TABLES

FIGURES

SECTION 4.10

Noise

This section describes the existing ambient noise environment of the UC Santa Cruz campus, including the sources of noise in the area of the proposed project and the current locations of noise-sensitive land uses that potentially would be affected by 2005 LRDP development. The relevant noise standards and guidelines are described. Potential project-related noise sources, including construction activity, are discussed. The changes in estimated noise levels due to the proposed project are compared to thresholds of significance to determine the significance of the changes in the ambient noise environment that are anticipated to result from implementation of the proposed 2005 LRDP.

Public comments in response to the Notice of Preparation of this EIR requested that the following issues be addressed in the EIR:

- Noise impacts from development in the north campus
- Noise impacts related to construction on campus
- Noise impacts produced by the increase in vehicular traffic within the city of Santa Cruz as well as surrounding neighborhoods
- The effect of increased noise levels on wildlife, including nesting birds

The first three topics are addressed in this section. The effect of construction noise on nesting birds is addressed in Section 4.4, *Biological Resources* (Volume I).

4.10.1 Environmental Setting

4.10.1.1 Study Area

For purposes of evaluating the noise impacts of the proposed project, the study area is defined to include all of the main campus, residences or schools within 1,000 feet of the campus boundary, 2300 Delaware Avenue property and residences/parks within 1,000 feet of the property boundary, and major city streets leading to the main campus or 2300 Delaware Avenue including Bay, High, Mission, and Swift Streets, Delaware Avenue, and Western Drive.[1]

4.10.1.2 Fundamentals of Environmental Noise

What is commonly referred to as "noise" is actually airborne noise. It is noise that travels through the air—such as the sound of traffic on a nearby roadway, or children playing in a playground. Groundborne noise is the rumbling sound caused by vibration or oscillatory motion. With groundborne noise, buildings

[1] Although other streets would also experience an increase in traffic related to the 2005 LRDP, noise levels would not increase substantially, as discussed later in this section.

and other structures act like speakers for low amplitude noise. As an example, groundborne noise is the low rumbling sound that occurs within a building as a train passes beneath or when a structure is close to a heavy construction activity such as pile driving. Unless indicated otherwise, "Noise" as analyzed in the rest of this section, refers to airborne noise.

The human response to noise is subjective and varies considerably from individual to individual. The effects of noise can range from interference with sleep, concentration, and communication, to hearing loss as a result of exposure at the highest levels. Although they have not been quantified, the adverse human health effects caused by increased environmental noise are suspected to be substantial.

Sound is described technically in terms of amplitude (loudness) and frequency (pitch). The standard unit of sound amplitude measurement is the decibel (dB). Because the human ear is not equally sensitive to sound at all frequencies, a frequency-dependent rating scale has been devised to relate noise to human auditory sensitivity. The decibel scale adjusted for A (audibility)-weighting (dBA) provides this compensation by discriminating among frequencies in a manner approximating the sensitivity of the human ear. Over the audible range of pitch, the human ear is less sensitive to low frequencies and very high-pitched sound and is more sensitive to mid-frequency sounds. Figure 4.10-1, *Common Noise Levels by Source*, lists A-weighted noise levels for common noise events in the environment and industry.

Community Noise

Community noise refers to the base of steady background ("ambient") noise that is the sum of many distant and indistinguishable noise sources, plus, superimposed on the distant background noise, the sound from individual local sources.

A number of noise descriptors are used to analyze the adverse effect of community noise on people. To account for the varying nature of environmental noise, these descriptors consider that the potential effect of noise upon people is largely dependent upon the total acoustical energy content of the noise, the context of the noise occurrence, and the time of day when the noise occurs. Common noise descriptors include the following:

- L_{eq}, the equivalent energy noise level, is the average acoustic energy content of noise, measured during a prescribed period (typically 1 hour). Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during the exposure period. L_{eq} values do not include a penalty for noise that might occur at night.
- L_{dn}, the Day-Night Average Sound Level (also abbreviated as DNL), is a 24-hour-average L_{eq} with a 10 dBA "penalty" added to noise occurring during the hours of 10:00 PM to 7:00 AM to account for the greater nocturnal noise sensitivity of people.
- CNEL, the Community Noise Equivalent Level, is also a 24-hour-average L_{eq} with no penalty added to noise during the daytime hours between 7:00 AM and 7:00 PM, a penalty of 5 dB added to evening noise occurring between 7:00 PM and 10:00 PM, and a penalty of 10 dB added to nighttime noise occurring between 10:00 PM and 7:00 AM.

Other noise descriptors (or metrics) give information on the range of instantaneous noise levels experienced over time. Examples include:

- L_{max}, the highest energy noise level experienced during a given period, usually a single event such as an aircraft overflight.
- L_{min}, the lowest energy noise level experienced during a given period during a complete lull in noise-producing activity.

L_n values (centiles) indicate noise levels that were exceeded “n” percent of the time during a specified period. For instance, L_{50} is the noise level that was exceeded for a cumulative 50 percent of the time during a measurement period (e.g., 30 cumulative minutes during a 1-hour measurement period).

Community noise environments are typically represented by noise levels measured for brief periods throughout the day and night, or during a 24-hour period (i.e., by L_{dn} or CNEL). The 1-hour period is especially useful for characterizing noise caused by short-term events, such as operation of construction equipment or concert noise (i.e., with L_{eq}). Community noise levels are generally perceived as quiet when the L_{dn} is below 50 dBA, moderate in the 50 to 60 dBA L_{dn} range, and loud above 60 dBA L_{dn}. Noisy urban residential areas are usually above 65 dBA L_{dn}. Along major thoroughfares, roadside noise levels are typically between 65 and 75 dBA L_{dn}. Interior noise levels above 40 dBA L_{eq} at night can disrupt sleep, and levels greater than 85 dBA L_{eq} can cause temporary or permanent hearing loss.

Noise levels from a source diminish as distance to the receptor increases. Other factors such as noise-reflecting surfaces or shielding from barriers also help intensify or reduce noise levels at any given location. A commonly used rule of thumb for traffic noise is that for every doubling of distance from the road, the noise level is reduced by 3 to 4.5 dBA. For a single source of noise, such as a piece of stationary equipment, the noise is reduced by 6 dBA for each doubling of distance away from the source. Noise levels may also be reduced by intervening structures; generally, a single row of buildings between the receptor and the noise source reduces the noise level by about 5 dBA.

Community reaction to a change in noise levels varies, depending upon the magnitude of the change. In general, a difference of 3 dBA is a minimally perceptible change, while a 5 dBA difference is the typical threshold that would cause a change in community reaction. An increase of 10 dBA would be perceived by people as a doubling of loudness. A doubling of traffic flow on any given roadway would cause a noise increase of approximately 3 dBA. Similarly, doubling the amount of railroad activity would increase the rail contribution to community noise level by 3 dBA.

For typical residential construction (i.e., light-frame construction with ordinary sash windows), the minimum amount of exterior-to-interior noise reduction is 20 dBA with exterior doors and windows closed. With windows open, the typical amount of exterior-to-interior noise reduction that can be expected is approximately 13 dBA. Buildings constructed of masonry with dual-glazed windows and solid core exterior doors can be expected to achieve an exterior-to-interior noise reduction of approximately 25 dBA or more.

4.10.1.3 Regulatory Background

Federal and state laws have led to the establishment of noise guidelines for the protection of the population from adverse effects of environmental noise. Local noise compatibility guidelines are often based on the broader guidelines of state and federal agencies. Many local noise goals are implemented as planning guidelines and by enforceable noise ordinances.

Federal

Among other guidance, the Noise Control Act of 1972 directed the U.S. Environmental Protection Agency (U.S. EPA) to develop noise level guidelines that would protect the population from the adverse effects of environmental noise. The U.S. EPA published a guideline (U.S. EPA 1974) containing recommendations of 55 dBA L_{dn} outdoors and 45 dBA L_{dn} indoors as a goal for residential land uses. The agency is careful to stress that the recommendations contain a factor of safety and do not consider technical or economic feasibility issues, and therefore should not be construed as standards or regulations.

