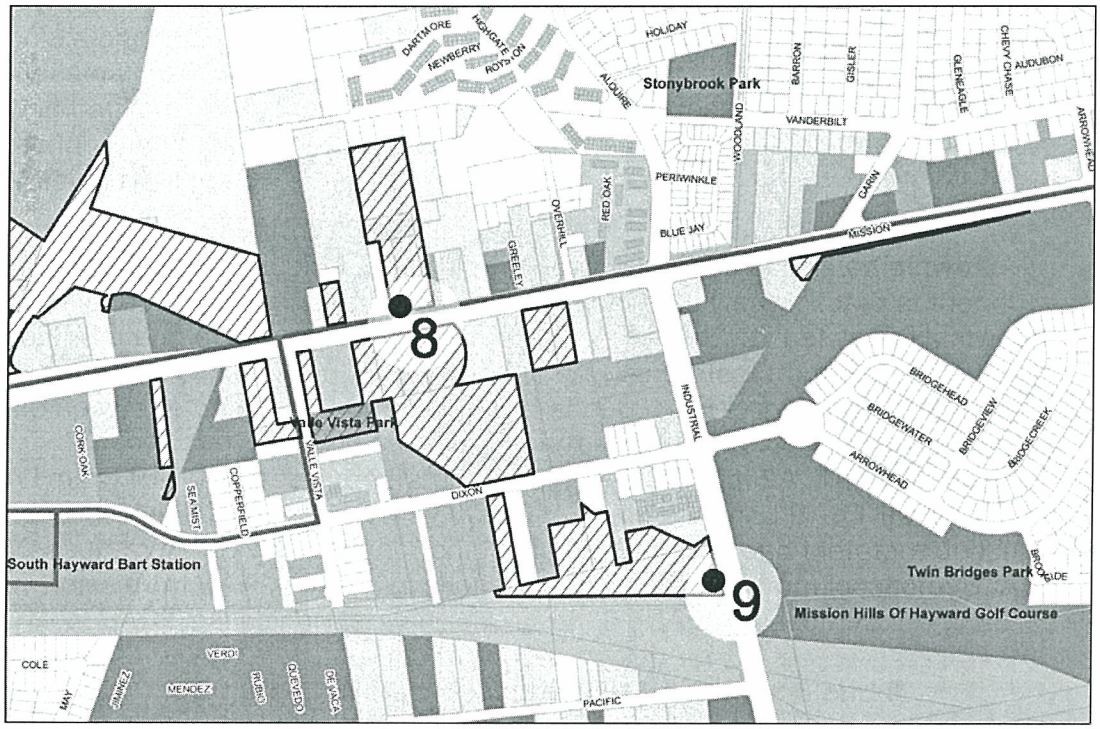


Measurement Location 8: The long-term measurement was made on a utility pole along the east side of Mission Boulevard between Valle Vista Avenue and Industrial Parkway. The dominant noise source at the measurement location was traffic on Mission Boulevard. The short-term measurement was adjacent to the long-term measurement, 50 feet from the centerline of the near lane of Mission Boulevard.

Measurement Location 9: Short-term Measurement 9 consisted of two simultaneous measurements. Both measurements were located at the southern end of the project site along Industrial Parkway between Huntwood Avenue and Dixon Road. Measurement 9A was 50 feet from the centerline of the near lane of Industrial Parkway and about 310 feet from the BART Tracks.

A typical BART passby generated an L_{max} of 71 dBA at 9A. There was some acoustical shielding provided by the edge of the elevated BART track structure. Measurement 9B was distant from Industrial Parkway and therefore dominated by noise from BART, which was located 210 feet away from location 9B. A typical BART passby generated an L_{max} of 79 dBA at location 9B.

Figure 2f: Noise Measurement Locations 8 and 9



Short-term measurements were correlated with the simultaneous measurement at the nearby long-term measurement locations to determine the L_{dn} at the short-term measurement locations. Table 3 shows the results of the short-term measurements. Figures 3a through 3e show the hourly plot of the measured noise levels at the long-term monitoring locations.

