M. NOISE

P P P

This section summarizes existing noise conditions in the City of Berkeley. Detailed background information on the characteristics and measurement of noise is provided in Appendix F, Fundamental Concepts of Noise. Noise impacts that would result from implementation of the *Draft General Plan* as well as the *Draft General Plan*=s consistency with State guidelines for Noise Elements, are outlined, with mitigation suggested to reduce those impacts. Impacts outlined in Section 2 have been concentrated to directly relate to the criteria of significance listed in Section 2a.

1 Setting

a0 Noise and Noise Measurement. Noise may be defined as sound which is objectionable and disturbing to some individuals. Several noise measurement scales exist which are used to describe noise in a particular location. A *decibel (dB)* is a unit of measurement which indicates the relative intensity of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect, but changes of 3.0 dB or less are only perceptible in laboratory environments. Sound levels in decibels are calculated on a logarithmic basis. An increase of ten decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more intense. Each 10-decibel increase in sound level is perceived as approximately a doubling of loudness. Sound intensity is normally measured through the *A-weighted sound level or dBA*. This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. The characteristics of sound, how sound is measured and the perceived effects of noise are explained in more detail in Appendix F of this EIR. Representative outdoor and indoor noise levels in units of dBA are shown in Figure AF-1 in Appendix F.

b0 Berkeley=s Noise Environment. Typical major noise sources in communities like Berkeley include: 1) cars, trucks and buses; 2) routine activities of daily life; 3) industrial plant equipment noise; 4) trains along railroad tracks; and 5) aircraft near an airport. The most important difference between transportation and non-transportation noise sources is that municipalities can generally exercise control on the level and duration of noise at the property line of any non-transportation source of noise. Cities can adopt noise exposure standards for noise levels generated from mobile sources, such as trucks, trains or planes, and then make permitting decisions regarding sensitivity of land uses in areas with excessive noise. Cities play a role in enforcing the requirement in the state vehicle code regarding properly operating mufflers, and may also set speed limits or weight restrictions on streets. In general terms, a city=s actions are primarily pro-active with respect to stationary noise sources versus reactive for those mobile sources beyond City control.

(1) Bus Noise. Bus service is provided on major streets, collectors and local streets within the Berkeley circulation system. AC Transit restructured its routes with the objective of locating bus service within 3- mile of every resident and consequently, the noise environment on several of the new routes degraded.

For purposes of assessing vehicular noise, three generic weight classifications are considered (light, medium and heavy). Buses do not fit exactly into either the medium truck or the heavy truck category, and their measured noise emission characteristics are equally intermediate. At 35 mph, one medium duty truck is as loud as ten cars. One heavy truck is as loud as 30 cars. A bus is approximately equivalent to 20 cars. In addition, bus noise may be worsened by grade or by pavement condition.

Measurements have shown that background noise levels on Aquieter@ major streets in Berkeley are near 60 dB while the Anoisier@ streets are about 65 dB at the nearest residences. An increase of three dB is generally considered the threshold level at which people complain that their noise quality has become noticeably degraded. For noisier streets, even ten buses each direction (one every six minutes) does not significantly worsen the noise level. Given that most major streets in Berkeley have noise baselines above 60 dB, and that few routes run more than six buses each direction per hour, except on already heavily traveled roadways, Berkeley bus routes are not a major source of noise.

(2) Other Non-Stationary Sources. There are no airports in Berkeley and thus aircraft noise is not typically a problem in the City. Most of the Bay Area Rapid Transit District=s (BART) tracks are below grade within the City, which limits the noise impact potential. Transportation noise in Berkeley is dominated by automobiles and trucks on I-80 and major streets and trains on the Union Pacific tracks.

Two major transportation noise sources in the City of Berkeley are traffic on I-80 and trains on the Union Pacific rail line. These two transportation noise sources run in parallel corridors through West Berkeley separated by approximately 450 feet. Traffic on I-80 was monitored continuously for 24 hours on April 19 and 20, 1993 during the preparation of the Albany and Northwest Berkeley properties Master Plan EIR.[1] Noise from traffic on I-80 generated an L_{dn} of 65 dB at approximately 720 feet from the centerline of the freeway. This noise level was used to calculate distances to other noise contour lines (i.e., 75, 70 and 60 L_{dn}). Existing noise contour distances (in feet) for I-80 are shown in Table IV.M-1.[2]

Noise levels for trains on the Union Pacific Railroad through West Berkeley were also projected based on available information for this line. Both freight and passenger (Amtrak) trains use this line. In the mid-1990s, Amtrak had 18 train movements per day on this line, and will increase the number to 26 train movements in 2000. This rail line also carries an average of 23 freight trains per day.[3] Based on 23 freight train movements and 26 passenger (Amtrak) train movements daily, noise levels along the Union Pacific Railroad were projected and are shown in Table IV.M-1. Noise contour distances (in feet) are shown to an L_{dn} noise level of 60, 65, 70 and 75 dB. Train noise in the year 2000 would exceed an L_{dn} of 60 dB within 480 feet from the centerline of the railroad.[4] Today=s noise levels for the railroad have not changed noticeably since they are primarily influenced by freight train operations which have not substantially changed since 1977.