The Department of Housing and Urban Development (HUD) standards define L_{dn} levels below 65 dBA outdoors as acceptable for residential use. Outdoor levels up to 75 dBA L_{dn} may be made acceptable through the use of insulation in buildings.

State

The pertinent California regulations are contained in the California Code of Regulations (CCR). Title 24 "Noise Insulation Standards" establish the acceptable interior environmental noise level (45 dBA L_{dn}) for multi-family dwellings (that may be extended by local legislative action to include single-family dwellings). Section 65302(f) of the CCR establishes the requirement that local land use planning jurisdictions prepare a General Plan. The Noise Element is a mandatory component of the General Plan. It may include general community noise guidelines developed by the California Department of Health Services and specific planning guidelines for noise/land use compatibility developed by the local jurisdiction. The state guidelines also recommend that the local jurisdiction consider adopting a local nuisance noise control ordinance. The California Department of Health Services has developed guidelines (1987) for community noise acceptability with which given uses are compatible for planning use by local agencies. For these purposes, selected relevant noise level guidelines include:

- CNEL[2] below 60 dBA—normally acceptable for low-density residential use
- CNEL of 55 to 70 dBA—conditionally acceptable for low-density residential use
- CNEL below 65 dBA—normally acceptable for high-density residential use
- CNEL of 60 to 70 dBA—conditionally acceptable for high-density residential, transient lodging, churches, and educational and medical facilities
- CNEL below 70 dBA—normally acceptable for playgrounds and neighborhood parks.

"Normally acceptable" noise levels are defined as levels satisfactory for the specified land use, assuming that conventional construction is used in buildings. "Conditionally acceptable" noise levels may require some additional noise attenuation or special study. Note that, under most of these land use categories, overlapping ranges of acceptability and unacceptability are presented, leaving some ambiguity in areas where noise levels fall within the overlapping range.

[2] L_{dn} may be considered nearly equal to CNEL.

The State of California additionally regulates the noise emission levels of licensed motor vehicles traveling on public thoroughfares, sets noise emission limits for certain off-road vehicles and watercraft, and sets required sound levels for light-rail transit vehicle warning signals. The extensive state regulations pertaining to worker noise exposure are for the most part applicable only to the construction phase of any project (for example California Occupational Safety and Health Administration Occupational Noise Exposure Regulations [8 CCR, General Industrial Safety Orders, Article 105, Control of Noise Exposure, §5095, et seq.]) or for workers in a “central plant” or a maintenance facility, or involved in the use of landscape maintenance equipment or heavy machinery.

Local

Although the University, as a state entity, is not subject to local regulation, local standards are a subject of importance to the University in evaluating impacts. It is University policy to seek consistency with local plans and policies where feasible. The State of California Governor’s Office of Planning and Research (OPR) has developed specific planning guidelines for noise/land use compatibility, which have been adopted by the City of Santa Cruz in the Noise Element of its General Plan (1994). These standards are shown in Table 4.10-1.

Table 4.10-1
City of Santa Cruz Acceptable Noise Levels for Land Use Categories

Land Use Category	Levels of Acceptability[a], L_{dn}[b] or CNEL[c] (dBA) [d]			
	Normally Acceptable	**Conditionally Acceptable**	**Normally Unacceptable**	**Clearly Unacceptable**
Residential – Low Density Single Family, Duplex, Mobile Homes	Less than 60	55 to 70	70 to 75	More than 75
Residential – Multi Family	Less than 65	60 to 70	70 to 75	More than 75
Transient Lodging – Motels, Hotels	Less than 65	60 to 70	70 to 80	More than 80
Schools, Libraries, Churches, Hospitals, Nursing Homes	Less than 70	60 to 70	70 to 80	More than 80
Auditoriums, Concert Halls, Amphitheaters	-	Less than 70	-	More than 65
Sports Arena, Outdoor Spectator Sports	-	Less than 75	-	More than 70
Playgrounds, Neighborhood Parks	Less than 70	-	67 to 75	More than 73
Golf Courses, Riding Stables, Water Recreation, Cemeteries	Less than 75	-	70 to 80	More than 80
Office Buildings, Business Commercial and Professional	Less than 70	68 to 73	More than 75	-
Industrial, Manufacturing, Utilities, Agriculture	Less than 75	70 to 80	More than 75	-

Source: Governor’s Office of Planning and Research
Notes:
(a) Levels of Acceptability are defined as follows:
Normally Acceptable: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional constructi without any special noise insulation requirements.
Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.
Normally Unacceptable: New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.
Clearly Unacceptable: New construction or development clearly should not be undertaken.
(b) Day-Night Level (DNL) is a descriptor of the community noise environment that represents the energy average of the A-weighted sound levels occurring during a 24-hour period, and that accounts for the greater sensitivity of most people to nighttime noise by weighting noise levels at night (“penalizing” nighttime noises). Noise between 10:00 PM and 7:00 AM is weighted (penalized) by adding 10 dBA to take into account the greater annoyance of nighttime noises.
(c) Community Noise Equivalent Level (CNEL) is the average A-weighted noise level during a 24-hour day, obtained by addition of 5 decibels in the evening from 7:00 to 10:00 PM, and an addition of a 10-decibel penalty in the night between 10:00 PM and 7:00 AM.
(d) dBA is the decibel scale adjusted for audibility (A-weighted).

In locating low-density residential uses, normally acceptable existing exterior noise levels are those below 60 dBA L_{dn} or CNEL. For multi-family residences, normally acceptable noise levels are those below 65 dBA L_{dn} or CNEL. Most of the on-campus housing falls into the category of multi-family housing (medium- to high-density) and therefore would be subject to the 65 dBA acceptability level for normally acceptable noise levels. Offices, laboratories, and academic buildings on campus would be subject to the 70 dBA acceptability level for normally acceptable noise levels, which is the threshold for schools and office buildings.

Apart from the noise/land use compatibility levels listed in the City's General Plan, the city has a noise control ordinance (Municipal Code Section 24.14.260) which states that noise levels shall not exceed the local ambient noise level on residential property by more than 5 dBA, or the local ambient noise level on non-residential property by more than 6 dBA. Furthermore, Section 9.36.010 of the Municipal Code prohibits production of offensive noise from 10:00 PM to 8:00 AM within 100 feet of any building or place regularly used for sleeping purposes, or that disturbs, or would tend to disturb, any person within hearing distance of such noise. The Municipal Code defines "offensive noise" as any noise that is likely to disturb people in the vicinity of such noise, and includes, but is not limited to, noise made by any device, structure, machine, or construction.

4.10.1.4 Noise-Sensitive Land Uses Within and Adjacent to the Campus

For purposes of this analysis, noise-sensitive receptors include residences, daycare centers, schools, hospitals and parks. Noise-sensitive receptors located close to heavily traveled roadways or other stationary noise sources on campus include the residents and children of Family Student Housing complex and Day Care Facility near Heller Drive at Koshland Way, the Kresge East Apartments near Heller Drive, the Crown/Merrill Apartments near Chinquapin Road, the Cowell Apartments on Hagar Drive, the academic buildings near the campus Central Heating Plant, and the recreation area and residences near the East Field.

There are residences off-campus to the south and southeast of the campus. There are single- and multi-family residences on both sides of High Street, Bay Street, and in some locations on Mission Street. Single-family residences are also located along Western Drive. Western Drive may be used for personal vehicle travel between the main campus and UC Santa Cruz-owned/leased facilities in the lower west side of Santa Cruz but would not be used by campus trucks because the use of trucks on this street is restricted to deliveries at addresses on Western Drive. The Santa Cruz Waldorf School and residences in the Cave Gulch neighborhood are adjacent to Empire Grade Road, to the west of the UC Santa Cruz campus. No noise-sensitive receptors were identified east or north of the campus.

Noise-sensitive receptors adjacent to the 2300 Delaware Avenue site include Natural Bridges State Beach and the residences along Swift Street and Delaware Avenue, including the De Anza Santa Cruz residential community to the southwest of 2300 Delaware Avenue site. Other sensitive receptors include residents who walk, jog, or bicycle along Delaware Avenue.