Table 3: Short-term Measurement Results

Location		Time	A-weighted Sound Level, dBA				
			L_{eq}	L_8	L_{25}	L_{50}	L_{dn}*
1	20' to centerline of near lane of Foothill Blvd between Apple Ave and Grove Wy	5:45 P.M. - 6:00 P.M. (9/16/08)	75	75	73	71	74
2	Center of Japanese Tea Gardens, near intersection of Crescent Ave and 3rd St	3:00 P.M. - 3:15 P.M. (9/17/08)	50	53	48	46	54
3	50' to centerline of the near lane of D Street at the intersection Clay St and D St	3:30 P.M. - 3:45 P.M. (9/17/08)	63	66	63	61	65
4	25 feet to centerline of the near lane of 2nd St, near Intersection 2nd St and Walpert St and Hayward High School	4:00 P.M. - 4:15 P.M. (9/16/08)	65	70	65	61	67
5A	50 ft to centerline of the near lane of Mission Blvd between Carlos Bee Blvd and Central Blvd	1:00 P.M. - 1:15 P.M. (9/16/08)	66	69	68	66	70
5B	100 ft to centerline of the near lane of Mission Blvd between Carlos Bee Blvd and Central Blvd	1:15 P.M. - 1:30 P.M. (9/16/08)	61	64	62	60	64
6	On Bunker Hill Blvd near cul-de-sac	1:45 P.M. - 2:00 P.M. (9/16/08)	55	57	55	54	56
7	50 ft to centerline of near lane of Harder Rd between Mission Blvd and West Loop Rd	2:15 P.M. - 2:30 P.M. (9/16/08)	59	65	58	52	63
8	50' to centerline of near lane of Mission Blvd between Valle Vista Ave and Industrial Pkwy	2:45 P.M. - 3:00 P.M. (9/16/08)	71	74	73	70	72
9A	50 ft to centerline of near lane of Industrial Pkwy, between Huntwood Ave and Dixon Rd	11:42 A.M. - 12:00 P.M. (9/16/08)	64	68	65	61	68
9B	Adjacent to BART Tracks near southern end of project site	11:45 A.M. - 12:13 P.M. (9/16/08)	62	58	48	45	68

* L_{dn} at short-term measurement locations calculated using simultaneous measurement at long-term locations.

Figure 3a: Long-term Noise Measurement Results at Measurement Location 1
L_{dn} = 77 dBA