[1] Illingworth & Rodkin, Inc., April 1993. *Albany and Northwest Berkeley Properties Master Plan and First Phase of Housing Development EIR: Noise Impact Assessment,* prepared for EIP Associates.

[2] These noise contour distances should be considered Aworst case@ since they do not take into account shielding provided by terrain variations and intervening structures.

[3] The number of freight trains on this line, in the future, was assumed unchanged since no data by Southern Pacific Transportation Company was available.

[4] Noise levels projected for the railroad should be considered Aworst case@ since they do not take into account the amount of attenuation provided by existing terrain variations and structures along the railroad.

(3) Stationary Noise Sources. Noise sources related to heavy manufacturing, located mainly in industrialized West Berkeley, were once a more dominant contributor to the noise environment. In the past, noise-related land use conflicts between West Berkeley and other more residential sectors of the City were at a minimum, given the distance between these areas. More recently, however, increased residential and commercial uses in West Berkeley have begun to threaten industrial uses, in part, through a changing perception of environmental standards as they relate to the manufacturing process. The presumption in the past in most industrially-zoned areas was that noise generated by an industrial use was an acceptable

Table IV.M-1
L_{dn} NOISE CONTOUR DISTANCES
FOR INTERSTATE-80 AND UNION PACIFIC RAILROAD

Noise Source	Distance (Feet) to Noise Contour			
	75-L_{dn}	70-L_{dn}	65-L_{dn}	60-L_{dn}
Interstate-80[a] (Existing)	100	330	720	1,550
Union Pacific[b] (Year 2000)	50	120	260	480

[a] Based on a 24-hour measurement on April 19-20, 1993 for the Albany and Northwest Berkeley Properties Master Plan EIR.

[b] Assumes 23 freight train movements and 26 Amtrak train movements during a 24-hour period. Based on information contained in the noise study conducted for the Centerville Train Station in the City of Fremont, a 24-hour noise measurement near the Martinez train station (April 8-9, 1993) and projected operations for Amtrak for year 2000.

Source: Illingworth & Rodkin, 1999.

part of the manufacturing context. The *Concept Plan for West Berkeley*, was adopted in 1991 and included policies to address these types of noise conflicts in order to maintain the historic mix of land uses in an environmentally responsible manner. The *West Berkeley Plan*, adopted in 1993, calls for more stringent environmental review and regulation, including the mitigation of noise through both industrial and residential measures.

c0 Regulatory Setting: City Noise Ordinance. The City=s Noise Ordinance sets limits for permissible noise levels during the day and night according to the zoning of the area. The Noise Ordinance does not recognize residents living in non-residential zones, such as in West Berkeley. In addition, if *ambient noise* (the general level of noise in the area) exceeds the standard, that ambient noise level becomes the allowable noise level. The City Health Department is in the process of documenting the current state of Berkeley noise problems as a prelude to revising the Noise Ordinance. Enforcement of the Berkeley Noise Ordinance (Chapter 13.40 of the Municipal Code) is often related to commercial or industrial mechanical equipment that is sited near residential uses.

d0 Noise Abatement. Three basic mechanisms are effective at reducing excessive noise exposure: 1) reduce the strength of the noise at the source; 2) increase the distance between the source and the receiver; and 3) place an obstruction between the noise source and the receiver.

Given that vehicular noise is exempt from local control and relocation of sensitive land uses away from freeways or major streets is not practical, a noise wall is often the remaining practical solution. A properly sited wall can reduce noise levels by almost ten dB. A decrease of ten dB is perceived by people to be about one-half as loud as before. However, a freeway that is one-half as loud as before may still be very loud. Construction costs of noise walls are expensive at approximately $100 to $200 per linear foot, making each mile of wall cost approximately $500,000 to $1,000,000 dollars.

Because of the competing impact of noise or sound wall costs versus benefits, the California Department of Transportation (Caltrans) is sensitive to the wishes of the affected community regarding wall construction. When building or upgrading roadways, Caltrans will generally support design features that minimize local objections as long as their own design standards are met. Those standards include the following:

$ Walls must reduce noise levels by a minimum of 5 dB.

$ Walls must be able to block truck exhaust stacks that are located at 11.5 feet above the pavement.

$ Walls within 15 feet of the outside of the nearest travel lane must be built upon safety-shaped concrete barriers.

The preferred wall material is concrete or masonry. The effectiveness of a material in stopping sound transmission is called the *transmission loss (TL).* Materials other than a heavy metal or concrete masonry unit are more typically used on a single unique project basis rather than along several miles of freeway.

Another method of obstructing noise for residential or commercial buildings involves the use of design features, site planning, or building materials to protect the users of buildings in the interior of the building. Features such as dense landscaping and the use of double-paned windows are two examples.

e0 Noise Measurements in Berkeley.

(1) Methodology. This evaluation is based on the most comprehensive study of existing noise levels throughout the City that was conducted in 1975 and 1993. Since then, additional noise readings have been provided for major noise generators (i.e., I-80 and the Union Pacific rail line), and some site specific noise readings have been taken for projects. Because traffic is the major noise source in Berkeley today and in 1975, a computer model was used to project future 2020 noise levels associated with projected increases in traffic. The modeling for noise impacts is based on the traffic modeling and analysis for the year 2020 described in the Transportation section and Appendix C of this EIR. Approximately 20 representative locations throughout the City were monitored for current noise exposure. Measurement sites were chosen to provide a representative

spectrum of the community=s existing noise environment, focusing on locations where there might be a reasonable expectation of quiet, such as parks, medical facilities, schools and residences, including several sites that were known to be noisy and thus provide some basis for comparison with some of the less noisy locations.