4.10.1.5 Noise Sources

The primary existing noise source in the project vicinity (both on campus and off campus) is motor vehicle traffic. Because they represent a relatively high percentage of the vehicle mix, buses are a large contributor to the motor vehicle noise. Within the campus core area, the noise from the Central Heating Plant cooling towers also contributes to ambient noise. Secondary, intermittent sources of noise include distant aircraft noise, sounds from parking lots, and noise from recreational activities.

Roadways

The most pervasive noise sources in developed areas are related to transportation. Vehicle noise along heavily traveled roadways commonly causes sustained elevated noise levels. In densely developed communities, traffic noise often occurs in close proximity to land uses where people are sensitive to noise.

Most of the vehicles traveling to and from the main campus take High Street or Bay Street. Inside the campus, the main traffic circulation loops around the campus starting at the intersection of Bay Street and High Street, and then follows a loop formed by Glenn Coolidge Drive, Hagar Drive, McLaughlin Drive, and Heller Drive. Buses travel in both directions around the campus loop. These roadways tend to be heavily traveled during the daytime, at moderate vehicle speeds, and handle buses and medium-duty trucks but generally few heavy-duty trucks. Motor vehicle traffic is the predominant noise source across the project area.

Stationary Sources

Stationary noise sources include common building or home mechanical equipment, such as air conditioners, ventilation systems, pool pumps, and institutional and agricultural operations. These noise sources may result in environmental effects when they are in proximity of land uses where people are likely to be sensitive to noise. No major industrial or manufacturing facilities are presently located in the project area. On campus, the principal existing stationary noise sources are the cooling towers, cogeneration plant, and other infrastructure machinery at the Central Heating Plant at the north end of the central campus.

Construction Activity

Construction traffic and equipment operation at construction sites temporarily elevates noise levels at the individual project site and in its vicinity. Construction noise is typically most noticeable in quieter residential areas that are in proximity to project construction locations. Noise levels vary depending on the distance between construction activity and the receptors and the type of equipment used, how the equipment is operated, and how well it is maintained. Presently, there is an active construction site on the central campus across from the Baskin Engineering Building at an infill development site. Although construction activity was not taking place during the noise surveys conducted for this EIR, it can be assumed that construction activity at that location would expose nearby noise-sensitive receptors such as laboratories and lecture halls in the core buildings to elevated noise levels. This was concluded to be a significant unavoidable impact of the project in the EIR for that project (UCSC 2002).

4.10.1.6 Ambient Noise Levels in the Project Area

In order to evaluate current conditions and assess potential project noise impacts, an ambient noise level survey was conducted on February 22, February 23, April 14, and April 15, 2005. The noise survey was conducted at selected sites in the project area, as shown in Figure 4.10-2, *Noise Measurement Locations*. The measurement locations were selected to be representative of the noise-sensitive receptors in the study area and included sites of existing residential, recreational, and educational land uses. As noted earlier, noise-sensitive receptors include single-family and multi-family residences, schools, daycare facilities, and hospitals. On campus, academic buildings are also considered noise sensitive.

Noise measurement locations were selected at/near existing homes along major roadways that are used to access the main campus or 2300 Delaware Avenue, including High Street, Bay Street, Mission Street, Western Drive, and Delaware Avenue, as these roadways are expected to experience the highest increases in traffic due to campus growth under the 2005 LRDP. Note that noise-sensitive receptors are present along all of the roadways listed above. Although Mission Street is largely flanked by non-sensitive land uses, there are some multi-family residences and a school present along that roadway. Therefore, LT-4 and ST-13 were selected to measure ambient noise levels along Mission Street. On the main campus, noise measurement locations were selected near existing on-campus housing or major recreational facilities.

Unattended long-term (LT) (typically 24-hour) and attended short-term (ST) (2- to 15-minute) noise measurements were taken. The long-term measurements were made with one Type 1 Larson Davis Model 820 sound level meter/analyzer, and three Type 2 (“engineering grade”) Metrosonics db308 community noise analyzers (CNAs). The short-term measurements were made with a tripod-mounted Type 1 Brüel & Kjær Type 2231 sound level meter. The sound-measuring instruments used for the survey were set on slow time response using the A-weighted decibel (dBA) scale for all of the noise measurements. To ensure accuracy, the laboratory calibration of the instruments was field checked before and after each measurement period using an acoustical calibrator. The accuracy of the acoustical calibrator is maintained through a program established by the manufacturer, and is traceable to the National Institute of Standards and Technology. The sound measurement instruments meet the requirements of the American National Standard S1.4-1983 and the International Electrotechnical Commission Publications 804 and 651. In all cases, the microphone height was 5 feet above the ground and the microphone was equipped with a windscreen. The sound level meter/analyzer samples the ambient noise levels over the duration of the measurement and calculates an equivalent noise level $L_{eq.}$

Short-term noise measurements were made to calculate L_{eq} noise levels during busy traffic hours and to calibrate the noise prediction model. Long-term noise measurements were made to obtain the trends in ambient noise levels variation during a 24-hour period and obtain AM and PM peak noise levels.

Long-term noise measurements were conducted at four locations. As shown on Figure 4.10-2, *Noise Measurement Locations*, LT-1 was adjacent to the Family Student Housing complex on campus, adjacent to Heller Drive. LT-2 was adjacent to the off-campus apartments at 724 Nobel Drive, immediately east of Bay Street. LT-3 was located at a single-family residence at 955 High Street. LT-4 was located in an off-campus parking lot at 611 Mission Street where there is a multi-family housing complex. Locations of noise measurements were selected along potential routes for trips originating or ending at the main campus and the 2300 Delaware Avenue. These locations were also selected to represent the sensitive land uses along those routes. For example, the measurement location along High Street was selected to represent adjacent single-family homes, while the measurement location along Mission Street was selected to reflect the multi-family land uses that are located along that road segment.

The noise levels recorded by the sound meters at the long-term measurement locations were used to calculate a 24-hour L_{eq} and L_{dn}. The noise levels recorded by the sound meters at the short-term measurement locations were used to estimate L_{eq} as well as other noise metrics. The results of the ambient noise level survey are summarized in Tables 4.10-2 and 4.10-3. Additionally, the hourly L_{eq} sound levels for LT-1, LT-2, LT-3, and LT-4 are shown graphically in Figures 4.10-3, 4.10-4, 4.10-5, and 4.10-6, *Hourly Noise Levels*, respectively. The existing noise environment at all monitored locations was dominated by noise from traffic along adjacent streets. Other noise sources included birds and distant aircraft. No substantial noise was noted from other human activities during measurement.

As shown on Table 4.10-2, three of the four monitored locations currently experience L_{dn} noise at levels that are above the City of Santa Cruz's exterior noise standard of 65 dBA L_{dn} for multi-family residential areas and 60 dBA L_{dn} for single-family residential areas.

Table 4.10-2
Long-Term Noise Measurement Data Summary

Site ID	Measurement Date	Location	Measurement Results (dBA)		
			24-hr L_{eq}	L_{dn}	CNEL
LT-1	15:30, 2/22/05 – 16:00, 2/23/05	Adjacent to FSH apartments, overlooking Heller Drive	55	58	58
LT-2	17:00, 2/22/05 – 17:00, 2/23/03	724 Nobel Drive, Unit A, just east of Bay Street	63	66	67
LT-3	17:00, 2/22/05 – 17:00, 2/23/05	955 High Street	66	69	70
LT-4	16:00, 4/13/05 – 16:00, 4/14/05	611 Mission Street	69	73	74

Concurrently with the long-term noise measurements, short-term noise measurements were conducted at 13 sites (ST-1 through ST-13). Measurement locations are shown on Figure 4.10-2, and the short-term noise measurement data are summarized in Table 4.10-3. The measurements were conducted at existing noise-sensitive land uses, consisting primarily of residential use but also including recreational and educational facilities. Weather conditions during the survey period were calm, with clear to partly cloudy skies. Air temperatures varied from 54°F to 76°F, with 15 to 82 percent relative humidity. Wind speed varied from 0 to 3 miles per hour during the survey period. The weather conditions were good to ideal for conducting noise measurements, and there was no adverse effect on measurement accuracy due to the weather. As shown in Table 4.10-3, the measured ambient noise levels varied from 43 to 67.8 dBA L_{eq}. Generally, traffic was the dominant noise source at the monitored locations.