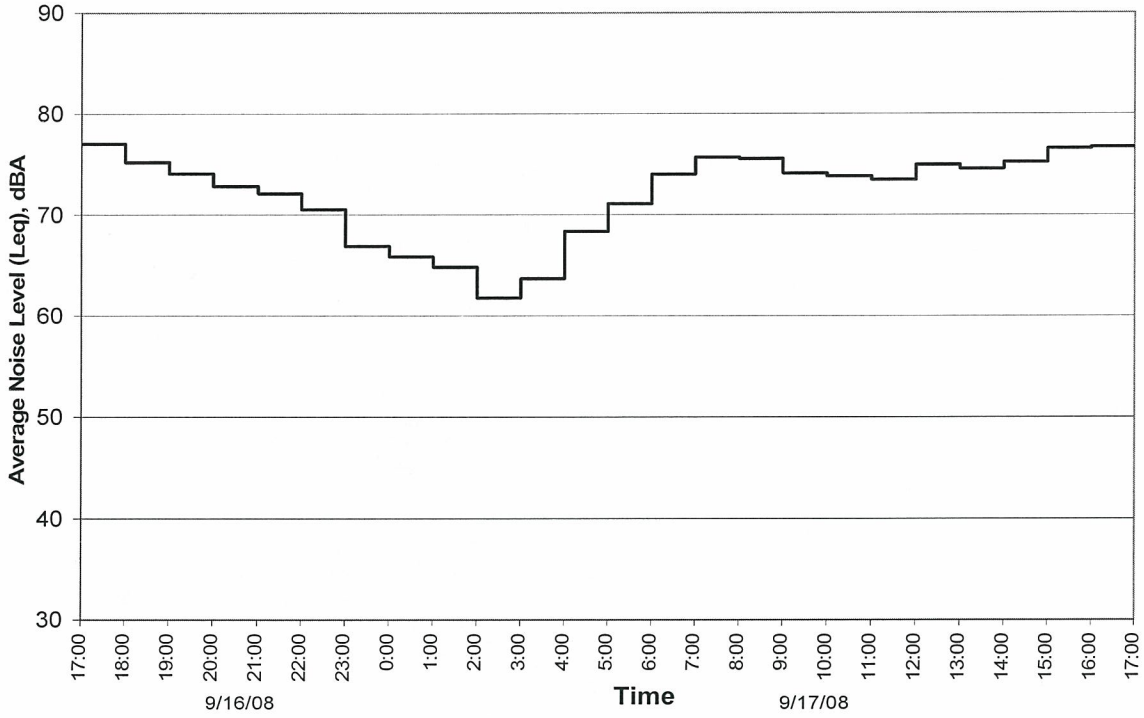


Figure 3b: Long-term Noise Measurement Results at Measurement Location 3
L_{dn} = 72 dBA

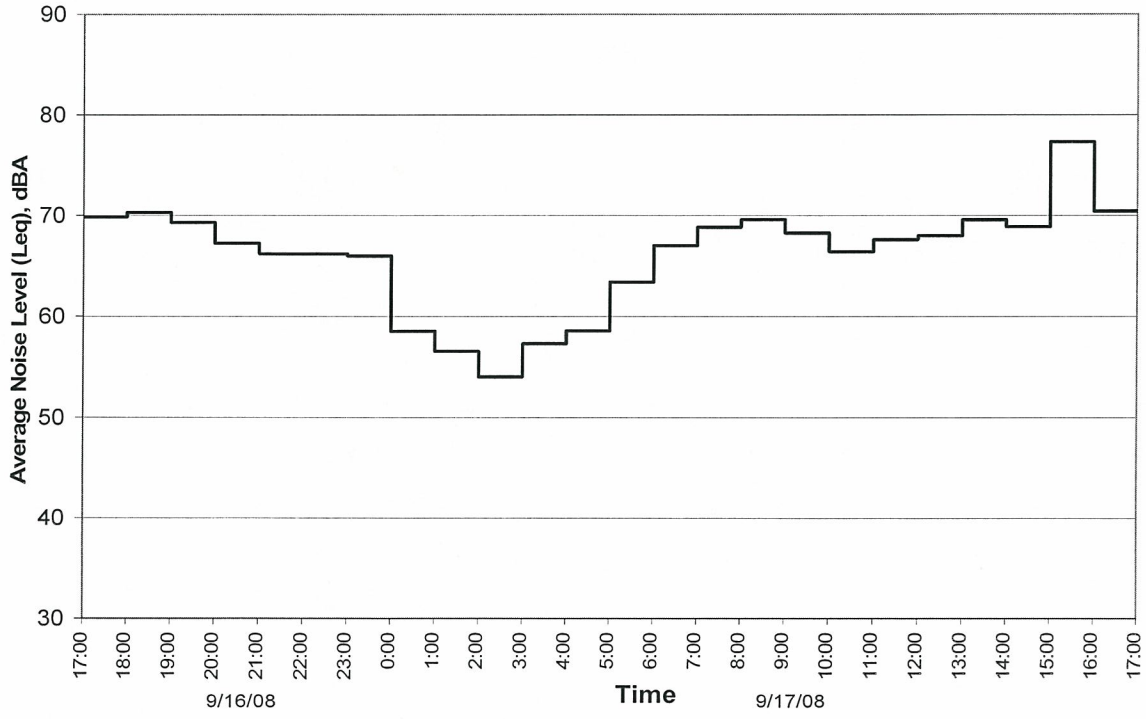


Figure 3c: Long-term Noise Measurement Results at Measurement Location 5
L_{dn} = 77 dBA