Measurements were made using two noise monitors during a two-day period on March 4-5, 1993. Each site was monitored for approximately 30 minutes. Although noise/land use compatibility standards are typically expressed as CNEL or L_{dn}, monitoring experience in traffic-dominated environments has shown short-term, mid-day L_{eq} and weighted 24-hour CNEL to be quite similar. Along commuter routes where there is heavy pre-7:00 AM traffic, the nighttime penalty assigned to noise events before 7:00 AM in the CNEL or L_{dn} descriptor creates 24-hour weighted readings that tend to be two to three dB higher than average daytime levels. Results of the community noise monitoring survey are summarized in Table IV.M-2. Monitoring locations are shown in Figure IV.M-1 keyed to the site numbers in Table IV.M-2. The quietest locations were parks or schools on low traffic streets or places where traffic was screened by topography or distance. The noisiest locations were along Ashby Avenue, combined street and traffic activity along Telegraph Avenue, and a high activity center on the University central campus.

During development of the Noise Element for the 1977 *Master Plan*, 42 sites were monitored around the City in 1975. These sites were heavily street oriented and many readings were taken at corners where traffic noise from two roadways was combined. Because the emphasis of the 1993 measurements was on the receiver and less on the source, the two data sets cannot readily be compared. The average reading of 68 dB in 1975 was higher than the 62 dB average of the 1993 measurements. However, since the 1975 data was not very specific in terms of location and roadway setback, the previous work cannot be readily duplicated to determine the degree of change since 1975. Since most people can not detect ambient noise differences of less than three dB, and it takes a doubling of traffic volumes to increase noise levels by three dB, very few Berkeley receiver sites have likely experienced a perceptible change in noise levels since 1975.

While it is likely that some long-time Berkeley residents have noticed that noise levels have become significantly degraded within the last two decades, some locations such as in industrial sites in West Berkeley are probably less noisy now than in 1975. Roadways that have maintained a reasonable travel speed despite moderate volume increases are probably slightly noisier. Clearly, traffic noise is a pervasive problem in an urbanized environment that will not change much in Berkeley until some quieter mode of transportation replaces the combustion engine vehicle.

Because a brief noise measurement is only representative of one instant in time at one location, the process of calculating community traffic noise exposure is generally performed using a computerized noise model based on average conditions (volumes, speeds, vehicle mixes, etc.), rather than on those monitored at one fixed point in time. Traffic noise exposure for this analysis was calculated along a number of Berkeley area roadways at a distance designed to duplicate the approximate nearest sensitive receiver location relative to the roadway centerline. The results of the model analysis are shown in Table IV.M-3. Of the 29 streets analyzed, only three had noise levels at the nearest receiver location that did not exceed the 65 dB CNEL goal for noise-sensitive land uses. Six roadways had noise levels of 70 dB CNEL or more at the face of the nearest noise-sensitive structure. University and Ashby Avenues are the noisiest streets in the City.

(2) Changes Since the 1977 Master Plan. The Noise Element of the 1977 *Master Plan*, first prepared in 1975, concluded that the existing City noise environment was dominated by traffic noise, which was the same condition in 1993 and in 2000. Small decreases in noise levels have occurred along much of San Pablo Avenue and along portions of Ashby Avenue since 1975. Noticeable noise increases since then (3 dB or more) have been observed along a considerable number of roadways, including portions of Sixth Street, Martin Luther King Jr. Way, Milvia Street, Shattuck Avenue, Oxford Street, Claremont Avenue, Grizzly Peak Boulevard, Gilman Street, Hopkins Street, Delaware Street, Hearst Avenue, and Dwight Street.

Since 1975 when the last set of measurements was taken, several factors influencing noise levels in the City have changed somewhat, but not enough to substantially change the overall role of traffic=s noise domination.

Factors that have *reduced* noise since 1975 include the following:

- $ Overall traffic speeds are lower. Slower traffic is generally less noisy than free-flow movement.
- $ Truck noise standards from the 1970s and 1980s have created a quieter truck fleet.
- $ Truck volumes on many streets in West Berkeley are lower, as heavy manufacturing has decreased or has been converted to uses that involve quieter medium-duty vehicles rather than diesel-fueled 18-wheelers hauling heavy loads.
- $ A noticeable increase has occurred in the number of alternative modes of transportation (other than the single occupant automobile).