Table 4.10-3
Short-Term Noise Measurement Data Summary

Site ID	Location	Measurement Period			Noise Sources	Measurement Results (dBA)					
		Date	Time	Duration (minutes)		L_{eq}	L_{max}	L_{min}	L_{90}	L_{50}	L_{10}
Vicinity of 2300 Delaware Avenue											
ST-1	Natural Bridges State Beach, south of 2300 Delaware Avenue	2/22/2005	17:25	15	Traffic, birds, distant aircraft, cyclists, cars parking in distance	57.9	71.1	41.9	45.0	50.5	63.0
ST-2	2300 Delaware Avenue, adjacent to Natural Bridges Drive	2/22/2005	17:55	15	Traffic, distant industrial noise to east	59.3	73.5	44.9	47.5	51.5	64.0
Central Campus											
ST-3	Crown Merrill Apartments, adjacent to parking lot	2/23/2005	8:45	15	Distant aircraft overhead, bell tower, trash truck, security truck, parking lot activities	43.2	59.4	32.4	34.0	37.5	46.5
ST-4	Central Heating Plant, near cooling tower	2/23/2005	9:20	2	Cooling tower, pumps, motors	64.3	65.1	62.5	64.0	64.5	64.5
ST-5	Kresge East Apartments	2/23/2005	10:00	15	Traffic, distant aircraft, birds	56.1	72.1	39.6	42.0	48.5	59.5
ST-6	East Field	2/23/2005	11:10	15	Distant fans at recreation center, pool activity, tennis, joggers, distant aircraft	48.8	64.1	45.1	47.0	48.5	50.0
ST-7	Campus Trailer Park parking area	2/23/2005	12:10	15	Distant traffic	44.6	68.9	32.8	34.0	37.5	45.5
ST-11	Adjacent to Family Student Housing, overlooking Heller Drive	2/23/2005	15:55	15	Traffic	55.5	66.1	38.8	48	53.5	59
Adjacent to Main Campus or Along Roads Leading to the Main Campus											
ST-8	Santa Cruz Waldorf School, along Empire Grade Road	2/23/2005	14:05	15	Traffic, distant construction, children playing, distant aircraft	47.5	59.9	31.4	35	42	52.5
ST-9	Bay Street, south of intersection of Bay and Meder	2/23/2005	14:40	15	Traffic	63.1	76.9	44.3	52.0	60.5	67.0
ST-10	Near intersection of High Street and Cardiff Street	2/23/2005	15:10	15	Traffic, distant aircraft, birds	66.0	76.9	50.2	57.5	65.0	69.5
ST-12	418/420 Western Drive, east side of the road	4/14/2005	12:45	15	Traffic	60	74.5	--	43.5	52	64.5
ST-13	Near intersection of Mission Street (Hwy 1) and Riggs Street	4/14/2005	15:35	15	Traffic	67.8	80.1	--	52.5	64.5	71.5

Notes:

L_{eq}= equivalent energy noise level; L_{max} = highest energy noise level experienced during a given period; L_{min}= lowest energy noise level experienced during a given period; L_{10} =noise levels exceeded 10 percent of the time during a given period; L_{50}= noise levels exceeded 50 percent of the time during a given period; L_{90}= noise levels exceeded 90 percent of the time during a given period.

As the data in Tables 4.10-2 and 4.10-3 show, noise levels on the main campus are generally low, under 56 dBA L_{eq}. Near 2300 Delaware Avenue, noise levels are also below 60 dBA L_{eq}. Along major streets leading to the main campus, noise levels are substantially higher and range from 60 to 69 dBA L_{eq}, and between 67 and 74 dBA CNEL.

4.10.2 Impacts and Mitigation Measures

4.10.2.1 Standards of Significance

The following standards of significance are based on guidance provided by Appendix G of the CEQA Guidelines. For the purposes of this EIR, the project would have a significant impact with regard to noise if it would result in any of the following:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

  For purposes of evaluating noise impacts from traffic and other permanent noise sources, the following noise standards consistent with State guidelines and City of Santa Cruz General Plan were used:

  – 60 dBA CNEL for single-family residences

  – 65 dBA CNEL for multi-family residences

  – 70 dBA CNEL for schools and parks

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

- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

  A substantial permanent increase in noise was evaluated based on the following criteria:

  – A 3 dBA or greater increase if CNEL for Without Project scenario is equal to or greater than 65 dBA

  – A 5 dBA or greater increase if CNEL for Without Project scenario is 50–65 dBA

  – A 10 dBA or greater increase if CNEL for Without Project is < 50 dBA

- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project

  A substantial temporary increase in ambient noise levels (associated mainly with construction activities) was evaluated based on the following criteria:

  – 80 dBA Leq (8h)[3] daytime

[3] $L_{eq(8h)}$ is an average measurement over an eight-hour period.

– 80 dBA Leq (8h) evening

– 70 dBA Leq (8h) nighttime

Note that all impacts were estimated and evaluated not at the source of noise but at the site where the nearest noise-sensitive receptor is located.

Non-Traffic Noise

Thresholds for periodic, intermittent, or temporary noise sources such as sports events, construction activities, and other fixed noise sources employ forms of the hourly Equivalent Sound Level (L_{eq}) for different periods of the day. Noise from sports events and construction activities cannot be evaluated with CNEL/DNL metrics because, by their nature, the noise from these sources is typically of short duration and occurs only intermittently. Therefore, to evaluate construction noise, an 8-hour L_{eq} was employed. Construction noise impacts would be significant if noise levels experienced at the nearest sensitive receptors exceeded 80 dBA $L_{eq\ (8h)}$ during the daytime and in the evening or exceeded 70 dBA $L_{eq\ (8h)}$ at night. Because construction activity generally increases the noise levels substantially over a short period of time, the impact is typically not evaluated in terms of a substantial increase.

Traffic Noise and Other Stationary Sources

Thresholds for road traffic sources or other permanent stationary sources such as generators and cooling towers employ long-term noise metrics such as CNEL. For these noise sources, the thresholds of significance are:

- 60 dBA CNEL for single-family residences; 65 dBA CNEL for multi-family residences; and 70 dBA CNEL for schools/parks, or
- Increases of 10 dBA CNEL, 5 dBA CNEL and 3 dBA CNEL, respectively, for receptors whose predicted (without project) CNEL would be less than 50 dBA CNEL, between 50 and 65 dBA CNEL, and greater than or equal to 65 dBA CNEL, respectively.

These thresholds would apply to the effects of road traffic noise on- and off-campus noise-sensitive land uses, as well as to effects of traffic and other permanent noise sources on-campus sensitive land uses. In this EIR, an increase of 3 decibels is considered a substantial noise increase in areas where the ambient or background noise levels under Without Project conditions are above the city and state noise thresholds for affected land uses. In areas where the ambient or background noise levels Without Project conditions are low or moderate, increases of 5 and 10 decibels are considered substantial. The use of this “sliding scale” is appropriate because where ambient/background levels are low, an increase of over 3 decibels would be perceptible but would not cause annoyance or activity interference, and therefore would not be considered significant. In contrast, if the ambient/background noise levels are high (above 60 dBA in single-family residential areas), any perceptible increase could cause an increase in annoyance.

4.10.2.2 CEQA Checklist Items Adequately Addressed in the Initial Study

The following checklist items under Appendix G of the CEQA Guidelines related to Noise are not discussed in the following analysis because they are not relevant to the proposed project for the reasons discussed below.

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

  Neither the main campus nor the 2300 Delaware Avenue property is located within an airport land use plan or within 2 miles of a public airport or public use airport. No impact would occur and no additional analysis is needed.

- For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels.

  Neither the main campus nor the 2300 Delaware Avenue property is located within 2 miles of a private airstrip. There would be no impact and no additional analysis is needed.

4.10.2.3 Analytical Method

The principal noise generators associated with the 2005 LRDP would be construction activities (temporary) and project-related motor-vehicle traffic (long term). Other noise generators associated with the proposed project include routine activities such as use of landscape maintenance equipment, infrastructure mechanical equipment, recreational activities, and parking lot activities. Additional secondary noise sources would be periodic short-term special events at the campus.