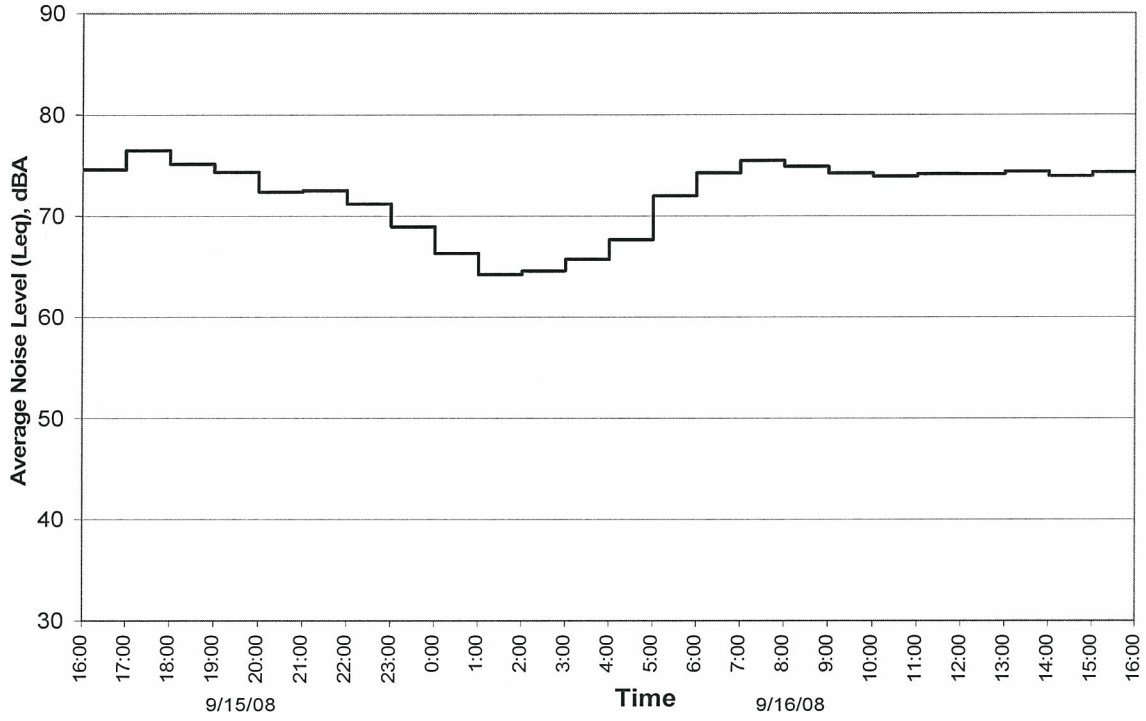


Figure 3d: Long-term Noise Measurement Results at Measurement Location 6
L_{dn} = 56 dBA