Table IV.M-2
AMBIENT NOISE MONITORING MAY 1993

No	Location	Leq	Lmax	Lmin	L10	L25	L50	L90
1.	Tilden Park - Hiking Trail	38.3	42.5	36.5	39.5	38.5	37.5	37.0
2.	Grizzly Peak Area Residence[a]	53.2	70.0	40.0	49.0	44.0	42.0	40.5
3.	Berkeley Rose Garden[b]	48.3	54.0	45.5	49.5	48.0	47.5	46.5
4.	Cordornices Park[c]	56.7	69.5	49.5	58.5	54.0	53.0	50.5
5.	UC - Golden Bear Center[d]	77.9	81.0	74.0	79.5	78.0	77.5	76.0
6.	UC - Sather Gate[e]	61.0	67.5	57.0	63.5	61.0	59.5	58.0
7.	Telegraph Avenue[f]	73.0	90.0	59.5	75.0	71.5	70.0	66.0
8.	Elmwood Conv. Hosp.	69.1	81.0	57.0	71.0	68.5	67.5	63.5
9.	Elementary School[g]	53.9	64.0	47.0	57.0	51.5	50.5	48.5
10.	Alta Bates Medical Center[h]	53.9	61.0	50.0	56.0	53.5	53.0	51.0
11.	Aquatic Park Parking Lot[i]	71.4	78.5	68.5	72.0	71.0	70.5	69.5
12.	W. Berkeley Senior Center[j]	68.0	76.0	51.0	71.5	68.0	65.0	59.5
13.	Cesar Chavez (N. Waterfront) Park[k]	58.3	68.0	47.0	63.0	56.5	54.5	48.5
14.	King Child Dev. Center[l]	45.8	56.0	41.0	48.0	44.5	43.5	42.0
15.	Berkeley High School Classroom[m]	65.9	73.5	55.0	68.5	66.5	65.0	59.0
16.	N. Berkeley Senior Center[n]	64.5	71.0	52.0	68.5	64.5	62.0	57.0
17.	Hearst Avenue Residence[o]	62.1	71.0	52.5	65.5	61.5	58.0	54.0
18.	Sacramento Avenue Residence[p]	62.6	72.0	50.0	66.0	62.0	60.0	55.5
19.	Cedar Street Residence[q]	66.4	80.5	43.5	70.0	65.0	61.0	49.0
20.	O=Brien Rest Home[r]	67.1	77.0	47.0	70.0	66.5	65.0	55.5
21.	St. Ambrose Church Steps[s]	70.6	83.0	55.5	74.0	69.0	66.5	60.0
22.	Aquatic Park[t]	66.5	71.5	59.0	67.5	66.5	66.0	65.0
23.	San Pablo Park[u]	47.3	55.5	41.0	51.0	45.5	44.0	42.0
24.	Ashby Avenue Residence[v]	79.4	99.5	60.0	76.5	72.0	70.5	67.0

Definitions:

L_{eq} - Equivalent noise level for the measurement period determined from the average of the acoustical energy of many instantaneous readings.

L_{max} - Highest one-second maximum reading.

L_{min} - Lowest one-second minimum reading.

L%% - Noise level equaled or exceeded in 10, 25, 50 or 90% of all instantaneous readings during the measurement period.

[a] Construction (hammers, electric saw) nearby. Fairlawn Drive.
[b] Tennis games in progress nearby. Mid-terrace bench.
[c] Near stream.
[d] Street musician (bongo) playing non-stop.
[e] Mid-afternoon.
[f] Street vendors shouting occasionally. Near Durant Avenue.
[g] Russell near Ellsworth.
[h] Emergency Ent./Bateman Park on Shattuck near Oregon.
[i] Freeway moving moderately well at start - showing signs of stagnation near end of measurements. Bolivar near Bancroft.
[j] Sixth near University.
[k] Bike/jogging path.

[l] East Campus/BUSD.
[m] MLK Blvd., near Bancroft.
[n] On Hearst near MLK Blvd.
[o] 1710 Hearst across from park.
[p] Across from BART station.
[q] Several noisy motorcycles passed nearby. Porch of 1728 Cedar.
[r] MLK Blvd./Vine Street.
[s] Gilman near Cornell.

Source: Illingworth & Rodkin, 1993.

[t] Freeway moving poorly in both directions. Same site as No. 11.
[u] Soccer practice in progress.
[v] Ambulance with siren heading eastbound across street from monitoring location, westbound traffic start/stop. 1313 Ashby front door.

Figure IV.M-1 Community Noise Survey Locations 8x11

Table IV.M-3
CNEL LEVELS AT THE NEAREST NOISE-SENSITIVE USE
(Adjacent to the Roadway for Segments Shown)

Location	1975	1993	Difference
6th & 7th Street			
Gilman-Cedar	64.3	64.2	-0.1
Cedar-Hearst	65.1	68.3	3.2
Hearst-University	67.5	68.4	0.9
University-Dwight	65.1	70.5	5.4
Dwight-Ashby	65.8	70.7	4.9
San Pablo Avenue			
Gilman-Cedar	68.7	67.9	-0.8
Cedar-University	68.7	68.2	-0.5
University-Dwight	68.2	67.4	-0.8
Dwight-Ashby	67.9	68.2	0.3
Sacramento Street			
Hopkins-Cedar	63.9	64.1	0.2
Cedar-University	65.1	67.2	2.1
University-Dwight	65.9	67.8	1.9
Dwight-Ashby	65.8	68.4	2.6
MLK, Jr. Way/The Alameda			
N. of Solano	61.2	62.8	1.6
Solano-Marin	64.8	65.1	0.3
Marin-Rose	66.6	67.0	0.4
Rose-Cedar	66.9	67.3	0.4
Cedar-University	66.7	68.3	1.6
University-Allston	68.0	68.8	0.8
Allston-Dwight	68.4	68.4	0.0
Dwight-Ashby	68.1	68.4	0.3
Ashby-Adeline	66.5	67.3	0.8
S. of Alcatraz	68.5	71.6	3.1
Milvia Street			
Cedar-Hearst	61.1	64.4	3.3
Hearst-University	63.5	64.4	0.9
University-Allston	64.8	66.1	1.3
Allston-Dwight	63.5	64.1	0.6
Shattuck/Henry/Sutter Street			
N. of The Circle	64.1	65.9	1.8
The Circle-Rose	65.9	66.9	1.0
Rose-Cedar	65.9	69.2	3.3
Cedar-University	66.2	69.0	2.8
University-Allston	68.2	68.7	0.5
Allston-Dwight	68.7	69.2	0.5
Dwight-Ward	69.1	69.9	0.8
Ward-Ashby	67.5	67.0	-0.5
S. of Ashby	65.6	66.4	0.8