Construction

Potential noise effects from construction activities were assessed using a standard reference for construction noise (U.S. EPA 1971). The U.S. EPA has compiled data related to the noise-generating characteristics of specific types of construction equipment and noise levels that can be achieved with implementation of feasible control measures. These data are presented in Table 4.10-4. As shown, heavy equipment can generate noise levels ranging from approximately 76 dBA to 89 dBA when measured at 50 feet, and 70 dBA to 83 dBA when measured at 100 feet, without implementation of noise reduction measures. The noisiest pieces of equipment that would be used during the project’s construction phase include jackhammers and pavers, which produce noise levels of approximately 75 and 80 dBA at 50 feet with implementation of the required feasible noise reduction control measures, as shown in Table 4.10-4. As with all construction equipment noise, these noise levels would diminish rapidly with distance from the construction site, with a decrease of approximately 6 dBA per doubling of distance. Persons closest to any portion of the area of disturbance that could be affected by noise generated during construction include faculty, staff, and students who work or live near the new building sites on campus, and residents, and joggers and other users of parks and open space near the 2300 Delaware Avenue site.[4]

Table 4.10-4
Noise Levels and Abatement Potential of Construction Equipment Noise at 50 and 100 Feet

Equipment	Noise Level at 50 Feet		Noise Level at 100 Feet	
	Without Controls	With Controls[a]	Without Controls	With Controls[a]
Earthmoving	dBA			
Front Loaders	79	75	73	69
Backhoes	85	75	79	69
Dozers	80	75	74	69
Tractors	80	75	74	69
Graders	85	75	79	69
Pavers	89	80	83	74
Trucks	82	75	76	69
Materials Handling				
Concrete Mixers	85	75	79	69
Concrete Pump	82	75	76	69
Crane	83	75	77	69
Concrete Crushers	85	75	79	69
Stationary				
Pumps	76	75	70	69
Generator	78	75	72	69
Compressors	81	75	75	69
Impact				
Jack Hammers	88	75	82	69
Pneumatic Tools	86	80	80	74
Other				
Saws	78	75	72	69
Vibrators	76	75	70	69

Source: U.S. EPA 1971.

Note:

(a) Noise levels that can be achieved with implementation of feasible noise controls. Feasible noise controls include selecting quieter procedures or machines and implementing noise-control features requiring no major redesign or extreme cost (e.g., improved mufflers, equipment redesign, use of silencers, shields, shrouds, ducts, and engine enclosures).

Traffic

Potential increases in noise levels from vehicular traffic were estimated using the Federal Highway Administration Traffic Noise Model (FHWA-TNM), Version 2.0. Information used in the model includes the existing year (Year 2004) and horizon year (Year 2010 for project level and 2020 for LRDP) traffic volumes and speeds. Noise levels were modeled at locations representative of noise-sensitive receivers. The receptors were assumed at a height of 1.5 meters (5 feet) above the local ground elevation. These receptors represent apartment buildings, single-family houses, and other residential units adjacent to

[4] The impact of construction noise on nesting birds is addressed in Section 4.4, *Biological Resources* (Volume I).

traffic routes. The computer model was calibrated by comparing calculated noise levels with actual (measured) noise levels. The calculated levels are modeled results obtained from traffic counts and other parameters recorded during the noise measurements. The difference between calculated and measured noise levels (more commonly known as a calibration factor) was then applied to calculated future noise levels. For most locations, traffic data collected simultaneously with field noise measurements was used in the modeling. This was of importance for on-campus locations where campus buses currently run at 7-minute intervals. Existing bus data for these locations was incorporated in the final model. Traffic volumes were obtained from the traffic study conducted for the 2005 LRDP for 2020 With Project traffic and Without Project traffic conditions (including projected bus data), and were used to model noise levels under both scenarios. This model, thus, predicts noise effects of increased traffic associated with development under the proposed 2005 LRDP.

Traffic noise impacts were calculated by comparing the existing 2004 baseline conditions, the 2020 Without Project scenario, and the 2020 With Project scenario (full development under the 2005 LRDP) to identify both the potential initial noise impact resulting from increased road traffic that would occur without implementation of the 2005 LRDP, and the total impact that could occur through 2020 including the traffic associated with campus growth under the 2005 LRDP.

4.10.2.4 2005 LRDP Impacts and Mitigation Measures

LRDP Impact NOIS-1: Construction of campus facilities pursuant to the 2005 LRDP could expose nearby sensitive receptors to excessive airborne noise but not to excessive groundborne vibration or groundborne noise.

Significance: Potentially significant

LRDP Mitigation NOIS-1: Prior to initiation of construction of a specific development project, the Campus shall approve a construction noise mitigation program that shall be implemented for each construction project. This shall include but not be limited to the following:

- Construction equipment used on campus is properly maintained and has been outfitted with feasible noise-reduction devices to minimize construction-generated noise.
- Stationary noise sources such as generators or pumps are located at least 100 feet away from noise-sensitive land uses as feasible.
- Laydown and construction vehicle staging areas are located at least 100 feet away from noise-sensitive land uses as feasible.
- Whenever possible, academic, administrative, and residential areas that will be subject to construction noise will be informed in writing at least a week before the start of each construction project.

- Loud construction activity (i.e., construction activity such as jackhammering, concrete sawing, asphalt removal, and large-scale grading operations) within 100 feet of a residential or academic building shall not be scheduled during finals week.
- Loud construction activity as described above within 100 feet of an academic or residential use shall, to the extent feasible, be scheduled during holidays, Thanksgiving break, Christmas break, Spring break, or Summer break.
- Loud construction activity within 100 feet of a residential building shall be restricted to the hours between 7:30 AM and 7:30 PM, Monday through Saturday.
- Loud construction activity within 100 feet of an academic building shall be scheduled to the extent feasible on weekends.

Residual Significance: Significant and unavoidable

Construction activities that might expose persons to excessive groundborne vibration or groundborne noise could cause a potentially significant impact. However, normal construction activities using conventional construction techniques and equipment would not generate substantial levels of vibration or groundborne noise. Pile driving, blasting, or other special construction techniques are not anticipated to be used for construction of the types of facilities identified under the 2005 LRDP. Therefore excessive ground vibration and groundborne noise would not be generated.

Routine airborne noise levels from conventional construction activities (with a typical number of pieces of equipment operating on the site) range from 75 to 86 dBA L_{eq} at a distance of 50 feet. Due to improvements in construction equipment silencing technology developed during the past 30 years, these sound levels are 3 decibels less than the noise levels reported in the U.S. EPA 1971 reference study. Typically, the quietest phase of building site construction for similar projects (i.e., schools) is that associated with constructing foundations (75 dBA L_{eq} at a distance of 50 feet), and the typical loudest phases producing 86 dBA L_{eq} at 50 feet are those associated with grading and finishing activities. Noise levels from construction activities generally decrease at a rate of 6 dB per doubling of distance from the activity. Thus, at a distance of 100 feet from the center of construction activities, construction noise levels would range from 69 to 80 dBA L_{eq}. At a distance of 500 feet from the center of construction activities, construction noise during the noisiest phases of construction would range from 55 to 66 dBA L_{eq}. At a distance of 1,000 feet, construction noise ranging between 48 dBA L_{eq} and 60 dBA L_{eq} could be experienced, but actual noise levels would likely be lower due to additional attenuation from ground effects, air absorption, and shielding by miscellaneous intervening structures.

At distances of 100 feet or more from the construction activity, noise from on-campus construction is predicted to be below the significance criteria of 80 dBA L_{eq} daytime and evening and 70 dBA L_{eq} nighttime. If a construction site were less than 100 feet from a nearby receptor, the noise levels would exceed the significance criteria.

Most of the new construction on the campus would occur on the central and north campus, in areas that are distant from off-campus sensitive receptors and relatively distant from most on-campus receptors. Therefore, although noise from construction would be audible and would temporarily elevate the local ambient noise levels to some degree at distances greater than 100 feet from the source, construction noise on the campus would not likely cause an exceedance of the noise impact significance criteria at existing off-campus residences or at receptors on campus, and would, as necessary, be reduced to less-than-significant levels through implementation of LRDP Mitigation NOIS-1.