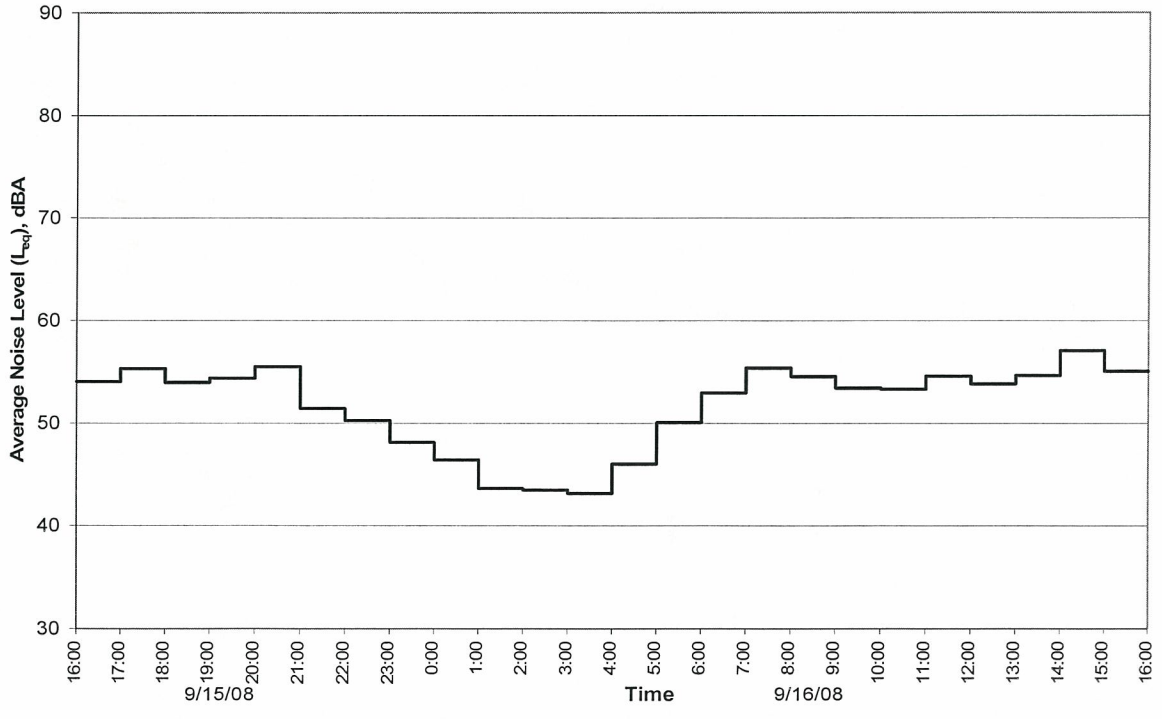
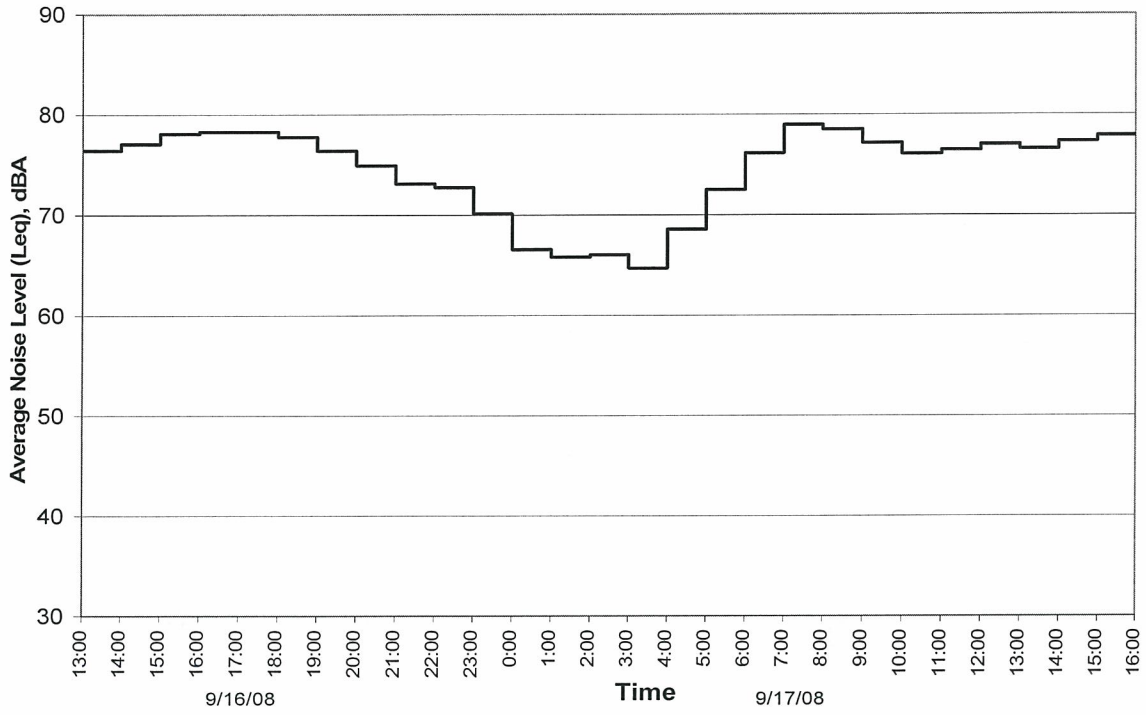


Figure 3e: Long-term Noise Measurement Results at Measurement Location 8
L_{dn} = 79 dBA



B. Future Noise Environment

In the future, traffic volumes will increase throughout the City of Hayward as a result of the project and cumulative growth. Traffic volumes for major roadways were provided by Dowling Associates, Inc[1]. Traffic noise levels were calculated for each of the studied roadways using the Federal Highway Administration's Traffic Noise Model (TNM 2.5).

Two future scenarios were evaluated: future without project and future with project. Table 4 shows the existing and future noise levels along the studied roadways. The last column in Table 4 shows the increase in noise level over the existing conditions. Also shown is the project's contribution to the future noise level increase.