Table IV.M-3 *continued*

Location	1975	1993	Difference
Spruce/Oxford Street			
N. of Marin	63.5	59.4	-4.1
Marin-Los Angeles	65.3	59.9	-5.4
Los Angeles-Rose	65.2	65.5	0.3
Rose-Cedar	65.7	65.7	0.0
Cedar-Hearst	66.8	68.4	1.6
Hearst-University	68.9	70.8	1.9
University-Durant	69.1	71.1	2.0
Durant-Dwight	63.3	64.3	1.
Dwight-Derby	67.5	67.4	-0.1
Derby-Ashby	68.7	68.2	-0.5
S. of Ashby	68.1	68.1	0.0
College Avenue			
Dwight-Derby	67.3	67.5	0.2
Derby-Ashby	68.1	67.5	-0.6
S. of Ashby	67.5	68.6	1.1
Gayley/Piedmont/Waring			
N. of Hearst	62.8	63.7	0.9
Hearst-Bancroft	66.9	67.8	0.9
Bancroft-Durant	66.8	68.2	1.4
Durant-Piedmont	66.9	67.2	0.3

Piedmont-Derby	67.6	68.8	1.2
Claremont Ave./Blvd.			
Alcatraz-Uplands	63.8	67.3	3.5
The Uplands-Ashby	64.0	65.7	1.7
Ashby-Derby	68.1	70.0	1.9
Adeline St. Ward-Ashby	66.1	67.2	1.1
Ashby-MLK Jr. Way	66.2	66.1	-0.1
MLK Jr. Way-Alcatraz	69.1	69.8	0.7
Grizzly Peak Blvd.			
Euclid-Marin	57.3	63.2	5.9
Marin-Shasta	60.0	63.2	3.2
Shasta-La Loma	60.4	59.7	-0.7
Solano Avenue			
Neilson-Colusa	66.6	68.2	1.6
Colusa-The Alameda	67.6	69.0	1.4
The Alameda-The Circle	60.8	62.1	1.3
Marin Avenue			
Tulare-The Alameda	66.9	68.5	1.6
The Alameda-The Circle	67.3	68.7	1.4
The Circle-Spruce	63.3	64.4	1.1
Spruce-Euclid	62.5	63.7	1.2
Euclid-Grizzly Peak	60.7	58.5	-2.2

Location	1975	1993	Difference
Gilman Street			
Eastshore-Sixth	64.9	68.9	4.0
Sixth-San Pablo	66.3	68.1	1.8
San Pablo-Santa Fe	64.6	66.0	1.4
Santa Fe-Hopkins	63.0	67.5	4.5
Hopkins Street			
San Pablo-Gilman	60.0	60.9	0.9
Gilman-Sacramento	66.0	67.6	1.6
Sacramento-MLK, Jr.	61.0	64.4	3.4
MLK, Jr.-Sutter	58.7	61.8	3.1
Cedar Street			
Eastshore-Sixth	62.2	61.0	-1.2
Sixth-San Pablo	65.0	66.3	1.3
San Pablo-Sacramento	63.9	65.7	1.8
Sacramento-MLK, Jr.	63.7	66.2	2.5
MLK, Jr.-Shattuck	64.9	66.6	1.7

Piedmont-Derby	67.6	68.8	1.2
Euclid-La Loma	62.1	62.6	0.5
Delaware Street			
San Pablo-Sacramento	60.4	64.3	3.9
Hearst Avenue			
Eastshore-Sixth	59.9	64.8	4.9
MLK, Jr.-Milvia	63.9	64.5	0.6
Oxford-Euclid	68.8	69.9	1.1
Euclid-Gayley	66.9	68.8	1.9
Allston Way			
Sixth-San Pablo	60.6	57.8	-2.8
Sacramento-MLK, Jr.	62.4	62.4	0.0
University Avenue			
I-80-Sixth	71.1	73.4	2.3
Sixth-San Pablo	70.5	72.6	2.1
San Pablo-Sacramento	70.7	72.4	1.7
Sacramento-MLK, Jr.	70.2	71.5	1.3
MLK, Jr.-Shattuck	69.6	70.4	0.8