Construction of new facilities on infill sites on the central campus would, however, occur at distances less than 100 feet from existing and future sensitive receptors on the campus, and would result in noise levels that exceed the criteria at these nearby receptors. Also as construction occurs on the north campus, there could be receptors occupying the new uses who could be with 100 feet of a construction site. This would be a significant impact. LRDP Mitigation NOIS-1 would be implemented to control construction noise on campus to the extent practicable and feasible and would reduce the potential impact at most locations to a less-than-significant level. However, there could potentially be some construction sites on campus where, even with the recommended mitigation, the noise levels would not be reduced to levels below the thresholds. Therefore, the impact is considered significant and unavoidable.

Construction activities at 2300 Delaware Avenue, which consist of interior remodeling and renovations, would not result in noise levels in excess of thresholds at nearby receptors. See Chapter 4, *2300 Delaware Avenue Project* (Volume III) for more information on this issue.

LRDP Impact NOIS-2:	Campus growth under the 2005 LRDP would result in increased vehicular traffic on the city road network, which would not result in a noticeable increase in ambient noise levels at modeled locations.
Significance:	Less than significant
LRDP Mitigation:	Mitigation not required
Residual Significance:	Not applicable

As a result of regional population and employment growth as well as campus growth under the 2005 LRDP, traffic on city streets is expected to increase relative to current conditions. As previously discussed, the noise prediction model, TNM, was used to estimate the future community noise levels from traffic under existing conditions, under a 2020 Without Project scenario, and under a 2020 With Project scenario. The 2020 Without Project scenario includes all traffic that is projected to result from population and employment growth within the county but does not include the additional vehicle trips that would be made to the campus as a result of campus growth through 2020. The 2020 With Project scenario includes the other regional traffic growth described above and the additional trips added by campus growth.

Based on the traffic noise model output for the noisiest hour, a CNEL value was calculated for each modeled locations under all three conditions described above. Six off-campus locations were modeled and evaluated. As discussed earlier in this section, the selected modeling locations are representative of areas that are expected to experience the greatest project-related traffic increases under the proposed 2005 LRDP. Although other streets in the vicinity of the campus would also experience an increase in traffic as a result of the proposed 2005 LRDP, the traffic increases on those streets are anticipated to be smaller than at the modeled locations and therefore the increase in noise due to the traffic would be expected to be smaller. The modeled locations, therefore, represent the reasonable worst case noise increases for this analysis.

The information provided by this modeling, along with the results from the ambient noise survey measurements, was compared to the noise impact significance criteria, to assess whether and where project-related traffic noise would cause a significant impact. The comparisons are presented in Table 4.10-5. A significant impact would result under one of the two following conditions: (1) if future noise levels under the With Project scenario would exceed the noise standards of 60 dBA CNEL for single-family residences, 65 dBA CNEL for multi-family residences, or 70 dBA CNEL for schools and parks; or (2) the modeled increase in noise is substantial, as defined in Section 4.10.2.1, *Standards of Significance.*

Table 4.10-5
Traffic Noise Levels at Off-Campus Locations

		Modeled Results (dBA CNEL)						
Site ID	**Measurement Location**	**Noise Standards**	**Estimated Existing Noise Levels (2005)**	**2020 Without Project Noise Levels**	**2020 With Project Noise Levels**	**2020 Without Project Increase over Existing Noise Levels**	**2020 With Project Increase Over Existing Noise Levels**	**2020 Increase due to LRDP**
ST-1	Natural Bridges Park, south of 2300 Delaware Avenue	70	57.6	61.2	61.3	3.6	3.7	0.1
ST-8	Santa Cruz Waldorf School, along Empire Grade Road	70	50.5	51.5	51.6	1.0	1.1	0.1
ST-12	418/420 Western Drive, east side of the road	60	61.3	62.9	63.8	1.6	2.5	0.9
LT-2	724 Nobel Drive, Unit A, just east of Bay Street	65	66.6	66.7	68.1	0.1	1.5	1.4
LT-3	955 High Street	60	70.5	70.7	71.5	0.2	1.0	0.8
LT-4	611 Mission Street	65	72.6	74.0	74.3	1.4	1.7	0.3

As Table 4.10-5, above, shows with the exception of two locations (ST-1 and ST-8), the existing noise levels along all study area streets are above the 60 to 65 dBA criterion level for single-family and multi-family residential land uses, respectively.

Although noise levels along High Street and Mission Street (LT-3 and LT-4) currently exceed the “normally acceptable” levels for residences, because the increase in noise levels at both these locations with the project would be less than 3 dBA (in fact less than 2 decibels), the increase is not considered a substantial increase and the impact would be less than significant.

Similarly, along Bay Street (LT-2), noise levels in 2020 with the proposed 2005 LRDP would also increase, but the increase would be less than 3 dBA and therefore the increase would not be substantial and the impact would be less than significant.

The existing ambient noise levels along Western Drive are 61 dBA CNEL and would increase to about 64 dBA CNEL with background growth and LRDP-related traffic increase. As shown in Table 4.10-5, there would be a 2.5 dBA increase over existing noise levels under the With Project scenario. According to the standards of significance, described above, in areas where ambient levels without the project are between 50 and 64 dBA CNEL, an increase of 5 decibels would represent a significant impact. Because the total increase in noise along Western Drive is less than 5 decibels (about 2.5 decibels total, with 1 decibel due to LRDP-related traffic), the increase is not substantial and the impact is considered less than significant.

Similarly, at Santa Cruz Waldorf School the noise levels from traffic, along Empire Grade Road, would increase from about 51 dBA CNEL under existing conditions, to about 52 dBA CNEL under the With Project scenario. The modeled noise level would be well below the criterion level of 70 dBA CNEL for schools, and furthermore, the increase in the noise level would not be substantial, and therefore, the impact would be less than significant.

At the 2300 Delaware Avenue site (ST-1), which is adjacent to Natural Bridges State Beach, the existing ambient noise levels are about 58 dBA CNEL. Ambient noise levels are estimated to increase to 61 dBA CNEL with the background and 2005 LRDP-related traffic increase, but would remain below the criterion level of 70 dBA CNEL for parks. The increase in noise levels under the With Project scenario would be 3.7 decibels. As shown in Section 4.10.2.1, *Standards of Significance*, in areas where noise levels without the project are between 50 and 64 decibels, an increase in noise levels would be considered substantial only if it greater more than 5 decibels. Therefore, the projected increase in noise represents a less-than-significant impact on the nearby sensitive receptors in this area.

Although noise impacts have not been modeled at additional locations along the major streets listed above, the modeled locations were selected as representative of all sensitive receptors, and thus these modeled impacts represent the nature and magnitude of impacts that would occur at all locations along these streets. Minor streets in the west side would also see an increase in traffic due to the proposed project, but because the increase in traffic along the minor streets would be smaller than on the major streets, the likely increases in noise along these minor streets would not exceed the noise increases modeled for the major streets. As noted earlier, it takes a doubling of traffic to produce a 3-decibel increase in noise levels. The traffic along other streets would not be doubled as a result of the implementation of the proposed 2005 LRDP.

Also note that these noise increases are predicted based on traffic volumes associated with full development under the 2005 LRDP (that is, projected levels in 2020). In the interim years (before 2020), because the traffic volumes would be lower than at full development under the 2005 LRDP, the noise increases would also be lower.

LRDP Impact NOIS-3:	Future residents on the campus would not be exposed to high noise levels from increased vehicular traffic on the campus road network.
Significance:	Less than significant

LRDP Mitigation NOIS-3:	For future noise-sensitive land uses such as Family Student Housing and other housing complexes that would be constructed under the 2005 LRDP, building and area layouts shall incorporate noise control as a design feature, as feasible. Noise control features would include increased setbacks, landscaped berms or vegetation screens, and building placement to shield noise-sensitive exterior areas from direct roadway exposures. The Campus may also use other noise attenuation measures such as double-pane windows and insulation to minimize interior noise levels.
Residual Significance:	Not applicable

The 2005 LRDP proposes development of additional housing for both students and employees on the campus. All of the employee housing, and some of the student housing, is planned for the north campus along the proposed north campus loop road. Because that roadway would serve mainly the persons living in that portion of the campus, traffic volumes along the north campus loop road would not be high and therefore are not expected to expose the new residents of the north campus to high noise levels.