[1] Email from Damian Stefanakis, Dowling Associates, Inc., 20 January 2008.

Table 4: Existing and Future Traffic Noise Levels

Street	Segment	L_{dn} in dBA 50 feet from Roadway Centerline			Future Traffic Increase, L_{dn} in dBA (Project Contribution)
		Existing	Future Without Project	Future With Project	
Foothill Blvd	North of Mattox Rd	68.4	69.9	69.9	1.5 (0.0)
	Mattox Rd to Grove Way	70.9	72.9	72.9	2.0 (0.0)
	Grove Way to A St	71.4	73.2	73.2	1.9 (0.0)
	A St to B St	71.2	72.2	72.2	1.0 (0.0)
	B St to D St	71.7	72.8	72.9	1.1 (0.0)
	D St to Jackson St	72.6	72.5	72.6	0.0 (0.0)
Mission Blvd	Foothill Rd to Fletcher Ln	71.1	72.5	72.7	1.4 (0.1)
	Fletcher Ln to Highland Blvd	71.3	73.0	73.1	1.7 (0.1)
	Highland Blvd to Carlos Bee Blvd	71.0	72.7	72.8	1.6 (0.1)
	Carlos Bee Blvd to Berry Ave	72.1	73.8	73.9	1.7 (0.1)
	Berry Ave to Harder Rd	71.9	73.5	73.6	1.6 (0.0)
	Harder Rd to Sorenson Rd	72.6	74.1	74.2	1.5 (0.1)
	Sorenson Rd to Jefferson St/Calhoun St	72.6	73.9	74.0	1.3 (0.1)
	Jefferson St/Calhoun St to Hancock St	72.5	73.7	73.7	1.2 (0.0)
	Hancock St to Tennyson Rd	72.5	74.0	74.0	1.4 (0.0)
	Tennyson Rd to Valle Vista Ave	72.0	73.4	73.5	1.4 (0.0)
	Valle Vista Ave to Industrial Pkwy West	72.1	73.6	73.6	1.5 (0.0)
	South of Industrial Pkwy West	72.0	73.5	73.5	1.5 (0.0)
Dixon Rd	North of Tennyson Rd	57.4	59.3	59.5	1.9 (0.2)
	Tennyson Rd to Valle Vista Ave	60.0	62.1	62.3	2.1 (0.2)
	Valle Vista Ave to Industrial Pkwy West	58.7	61.1	61.3	2.4 (0.2)
	South of Industrial Pkwy West	54.6	55.9	55.9	1.3 (0.0)
Tennyson Rd	Mission Blvd to Dixon Rd	64.9	66.6	66.7	1.7 (0.0)
Valle Vista Ave	Mission Blvd to Dixon Rd	53.5	56.4	56.6	2.8 (0.2)
Industrial Pkwy West	Mission Blvd to Dixon Rd	65.5	66.8	66.8	1.3 (0.0)

C. Impact Discussion

Impact 1: Compatibility of Proposed Land Uses with Existing and Future Noise.

Proposed land uses within the project area would include various types and densities of residential uses, commercial and office uses, open spaces and public/quasi-public uses. Implementation of the proposed land uses in all three alternatives could lead to new development in areas with ambient noise levels that are or will be in excess of acceptable levels.

Under alternatives A and C, for example, there are proposed residential land uses adjacent to Foothill Boulevard near Measurement Location 8. These proposed residential uses could be exposed to an L_{dn} of 70 dBA or greater which is considered "normally unacceptable" for residential development (see Table 1). According to the City's General Plan, "normally unacceptable" means that construction would generally be discouraged at these locations but may proceed with a detailed acoustical analysis including specific noise mitigation measures included in the design.

Exposure of proposed development projects to noise levels that are greater than "normally acceptable" for the proposed land use is considered a potentially significant impact.