Table IV.M-3 *continued*

Location	1975	1993	Difference
Shattuck-Oxford	67.5	69.2	1.7
Bancroft Way			
San Pablo-Sacramento	59.3	60.3	1.0
Sacramento-MLK, Jr.	60.5	60.4	-0.1
Oxford-Telegraph	68.6	66.5	-2.1
Telegraph-College	65.7	65.7	0.0
College-Piedmont	62.9	65.0	2.1
Durant Avenue			
Oxford-Ellsworth	64.1	65.4	1.3
Ellsworth-Telegraph	65.2	65.5	0.3
Telegraph-College	65.4	63.8	-1.6
Haste Street			
Oxford-Ellsworth	64.9	65.0	0.1
Ellsworth-Telegraph	65.3	65.4	0.1
Telegraph-College	64.0	63.6	-0.4
Dwight Way			
San Pablo-Sacramento	65.0	68.2	3.2
Sacramento-MLK, Jr.	65.8	67.5	1.7
Shattuck-Ellsworth	67.6	67.8	0.2
Ellsworth-Telegraph	69.0	68.9	-0.1
Telegraph-College	64.0	66.3	2.3
College-Piedmont	63.2	67.4	4.2
Derby Street			
Telegraph-College	59.3	61.8	2.5
Waring-Claremont	68.4	68.0	-0.4
Ashby Avenue			
I-80-Seventh	72.5	73.6	1.1
Seventh-San Pablo	71.6	71.0	-0.6
San Pablo-Sacramento	71.2	69.9	-1.3
Sacramento-MLK, Jr.	71.0	69.9	-1.1
MLK, Jr.-Shattuck	70.6	72.7	2.1
Shattuck-Telegraph	70.7	72.6	1.9
Telegraph-College	70.8	71.7	0.9
College-Claremont	70.1	71.7	1.6
E. of Claremont (Tunnel Rd.)	72.5	73.5	1.0
Alcatraz Avenue			
San Pablo-Sacramento	63.4	64.1	0.7
Sacramento-Adeline	65.2	66.9	1.7

Note: **Bold** name is street being measured; hyphenated names that follow represent street segments for which specific noise levels are produced.

Source: Illingworth & Rodkin, 1993 (data) and LSA Associates, Inc., 1999 (table design).

Factors that have *increased* noise since 1975 include the following:

- $ Traffic volumes on many streets have increased.
- $ Much more traffic occurs before 7:00 AM than two decades ago. Using the weighting factors of the CNEL or L_{dn} descriptors, any car traveling before 7:00 AM counts as 10 cars in the noise equation.
- $ Pass-through traffic seeking alternatives to crowded freeways uses City streets to a greater extent than 20 years ago.
- $ Closure of residential side streets formerly used as alternative routes has funneled more traffic onto already noisy arterials.
- $ Increase in the use of noisy motorcycles and scooters because parking and traffic within the City these more practical as a means of transportation.

(3 Locations of Concern. The noise monitoring and modeling conducted for this study reveal the following areas of particular concern:

- $ Noise levels along many roadways north of University Avenue are excessive for areas of older residences with minimum setbacks and inadequate noise insulation.
- $ Noise levels along University and Ashby Avenues where existing homes and other noise-sensitive uses may have minimum setbacks and inadequate noise insulation.
- $ Noise levels along historically quieter streets, such as Grizzly Peak Boulevard are beginning to reach undesirable levels.
- $ Residential conversion (whether by demolition/construction or live/work situations) in West Berkeley may create more residences within freeway and train noise impact zones.

f. Draft General Plan Policies. The *Draft General Plan* does not contain a noise element, but instead incorporates noise policies and actions into the Environmental Management Element. The following policies from the *Draft General Plan* Open Space Element and Environmental Management Element pertain to the noise environment in Berkeley.

- $ *Policy OS-7: Serving the Underserved.* Within the context of open space resource allocations for new or expanded facilities, give high priority to providing additional facilities in areas of the city and for populations that are currently underserved.

  Action:

  G. Make Aquatic Park more accessible and useable as a neighborhood park by:

  B Installing an effective and attractive freeway noise barrier with landscaping for Aquatic Park...(Open Space Element)

$ *Policy EM -46.* Reduce significant noise levels and minimize new sources of noise. (Environmental Management Element)

Action:

A. Continue to enforce the noise ordinance to control non-transportation noise impacts.

$ *Policy EM -47.* Protect public health and welfare by eliminating existing noise problems where feasible and by preventing significant future degradation of the acoustic environment. (Environmental Management Element)

Actions:

A. Incorporate noise considerations into land use planning decisions.

B. Ensure the effective enforcement of City, State and Federal noise levels by appropriate City departments.

C. Coordinate with the California Occupational Safety and Health Administration (Cal-OSHA) to provide information on and enforcement of occupational noise requirements within the City of Berkeley.

$ *Policy EM-48.* Work with local and regional agencies to reduce local and regional traffic, which is the single largest source of unacceptable noise in the City. (Environmental Management Element)

Actions:

A. Encourage neighborhood traffic calming strategies that cause motorists to slow down and decrease noise levels.

B. Restrict taxis and shuttles from honking in neighborhoods through the taxi permit process.

C. Minimize potential transportation noise through proper design of street circulation, coordination of routing, and other traffic control measures.