Some of the new housing for students included in the proposed 2005 LRDP would be built on the central campus. This would include the redevelopment of the Family Student Housing complex along Heller Drive in the western portion of the campus, and student apartments built at infill sites in and around the areas currently developed with student housing. Some of these infill sites would be located close to campus roads, and residents of these new housing units could potentially be exposed to elevated noise levels from traffic on campus streets. Table 4.10-6, below, shows the existing noise levels near Family Student Housing Complex and Kresge East Apartments. Noise measurement locations are shown on Figure 4.10-2. Noise measurements conducted near these two housing complexes in 2005 show that, based on existing traffic and other noise sources in the area, the existing noise level along the first row of apartments in the Family Student Housing complex facing Heller Drive is about 57 dBA CNEL. At Kresge East Apartments, the existing noise level is about 62 dBA CNEL. With the increase in traffic along Heller Drive as a result of campus growth under the 2005 LRDP, at the Family Student Housing complex the noise level would increase to about 58 dBA CNEL, an increase of about 1 decibel. Noise due to the increase in Heller Drive traffic would increase by less than 0.5 decibel near Kresge East Apartments. At both locations, the resultant CNEL would be below 65 dBA CNEL and, therefore, the residents would not be exposed to excessive noise levels from the roadway.

Table 4.10-6
Traffic Noise Levels at On-Campus Locations

Site ID	Measurement Location	Modeled Results (dBA CNEL)						
		Criterion Level	Estimated Existing Noise Levels (2005)	2020 Without Project Noise Levels	2020 With Project Noise Levels	2020 Without Project Increase over Existing Noise Levels	2020 With Project Increase Over Existing Noise Levels	2020 Increase due to LRDP
ST-5	Kresge East Apartments	65	62.3	62.3	62.4	0.0	0.1	0.1
LT-1	Family Student Housing	65	57.3	57.3	58.1	0.0	0.8	0.8

Specific locations of other future student apartments and dormitories have not been identified at this time. However, the noise levels at other locations are also not considered likely to exceed the noise standard for multi-family residences, because it typically takes a doubling of traffic to result in a 3 decibel increase in noise, and the traffic would not be doubled along any of the major roadways on the campus. The Campus will, nonetheless, further reduce potential noise impacts by implementing LRDP Mitigation NOIS-3, which would ensure that new student housing built on the campus is designed to minimize exposure of residents to high noise levels.

4.10.2.5 Cumulative Impacts and Mitigation Measures

LRDP Impact NOIS-2 evaluates the increase in noise in 2020 under two scenarios: a Without Project scenario that estimates the increase in noise levels along city streets as a result of 2020 background traffic volumes, and a With Project scenario that adds 2005 LRDP-related traffic volumes to 2020 background traffic volumes and then estimates the increased noise levels. Note that the 2020 background traffic volumes were derived from the AMBAG regional traffic model, and reflect the increased traffic that would result from population and employment growth projected in the study area through 2020 by AMBAG. The analysis presented under LRDP Impact NOIS-2, therefore, presents the cumulative noise impacts in the study area. Further evaluation is not required.

4.10.3 References

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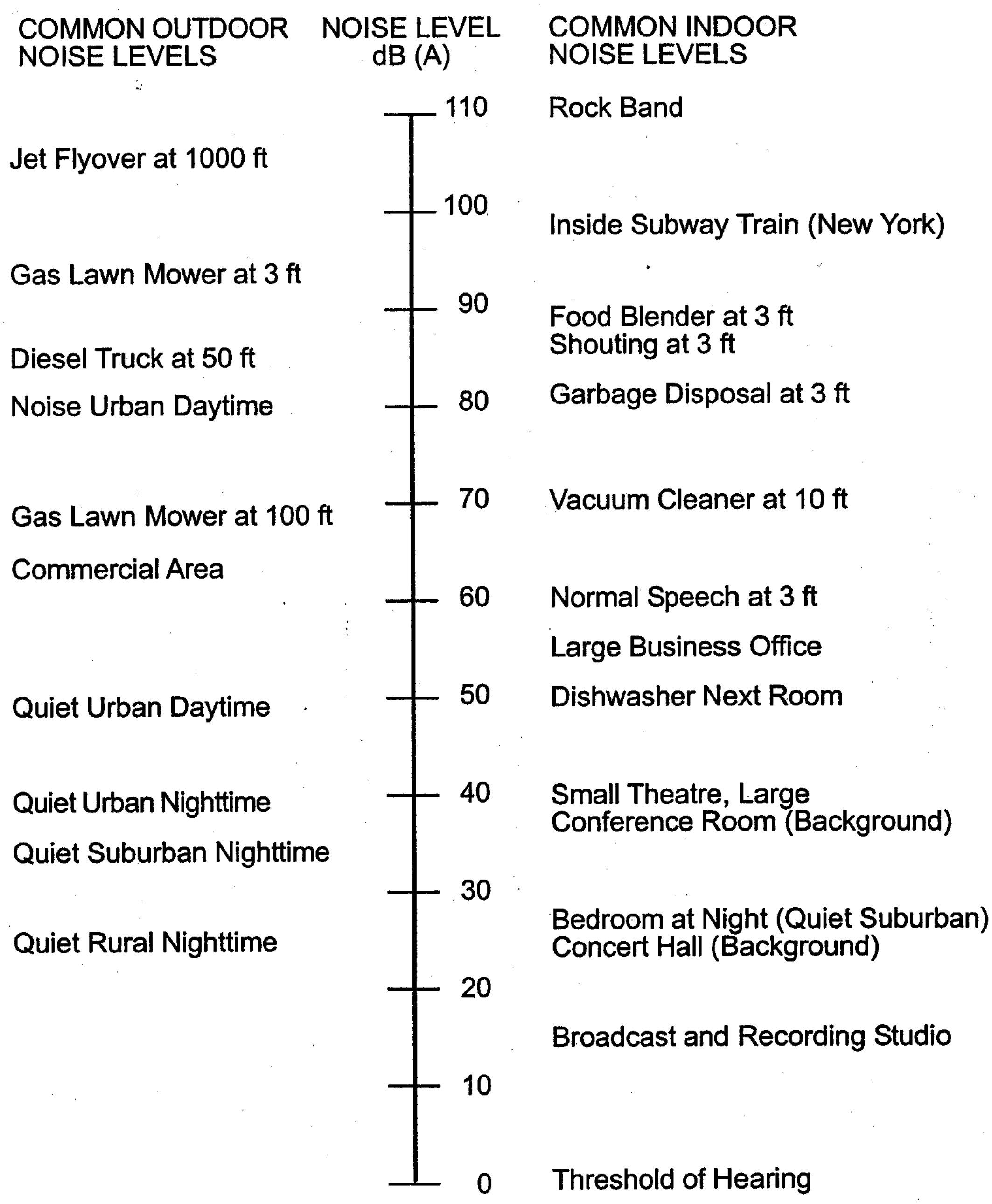

COMMON NOISE LEVELS BY SOURCE

October 2005
28649607

UC Santa Cruz LRDP EIR
Santa Cruz, California

URS

FIGURE 4.10-1

URS Corporation L:\Projects\UC_Santa_Cruz_28649607\MXD\Current Working Documents\100705\Figure_4_10-2_Noise_Measurement_Locations.mxd Date/Time: 10/7/2005 2:48:31 PM Name: dhwrigh0

NOISE MEASUREMENT LOCATIONS

October 2005
28649607

UC Santa Cruz LRDP EIR
Santa Cruz, California

URS

FIGURE 4.10-2

Figure 4.10-3: LT-1: Hourly Noise Level (LeqH (dBA))