Mitigation 1: A site specific noise study should be performed for future individual development proposals within the project area that are proposed near major roadways or other noise sources, as determined by the Development Services Director to determine compatibility with the existing and future noise environment. The City's noise contour maps (General Plan Appendix M) should be used as a guide for determining which projects will require a site specific noise study. If noise levels exceed applicable standards then noise reduction measures shall be incorporated into the project design to ensure consistency with local and state noise standards. Noise reduction measures could include but would not be limited to noise barriers and site orientation for outdoor spaces and sound rated building constructions for indoor spaces. The analysis must consider the following criteria and guidelines:

- General Plan Policies for Noise including Appendix N of the General Plan which contains Noise Guidelines for Review of New Development)
- General Plan EIR Mitigation Measure 7.3: Project-Specific Noise Analysis/Abatement
- State Building Code, Chapter 1207 (insulation from exterior noise in new residential construction)

Impact 2: Increased Traffic Noise due to Project.

There will be increased traffic activity along local and arterial roads from the development of various new land uses associated with the project and future growth in other areas. According to Table 4, a majority of the increase in noise due to traffic (up to 2.8 dBA) would occur as a result of future growth in other areas. The project would contribute less than 0.2 dBA to the future traffic noise levels. These relatively small increases would not cause a significant impact since they are less than the 3 dBA threshold of significance.

Depending upon the type and intensity of development that would occur at individual parcels, there may be instances where the future traffic noise increase due to a project would be greater than 3 dBA. This is more likely to occur at project parcels located farther from the major arterials than at parcels along Mission and Foothill Boulevard. Future traffic noise increases due to the project are considered a potentially significant impact.

> **Mitigation 2:** Consistent with Mitigation Measure 7.4 of the City of Hayward General Plan Update EIR, an acoustical study shall be performed for each development proposal within the project area that has potential to significantly increase existing noise levels.
>
> If it is determined that the proposed development would result in a substantial increase in ambient noise levels along nearby roadways, the study shall identify and implement noise abatement measures which will reduce project-related noise effects to a level consistent with City and State standards. Such measures could include the installation of noise barriers such as berms or sound walls).

Impact 3: Impact of Operational Noise on Existing and Proposed Land Uses

Activities at proposed residential, commercial, public and other project developments have the potential to generate noise that would impact adjacent land uses. Examples of operational noise sources include loading docks, heating and cooling equipment and outdoor recreation. Operational noise affecting existing and proposed land uses is considered to be a potentially significant impact.

> **Mitigation 3:** Consistent with Mitigation Measure 7.2 of the City of Hayward General Plan Update, Draft EIR, the City of Hayward shall review individual projects using the City's General Plan as guidance to determine whether or not an operational noise source would generate significant noise impacts. Noise reduction measures including but not limited to setbacks, site plan revisions, operational constraints, buffering, and sound insulation shall be incorporated into final development plans to reduce operational noise to a less than significant level.

Impact 4: Impact of Temporary Construction Noise

Construction noise has the potential to generate significant, temporary noise increases at adjacent noise sensitive land uses. Typically, construction generally occurs in four phases. These are grading, foundation work, framing and building construction. Usually, the noisier phases are grading and foundation work where heavy diesel machines such as front end loaders or bulldozers are used. Table 5 summarizes some typical construction noise levels.

Table 5: Typical Construction Equipment Noise Levels

Equipment	L_{max} (dBA) at 50 feet
Backhoe	78
Compactor	83
Compressor	78
Concrete Mixer Truck	79
Concrete Pump Truck	81
Crane	81
Bulldozer	82
Dump Truck	76
Excavator	81
Front End Loader	79
Generator	81
Grader	85
Hoe Ram	90
Jackhammer	89
Paver	77
Pneumatic Tools	85
Impact Pile Driver	101
Roller	80
Scraper	84
Tractor	84
Warning Horn	83
Welder/Torch	74

Source: FHWA Roadway Construction Noise Model, 2006

Many of the projects will be located immediately adjacent to other developed parcels and there is the potential for significant short term noise increases. Therefore, construction noise is considered a significant impact.

Mitigation 4: The City should require reasonable construction practices, consistent with Mitigation Measure 7.1 of the City of Hayward General Plan Update Draft EIR. Measures should include but are not limited to the following:

- Restricting construction hours to avoid early morning and late evening noise generation near residences,

- Require all equipment to have mufflers and be properly maintained so as to minimize noise emission.
- Limit the amount of time equipment is allowed to stand idle with the engine running.
- Shield construction activity and equipment from nearby noise sensitive areas using appropriate project phasing, existing building structures and/or noise barriers, to the extent practicable.