D. Promote and encourage new vehicle technologies to reduce transportation noise levels.

E. Construct a noise barrier for Aquatic Park.

F. Enforce muffler laws

G. Work with AC Transit to reduce bus noise

$ *Policy EM-49.* Require operational limitations and all feasible noise buffering for new commercial or industrial uses that generate significant noise impacts near residential, institutional, or recreational uses. (Environmental Management Element)

Actions:

A. Promote use of noise insulation materials in new construction and major rehabilitation.

B. Mitigate significant noise impacts on parks and public open space, whenever feasible.

$ *Policy EM-50.* All new noise-sensitive development proposals should be reviewed with respect to the Land Use Compatibility Guidelines below. Figure 1 Draft Noise Contour Map presents noise contours throughout the City. Figure 2 Land Use Compatibility Standards presents the ranges of exterior noise exposure which are considered to be appropriate for different land uses. The Noise Contour Map and the Land Use Compatibility Standards may be used to determine compatibility of certain land uses in certain areas of the City and guide local decision making regarding the types of noise analysis and mitigations that might be necessary before making a final decision on a project or plan to ensure compatibility between land uses and the noise environments. (Environmental Management Element)

2. Impacts And Mitigation Measures

a. Criteria of Significance. The *Draft General Plan* would have a significant effect on noise if it would cause:

$ Exposure of persons to or generation of noise levels in excess of standards established in the Berkeley Noise Ordinance, or applicable standards of other agencies.

$ Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.

$ A substantial permanent increase of over 4 dBA in ambient noise levels in the project vicinity above levels existing without the project.

$ A substantial temporary or periodic increase of over 4dBA in ambient noise levels in the project vicinity above levels existing without the project.

b. Impacts and Mitigation Measures. This section describes noise impacts that would result from Plan implementation and suggests mitigation to reduce these impacts. Less-than-significant noise impacts are listed first, followed by significant impacts.

(1 Less-than-Significant Noise Impacts. Implementation of the *Draft General Plan* Housing and Land Use policies would add over 3,400 new housing units from 1999 to 2020. Figure IV.M-2 illustrates future traffic and railroad noise exposure in Berkeley with full implementation of the *Draft General Plan* and projected increases in

regional traffic. A future noise exposure map for Berkeley was developed, rather than a more typical noise contour map, since Berkeley is already built out. Noise exposure would be difficult to describe in Berkeley with a noise contour map since buildings provide substantial shielding of traffic noise. This noise exposure map illustrates the noise levels along each roadway taking into account shielding from buildings. Shading on the noise exposure map should be interpreted as follows:

- Light grey indicates noise exposure of 60 to 65 dBA L_{dn};
- Crosshatch pattern indicates noise exposure of 65 to 70 dBA L_{dn};
- Dark grey indicates a noise level above 70 dBA L_{dn};
- Black indicates the noise contours for I-80 traffic combined with railroad activity, and
- Roadways that are not shaded either have noise levels less than 60 dBA L_{dn}, or traffic data were not available.

Stationary noise sources, which are not depicted on Figure IV.M-2, are usually localized and are not located near noise-sensitive land uses. However, noise from stationary sources could also affect new development. New homes, office and commercial uses could be located in areas where existing or future noise levels would be considered excessive, which would constitute a significant impact.

As identified in *Policy EM-50* , the City included Noise and Land Use Compatibility Standards (see Figure IV.M-3) in the Environmental Management Element of the *Draft General Plan* to ensure that all new development will be compatible with the existing and future noise environment. The Land Use Compatibility Standards (Figure IV.M-3) shows the ranges of exterior noise exposure which are considered to be AAcceptable,@ AConditionally Acceptable,@ or AAnalysis and Mitigation Required@ for a specified land use. The standards can be used to determine whether or not the noise exposure requires mitigation in order to achieve a compatible noise environment. Figure IV.M-3 can be interpreted as follows:

Figure IV.M-2 Future Noise Exposure 8x11

$ Where the noise exposure would be AAcceptable@ for the intended land use, new development may occur without requiring an evaluation of the noise environment.

$ Where the noise exposure would be AConditionally Acceptable,@ a specified land use may be permitted only after detailed analysis of the noise reduction requirements is made and the needed noise insulation features are included in the design. Such noise insulation features may include measures to protect noise-sensitive outdoor activity areas (e.g., at residences, schools or parks) or may include building sound insulation treatments such as sound-rated windows to protect interior spaces in sensitive receptors. Mitigation measures should be focused on reducing noise where it would have an adverse effect for the specified outdoor or indoor land use.

$ For areas where AAnalysis and Mitigation Required,@ the noise environment may be unacceptable for new development due to an existing unacceptable noise environment. New construction or development should generally not be undertaken unless mitigation has been identified that would reduce the exposure of people to unacceptable noise standards.

The following impact has been identified with suggested mitigation that calls for expanding the noise compatibility guidelines in the *Draft General Plan*.

<u>Impact NOI-1</u>: New development, particularly residential uses on and adjacent to major transit corridors and in the Southside and Downtown areas, could be exposed to excessive noise levels. (LTS)

<u>Mitigation Measure NOI-1</u>: To further ensure that all new noise sensitive proposals are carefully reviewed with respect to potential noise impacts, the City should review new development using the following guidelines in combination with the Land Use Compatibility Standards:

$ All new residential developments should conform to a noise exposure standard of 60 L_{dn} (day/night average noise level) for outdoor noise in noise-sensitive outdoor activity areas (such as tot lots) and 45 L_{dn} for indoor noise. New residential development which does not and cannot be made to conform to this standard should not be permitted.