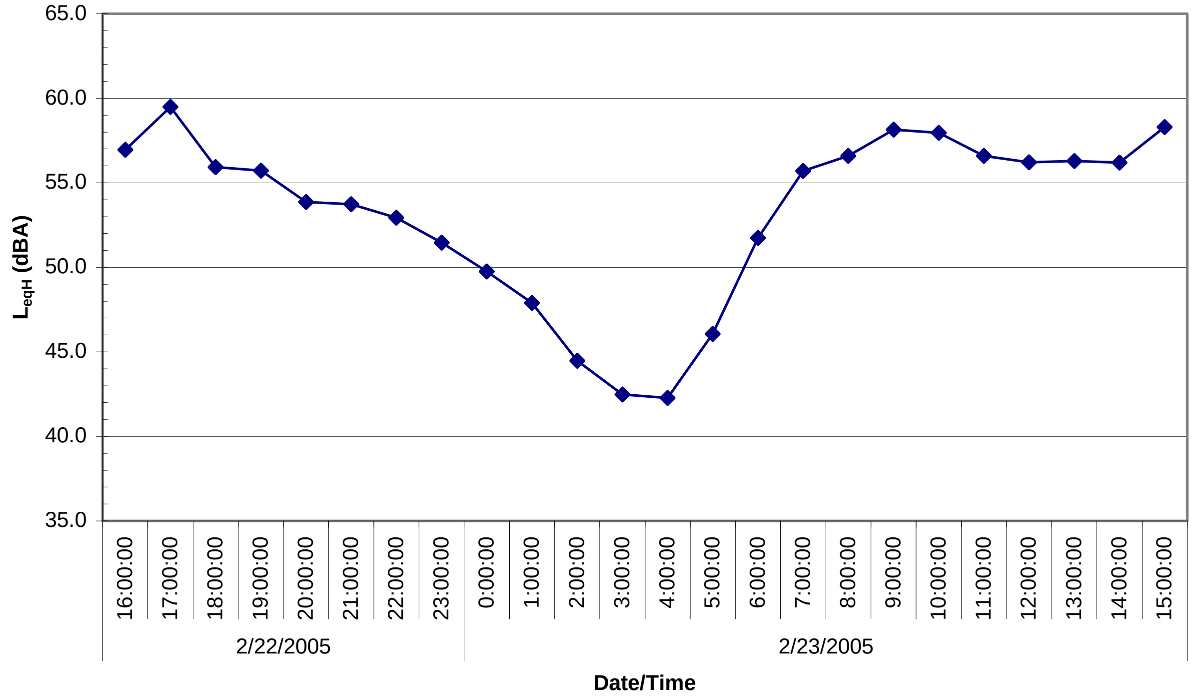

Figure 4.10-4: LT-2: Hourly Noise Level (LeqH (dBA))

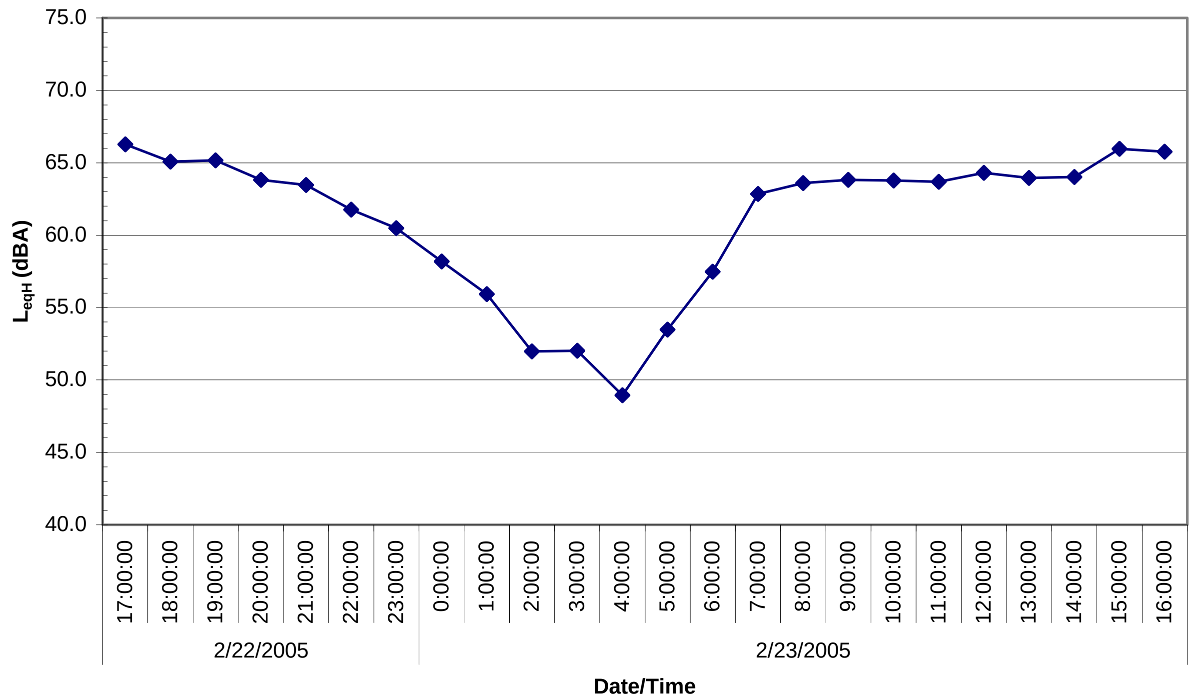

Figure 4.10-5: LT-3: Hourly Noise Level (LeqH (dBA))

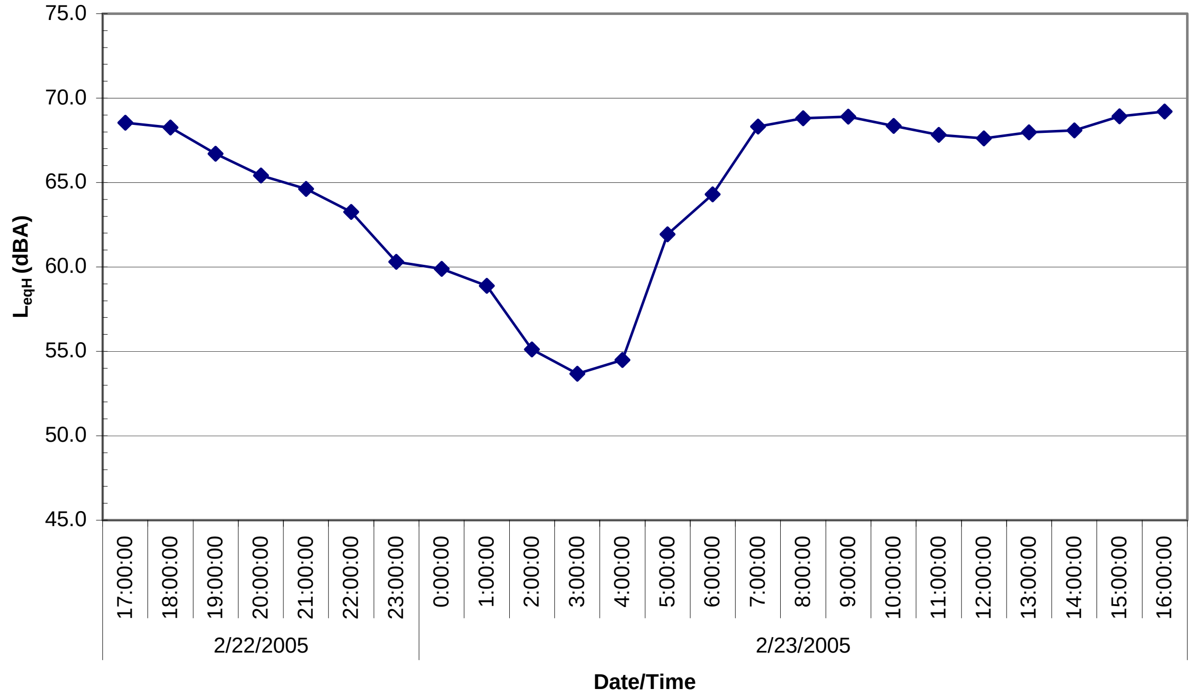

Figure 4.10-6: LT-4: Hourly Noise Level (LeqH (dBA))