$ Acoustical studies, describing how the exterior and interior noise standards will be met, should be required for all new residential developments with an outdoor noise exposure greater than 60 L_{dn}. The studies should satisfy the requirements set forth in Title 24, part 2 of the California Administrative Code, Noise Insulation Standards, for

Figure IV.M-3 Noise and Land Use Compatibility 8x11 multiple-family attached, hotels, motels, etc., regulated by Title 24. The noise exposure diagram (Figure IV.M-2) should be used as the basis to initially identify areas with excessive noise exposure.

$ Acoustical studies should be required for all new noise-sensitive projects which may be affected by existing noise from stationary sources.

$ To permit new development of residential and noise-sensitive land uses where existing stationary noise sources exceed the Noise Ordinance limits, effective mitigation measures shall be implemented to reduce noise exposure to or below the allowable levels of the Noise Ordinance. (LTS)

Implementation of *Policies OS-7.G* and *EM -47, EM-48* and *EM-50* relate to noise but would not be expected to result in adverse environmental impacts. However, *Policies EM-46* and *EM-49* could result in noise impacts.

<u>Impact NOI-2</u>: *Policy EM-46* appears to exempt transportation-related noise from being controlled by enforcement of the Noise Ordinance which could result in impacts to adjacent residential neighborhoods. (LTS)

The term Anon transportation noise@ is not well-defined in *Policy EM-46* and could include noise that might be generated in new parking lots, (see *Policy T-36* regarding opportunities for satellite parking lots) adjacent to residences, that are used late at night or early in the morning.

<u>Mitigation Measure NOI-2</u>: Revise *Policy EM-46A* to read AContinue to enforce the noise ordinance to control ~~non-transportation~~ noise impacts.@ (LTS)

<u>Impact NOI-3</u>: *Policy EM-49* exempts institutional and recreational uses that might generate significant noise from operational limitations and feasible noise buffering which could result in impacts on adjacent residential uses. (LTS)

Noise impacts on adjacent residences could be associated with parties and early morning or night time events that may be held at institutions, and with the early morning or late night use of tennis courts or ballfields.

<u>Mitigation Measure NOI-3</u>: Revise *Policy EM-49* to read, ARequire operational limitations and all feasible noise buffering for new commercial, industrial, <u>institutional or recreational</u> uses that generate significant noise impacts near residential ~~, institutional, or recreational~~ uses. (LTS)

Implementation of land use and housing policies in the *Draft General Plan* that would increase development in the City could result in noise impacts. Two less-than-significant impacts are discussed below.

Impact NOI-4: New development associated with implementation of the *Draft General Plan* could expose existing residences to noise from non-traffic noise sources, but this noise exposure would not be excessive, and would not be considered significant. (LTS)

New manufacturing, commercial, office or other non-residential development could produce non-traffic (or stationary-source) noise that could affect existing residences or noise-sensitive land uses. New projects developed under the *Draft General Plan* would be subject to the City=s Noise Ordinance, which sets limits for permissible noise levels during the day and night according to the land use zoning of the area. Under the Noise Ordinance, if the ambient noise exceeds ordinance limits, then the ambient noise level becomes the allowable limit. This Noise Ordinance would be the City=s tool to ensure that existing residences and noise-sensitive land uses would not be exposed to excessive noise from non-traffic noise sources.

Mitigation Measure NOI-4: None required. (LTS)

Impact NOI-5: Full implementation of the *Draft General Plan* would increase traffic noise levels along some roadway segments, potentially exposing residences along those roadway segments to excessive noise levels. (LTS)

Development under the *Draft General Plan* would change traffic levels on Berkeley roadways. Projected changes to traffic noise levels, were calculated with *Draft General Plan* implementation and under existing conditions. Along most roadways, noise level changes resulting from Plan implementation would be 1 dBA or less. The roadway sections with the greatest predicted noise level increases are shown in Table IV.M-4. A noise level change of 4 dBA over the build-out period of the *Draft General Plan* would be considered to be significant. Traffic noise modeling indicates that the greatest noise level increases would be 3 dBA or less. The noise level increases along many of the roadways shown in Table IV.M-4 would primarily affect non-noise sensitive uses (e.g., commercial uses). Substantial noise level increases are not predicted under *Draft General Plan* buildout; therefore, potential impacts to existing residences would be considered less-than-significant.

Mitigation Measure NOI-5: None required. (LTS)

(2 Significant Noise Impacts and Mitigation Measures. The *Draft General Plan* would not result in any significant noise impacts. No mitigation measures would be required.

Table IV.M-4
PREDICTED SUBSTANTIAL TRAFFIC NOISE LEVEL CHANGES

Roadway Section	1999-2020 Noise Level Increase Under Existing Conditions	1999-2020 Noise Level Increase Under Draft General Plan
Adeline at MLK	2.3 dBA	2.6 dBA
Bancroft at Milvia	3.2 dBA	2.5 dBA
Bancroft at Shattuck	3.2 dBA	3.0 dBA
Telegraph at Bancroft	2.5 dBA	3.0 dBA
Telegraph at Durant	2.4 dBA	2.6 dBA
University at Oxford	1.4 dBA	2.6 dBA

Note: A noise increased of 4 dBA from the existing noise level over the build-out period of the *Draft General Plan* would be considered significant.

Source: Illingworth & Rodkin, 1999.